TVA Request for Alternative: SQN CRDM Canopy Seal Welds

March 2021

TVA TENNESSEE VALLEY AUTHORITY

Agenda

Outage activities

Alternative visual examination

Alternative weld repair

Precedents

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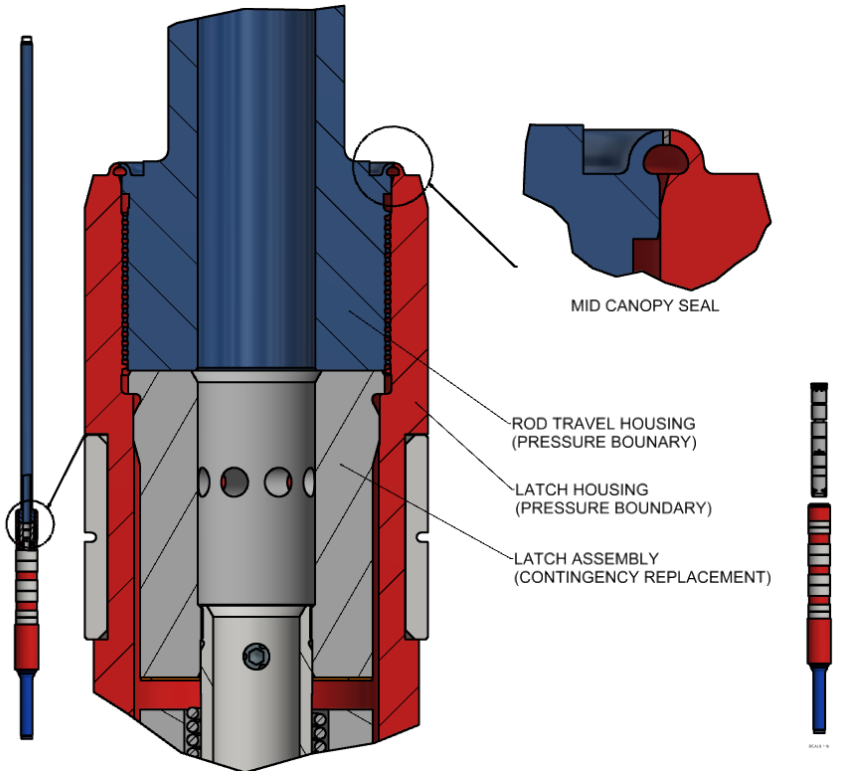
Outage Activities

- Planned Activities
- Inspection of CRDMs
- Failure of inspection criteria may require latch assembly replacement

- Contingent Activities
- Latch assembly replacement requires disassembly of the CRDM housing including the mid canopy seal weld
- A visual weld inspection would be performed after restoring the canopy seal weld
- Defects identified during this process may require an overlay



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ASME Code Requirements

- For both units:
- The Code of Record for the Fourth 10-Year ISI Interval is the 2007 Edition with 2008 Addenda of the ASME BPV Code, Section XI
- The Construction Code for 53 of the CRDM housings is ASME Section III, Summer 1968 Edition
- The Construction Code for an additional 4 CRDM housings is ASME Section III, 1971 Edition through Winter 1972 Addenda
- IWA-4420 and NB-4131 provide the requirements for defect removal.
- IWA-4422.2.2(a) requires a surface examination of the defect removal area prior to welding
- IWA-4422.2.2(e) requires examination of the repaired area, following welding, in accordance with IWA-4520 and the original Construction Code.
- NB-5271 requires examination of specially designed seal welds by either magnetic particle or liquid penetrant methods
- Relief will be requested in accordance with 10 CFR 50.55a(z)(2)

Alternate Visual Examination

- To comply with ASME Section XI and the original Construction Code, a surface examination must be performed on the completed seal weld
- The CRDM mid canopy seal welds are located above the Reactor Vessel Closure Head, providing extremely limited access for workers to reach the assembled weld for examination
- This highly congested area is also subject to high radiation levels
- Most of the repair activities will be performed remotely using robotic equipment to the extent practical
- The required dye penetrant (PT) examinations would necessitate hands on access to the mid canopy weld
- Sequoyah will perform a remote enhanced visual examination on the completed weld, in lieu of the surface examination required by Code
- The proposed remote enhanced visual examination would be conducted using a video camera with 5X magnification
- Lighting and acuity will be verified using ASME Section XI Table IWA-2211-1 requirements for VT-1 note (2)
- A machinist scale will be used to ensure a 1/32-inch graduation can be distinguished

Alternate Weld Repair

- In the event a defect that can not be removed is identified in the seal weld or adjoining base materials, Sequoyah will replace the original CRDM housing intermediate seal weld with a modified seal weld overlay using Code Case N-504-4 as guidance
- Contrary to the requirements of ASME Section XI and the original Construction Code, this modified seal weld may be installed without removal of the defect, and without the associated surface examination of the defect removal area prior to welding
- The modified seal weld overlay will serve as a full replacement for the secondary leakage barrier
- It will not serve a structural function
- The full structural load is still carried by the threaded connection in accordance with the original CRDM housing design

Precedents

- NRC Letter to Exelon, “Braidwood Station, Units 1 and 2 - Relief from the Requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (EPID L-2018-LLR-0033),” dated January 17, 2019
- NRC Letter to TVA, “Sequoyah Nuclear Plant, Unit 1 - Relief from ASME Code Repair Requirements for Canopy Seal Welds (TAC NO. MA9095),” dated September 12, 2000
- NRC Letter to TVA, “Relief from ASME Code Repair Requirements for Canopy Seal Welds at Watts Bar Nuclear Plant (TAC NO. MA5051),” dated August 25, 1999
- NRC Letter to TVA, “Relief from ASME Code Repair Requirements for Canopy Seal Welds Sequoyah Nuclear Power Plant, Unit 1 (TAC NO. M93835),” dated April 4, 1996


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