



Draft Response to NRC Proposed Rule Conditions for Code case N-729-1

Jack Spanner
PDI/NRC Meetings
May 2-4, 2007
Knoxville, TN

Proposed Rule

D-Head Penetration NDE

- Proposed 10 CFR 50.55a Amendment And Conditions
- (D) *Reactor Vessel Head Inspections.*
- (1) All licensees of pressurized water reactors shall augment their inservice inspection program by implementing ASME Code Case N-729-1 subject to the conditions specified in paragraphs (g)(6)(ii)(D)(2) through (6) of this section.
- (2) Item B4.40 of Table 1 must be inspected at least every fourth refueling outage or at least every seven calendar years, whichever occurs first, after the first ten-year inspection interval.
- **Comment: MRP has technical basis for 10 year inspection interval for replacement heads with alloy 690 materials.**

Proposed Rule

D-Head Penetration NDE (Cont'd)

- (3) Instead of fulfilling the specified 'examination method' requirements for volumetric and surface examinations of Note 6 in Table 1, the licensee shall perform a volumetric or surface examination or both of essentially 100 percent of the required volume or equivalent surfaces of the nozzle tube, as identified by Fig. 2 of ASME Code Case N-729-1. **A surface examination must be performed on all J-groove welds.** If a surface examination is substituted for a volumetric examination on a portion of a penetration nozzle that is below the toe of the J-groove weld (Point E on Fig. 2 of ASME Code Case N-729-1), the surface examination must be of the inside and outside wetted surfaces of the penetration nozzle not examined volumetrically.
- **Comment: This is a new requirement and requires a backfit analysis. Leaking of the J-groove weld will be detected visually or volumetrically from the tube and is not a safety issue. Inspection time will increase 7-21 days at a dose increase of 5-20 R. Current experience has shown a low or zero leak frequency.**

Proposed Rule

D-Head Penetration NDE (Cont'd)

- (4) Ultrasonic examinations must be performed using personnel, procedures and equipment that have been qualified by blind demonstration on representative mockups using a methodology that meets the conditions specified in paragraphs (g)(6)(ii)(D)(4)(i) through (iv) of this section instead of using a methodology that satisfies the conditions specified by the qualification requirements of Paragraph–2500 of ASME Code Case N–729–1.
- Comment: MRP is already developing a program that meets the intermediate rigor of SC V, Article 14 in lieu of low rigor. These conditions are not necessary.

Proposed Rule

D-Head Penetration NDE (Cont'd)

- (i) The diameters of pipes in the specimen set shall be within 1/2 in. (13 mm) of the nominal diameter of the qualification pipe size and a thickness tolerance of ± 25 percent of the nominal through-wall depth of the qualification pipe thickness. The specimen set must contain geometric and material indications that normally require discrimination from primary water stress corrosion cracking (PWSCC) flaws.
- Comment: MRP is currently evaluating the dimensional tolerances applicable to CRDMs, CEDM, ICI, and Vents. For example, may recommend use of UT modeling to show equivalence of demonstrated CRDM procedures for ICI examinations.

Proposed Rule

D-Head Penetration NDE (Cont'd)

- (ii) The specimen set must have a minimum of ten (10) flaws that provide an acoustic response similar to that of PWSCC indications. All flaw depths in the specimen set must be greater than 10 percent of the nominal pipe wall thickness. A minimum number of 30 percent of the total flaws must be connected to the outside diameter and 30 percent of the total flaws must be connected to the inside diameter. Further, at least 30 percent of the total flaws must measure from a depth of 10 to 30 percent of the wall thickness and at least 30 percent of the total flaws must measure from a depth of 31 to 50 percent of the wall thickness and be connected to the inside or outside diameter, as applicable. At least 30 percent, but no more than 60 percent, of the flaws must be oriented axially.
- **Comment: Replace with - All flaws shall be greater than 10% through wall. A minimum of 20% of the total flaws shall initiate from the inside surface and 20% from the outside surface. At least 20% of the flaws shall be in the depth ranges of 10%-30% and 31% -50%. At least 20% and no more than X% of the flaws shall be oriented axially. Mockups do not meet all the conditions in the proposed rule.**

Proposed Rule

D-Head Penetration NDE (Cont'd)

- (iii) The procedures must identify the equipment and essential variable settings used to qualify the procedures. An essential variable is defined as any variable that affects the results of the examination. The procedure must be requalified when an essential variable is changed to fall outside the demonstration range. A procedure must be qualified using the equivalent of at least three test sets that are used to demonstrate personnel performance. Procedure qualification must require at least one successful personnel performance demonstration.
- Comment: MRP is evaluating requalification and will provide recommendations based on Art. 14; for example use of Technical Justifications, modeling, hierarchical approach and non-blind demonstrations and the PDI strategy.

Proposed Rule

D-Head Penetration NDE (Cont'd)

- (iv) The test acceptance criteria for a personnel performance demonstration must meet the detection test acceptance criteria for personnel performance demonstration in Table VIII–S10–1 of Section XI, Appendix VIII, Supplement 10. Examination procedures, equipment, and personnel must be considered qualified for depth sizing only if the root mean square (RMS) error of the flaw depth measurements, as compared to the true flaw depths, does not exceed 1/32-inch (0.8 mm). Examination procedures, equipment, and personnel must be considered qualified for length sizing if the RMS error of the flaw length measurements, as compared to the true flaw lengths, does not exceed 1/16-inch (1.6 mm).
- **Comment:** The condition of flaw sizing tolerance is generally less than the accuracy of the flaw fabrication and a significant number of current techniques cannot meet this.
- **Insert –** The RMS error of the flaw depths shall not exceed .125 in and the length sizing error shall not exceed .375 in, respectively. These values are based on probabilistic and deterministic calculations.

Proposed Rule

D-Head Penetration NDE (Cont'd)

- (5) If flaws attributed to PWSCC have been identified, whether acceptable or not for continued service under Paragraphs -3130 or -3140 of ASME Code Case N-729-1, the reinspection interval must be each refueling outage instead of the reinspection intervals required by Table 1, Note (8) of ASME Code Case N-729-1.
- **Comment:** What is the technical basis for this revision to the Code case? Assessment ITG is developing a comment for this.

Response Summary

- Conditions 1, 2 and 5 have been previously addressed by MRP, Section XI or no response is necessary
- Condition 3 – essentially 100% Volumetric or Surface exam plus Surface exam of J-groove weld
 - This generally pertains to Assessment ITG
 - Backfit analysis is needed because of impact
 - Condition 4 – Current mockups do not meet these conditions and requalification to new mockups is not necessary
 - Can't begin design of potential new mockups until final rule is issued
 - New qualification program is sufficient and these conditions are not necessary.

MRP Action Item

Providing Response to NRC

- Obtain concurrence from Inspection ITG on comments
- MRP is developing a response and obtaining input from the Assessment ITG also
- MRP recommends a meeting with the NRC to discuss comments before June 19, 2007
- Issue letter to NRC