Conte, Richard

From: Sent: To: Cc: Subject: Attachments: Cline, Leonard Wednesday, July 28, 2010 8:19 AM OHara, Timothy; Conte, Richard Burritt, Arthur Salem AFW finding Salem1-(2010003)(OHara)(ISI-Rpt)(7-21-2010)wbr3edits_morebr3comments.docx

As we discussed yesterday attached are the Branch 3 comments on the feeder.



UNITED STATES NUCLEAR REGULATORY COMMISSION REGION I 475 ALLENDALE ROAD

KING OF PRUSSIA, PA 19406-1415 .

July 22, 2010

MEMORANDUM TO: Arthur L. Burritt, Chief Projects Branch 3 Division of Reactor Projects

THRU:

FROM:

Richard J. Conte, Chief Engineering Branch 1 Division of Reactor Safety

Timothy L. OHara, Reactor Inspector Engineering Branch 1 Division of Reactor Safety

 SUBJECT:
 INSERVICE INSPECTION ACTIVITIES INSPECTION FEEDER

 FOR SALEM UNIT 1, INSPECTION REPORT
 05000272/2010003, REVISION OF July 21, 2010

The enclosed feeder contains input for the subject report resulting from inspection of Inservice Inspection (ISI) activities during the period from April 5, 2010 to June 28, 2010, at Salem Unit 1. The inspection was conducted using Inspection Procedure 71111.08, Inservice Inspection Activities and Temporary Instruction (TI) 2515/172, Reactor Coolant System Dissimilar Metal Butt Welds. The results of this inspection were presented to Mr. Ed Eilola, Salem Plant Manager, at an exit meeting on June 28, 2010.

Suggested Cover Letter Input

This feeder documents one NRC-identified finding of very low safety significance (Green). This finding was determined to be a violation of an NRC requirement. This feeder also documents a licensee-identified violation, which was determined to be of very low safety significance, in section 4OA7 of this report. Because these violations are of very low safety significance and because the issues were entered into your corrective action process, these findings are being treated as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy.

Issue of Agency Concern; Buried, Safety Related Piping:

Because of an ongoing issue of Agency Concern about the degradation of buried piping, this issue is being documented as a licensee-identified finding in Section 4OA7, in accordance with the guidance of IMC 0612-10.

No specific action is needed for this concern in light of industry initiatives on buried piping and the NRC Buried Piping Action Plan.

Since this issue, as noted below, is licensee identified, a long discussion was not permitted by IMC0612 format requirements. Documenting an issue of agency wide concern appears to only apply to minor findings, however, this issue is more than minor and licensee identified.

The following finding of very low safety significance was identified by PSEG and is a violation of 10 CFR 50, Appendix B, Criterion III, Design Control, an NRC requirement. PSEG did not provide an effective protective coating for the buried AFW piping. This issue has been evaluated via IMC 0609, Attachment 4, Initial Screening and Characterization of Findings and IMC 0612, Appendix B, Issue Screening.

During a planned excavation and inspection of the Unit 1 AFW buried piping to SG #12 and SG #14, PSEG identified corrosion (significantly below minimum wall thickness for a design pressure of 1950 psi) of the safety related, ASME Class 3, Seismic Class 1 piping. PSEG repaired or replaced the affected Unit 1 buried AFW piping before returning the plant to operation. Portions of the Unit 1 and Unit 2 Auxiliary Feedwater (AFW) System piping is buried piping and has not been visually inspected since the plant began operation in 1977 for Unit 1 and since 1979 for Salem Unit 2. In April 2010, approximately 680 ft. (340 ft. of the #12 SG AFW supply and 340 ft. of the #14 SG AFW supply) of piping between the pump discharge manifold and the connection to the Main Feedwater piping to the affected SGs was discovered to be corroded to below minimum wall thickness (0.278") for the 1950 psi design pressure of the AFW System. The lowest wall thickness measured in the affected piping was 0.077". Preliminarily, PSEG representatives believe that there was an inadvertent omission of coating during construction days. PSEG plans on excavating the Unit 2 buried piping to inspect the condition during the next Unit 2 outage scheduled for the spring of 2011. Although no leakage was evident for these conditions, the inspector questioned if periodic pressure test had been conducted on this underground piping and this resulted in an NRC identified finding, as noted in this feeder, along with an operability determination for Unit 2 and as risk assessment for waiting to do the above noted inspection. This analysis resulted in a revised pipe design rating for Unit 2 down to 1275 psig.

10 CFR 50, Appendix B, Criterion III, Design Control, states, in part, "Measures shall be established to assure that applicable regulatory requirements and the design basis, ..., for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components."

Contrary to these requirements, PSEG did not provide engineering evaluations, vendor certification, or testing data to demonstrate that the specified coating would protect the buried AFW piping for the design lifetime of the plant. Also, PSEG did not assure appropriate quality standards which assure that deviations from such standards were controlled. Additionally, PSEG did not provide measures for the selection and review for suitability of the coating materials for the buried AFW piping application, for periodic inspections to ensure that the applied coating was protecting the buried AFW piping, and did not provide engineering details demonstrating the ability of the coating to protect the buried AFW piping for the design life of the plant.

This licensee identified finding affects the mitigating systems cornerstone by affecting the secondary, short term decay heat removal capability. Because the finding did not result in loss of operability or functionality the inspector determined that the finding was of very low safety significance, Green. The inspector determined that this licensee identified finding is more than minor, and that a Cross Cutting Aspect did not exist because the issue was not indicative of current performance because the condition existed since 1977. Specifically, the section of piping under question was identified with degradation that put the system outside its original design basis (1950 psi design rating); and PSEG was required to make significant revisions to the system design analysis to take credit for available margin to show that the system remained operable.

Because PSEG entered this condition into the corrective action process (Notification 20456999) and because the issue is of very low safety significance (Green), this issue is being treated as a licensee identified non-cited violation consistent with Section VI.A.1 of the NRC Enforcement Policy.

Follow up Comments for Future PI&R Sample

Because PSEG had not completed the EQ:ACE for the corroded AFW piping, had not completed the Root Cause Evaluation for missing the IWA-5244 pressure tests, and had not completed it's evaluation of Notification 20462034, it was agreed that an annual PI&R sample would be completed to review these documents to determine that the following comments/observations have been addressed by PSEG. It is anticipated that this sample will be performed in September 2010 depending upon PSEG completion of the cause determinations and Notification actions.

The inspector made other observations related to the finding on the AFW pressure testing issue and degradation noted in the AFW yard piping. PSEG intends to address the following observations/comments in the cause determinations and Notification evaluations.

(1) The PSEG buried piping inspection procedure did not document how a representative inspection sample is selected and did not enumerate the basis for the inspection sample selection(s).

(2) The PSEG buried piping inspection procedure does not provide a threshold criteria for inspection conditions which must be entered into the corrective action process for evaluation, potential resolution and/or tracking.

(3) PSEG has not defined a design life for the new coating on the replaced buried AFW piping for Unit 1. Also, PSEG has not determined an excavation and inspection frequency for the newly coated, replaced Unit 1 buried piping.

(4) Notification 20459689 reported the failure to perform the ASME, Section XI, paragraph IWA-5244 required pressure tests on the buried AFW piping for Unit 1 and Unit 2. This Notification states, "The system pressure test boundary drawing (S2-SPT-336-0) identifies the piping as YARD piping not buried piping." It is not clear what PSEG is doing to ensure that other system drawings which may contain the same YARD markings and are potentially not being treated as buried piping and components.

(5) PSEG Buried Piping Program assumes that buried piping is protected by a coating system to protect the piping from degradation/corrosion for the design life of the plant. However, the Unit 1 AFW piping was discovered to not have been coated or protected. It is not clear what PSEG is doing to confirm or verify that other buried piping is protected with an effective coating which will protect the piping for the plant life.

(6) PSEG agreed to provide the ASME, NIS-2 forms with ANI approval for the completion of the repair/replacement of the Unit 1 AFW piping.

(7) PSEG has initiated Notification 20462034 to investigate and confirm the basis of the 1950 psig design pressure of the AFW system. Actions included in this Notification were in progress when the inspection ended on June 28, 2010.

Enclosure: Feeder for Salem Unit 1, Inspection Report No. 05000272/2010003, 05000311/2010003



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<u>cc w/Enclosure</u>: **(VIA E-MAIL)** A. Burritt, DRP L. Cline, DRP D. Schroeder, DRP, SRI - Salem Unit 1 T. O'Hara, DRS R. Hardies, NRR DRS Files

SUNSI Review Complete: <u>TLO/RJC</u> (Reviewer's Initials) Non-Public Designation Category: MD 3.4 Non-Public A.7 DOCUMENT NAME: g:\DRS\EB1\ohara\salem1-(2010003)(ohara)(isi-rpt)(7-21-2010)wbr3edits.doc

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SUMMARY OF FINDINGS

Reactor Safety

Cornerstone: Mitigating Systems

<u>Green.</u> The inspector identified a non-cited violation (NCV) of very low safety significance (Green) for PSEG's failure to perform auxiliary feedwater system (AFW) discharge piping pressure tests on buried piping components as required by 10 CFR 50.55a(g)(4) and the referenced American Society of Mechanical Engineers Code (ASME), Section XI, paragraph IWA-5244 for Salem Unit 1 and Salem Unit 2. The required tests are intended to provide-evidence of demonstrate the structural integrity of the buried piping portions of the system.

The affected piping is safety related, ASME Class 3, Seismic Class 1 piping. This performance deficiency is more than minor because the condition affected the Equipment Performance attribute (availability and reliability) of the mitigating systems cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The only ASME-required inspection, used to demonstrate structural integrity, had not been performed between 1988 and 2010 for Unit 1 and Unit 2. No Cross Cutting Aspect is assigned to this violation because this condition is not indicative of current performance. This finding is described in Section 1R08.

One violation of very low safety significance, which was identified by PSEG, was reviewed by the inspector. Corrective actions taken or planned by PSEG were entered into the corrective action program. The violation and corrective action (notification) tracking number is described in Section 40A7 of this report.

Comment [L1]: MC 0612 requires the summary of findings to discuss the immediate corrective actions and to state that the issue was entered into the CAP.

Comment [L2]: This sentence appears to be out of place in accordance with MC 0612 the second paragraph should include the following:

Second paragraph – Summarize significance as discussed in Analysis, why greater than minor, effect on cornerstone, why not greater than green, cross-cutting area, component and aspect, alpha numeric identifier. If no crosscutting aspect state. Reference section of report.

See MC 0612 pg 28 and 29..

Comment [L3]: I believe in accordance with the applicable section of MC 0612 this paragraph is still missing information (see above). Specifically, why the finding screens to green.

REPORT DETAILS

1R08 Inservice Inspection (ISI) (7111108 - 1 Sample)

a. Inspection Scope

The inspector observed a selected sample of nondestructive examination (NDE) activities in process. Also, the inspector reviewed the records of selected additional samples of completed NDE and repair/replacement activities. The sample selection was based on the inspection procedure objectives and risk priority of those components and systems where degradation would result in a significant increase in risk of core damage. The observations and documentation reviews were performed to verify that the activities inspected were performed in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code requirements.

The inspector reviewed the licensee's performance of a visual inspection (VT) of the Unit 1 reactor vessel closure head (RVCH) and the installed upper head penetrations. The inspector reviewed the visual procedure, the qualifications of the personnel and reviewed the inspection report documenting the inspection results. The inspector also reviewed the data sheets for the penetrant tests completed on three of the penetration welds of the RVCH.

The inspector reviewed records for ultrasonic testing (UT), visual testing (VT), penetrant testing (PT) and magnetic particle testing (MT) NDE processes. PSEG did not perform any radiographic testing (RT) during this outage. The inspector reviewed inspection data sheets and documentation for these activities to verify the effectiveness of the examiner, process, and equipment in identifying degradation of risk significant systems, structures and components and to evaluate the activities for compliance with the requirements of ASME Code, Section XI.

Steam Generator Inspection Activities

The inspectors reviewed a sample of the Unit 1 steam generator eddy current testing (ECT) tube examinations, and applicable procedures for monitoring degradation of steam generator tubes to verify that the steam generator examination activities were performed in accordance with the rules and regulations of the steam generator examination program, Salem Unit 1 steam generator examination guidelines, NRC Generic Letters, 10CFR50, technical specifications for Unit 1, Nuclear Energy Institute 97-06, EPRI PWR steam generator examination guidelines, and the ASME Boiler and Pressure Vessel Code Sections V and XI. The review also included the Salem Unit 1 steam generator Cycle 21 and 22 operational assessment. The inspector also verified the individual certifications for personnel participating in the SG ECT inspections during the 1R20 refueling outage.

The inspector reviewed PSEG's efforts in identifying wear degradation to the tubing in the four SGs at Unit 1. The majority of the identified wear indications were attributed to anti vibration bar (AVB) wear in the u bend regions of the four SGs. The inspector reviewed the analyses and evaluations that determined that a total of 14 SG tubes would be removed from service by plugging.

Boris Acid Corrosion Control Program Activities

The inspector reviewed the PSEG boric acid corrosion control program. The resident inspectors observed PSEG personnel performing boric acid walkdown inspections, inside containment, and in other affected areas outside of containment, at the beginning of the Unit 1 refueling outage. The inspectors reviewed the notifications generated by the walkdowns and the evaluations conducted by Engineering to disposition the notifications. Additionally, the inspector reviewed a sample of notifications and corrective actions completed to repair the reported conditions.

Section XI Repair/Replacement Samples:

<u>AFW System Piping, Control Air & Station Air:</u> The inspectors reviewed PSEG's discovery, reporting, evaluation and the repair/replacement of Unit 1 AFW piping that was excavated for inspection during the April 2010 Unit 1 refueling outage (1R20). PSEG conducted this inspection in accordance with PSEG's Buried Piping Inspection Program. Additionally, the inspectors reviewed the UT testing results (approximately 20,000) performed to characterize the condition of the degraded Unit 1 buried AFW piping.

The inspector also reviewed the repair/replacement work orders and the 50.59 screening and evaluation for the AFW, CA and SA piping. The inspectors reviewed the fabrication of the replacement piping, reviewed the documentation of the welding and NDE of the replacement piping and reviewed the pressure tests used to certify the replacement piping. Additionally, the inspector reviewed the specified replacement coating, the application of the replacement coating and the backfill of the excavated area after the piping had been tested.

The inspector reviewed the finite element analysis (FEA) results from PSEG's past operability analysis on the affected Unit 1 buried AFW piping completed by the licensee in order to demonstrate past operability at a reduced system pressure of 1275 psig. The design pressure of the AFW system is 1950 psig.

The inspector also reviewed the UT testing results (approximately 400) performed on limited portions of the Unit 2 AFW piping in response to the conditions observed on Unit 1 piping in order to determine if significant degradation existed on the Unit 2 buried AFW piping.

Rejectable Indication Accepted For Service After Analysis:

The inspector reviewed the Notification and the UT data report of a rejectable wall thickness measurement on the #11 SG Feedwater elbow during 1R20. The inspector reviewed the additional wall thickness data taken to further define the condition and

Comment [L4]: I still believe that no matter where you move this to, it is still purple.

reviewed the finite element analysis (FEA) which verified that sufficient wall thickness remained to operate the component until the next refueling outage when it will be replaced.

b. Finding

The inspector identified the following violation related to ASME, Section XI testing of buried Unit 1 and Unit 2 buried AFW piping.

Introduction. The inspector identified a GREEN non-cited violation (NCV) of 10 CFR 50.55a(g)(4) and the referenced American Society of Mechanical Engineers (ASME) Code, Section XI, paragraph IWA-5244 for PSEG's failure to perform required pressure tests of buried components. This piping is safety related, 4.0" ID, ASME Class 3, Seismic Class 1 piping.

Description. Portions of the Unit 1 and Unit 2 Auxiliary Feedwater (AFW) System piping is buried piping and has not been visually inspected since the plant began operation in 1977 for Unit 1 and since 1979 for Salem Unit 2. In April 2010, approximately 680 ft. (340 ft. of the #12 SG AFW supply and 340 ft. of the #14 SG AFW supply) of piping between the pump discharge manifold and the connection to the Main Feedwater piping to the affected SGs was discovered to be corroded to below minimum wall thickness (0.278") for the 1950 psi design pressure of the AFW System. The discovery was noted by PSEG during a planned excavation implementing their buried pipe inspection program. The lowest wall thickness measured in the affected piping was 0.077". PSEG plans on excavating the Unit 2 buried piping to inspect the condition during the next Unit 2 outage scheduled for the spring of 2011. The affected Unit 1 piping was replaced. Although no leakage was evident for these conditions, the inspector questioned if periodic pressure tests had been conducted on this underground piping.

10 CFR 50.55(a)(g)(4)(ii) requires licensees to follow the in-service requirements of the ASME Code, Section XI. Paragraph IWA-5244 of Section XI requires licensees to perform pressure tests on buried components to demonstrate the structural integrity of the tested piping. The pressure test required by IWA-5244 is considered to be an inservice inspection and is part of Section XI. Section XI and IWA-5244 do not specify other non-destructive examinations (NDE) on buried components to demonstrate the existence of structural integrity. PSEG did not perform the required tests for Unit 1 during the 1st period (5/19/01 to 6/3/04) and 2nd period (6/24/04 to 5/20/08) periods of the 3rd In Service Inspection Interval, and for Unit 2 for the 1st period (5/19/01 to 6/3/04) and 2nd period (6/24/04 to 5/20/08) of the 3rd In Service Inspection Interval. Thus, PSEG **Reglected_did not** to perform the only inservice inspection, intended to provide evidence of demonstrate the structural integrity of this safety related buried piping.

PSEG sought relief, from the NRC, from the previous Code required pressure testing in 1988 for Unit 1 only. Relief was granted to PSEG, by the NRC, to perform an alternate flow test in 1991 for Unit 1. However, PSEG did not perform the proposed alternate tests during the 2nd inservice interval and during the 1st (5/19/01 to 6/3/04) and 2nd (6/24/04 to 5/20/08) periods of the 3rd In Service Inspection Interval for Unit 1. Also, PSEG did not request relief from the required tests or perform perform the proposed alternate tests on the Unit 2 buried piping during the 1st period (5/19/01 to 6/3/04) and 2nd period (6/24/04 to 5/20/08) of the 3rd In Service Inspection Intervals. [Thus, PSEG

Comment [L5]: According to the code it appears to require a "rate of pressure loss" test. I understand that there are some differences in what the code said then and now but we probably need to make all the write-up sections consistent. If the Enforcement section says rate of pressure loss maybe the whole write-up should sy raite of pressure loss.

Comment [L6]: Should delete as long as included in the Enforcement section. Comment [L7]: Purple

Comment [L8]: Should delete as long as included in the Enforcement section.

missed an opportunity to identify and correct this performance deficiency which affects Unit 1 and Unit 2.

A second opportunity to identify and correct this performance deficiency was missed in 2002 when a similar condition (failure to perform buried piping pressure tests) was documented in NRC Inspection Report 05000286-01-011 for Indian Point Unit 3 as NCV 50-286/2001-011-02. PSEG's review of NRC inspection reports did not identify that the same condition existed at Unit 1 and Unit 2.

PSEG replaced the affected buried Unit 1 piping during the refueling outage in April/May 2010. The required pressure tests were successfully completed after the replacement of the Unit 1 buried piping. Because the AFW system functioned as required during the plant shutdown prior to the start of 1R20 (April 2010), the system did not loose operability.

For Unit 2, PSEG completed an Operability Determination and a Risk Assessment for continued operation until the next scheduled refueling outage scheduled for spring 2011 for this issue. These evaluations determined that the condition was acceptable for continued operation until spring 2011.

<u>Analysis</u>. PSEG's failure to perform the required pressure test on this safety related buried piping is a performance deficiency for each Salem Unit. This condition was the result of the licensee's failure to meet the regulatory requirements of 10 CFR 50.55a(g)(4) and the ASME Code, Section XI, paragraph IWA-5244. This performance deficiency was reasonably within the licensee's ability to foresee and correct and should have been prevented, based on the above noted missed opportunities. PSEG did not perform the only inservice inspection (IWA-5244), intended to provide evidence of demonstrate the structural integrity of this safety related buried piping.

The inspector determined that the performance deficiency was more than minor because this condition affected the Equipment Performance attribute (availability and reliability) of the mitigating systems cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Further, if left uncorrected, this condition could have reculted in a more significant condition due to continued, undetected corrosion without pressure testing for leakage.

The inspector screened this performance deficiency using IMC 0609, Attachment 0609.04, "Phase 1 Initial Screening and Characterization of Findings." This finding impacts the mitigating systems cornerstone by adversely affecting the secondary, short term decay heat removal capability. Because the finding did not result in loss of operability or functionality, the inspector determined that the finding screened to Green, a very low safety significance.

The inspector determined that a Cross Cutting Aspect did not exist because the issue was not indicative of current performance because the condition existed since 1991, more than 3 years ago. Specifically, the failure to perform these pressure tests began in 1988 when PSEG requested relief from the requirement and neglected to incorporate the actions of the relief when it was granted in 1991.

Comment [L9]: Not sure I understand this the way you have it written here. Wouldn't a better argument be that it was within their ability to forsee and correct because it was a requirement that we know that they were aware of because they sought relief from the requirement for Unit 1 in 1991.

Comment [L10]: We do not require licensee's to review and take action on inspection reports written to document issues at other sites. So unless their procedure requires this we should probably back away. Again I believe that we can say that it was within their ability to forsee and correct because it was a requirement that we know that they were aware of because they sought relief from the requirement for Unit 1 in 1991.

Comment [L11]: Use this statement to support a <u>not</u> more than minor violation for Unit 2 based on the information currently provided to us by PSEG in the OD and RA. This may change during the next Unit 2 outage depending on what they find with the piping on Unit 2, but we can deal with that during the U2 outage.

Comment [L12]: I think that we missed the point here. As defined in MC 0612 a performance deficiency is an issue that <u>is the result</u> of a licensee not meeting a requirement or standard where the cause was reasonably within the licensee's ability to forsee and correct, and therefore should have been prevented. PSEG did not meet the CFR because they did not perform the testing, not the other way around. What was the result/the impact on the safety of the public by not performing the required testing? It is necessary to define thise result in order to evaluate the significance – that is why the <u>11</u>

Comment [L13]: As stated above the issue was within their ability to forsee and correct because it was a requirement that we know that they were aware of because they sought relief from the requirement for Unit 1.

Comment [L14]: Since, as of today, there was no consequence for the lack of testing, the easier approach for "more than minor" is the left uncorrected approach. So, in accordance with MC 0612, we need to state the cornerstone affected and then define why if left uncorrrected this PD would result in a more significant safety concern.

Comment [L15]: This does not meet the MC 0612 documentation requirements. Needs to address all the screening criteria. A more appropriate statement would be something like this. The inspectors determined the issue was of very low safety significance (Green) because the finding was not a design or qualification deficiency [______7]

Comment [L16]: Would like more information here if possible, but understand that MC 0612 defines present performance as occurred within the last three years.

Enforcement. [10 CFR 50.55a(g)(4) states, in part: "Throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components ...which are classified as ASME Code Class 1, Class 2 and Class 3 must meet the requirements, set forth in Section XI of editions of the ASME Boiler and Pressure Vessel Code". Paragraph IWA-5244, Buried Components, of Section XI says, in part,

"(b)that For for buried components where a VT 2 visual examination cannot be performed, the examination requirement is satisfied by the following: (1) The system pressure test for buried components that are isolable by means of valves shall consist of a test that determines the rate of pressure loss. Alternatively, the test may determine the change in flow between the ends of the buried components. "

Contrary to these requirements, PSEG did not perform the required pressure tests of the buried AFW piping to the #12 SG and #14 SG at Salem Unit 1 during the 2nd In Service Inspection Interval (2/27/88 to 5/19/01) and during the 1st (5/19/01 to 6/3/04) and 2nd (6/24/04 to 5/20/08) periods of the 3rd In Service Inspection Interval (5/19/01 to 5/19/11). Also, contrary to these requirements, PSEG did not perform the required pressure tests of the buried piping to the #22 SG and #24 SG for Unit 2 for the 1st period (5/19/01 to 6/3/04) and 2nd period (6/24/04 to 5/20/08) of the 3rd In Service Inspection Interval. Consequently, from 2/27/88 to 4/20/07) the required pressure tests were not performed to demonstrate structural integrity on the affected buried Unit 1 AFW piping.

Because PSEG entered this condition into the corrective action process (Notification 20459686) and because it is is of very low safety significance (Green), it is being treated as a non-cited violation consistent with Section VI.A.1 of the NRC Enforcement Policy. NCV 50-272/2010-?? and NCV 50-311/2010-??

4OA2 Identification and Resolution of Problems (71152)

a. Inspection Scope

The inspectors reviewed a sample of corrective action reports (notifications), listed in Attachment 2 which involved in-service inspection related issues, to ensure that issues are being promptly identified, reported and resolved.

b. <u>Findings</u>

No findings of significance were identified.

4OA5 Temporary Instruction (TI) 2515/172

a. Inspection Scope

The Temporary Instruction (TI), 2515/172 provides for confirmation that owners of pressurized-water reactors (PWRs) have implemented the industry guidelines of the Materials Reliability Program (MRP) -139 regarding nondestructive examination and evaluation of certain dissimilar metal welds in the RCS containing nickel based Alloys 600/82/182.

Comment [L17]: Originally, without the deletion that you recommended TIM, the way this was cited was not clear. However, recommended deletion would address my earlier comment.

During 1R20 PSEG inspected the dissimilar metal weld on the 1" reactor vessel drain piping with no detected indications. Salem Unit 1 has dissimilar metal welds in the eight reactor coolant system piping to reactor vessel nozzle safe end welds. No additional inspections or MSIP applications were performed during 1R20. This TI requires documentation of specific questions in an inspection report. The

questions and responses for the IR 05000272/2010003 section 4OA5 are included in this report as Attachment "B-1".

b. Findings

No findings of significance were identified.

40A6 Meetings, including Exit

The inspectors presented the ISI inspection and TI 2515/172 inspection results to Mr. Ed Eilola, Salem Plant Manager, and other members of the PSEG staff at the conclusion of the inspection at an exit meeting on June 28, 2010 for Salem Unit 1. The licensee acknowledged the conclusions and observations presented. Some proprietary information was reviewed during this inspection and was properly destroyed. No proprietary information is contained in this report.

40A7 Licensee Identified Violations

The following finding of very low safety significance was identified by PSEG. The finding is a violation of 10 CFR 50, Appendix B, Criterion III, Design Control that requires in part that measures shall be established to assure that applicable regulatory requirements and design bases are correctly translated into specifications, drawings, and instructions and that these measures shall include provisions to assure the proper selection and review for suitability of application of materials, parts, equipment, and processes. PSEG did not provide an effective protective coating for the buried AFW piping on Unit 1.

PSEG identified general corrosion that reduced the wall thickness of the safety related piping to less than the design minimum wall thickness of 0.278" for the system design pressure of 1950 psig. The lowest measured wall thickness was 0.077". An FEA for the degraded piping was able to demonstrate past operability at a reduced operating pressure of 1275 psig. However, the required design pressure for the AFW system is 1950 psig and could not have been supported by the "as found" corroded piping.

This finding was associated with the mitigating systems cornerstone, specifically the short term decay heat removal capability. The finding was determined to be Green because it was a design or qualification deficiency that was confirmed not to result in loss of operability it did not result in loss of operability or functionality of the AFW system.

Because PSEG entered this condition into the corrective action process (Notification 20456999) and because the issue is of very low safety significance (Green), this issue is being treated as a non-cited violation consistent with Section VI.A.1 of the NRC Enforcement Policy. NCV 50-272/2010003-??

Comment [L18]: Not necessary and I believe confuses the write-up.

Comment [L19]: This discussion should clearly include: cornerstone affected, justification for more than minor, and justification for screen to green based on Phase 1 questions in MC 0609. Probably need a little more detail here on how the phase 1 questions were answered. . See MC 0612 requirements for LIV documentation:

Include the requirement(s) violated, describe how it was violated, identify the licensees corrective action tracking number(s), and provide a very brief justification why the violation is not greater than Green. A complete reconstruction of the SDP logic is not required. However, Section 4OA7 must include the following introductory paragraph:

The following violations of very low safety significance (Green) or Severity Level IV were identified by the licensee and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy, for being dispositioned as a Non-Cited Violation.

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY CONTACTS

Licensee Personnel:

Howard Berrick, PSEG Pat Fabian, PSEG Mohammad Ahmed, PSEG Tony Oliveri, PSEG Tom Roberts, PSEG Ali Fakhar, PSEG Len Rajkowski, PSEG Dave Mora, PSEG Edley Giles, PSEG Walter Sheets, PSEG Bob Montgomery, PSEG Jim Mellchiona, PSEG Bill Mattingly, PSEG Pat Van Horn, PSEG Jim Barnes, PSEG Justin Werne, PSEG **Rick Villar, PSEG** Matthew Murray, PSEG

LIST OF DOCUMENTS REVIEWED

Notifications:

20457869, Control Air Piping Leak* 20462034, Basis AFW Discharge Line Design Pressure* 20461785, Untimely retrieval of Design Documents* 20461255, U2 Containment Liner Blisters* 20459259, U2 Containment Liner Blisters* 20459689, failure to do IWA-5244 pressure tests* 20456999, Guided Wave (GW) pipe wall loss 20% to 44%*, in Equipment Apparent Cause Evaluation (EQ:ACE) Charter 20457854, see Equipment Apparent Cause Evaluation (EQ: ACE) Charter 20457869, Air Line Leak, in Equipment Apparent Cause Evaluation EQ: ACE Charter 20458147, see Equipment Apparent Cause Evaluation (EQ: ACE) Charter 20458148, see Equipment Apparent Cause Evaluation (EQ: ACE) Charter 20458568, see Equipment Apparent Cause Evaluation (EQ: ACE) Charter 20458554, 11 CA HDR Line In Fuel Xfer Area Degraded* 20458761, 1R20 CA Buried Pipe Coating Repair* 20458925, 1R20 SA Buried Pipe Coating Repair* 20457262, (88) 1R20 AF Buried Pipe Inspection Results* 20460624, Need Heat Trace on AF lines in FFT Area 20457877, U1 Containment Liner Corrosion at 78' EI.*

20459259, U1 Corrosion on Containment Liner* 20459303, #14 AF pipe damaged penetration seal* 20459304, #12 AF pipe damaged penetration seal* 20459454, Request for Additional UT Data, 4/18/10 (due to 0.077" reading)* 20344017, Inspect steel liner in 1R19 20235636, NRC noted water running down containment wall 20459189, Question on location of RFO-14 location of a PZR shell weld 20290560, Replace section of 15B FWH shell-S1-R18 20457879, (184) 1R20 FAC(N18) 14# elbow below Tmin 20456828, (66) valve has visible boron buildup 1R20 20459232, Heavy Dry White Boron VIv Packing (1R20) 20456834, Heavy Dry White Boron Vlv Packing (1R20) 20456840, Medium Dry White Boron Vlv Packing (1R20) 20456839, Medium Dry White Boron Vlv Packing (1R20) 20389147, Recordable ISI Indications on CVC Tank 20344017, Inspect Steel Liner in 1R19 @ Containment Sump 20235636, NRC Noted Water Running Down Containment Wall 20392631, ARMA From ISI Program Audit 2008 20460624, Need Heat Trace on AF lines in FTT Area 20333050, Response to NRC NOV EA-07-149 20322039, 2nd Interval ISI NRC Violation 20397518, A1CVC-1CV180 Chk Vlv Stuck Open - PI&R review 20444514, Boric Acid Leak from Drain Line - PI&R review 20445314, boron leak - PI&R review 20448241, Minor Packing Leak - BAC - PI&R review 20435861, 21SJ313 Has Boric Acid Leakage - PI&R review 20417331, Boric Acid Leak at 11 CV156 - PI&R review 20411151, Tubing leak on 1SS653 - PI&R review 20414343, 12 Charging Pump seal inj. Line - PI&R review 20395346, 12 Bat PP Seal Leak - PI&R review 20450330, Containment Liner Corrosion - PI&R review 20385733, Severe Corrosion on FP Valve - PI&R review 20438320, (217) Op Eval. Of Containment Corrosion - PI&R review 20387897, Significant outlet pipe corrosion - PI&R review 20397225, MIC Corrosion Causing Through Wall Leak - PI&R review 20436836, Repair Cracks in Battery Cells - PI&R review 20392145, Update U1 ISI Relief Request Book - PI&R review 20449447, Update Salem Unit 1 ISI 10 Yr Plan - PI&R review 20449744, Update Salem Unit 1 Containment ISI 10 Yr Plan - PI&R review 20449442, Update Salem Unit 2 Containment ISI 10 Yr Plan - PI&R review 20449554, Salem U2 RFO18 ISI Scope - PI&R review 20416605, INPO PSIRV Alloy 600 Program - PI&R review 20404057, Unit 2 ISI (MSIP) - PI&R review 20392631, ARMA FROM ISI PROGRAM AUDIT 2008 - PI&R review 20388065, Water leaking in decon room - PI&R review 20439023, 23 CFCU Head Leakage - PI&R review 20439022, SW Header Leakage 23 CFCU - PI&R review 20389148, 1R19 ISI Weld Exam Limitations - PI&R review 20416605, INPO PSIRV Alloy 600 Program - PI&R review 20449442, Update Salem 2 Containment ISI 10 yr. Plan - PI&R review 20449554, Salem Unit 2 RFO18 ISI Scope - PI&R review

20449747, Update Salem 2 ISI 10 Yr. Plan - Pl&R review 20401542, Perform ISI BMV Exam on RPV Upper Head - Pl&R review 20449063, SA U1 Service Inspec – ISI & U1 TI 2515 - Pl&R review 20389147, Recordable ISI Indications on CVC Tank - Pl&R review 20392145, Update U1 ISI Relief Request Book - Pl&R review 20449744, Update Salem U1 Containment ISI 10 Yr. Plan - Pl&R review 20409943, NRC RIS 2009-04 SG Tube Insp Rqmts – Pl&R review 20459851, Section XI Exams Limited to 90% or Less – Pl&R review 20450520, Recoat Affected Areas of Liner 2R18 – Pl&R review 20457388, Excavation Issues – Pl&R review

*Denotes this Notification was generated as a result of this inspection

Section XI Repair/Replacement Samples:

W.O. 60079414, 14" Carbon Steel Elbow FAC indication below minimum wall

- W.O. 60084266, Salem U1 AF Buried Piping Inspection
- W.O. 60089561, 80101381: Replace Aux FW U/G Piping
- W.O. 60064104, Repair 15B FWH Area
- W.O. 60084375, BACC Program repair to 1PS1
- W.O. 60089612, BACC Program repair to S1CVC-14CV392
- W.O. 60089615, BACC Program repair to S1SJ-13SJ25
- W.O. 60089848, 80101382 Advanced Work Authorization #2 FTTA Replace Aux. Feedwater Pipe

W.O. 60089561, 80101381 Advanced Work Authorization – Replace Aux. FW U/G Piping, 4/9/10

Non-Code Repair

W.O. 60089848, Repair Non-nuclear, safety related CA Pipe, Unit 1 FTTA W.O. 60089757, Test Non-nuclear, safety related CA Pipe Repair, Unit 1 FTTA

Miscellaneous Work Orders:

W.O. 60089917, Penetrations for CA & SA Lines, 4/23/10

W.O. 941017262, Activity 04, Excavate and Examine Auxiliary Feedwater Piping, Unit 2, 12/94 W.O. 941017262, Activity 03, Excavate and Examine Auxiliary Feedwater Piping, Unit 2, 12/94 W.O. 941017262, Activity 02, Excavate and Examine Auxiliary Feedwater Piping, Unit 2, 12/94 W.O. 941017262, Activity 01, Excavate and Examine Auxiliary Feedwater Piping, Unit 2, 12/94 W.O. 60089561, Flush New AFW piping 12 and 14

Drawings & Sketches:

205236A8761-54, Salem Nuclear Generating Station, Unit No. 1, Auxiliary Feedwater Salem Unit 1 Aux Feed Piping, Allan Johnson, 4/10/10

80101381RO, Buried Pipe, Replaced AFW Piping Arrangement

207483A8923-11, Salem Nuclear Generating Station, Unit No. 1 – Reactor Containment Auxiliary Feedwater, Plans & Sections – Elev. 78' 10" & 100' 0", Mechanical Arrangement, Revision 8, 9/31/86 207483A8923-28, Sheet 1 of 4, Salem Nuclear Generating Station, Unit No. 1 – Reactor Containment Auxiliary Feedwater, Plans & Sections – Elev. 84',Mechanical Arrangement, Revision 8, 9/31/86

207483A8923-31, Sheet 2 of 4, Salem Nuclear Generating Station, Unit No. 1 – Reactor Containment Auxiliary Feedwater, Plans & Sections – Elev. 84', Mechanical Arrangement, Revision 8, 9/31/86

207483A8923-28, Sheet 3 of 4, Salem Nuclear Generating Station, Unit No. 1 – Reactor Containment Auxiliary Feedwater, Plans & Sections – Elev. 84',Mechanical Arrangement, Revision 8, 9/31/86

207483A8923-30, Salem Nuclear Generating Station, Unit No. 1 – Reactor Containment Auxiliary Feedwater, Plans & Sections – Elev. 84',Mechanical Arrangement, Revision 8, 9/31/86

207610A8896-12, Salem Nuclear Generating Station, Unit No. 1 – Auxiliary Building & Reactor Containmnet Compressed Air Piping, Aux. Building El. 84 East & React. Contain. El. 78, Mechanical Arrangement, Revision 8, 9/31/86

Design Change Packages/Equivalent Change Packages

80101382, Revision 2, Replace Salem Unit 1 AFW Piping from the Unit Mechanical Penetration Area El. 78'-0" to the Unit 1 Fuel Transfer Tube Area El. 100'-0"

80101381, Revision 1, Replace in-kind the Salem Unit 1 AF Piping that runs underground from the Unit 1 Fuel Transfer Tube Area to the Unit 1 Main Steam Outer Penetration Area

50.59 Applicability Reviews, Screenings & Evaluations

80101382; Salem Unit 1 12/14 AF Piping Reroute; 4/24/10

System & Program Health Reports & Self-Assessments:

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Program Documents

PSEG Nuclear Salem Units 1 & 2, Alloy 600 Management Plan, Long Term Plan (LTP), Revision 2, Integrated Strategic Plan For Long Term Protection from Primary Water Stress Corrosion Cracking (PWSCC), 10/15/09

ASME, Section XI,1998 Edition, 2000 Addenda, IWA-5244 Buried Components OAR-1, Owner's Activity Report, #S1RFO19, 1/15/09

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ER - AP - 331 - 1003, Revision 1, RCS Leakage Monitoring And Action Plan

ER - AP - 331 - 1004, Revision 2, Boric Acid Corrosion Control (BACC) Program Training and Qualification

ER - AA - 330 - 001, Revision 7, SECTION XI PRESSURE TESTING

LS - AA - 125, Revision 13; Corrective Action Program (CAP) Procedure

LS - AA - 120, Revision 8; Issue Identification And Screening Process

SH.RA-IS.ZZ-0005(Q)-Revision 6; VT-2 Visual Examination Of Nuclear Class 1, 2 and 3 Systems

SH.RA-IŚ.ZZ-0150(Q) – Revision 8, 10/19/04; Nuclear Class 1, 2, 3 and MC Component Support Visual Examination

OU-AP-335-043, Revision 0; <u>BARE METAL VISUAL EXAMINATION (VE) OF CLASS 1 PWR</u> <u>COMPONENTS CONTAINING ALLOY 600/82/182 AND CLASS 1 PWR REACTOR</u> VESSEL UPPER HEADS

OU-AA-335-015, Revision 0; VT 2 - VISUAL EXAMINATION

Areva NP, Inc., Engineering Information Record 51-9118973-000; Qualified Eddy Current Examination Techniques for Salem Unit 1 Areva Steam Generators, 10/15/09

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PSEG Test Procedure 10-H-8-R1, Unit 2 Auxiliary Feedwater 2100/2150 Hydro; 9/21/78

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003753, VT-10-113, PRV nozzle sliding support 003754, VT-10-114, RPV nozzle sliding support 006325, UT-10-041, PZR longitudinal shell weld J (100%) 007500, UT-10-132, PZR surge line nozzle (100%) 007901, UT-10-028, 13 SG lower head to tubesheet weld (67%) 006073, VE-10-026, CRDM TO VESSEL PENETRATION WELD, 4/12/10 008001, VE-10-027, 31-RCN-1130-IRS 008026, VE-10-028, 29-RCN-1130-IRS 009070, VE-10-030, 12-STG Channel Head Drain (100%) 033300, UT-10-027, 4-PS-1131-27 (100%) 033200, UT-10-029, 4-PS-1131-26 (100%)

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Miscellaneous Documents

Salem Unit 1 & Salem Unit 2 Technical Specification, 3.4.11 STRUCTURAL INTEGRITY, ASME CODE CLASS 1, 2 AND 3 COMPONENTS

Electric Power Research Institute (EPRI), Steam Generator Integrity Assessment Guidelines, Technical Report 1012987, Revision 2, July 2006

NRC Letter dated 3/11/91; FIRST TEN-YEARINSPECTION INTERVAL, INSERVICE INSPECTION PROGRAM RELIEF REQUEST, SALEM NUCLEAR GENERATING STATION, UNIT 1 (TAC NOS. 66013 AND 71101)

PSEG Nuclear, Salem Unit 1 & 2 Alloy 600 Management Plan, Long Term Plan (LTP), Revision 2, 10/15/09

Salem Unit 1 – Buried Piping Risk Ranking

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A-11 MPR Associates Report, Technical Input To Operability of Potential Containment Liner Corrosion, Revision 0, 10/30/09 Transmittal of Design Information #S-TODI-2010-0005, 4/20/2010 Transmittal of Design Information #S-TODI-2010-0004, 4/16/2010 OQ950315126, PSEG Itr. Dated 12/16/94; Excavated Auxiliary Feedwater Piping Walkdown/Disposition of Coating Requirements PSEG letter LR-N07-0224 dated 9/13/2007; REPLY TO NOTICE OF VIOLATION EA-07-149 UNTAGGING WORKLIST 4274446, 14 AF Underground Piping 1R20, 4/30/10 UNTAGGING WORKLIST 4274351, 12 AF Underground Piping 1R20, 4/30/10

LIST OF ACRONYMS

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A. A.

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ASME	American Society of Mechanical Engineers
BAST	Boric Acid Storage Tank
CEA	Control Element Assembly
CEDM	Control Element Drive Mechanism
CFR	Code of Federal Regulations
EDG	Emergency Diesel Generator
EPRI	Electric Power Research institute
EQ;ACE	Equipment Apparent Cause Evaluation
EQ	Environmental Qualification
ER	Engineering Request
FEA	Finite Element Analysis
FTTA	Fuel Transfer Tube Area
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	NRC Inspection Report
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
МТ	Magnetic Particle Testing
MSIP	Mechanical Stress Improvement Process
NCV	Non-cited Violation
Notification	Corrective Action Notification
NRC	Nuclear Regulatory Commission
NDE	Nondestructive Examination
OE	Operating Experience
PDI	Performance Demonstration Initiative
PI&R	Problem Identification and Resolution
PSEG	Public Service Electric & Gas, LLC
PWSCC	Primary Water Stress Corrosion Cracking
PQR	Procedure Qualification Record (Welding Procedures)
RCS	Reactor Coolant System
RT	Radiographic Test (Radiography)
PT	Dye Penetrant Testing
SDP	Significance Determination Process
SE	Safety Evaluation

SG	Steam Generator
SI	Stress Improvement
SSC	Structure, System, and Component
TS	Technical Specifications
UT	Ultrasonic Test
UFSAR	Updated Final Safety Analysis Report
VT	Visual Examination
WPS	Weld Procedure Specification

PROCEDURE or TI	MINIMUM REQUIRED SAMPLES Annual (A) Biennial (B)	CURRENT INSPECTION SAMPLES	RPS TOTAL SAMPLES TO DATE	PROCEDURE STATUS OPEN (O) CLOSED (C)	RPS UPDATED (Y) (N)
7111108 (G)	1				Y
2515/172	1				YES

A-13 INSPECTION SAMPLE COMPLETION STATUS

A-14 Attachment B-1

TI 172 MSIP Documentation Questions Salem Unit 1

Introduction:

The Temporary Instruction (TI), 2515/172 provides for confirmation that owners of pressurized-water reactors (PWRs) have implemented the industry guidelines of the Materials Reliability Program (MRP) -139 regarding nondestructive examination and evaluation of certain dissimilar metal welds in the RCS containing nickel based Alloys 600/82/182. This TI requires documentation of specific questions in an inspection report. The questions and responses for MSIP for the IR 05000311/2009005 section 40A5 are included in this Attachment "B-1".

In summary the Salem Units 1 and 2 have MRP-139 applicable Alloy 600/82/182 RCS welds in the four hot and four cold leg piping to reactor pressure vessel nozzle connections for each plant.

For Unit 1 during the 1R20 refueling outage in April 2010 PSEG inspected one dissimilar metal weld, a SG channel head drain line weld. No indications were reported from this inspection. PSEG plans on replacing this valve, and the dissimilar metal weld, during refueling outage 1R22.

TI 2515/172 requires the following questions to be answered for MRP-139 MSIP inspections:

<u>Question 1:</u> For each mechanical stress improvement used by the licensee during the Salem U1 1R20 outage, was the activity performed in accordance with a documented qualification report for stress improvement processes and in accordance with demonstrated procedures?

Response Question 1: No MSIP activities were conducted on U1 during 1R20.

<u>Question d.1</u>: Are the nozzle, weld, safe end, and pipe configurations, as applicable, consistent with the configuration addressed in the stress improvement (SI) gualification report?

Response - Question d.1: No MSIP activities were conducted on U1 during 1R20.

<u>Question d.2.</u>: Does the SI qualification report address the location radial loading is applied, the applied load, and the effect that plastic deformation of the pipe configuration may have on the ability to conduct volumetric examinations?

Response Question d.2: No MSIP activities were conducted on U1 during 1R20.

<u>Question d.3.</u>: Do the licensee's inspection procedure records document that a volumetric examination per the ASME Code, Section XI, Appendix VIII was performed prior to and after the application of the MSIP?

Response: Question d.3.: No MSIP activities were conducted on U1 during 1 R20.

<u>Question d.4.</u>: Does the SI qualification report address limiting flaw sizes that may be found during pre-SI and post-SI inspections and that any flaws identified during the volumetric examination are to be within the limiting flaw sizes established by the SI qualification report?

Response: Question d.4.: No MSIP activities were conducted on U1 during 1 R20.

<u>Question d.5.</u>: Was the MSIP performed such that deficiencies were identified, dispositioned, and resolved?

Response Question d.5.: No MSIP activities were conducted on U1 during 1 R20.

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I think that we missed the point here. As defined in MC 0612 a performance deficiency is an issue that <u>is</u> <u>the result</u> of a licensee not meeting a requirement or standard where the cause was reasonably within the licensee's ability to forsee and correct, and therefore should have been prevented. PSEG did not meet the CFR because they did not perform the testing, not the other way around. What was the result/the impact on the safety of the public by not performing the required testing? It is necessary to define thise result in order to evaluate the significance – that is why the definition is written that way. Not using the following words exactly one suggestion for defining the result would be - due to the condition of the pipe and coating identified during the excavation, it is clear that the failure to perform required testing would have ultimately resulted a loss of structural integrity for the pipe impacting the operability of the affected AFW trains.

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This does not meet the MC (0612 documentation requirements	. Needs to address all the
screening criteria. A more a	ppropriate statement would be so	mething like this. The inspectors
determined the issue was of	very low safety significance (Gree	en) because the finding was not a
design or qualification deficie	ency, did not result in an actual los	ss of safety function, and was not

potentially risk significant for external events.