



Industry Perspectives on ASME III and XI Pre-Service Inspection (PSI)

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Introduction

- Industry response to NRC concerns with potential changes to ASME Section III and XI regarding Preservice Inspections
 - Industry Perspective on Section III PSI
 - Industry Perspective on Section XI PSI
 - Summary and Conclusion

Industry Perspective on Section III PSI

- Preservice Inspection in Section III is not a construction code acceptance examination.
- PSI is performed **ONLY** to provide a baseline for future Section XI Inservice Inspection.
 - Section XI requires that PSI be completed prior to initial plant startup.
- PSI was first added to Section III in the 1997 addendum to the 1995 edition of Section III
- In some cases, the PSI is performed in a fabrication shop, but in many cases the PSI is performed by the Owner at site after installation is complete

Industry Perspective on Section III PSI

- Current requirement to complete PSI prior to N-5 means the N-certificate holder, who may not be performing the PSI, is held up issuing N-5 due to PSI not in their control
- Code Case N-907 and proposed code change (Record 20-82) allows PSI to be performed after N-5 but before N-3 data report
 - **PSI is still performed before components are placed into commercial service.**
- Section III is NOT eliminating PSI it is only changing the timing as to when it can be completed to provide flexibility during construction
- Record 20-82 also adds requirements for Owner's Design Specification to specify responsible parties for performing each PSI and reporting/documentation

Industry Perspective on Section XI PSI

- PSI is a preoperational examination performed to provide a baseline for subsequent ISI.
- PSI must be performed prior to placing the system in operation.
- ASME XI IWB-3131(c) only requires the results of ISI be compared with PSI and previous ISI examinations and differences recorded.
- To maintain the baseline any repair/replacement activity that affects a previous PSI/ISI examination requires a new baseline PSI.

Original Intent of Section XI PSI

- Of primary concern when developing Section XI acceptance standards in the early 1970s was to avoid conflicts with Section III requirements.
 - “.... a flaw found by a Section XI examination that is determined to have been present in original construction and is of a size and type that exceeds the acceptance standard of the original Construction Code, but is acceptable under the acceptance standards of Section XI, the flaw is not required to be removed or repaired.” [1]
- Any indications found under PSI that meet the original Construction Code, should be acceptable using evaluation techniques such as fracture mechanics.

Section III Acceptance Criteria

- Acceptance criteria based on appropriate quality and workmanship standards.
- Intended to detect weld fabrication type flaws that do not meet the specified level of quality and workmanship.
 - Flaws characterized as a crack, lack-of-fusion, lack-of-penetration of any size are rejectable.
 - Volumetric flaws, such as non-metallic inclusions (slag) or porosity, that exceed a specified size are rejectable.
- Not based on detailed structural integrity or fracture mechanics.

Current Section XI Acceptance Criteria

- Fracture mechanics-based acceptance standards.
- Conservative assumption that all observed indications are crack-like defects and treated as planar flaws with depth “a” and length “l”.
 - The treatment of all indications as planar flaws was adopted by Section XI to assure a high degree of conservatism although defects, other than cracks, were recognized as relatively unimportant. [2]

PSI Acceptance Standards

- PSI acceptance standards for piping welds based on fracture mechanics were added in the 1974 Edition of Section XI. [3,4]
 - An important consideration at the time was the variability in capability of UT techniques to accurately locate and size flaws in piping welds.
 - The allowable acceptance standards for PSI were intentionally established at a more restrictive level to assure that the results of the ISI examinations would not be unacceptably biased by the variability of UT examination of piping, particularly when results are compared to PSI. [4]
- Much improved UT techniques and Appendix VIII performance demonstration requirements have all but eliminated this concern of the early 1970s.

[3] EPRI Report NP-1406-SR, Special Report, May 1980, pp. I-19.

[4] Chockie, L.J. and MacCary, R.R. Extended Rules of the 1974 ASME Section XI Code, "Inservice Inspection of Nuclear Power Plant Components," IMechE 1976, pp. 91-99; C206/76

Section XI Proposed Changes

- The original reference to a “Preservice Examination” was identified as “Preoperational Examination” and was only used to identify the condition of items prior to putting them into service.
- Over time preservice examination evolved into a second acceptance examination even though the item was already acceptable to the construction code.

Section XI Proposed Changes

- As items have already been accepted by the Construction Code, the PSI Acceptance Standards are no longer required and are proposed to be deleted.
- This change reestablishes the original intent that PSI is for baseline only.

Summary and Conclusion

- ASME III changes provide more flexibility for when PSI can be performed during construction and shifts responsibility more to the Owner
- ASME XI proposed changes reestablish the original intent of PSI
- No code changes eliminate PSI



Backup Slides

Code Case N-907: Passed and published by ASME

Rules for Performance of Preservice Inspection (PSI) During Section III Construction

Inquiry: What rules may be used for performance of preservice inspection (PSI) during Section III Construction if the examinations are not performed prior to completion of the N-5 data report, as required by NB-5281(a).

Reply: It is the opinion of the Committee that PSI required to be completed by NB-5281(a) may be completed after completion of the N-5 Data Report but prior to the Owner's filing of the N-3 Data Report under the following conditions:

- a) This Case number and revision shall be listed on the applicable N-5 Data Report.
- b) The Authorized Nuclear Inspector (ANI) signing the N-3 Data Report is required to confirm all PSI required by NCA-3252(c) is complete.
- c) This Code Case number and revision shall be listed on the applicable N-3 Owner's Data Report in the Remarks section.

Record 20-82 (Out
for Section III
Standards
Committee Ballot)

Changes to both

- **NCA-3211.19**
Provisions of the
Design
Specifications and
- **NB-5280**
PRESERVICE
EXAMINATION OR
MANDE

Record 20-82 changes to NCA-3211.19

(-g) loads from internal structures (see NCA- or MANDE

(5) The Design Specification shall identify those components and/or parts that require a preservice examination and shall include the following:

(-a) examination

(-1) Division and Edition of Section XI to be used

(-2) category and method

(-3) qualifications of and equipment

(-b) welds

(-1) surface condition

(-2) identification/marking

(-c) When Section XI, Division 2

preservice monitoring and NDE (MANDE), the Design

identify the organization (N-certificate Holder or Owner) responsible for completion of each specific examination or MANDE. Preservice examination or MANDE information

all identify each feature requiring and method of MANDE required, and acceptance standards.

of Jurisdiction³

to define the boundaries of components adjacent components, intervening

elements and other structures the Design Specifications

(-4) Section XI reporting requirements applicable to the examination or MANDE (ASME Section XI IWA-6230 for Section XI Division 1 and RIM-6.2.2 for Section XI Division 2)

Record 20-82 changes to NB-5280

Welded joints shall be examined by the following method.

1 Joints

Examination shall be removed from all surfaces on. Joints shall be visually examined on all surfaces to determine whether there has been any penetration of brazing metal through the joint. Examination employed for indirect visual examination cannot be directly examined.

1 and Continuous Drive Friction

(c) Examinations identified as the responsibility of the Certificate Holder in the Design Specification shall be documented on the applicable Data Report for the component.
(d) Examinations identified as the responsibility of the Owner in the Design Specification shall be documented by the Owner in accordance with ASME Section XI.

Between the two members shall be a full

NB-5110 and meet the acceptance standards of NB-5300.

NB-5280 PRESERVICE EXAMINATION OR MANDE (25) N-3

NB-5281 General Requirements

(a) Examinations or MANDE required by NCA-3211.19 (b)(3) shall be completed prior to completion of the N-5 Data Report.

(b) All volumetric and surface examinations shall be documented with results and identified in a form consistent with those required in NCA-4134.17 for transfer to the Owner.

NB-5282 Examination and MANDE Requirements

(a) Section XI, Division 1 Examinations
(1) Components shall be examined as specified in Section XI, IWB-2500. The method of examination for the components and parts of the pressure-retaining boundaries shall comply with those tabulated in IWB-2500. Only the volumetric and surface examinations are required to be performed.

(2) For Control Rod housings, Examination Category B-O, the examination shall be extended to include essentially 100% of the welds in the installed peripheral control rod drive housing only.

(3) Section XI, Division 2 MANDE MANDE shall be