

# STP Aluminum Bronze Public Meeting Staff Questions on AMP

June 21, 2016

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# Introduction

- This presentation summarizes comments/questions on AMP B2.1.37, “Selective Leaching of Aluminum Bronze.”
- Comments/questions are organized in accordance with the Standard Review Plan for License Renewal, Appendix A.1.2.3, “Aging Management Program Elements.”

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# Scope of Program

Program states that extruded tees with weld repairs will be replaced if it is determined that "the repair size is such that failure of the repair would affect structural integrity of the component."

- During the audit, the applicant stated that weld repair size was not known for all of the affected tees.
- Staff needs to understand how the structural determination will be made in the absence of this detail.

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## Preventive Actions

- Document which portions of the buried essential cooling water system are coated.
- Cite the coating as a preventive action – or cite soil as an applicable environment.
- The statements on aluminum bronze castings and extruded piping tees need not be repeated in this program element.

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# Parameters Monitored or Inspected

- The AMP should consistently cite the following parameters:
  - Loss of material (aging effect) [sometimes referred to as selective leaching in AMP]
  - Cracking (aging effect)
  - Phase distribution (indirect measure of the potential for continuous dealloying)
- 4<sup>th</sup> paragraph states that OE has shown that certain welds are “not susceptible to cracking caused by selective leaching.”
  - OE only demonstrates that there are no through-wall indications

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# Detection of Aging Effects

Buried pipe inspections when pipe is exposed:

- What is the method of inspection?
- Is the inspection conducted on internal, external, or both surfaces?

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# Detection of Aging Effects - cont.

## Weld with No Backing Rings

- Staff believes that volumetric inspections should demonstrate no cracking accompanied by dealloying.
- Volumetric inspections, one-time inspection of 3% of the welds with a maximum of 10 welds.
  - AMP XI.M32, “One-Time Inspection,” recommends 20% with a maximum of 25. Prior to PEO.
  - Quantity is inconsistent with GALL Report recommendations.
- Program states that, “[i]f rejectable weld flaws,” are detected, inspections will become periodic in lieu of one-time.
  - How many weld flaws will it take to transition to periodic in lieu of one-time inspections?

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# Detection of Aging Effects - cont.

## Weld with Backing Rings

- Staff believes that volumetric inspections should demonstrate no cracking accompanied by dealloying.
- Periodic inspection of 20% of the welds with a maximum of 25 welds
- Program states, “if no weld defects are found” the number of inspections will be reduced to 3% with a maximum of 10 welds.
  - How many weld flaws will it take to not transition to the reduced number of inspections?

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# Detection of Aging Effects - cont.

## **Destructive Examinations**

- Staff believes that examinations are to demonstrate:
  - for welds without backing rings, no loss of material due to uniform or plug-like dealloying, a phase distribution that supports the basis document, and no cracking accompanied with dealloying
  - for welds with backing rings, no loss of material due to uniform or plug-like dealloying, a phase distribution that supports the basis document, and the frequency of occurrence of cracking accompanied with dealloying
- The program states that two welds with backing rings will be destructively examined.
  - AMP XI.M32 recommends 20% with a maximum of 25.
- Staff believes that welds with backing rings and welds without backing rings are two separate populations
  - Backing rings – crevice for selective leaching
  - Without backing rings – less dilution and longer cooling period in root weld

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# Detection of Aging Effects - cont.

## Inspection Locations

Program states that inspection locations will be randomly selected.

- Staff believes that inspection locations can be random.
- Locations should be representative of range and quantity of weld sizes.

## Inspection Timing

Program is not clear on whether one-time inspections occur prior to PEO.

- Periodic inspection of 20% of the welds with a maximum of 25 welds if “rejectable weld flaws....” are detected.
  - “Performed every 10 years thereafter.”

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# Monitoring and Trending

- The staff recognizes that quantitative results will not be obtained by the planned volumetric and destructive inspections/examinations.
- Without trending, inspection results would be “buried” in the corrective action program.
- The staff needs to understand why the results of the volumetric and destructive inspections will not be compiled (trended) and the compiled results evaluated.
- The staff needs to understand why the results of the walk downs will not be trended.

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# Acceptance Criteria

The AMP states that the acceptance criteria for welds is no defects:

- A/C for volumetric examinations is, no defects.
  - Parameters monitored or inspected program element states, “If rejectable weld flaws (weld defects) per ASME Section IX....”
    - Program is unclear in that it addresses flaws and defects.
    - Why is Section IX cited?
    - Citing Section III could lead to nonconsequential (for dealloying) defects (e.g., concavity with weld size slightly under thickness (suckback), rounded indications > 5/32”, inadequate penetration).
    - Citing Section III could lead to analytical resolution that a defect is classified as a flaw.
  - Describe the specific criteria for declaring that an indication in a weld is rejectable.
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## Acceptance Criteria - cont.

- There is no acceptance criteria for the destructive examinations.
- Why is there no acceptance criteria for the detection of plug-like or uniform dealloying?
- Why is there no acceptance criteria for buried pipe coatings?

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# Corrective Actions

## Expansion of Examinations

- AMP states that each weld found to have defects will result in five additional volumetric examinations until no additional weld defects are detected.
- Will expansion of inspections be conducted if aboveground leaks are detected?
  - Leaks should not be detected once castings are replaced, regardless of the use of backing rings.
  - What type of expanded inspection will be conducted if leaks are detected (e.g., volumetric, destructive).
- What corrective actions will occur if dealloying is detected in welds without backing rings?
- For welds with backing rings, what corrective actions will occur depending on the frequency of occurrence of cracking accompanied with dealloying?

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# Corrective Actions - cont.

## Expansion of Examinations

- AMP states that if buried pipe leak is detected, “a section of each leaking pipe weld will be removed for destructive examination.”
  - Will an expansion of inspections be conducted?
- Will expansion of destructive examinations be conducted if acceptance criteria for destructive examinations is not met?
- Corrective actions for the detection of plug-like or uniform dealloying?
- Corrective actions for buried pipe coating defects?

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# Basis Document

- Enclosure 1, page 54, Table 12
  - Why is the 30-inch, discharge side tee (with a margin of 1.01 of allowable length to leak length) acceptable for service in the PEO?
- Enclosure 1, page 53, Table 11
  - Walk through how this table was developed.
  - Why was the unintensified bending stress used?
- Enclosure 1, Table 1
  - Review instances of OE where indications were:
    - “near and parallel to the butt weld” page 21
    - “along a line on the flange neck near the butt weld” page 22
    - “near the butt weld” page 23

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# Editorial Comments

- The periodic walkdown of aboveground weld locations should be cited in the “parameters monitored or inspected” program element.
- The periodic walkdown of yard areas to detect buried pipe leaks should be cited in the “parameters monitored or inspected” program element.
- Program states that the environment is raw water; however, soil should also be cited, unless coatings credited.
- First enhancement states that aluminum bronze castings will be replaced; however, it is does not state that the replacement material will not be susceptible to selective leaching.
- Corrective actions program states, “leak from a buried pipe weld.” It should be made clear that the weld could be: (a) to non susceptible pipe, (b) to susceptible cast components, or (c) the repair weld in an extruded tee. This should be made clear throughout the AMP.

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# Summary/Wrap-up