Turkey Point Unit 3
Relief Request No. 10
ICW Pipe Leak Repair Modification Update

NRC NRR Turkey Point PM and Tech Staff Briefing

Public Pre-Submittal Meeting Presentation

February 17, 2022

Meeting Agenda

Introductions and Purpose

Summary and Overview of Relief Request No. 10 - Open Public Meeting

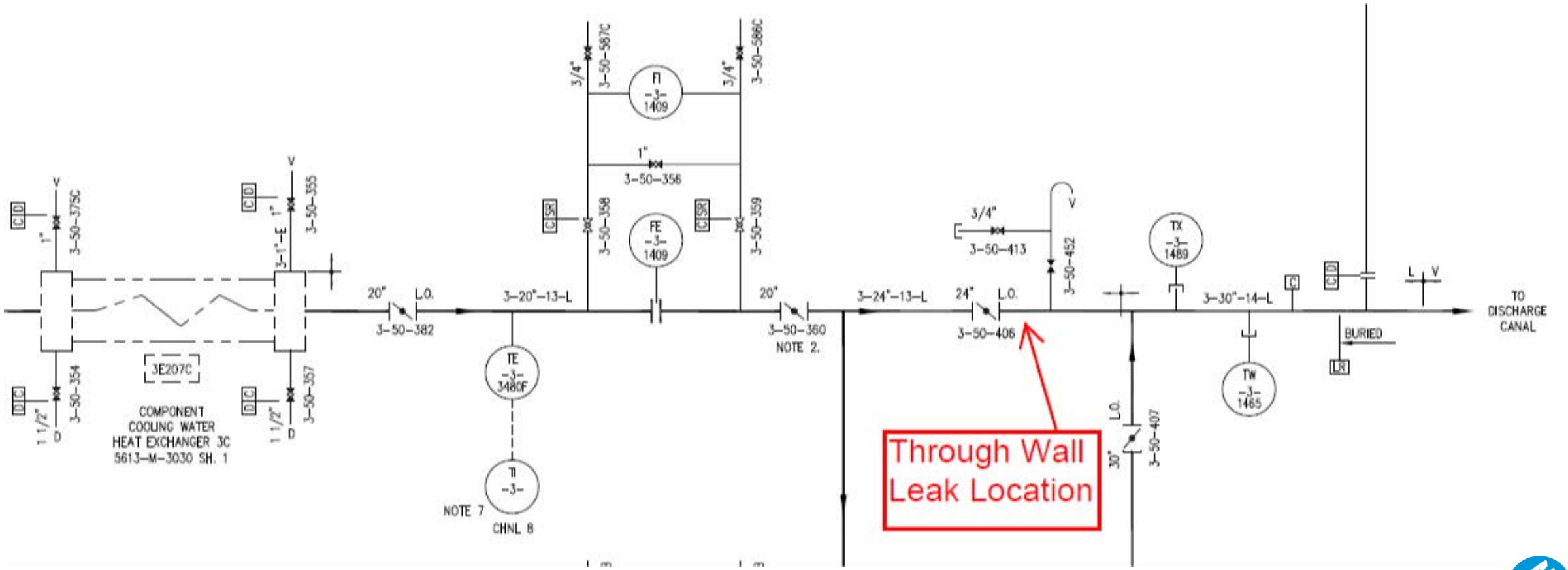
- Leak Discovery and Leak Location
- Pipe Characteristics and Flaw size
- Flaw Evaluation
- Code Repair Hardship, Risks and Relief Request
- Code Case- N 513-4 Extension
- Flaw size NDE Results Status Update
- Restoration Hardware Assembly Proposed Alternate

Leak Discovery

- On 3/5/2020, during surface preparation for metalizing / coatings applications, a through-wall leak was discovered on a 24” diameter Intake Cooling Water (ICW) safety related piping.

- The non-planar wall loss was identified under the pipe coatings, downstream of valve 3-50-406, the ICW manual isolation valve from the CCW heat exchangers.

ICW Leak Location

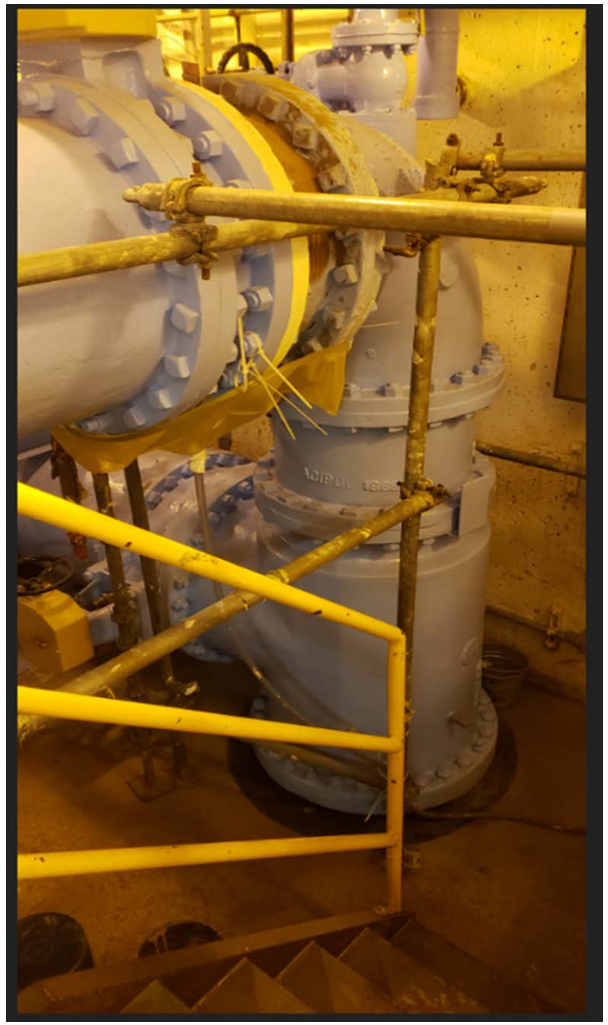


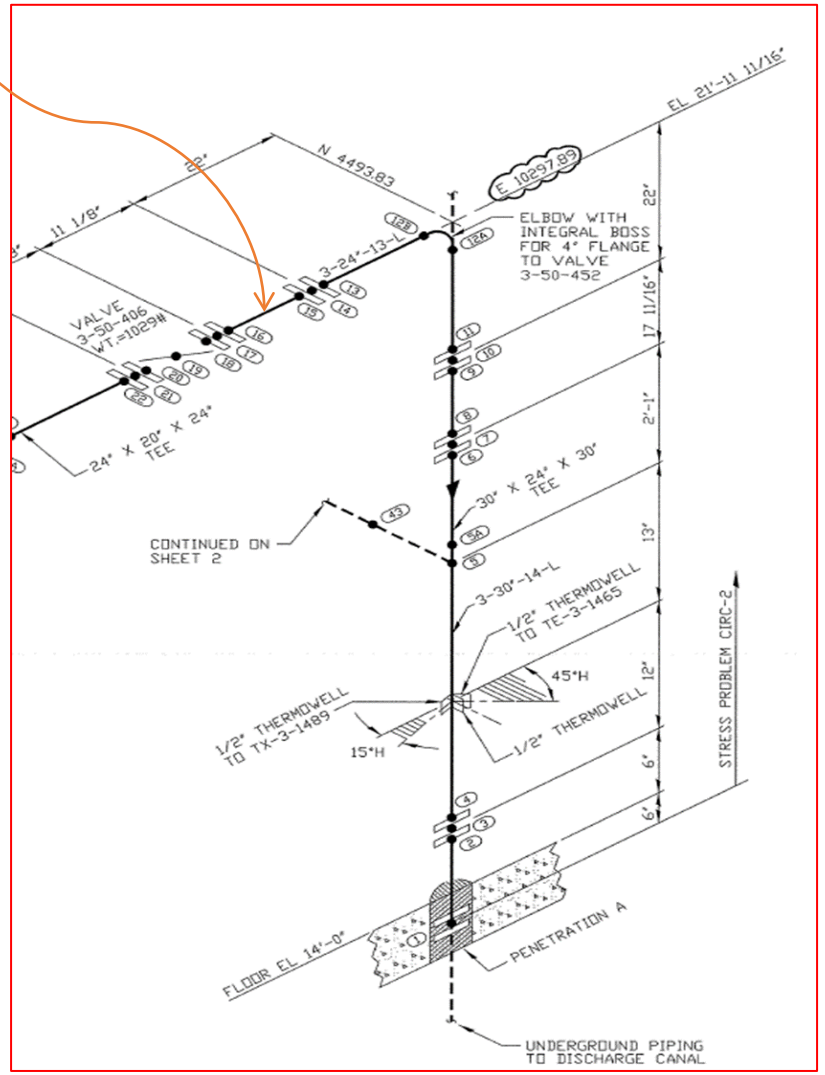
ICW Leak Location

- The flaw is approximately 12 feet from the underground piping directed to the discharge canal and is located in the Unit 3 CCW heat exchanger room.
- This section of piping directs the water exiting the CCW heat exchangers back to the discharge structure and the ultimate heat sink. It does not include any valves or any other components that could possibly fail and prevent delivery of the ICW fluid back to the discharge location.
- The safety significance of this section of pipe is low as the safety significant heat removal function is complete as the ICW fluid exits the CCW heat exchangers.

ICW Leak Location

11-1/8 inch-Long spool piece Directly Downstream of Valve 3-50-406





Pipe Characteristics and Flaw size

- The ICW safety related piping affected is classified as Quality Group C and treated as ASME Section XI Class 3 piping, 24” nominal diameter, with nominal wall thickness of 0.73”.
- The pipe is Cast Iron ASA 21.6-1955, Cement Lined ASA 21.4 with .25” thickness. Maximum operating parameters are T = 120 degF and P = 25 psig
- The flaw is shaped like a crater with two small, through-wall weep holes inside. The size of the flaw OD is 9/16” longitudinal and 13/16” circumferential.

Flaw Evaluation

- The subject ICW pipe spool piece is confirmed as being an original installation, being in operation from initial plant startup.
- Prompt Operability Determination concluded “Operable but Degraded”.
- Our initial assessment concluded that the reason for the thru-wall was due to a combination manufacturer’s casting defect and ID wall loss.
- Turkey Point performed a flaw evaluation utilizing Code Cases N-513-3 and N-513-4 when the through-wall leak was initially discovered to validate the structural integrity of the as found condition and to justify continued system operation until a repair could be performed.
- Historical site OE was not able to find a same or similar condition regarding this physical anomaly.

Code Repair Hardship

- The degraded ICW piping is a cast iron spool piece with concrete lining which is un-isolable.
- Turkey Point determined that performing an ASME Code compliant repair represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety.
- The hardship involves the unusual configurations required to affect a repair and the materials in the ICW system that create both operational and repair risks:

Code Repair Risks

- The operational risks associated with the ASME Code-compliant repair options would require removing the CCW HXs from service and providing temporary heat exchangers and temporary flow paths which could impact cooling of the Turkey Point spent fuel pool.
- The repair risks are related to the cast iron piping material and the likelihood of causing further damage by drilling and/or welding on the pipe.
  - Drilling or welding cast iron could cause cracking of the piping which could increase the leak rate or cause further damage to the concrete lining making the system more susceptible to internal corrosion.
  - If removed by drilling, the size of the flaw would necessitate a plug size which will limit the number of threads that can be cut into the pipe wall and therefore affect the ASME Code-required thread engagement and leak tightness of the plug.

Relief Request

- Compliance with ASME Section XI Code Case N-513 allows for one operating cycle to implement a viable repair.
- Due to the risks and hardship associated with code compliant repairs, Turkey Point requested relief to allow installation of a pressure retaining component that would restore areas with unacceptable through wall leakage.
- Relief Request 10 also requested to extend the use of ASME Code Case N-513-4 beyond the allowed single operating cycle for a period not to exceed six months (after approval) to allow for the design of an alternative repair method to be developed and implemented.
- Turkey Point proposed to increase the frequency of the compensatory measures leak rate monitoring, wall thickness ultrasonic measurements to validate structural integrity for six months, as well as to implement additional enhanced monitoring measures.

ASME Code Case N-513-4 extension

- The NRC found that the specific operations and repair risks based on the system functions and material construction created an unusual, but valid basis for establishing hardship with respect to implementing an ASME Code-compliant repair during the Unit 3 2021 refueling outage.
- On October 29, 2021, the NRC verbally authorized the proposed alternative for extending the use of ASME Code Case N-513-4 for a period not to exceed six months, or April 29, 2022, to allow for the design of the repair method to be established and implemented.

Flaw size Monitoring NDE 15-Day Status Update

Based on the last 15-Day NDE flaw assessment conducted on 2/8/2022, flaw growth rate projections do not indicate a challenge to the evaluated wall thickness of the subject pipe associated with the Code Case N-513-4 characterized flaw size. The estimated time at which wall loss would reach an adjusted minimum allowable wall thickness of 0.650 inches would be **July 06, 2023**.

Updated Relief Request Proposed Alternative

Restoration Hardware Assembly

- The original design code for the Unit 3 ICW system was USAS-B31.1-1955 and has been reconciled to ASME B31.1, 1973 Edition through Winter 1976 Addenda. The piping configuration is seismically designed.
- The piping and components involved in this restoration include the subject 25.8” OD straight section of degraded pipe, the adjacent Pipe Spool flanges, the adjacent upstream flange connected to Valve 3-50-406, and the flange connected to adjacent downstream elbow.
- The Pipe Spool will be restored by encapsulation using a 2-piece split Restoration Hardware Assembly with interfacing gaskets at the circumferential edge faces of the Pipe Spool end flanges and the axial edges of the Restoration Hardware Assembly.
- Additionally, the existing bolts connecting the existing spool piece flanges and the adjacent valve and elbow flanges will be replaced with high-strength, saltwater corrosion-resistant stud bolting that incorporates individual gaskets to prevent leakage through the flange bolt holes.
- The Restoration Hardware Assembly design calculations include piping re-analysis with seismic loading that also includes the mass of the Restoration Hardware Assembly.

Restoration Hardware Assembly

- The Restoration Hardware Assembly is designed to ASME B31.1, 1973 Edition w/Addenda through Winter 76 Safety Related component for Code restoration of the pipe spool and it will be provided for installation in the field by FPL to encapsulate the existing degraded spool piece.
- All wetted parts of the Restoration Hardware Assembly will be constructed of materials that are highly resistant to saltwater corrosion.
- The exterior of the encapsulated portion of the existing Pipe Spool Flanges will have a saltwater resistant surface coating applied by FPL, where required, to inhibit future metal loss.
- The straight section portion of the Pipe Spool that contains the degradation does not have to be removed and is reclassified as non-pressure boundary / non-structural / sacrificial material after the restoration is complete.
- The installation of the Restoration Hardware Assembly will restore the Intake Cooling Water Piping to ASME code compliance by providing a new pressure boundary over the degraded Pipe Spool.

End of Public Meeting
Q&A

- Ask for questions/comments