STP Nuclear Operating Company

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

November 21, 2011
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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2746

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Response to Requests for Additional Information for the
South Texas Project License Renewal Application
Aging Management Review, Set 2 (TAC Nos. ME4936 and ME4937)

References:
1. STPNOC Letter dated October 25, 2010, from G. T. Powell to NRC Document Control Desk, "License Renewal Application" (NOC-AE-10002607) (ML103010257)
2. NRC letter dated September 21, 2011, "Requests for Additional Information for the Review of the South Texas Project, Units 1 and 2 License Renewal Application – Aging Management Review, Set 2 (TAC Nos. ME4936 and ME4937)" (ML112440201)

By Reference 1, STP Nuclear Operating Company (STPNOC) submitted a License Renewal Application (LRA) for South Texas Project (STP) Units 1 and 2. By Reference 2, the NRC staff requests additional information for review of the STP LRA. Responses to a number of the requests for additional information are provided in the enclosure to this letter. Responses to questions pertaining to aluminum bronze components are in preparation, and will be provided in a separate submittal by December 8, 2011.

There are no new regulatory commitments provided in this letter.

Should you have any questions regarding this letter, please contact either Arden Aldridge, STP License Renewal Project Lead, at (361) 972-8243 or Ken Taplett, STP License Renewal Project regulatory point-of-contact, at (361) 972-8416.

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

Executed on 11/21/2011.
Date

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Senior Vice President,
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PLW
Enclosure: STPNOC Response to Requests for Additional Information

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Enclosure

STPNOC Response to Requests for Additional Information

Set 2

STPNOC Response to Requests for Additional Information

SOUTH TEXAS PROJECT, UNITS 1 AND 2
REQUEST FOR ADDITIONAL INFORMATION -
AGING MANAGEMENT REVIEW, SET 2
(TAC NOS. ME4936 AND ME4937)

Corrosion Effects in Essential Cooling Water (066)
RAI 4.7.3-1

Background:

License renewal application (LRA) Section 4.7.3, "Time-Limited Aging Analysis (TLAA) for the Corrosion Effects in the Essential Cooling Water (ECW) System," states that the degree of corrosion within the ECW system will not exceed the design level of 40 mils in 40 years of service life based on a 0.6 mil/year corrosion rate. The TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii), which states that the applicant shall demonstrate that the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

The LRA states that corrosion effects in the ECW system will be managed with the Open-Cycle Cooling Water System Program. An enhancement to LRA Section B2.1.9, associated with the "parameters monitored or inspected" and "detection of aging effects" program elements states that inspections will provide visual evidence of loss of material and fouling in the ECW system.

Issue:

It is not clear to the staff how the visual inspection techniques in the Open-Cycle Cooling Water System Program will be capable of monitoring component wall thickness.

Request:

State how the visual inspections in the Open-Cycle Cooling Water System Program are capable of ensuring that corrosion in the ECW system will not exceed the design limit in the period of extended operation. Otherwise, propose an alternative methodology for ensuring that the wall thickness design limit is not exceeded.

STPNOC Response:

The South Texas Project (STP) Open-Cycle Cooling Water System Program, discussed in LRA Appendix B2.1.9, manages the ECW system for loss of material, including corrosion, consistent with Nuclear Regulatory Commission Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." When corrosion of the base metal is observed, wall thickness measurements are taken and the results are evaluated. Therefore, visual inspections in the Open-Cycle Cooling Water (OCCW) System Program combined with the corrective action program are capable of ensuring that corrosion in the ECW system will not exceed the design limit in the period of extended operation.

Scoping and Screening (106)
RAI 2.1-4

Background:

10 CFR 54.4, "Scope," states, in part,

(a) Plant systems, structures, and components within the scope of this part are -

(1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions

(i) The integrity of the reactor coolant pressure boundary;
(ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
(iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.

(2) All nonsafety-related systems, structures and components whose failure could prevent satisfactory accomplishment of any of the functions identified in (a)(1)(i), (ii), or (iii) of this section.

(3) All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

10 CFR 54.21, "Contents of application--technical information," states, in part:

(a)(1) For those systems, structures, and components within the scope of this part, as delineated in § 54.4, identify and list those structures and components subject to an aging management review.

Issue:

During the review of the LRA and associated current licensing basis documents, the staff determined that the applicant had received approval of an exemption from special treatment requirements in an August 3, 2001, U.S. Nuclear Regulatory Commission (NRC) letter. The NRC letter forwarded the staff's approval and supporting safety evaluation report (SER), subject titled, "South Texas Project, Units 1 and 2 - Safety Evaluation on Exemption Requests from Special Treatment Requirements of 10 CFR Parts 21, 50 and 100," (the exemption). The NRC letter and SER contained the staff's analysis and conclusion approving the South Texas Project (STP) exemption from certain specific requirements based on the applicant's analysis and identification of non-risk significant (NRS) or low safety significant (LSS) structures, systems, and components (SSCs). However, the staff has determined that the application of the exemption, as it may relate to license renewal, is not sufficiently addressed in the LRA to enable the staff to make a safety conclusion.

Request:

The staff requests that the applicant review the following items as they relate to the application of the exemption and its impact relative to identifying SSCs included within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an aging management review (AMR) in accordance with 10 CFR 54.21.

1. Indicate whether the determination that SSCs were NRS or LSS resulted in reclassification of those SSCs from safety-related to nonsafety-related. In addition, explain whether those SSCs were omitted from the scope of license renewal in accordance with 10 CFR 54.4(a)(1).

2. Indicate whether reclassification of NRS or LSS SSCs, from safety-related to nonsafety-related, resulted in omitting other nonsafety-related SSCs (that could impact the intended function of the reclassified SSCs) from the scope of license renewal in accordance with 10 CFR 54.4(a)(2).

3. Indicate whether the determination that SSCs were NRS or LSS resulted in removal of those SSCs from the population "relied on in safety analyses or plant evaluations to perform a function demonstrating compliance with the Commission's regulations" for the five categories listed in 10 CFR 54.4(a)(3), thereby omitting SSCs from the scope of license renewal in accordance with 10 CFR 54.4(a)(3).

4. For NRS or LSS SCs included within the scope of license renewal in accordance with 10 CFR 54.4, identify whether the exemption precluded performance of any aging management review(s) in accordance with 10 CFR 54.21.

In addition, the staff requests that the applicant consider extent of condition when performing the review of this issue and describe all additional scoping evaluations and AMRs performed for NRS or LSS SSCs and the results, based on this review.

STPNOC Response:

1. No non-risk significant (NRS) or low safety significant (LSS) SSCs were reclassified from safety-related to nonsafety-related. NRS and LSS components satisfy the QA requirements of 10 CFR Part 50 Appendix B for design control, control of nonconformances, and corrective actions. No components are excluded from the scope of license renewal as a result of special treatment requirements exemption of SSCs (10 CFR 50.69). As stated in UFSAR Section 13.7.1, "exemption only pertains to special treatment requirements; it does not change the requirements of 10 CFR Parts 50 and 100 that specify design or functional requirements for SSCs".

2. No NRS or LSS SSCs were reclassified from safety-related to nonsafety-related. NRS and LSS components satisfy the QA requirements of 10 CFR Part 50 Appendix B for design control, control of nonconformances, and corrective actions

3. No NRS or LSS SSCs were excluded from the population categories listed by 10 CFR 54.4(a)(3) defining the scope of license renewal as a result of special treatment requirements exemption of SSCs (10 CFR 50.69).

4. Aging management review(s) were performed on all SSCs within the scope of license renewal in accordance with 10 CFR 54.4 regardless of the component special treatment classification. The results of AMRs for SSCs within the scope of license renewal in accordance with 10 CFR 54.4, regardless of the component special treatment classification, are provided in LRA Sections 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6.

The results of AMRs for SSCs within the scope of license renewal, regardless of the component special treatment classification, are provided in LRA Sections 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6. As discussed above, no NRS or LSS components were excluded from aging management review as a result of special treatment requirements exemption of SSCs (10 CFR 50.69).

RAI 3.0.4-1

Background:

10 CFR 54.21, "Contents of application--technical information," states, in part:

(a)(1) For those systems, structures, and components within the scope of this part, as delineated in §54.4, identify and list those structures and components subject to an aging management review.

(2) Describe and justify the methods used in paragraph (a)(1) of this section.

(3) For each structure and component identified in paragraph (a)(1) of this section, demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

Issue:

During the review of the LRA and associated current licensing basis documents, the staff determined that the applicant had received approval of an exemption from special treatment requirements in an August 3, 2001, NRC letter. The NRC letter forwarded the staff's approval and supporting SER subject titled, "South Texas Project, Units 1 and 2 - Safety Evaluation on Exemption Requests from Special Treatment Requirements of 10 CFR Parts 21, 50 and 100" (the exemption). The NRC letter and SER contained the staff's analysis and conclusion that approved STP be exempted from certain specific requirements based on the applicant's analysis and identification of NRS or LSS, SSCs. However, the staff has determined that the application of the exemption, as it may relate to license renewal, is not sufficiently addressed in the LRA to enable the staff to make a safety conclusion.

Request:

The staff requests that the applicant review the following items as they relate to any application of the exemption and its impact relative to the aging management of SCs in accordance with 10 CFR 54.21.

1. For NRS or LSS SCs included within the scope of license renewal and subject to an AMR, indicate whether implementation of the exemption has precluded or impacted the

application of any aging management programs or portions such that, if the exemption were not in place, aging management would be required by the results of the aging management review for the structure or component.

2. For NRS or LSS SCs within the scope of license renewal and included in an aging management program, indicate whether the exemption has precluded or impacted the application (including use of the 10 CFR Part 50, Appendix B quality assurance program) for elements 7 (corrective actions), 8 (confirmation process) or 9 (administrative controls), for NRS or LSS SCs.

In addition, the staff requests that the applicant consider the extent of condition when performing the review of this issue and identify all aging management programs applied to NRS or LSS SCs that were impacted by application of the exemption, and the resultant modifications, based on this review.

STPNOC Response:

1. Components classified as low safety significant (LSS) or non-risk significant (NRS) credited with performing an intended function will be managed for aging throughout the period of extended operation as referenced in implementing procedures, and as described in UFSAR Chapter 13.7 "Risk-informed Special Treatment Requirements" and Table 13.17-1, "Exemptions from Special Treatment Requirements".

   An exemption from meeting the requirements of ASME Section XI for testing of safety-related LSS and NRS components was granted. The STP ASME Class 1, 2, and 3 components that are exempt from examination meet the criteria of ASME Section XI, IWB-1220, IWC-1220, and IWD-1220. The STP ISI Program details the specific exemption criteria applicable to each component consistent with ASME Section XI requirements

2. The special treatment exemption of NRS and LSS components does not preclude or impact the application (including use of the 10 CFR Part 50, Appendix B quality assurance program) for elements 7 (corrective actions), 8 (confirmation process), or 9 (administrative controls). As stated in UFSAR section 13.7.3.3.6, "the Station's Corrective Action Program is used for safety-related (LSS and NRS as well as HSS and MSS SSCs) applications. The Corrective Action Program complies with 10 CFR Part 50 Appendix B, and is described in the OQAP [Operations Quality Assurance Plan]."

   A review of the special treatment exemptions only identified AMP B2.1.1, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD, program, where NRS or LSS components are impacted by the application of the special treatment exemptions. As stated above, an exemption from meeting the requirements of ASME Section XI for testing safety-related LSS and NRS components was granted. The STP ASME Class 1, 2, and 3 components that are exempt from examination meet the criteria of ASME Section XI, IWB-1220, IWC-1220, and IWD-1220. The STP ISI Program details the specific exemption criteria applicable to each component consistent with ASME Section XI requirements.

Aluminum Bronze (111)
RAI B2.1.37-1

Background:

LRA Section B2.1.37 states that the plant-specific Selective Leaching of Aluminum Bronze program will consist of an external surface visual inspection every six months of aluminum bronze (copper alloy with greater than 8 percent aluminum) components and a walkdown of yard areas to detect changes in ground conditions that could indicate leakage where susceptible buried piping welds are located.

The GALL Report Revision 2, AMP XI.M33, "Selective Leaching," utilizes internal visual inspections and hardness tests (where feasible) or mechanical examination to identify the presence of selective leaching prior to the period of extended operation.

LRA Tables 3.3.2-4 and 3.3.2-27 state that copper alloy (aluminum> 8%) components which are being managed by the Selective Leaching of Aluminum Bronze program are exposed to raw water or are buried. Raw water and soil environments are subject to change with time, or there may be local environments where degradation may be more adverse than generally expected (e.g., in locations where microbiologically-influenced corrosion (MIC) may be occurring, reference IN 94-59).

LRA Section B2.1.37, "operating experience," does not describe any specific instances of selective leaching of aluminum bronze (copper alloy with greater than 8 percent aluminum) components.

Issue:

The staff lacks sufficient information (e.g., the extent to which selective leaching is known or suspected to have occurred in aluminum bronze components) to conclude that the external surface visual inspections and changes in ground conditions proposed in LRA Section B.2.1.37 would be sufficient to detect selective leaching on internal surfaces of aluminum-bronze components prior to a loss of the components intended function. This is of particular concern given that the internal raw water and buried environments can change and therefore the rate of selective leaching may not be constant over time.

Request:

1. Revise LRA Sections B2.1.37, Selective Leaching of Aluminum Bronze Program, to:

    a. Include periodic internal visual inspections coupled with mechanical examinations (e.g., hardness testing, destructive examination) capable of detecting the degree of selective leaching occurring in aluminum bronze components in order to establish a baseline understanding of the extent to which subsurface degradation has occurred to date and to monitor and trend this aging effect throughout the period of extended operation (based on a review of plant-specific operating experience, opportunistic inspections may suffice).

b. State when baseline inspections will commence (e.g., ten years prior to the period of extended operation).

c. Based on a review of plant-specific operating experience related to selective leaching of aluminum bronze components, state the minimum number of inspections that will occur both prior to and during the period of extended operation.

Alternatively, state the basis for why the external surface visual inspections and changes in ground conditions proposed in LRA Section B.2.1.37 would be sufficient to detect selective leaching on internal surfaces of aluminum-bronze components prior to a loss of the components intended function.

2. For each instance of aluminum bronze selective leaching that has been identified:

   a. Characterize each by date and where the defect was discovered (e.g., weld, casting, forging).

   b. Identify which had sufficient metallurgical examination to determine the full extent of de-alloying, and state the results of those exams (e.g., penetration depth, circumferential and axial span, and location of affected area).

   c. For each instance of selective leaching which did not have sufficient metallurgical examination to determine the extent of de-alloying, state what is known regarding the defect configuration, (e.g., whether they are radial or axial, dimensions, exposure time).

<u>STPNOC Response:</u>

STPNOC will provide a response to this RAI by December 8, 2011.

RAI B2.1.37-2

<u>Background:</u>

SRP-LR Revision 2, Section A.1.2.3.4, "Detection of Aging Effects," states that the detection of aging effects should occur before there is a loss of a component's intended function and that the parameters monitored or inspected should be appropriate to ensure that the intended function will be adequately maintained.

LRA Section B2.1.37, "scope of program" program element states that the applicant has analyzed the effects of de-alloying and found that degradation is sufficiently slow such that rapid or catastrophic failure is not a consideration. The LRA "scope of program" program element also states that leakage can be detected before a flaw reaches a limiting size that would affect the operability of the essential cooling water system. STP updated final safety analysis report (UFSAR) Appendix 9A states that the temporary non-code conditions are justified for operability in accordance with fracture mechanics and limit load methods consistent with ASME Code, Section XI methodology.

Issue:

1. The staff lacks sufficient information to determine the anticipated continued progression of de-alloying during the period of extended operation.

2. During the audit, the staff reviewed a calculation that determined the critical bending stress for pipe failure as a function of through-wall crack length for a postulated crack in an aluminum bronze pipe weld, AES 92021630-1Q. The staff also reviewed a calculation for circumferential through-wall de-alloying in aluminum bronze castings, AES 93061964-1Q (ML003742174). Given that material properties (e.g., fracture toughness, tensile strength) are expected to degrade due to de-alloying, it is not clear to the staff:

    a. Whether the fracture toughness properties used in both calculations were obtained from de-alloyed specimens.

    b. Whether tensile strength properties used in the first calculation were obtained from de-alloyed specimens.

    c. How the fully de-alloyed flow stress value was derived for the second calculation.

3. Given that both of the above calculations were modeled based on the de-alloying configuration being crack-like, the staff lacks sufficient information to determine that the methodology of the calculations is sufficient to demonstrate operability of the components if the de-alloying progresses in a uniform or layer-like manner, thus impacting a larger area of the component. In addition, the program does not address trending of inspection results against the analysis results to ensure that impacted component current licensing basis (CLB) function(s) will be met.

4. The staff lacks sufficient information to conclude that the USFAR Appendix 9A flooding, reduction in flow, and water losses from the essential cooling pond analyses envelope the potential degradation that could occur throughout the period of extended operation and, therefore, cannot conclude that the leak from a component will not impact the CLB function of the essential cooling water system components or other in-scope components.

5. During the audit, the staff reviewed a calculation that evaluated the capability of the station to detect leakage in buried essential cooling water piping. Based on the calculation methodology and assumptions, it does not appear to the staff that the analysis included the potential for leakage to preferentially travel down the interface between the soil and pipe nor along compaction seams. In addition, the staff lacks sufficient information to determine that the ground level surface is soil, versus stone or a paved surface, in all locations where there are susceptible buried welds. Given this, the staff cannot conclude that the detectability is as low as stated.

6. LRA Section B2.1.37, "acceptance criteria" program element states that components with visible signs of leakage are evaluated and scheduled for replacement by the corrective action process. The staff believes that, given the degree of subsurface de-alloying that could occur before and during the period of extended operation, the program should include periodic internal visual inspections coupled with mechanical examinations (e.g., hardness testing, destructive examination) capable of detecting the degree of selective leaching occurring in aluminum bronze components (see RAI B2.1.37-1). In order to evaluate the

effectiveness of the program, the staff needs to understand the acceptance criteria of the periodic internal inspections.

Request:

1. Based on plant-specific information provided in the response to Request 2 in RAI B2.1.37-1, state the maximum expected subsurface degradation that could occur throughout the period of extended operation prior to the pressure boundary being penetrated by a de-alloying layer.

2. Regarding calculations AES 92021630-1Q and AES 93061964-1Q, state:

    a. Whether the fracture toughness properties were obtained from de-alloyed specimens, and if not, what is the basis for the calculation's assumed value.

    b. Whether tensile properties were obtained from de-alloyed specimens for the first calculation, and if not, what is the basis for the calculation's assumed value.

    c. How the fully de-alloyed flow stress value was derived for the second calculation.

3. Given that both of the above calculations were modeled based on the de-alloying configuration being crack-like, respond to (a), (b), or (c), and (d) below:

    a. State the basis for why the methodology of the calculations is sufficient to demonstrate operability of the components if the de-alloying progresses in a uniform or layer-like manner, thus impacting a larger area of the component, or

    b. Provide an analysis that uses the worst case uniform or layer-like de-alloying that could occur through the period of extended operation, or

    c. State the basis for how a potential transition to uniform or layer-like de-alloying will be detected, and update the UFSAR Supplement for the Selective Leaching of Aluminum Bronze program to reflect this basis and that an analysis will be conducted to reflect the worst case uniform or layer-like de-alloying that could occur during the period of extended operation.

    d. State how periodic internal visual inspections coupled with mechanical examination results will be trended against the results of existing analyses to ensure that the rate of degradation is understood and there will not be a loss of a component's CLB function(s).

4. In relation to the flooding, reduction in flow, and water loss from the essential cooling pond analyses of UFSAR Appendix 9A:

    a. State the basis for why the medium energy break size flaw stated in UFSAR Appendix 9A is larger than the maximum size flaw for which the piping can still perform its CLB function, and

    b. State the basis for why only one through-wall, and not multiple through wall defects, is acceptable in analyzing the impact of flooding, reduction in flow, and water loss from the essential cooling pond.

5. State the basis for why potential for leakage from buried ECW piping will not preferentially travel down the interface between the soil and pipe or along compaction seams, or revise the calculation to account for this phenomenon. In addition, state the basis for being able to detect leakage where the ground level surface is stone or paved in locations where there are susceptible buried welds.

6. State the following acceptance criteria that will be used during the periodic internal inspections (see RAI B2.1.37-1):

   a. Degree of de-alloying that will result in an expansion of the scope of internal inspections beyond that submitted in the response to RAI B2.1.37-1.

   b. Degree of de-alloying that will result in replacement of an affected component prior to visually detecting external leakage.

STPNOC Response:

STPNOC will provide a response to this RAI by December 8, 2011.

RAI 4.1-6 (Use of Leak Before Break Methodology for ECWS Components)

Background:

UFSAR Appendix 9A provides the applicant's "Assessment of the Potential Effects of Through-Wall Cracks in the ECWS Piping." Specifically, UFSAR Appendix 9A states that the applicant identified through-wall cracks in the STP ECWS piping, which were initiated by pre-existing weld defects and propagated by a de-alloying growth phenomenon. UFSAR Appendix 9A states that potential effects of leakage in the ECWS were assessed for the following safety-related impacts at the plant:

1. Internal flooding in rooms containing these pipes and other rooms which receive drains from these sources.

2. Electrical shorts or grounds caused by water spray from the crack.

3. Reduction in ECWS flow through the heat exchangers served by the affected ECWS piping train.

4. Water losses from the essential cooling pump (ECP) not accounted for in the existing analysis.

5. Possible effects on the transient pressures when the pump is started or stopped.

UFSAR Appendix 9A also states that "STPEGS has analyzed the effects of the cracking and found that the degradation is slow so that rapid or catastrophic failure is not a consideration, and determined that the leakage can be detected before the flaw reaches a limiting size that would affect the operability of the ECWS." UFSAR Appendix 9A then references three flaw related analyses that were performed to support the applicant's basis that any potential leakage from the ECWS piping would be detected before a catastrophic fast fracture of the piping would occur:

1. HL&P Laboratory Report MT -3512A, "Evaluation of Cracked Elbow-to-Nozzle Weld from South Texas Project Unit 1 Essential Cooling Water System"

2. HL&P Laboratory Report MT-3512B, "Evaluation of Cracked Aluminum Bronze Pipe-to-Pipe Weld from South Texas Project Unit 2 Essential Cooling Water System"

3. Aptech Calculation No. AES-C-1630-2, "Calculation of Critical Bending Stress for Flawed Pipe Welds in the ECW System"

Issue:

UFSAR Appendix 9A appears to be using a leak-before-break type of logic (leakage detection basis) to the assessment of potential flaws in the aluminum bronze ECWS components. The apparent cause basis in UFSAR Appendix 9A is predicated on the conclusion that the existing flaws that were detected in the aluminum bronze components were fabrication-induced flaws that propagated by an aluminum bronze de-alloying flaw growth mechanism.

The LRA does not mention the applicability and relationship of UFSAR Appendix 9A to the aging management basis for buried aluminum bronze ECWS piping components or evaluate whether the MT-3512A, MT-35612B, and AES-C-1630-2 technical evaluations that were referenced in that UFSAR Appendix 9A need to be identified as TLAAs for the LRA when compared to the six criteria for defining TLAAs in 10 CFR 54.3.

In addition, during the staff's audit of the STP LRA during the week of June 20 - 24, 2011, the staff also noted that the applicant's leak-before-break type of logic to the assessment of potential flaws in the aluminum bronze ECWS components appeared to be based on three additional assessments that were not referenced as being relevant in UFSAR Appendix 9A: (1) a vendor-specific leakage seepage and soil diffusion calculation; (2) an applicant-specific leakage seepage and soil diffusion calculation that was used to verify the conclusions in the vendor-specific calculation; and (3) an applicant-specific engineering report that summarized the applicant's results in the vendor-specific and applicant-specific leakage seepage and soil diffusion calculations and that appears to have been the basis for the design basis conclusions in UFSAR Appendix 9A. However, UFSAR Appendix 9A does not list these documents as applicable references for its basis, and these evaluations did not include any flaw tolerance evaluations to support the applicant's claim that a leak in the ECWS aluminum bronze components would be detected prior to a catastrophic fast fracture in the system's aluminum bronze piping.

Thus, if the leakage detection basis in UFSAR Appendix 9A is to be relied upon for aging management, it would need to be supported by an appropriate time-dependent flaw tolerance evaluation to demonstrate: (1) that the critical flaw size for the applicable piping would not be less than the flaw size that would lead to a detectable leak at the soil or soil/gravel surface; or (2) if the critical crack size was greater than the flaw size that would lead to a detectable leak (i.e., the leak-detection size), that a flaw the size of the leak-detection size would not grow and reach the critical flaw size limit for the piping prior to the time that it would take the applicant to detect such a leak at the soil surface or soil/gravel surface in the vicinity of the affected piping.

The staff also believes that any evaluations that were used to support this type of safety basis objective would be relevant even if the applicant had repaired the relevant indications under applicable ASME Code Section XI repair criteria because the evaluations would still be needed to support the applicant's basis that visual examinations of the piping would be capable of detecting leakage from aluminum bronze ECWS components prior to a postulated fast fracture (i.e. catastrophic failure) of the piping.

In addition, the apparent cause basis in UFSAR Appendix 9A is predicated on the assumption that flaw growth was occurring by an aluminum bronze de-alloying mechanism. However, during its audit of the HL&P MT-3512A and MT-35612B lab reports, the staff noted that the lab reports also indicated the occurrence of some failure striations in the weld failure morphology photographs that could indicate that the flaw growth in the aluminum bronze materials had also been, at times, propagating by a low-cycle or high-cycle fatigue growth mechanism (as supported by the striations in weld failure photographs). Thus, the staff was concerned that the scope of the current design basis in UFSAR Appendix 9A might have been too limited in its assessment of the weld failures in the aluminum bronze components, and that the basis should also have accounted for the possibility of fatigue flaw growth as a potential failure mechanism.

<u>Request:</u>

Part 1 - Provide the basis on why the applicable vendor-specific and applicant-specific leakage, seepage, and soil diffusion analyses, and the applicable engineering report, that were used in support of the UFSAR Appendix 9A basis for the ECWS aluminum bronze components are not referenced as applicable reports in UFSAR Appendix 9A.

Part 2 - Clarify whether these vendor-specific and applicant-specific leakage seepage and soil diffusion analyses have been supported by any flaw tolerance analyses that would demonstrate that: (1) the critical flaw size for the applicable piping would not be less than the flaw size that would lead to a detectable leak (i.e., the leak-detection size) at the soil or soil/gravel surface, or (2) if the limiting critical flaw size was greater than the leak-detection size, that a flaw the size of the leak-detection size would not grow and reach the critical flaw size for the piping prior to the time that it would take the applicant to detect such a leak at the soil surface or soil/gravel surface. Clarify whether such a flaw tolerance analysis (or analyses), if performed as part of the CLB or current design basis, will need to be identified as a TLAA(s) for the LRA in accordance with the criterion in 10 CFR 54.21(c)(1), as assessed against the six criteria for TLAAs in 10 CFR 54.3; or if they have not been included as part of the CLB, whether the CLB basis in UFSAR Appendix 9A will need to be updated to include a supporting flaw tolerance assessment in order to justify a pending license renewal approval decision by the Commission pursuant to the requirement criteria in 10 CFR 54.29.

Part 3 - Perform a comparison of the evaluations in HL&P Report Nos. MT-3512A and MT3512B, and in Aptech Calculation No. AES-C-1630-2, to the six criteria for defining analyses as TLAAs in 10 CFR 54.3, and to provide your bases on why any evaluations, analyses or calculations in these reports would not need to be identified as TLAAs under the requirements of 10 CFR 54.21(c)(1).

Part 4 - Provide the basis on why scope of the apparent cause basis in UFSAR Appendix 9A does not need to consider, account for, and evaluate the possibility of fatigue flaw growth (i.e. flaw propagation by a fatigue-induced failure mechanism in addition to that which might be caused by a de-alloying mechanism) in these aluminum bronze components.

STPNOC Response:

STPNOC will provide a response to this RAI by December 8, 2011.