UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 11, 2015

LICENSEE: STP Nuclear Operating Company

FACILITY: South Texas Project

SUBJECT: SUMMARY OF TELEPHONE CONFERENCE CALL HELD ON MAY 12, 2015 BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION AND STP NUCLEAR OPERATING COMPANY, CONCERNING REQUEST FOR ADDITIONAL INFORMATION, SET 31, PERTAINING TO THE SOUTH TEXAS PROJECT, LICENSE RENEWAL APPLICATION (TAC. NOS. ME4936 AND ME4937)

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of STP Nuclear Operating Company (STPNOC) held a telephone conference call on May 12, 2015, to discuss and clarify the staff's requests for additional information (RAIs) concerning the South Texas Project, license renewal application. The telephone conference call was useful in clarifying the intent of the staff's RAIs.

Enclosure 1 provides a listing of the participants and Enclosure 2 contains a summary of the RAI discussions, including a brief description on the status of the items.

The applicant had an opportunity to comment on this summary.

/RA/

John Daily, Senior Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosures:
1. List of Participants
2. Summary of conference call

cc: ListServ

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TELEPHONE CONFERENCE CALL
SOUTH TEXAS PROJECT
LICENSE RENEWAL APPLICATION

LIST OF PARTICIPANTS
MAY 12, 2015

PARTICIPANT	AFFILIATION
John Daily	Nuclear Regulatory Commission (NRC)
Bill Holston	NRC
Chris Hovanec	NRC
Arden Aldridge	STP Nuclear Operating Company (STPNOC)
Rafael Gonzales	STPNOC
Gary Warner	Worley Parsons
Russ Cipolla	Intertek

ENCLOSURE 1

SUMMARY OF TELEPHONE CONFERENCE CALL
FOR RAI SET 31
SOUTH TEXAS PROJECT, UNITS 1AND 2

MAY 12, 2015

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of STP Nuclear Operating Company (STPNOC or the applicant) held a telephone conference call on May 12, 2015, to discuss the staff's Request for Additional Information (RAI), RAI Set 31, for the South Texas Project, Units 1 and 2, license renewal application (LRA). The telephone conference call was useful in clarifying the staff's concerns in the RAI.

Discussion

The staff and the applicant held brief discussions on each of the issues and requests in the RAI set in order to ensure a common understanding of the information being requested. Those issues and requests are presented below. One change was agreed to, which concerns RAI B.2.1.37-6-9, "Scope Expansion Criteria": The Request portion of this RAI will begin "State how the number of additional profile examinations and/or analysis confirmatory tests…" where the phrase "profile examinations and/or analysis confirmatory tests" will replace the original wording "inspections."

The RAIs will be issued with this one edit. The applicant indicated that it could provide responses by July 31, 2015.

RAI B.2.1.37-6-1, *Monitoring and Trending and Acceptance Criteria AMP Elements*

Issue

It is not clear to the staff that the currently proposed parameters to be monitored and trended are adequate because the percent of average internal dealloying and flaw size correlation are critical parameters used in AES-C-1964-1 and AES-C-1964-5 to demonstrate structural integrity when a through-wall leak is detected and they are not included in the list of parameters to be trended. It is not clear as to whether 100 percent dealloyed material properties used in these calculations will be monitored and trended because the program uses the term "and/or" for trending these parameters. In addition, it is not clear as to why there are no acceptance criteria for percent average dealloying and verification of the flaw size correlation to Figure 4-1 of AES-C-1964-5.

Request

1. State the basis for not monitoring and trending the percent of average internal dealloying and data related to the flaw size correlation in Figure 4-1 of AES-C-1964-5. In addition, state whether 100 percent dealloyed material properties will be monitored and trended.

2. In light of the use of the term “and/or,” provide justification as to why there are no acceptance criteria for percent average dealloying and verification of the flaw size correlation in Figure 4-1 of AES-C-1964-5.
3. If a 100 percent dealloyed or other parameter that should be monitored and trended or have an acceptance criterion because it has been used as an input value (except as-received values) in analyses used to demonstrate structural integrity is not addressed in the above two requests, state the parameter and whether it will be monitored and trended and its acceptance criterion.

RAI B.2.1.37-6-2, *Percent Average Dealloying Inspection Results*

Issue

The staff cannot conclude that the applicant’s existing structural integrity calculations remain valid when some inspections have revealed average dealloying values that exceed the 60 percent value used in the current analysis.

Request

Explain how structural integrity is demonstrated when inspections have revealed average dealloying values that exceed 60 percent.

RAI B.2.1.37-6-3, *Inspection Results Demonstrating the Acceptability of the Flaw Size Correlation*

Issue

During the audit, the staff found that other piping specimens that exhibited dealloying and through-wall cracks have since been tested; however, the new examination data from these tests have not been used to update or justify the continued use of Figure 4-1 of AES-C-1964-5.

Request

Plot the data for all of the more recent tests of dealloyed specimens with through-wall cracks onto Figure 4-1 of AES-C-1964-5. Justify the continued use of this figure if the new data points fall outside the existing relationship established between crack angle and dealloying angle. Provide a list of all the data points referenced to their source document.

RAI B.2.1.37-6-4, *Substantiation of 100 Percent Dealloyed Tensile Specimens*

Issue

The staff has not been provided with a technical basis to substantiate the assumption that alloys susceptible to selective leaching only exist in two discrete conditions. The staff cannot conclude that the susceptible material only exists in two discrete conditions or that the dealloying process has gone to completion in a region of reduced aluminum/iron based on a single traverse taken on a single specimen. The staff recognizes that material in the fully dealloyed condition will still have measureable amounts of aluminum and iron because not all of the phases present in the alloys are affected by the dealloying process. It is unclear to the staff if conclusions being drawn from Energy Dispersive Spectroscopy (EDS) traverses in dealloyed regions are based on elemental levels, degree of stability of the composition over a given length, or some other factor. In addition, the elemental composition of the 100 percent dimensionally dealloyed tensile specimen (10x10x6 tee, piece number 3, Alloy CA952) has not been evaluated to determine if the dealloying process has gone to completion. This tensile specimen was used to produce the only yield strength value for 100 percent dimensionally dealloyed material measured to date, as shown in the plots on page 6 of Enclosure 1.

Request

1. Provide the technical basis used to substantiate the assumption that the alloys (C95400 and C95200) susceptible to selective leaching only exist in two discrete conditions; the as-received condition and fully dealloyed. Provide the technical references and experimental data used to support the technical basis, as applicable.
2. Demonstrate that the dealloying process has gone to completion in the tensile specimen (10x10x6 tee, piece number 3, Alloy CA952) used to produce the 100 percent dimensionally dealloyed yield strength value plotted on page 6 of Enclosure 1.
3. Provide, in tabular form, all the specimens that were tested in the 100 percent dealloyed condition. Provide a short description to identify each specimen including the component it was extracted from and alloy. Provide the mechanical properties that were measured from conducting the test. Provide the method used to establish that the specimen was 100 percent dealloyed. If neither the optical method discussed above nor direct elemental evaluation was used to establish that the test specimen was 100 percent dealloyed, provide a justification to substantiate the condition of the material.

RAI B.2.1.37-6-5, *Strength vs. Percent Dealloyed Curves*

Issue:

(1) The plots on pages 5 and 6 in Enclosure 1 have multiple data sets for alloys C95200 and C95400. Each plot also has a single regression curve plotted. It is unclear to the staff if the data within each plot is being treated as a single data set or multiple data sets when determining strength values as a function of percent dealloying (DA).

(2) It appears that linear regression analysis was used to determine the relationship between yield strength and percent DA while a nonlinear regression analysis was used to determine the relationship between ultimate tensile strength and percent DA. It is unclear to the staff why different types of regression analysis were used for the different data sets. The R-squared value for the curves has not been provided. It is also unclear to the staff if each data point is weighted equally in the analysis.

(3) It is unclear to the staff why the yield strength is being determined by both the 0.2 percent offset and the 0.5 percent extension under load (EUL) methods for all alloys and material conditions. It is also unclear if the values determined by the two different methods are being used for two different purposes. Depending on what the yield strength values are being used for, the appropriateness of determining the tensile yield strength using the 0.5 percent EUL method is uncertain.

(4) Tensile testing of material in the zero percent dealloyed condition has produced lower yield strength values than the material tested in the 100 percent dealloyed condition. Also, material tested in the less than 10 percent dealloyed condition produced comparable yield strength values as the material tested in the 100 percent dealloyed condition. Given the degree of scatter and statistical uncertainty in the yield strength values plotted on page 6 of Enclosure 1, it is not clear to the staff that the single yield strength data point for the 100 percent dealloyed material bounds the lower limit which could exist for the susceptible components in operation.

Request:

Respond to the following requests to the extent applicable to the aging management, structural integrity, and operability of aluminum bronze components. If the data is not being used to support these activities, state that it is not applicable and no further discussion is needed.

(1) Clarify if the data sets, within each plot on pages 5 and 6 in Enclosure 1, are being treated as a single data set or multiple data sets when determining strength values as a function of percent DA. If the data sets within each plot are treated as a single data set, state and justify how this ensures that the strength values are conservatively bounded given that: (a) there are values for two different alloys; (b) the data sets are comprised of more C95400 data points than the lower strength C95200 alloy; and (c) the only material condition where values are available for both alloys is the as-received condition.

(2) State and justify the basis for the type of regression analysis used to determine the relationship between strength and percent DA for each plot on pages 5 and 6 in Enclosure 1, addressing why different types were used. Clarify if any data points were excluded or weighed unequally in the analysis. Provide the R-squared value for each fit on pages 5 and 6 in Enclosure 1.

(3) Clarify if and how the different yield strength values, determined by the 0.2 percent offset method and the 0.5 percent EUL method, are being used. If the 0.5 percent EUL yield strength values are being used for structural integrity, provide and justify the ductility criteria used to establish when this method will be used. Provide the lowest percent elongation value measured for C95200 and C95400, at any level of dealloying. If the 0.5 percent EUL yield strength values are being used for structural integrity calculations to support operability evaluations state and justify the basis for using this method.

(4) Provide the lowest yield strength and ultimate tensile strength values measured to date, at any level of dealloying. Clarify what numerical yield strength value is being used for the 100 percent dealloyed material in the structural integrity calculations to support

operability evaluations. State and justify the basis used to conclude that the 100 percent dealloyed yield strength value being used for the structural integrity calculations to support operability evaluations is bounding for the susceptible components in operation.

RAI B.2.1.37-6-6, *AMP Acceptance Criteria for Strength*

<u>Issue</u>

It is unclear to the staff how acceptance criteria of 30 ksi can be established for ultimate tensile strength and yield strength properties when current plant-specific data shows values below the acceptance criteria.

<u>Request</u>

State the basis and justify how the 30 ksi acceptance criteria can be established for ultimate tensile strength and yield strength properties when current test data shows values below the acceptance criteria. If 30 ksi is not the appropriate acceptance criteria for yield strength and ultimate tensile strength, state the revised acceptance criteria and basis used to establish the values. If the acceptance criterion for yield strength or ultimate tensile strength is revised, provide a summary of the results of each structural integrity calculation to reflect lower acceptance criteria.

RAI B.2.1.37-6-7, *Basis for Use of the Average Dealloying Angle in Structural Integrity Analyses*

<u>Issue</u>

The staff cannot conclude that ASME Code Section XI, Appendix H (a methodology used to evaluate partial through-wall indications) provides a basis for use of an average through-wall dealloying angle because it lacks specificity to demonstrate acceptance of an average flaw size. Generic Letter 90-05 cites a flaw length, 2a which is based on the dimensions of the flaw at the minimum pipe wall thickness. However, Generic Letter 90-05 is based on a process where the flaw can be characterized by volumetric measurements. In the case of selective leaching of castings, it is unlikely that volumetric characterization of the flaw would be possible, and if it were possible, the flaw-sizing correlation from Figure 4-1 of AES-C-1964-5 would not be necessary. A sufficient basis for use of the average dealloying angle has not been provided.

<u>Request</u>

State and justify the basis for use of an average through-wall dealloying angle as the output of the flaw-sizing correlation in Figure 4-1 of AESC-1964-5.

RAI B.2.1.37-6-8, *Implementing Procedures Related to System Walkdowns and Design Verification of As-Found Conditions*

<u>Issue</u>

1. Based on its review of Preventive Maintenance Work Order (PMWO) SEM-1-9100041 and PMWO SEM-2-9100045 and an interview with a system engineer who has

conducted system walk downs to detect potential leaking susceptible aluminum bronze components, it is not clear that all susceptible components are listed in the PMWO.

2. The staff cannot conclude that the change to 0PGP04-ZA-0148 to allow the use of ASME Code Section XI Code Case N513-3 is acceptable. Code Case N-513-3, states, “[t]he flaw geometry shall be characterized by volumetric inspection methods or by physical measurement. The full pipe circumference at the flaw location shall be inspected to characterize the length and depth of all flaws in the pipe section.” In most if not all cases, the internal flaw size cannot be characterized by volumetric or physical measurements.

3. It is not clear to the staff that the range of crack sizes that would limit the leakage rate to below administrative limits have been determined to be less restrictive than allowable flaw sizes that are determined meet structural integrity using AES-C-1964-1. In addition, 0PGP04-ZA-0148 has not been updated to reflect this potential further limit on allowable flaw size.

Request

1. State whether all susceptible components or description of components are listed in PMWO SEM-1-9100041 and PMWO SEM-2-9100045. If not, explain why all of the susceptible components are not identified in these inspection tasks.

2. State and justify the basis for use of Code Case N-513-3 to determine the acceptability of components exhibiting through-wall flaws.

3. State whether there are any flaw sizes that would be acceptable from a structural integrity basis but not acceptable to ensure that the leakage rate from a degraded component is below administrative limits. If this is the case, state how the leakage rate flaw size acceptance criteria will be incorporated into the program.

RAI B.2.1.37-6-9, *Scope Expansion Criteria*

Issue

With respect to the “corrective actions” program element, SRP-LR Section A.1.2.3.7 states that actions to be taken when the acceptance criteria are not met should be described in appropriate detail or referenced to source documents. However, the “corrective actions” program element of the Selective Leaching of Aluminum Bronze Program does not describe the extent of condition testing that will be conducted when degraded components are detected.

Request

State how the number of additional profile examinations and/or analysis confirmatory tests that will be conducted (beyond those stated in the “detection of aging effects” program element) when indications of through-wall leakage are discovered in susceptible aluminum bronze components will be addressed in the Selective Leaching of Aluminum Bronze Program and licensing basis.

RAI B.2.1.37-6-10, *Clarification of Licensing Basis Related to Use of Partially Dealloyed Material Properties*

Issue

As a result of the staff's review of these plots and interviews with the applicant's personnel, the staff lacks sufficient information to validate the accuracy of the partially dealloyed mechanical properties. The staff notes that no partially dealloyed material properties have been used in the calculations that support the technical basis for the Selective Leaching of Aluminum Bronze Program, including AES-C-1964-5 and RC 9890. However, it is not clear whether partially dealloyed material properties might be used in the future. If partially dealloyed materials were to be used the staff will require additional information to determine the validity of partially dimensionally dealloyed toughness values and the statistical significance of the partially dimensionally dealloyed strength values if they will be used to demonstrate structural integrity.

Request

Clarify whether partially dimensionally dealloyed mechanical properties (i.e., ultimate tensile strength, yield strength, and fracture toughness) will be used during the period of extended operation to demonstrate the structural integrity of aluminum bronze components. If partially dealloyed material properties will not be used during the period of extended operation, state how this will be addressed in the licensing basis.

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