

SMiRT LBB Workshop

V. C. Summer Experience

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V. C. Summer Experience

- In October 2000, during a normal refueling outage significant boric acid deposits were discovered in the vicinity of the reactor vessel Loop A outlet nozzle to pipe weld location by plant walkdown
- A small hole in the Alloy 82/182 weld was discovered
- Unidentified leak rate was 0.30 gpm from all sources (Technical specification limit of 1.0 gpm)
- Ultrasonic inspections from outside were inconclusive
- Ultrasonic inspections from inside the pipe revealed a single flaw near the top of the pipe

V. C. Summer Experience (Continued)

- Destructive examination confirmed axial primary side initiated cracking confined to the Alloy 182 nozzle to pipe weld and to the Alloy 182 buttering on the inside surface of the low Alloy steel nozzle near the weld
- A short shallow circumferential (a maximum depth of 0.20 inches and length 1.6 inches) crack in the buttering which arrested at the low alloy steel nozzle
- A number of small indications were also characterized and verified by destructive examination
- Based on detailed investigation, it was concluded that this incidence was due to the primary water stress corrosion cracking (PWSCC) in the Alloy 82/182 welds

V. C. Summer Experience (Continued)

- Safety assessments show that there is a very low risk of pipe rupture as a result of PWSCC of Alloy 82/182 welds
- There have been no previous reports of leakage from these types of welds worldwide. V. C. Summer was discovered well before there was a risk of failure
- Existing Alloy 82/182 weld was removed and replaced with crack resistance Alloy 52/152 weld

V. C. Summer Experience (Continued)

- LBB concept was proved by V. C. Summer incident
- LBB analysis concluded that all the recommended margins were maintained. LBB concept remains applicable to V. C. Summer

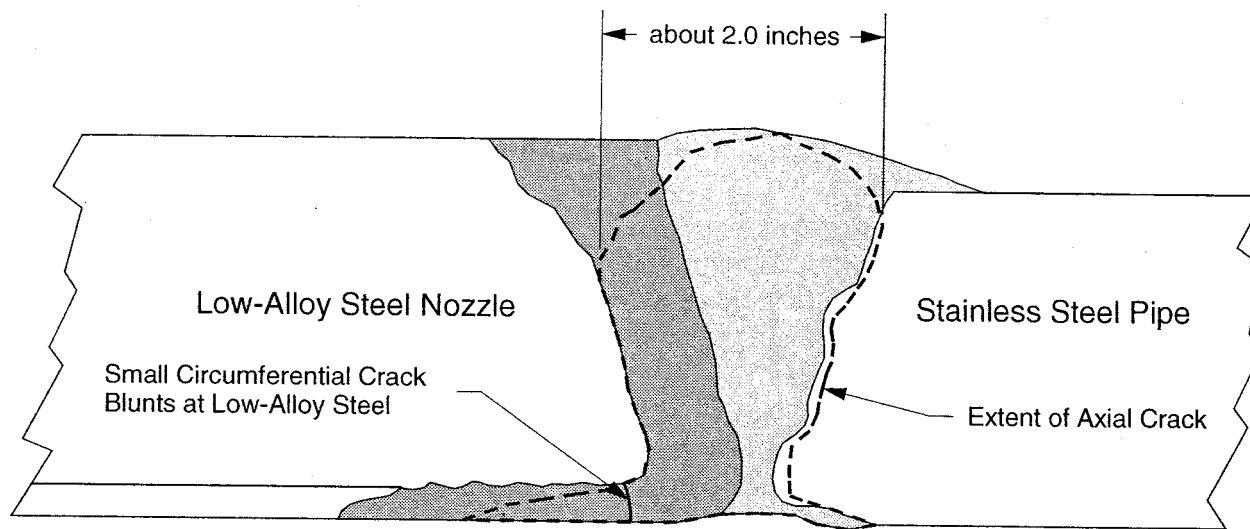
Ringhals 3 and 4 Experience

- 4 Axial flaws in Ringhals Unit 4, 2 at Ringhals Unit 3.
- Flaws are entirely in the Alloy 182 Material.
- Boat samples removed from R4, and sent to Studsvik for evaluation.
- R3 remained inservice with the existing flaws
- Results were called “stress corrosion cracking”.
- Follow up inspection done on R3 in June 2001:
 - length increased by 2 to 4 mm
 - depth increased by 4 to 7 mm
 - one new shallow defect found
 - all flaws removed for study (ISI and metallurgical)

MRP Program

- As a consequence of the hot leg nozzle weld leak at V. C. Summer in October 2000, the industry, acting through the EPRI Material Reliability Project, has undertaken development of a comprehensive program to address this issue

V. C. Summer Experience (Continued)



Location of Axial and Circumferential Cracks in V.C. Summer Hot Leg Nozzle to Primary Coolant Pipe Weld