

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

March 30, 2017 NOC-AE-17003454 10 CFR 54 File No. G25

U. S. Nuclear Regulatory Commission Attention: Document Control Desk Washington, DC 20555-0001

> South Texas Project Units 1 and 2 Docket Nos. STN 50-498, STN 50-499 Supplement to the South Texas Project License Renewal Application (CAC Nos. ME4936 and ME4937)

Reference:

Letter; G. T. Powell to the NRC Document Control Desk; "License Renewal Application", NOC-AE-10002607; dated October 25, 2010. (ML103010257)

By Reference above, STP Nuclear Operating Company (STPNOC) submitted a License Renewal Application (LRA). The purpose of this letter is to supplement the License Renewal Application Appendix A1.37, B2.1.37, and Table A4-1.

Enclosure 1 provides line in/line out revisions to the License Renewal Application Appendix A1.37 and B2.1.37. Enclosure 2 provides Table A4-1 regulatory commitment changes.

There are no other commitments in this letter.

If there are any questions regarding this submittal, please contact Arden Aldridge, STP License Renewal Project Lead, at (361) 972-8243 or Rafael Gonzales, STP License Renewal Project regulatory point-of-contact, at (361) 972-4779.

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

Executed on

March 30, 2017 Date

James Connolly Site Vice Provide Site Vice Preside

rjg

Enclosures:

- 1) STPNOC License Renewal Application Appendix A and B Line in/out Sections
- 2) STPNOC Regulatory Commitment Changes

- A147

STI: 34464877

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Enclosure 1 STPNOC License Renewal Application Appendix A and B Line in/out Sections

Affected LRA Section	
A1.37	
B2.1.37	

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A1.37 SELECTIVE LEACHING OF ALUMINUM BRONZE

The Selective Leaching of Aluminum Bronze program manages loss of material and cracking due to selective leaching of aluminum bronze (copper alloy with greater than 8 percent aluminum) components and welds exposed to raw water within the scope of license renewal. The program also validates phase distribution characteristics of the microstructure.

All aluminum bronze castings susceptible to selective leaching, including attachment welds related to the castings, and aluminum bronze root valves with adapter socket welds will be replaced prior to the period of extended operation with material that is not susceptible to selective leaching. Extruded piping tees with aluminum bronze weld repairs, where the repair size is such that failure of the repair would affect the structural integrity of the component, will be replaced prior to the period of extended operation.

STP uses copper alloy piping with less than 8 percent aluminum content, which is not susceptible to selective leaching. However, there are welds in which the filler metal is copper alloy with greater than 8 percent aluminum. The final composition of welds and process used to fabricate the welds results in a reduction in the susceptibility of the root pass filler material to selective leaching.

The Selective Leaching of Aluminum Bronze program directs that prior to the period of extended operation 20 percent with a maximum of 25 welds of the above ground weld population with no backing rings are examined one-time volumetrically to manage cracking. If a weld indication that does not meet the acceptance criteria is found during the one-time inspection of welds with no backing rings, periodic volumetric examinations of 20 percent with a maximum of 25 welds will be performed every 10 years thereafter.

The Selective Leaching of Aluminum Bronze program directs that 20 percent with a maximum of 25 welds of the above ground weld population with backing rings are examined volumetrically to manage cracking prior to the period of extended operation and every 10 years thereafter.

Discovery of a weld indication that does not meet the acceptance criteria requires expansion of the volumetric examination sample population. Each weld found with a weld indication not meeting the acceptance criteria requires five additional volumetric examinations to be performed until no additional weld indication not meeting the acceptance criteria is found.

The Selective Leaching of Aluminum Bronze program directs that prior to the period of extended operation 20 percent with a maximum of 25 welds of the above ground weld population with no backing rings and 20 percent with a maximum of 25 welds of the above ground weld population with backing rings be examined one-time destructively to detect loss of material due to selective leaching and verify microstructure phase distribution.

If selective leaching or microstructure phase distribution that does not meet the acceptance criteria are found the following will be performed.

 Five Time-of-Flight Diffraction (TOFD) UT examinations within 60 days for each weld not meeting acceptance criteria until no additional weld not meeting the acceptance criteria is found. Welds for examination will be selected from the total population of above ground welds associated with the weld type (with or without backing ring) consider variability of construction, size distributions, structural integrity margins, and consequence of failure.

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- 2. Periodic TOFD UT monitoring every 5 years on any welds not removed and previously found to not meet acceptance criterion but met structural integrity capability. These welds shall be monitored until 3 consecutive examinations identify no additional propagation of the selective leaching.
- 3. Periodic TOFD UT examinations of an additional 10% sample of the remaining above ground weld types (with or without backing ring) every 5 years. The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering variability of construction, size distributions, structural integrity margins, and consequence of failure.

Yard walkdowns are performed in the areas above the buried piping with aluminum bronze welds to look for changes in ground conditions that would indicate leakage. If a leak from a buried pipe weld is discovered by surface water monitoring or during a buried ECW piping inspection, a section of each leaking piping weld will be removed for destructive examination. Visual inspections are performed every six months of the external surfaces of the above ground welds for evidence of through wall leakage.

The Buried and Underground Piping and Tank program, B2.1.18, includes the visual inspection of the buried aluminum bronze exterior pipe coatings for visible breaks, gaps, and discontinuities which could indicate cracking of the welds and defines the acceptance criterion for buried pipe coatings.

The acceptance criterion for volumetric examination of aluminum bronze welds is no detected planar indication that is surface connected (exposed to the ECW environment) unless the depth of the indication is contained within the 80% of the weld root pass region. An indication not connected to the surface (not exposed to the ECW environment) is acceptable.

The acceptance criterion for visual inspection of the aluminum bronze welds and adjacent copper alloy piping during the walkdowns is no through wall leakage.

The acceptance criteria for destructive examinations are:

- 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 resistant phase distribution).
- 3. The microstructure of the weld root region shall exhibit a resistant phase distribution consistent with the metallurgical technical basis report.

The acceptance criterion for TOFD UT examination is no loss of material due to selective leaching resulting in not meeting ASME Section XI Code required margins imposed by ASME Section XI structural factors for normal/upset and emergency/faulted conditions.

The acceptance criterion for buried aluminum bronze exterior pipe coating is defined in the Buried Piping and Tanks Inspection Aging Management Program B2.1.18. An external surface examination capable of detecting selective leaching will be performed on the buried ECW piping welds in the vicinity of degraded coatings to detect loss of material due to selective leaching. The acceptance criterion for extent of loss of material on the external surface is that upon removal of the selective leaching the minimum wall thickness is maintained. Corrective action

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(e.g. surface conditioning) is performed until no selective leaching is detected. If unacceptable wall thickness is found following surface conditioning, the buried ECW piping is repaired or replaced.

An aluminum-bronze weld found to have an indication that does not meet the acceptance criteria or has through wall leakage is removed and destructively examined to determine the extent of cracks, extent of selective leaching and the microstructure phase distribution. The condition is documented in the corrective action program and a structural integrity analysis is performed to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.

Loss of material due to selective leaching resulting in a weld not meeting ASME Section XI Code required margins with the weld declared operable per station Operability, Functionality, and Reportability procedure An unacceptable structural integrity evaluation requires:

1. A determination of operability

- <u>1</u>2. An extent of condition evaluation to determine the cause of the structural integrity evaluation failure and identify other locations requiring examination.
- 23. Monthly above_ground walkdowns of the aluminum bronze welds.
- 34. Monthly yard walkdowns to verify no through-wall leakage is occurring.
- <u>45</u>. Performing TOFD UT examinations on the remaining above ground weld population using a sample with a 95/95 confidence until no additional weld indication not meeting the <u>TOFD UT examination</u> acceptance criteria and within structural integrity is found. The weld population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings) and locations that would not meet code allowable margins when evaluated against the failed components degraded load carrying capability.

The TOFD UT examinations are <u>will be</u> prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations following one weld not meeting structural integrity will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage <u>with at least 20% of the examinations being completed within 30 days and all examinations.</u> The examinations will be completed within <u>180 90</u>-days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.

If a second weld is found that does not meet <u>TOFD UT examination acceptance criteria</u> structural integrity;

- Develop examination plan, schedule and bases for the examination of the remaining above ground welds.—Inform the NRC of the examination plan, schedule, and bases.
- Perform TOFD UT examinations on 100 percent of the remaining above ground welds to determine extent of condition with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days of finding the second weld.

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- Perform an evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations where structural integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally-unacceptable weld(s). All below ground welds where the evaluation shows that the structural integrity could challenge operability will be examined using TOFD UT during the next scheduled refueling outage. Inform the NRC of the examination plan, schedule, and bases for below ground weld inspections.
- <u>56</u>. Performing periodic 95/95 confidence sample TOFD UT examinations every 5 years on the remaining welds which have not been TOFD UT examined. The population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings). The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering construction, size distributions, structural integrity margins, and consequence of failure.
- <u>67</u>. Perform Repair or replacement of the susceptible weld(s).

Loss of material due to selective leaching resulting in a weld not meeting ASME Section XI Code required margins with the weld declared inoperable per station Operability, Functionality, and Reportability procedure requires:

- 1. If the weld has been removed from service for examination, then the examination results will be used to determine past operability and reportability.
- 2. An extent of condition evaluation to determine the cause of the structural integrity evaluation failure and identify weld population requiring examination.
- 3. Twice a month above ground walkdowns of the aluminum bronze welds.
- 4. Twice a month yard walkdowns to verify no through-wall leakage is occurring.
- 5. Performing TOFD UT examinations on 100% of the remaining above ground weld population.

The TOFD UT examinations will be prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.

- 6. An evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations where structural integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally unacceptable weld(s). All below ground welds where the evaluation shows that the structural integrity could challenge operability will be examined using TOFD UT during the next scheduled refueling outage.
- 7. Repair or replacement of the susceptible weld(s).

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B2.1.37 SELECTIVE LEACHING OF ALUMINUM BRONZE

Program Description

The Selective Leaching of Aluminum Bronze program manages loss of material and cracking due to selective leaching for aluminum bronze (copper alloy with greater than eight percent aluminum) components and welds exposed to raw water within the scope of license renewal. The program also validates phase distribution characteristics of the microstructure. The selective leaching of aluminum bronze is applied in addition to the Open-Cycle Cooling Water program (B2.1.9).

All aluminum bronze castings susceptible to selective leaching, including attachment welds related to the castings and aluminum bronze root valve adapter socket welds, will be replaced prior to the period of extended operation with material that is not susceptible to selective leaching. Extruded piping tees with aluminum bronze weld repairs, where the repair size is such that failure of the repair would affect the structural integrity of the component, will be replaced prior to the period of extended operation.

STP uses copper alloy piping with less than 8 percent aluminum content, which is not susceptible to selective leaching. However, there are welds in which the filler metal is copper alloy with greater than 8 percent aluminum. The final composition of welds and process used to fabricate the welds results in a reduction in the susceptibility of the root pass filler material to selective leaching.

The Selective Leaching of Aluminum Bronze program directs that prior to the period of extended operation 20 percent with a maximum of 25 welds of the above ground weld population with no backing rings are examined one-time volumetrically to manage cracking. If a weld indication that does not meet the acceptance criteria is found during the one-time inspection of welds with no backing rings, periodic volumetric examinations of 20 percent with a maximum of 25 welds will be performed every 10 years thereafter.

The Selective Leaching of Aluminum Bronze program directs that 20 percent with a maximum of 25 welds of the above ground weld population with backing rings are examined volumetrically to manage cracking prior to the period of extended operation and every 10 years thereafter.

Discovery of a weld indication that does not meet the acceptance criteria requires expansion of the volumetric examination sample population. Each weld found with a weld indication not meeting the acceptance criteria requires five additional volumetric examinations to be performed until no additional weld indication not meeting the acceptance criteria is found.

The Selective Leaching of Aluminum Bronze program directs that prior to the period of extended operation 20 percent with a maximum of 25 welds of the above ground weld population with no backing rings and 20 percent with a maximum of 25 welds of the above ground weld population with backing rings be examined one-time destructively to detect loss of material due to selective leaching and verify microstructure phase distribution.

If selective leaching or microstructure phase distribution that does not meet the acceptance criteria are found the following will be performed.

1. Five Time-of-Flight Diffraction (TOFD) UT examinations within 60 days for each weld not meeting acceptance criteria until no additional weld not meeting the acceptance criteria is found. Welds for examination will be selected from the total population of

above ground welds associated with the weld type (with or without backing ring) consider variability of construction, size distributions, structural integrity margins, and consequence of failure.

- 2. Periodic TOFD UT monitoring will be performed every 5 years on any welds not removed and previously found to not meet acceptance criterion but met structural integrity capability. These welds shall be monitored until 3 consecutive examinations identify no additional propagation of the selective leaching.
- 3. Periodic TOFD UT examinations of an additional 10% sample of the remaining above ground weld types (with or without backing ring) every 5 years. The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering variability of construction, size distributions, structural integrity margins, and consequence of failure.

Yard walkdowns are performed in the areas above the buried piping with aluminum bronze welds to look for changes in ground conditions that would indicate leakage. If a leak from a buried pipe weld is discovered by surface water monitoring or during a buried ECW piping inspection, a section of each leaking piping weld will be removed for destructive examination. Visual inspections are performed every six months of the external surfaces of the above ground welds for evidence of through wall leakage.

The Buried and Underground Piping and Tank program, B2.1.18, includes the visual inspection of the buried aluminum bronze exterior pipe coatings for visible breaks, gaps, and discontinuities which could indicate cracking of the welds.

The acceptance criterion for volumetric examination of aluminum bronze welds is no detected planar indication that is surface connected (exposed to the ECW environment) unless the depth of the indication is contained within the 80% of the weld root pass region. An indication not connected to the surface (not exposed to the ECW environment) is acceptable.

The acceptance criterion for visual inspection of the aluminum bronze welds and adjacent copper alloy piping during the walkdowns is no through wall leakage.

The acceptance criteria for destructive examinations are:

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

The acceptance criterion for TOFD UT examination is no loss of material due to selective leaching resulting in not meeting ASME Section XI Code required margins imposed by ASME Section XI structural factors for normal/upset and emergency/faulted conditions.

The acceptance criterion for buried aluminum bronze exterior pipe coating is defined in the Buried Piping and Tanks Inspection Aging Management Program B2.1.18. An external surface examination capable of detecting selective leaching will be performed on the buried ECW piping welds in the vicinity of degraded coatings to detect loss of material due to selective leaching. The acceptance criterion for extent of loss of material on the external surface is that upon

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removal of the selective leaching the minimum wall thickness is maintained. Corrective action, such as surface conditioning, is performed until no selective leaching is detected. If unacceptable wall thickness is found following surface conditioning, the buried ECW piping is repaired or replaced.

An aluminum bronze weld found to have an indication that does not meet the acceptance criteria or has through wall leakage is removed and destructively examined to determine extent of cracks, extent of selective leaching, and the microstructure phase distribution. The condition is documented in the corrective action program and a structural integrity analysis is performed to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.

Loss of material due to selective leaching resulting in a weld not meeting ASME Section XI Code required margins with the weld declared operable per station Operability, Functionality, and Reportability procedure An unacceptable structural integrity evaluation requires:

- A determination of operability.
- An extent of condition evaluation to determine the cause of the structural integrity evaluation failure and identify other locations requiring examination.
- Monthly above_ground walkdowns of the aluminum bronze welds.
- Monthly yard walkdowns to verify no through-wall leakage is occurring.
- Performing TOFD UT examinations on the remaining above ground weld population
 using a sample with a 95/95 confidence until no additional weld indication not meeting
 the <u>TOFD UT examination</u> acceptance-criteria and within structural integrity is found.
 The weld population used to determine the 95/95 confidence sample will be based on
 the above ground weld types (with or without backing rings) and locations that would
 not meet code allowable margins when evaluated against the failed components
 degraded load carrying capability.

The TOFD UT examinations are <u>will be</u> prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations following one weld not meeting structural integrity will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage <u>with at least 20% of the examinations being completed within 30 days and all examinations. The examinations will be completed within 180 90 days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.</u>

If a second weld is found that does not meet <u>TOFD UT examination acceptance</u> <u>criteria</u>-structural integrity;

- Develop examination plan, schedule and bases for the examination of the remaining above ground welds. <u>Inform the NRC of the examination plan,</u> schedule, and bases.
- Perform TOFD UT examinations on 100 percent of the remaining above ground welds to determine extent of condition with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days of finding the second weld.

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- Perform an evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations where structural integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally-unacceptable weld(s). All below ground welds where the evaluation shows that the structural integrity could challenge operability will be examined using TOFD UT during the next scheduled refueling outage. Inform the NRC of the examination plan, schedule, and bases for below ground weld inspections.
- Performing periodic 95/95 confidence sample TOFD UT examinations every 5 years on the remaining welds which have not been TOFD UT examined. The population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings). The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering construction, size distributions, structural integrity margins, and consequence of failure.
- <u>Perform-Repair</u> or replacement of the susceptible weld(s).

Loss of material due to selective leaching resulting in a weld not meeting ASME Section XI Code required margins with the weld declared inoperable per station Operability, Functionality, and Reportability procedure, requires:

- If the weld has been removed from service for examination, then the examination results will be used to determine past operability and reportability.
- An extent of condition evaluation to determine the cause of the structural integrity evaluation failure and identify weld population requiring examination.
- Twice a month above ground walkdowns of the aluminum bronze welds.
- Twice a month yard walkdowns to verify no through-wall leakage is occurring.
- <u>Performing TOFD UT examinations on 100% of the remaining above ground weld</u> population.

The TOFD UT examinations will be prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.

- An evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations where structural integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally unacceptable weld(s). All below ground welds where the evaluation shows that the structural integrity could challenge operability will be examined using TOFD UT during the next scheduled refueling outage.
- <u>Repair or replacement of the susceptible weld(s).</u>

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Aging Management Program Elements

An evaluation of each element of the Aging Management Program against the 10 elements described in Appendix A of NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, is provided below.

Scope of Program (Element 1)

The Selective Leaching of Aluminum Bronze program manages loss of material and cracking due to selective leaching for aluminum bronze (copper alloy with greater than 8 percent aluminum) components and welds exposed to raw water within the scope of license renewal.

Prior to the period of extended operation, all aluminum bronze castings susceptible to loss of material due to selective leaching, including attachment welds related to the castings and aluminum bronze root valves with adapter socket welds, will be replaced with material that is not susceptible to selective leaching.

Extruded piping tees with aluminum bronze weld repairs are characterized using the following techniques:

- 1. The vendor Record of Nonconformance is evaluated; or
- 2. Where insufficient information is available, then past radiography film is used to determine the limiting size of the weld repair by measuring the size of the area of interest on the film; or
- 3. Where past radiography film is not available, radiography will be performed to characterize the weld repair. Extrapolation during sizing of the weld repair is not performed. Where the repair size is such that failure of the repair would affect the structural integrity of the component, the component will be replaced prior to the period of extended operation.

STP uses copper alloy piping with less than 8 percent aluminum, which is not susceptible to selective leaching. However, welds in which the filler metal is copper alloy with greater than 8 percent aluminum may be susceptible to loss of material and cracking due to selective leaching. The final composition of welds and process used to fabricate the welds results in a reduction in the susceptibility of the root pass filler material to selective leaching.

The following weld material is used.

- ERCuAl-A2 with no backing ring,
- ERCuNiAl with no backing ring,
- ERCuAl-A2 with backing ring, and
- ERCuAl-A2 non-cast component weld repairs.

Preventive Actions (Element 2)

The Selective Leaching of Aluminum Bronze program does not prevent degradation due to aging effects but provides for component replacement and inspections to detect aging degradation prior to the loss of intended functions.

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External surfaces of the buried aluminum bronze piping are coated to prevent selective leaching of the exterior surface of the aluminum bronze welds. The above ground piping is not coated.

Parameters Monitored or Inspected (Element 3)

The susceptibility of aluminum bronze welds is related to the integrity of the weld, the weld material composition, and the welding temperature controls.

Loss of material due to selective leaching is monitored through system walkdowns and destructive examinations.

Cracking associated with selective leaching is monitored through volumetric examination and destructive examination.

Phase distribution to verify the potential for continuous selective leaching is monitored through destructive examination.

Welds without backing rings are either original ERCuAI-A2 material or replacement ERCuNiAI material. The original ERCuAI-A2 welds without backing rings were radiographed at time of installation to detect the presence of weld flaws. The replacement ERCuNiAI welds without backing rings were examined visually and by liquid penetrant method at time of installation. The ERCuNiAI weld material is less susceptible to selective leaching than the ERCuAI-A2 weld material due to the addition of nickel.

Welds with backing rings are original ERCuAl-A2 material. The original ERCuAl-A2 welds with backing rings were examined visually and by use of liquid penetrant method at time of installation.

The aging management program will manage cracking of the above ground weld population with no backing rings by performing a one-time volumetric examination on 20 percent with a maximum of 25 welds prior to the period of extended operation. If a weld indication that does not meet the acceptance criteria is found during the one-time inspection of welds with no backing rings, periodic volumetric examinations of 20 percent with a maximum of 25 welds will be performed every 10 years thereafter.

The aging management program will manage cracking of the above ground weld population with backing rings by performing periodic volumetric examinations on 20 percent with a maximum of 25 welds prior to the period of extended operation and every 10 years thereafter.

Since the population of welds use similar material and are exposed to the same environment, the samples for volumetric examination will be selected from the total population of welds, considering construction and size distributions. The above ground welds are used as the bounding condition to represent both the above and below ground welds when performing the volumetric examination.

The aging management program will manage loss of material due to selective leaching and verify microstructure phase distribution of the above ground weld population with and without backing rings by performing a one-time destructive examination on 20 percent with a maximum of 25 welds with backing rings and 20 percent with a maximum of 25 welds without backing rings prior to the period of extended operation. The samples for the destructive examination sample population will be selected from the total population of welds with and without backing rings, considering construction and size distributions.

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If selective leaching or microstructure phase distribution that does not meet the acceptance criteria are found the following will be performed.

- Five Time-of-Flight Diffraction (TOFD) UT examinations within 60 days for each weld not meeting acceptance criteria until no additional weld not meeting the acceptance criteria is found. Welds for examination will be selected from the total population of above ground welds associated with the weld type (with or without backing ring) consider variability of construction, size distributions, structural integrity margins, and consequence of failure.
- 2. Periodic TOFD UT monitoring every 5 years on any welds not removed and previously found to not meet acceptance criterion but met structural integrity capability. These welds shall be monitored until 3 consecutive examinations identify no additional propagation of the selective leaching.
- 3. Periodic TOFD UT examinations of an additional 10% sample of the remaining above ground weld types (with or without backing ring) every 5 years. The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering variability of construction, size distributions, structural integrity margins, and consequence of failure.

Periodic walkdowns of the above ground piping, components and welds is performed to verify no through wall leakage.

Periodic walkdowns of the yard areas over the buried ECW piping and welds is performed to verify no evidence of through wall leakage.

An aluminum bronze weld found to have an indication that does not meet the acceptance criteria or has through wall leakage is removed and destructively examined to determine extent of cracks, extent of selective leaching, and the microstructure phase distribution. The condition is documented in the corrective action program and a structural integrity analysis is performed to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.

The Buried and Underground Piping and Tank program, B2.1.18, includes the visual inspection of the buried aluminum bronze exterior pipe coatings for visible breaks, gaps, and discontinuities which could indicate possible cracking of the welds. An external surface examination capable of detecting selective leaching will be performed on the buried ECW piping welds in the vicinity of degraded coatings to detect loss of material due to selective leaching.

Detection of Aging Effects (Element 4)

The Selective Leaching of Aluminum Bronze program includes one-time and periodic volumetric and destructive examinations of aluminum bronze welds to determine if loss of material and cracking due to selective leaching is occurring.

The Selective Leaching of Aluminum Bronze program includes visual inspections every six months of the external surfaces of the above ground components and welds for evidence of through wall leakage.

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Every six months, a walkdown is performed in the areas above the buried ECW piping containing copper alloy welds with aluminum content greater than 8 percent. During the walkdown, the ground is observed for conditions that would indicate leakage. If a leak from a below-grade piping weld is discovered by surface water monitoring, a section of each leaking piping weld will be removed for destructive examination.

The Buried and Underground Piping and Tank program, B2.1.18, specifies that whenever aluminum bronze materials are exposed during inspection of the buried ECW piping, the exterior pipe coating is inspected for degradation. If degradation is identified near a weld a volumetric examination will be performed to determine if cracking of the weld is occurring. An external surface examination capable of detecting selective leaching will be performed on the buried ECW piping welds in the vicinity of degraded coatings to detect loss of material due to selective leaching.

If leaking below-grade welds are discovered during a buried ECW piping inspection, a section of each leaking weld will be removed for destructive examination.

An aluminum bronze weld found to have an indication that does not meet the acceptance criteria or has through wall leakage is removed and destructively examined to determine extent of loss of material, extent of cracking due to selective leaching, and the microstructure phase distribution.

Monitoring and Trending (Element 5)

This is an inspection program to determine if selective leaching is occurring and the degree of the selective leaching.

STP will maintain the history of the volumetric, <u>TOFD UT</u> and destructive examinations results. Following completion of the volumetric and destructive examinations scope, a review is performed to identify potential adverse trends or other indications requiring action.

Acceptance Criteria (Element 6)

The acceptance criterion for volumetric examination of aluminum bronze welds is no detected planar indication that is surface connected (exposed to the ECW environment) unless the depth of the indication is contained within the 80% of the weld root pass region. An indication not connected to the surface (not exposed to the ECW environment) is acceptable.

The acceptance criterion for visual inspection of the aluminum bronze welds and adjacent copper alloy piping during the walkdowns is no through wall leakage.

The acceptance criteria for destructive examinations are:

- 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 resistant phase distribution).
- 3. The microstructure of the weld root region shall exhibits a resistant phase distribution consistent with the metallurgical technical basis report.

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The acceptance criterion for TOFD UT examination is no loss of material due to selective leaching resulting in not meeting ASME Section XI Code required margins imposed by ASME Section XI structural factors for normal/upset and emergency/faulted conditions.

The acceptance criterion for buried aluminum bronze exterior pipe coating is defined in the Buried Piping and Tanks Inspection Aging Management Program B2.1.18. The acceptance criterion for extent of loss of material on the external surface of buried aluminum bronze piping with coating degradation is that upon removal of the selective leaching the minimum wall thickness is maintained.

If an acceptance criterion is not met, the condition is documented in the corrective action program.

Corrective Actions (Element 7)

The following corrective actions are performed when acceptance criteria are not met:

A through wall leak of the above or below ground weld.

- Remove weld and destructively examined to determine the extent of cracks, extent of selective leaching, and the microstructure phase distribution.
- Perform five additional volumetric inspections to assess extent of condition and cause.
- Perform a structural integrity evaluation to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.
- Replace leaking weld
- Perform an AMP effectiveness evaluation to determine program changes required to manage the aging.

An aluminum bronze weld found to have an indication that does not meet the acceptance criterion.

- Remove weld and destructively examined to determine the extent of cracks, extent of selective leaching, and the microstructure phase distribution.
- Perform five additional volumetric examinations until no additional weld indication not meeting the acceptance criterion is found to assess extent of condition and cause.
- Perform a structural integrity evaluation to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.
- Perform an AMP effectiveness evaluation to determine program changes required to manage the aging.
- Replace weld

Assess extent of condition and cause of a weld destructive examination not meeting acceptance criteria but the welds meets structural integrity.

 Perform five TOFD UT examinations within 60 days for each weld not meeting acceptance criteria until no additional weld not meeting the acceptance criteria is found. The TOFD UT examinations to be completed within 60 days of identifying acceptance criteria not met. Welds for examination will be selected from the total population of above ground welds associated with the weld type (with or without backing ring) consider variability of construction, size distributions, structural integrity

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margins, and consequence of failure.

- Perform periodic TOFD UT monitoring every 5 years of any welds not removed and previously found to not meet acceptance criterion but met structural integrity capability. These welds shall be monitored until 3 consecutive examinations identify no additional propagation of the selective leaching.
- Perform periodic TOFD examination of an additional 10% sample of the remaining above ground weld types every 5 years. The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring) not meeting acceptance criteria, considering construction, size distributions, structural integrity margins, and consequence of failure.
- Perform a structural integrity evaluation on any weld not meeting acceptance criteria to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.
- Perform an AMP effectiveness evaluation to determine program changes required to manage the aging.

Loss of material due to selective leaching resulting in a weld not meeting ASME Section XI Code required margins with the weld declared operable per station Operability, Functionality, and Reportability procedure requires: Assess extent of condition and cause of an unacceptable structural integrity evaluation:

- Perform a determination of operability.
- Perform <u>An</u> extent of condition evaluation to determine the cause of the structural integrity evaluation failure and identify other locations requiring examination. These additional examinations will focus on stress margin locations less than or equal to that of the structurally unacceptable weld.
- Performing TOFD UT examinations on the remaining above ground weld population using a sample with a 95/95 confidence until no additional weld indication not meeting the <u>TOFD UT examination</u> acceptance criteria and within structural integrity is found. The weld population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings) and locations that would not meet code allowable margins when evaluated against the failed components degraded load carrying capability.

The TOFD UT examinations are will be prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations following one weld not meeting structural integrity will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage with at least 20% of the examinations being completed within 30 days and all examinations. The examinations will be completed within 180–90 days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.

 If a second weld is found that does not meet <u>TOFD_UT examination acceptance</u> <u>criteria</u> structural integrity;

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- Develop examination plan, schedule and bases for the examination of the remaining above ground welds. <u>Inform the NRC of the examination plan</u>, schedule, and bases.
- Perform TOFD UT examinations on 100 percent of the remaining above ground welds to determine extent of condition with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days of finding the second weld.
- Perform an evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations where structural integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally unacceptable weld(s).-Inform the NRC of the examination plan, schedule, and bases for below ground weld inspections.
- Performing periodic 95/95 confidence sample TOFD UT examinations every 5 years on the remaining welds which have not been TOFD UT examined. The population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings). The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering variability of construction, size distributions, structural integrity margins, and consequence of failure.
- <u>Perform Monthly above ground walkdowns of the aluminum bronze welds to verify</u> no through-wall leakage is occurring.
- Perform-Monthly yard walkdowns to verify no through wall leakage is occurring.
- Determine a <u>Repair</u> or replacement program of the susceptible weld(s) based on the cause of the structural integrity evaluation failure, results of the additional TOFD UT examinations and the extent of condition.

Loss of material due to selective leaching resulting in a weld not meeting ASME Section XI Code required margins with the weld declared inoperable per station Operability, Functionality, and Reportability procedure, requires:

- If the weld has been removed from service for examination, then the examination results will be used to determine past operability and reportability.
- <u>An extent of condition evaluation to determine the cause of the structural integrity</u> evaluation failure and identify weld population requiring examination.
- <u>Performing TOFD UT examinations on 100% of the remaining above ground weld</u> <u>population.</u>

The TOFD UT examinations will be prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.

• <u>An evaluation of the below ground weld margins to identify locations requiring</u> inspection. The evaluation will focus on below ground locations where structural

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integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally unacceptable weld(s). All below ground welds where the evaluation shows that the structural integrity could challenge operability will be examined using TOFD UT during the next scheduled refueling outage.

- <u>Twice a month above ground walkdowns of the aluminum bronze welds.</u>
- Twice a month yard walkdowns to verify no through-wall leakage is occurring.
- Repair or replacement of the susceptible weld(s) based on the cause of the structural integrity evaluation failure, results of the additional TOFD UT examinations and the extent of condition.

The Buried Piping and Tanks Inspection Aging Management Program B2.1.18, outlines corrective actions resulting from the identification of degraded buried aluminum bronze exterior pipe coating. Corrective action for selective leaching found under degraded ECW buried piping coatings such as surface conditioning is performed until no selective leaching is detected. If unacceptable wall thickness is found following surface conditioning, the buried ECW piping is repaired or replaced.

STP QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing corrective actions. The QA program includes elements of corrective action, and is applicable to the safety-related and nonsafety-related systems, structures, and components that are subject to aging management review.

Confirmation Process (Element 8)

STP QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing confirmation processes and administrative controls. The QA program includes elements of corrective action, and is applicable to the safety-related and nonsafety-related systems, structures, and components that are subject to aging management review.

Administrative Controls (Element 9)

See Element 8.

Operating Experience (Element 10)

STP identified through-wall cracks in the ECW system piping which were initiated by preexisting weld defects and propagated by a selective leaching phenomenon. The pre-existing weld defects identified appeared in welds with backing rings. The weld population consists of shop and field welds without backing rings, field welds with backing rings, weld repairs to extruded piping tees, and valves with adapter socket welds. Welds that have shown throughwall cracks have been welds with backing rings, weld repairs to extruded piping tees, and valves with adapter socket welds. Laboratory failure analysis data has indicated that in the cases with leaks, a preexisting crack penetrating into the central core of the weld was present. Poor fit-up may have contributed to such root pass cracking. Crack growth appears to have occurred by a process of the crack tip selective leaching locally and the crack propagating through the selectively leached zone. The affected welds were repaired.

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Selective leaching has occurred in susceptible aluminum bronze components. STP will replace all susceptible aluminum bronze components prior to the period of extended operation.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

Scope of Program (Element 1) and Preventive Actions (Element 2)

Procedure will be enhanced to:

- Replace all aluminum bronze castings susceptible to selective leaching, including attachment welds with material that is not susceptible to selective leaching, prior to the period of extended operation.
- Replace aluminum bronze root valve adapter socket welds with material that is not susceptible to selective leaching prior to the period of extended operation.
- Replace extruded piping tees with aluminum bronze weld repairs where the repair size is such that failure of the repair would affect the structural integrity of the component prior to the period of extended operation.

Parameters Monitored or Inspected (Element 3)

- Specify, loss of material due to selective leaching is monitored through system walkdowns and destructive examinations.
- Specify, cracking associated with selective leaching is monitored through volumetric examination and destructive examination.
- Specify, phase distribution to verify the potential for continuous selective leaching is determined through destructive examination.
- Verify, the management of cracking of the above ground weld population with no backing rings by performing a one-time volumetric examination on 20 percent with a maximum of 25 welds prior to the period of extended operation.
- Specify, if a weld indication that does not meet the acceptance criteria is found during the one-time inspection of weld with no backing rings, periodic volumetric examinations of 20 percent with a maximum of 25 welds will be performed every 10 years thereafter.
- Verify, the management of cracking of the above ground weld population with backing rings by performing periodic volumetric examinations on 20 percent with a maximum of 25 welds prior to the period of extended operation and every 10 years thereafter.
- Specify, the samples for volumetric examination be selected from the total population of above ground welds, considering construction and size distributions.

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- Verify, the management of selective leaching and microstructure phase distribution of the above ground weld population with and without backing rings by performing a onetime destructive examination on 20 percent with a maximum of 25 welds with backing rings and 20 percent with a maximum of 25 welds without backing rings prior to the period of extended operation.
- Require the sample population for destructive examinations be selected from the total population of welds with and without backing rings, considering construction and size distributions.
- If selective leaching or microstructure phase distribution that does not meet the acceptance criteria is found require the following be performed.
 - Five TOFD UT examinations within 60 days for each weld not meeting acceptance criteria until no additional weld not meeting the acceptance criteria is found. Welds for examination will be selected from the total population of above ground welds associated with the weld type (with or without backing ring) consider variability of construction, size distributions, structural integrity margins, and consequence of failure.
 - Periodic TOFD UT monitoring every 5 years on any welds not removed and previously found to not meet acceptance criterion but met structural integrity capability. These welds shall be monitored until 3 consecutive examinations identify no additional propagation of the selective leaching.
 - Periodic TOFD UT examinations of the remaining 10 percent of the above ground weld types (with or without backing ring) will be performed every 5 years thereafter. The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering variability of construction, size distributions, structural integrity margins, and consequence of failure.
- Require a weld which does not meet the acceptance criteria or has through wall leakage, be removed and destructively examined to determine the extent of cracks, extent of selective leaching, and the microstructure phase distribution.
- Require a welds which does not meet the acceptance criteria or has through wall leakage be documented in the corrective action program and a structural integrity analysis be performed to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.
- Require an external surface examination capable of detecting selective leaching will be performed on the buried ECW piping welds in the vicinity of degraded coatings to detect loss of material due to selective leaching.

Detection of Aging Effects (Element 4)

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- Require one-time and periodic volumetric examination of above ground aluminum bronze welds to determine if cracking is occurring.
- Require one-time and periodic destructive examination of above ground aluminum bronze welds to determine if selective leaching is occurring and verify phase distribution.
- Require a weld which does not meet the acceptance criteria or has through wall leakage be removed and destructively examined to determine extent of cracks, extent of selective leaching, and the microstructure phase distribution.
- Require whenever aluminum bronze materials are exposed during inspection of the buried ECW piping, the exterior aluminum bronze pipe coating is inspected for degradation. If degradation is identified near a weld, a volumetric examination will be performed to determine if cracking due to selective leaching is occurring. An external surface examination capable of detecting selective leaching will be performed on the buried ECW piping welds in the vicinity of degraded coatings to detect loss of material due to selective leaching.

Monitoring and Trending (Element 5)

Procedure will be enhanced to:

• Require that the history of the volumetric, <u>TOFD UT</u>, and destructive examinations results be maintained and a review be performed to identify potential adverse trends or other indications requiring action.

Acceptance Criteria (Element 6)

- Specify, the acceptance criterion for volumetric examination of aluminum bronze welds is no detected planar indication that is surface connected (exposed to the ECW environment) unless the depth of the indication is contained within the 80% of the weld root pass region. An indication not connected to the surface (not exposed to the ECW environment) is acceptable.
- Specify, the acceptance criterion for visual inspection of the aluminum bronze welds and adjacent copper alloy piping during the walkdowns is no through wall leakage.
- Specify, the acceptance criteria for destructive examinations are:
 - 1. No loss of material due to selective leaching penetrating 80% of the root-pass region.
 - 2. Found selective leaching is and non-propagating (surrounded by a resistant phase distribution).
 - 3. The microstructure of the weld root region shall exhibits a resistant phase distribution consistent with the metallurgical technical basis report.
- Specify, the acceptance criterion for TOFD UT examination is no loss of material due to selective leaching resulting in not meeting ASME Section XI Code required margins

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imposed by ASME Section XI structural factors for normal/upset and emergency/faulted conditions.

- Require, if an acceptance criterion is not met, the unacceptable condition be documented in the corrective action program and a structural integrity analysis be performed to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.
- The acceptance criterion for extent of loss of material on the external surface of buried aluminum bronze piping with coating degradation is that upon removal of the selective leaching the minimum wall thickness is maintained.

Corrective Actions (Element 7)

- Require, upon discovery of a weld which does not meet the acceptance criteria or has through wall leakage, the weld is removed and destructively examined to determine extent of cracking, extent of selective leaching, and the microstructure phase distribution.
- Specify, when a weld is found that does not meet the acceptance criteria a structural integrity analysis shall be performed to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.
- Specify, discovery of a weld indication that does not meet the acceptance criteria requires expansion of the volumetric examination sample population. Each weld found with a weld indication not meeting the acceptance criteria requires five additional volumetric examinations to be performed until no additional weld indication not meeting the acceptance criteria is found.
- Specify, discovery of selective leaching or continuous microstructure phase distribution that do not meet the acceptance criteria but the welds meets structural integrity requires performing the following:
 - Five TOFD UT examinations within 60 days for each weld not meeting acceptance criteria until no additional weld not meeting the acceptance criteria is found to. Welds for examination will be selected from the total population of above ground welds associated with the weld type (with or without backing ring) consider variability of construction, size distributions, structural integrity margins, and consequence of failure.
 - Periodic TOFD UT monitoring every 5 years of any welds not removed and previously found to not meet acceptance criterion but met structural integrity capability. These welds shall be monitored until 3 consecutive examinations identify no additional propagation of the selective leaching.
 - Periodic TOFD examinations of an additional 10% sample of the remaining above ground weld types every 5 years. The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring) not meeting acceptance criteria, considering construction, size distributions, structural integrity margins, and consequence of failure.

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- A structural integrity evaluation on a weld not meeting acceptance criteria to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation.
- An AMP effectiveness evaluation to determine program changes required to manage the aging.
- Specify, discovery of loss of material due to selective leaching resulting in a weld not meeting ASME Section XI Code required margins with the weld declared operable per station Operability, Functionality, and Reportability procedure an unacceptable structural integrity evaluation-requires performing the following:
 - A determination of operability.
 - An extent of condition evaluation to determine the cause of the structural integrity evaluation failure and identify other locations requiring examination. These additional examinations will focus on stress margin locations less than or equal to that of the structurally unacceptable weld.
 - Monthly walkdowns of above_ground aluminum bronze welds.
 - Monthly yard walkdowns to verify no through-wall leakage is occurring.
 - Performing TOFD UT examinations on the remaining above ground weld population using a sample with a 95/95 confidence until no additional weld indication not meeting the <u>TOFD UT examination</u> acceptance criteria and within structural integrity is found. The weld population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings) and locations that would not meet code allowable margins when evaluated against the failed components degraded load carrying capability.

The TOFD UT examinations are will be prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations following one weld not meeting structural integrity will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage with at least 20% of the examinations being completed within 30 days and all examinations. The examinations will be completed within <u>180-90</u> days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.

- If a second weld is found that does not meet <u>TOFD UT examination acceptance</u> <u>criteria-structural integrity;</u>
 - Develop examination plan, schedule and bases for the examination of the remaining above ground welds. <u>Inform the NRC of the examination plan</u>, schedule, and bases.
 - Perform TOFD UT examinations on 100 percent of the remaining above ground welds to determine extent of condition with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days of finding the second weld.
 - Perform an evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations

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where structural integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally unacceptable weld(s). Inform the NRC of the examination plan, schedule, and bases for below ground weld inspections.

- <u>Performing p</u>eriodic 95/95 confidence sample TOFD UT examinations every 5 years on the remaining welds which have not been TOFD UT examined. The population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings). The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering variability of construction, size distributions, structural integrity margins, and consequence of failure.
- Determine a <u>Repair</u> 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.
- Specify, discovery of loss of material due to selective leaching resulting in a weld not meeting ASME Section XI Code required margins with the weld declared inoperable per station Operability, Functionality, and Reportability procedure requires:
 - If the weld has been removed from service for examination, then the examination results will be used to determine past operability and reportability.
 - Performing TOFD UT examinations on 100% of the remaining above ground weld population.

The TOFD UT examinations will be prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.

- An evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations where structural integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally unacceptable weld(s). All below ground welds where the evaluation shows that the structural integrity could challenge operability will be examined using TOFD UT during the next scheduled refueling outage.
- <u>Twice a month above ground walkdowns of the aluminum bronze welds.</u>
- Twice a month yard walkdowns to verify no through-wall leakage is occurring.
- Repair or replacement of the susceptible weld(s) based on the cause of the structural integrity evaluation failure, results of the additional TOFD UT examinations and the extent of condition.
- Specify, corrective action for selective leaching found under degraded ECW buried piping coatings such as surface conditioning is performed until no selective leaching is

detected. If unacceptable wall thickness is found following surface conditioning, the buried ECW piping is repaired or replaced.

Conclusion

The continued implementation of the Selective Leaching of Aluminum Bronze program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

Enclosure 2

STPNOC Regulatory Commitment Changes

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Item #	Commitment	LRA	Implementation
		Section	Schedule
44	 The Selective Leaching of Aluminum Bronze program will: Replace all aluminum bronze castings susceptible to selective leaching, including attachment welds related to the castings with material that is not susceptible to selective leaching. Replace aluminum bronze root valve adapter socket welds with material that is not susceptible to selective leaching. Replace extruded piping tees with aluminum bronze weld repairs where the repair size is such that failure of the repair would affect the structural integrity of the component. Enhance the Selective Leaching of Aluminum Bronze procedure to: Specify loss of material due to selective leaching is monitored through system walkdowns and destructive examinations. Specify cracking associated with selective leaching is monitored through volumetric examination and destructive examination. Specify phase distribution to verify the potential for continuous selective leaching is monitored through destructive examination. 	B2.1.37	Replacements and inspections to be complete no later than six months prior to the PEO or the end of the last refueling outage prior to the PEO, whichever occurs later. Procedure changes no later than the date the renewed operating licenses are issued.
	 Verify the management of cracking of the above ground weld population with no backing rings by performing a one-time volumetric examination on 20 percent with a maximum of 25 welds prior to the period of extended operation. Specify, if a weld indication that does not meet the acceptance criteria is found during the one-time inspection of welds with no backing rings, periodic volumetric examinations of 20 percent with a maximum of 25 welds with a maximum of 25 welds will be performed every 10 years thereafter. 		CR 12-22150
	 Verify, the management of cracking of the above ground weld population with backing rings by performing periodic volumetric examinations on 20 percent with a maximum of 25 welds prior to the period of extended operation and 		

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Item #	Commitment	LRA	Implementation
		Section	Schedule
	every 10 years thereafter.	<u> india 2215 2 si 115 a</u>	<u></u>
	 Specify, the samples for volumetric examination be selected from the total population of above ground welds, considering construction and size distributions. 		
	 Verify, the management of loss of material due to selective leaching or microstructure phase distribution of the above ground weld population with and without backing rings by performing a one-time destructive examination on 20 percent with a maximum of 25 welds with backing rings and 20 percent with a maximum of 25 welds without backing rings prior to the period of extended operation. 		
	 Require the sample population for destructive examinations be selected from the total population of welds with and without backing rings, construction and size distributions. 		
	 Require a weld which does not meet the acceptance criteria or has through wall leakage, be removed and destructively examined to determine extent of cracking, extent of selective leaching and the microstructure phase distribution. 		
	 Require a weld which does not meet the acceptance criteria or has through wall leakage, be documented in the corrective action program, and a structural integrity analysis be performed to confirm that the load carrying capacity of the installed welds remain adequate to support the intended function of the ECW system through the period of extended operation. 		
	 Require an external surface examination capable of detecting selective leaching will be performed on the buried ECW piping welds in the vicinity of degraded coatings to detect loss of material due to selective leaching. 		
	 Require that the history of the volumetric, TOFD UT, and destructive examinations results be maintained and a review be performed to identify potential adverse trends or other indications requiring action. 		

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Item #	Commitment	LRA	Implementation
		Section	Schedule
	 Specify, the acceptance criterion for volumetric examination of aluminum bronze welds is no detected planar indication that is surface connected (exposed to the ECW environment) unless the depth of the indication is contained within the 80% of the weld root pass region. An indication not connected to the surface (not exposed to the ECW environment) is acceptable. 		
	 Specify, the acceptance criterion for visual inspection of the aluminum bronze welds and adjacent copper alloy piping during the walkdowns is no through wall leakage. 		
	 Specify, the acceptance criterion for destructive examinations is; No loss of material due to selective leaching penetrating 80% of the root-pass region. 		
	 Found selective leaching is non-propagating (surrounded by resistant phase distribution). 		
	 The microstructure of the weld root region shall exhibits a resistant phase distribution consistent with the metallurgical technical basis report. 		
	 Specify, the acceptance criterion for TOFD UT examination is no loss of material due to selective leaching resulting in not meeting ASME Section XI Code required margins imposed by ASME Section XI structural factors for normal/upset and emergency/faulted conditions. 		
	 Specify, discovery of a weld indication that does not meet the acceptance criteria requires expansion of the volumetric examination sample population. Each weld found with a weld indication not meeting the acceptance criteria requires five additional volumetric examinations to be performed until no additional weld indication not meeting the acceptance criteria is found. 		
	 Specify, discovery of selective leaching or continuous microstructure phase distribution that do not meet the acceptance criteria but the welds meets 		

Table A4-1	License Rer	newal Commitments
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ltem #		Commitment	LRA Section	Implementation Schedule
	structural integrity requi	res performing the following:		
	 Five TOFD UT e acceptance crite criteria is found total population (with or without l distributions, structure) 	examinations within 60 days for each weld not meeting tria until no additional weld not meeting the acceptance to. Welds for examination will be selected from the of above ground welds associated with the weld type backing ring) consider variability of construction, size uctural integrity margins, and consequence of failure.		
	 Periodic TOFD I and previously f integrity capabili examinations id leaching. 	JT monitoring every 5 years of any welds not removed ound to not meet acceptance criterion but met structural ity. These welds shall be monitored until 3 consecutive entify no additional propagation of the selective		
	 Periodic TOFD remaining above selected from th with the weld ty acceptance crite structural integr 	examinations of an additional 10% sample of the e ground weld types every 5 years. The sample will be ne total population of above ground welds associated pe (with or without backing ring) not meeting eria, considering construction, size distributions, ity margins, and consequence of failure.		
	 A structural inter criteria to confir remain adequat through the per 	grity evaluation on a weld not meeting acceptance m that the load carrying capacity of the installed welds te to support the intended function of the ECW system iod of extended operation.		
	 An AMP effective required to mar 	veness evaluation to determine program changes hage the aging.		
	 Specify, discovery of <u>loweld not meeting ASM</u> declared operable per 	oss of material due to selective leaching resulting in a E Section XI Code required margins with the weld station Operability, Functionality, and Reportability		

Item #	Commitment	LRA Section	Implementation Schedule
proce	dure an unacceptable structural integrity evaluation requires: performing		
the fo	llowing.		
с	A determination of operability.		
0	An extent of condition evaluation to determine the cause of the structural integrity evaluation failure and identify other locations requiring examination. These additional examinations will focus on stress margin locations less than or equal to that of the structurally unacceptable weld.		
0	Monthly walkdowns of above_ground aluminum bronze welds.		
0	Monthly yard walkdowns to verify no through-wall leakage is occurring.		
0	Performing TOFD UT examinations on the remaining above ground weld population using a sample with a 95/95 confidence until no additional weld indication not meeting the <u>TOFD UT examination</u> acceptance criteria and within structural integrity is found. The weld population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings) and locations that would not meet code allowable margins when evaluated against the failed components degraded load carrying capability.		
	The TOFD UT examinations are <u>will be</u> prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations following one weld not meeting structural integrity will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage with at least 20% of the examinations being completed within 30 days and all examinations. The examinations will be		

ltem #		Commitment	LRA Section	Implementation Schedule
<u></u>	<u>inding (k. k. 1. jenne (k. k.</u>	completed within <u>180-90</u> days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.	<u>2000-120 (800 (800)</u>	<u>an in 1992 - In de 1997 de 1997 de 1997 de 1997</u>
	0	If a second weld is found that does not meet <u>TOFD UT examination</u> acceptance criteria structural integrity;		
		 Develop examination plan, schedule and bases for the examination of the remaining above ground welds. Inform the NRC of the examination plan, schedule, and bases. 		
		 Perform TOFD UT examinations on 100 percent of the remaining above ground welds to determine extent of condition with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days of finding the second weld. 		
		 Perform an evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations where structural integrity could be challenged based on the relative stress margins and the inspection results obtained on the above ground structurally unacceptable weld(s). Inform the NRC of the examination plan, schedule, and bases for below ground weld inspections. 		
	0	<u>Performing periodic 95/95 confidence sample TOFD UT examinations</u> every 5 years on the remaining welds which have not been TOFD UT examined. The population used to determine the 95/95 confidence sample will be based on the above ground weld types (with or without backing rings). The sample will be selected from the total population of above ground welds associated with the weld type (with or without backing ring), considering variability of construction, size distributions, structural integrity margins, and consequence of failure.		

Item #	Commitment	LRA	Implementation
a a di mangana ang kanang kanang Kanang kanang	ᅸᅸᅸᆊᇏᅸᆊᅸᅸᅸᅸᅸᆕᇆᅸᆙᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸᅸ	Section	Schedule
<u>O</u>	Determine a Repair or replacement program of the susceptible welds within the STP Technical Specification requirements based on the cause of the structural integrity evaluation failure, results of the additional volumetric examinations and the extent of condition.		
• <u>Speci</u> <u>margi</u> <u>Funct</u>	fy, discovery of a weld not meeting ASME Section XI Code required ns with the weld declared inoperable per station Operability, onality, and Reportability procedure requires:		
0	If the weld has been removed from service for examination, then the examination results will be used to determine past operability and reportability.		
0	An extent of condition evaluation to determine the cause of the structural integrity evaluation failure and identify weld population requiring examination.		
0	<u>Performing TOFD UT examinations on 100% of the remaining above ground weld population.</u>		
	The TOFD UT examinations will be prioritized by examining the weld locations with the least structural integrity margin and with the highest consequence of failure first. Planning and preparations for performing TOFD UT extent of condition examinations will commence upon discovery of the condition. The examinations will commence at the next ECW train outage and will sequence through all the ECW trains during each ECW train outage with at least 20% of the examinations being completed within 30 days and all examinations completed within 180 days. This allows for timely planning and execution of sequenced train by train examinations during first available train work windows.		-
0	An evaluation of the below ground weld margins to identify locations requiring inspection. The evaluation will focus on below ground locations where structural integrity could be challenged based on the		

ltem #		Commitment	LRA Section	Implementation Schedule
		relative stress margins and the inspection results obtained on the above ground structurally unacceptable weld(s). All below ground welds where the evaluation shows that the structural integrity could challenge operability will be examined using TOFD UT during the next scheduled refueling outage.		
	0	Twice a month above ground walkdowns of the aluminum bronze welds.		
	0	Twice a month yard walkdowns to verify no through-wall leakage is occurring.		
	o	Repair or replacement of the susceptible weld(s) based on the cause of the structural integrity evaluation failure, results of the additional TOFD UT examinations and the extent of condition.		
	 Specif surfac remov 	y, the acceptance criterion for extent of loss of material on the external e of buried aluminum bronze piping with coating degradation is that upon al of the selective leaching the minimum wall thickness is maintained.		
	 Specif buried selecti conditi 	y, corrective action for selective leaching found under depredated ECW piping coatings such as surface conditioning is performed until no ve leaching is detected. If unacceptable wall thickness following surface oning is found, the buried ECW piping is repaired or replaced.		