

## James, Lois

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**From:** James, Lois  
**Sent:** Monday, December 05, 2016 11:38 AM  
**To:** 'gtpowell@STPEGS.COM'  
**Cc:** Chazell, Russell; Tran, Tam; Rikhoff, Jeffrey; McIntyre, David; Regner, Lisa; Taylor, Nick; Money, Shawn; Sanchez, Alfred; Hernandez, Nicholas; Maier, Bill; Dricks, Victor; Pick, Greg; Graves, Samuel; Werner, Greg; 'Aldridge, Arden J'; 'Gonzales, Rafael'; 'Sterling, Lance'; Engen, Rob; Murray, Michael; RidsNrrDlrRarb Resource; RidsNrrDlr Resource; RidsNrrDlrRpb1 Resource; RidsNrrPMSouthTexas Resource; RidsOgcMailCenter Resource; Holston, William; Hovanec, Christopher; Hiser, Allen; Allik, Brian; Morey, Dennis  
**Subject:** REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SOUTH TEXAS PROJECT LICENSE RENEWAL APPLICATION (CAC NOS. ME4936 AND ME4937)  
**Attachments:** RAI FOR THE REVIEW OF THE STP LRA (CAC NOS. ME4936 AND ME4937) - Enclosure.pdf



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

Mr. G. T. Powell  
Site Vice President  
STP Nuclear Operating Company

**SUBJECT:** REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SOUTH TEXAS PROJECT LICENSE RENEWAL APPLICATION (CAC NOS. ME4936 AND ME4937)

Dear Mr. Powell:

By letter dated October 25, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103010256), South Texas Project (STP) Nuclear Operating Company (STPNOC), submitted a License Renewal Application (LRA) pursuant to Title 10 of the *Code of Federal Regulations* (CFR) Part 54 for review by the U.S. Nuclear Regulatory Commission (NRC or the staff), to renew operating licenses NPF-76 and NPF-80 for South Texas Project, Units 1 and 2, for an additional 20 years.

These requests for additional information were discussed with members of your staff, including Arden Aldridge and Rafael Gonzales, and a mutually agreeable date for the response is within 30 days from the date of this email. If you have any questions, please contact me at (301) 415-3306 or e-mail Lois.James@nrc.gov.

Sincerely,

Lois M. James, Senior Project Manager  
License Renewal Branch RPB1  
Division of License Renewal  
Office of Nuclear Reactor Regulation

Docket Nos.: 50-498 & 50-499

Enclosure: Requests for Additional Information

cc w/encl: Listserv

ADAMS Accession No.: ML16340A102

OFFICE	PM:RPB1:DLR	BC:RARB:DLR	BC:RPB1:DLR	PM: RPB1:DLR
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DATE	12/1/2016	11/21/2016	12/5/2016	12/5/2016

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SOUTH TEXAS PROJECT  
LICENSE RENEWAL APPLICATION (LRA)  
REQUESTS FOR ADDITIONAL INFORMATION (RAI)

**RAI B2.1.37-8**

**Background**

As amended by letter dated September 28, 2016, the “corrective actions” program element of the Selective Leaching of Aluminum Bronze Aging Management Program (AMP) states that if the results of a structural integrity evaluation are unacceptable, the following will be conducted:

- An operability determination.
- An extent of condition review to determine the cause of the structural integrity analysis failure and determine other locations requiring examination.
- Additional examinations focused on locations with stress margins less than or equal to that of the structurally unacceptable weld.
- Monthly walkdowns to conduct visual inspections of aboveground piping and yard walkdowns to conduct inspections for evidence of leakage.
- Volumetric inspections of 25 additional welds within 6 months.
- Five additional volumetric weld examinations for each weld not meeting acceptance criteria until no additional unacceptable welds are detected.
- An evaluation to “[d]etermine a repair or replacement program of the susceptible weld(s) based on the cause of the structural integrity evaluation failure, results of the additional volumetric examinations and the extent of condition.”

The “corrective actions” program element also states that if a destructive examination does not meet the acceptance criteria, five additional destructive examinations will be conducted until no unacceptable loss of material due to selective leaching or non-continuous microstructure phase distributions are found.

In addition, the acceptance criteria for destructive examinations state the following:

(1) No loss of material due to selective leaching penetrating 80% of the root-pass region; (2) Found selective leaching is non-propagating (surrounded by a non-continuous resistant phase distribution); and (3) The microstructure of the weld root region shall exhibit [sic] a non-continuous phase distribution consistent with the metallurgical technical basis report.

During an RAI clarification call on November 3, 2016, a new volumetric examination technique was mentioned that could be capable of characterizing the extent of selective leaching in aluminum bronze welds.

ENCLOSURE

## Issue

### Examination Technique Capable of Characterizing the Extent of Selective Leaching in Aluminum Bronze Welds

The staff lacks sufficient information to conclude that the new examination technique will be capable of effectively characterizing the extent of selective leaching in aluminum bronze welds. The staff seeks information related to: (a) a description of the method; (b) how the method will be demonstrated; (c) the information and resolution of the data provided by the technique; and (d) personnel qualifications. For example, in regard to demonstrating the process, will the examination technique be used on welds that will be removed for destructive examination? This could provide valuable insights into the effectiveness of the examination technique.

Based on a review of CR-12-29261-109, "STP Nuclear Operating Company Overview and Bases for License Renewal Aging Management Program Outlined in License Renewal Application Appendix A1.37, B2.1.37, and PSALBZ 'Selective Leaching of Aluminum Bronze,'" dated May 31, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16155A131), there could be over 2000 susceptible pipe-to-pipe welds in the cooling water system (ECW) systems subsequent to the replacement of the susceptible fittings.

The staff recognizes that an unacceptable structural integrity evaluation result could occur due to localized conditions where the stress levels (e.g., pressure, deadweight, seismic) are much higher than in other locations in the essential ECW. In this case, it might be possible to conduct follow-on analyses (using the same as-found data) that could demonstrate that many of the remaining susceptible in-service welds would meet structural integrity requirements. However, the staff lacks sufficient information to conclude that there is reasonable assurance that the ECW system will meet its intended function(s) because there could be in-service welds in critical locations (e.g., main supply header, upstream of heat exchangers) that would not meet structural integrity requirements.

The staff recognizes that a volumetric examination technique capable of characterizing the extent of selective leaching in aluminum bronze welds (hereinafter referred to as a ultrasonic testing (UT) examination), as identified during the November 3, 2016, RAI clarification call, could provide the information necessary to conduct an effective extent of condition review. This UT examination technique is different than that performed to detect weld defects. This RAI is based on the assumption that these UT examinations will be conducted in conjunction with the actions described in the Background.

The staff has the following concerns in regard to the statement that, "[v]olumetric inspections of 25 additional welds within 6 months" will be conducted:

- A maximum of 25 inspections is cited in several sampling-based Generic Aging Lessons Learned (GALL) Report AMPs. The staff established this threshold of inspections based on the assumption that it would be used to either establish that an aging effect was not occurring or the progression of degradation is such that the intended function of the component would be met throughout the period of extended operation. Corrective actions are taken when an intended function would not be met. Corrective actions could include replacement of all components exposed to the same environment and

susceptible to the aging effect or periodic inspections to establish that there is still reasonable assurance that the intended function is being met. The staff has concluded that 25 inspections is insufficient to establish reasonable assurance when structural integrity requirements have not been met. Given that there will be a large number of welds in critical locations for which the extent of dealloying is not known, a larger number of UT examinations would be prudent. For example, one failure out of a population of 2000 welds could result in the need to conduct 42 to 633 UT examinations to establish reasonable assurance. If a subsequent failure to meet structural integrity requirements were detected, the degree of degradation leaves the realm of a sampling-based program.

- Deferring the completion of the examinations for 6 months when multiple welds in multiple trains could be affected does not provide reasonable assurance that the intended function(s) of the ECW system will be met.
- The staff considers the failure to meet structural integrity requirements potentially consequential enough to warrant periodic UT examinations. This is similar to the recommendation in the “corrective actions” program element in GALL Report AMP XI.M33, “Selective Leaching,” which states, “[u]nacceptable inspection findings result in additional inspection(s) being performed which may be on a periodic basis, or in component repair or replacement.” The staff recognizes that the weld that did not meet structural integrity requirements would have been replaced; however, many other welds could be degraded to the point where structural integrity requirements might not be met.
- The corrective actions for not meeting the acceptance criteria for destructive examinations includes performing additional destructive examinations and a structural integrity evaluation. The staff considers the failure to meet destructive examination acceptance criteria potentially consequential enough to warrant periodic UT examinations. Failure to meet these acceptance criteria would be indicative of the weld root pass not acting as an effective barrier for the subsequent weld passes that are more susceptible to loss of material due to selective leaching. In contrast to a scenario where structural integrity requirements are not met, not meeting the destructive examination criteria might not necessitate as high a number of inspections. However, given that the root pass has been challenged, an inspection sample size of 25 UT examinations is insufficient.

The staff recognizes that the output of the volumetric examinations could provide the input for subsequent structural integrity analyses. However, the acceptance criteria for the UT examination results and associated corrective actions for results that do not meet acceptance criteria have not been formalized.

The staff lacks sufficient information to understand how the UT examination results will be integrated into other acceptance criteria. One of the acceptance criteria for destructive examinations is: “[n]o loss of material due to selective leaching penetrating 80% of the root-pass region.” If a UT examination were to reveal loss of material due to selective leaching extending beyond the root-pass region, the staff has concluded that the examination result is equally as impactful as if the result was found during a destructive examination. As a result, if a UT examination reveals loss of material due to selective leaching that does not meet the destructive examination acceptance criterion; the associated corrective actions (additional destructive examinations) should be implemented.

Buried piping is exposed to different loadings than aboveground piping and as a result, there might be more or less structural margin for the buried piping. Buried piping will not be as readily available for followup UT examinations as aboveground piping. The staff lacks sufficient information to conclude whether buried piping has more or less margin than aboveground piping.

The staff noted that with the incorporation of this new technique into the Selective Leaching of Aluminum Bronze Program, the UT examinations might be considered as a replacement for destructive examinations in that the UT examinations can characterize the extent of potential loss of material due to selective leaching. However, this would be contrary to the purpose of the destructive examinations, which is to verify the susceptibility of the welds to selective leaching. The absence of selective leaching conducted by UT examination does not confirm that the phase distribution within the weld is consistent with basis document submitted by letter dated May 31, 2016. Given that it is unlikely that the hundreds of buried susceptible welds will be inspected by this technique, the destructive examinations are necessary to provide reasonable assurance that the ECW system will be capable of meeting its intended function(s).

### Acceptance Criteria

During its review of the acceptance criteria for destructive examinations, the staff noted a criterion that might be stated in an inaccurate manner. Specifically criterion 2 states: “[f]ound selective leaching is non-propagating (surrounded by a non-continuous resistant phase distribution).” The staff does not understand the intent of the “non-continuous resistant phase” statement. Any loss of material due to selective leaching should be surrounded by a continuous resistant phase.

### **Request**

1. State the approximate number of susceptible aboveground and buried welds that will be in-service subsequent to the replacements proposed in the scope of program element of the Selective Leaching of Aluminum Bronze Program.
2. State the following in relation to the UT technique capable of characterizing the extent of selective leaching in aluminum bronze welds:
  - a. A description of the method.
  - b. How the effectiveness of the technique will be demonstrated.
  - c. Type of information and resolution provided by the technique.
  - d. The qualifications of the individuals conducting the examinations and evaluating the examination results.
3. State the acceptance criteria for the UT examination results and associated corrective actions for results that do not meet acceptance criteria.
4. In regard to a failed structural integrity analysis result, state: (a) how many UT examinations will be conducted; (b) the timing of the UT examinations; (c) the periodicity and quantity of periodic examinations; (d) location selection criteria; (e) the basis for the above inspection parameters; and (e) the actions that will be taken if the results of a subsequent inspection does not meet structural integrity requirements.

5. In regard to a destructive examination not meeting acceptance criteria, state: (a) how many UT examinations will be conducted; (b) the timing of the UT examinations; (c) the periodicity and quantity of periodic examinations; (d) location selection criteria; and (e) the basis for the above inspection parameters.
6. State how the results of the UT examinations will be incorporated into the existing acceptance criteria for destructive examinations and the associated corrective actions.
7. Provide an evaluation demonstrating the structural integrity margins of buried piping as compared to aboveground piping.
8. State the intent of criterion 2 associated with the acceptance criteria for destructive examinations, if the wording is not changed to, "(surrounded by a continuous resistant phase distribution)."