N-853-1 Proposed Revision

Travis Olson, Framatome

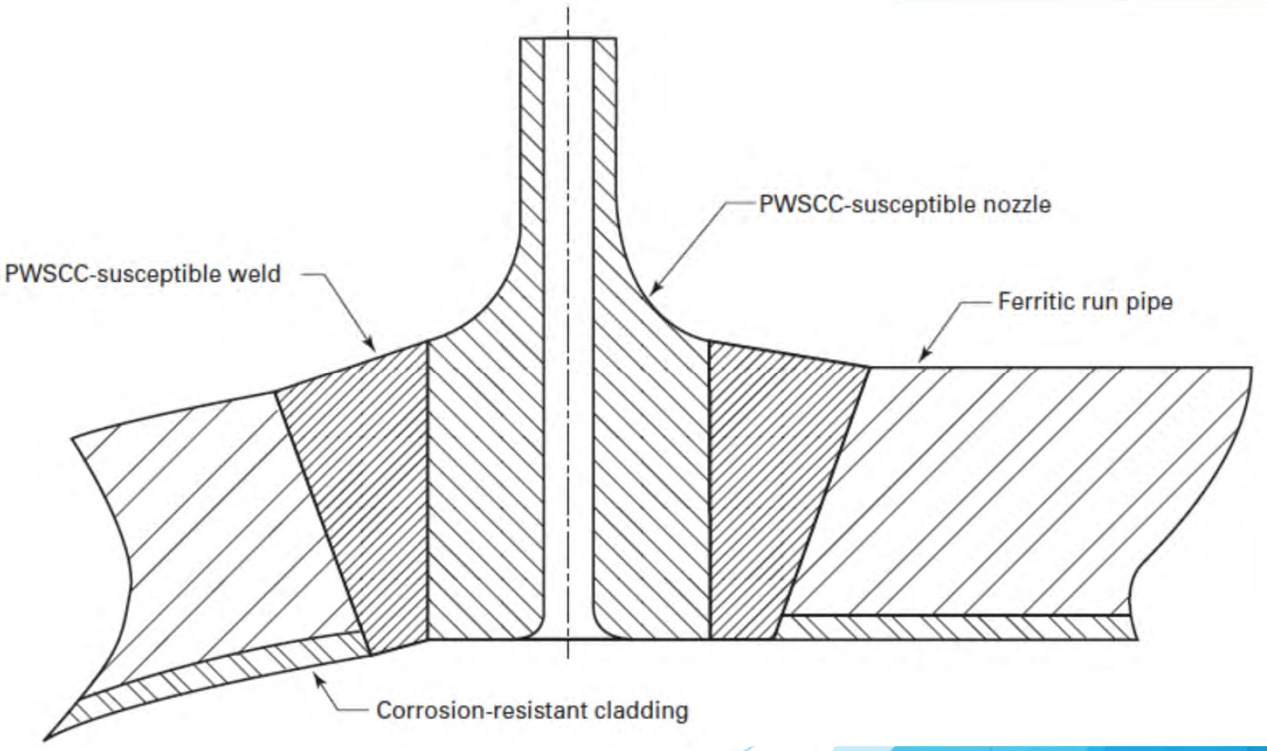
NRC/EPRI Technical Exchange Meeting

March 7, 2023

Purpose of N-853

- B&W and some CE NSSS primary piping contain branch connections
  - Contained in both the hot and cold legs
  - Some locations mitigated through piping replacement during SGRs
  - Locations not replaced remained susceptible to PWSCC
- Rules were needed for repair and mitigation as well as NDE
- PWROG funded a project to design and analyze a repair and mitigation approach
- Project supported technical basis for N-853 for Branch Connection Weld Metal Buildup (BCWMB)

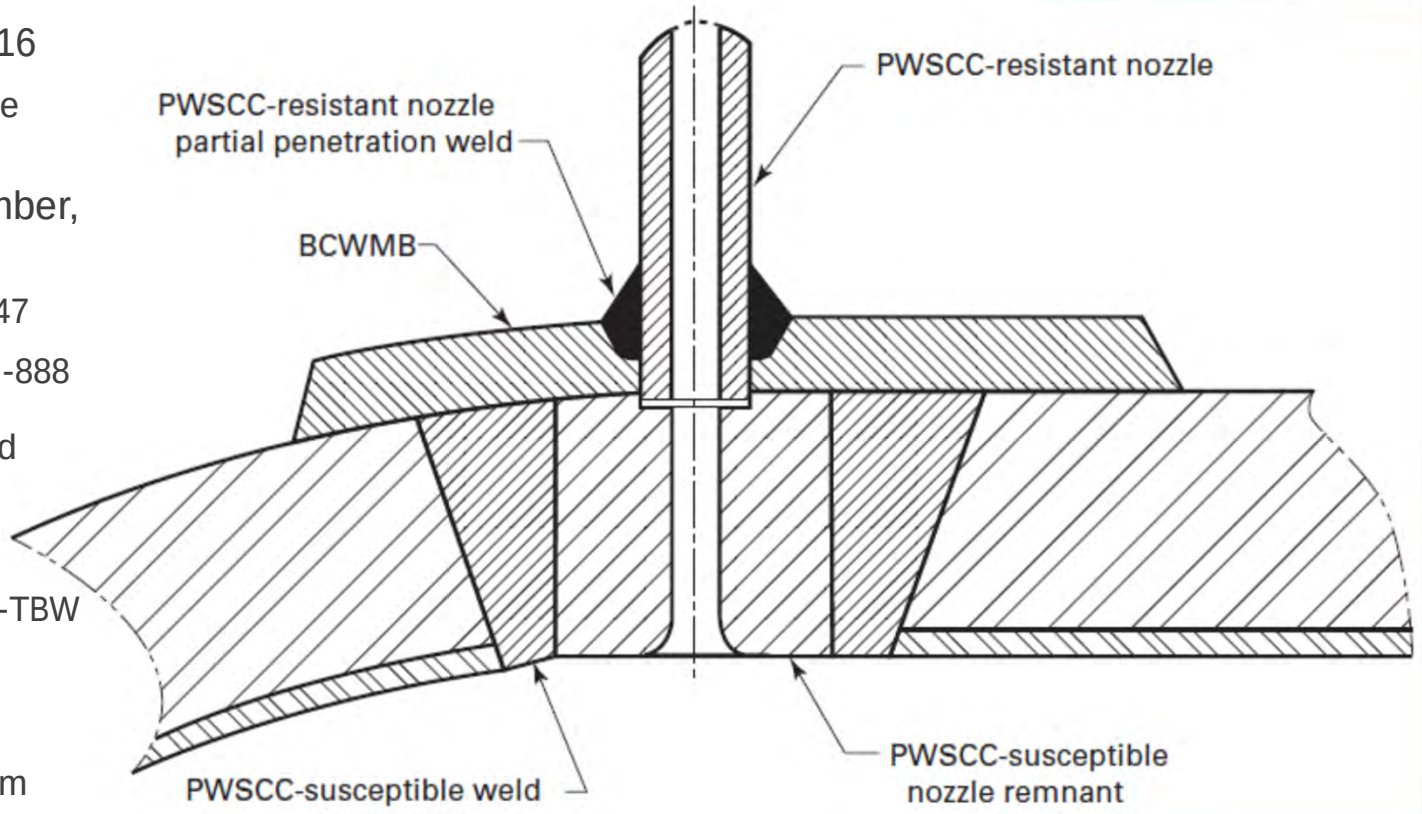
Typical Branch Connection Configuration



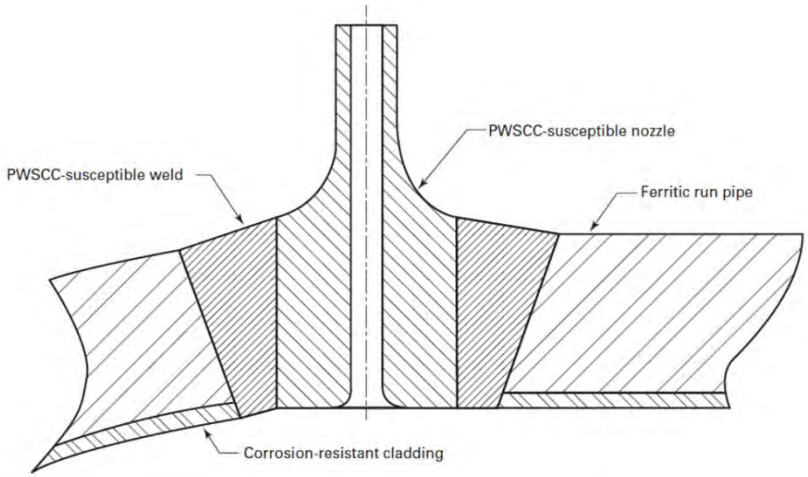
Status of N-853

- N-853 was approved June 2016
  - Endorsed as Acceptable Code Case by RG 1.147 R19
- N-853-1 was approved November, 2020
  - Not yet endorsed by RG 1.147
  - Incorporated reference to N-888 or IWA-4600 for procedure qualifications of temperbead welding
- Proposed N-853-2
  - Draft presented to ASME TG-TBW and WG-W&SRP August and November 2022 meetings
  - Currently incorporating comments and feedback from meetings

Typical Branch Connection Repair Configuration



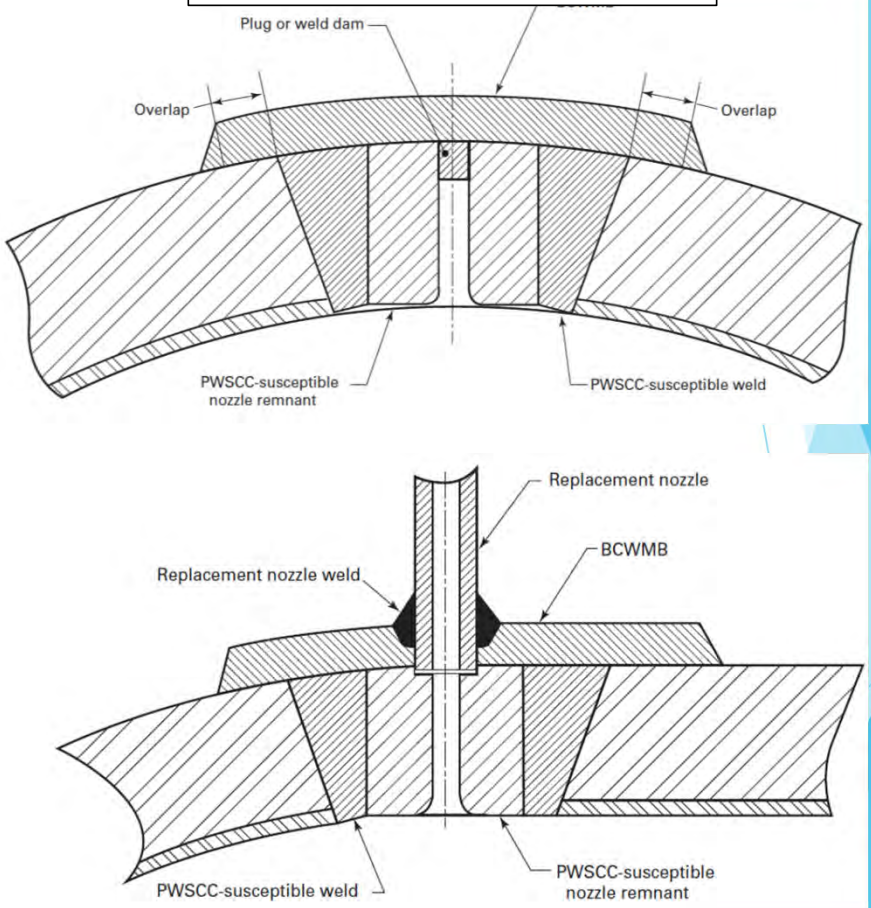
Implementation Steps



Existing Configuration

- Fabrication Examinations:
  - Surface exam prior to welding
  - Surface exam and UT of BCWMB (prior to hole drilling)
  - Surface exam of bore & J-prep
  - Progressive PT of new J-groove weld
  - Bare metal visual PSI

Cut Nozzle Flush and Install Weld Metal Buildup

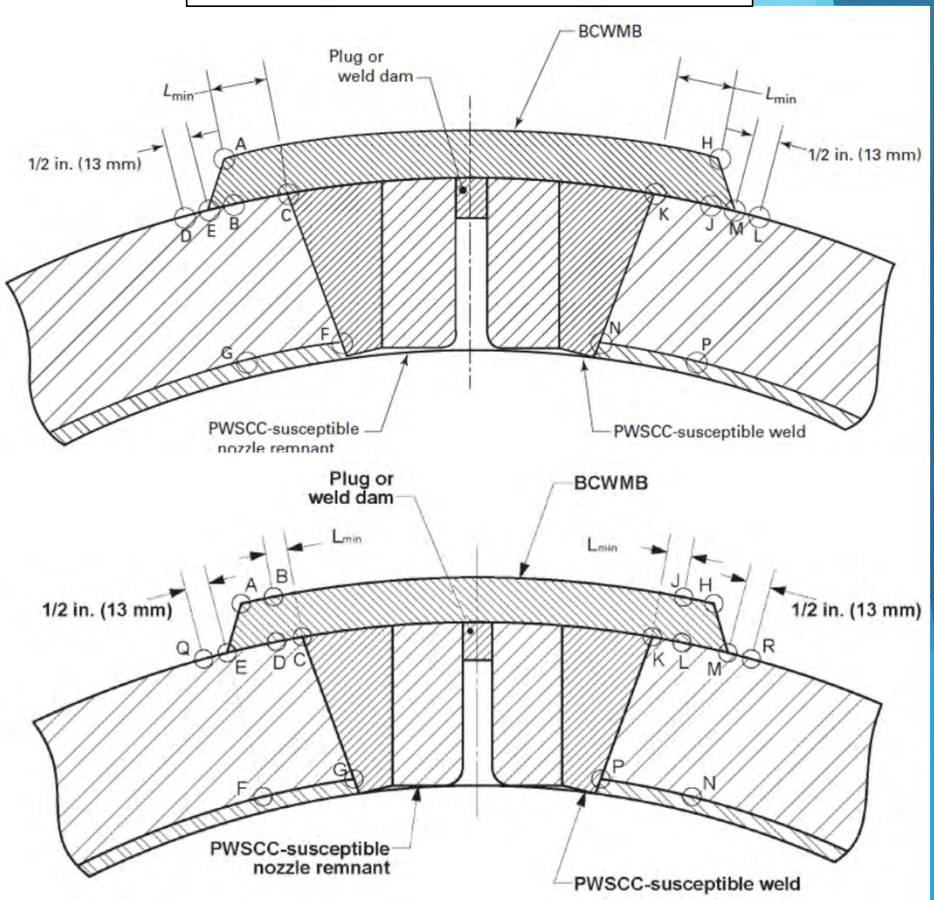


Drill Bore & J-Prep and Install New Nozzle

Proposed Changes

- Technical Changes
  - All technical changes are associated with UT volumetric examination requirements
    - Section 3 – Fabrication Examination
    - Figure 6 – Surface and Volumetric Acceptance Examination for BCWMB Prior to Nozzle Welding
  - Intent of revision is to allow use of ASME Section XI acceptance criteria and bring N-853 into alignment with other ASME C&S
    - Distinguish volumetric exam requirements for structural versus non-structural
    - Brings into alignment with other ASME C&S:
      - Non-Mandatory Appendix Q
      - N-740-3 (Draft)
      - N-894 (Draft)
- Editorial
  - Delete Mandatory Appendix I – should have been deleted as part of N-853-1 revision
  - Minor editorial changes throughout

N-853 and N-853-1 Figure 6

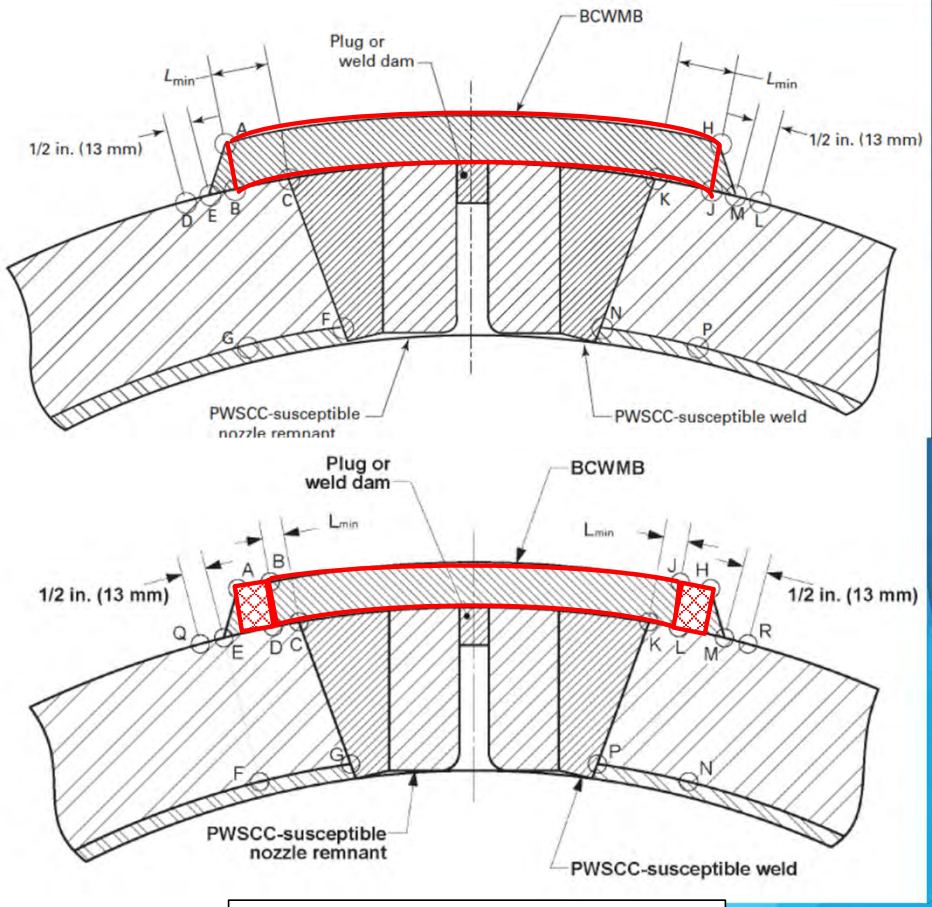


Proposed N-853-2 Figure 6

Proposed Changes

- Section 3 – Fabrication Examination
  - UT Qualification and Acceptance Criteria
    - Current revisions require qualification to Section V and acceptance criteria of NB-5330
    - Proposed revision would permit qualification to Section XI Mandatory App. VIII, Supplement 11, using IWB-3514 pre-service acceptance criteria
  - Volumetric Examination Volume
    - Current revisions require essentially 100% of the BCWMB to be volumetrically examined for planar flaws (volume A-H-J-K-C-B)
    - Proposed revision would require structural portion of BCWMB (volume B-J-L-K-C-D) to be examined for planar flaws. Non-structural portion (volumes A-B-D-E and H-J-L-M) would only be examined for laminar flaws for reduction in UT coverage (not to exceed 10%) of the structural portion of the BCWMB only

N-853 and N-853-1 Figure 6



Proposed N-853-2 Figure 6

Precedence and Moving Forward

- Precedence
  - Oconee RR RA-20-0334
    - NRC SER ML21124A170
  - UT in lieu of RT CC N-831-1
  - Majority of Section XI design specific ambient temperature temperbead code cases utilize Section XI qualifications and acceptance criteria
- Moving Forward
  - Incorporate comments to draft N-853-2
    - Present to May TG-TBW, WG-W&SRP, SG-RRA
    - August/November – WG-PQ&VE, SG-NDE
  - Support technical basis for N-888 revision
    - ASME Record 22-954, Revise N-888 to allow Section XI acceptance criteria
    - Establish position on subsequent UT monitoring of flaws