THE NATIONAL BOARD
OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE SUBCOMMITTEE REPAIRS & ALTERATIONS

AGENDA

Meeting of January 11, 2023
Charleston, SC

The National Board of Boiler & Pressure Vessel Inspectors 1055 Crupper Avenue
Columbus, Ohio 43229-1183
Phone: (614)888-8320
FAX: (614)847-1828

1. **Call to Order**
   The Chair will call the meeting to order at 8:00 a.m. Central Time. For those attending in person, the meeting will be held in Cardinal A and B at the hotel.

2. **Roll call of Members and introduction of Visitors**

3. **Check for a Quorum**

4. **Announcements**
   - The National Board will be hosting a reception on Wednesday evening from 5:30 p.m. to 7:30 p.m. at Sports & Social St. Louis Ballpark Village next to the hotel.
   - The National Board will be hosting breakfast and lunch on Thursday for those attending the Main Committee meeting. Breakfast will be served from 7:00 a.m. to 8:00 a.m. in Cardinal C, and lunch will be served from 11:30 a.m. to 12:30 p.m. in Cardinal C.
   - Meeting schedules, meeting room layouts, and other helpful information can be found on the National Board website under the **Inspection Code** tab → NBIC Meeting Information.
   - Remember to add any attachments that you'd like to show during the meeting (proposals, reference documents, power points, etc.) to the NBIC file share site (nbfileshare.org) **prior to the meeting**.
     - Note that access to the NBIC file share site is limited to committee members only.
     - ALL power point attachments/presentations must be sent to the NBIC Secretary prior to the meeting for approval.
     - Contact Jonathan Ellis (*nbicsecretary@nbbi.org*) for any questions regarding NBIC file share access.
   - When possible, please submit proposals in word format showing "strike through/underline".
   - If you'd like to request a new Interpretation or Action item, this should be done on the National Board Business Center.
     - Anyone, member or not, can request a new item.
   - As a reminder, anyone who would like to become a member of a group or committee:
     - Should attend at least two meetings prior to being put on the agenda for membership consideration. The nominee will be on the agenda for voting during their third meeting.
     - The nominee must submit the formal request along with their resume to the NBIC Secretary **PRIOR TO** the meeting. *nbicsecretary@nbbi.org*
     - If needed, we can also create a ballot for voting on a new member between meetings.
   - Thank you to everyone who registered online for this meeting. The online registration is very helpful for planning our reception, meals, room set up, etc. Please continue to use the online registration for each meeting. If you are here in person, and did not register, please visit the National Board website to register now. Registering will make sure we have an accurate count for the reception, breakfast, and lunch. It is also a good way to make sure we have the most up-to-date contact information.

5. **Awards and Special Recognition**

6. **Adoption of the Agenda**

7. **Approval of the Minutes of the January 11, 2023, Meeting**
   The minutes from the January 2023 meeting can be found on the Committee Information page under the Inspection Code tab on the National Board's website.

8. **Review of Rosters**

   a. **Membership Nominations**

      i. Mr. Jonathan Ferreira (AIA) is interested in becoming a member of **Subgroup R&A**.

   b. **Membership Reappointments**

      i. The following **Subgroup R&A** memberships will expire prior to the January 2024 NBIC meetings: Mr. Brian Boseo, Mr. Ben Schaefer, Mr. Scott Chestnut, Mr. Paul Davis, Mr. Trevor Seime, and Mr. Rick Valdez.

      ii. The following **Subcommittee R&A** memberships will expire prior to the January 2024 NBIC meeting: Mr. Trevor Seime and Mr. Bob Underwood.

      iii. The following **NR Task Group** memberships are set to expire prior to the January 2024 NBIC meeting: Mr. Ray Spuhl.

      iv. The following **Interpretations Task Group** memberships are about to expire prior to the January 2024 NBIC meeting: Mr. George Galanes.

   c. **Officer Nominations**

      i. **Subgroup R&A** will be nominating a new Chair and Vice Chair during their meeting.

      ii. Mr. Ray Spuhl's term as Chair of the **NR Task Group** is set to end after this meeting. Mr. Spuhl is eligible for reappointment to the position.

   d. **Resignations**

9. **Interpretations**

   New Interpretations Requests:

Item Number: I23-10	**NBIC Location: Part 3, 3.3.4.6 and 3.4.3**	**Attachment 4**

General Description: Seamless Head Flush Patch - Repair vs Alteration

Subgroup: Repairs and Alterations

Task Group: B. Boseo (PM), L. Dutra, B. Schaefer

Explanation of Need: Is the use of a flush patch on the center portion of a seamless head of an ASME Sect. VIII Div. 1 vessel considered a repair or alteration per the 2011 NBIC?

July 2023 Meeting Action:

Item Number: I23-11 **NBIC Location: Part 3, 5.1 and 5.11** **Attachment Page 2**

General Description: Correcting duplicate nameplate that is not affixed to directly the vessel

Subgroup: Repairs and Alterations

Task Group: M. Quisenberry (PM), R. Derby

Explanation of Need: Part 3 seems to contain no method for correcting errors on a name plate. Section 5 is not clear on what requirements apply to a duplicate name plate when the actual name plate is still affixed to the vessel and hidden under insulation. Since the duplicate name plate is not the actual name plate and is not affixed directly to the ASME pressure vessel, an R stamp holder should not be required to correct or replace a duplicate name plate. If a duplicate name plate were welded directly to the vessel, one could argue that Part 3 applies since interaction with the vessel could be required.

July 2023 Meeting Action:

Item Number: I23-15 **NBIC Location: Part 3, 3.3.2** **Attachment Page 5**

General Description: Routine Repairs Using Parts With Different Nominal Composition

Subgroup: Repairs and Alterations

Task Group: T. McBee (PM), M. Schaser

Explanation of Need: As written, Paragraph 3.3.2 implies that routine repairs require repair or replacement with "like material"...as in 3.3.3 r). This is supported by Interpretation 01-19. Allowing "material upgrades"...as in 3.3.3 s)...will reduce costs and labor associated with the growing number of repairs requiring in-process inspection and stamping due solely to material availability.

July 2023 Meeting Action:

Item Number: I23-20 **NBIC Location: Part 3, 3.3.4.8** **Attachment Page 6**

General Description: Boiler tube plug installation time consideration

Subgroup: Repairs and Alterations

Task Group: M. Quisenberry (PM), L. Dutra

Explanation of Need: 3.3.4.8 does imply that the defect should be known in regards to characteristics such as orientation, nature, depth, configuration but does not fully state this.

January 2023 Meeting Action:

Item Number: I23-47	NBIC Location: Part 3, 3.4.4 d)	Attachment Page 7

General Description: Interpretation of Alteration for dimensional change.

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: The inquirer is looking to change a vessel nozzle flange from 150# to 300# to allow them to increase the torque value to reduce flange leaks that have been occurring.

January 2023 Meeting Action:

Item Number: I23-48	NBIC Location: Part 3, 3.3.2	Attachment Page 8

General Description: Plugging of tube hole without welding.

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: An Air-Cooled Heat Exchanger where the tube was expanded to the tube sheet needs to be repaired due to a tube leak. The repair will be done by plugging without removing the tube from the tube sheet. Is this considered a Routine Repair?

January 2023 Meeting Action:

10. Action Items

a. Task Group Graphite

Item Number: NB15-2208	NBIC Location: Part 3	No Attachment

General Description: Develop supplement for repairs and alterations based on international construction standards

Subgroup: Graphite

Task Group: Greg Becherer (PM)

Explanation of Need: The last item in paragraph 3.3.2 e) reads, "5) Seal welding a mechanical connection for leak tightness where by design, the pressure retaining capability is not dependent on the weld for strength and requires no PWHT." A repair organization used this paragraph as justification to document a seal welded tube plug on a watertube boiler as routine.

SC R&A January 2023 Meeting Action: No report. - PR

Item Number: A19-73	NBIC Location: Part 3, S3	No Attachment

General Description: Requirements for who can make hole plugging repairs on graphite blocks

Subgroup: Graphite

Task Group: C. Cary (PM), A. Viet, A. Stupica

Explanation of Need: The last item in paragraph 3.3.2 e) reads, "5) Seal welding a mechanical connection for leak tightness where by design, the pressure retaining capability is not dependent on the weld for strength and requires no PWHT." A repair organization used this paragraph as justification to document a seal welded tube plug on a watertube boiler as routine.

SC R&A January 2023 Meeting Action: No report. - PR

Item Number: A23-43	NBIC Location: Part 3, S3.3 a)	Attachment Page 9

General Description: Gasket surface repair

Subgroup: Graphite

Task Group: A. Viet (PM)

Explanation of Need: Occasionally, minor damage can occur along the gasket surface on parts of a graphite pressure vessel. Currently, repairing these minor damages is not a routine repair, but in certain instances it would make sense for the repair to be considered routine. This proposal adds language to allow for cement-only repair of a gasket surface where the damage is no more than 3/16" deep to be considered a routine repair.

TG Graphite April 2023 Meeting Action: During the Task Group's meeting, they determined that performing a cement-only repair to a damaged gasket surface on a graphite pressure vessel could be considered a routine repair, if the depth of the damage did not exceed 3/16". This proposed change was unanimously approved by the group.

Item Number: A23-44 **NBIC Location: Part 3, S3.5.4** **Attachment Page 10**

General Description: Revision to Part 3, S3.5.4 m) to clarify requirements

Subgroup: Graphite

Task Group: F. Brown (PM)

Explanation of Need: Task Group discussion noted that S3.5.4 m) applies to all of S3.5.4, not only to the tube plugging proposal in S3.5.4 f). The TG agreed that the existing language in S3.5.4 f) 3) is not sufficiently specific where it says: "The "R" Certificate Holder shall note on Line 8 of the R-1 Form the installation of cemented graphite tube plugs in accordance with this section." ("this section" is ambiguous).

TG Graphite April 2023 Meeting Action: The Task Group worked on Mr. Brown's proposal for changing S3.5.4 m) to specifically say that "R" stamp holders without the G designator would need to specify on Form R-1 that they are using the provisions of S3.5.4 f). This proposal was unanimously approved by the Task Group.

Item Number: A23-45 **NBIC Location: Part 3, S3.3** **Attachment Page 11**

General Description: Graphite plate replacement as Routine repair

Subgroup: Graphite

Task Group: J. Wince (PM)

Explanation of Need: In many cases, replacing a plate in a graphite plate heat exchanger is something that can be considered routine, but it is not currently defined as such. This proposal seeks to add this procedure to the list of routine repairs for graphite pressure vessels.

TG Graphite April 2023 Meeting Action: The Task Group worked on Mr. Wince's proposal, and then voted to unanimously approve the proposed changes.

Item Number: A23-46 **NBIC Location: Part 3, S3.3** **Attachment Page 12**

General Description: Requirements for Inlays as Routine repairs

Subgroup: Graphite

Task Group: J. Clements (PM)

Explanation of Need: The one cubic inch limit for inlays in S3.3 a) 6) is impractically small and "never happens". There is a need to increase this limit to something more practical while staying within the scope of a routine repair.

TG Graphite April 2023 Meeting Action: The Task Group worked on Mr. Clement's proposal, and through discussion decided on increasing the limit for inlays as a routine repair from one cubic inch to no greater than 64 cubic inches or 10% of total volume. This proposed change was unanimously approved by the Task Group.

b. Task Group FRP

There are currently no open FRP items related to Part 3.

c. Task Group Historical

Item Number: A20-25	**NBIC Location: Part 3, S2.13**	**No Attachment**

General Description: Repair Procedure for Fire Boxes

Subgroup: SG Historical

Task Group: M. Wahl (PM), Robin Forbes, T. Dillon, & F. Johnson

Explanation of Need: In NBIC Part 3, S2.13.10.3, S2.13.11 do not define what to do at a riveted joint. On the tubesheet, or firedoor sheet, where it is flanged to rivet to the firebox, the repairs are silent on what to do at the riveted joint.

SG Historical July Meeting Action: PROGRESS REPORT: Mr. Dillon spoke on this item stating they were still waiting on locomotive on this item. He said locomotive were close or had passed something and then they would refer to it or add it to the Historical section of NBIC Part 3.

SC R&A Jan. 2023 Meeting Action: T. Seime presented a PR

d. Task Group Locomotive

There are currently no TG Locomotive items open for Part 3.

e. NR Task Group

There are currently no NR Task Group items open for Part 3.

f. Subgroup Repairs & Alterations

Item Number: A21-12	**NBIC Location: Part 3, 3.3.3, 3.4.4, Section 9**	**No Attachment**

General Description: Clarify the definitions and examples of "Repair" and "Alteration"

Subgroup: Repairs and Alterations

Task Group: K. Moore, P. Shanks, R. Underwood, M. Chestnut, T. Seime

Explanation of Need: Clarify the definitions of "Repair" and "Alteration" in the Glossary and revise the list of examples of each to better define the allowable scope of activities.

History: This Item was created as a result of conversation regarding Interp. Item 20-78 and Action Item 20-54

SC R&A Jan. 2023 Meeting Action: P. Becker presented a PR

Item Number: A21-31 **NBIC Location: NBIC Glossary** **No Attachment**

General Description: Revise definition of "Field"

Subgroup: Repairs and Alterations

Task Group: R. Miletti (PM), P. Gilston, M. Toth, J. Walker, E. Cutlip

Explanation of Need: A "Field" site under the current definition could be multiple rented or leased spaces used for repairs/alterations, where there is no single or specific customer or job, but rather the locations(s) are used for conducting repair/alteration activities by personnel employed by the Certificate Holder on a continual basis.

SC R&A Jan. 2023 Meeting Action: R. Miletti presented a PR. Revisions to NB-415 required first.

Item Number: A21-43 **NBIC Location: Part 3, Glossary** **No attachment**

General Description: Defining and revising "Practicable" and "Practical" within the NBIC

Subgroup: Repairs and Alterations

Task Group: M. Toth (PM), B. Underwood, B. Wielgoszinski, M. Wadkinson

Explanation of Need: Defining and revising Practicable and Practical within the NBIC and revising where applicable

SC R&A Jan. 2023 Meeting Action: M. Toth presented. This item is related to previously accepted Item A20-51 defining “Practicable”. This was a PR.

Item Number: A21-44 **NBIC Location: Part 3, Glossary** **No attachment**

General Description: Defining "De-Rating" within Part 3

Subgroup: Repairs and Alterations

Task Group: M. Toth (PM), B. Underwood, B. Wielgoszinski, M. Wadkinson, L. Dutra

Explanation of Need: Defining de-rating within Part 3

SC R&A Jan. 2023 Meeting Action: M. Toth presented a PR.

Item Number: A21-45 **NBIC Location: Part 3, Supplements** **Attachment Page 13**

General Description: Add a supplement to address oil, gas and chemical repair & alteration scope

Subgroup: Repairs and Alterations

Task Group: R. Underwood (PM), P. Shanks

Explanation of Need: There has been interest from companies operating with the Oil, Gas and Chemical industries to address certain types of repairs that may exist in ASME PCC-2 or API. NBIC does not have many of these repair methods within the book.

SC R&A Jan. 2023 Meeting Action: B. Underwood presented a PR. Added P. Shanks to TG.

Item Number: A21-53 **NBIC Location: Part 3, S8.5 a)** **No Attachment**

General Description: Post Repair Inspection of weld repairs to CSEF steels

Subgroup: Repairs and Alterations

Task Group: P. Gilston (PM), E. Cutlip

Explanation of Need: The requirement for Inspector involvement in post-repair inspections to CSEF weld repairs is to ensure future safe operation of the boiler. This is a function of the inservice Authorized Inspection Agency, not the Repair Inspector, whose duties end with completion of repair documentation.

SC R&A Jan. 2023 Meeting Action: P. Gilston presented a PR. Meetings with Part 2 will be needed to determine impacts across both Parts (2 & 3).

Item Number: A21-67 **NBIC Location: Part 3, 3.4.9** **No Attachment**

General Description: Add welding requirements to plugging firetubes

Subgroup: Repairs and Alterations

Task Group: P. Gilston (PM), K. Moore, Trevor Sieme , M. Quisenberry

Explanation of Need: The current NBIC does not have enough direction or requirements for welding tube plugs in firetubes.

SC R&A January 2023 Meeting Action: P. Gilston presented a **PR**

Item Number: A21-82 **NBIC Location: Part 3, 3.3.3(s)** **Attachment Page 14**

General Description: Examples of Repairs

Subgroup: Repairs and Alterations

Task Group: P. Davis (PM), R. Underwood, P. Gilston, J. Ferreira, J. Walker, E. Cutlip, P. Miller, L. Dutra

Explanation of Need: Adding "repair" to 3.3.3(s) would then address use of different weld material. Currently 3.3.3(s) only addresses replacement of the part, not repair (Repair is addressed in 3.3.3(r)).

SC R&A Jan. 2023 Meeting Action: P. Davis presented. Discussion on consistent addressing of the term for weld metal will require a new item to be opened (P. Gilston as PM). The proposal was revised and was UA approved to go to LB to SG & SC for vote.

Item Number: A22-18 **NBIC Location: Part 3, Glossary** **No Attachment**

General Description: Definition of blowdown and blowoff

Subgroup: Repairs and Alterations

Task Group: K. Moore (PM).

Explanation of Need: These terms are not consistently used throughout the industry. This is to provide guidance to use the correct term when addressing the equipment or the action.

SC R&A 2023 Meeting Action: K. Moore presented a PR.

Item Number: A22-19 **NBIC Location: Part 3, 5.2.2** **No Attachment**

General Description: R Certificate Holders with Design Only Scope

Subgroup: Repairs and Alterations

Task Group: J. Ferreira (PM). R. Valdez, G. Scribner, B. Schaefer, M. Schaser

Explanation of Need: To add new paragraphs 5.2.2 d) and 5.2.2 e) which will provide guidance for R Certificate Holders with "Design Only" on which activities they are permitted to perform and how they and the Inspectors shall complete the R-2 Form.

SC R&A January 2023 Meeting Action: J. Ferreira presented a **PR**.

Item Number: A22-41 **NBIC Location: Part 3, 1.5** **No Attachment**

General Description: Reference NB-415 in Quality System

Subgroup: Repairs and Alterations

Task Group: P. Davis (PM), M. Carlson, L. Ponce, J. Walker.

Explanation of Need: Requirements in the NB-415 should be included in the R Cert. Holder's QC Manual. Examples: a) Notifying the National Board when an organization changes scope, ownership, name, location, address, or Inspection Agreement and b) Return of the stamp.

SC R&A January 2023 Meeting Action: P. Davis presented a PR.

Item Number: A23-04	NBIC Location: Part 3, 3.3.4.6	Attachment Page 16

General Description: Addressing Flush Patch Plate Weld NDT

Subgroup: Repairs and Alterations

Task Group: J. Ferreira (PM), K. Moore, Added M. Schaser, T. McBee, and F. Johnson

Explanation of Need: NBIC Item to Address Flush Patch Plate Weld NDT.

SC R&A 2023 Meeting Action: J. Ferreira presented a PR.

New Action Items:

Item Number: A23-12	NBIC Location: Part 3	No Attachment

General Description: Inspector involvement for repairs of wasted areas

Subgroup: Repairs and Alterations

Task Group: R. Valdez (PM), J. Ferreira

Explanation of Need: Based on recommendations by CSB, should an Inspector be required to physically view equipment that is being repaired in a wasted area prior to any repair/alteration activity?

July 2023 Meeting Action:

Item Number: A23-13	NBIC Location: Part 3, 3.3.3 s)	Attachment Page 17

General Description: Consistent addressing of the term for weld metal

Subgroup: Repairs and Alterations

Task Group: P. Gilston (PM), W. Sperko, J. Siefert, T. Melfi, F. Johnson

Explanation of Need: Item for addressing consistent addressing of the term for weld metal is being opened based on discussions on A21-82. Weld Metal vs Filler Metal vs Filler Material, etc.

July 2023 Meeting Action:

Item Number: A23-14 **NBIC Location: Part 3, Table S9.2** **Attachment Page 18**

General Description: Extension Instructions for Reports of Repair

Subgroup: Repairs and Alterations

Task Group: M. Quisenberry (PM)

Explanation of Need: Additional text should be added to Instruction (29) of Table S9.2 of Supplement 9 (listing the "R" Cert. of Auth expiration date), to provide instructions on how to document if the "R" Cert. Holder is operating under an extension.

July 2023 Meeting Action:

Item Number: A23-21 **NBIC Location: Part 3, 3.3.4.9** **Attachment Page 23**

General Description: Boiler tube plug guidelines and inclusion or watertube boilers

Subgroup: Repairs and Alterations

Task Group: E. Cutlip (PM), P. Gilston, K. Moore

Explanation of Need: Currently both firetube and watertube boilers require a boiler tube be plugged when replacement of a tube is not practicable at the time the defective tube is detected.

July 2023 Meeting Action:

Item Number: A23-22 **NBIC Location: Part 3, 2.5.3.4** **Attachment Page 25**

General Description: Changes to Part 3, 2.5.3.4 to clarify intent

Subgroup: Repairs and Alterations

Task Group: T. White (PM)

Explanation of Need: As written, this paragraph is ambiguous and confusing. The rewrite clarifies the paragraphs intent.

July 2023 Meeting Action:

Item Number: A23-24 **NBIC Location: Part 3** **No Attachment**

General Description: Repairs to quick actuating closures

Subgroup: Repairs and Alterations

Task Group: T. McBee (PM), C. Becker, M. Schaser, A. Khssassi, R. Smith

Explanation of Need: Put safe guidelines for repairs to quick actuating closures.

July 2023 Meeting Action:

Item Number: A23-25 **NBIC Location: Part 3, 5.11** **No Attachment**

General Description: Name Plate replacement

Subgroup: Repairs and Alterations

Task Group: R. Valdez (PM), J. Ferreira

Explanation of Need: This does not address missing name plates. NB136 is about the form not the name plate. This needs to address missing name plates as well. There should also be a reference to point the Stamp Holder Part 2 - 5.2

July 2023 Meeting Action:

Item Number: A23-29 **NBIC Location: Part 3, 1.5.1 s)** **Attachment Page 26**

General Description: Clarification of Intent

Subgroup: Repairs and Alterations

Task Group: S. Chestnut (PM),

Explanation of Need: The sentence is unclear as it currently reads. With the new wording it clarifies the intent.

July 2023 Meeting Action:

Item Number: A23-33 **NBIC Location: Part 3, Table 2.3** **Attachment Page 27**

General Description: Update Table 2.3 to remove dates

Subgroup: Repairs and Alterations

Task Group: J. Sekely (PM)

Explanation of Need: Since the use of all current and previous versions of the listed SWPS's is permitted, there is no reason to date the listed SWPSs.

July 2023 Meeting Action:

Item Number: A23-35 **NBIC Location: All Parts, 9.1** **Attachment Page 29**

General Description: Definition of "non-load bearing attachment" (All Parts)

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: The term "nonload bearing attachment" is used as a basis for determining a routine repair but is not defined in the NBIC.

July 2023 Meeting Action:

Item Number: A23-36 **NBIC Location: Part 3, 4.2 a) and 4.4 b)** **Attachment Page 30**

General Description: Clarifying Rules for Using Alternative NDE Methods

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: It has been determined that there may be some confusion regarding allowable NDE methods for repairs and alterations. The existing language of 4.2 a) tells the reader that alternative NDE methods acceptable to the Inspector and, where required, the Jurisdiction, may be used provided the requirements of Section 4 are met. However, it is possible that the reader is not familiarizing themselves with all of the requirements of Section 4 prior to proposing an alternative NDE method. This change should help clarify and reinforce the requirements for alternative NDE methods for repairs and alterations.

July 2023 Meeting Action:

Item Number: A23-38 **NBIC Location: Part 3, 1.1 a)** **Attachment Page 31**

General Description: Scope Clarification for Part 3

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: The owner or user's need to return equipment to service must never compromise the operational safety of the equipment or the process by which the operational safety of the equipment is assured. There is an interpretation that supports this notion by describing subjects permitted to be considered when determining whether a repair or alteration activity is practicable.

July 2023 Meeting Action:

Item Number: A23-39 **NBIC Location: Part 3, 3.3.1** **Attachment Page 32**

General Description: Strengthening Prevention of Defect Recurrence

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: The existing text recommends, but does not require an investigation of the cause, extent, and likelihood of recurrence of defects. The existing text also has no requirement for anyone to act to prevent the recurrence of defects. Where root and/or proximate causes of defects are known, or could be determined, someone needs to act to prevent catastrophic failure of equipment.

July 2023 Meeting Action:

Item Number: A23-40 **NBIC Location: Part 3, 3.3.4.1** **Attachment Page 34**

General Description: Strengthening Requirements to Ensure Defect Removal

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: The existing text alludes to the potential need for nondestructive examination (NDE) to ensure complete removal of defects but does not require it. The means to ensure defects have been removed must be understood by all to ensure safety. There is an interpretation of the 2021 NBIC that compounds this issue permitting repair organizations to not follow the requirements of NBIC Part 3, 3.3.4.8 even when the characteristics of the defect cannot be fully established.

July 2023 Meeting Action:

Item Number: A23-41 **NBIC Location: Part 3, 3.3.4.6 a) 2)** **Attachment Page 36**

General Description: Strengthening Requirements for Defect Removal When Patching

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: The existing text requires the removal of defective material until sound material is reached but provides no requirements or guidance on means to employ to ensure complete removal of defective material. The means to ensure defects have been removed must be understood by all to ensure safety. There is an interpretation of the 2021 NBIC that compounds this issue permitting repair organizations to not follow the requirements of NBIC Part 3, 3.3.4.8 even when the characteristics of the defect cannot be fully established.

July 2023 Meeting Action:

Item Number: A23-49 **NBIC Location: Part 3, 3.2.1 a)** **Attachment Page 38**

General Description: Hardness testing of existing materials

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: Field hardness testing of existing materials may be difficult and produce erroneous results. It is usually unnecessary for determining properties required for selection of welding procedures. Unless needed, it should not be required to be performed. The purpose of verifying existing materials in Paragraph 3.2.1 a) is not to confirm acceptability of existing design, but to determine nominal composition for welding.

July 2023 Meeting Action:

Item Number: A23-51 **NBIC Location: Part 3, 1.5.1** **Attachment Page 39**

General Description: Replace "legal" with "company" in 1.5.1 a) Title Page

Subgroup: Repairs and Alterations

Task Group: None assigned.

Explanation of Need: The National Board has not adopted the ASME policy regarding company and legal names. Per the ASME policy it is permissible to have two names on a Certificate of Authorization and the quality manual. The 2023 NBIC 1.5.1 a) "legal" term may cause confusion for certificate holders, their AIAs, and review teams.

July 2023 Meeting Action:

11. Future Meetings

- January 8-11, 2024 – Charlotte, NC
- July 2024 – TBD

12. Adjournment

Respectfully submitted,

Terrence Hellman

Terrence Hellman

SC R&A Secretary

Subcommittee Repairs/Alterations

Last Name	First Name	Interest Category	Role	Exp. Date	More
Moore	Kathy	National Board Certificate Holders	Chair	07/30/2024	Details
Toth	Marty	General Interest	Vice Chair	07/30/2024	Details
Hellman	Terrence		Secretary	12/30/2099	Details
Becker	Patricia	General Interest	Member	01/30/2026	Details
Boseo	Brian	General Interest	Member	07/30/2024	Details
Carlson	Michael	Jurisdictional Authorities	Member	06/29/2025	Details
Frazier	Steven	Jurisdictional Authorities	Member	07/30/2024	Details
Gilston	Philip	Authorized Inspection Agencies	Member	07/30/2025	Details
Hopkins	Craig	National Board Certificate Holders	Member	01/30/2025	Details
Kinney	Donald	Jurisdictional Authorities	Member	01/30/2024	Details
McBee	Timothy	Authorized Inspection Agencies	Member	07/30/2025	Details
Miletti	Ray	National Board Certificate Holders	Member	07/30/2025	Details
Moedinger	Linn	Users	Member	01/30/2025	Details
Morelock	Brian	Users	Member	01/30/2026	Details
Quisenberry	Michael	National Board Certificate Holders	Member	07/30/2025	Details
Schaefer	Benjamin	National Board Certificate Holders	Member	01/30/2025	Details
Seime	Trevor	Jurisdictional Authorities	Member	07/30/2023	Details
Sekely	James	General Interest	Member	07/30/2024	Details
Shanks	Paul	Authorized Inspection Agencies	Member	07/30/2025	Details
Siefert	John	General Interest	Member	07/30/2025	Details
Underwood	Robert	Authorized Inspection Agencies	Member	07/30/2023	Details

PROPOSED INTERPRETATION

Item No.

23-11

Subject/Title

Correcting duplicate nameplate that is not affixed to directly the vessel

Project Manager and Task Group

Source (Name/Email)

Adam Renaldo / adam_renaldo@praxair.com

Statement of Need

Part 3 seems to contain no method for correcting errors on a name plate. Section 5 is not clear on what requirements apply to a duplicate name plate when the actual name plate is still affixed to the vessel and hidden under insulation. Since the duplicate name plate is not the actual name plate, and is not affixed directly to the ASME pressure vessel, an R stamp holder should not be required to correct or replace a duplicate name plate. If a duplicate name plate were welded directly to the vessel, one could argue that Part 3 applies since interaction with the vessel could be required.

Background Information

During inspection, a vessel was found with a duplicate ASME name plate that incorrectly indicated the MDMT. A check of the U-1A form, and communication with the manufacturer, confirmed that the duplicate name plate had a typo that requires correction. The actual ASME name plate is welded directly to the vessel and hidden under insulation. The duplicate is welded to a support leg.

Proposed Question

(1) Does the correction or replacement of a duplicate ASME name plate with a typographical error fall under the scope per Section 5.1 when the duplicate name plate is not affixed directly to the pressure vessel? (2) Does the NBIC contain any procedures for correcting a typographical error on a duplicate ASME nameplate that is affixed to a structural support or non-pressure-retaining part of the ASME pressure vessel? (3) Do the requirements of Section 5.11 apply to the correction or replacement of an inaccurate duplicate ASME nameplate that is affixed to a structural support or non-pressure-retaining part of the ASME pressure vessel? (4) Do the requirements of Section 5.11 apply to the correction or replacement of an inaccurate ASME name plate or duplicate name plate that is affixed directly to the pressure vessel?

Proposed Reply

(1) No (2) No. If a duplicate name plate is not affixed directly to the pressure vessel, corrections of typographical errors on the duplicate name plate fall outside the scope of Part 3 and are left to the discretion of the owner working in conjunction with the manufacturer. (3) No (4) Yes

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED INTERPRETATION

Item No.

23-10

Subject/Title

Seamless Head Flush Patch - Repair vs Alteration

Project Manager and Task Group

Source (Name/Email)

Terrence Hellman / thellman@nationalboard.org

Statement of Need

Is the use of a flush patch on the center portion of a seamless head of an ASME Sect. VIII Div. 1 vessel considered a repair or alteration per the 2011 NBIC?

Background Information

A seamless bottom head of a vertical ASME Sect. VIII Div. 1 vessel is corroded and needs to be repaired per the 2011 NBIC. The “R” Certificate Holder will use a full penetration flush patch to replace the center corroded area of the head (in lieu of replacing the entire head). As a result of the flush patch, there is now a weld seam in a previously “seamless” head. Since welding will be performed on the head, the required thickness may be affected because the possible reduction in joint efficiency due to the new seam on the patch, and the strength and composition of the weld metal. Consequently, the repair organization has the responsibility to consider all design aspects. Per the 2011 NBIC, 3.4.3, Examples of Alterations: h) Replacement of a pressure-retaining part in a pressure-retaining item with a material of different allowable stress or nominal composition from that used in the original design;

Proposed Question

Question 1 When replacing any part of a seamless head with a full penetration flush patch, is the repair organization responsible for any changes in design? Question 2 Is the use of a flush patch on a seamless head an Alteration?

Proposed Reply

Reply 1 Yes. Reply 2 Yes.

Committee's Question 1
When replacing any part of a pressure retaining item, in an ASME Section VIII Div. 1 pressure vessel with a full penetration flush patch, is the repair organization responsible for any changes in design?

Committee's Reply 1

Yes

Rationale

Committee's Question 2

Is the installation of a full penetration flush patch in an ASME Section VIII Div. 1 pressure vessel considered an Alteration?

Committee's Reply 2

No, provided the original design requirements are satisfied.

Rationale

PROPOSED INTERPRETATION

Item No.

23-15

Subject/Title

Routine Repairs

Project Manager and Task Group

Source (Name/Email)

Mark Kincs / mark.r.kincs@xcelenergy.com

Statement of Need

As written, Paragraph 3.3.2 implies that routine repairs require repair or replacement with "like material"...as in 3.3.3 r). This is supported by Interpretation 01-19. Allowing "material upgrades"...as in 3.3.3 s)...will reduce costs and labor associated with the growing number of repairs requiring in-process inspection and stamping due solely to material availability.

Background Information

Oftentimes, original materials of construction are no longer available or cost-prohibitive to obtain. Replacement of pressure-retaining components with those of different nominal composition is commonplace. The required in-process Inspector involvement and stamping of these common repairs is believed unnecessary.

Proposed Question

May repair or replacement of tubes, pipes, butt-welded fittings, or nonload bearing attachments with a code-acceptable material having a nominal composition and strength equivalent to or greater than the original material with equal-or-greater material thickness, that is suitable for the intended service, be considered a routine repair if the requirements of NBIC Part 3, 3.3.2 and the categories of 3.3.2 e) are met?

Proposed Reply

Yes, with concurrence of the Inspector and Jurisdiction, as applicable.

Committee's Question 1

1: May the replacement or repair of a pressure-retaining item using code-acceptable material suitable for the intended service, that has a different nominal composition, strength and thickness equivalent to or greater than the original material, be considered a routine repair if it meets the requirements of NBIC Part 3, 3.3.2 and one or more of the categories listed in 3.3.2 e)?

Committee's Reply 1

1: Yes

Rationale

2021 NBIC Part 3, 3.3.3, r) and 3.3.3, s), Interpretation 21-08.

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

23-20

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

Subject/Title

Boiler tube plug installation time consideration

Project Manager and Task Group

Source (Name/Email)

David Starr / dave.starr@starrcompanies.com

Statement of Need

No specific guidance is provided within the code in regard to the length of time a boiler tube plug can be left in place. Agreement by owner, inspector, and when required, Jurisdiction is ambiguous.

Background Information

Currently owners, inspectors, repair companies and Jurisdictions are applying this rule inconsistently. Often boiler tube (s) remain plugged for the life of the boiler and in some Jurisdictions this is an acceptable practice. In other cases plugged boiler tubes are required to be removed as soon as possible. Currently inconsistency in the industry is causing confusion.

Proposed Question

May a boiler be returned to service permanently with plugged tubes if agreed upon by the owner, the inspector, and when required, the Jurisdiction?

Proposed Reply

No, a plugged tube or tubes is not considered a permanent repair.

Committee's Question 1

Does the NBIC specify the time period a boiler may be placed back in service after firetubes are plugged per NBIC Part 3, 3.3.4.9?

Committee's Reply 1

No.

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

23-47

Subject/Title

Interpretation of Alteration for dimensional change.

Project Manager and Task Group

Source (Name/Email)

Corey Mccon / cmccon@cfindustries.com

Statement of Need

Just need some clarification as we have gotten conflicting responses from different parties.

Background Information

We are looking to change a vessel nozzle flange from 150# to 300# to allow us to increase the torque value to reduce flange leaks that have been occurring.

Proposed Question

Section 3.4.4 d) states an example of an alteration is a change in the dimensions or contour of a pressure retaining item. Would this include a change a flange OD? For example if you are changing a nozzle flange from a 150# flange to a 300# flange would that fall under this section due to the added flange thickness and OD, even though the ID is remaining the same.

Proposed Reply

Yes.

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

PROPOSED INTERPRETATION

Item No.

23-48

Subject/Title

Plugging of tube hole without welding.

Project Manager and Task Group

Source (Name/Email)

Djoni Pratomo / djoni_pratomo@yahoo.com

Statement of Need

Paragraph 3.3.3.f of NBIC Part 3 describes only when welding is involved.

Background Information

This question is different from Interpretation No 21-17, Question No 2, where the tube was removed and can not be considered as Routine Repair.

Proposed Question

An Air Cooled Heat Exchanger where the tube was expanded to the tube sheet needs to be repaired due to a tube leak. The repair will be done by plugging without removing the tube from the tube sheet. Is this considered as Routine Repair?

Proposed Reply

Yes.

Committee's Question 1

Committee's Reply 1

Rationale

Committee's Question 2

Committee's Reply 2

Rationale

S3.3 ROUTINE REPAIRS

a) The following repairs shall be considered routine, and shall comply with NBIC Part 3, 3.3.2.

1) Machining — routine repair shall not include the machining of pressure-retaining parts with the exception of minor machining for cleaning and joint preparation not to exceed 1/32 in. (0.8 mm) of material thickness.

2) Repair of Gasket Surfaces

a. ~~—~~ R~~r~~e-machining of gasket surfaces, re-serrating, or flattening is permitted if the design thickness is maintained.

b. Gasket surface damage repair by cement only is permitted, provided that the damaged area is no deeper than 3/16 in. (5 mm).

m) The scope of the work completed shall be described and reported on ~~a~~ Form R-1. When the work is performed in accordance with S3.5.4 f), the “R” Certificate Holder shall note on Form R-1 in “Remarks”: “Repaired in accordance with NBIC Part 3, S3.5.4 f).”

S3.2 Repairs

k) Blind cracks and delaminations ~~may~~ shall not be repaired by cement injection only.

l) Cracks and porosity in tubes ~~may~~ shall not be repaired. Cracked and porous sections may be removed so that the remainder of the tube may be used. Individual tube sections shall not be less than 24 in. (610 mm) in length, and the number of segments in a tube shall not exceed the quantity listed in NBIC Part 3, Table S3.2.

~~r)~~m) Cracks and porosity in graphite plates used in plate and frame exchangers shall not be repaired.

S3.3 Routine Repairs

a)

8) Replacing graphite plate(s) with new plate(s) in a plate and frame exchanger. Only certified materials shall be used for this repair.

S3.3 ROUTINE REPAIRS

a) The following repairs shall be considered routine, and shall comply with NBIC Part 3, 3.3.2.

1) Machining — routine repair shall not include the machining of pressure-retaining parts with the exception of minor machining for cleaning and joint preparation not to exceed 1/32 in. (0.8 mm) of material thickness.

2) Repair of Gasket Surfaces — re-machining of gasket surfaces, re-serrating, or flattening is permitted if the design thickness is maintained.

3) Replacing Individual Tubes — drilling out and replacing tubes with new tubes or repaired tubes. Only certified materials shall be used for this repair.

4) Nozzle Replacement — replacement of nozzles by removing the old nozzle and cementing a new nozzle in place. This is applicable for nozzles with inside diameters not exceeding 6 inches (152 mm).

5) Plugging Tubes — plugging individual tubes using accepted procedures.

6) Surface Repair — surface repair by installation of ~~plugs or~~ inlay material shall not exceed 64~~1~~ $in.^3$ (1049~~16~~ cm^3) in total or ten percent of the total volume of the part, whichever is less. Surface repair does not include plug stitching.

7) Replacement or Addition of Non-Load Bearing Attachments to Pressure-Retaining Item — For attachment of non-load bearing attachments to pressure-retaining items, the cementing procedure specification need only be qualified for the pressure part and cement to be used.

Item 21-45 Review and Comment for the general "Scope" of the proposed supplement "Engineered Repairs and Alterations"

Note: Each Repair and Alteration activity that will be added to this supplement (such as fillet welded patches, FEA, Encapsulation, etc…) will have its own detailed Scope.

SUPPLEMENT XX – ENGINEERED REPAIRS AND ALTERATIONS

SXX.1 SCOPE

a) This supplement provides general and specific requirements for engineered repairs and alterations to pressure retaining items. These requirements shall be considered as supplemental requirements to those set forth in the main Parts of the NBIC.

b) Engineered repairs and alterations contained in this supplement will require acceptance by the Inspector and when required by the Jurisdiction. Procedures and methodologies established and proven in the industry are leveraged through references to published documents. Supplemental requirements are provided as necessary.

c) Implementation of engineered repairs and alterations will typically require specific inspection procedures, material identification and/or testing, a complete characterization of damage assessment, and knowledge of process conditions, etc. The remaining life and monitoring requirements of any engineered repair or alteration should be established prior to implementation.

d) Careful consideration shall be given to repair or alteration of pressure-retaining items that have been fabricated of either creep strength enhanced ferritic steel materials or ferritic steel materials enhanced by heat treatment. The tensile and creep strength properties of these materials can be degraded by not following specific welding procedure specifications and heat treatment requirements. The user is cautioned to seek technical guidance for welding and heat treating requirements for these materials in accordance with the original code of construction.

e) A safety analysis may be necessary for certain engineered repairs and alteration activities to ensure safe operation of equipment and minimal risk to personnel.

PROPOSED REVISION OR ADDITION

Item No.

A 21-82

Subject/Title

Selection of Filler Metal used for Repairs and Alterations

NBIC Location

Part 3: Section: 2, paragraph 2.1.1(c) and Section 3; Paragraph: 3.3.3(s)

Project Manager and Task Group

Paul Davis, Subcommittee Repairs/Alterations

Source (Name/Email)

Paul Davis / paul.davis22@woodplc.com

Statement of Need

The NBIC does not address the selection of welding consumables to be used when performing repairs and alterations.

Background Information

We have had some recent questions from repair firms about using different weld metal when performing repairs of pressure retaining items. The NBIC does not directly address use of weld metal that is different than the original design. This proposal would create a new 2.1.1(c) with words taken from ASME Section I that addresses who is responsible for selecting the filler metal and how they are selected. A new paragraph 3.3.3(s) adds a new repair example that addresses adding filler metal equal to or greater in TS than the base metal with some exceptions.

Existing Text	Proposed Text
See next page	See next page for proposal.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

Revision to 2.2.1

- *add letters "a" and "b" to existing paragraphs and add new "c" paragraph which is wording from ASME Section I*

2.2.1 PROCEDURE SPECIFICATIONS

a) A procedure specification is a written document providing direction to the person applying the material joining process. Welding, brazing and fusing shall be performed in accordance with procedure specifications for welding (WPS), brazing (BPS), and fusing (FPS) qualified in accordance with the original code of construction or the construction standard or code selected. When this is not possible or practicable, the procedure specification may be qualified in accordance with ASME Section IX.

b) Welding procedures may be simultaneously qualified by more than one organization under the rules of ASME Section IX QG-106.4. The "R" Certificate Holder's written quality control program shall include requirements for addressing the rules of Section IX QG-106.4.

c) The "R" Certificate Holder is responsible for the selection of welding consumables and the welding process. Welding electrodes and filler metal shall be selected to provide deposited weld metal of chemical composition and mechanical properties compatible with the materials to be joined and the service conditions anticipated.

Revision to 3.3.3 (Examples of Repairs)

- *Insert a new paragraph (s) with the old (s) and subsequent paragraphs being re-lettered (t, u, v…). This paragraph essentially states that any filler metal with equivalent or greater tensile strength as the base metal (with noted exceptions) is considered a repair.*

r) The repair or replacement of a pressure part with a code-accepted material that has a nominal composition and strength that is equivalent to the original material and is suitable for the intended service.

s) A repair of a pressure part where, with the exception of the root pass, the nominal tensile strength of the weld metal, not considered to be corrosion resistant overlay, equals or exceeds the minimum specified tensile strength of the base metals being repaired or joined unless the original weldment was fabricated using a weld metal with a lower tensile strength of the base metals to be repaired or joined.

t) Replacement of a pressure-retaining part with a material of different nominal composition and, equal to or greater in allowable stress from that used in the original design, provided the replacement material satisfies the material and design requirements of the original code of construction under which the vessel was built. The minimum required thickness shall be at least equal to the thickness stated on the original Manufacturer's Data Report;

Item A-23-04 (Revised Proposal after hearing feedback from several people)

New proposed 2025 changes

3.3.4.6 PATCHES

a) Flush Patches

1) The weld around a flush patch shall be a full penetration weld and the accessible surfaces shall be ground flush where required by the applicable original code of construction. Examples of welded flush patches are shown in NBIC Part 3, Figure 3.3.4.6-a.

2) Before installing a flush patch, defective material shall be removed until sound material is reached. The patch shall be formed to the proper shape or curvature. The edges shall align without overlap. In stayed areas, the weld seams should come between staybolt rows or riveted seams. Patches shall be made from a material whose composition and thickness meet the intended service. Patches may be any shape or size. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted.The completed welds shall meet the requirements of the original code of construction.

3) Nondestructive examination shall be performed in accordance with the requirements from NBIC Part 3, Section 4.2. As an alternative to volumetric examination, when required, for flush patches, in P-No 1, 3 and 8 materials only, progessive liquid penetrant or magnetic particle examination as described in paragraph 3.3.4.6 (a)(3)(a) may be used. This alternative NDE method is subject to the acceptance of the Inspector, owner and when required, the Jurisdiction where the pressure-retaining item is installed, provided that all other requirements of this section are met.

a) Liquid penetrant or magnetic particle examination shall be performed on each layer of the weld to be examined, including the final weld. Prior to performing PT or MT the surface of each layer of weld should be ground. The final weld may be examined with without grinding. The NDE report shall include the number of layers examined.

PROPOSED REVISION OR ADDITION

Item No.

A 23-13

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

Subject/Title

New item for consistent addressing of the term for weld metal

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.3(s)

Project Manager and Task Group

Source (Name/Email)

Terrence Hellman / thellman@nationalboard.org

Statement of Need

New item for addressing consistent addressing of the term for weld metal is being opened based on discussions on A21-82. Weld Metal vs Filler Metal vs Filler Material, etc.

Background Information

New item for addressing consistent addressing of the term for weld metal is being opened based on discussions on A21-82. Weld Metal vs Filler Metal vs Filler Material, etc.

Existing Text

Proposed Text

New item for addressing consistent addressing of the term for weld metal is being opened based on discussions on A21-82. P. Gilston (PM); J. Siefert (other TG members TBD)

Frank Johnson's proposal:

Weld Metal – Weld Metal is the material that has melted and re-solidified as the result of the weld operation. In cases where no filler is added (resistance, electron beam, lazer and some autogenous arc welding) The weld metal has the same composition as the parent metal.

Filler Metal – Filler metal is the metal or alloy that is added to making a welded, brazed, or soldered joint' The filler is melted or drawn into the joint during the welding process. It serves to join two pieces of metal together and fill any gaps that may be present.

Weld Filler Maternal – There are many different types of filler that can be used in welding, and the type that is used will depend on the metal being welded, the strength of the joint that is needed and the appearance of the finished weld. The welding filler material can be made of a variety of metals alloys and fluxes, to make a strong reliable joint.

S9.2 FORM R-1, REPORT OF REPAIR, NB-66

FIGURE S9.2.1
FORM R-1, PAGE 1 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-66, Rev. 16, (02/04/21)

FORM R-1 REPORT OF REPAIR

in accordance with provisions of the *National Board Inspection Code*

(1) (Authorized Rep. initials)
(2) (Inspectors initials)
(3) (Form "R" Registration no.)
(4) (P.O. no., job no., etc.)

1. WORK PERFORMED BY: (5) (name of repair organization)
(address)
2. OWNER: (6) (name)
(address)
3. LOCATION OF INSTALLATION: (7) (name)
(address)
4. ITEM IDENTIFICATION: (8) (boiler, pressure vessel, or piping) NAME OF ORIGINAL MANUFACTURER: (9)
5. IDENTIFYING NOS: (10) (mfg. serial no.) (11) (National Board no.) (12) (jurisdiction no.) (13) (other) (14) (year built)
6. NBIC EDITION/ADDENDA: (15) (edition) (addenda)
Original Code of Construction for Item: (16) (name / section / division) (edition / addenda)
Construction Code Used for Repair Performed: (17) (name / section / division) (edition / addenda)
7. REPAIR TYPE: (18) ☐ welded ☐ graphite pressure equipment ☐ FRP pressure equipment ☐ DOT
8. DESCRIPTION OF WORK: (use Form R-4, if necessary) ☐ Form R-4, Report Supplement Sheet is attached ☐ FFSA Form (NB-403) is attached
(19)

(20) (Liquid, Pneumatic, Vacuum, Leak) Pressure Test, if applied (21) psi MAWP (22) psi

9. REPLACEMENT PARTS: (Attached are Manufacturer's Partial Data Reports or Form R-3's properly completed for the following items of this report):
(name of part, item number, data report type or Certificate of Compliance, mfg's. name and identifying stamp)
(23)

10. REMARKS: (24)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors •1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 1 of 2

SUPPL. 9

FIGURE S9.2.2
FORM R-1, PAGE 2 OF 2

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NB-66, Rev. 16, (02/04/21)

(25) _____
(Form "**R**" Registration no.)

(26) _____
(P.O. no., job no., etc.)

CERTIFICATE OFCOMPLIANCE

I, (27) _____, certify that to the best of my knowledge and belief the statements made in this report are correct and that all material, construction, and workmanship on this Repair conforms to the *National Board Inspection Code*. National Board "**R**" *Certificate of Authorization* No. (28) _____ Expiration date: (29) _____

Repair Organization: (30) _____

Signed: (31) _____
(authorized representative)

Date: (32) _____

CERTIFICATE OF INSPECTION

I, (33) _____, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and certificate of competency, where required, issued by the Jurisdiction of (34) _____ and employed by (35) _____ of (36) _____ have inspected the work described in this report on (37) _____, _____ and state that to the best of my knowledge and belief, this work complies with the applicable requirements of the *National Board Inspection Code*. By signing this certificate, neither the undersigned nor my employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the undersigned nor my employer shall be liable in any manner for any personal injury, property damage, or loss of any kind arising from or connected with this inspection.

Commissions: (38) _____
(National Board and Jurisdiction no. including endorsement)

Signed: (39) _____
(Inspector)

Date: (40) _____

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, Ohio 43229-1183 Page 2 of 2

TABLE S9.2

GUIDE FOR COMPLETING FORM R-1, REPORT OF REPAIR, NB-66

Reference to Circled Numbers in the Form	Description
(1)	Initials of the authorized representative of the "R" Certificate Holder.
(2)	Initials of the Inspector reviewing the "R" Certificate Holders work.
(3)	When registering a Form R-1 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the “R” Form is not to be registered, indicate so by “N/A”. As described in NBIC Part 3, 5.6, a log shall be maintained identifying sequentially, any Form “R” registered with the National Board.
(4)	If applicable, document the unique purchase order, job, or tracking number assigned by the organization performing the work.
(5)	The name and address of the National Board “R” Certificate Holder performing the work as it appears on the “*Certificate of Authorization*”.
(6)	Name and address of the owner of the pressure-retaining item.
(7)	Name and address of plant or facility where the pressure-retaining item is installed.
(8)	Description of the pressure-retaining item, such as boiler or pressure vessel, or piping. Include the applicable unit identification.
(9)	Name of the original manufacturer of the pressure-retaining item. If the original manufacturer is unknown, indicate by, “unknown.”
(10)	Document the serial number of the pressure-retaining item if assigned by the original manufacturer. If there is no serial number assigned or is unknown, indicate “unknown.”
(11)	When the pressure-retaining item is registered with the National Board, document the applicable registration number. If the pressure-retaining item is installed in Canada, indicate the Canadian design registration number (CRN), and list the drawing number under “other.” If the item is not registered, indicate, “none.”
(12)	Indicate the jurisdiction number assigned to the pressure retaining item, if available.
(13)	Indicate any other unique identifying nomenclature assigned to the pressure retaining item by the owner or user.
(14)	Identify the year in which fabrication/construction of the pressure retaining item was completed.
(15)	Indicate edition and addenda of the NBIC under which this work is being performed.
(16)	Indicate the name, section, division, edition, and addenda (if applicable) of the original code of construction for the pressure-retaining item.

TABLE S9.2 CONT'D

Reference to Circled Numbers in the Form	Description
(17)	Indicate the name, section, division, edition, and addenda (if applicable) of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.
(18)	Check the repair type performed on the pressure retaining item.
(19)	Provide a detailed summary describing the scope of work that was completed to a pressure retaining item (PRI). The information to be considered when describing the scope of work should include such items as, the nature of the repair (i.e. welding, bonding, cementing), the specific location of the work performed to the PRI, the steps taken to remove a defect or as allowed by 3.3.4.8 to remain in place, the method of repair described as listed in the examples of Part 3, Section 3 or supplemental section if applicable, and the acceptance testing and or examination method used in accordance with the NBIC. When additional space is required to describe the scope of work, a Form R-4 shall be used and attached (check box). If a FITNESS FOR SERVICE Form (NB-403) is part of the Form R-1 repair package, check box and attach the form. Information determined to be of a proprietary nature need not be included, but shall be stated on the form.
(20)	Indicate type of pressure test applied (Liquid, Pneumatic, Vacuum, Leak). If no pressure test applied, indicate "none."
(21)	Indicate test pressure applied.
(22)	Indicate maximum allowable working pressure (MAWP) for the pressure retaining item, if known.
(23)	As applicable, identify what Replacement Parts manufactured by welding or bonding were introduced as needed to complete the scope of work. Indicate part, item number, manufacturer's name, stamped identification, and data report type or Certificate of Compliance.
(24)	Indicate any additional information pertaining to the work involved (e.g., routine repairs, code cases).
(25)	When registering a Form R-1 Report with the National Board, this line is solely designated for a unique sequential number assigned by the "R" Certificate Holder. When the "R" Form is not to be registered, indicate so by "N/A". As described in NBIC Part 3, 5.6, a log shall be maintained identifying sequentially, any Form "R" registered with the National Board.
(26)	If applicable, document the unique purchase order, job, or tracking number assigned by organization performing work.
(27)	Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.
(28)	Indicate National Board "R" *Certificate of Authorization* number.
(29)	Indicate month, day, and year that the "R" *Certificate of Authorization* expires. If an Extension of your *Certificate of Authorization* has been granted by the National Board, and during the extension period, work is performed under your *Certificate of Authorization*, you must insert "Under Extension" after the Certificate expiration date on the "R" forms.

TABLE S9.2 CONT'D

Reference to Circled Numbers in the Form	Description
(30)	Record name of "R" Certificate Holder who performed the described work, using full name as shown on the *Certificate of Authorization* or an abbreviation acceptable to the National Board.
(31)	Signature of "R" Certificate Holder authorized representative.
(32)	Enter month, day, and year repair certified.
(33)	Type or print name of Inspector.
(34)	Indicate Inspector's Jurisdiction.
(35)	Indicate Inspector's employer.
(36)	Indicate address of Inspector's employer (city and state or province).
(37)	Indicate month, day, and year of final inspection by Inspector. For routine repairs this shall be the month, day, and year the Inspector reviews the completed routine repair package.
(38)	Inspector's National Board commission number and endorsement that qualifies the Inspector to sign this report, and when required by the Jurisdiction, the applicable State or Provincial numbers.
(38)	Signature of Inspector.
(40)	Indicate month, day, and year of Inspector signature

PROPOSED REVISION OR ADDITION

Item No.

A 23-21

Subject/Title

Boiler tube plug guidelines and inclusion or watertube boilers

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: 3.3.4.9

Project Manager and Task Group

Source (Name/Email)

David Starr / dave.starr@starrcompanies.com

Statement of Need

Currently both firetube and watertube boilers require a boiler tube be plugged when replacement of a tube is not practicable at the time the defective tube is detected.

Background Information

Boilers of both types require a boiler tube to be plugged on occasion whereas a more permanent option is not available. Current code seems to limit the use of plugs to firetube and fail to address watertube boilers. This change would provide guidance for both types of boilers.

Existing Text	Proposed Text
3.3.4.9 TUBE PLUGGING IN FIRETUBE BOILERS	3.3.4.9 TUBE PLUGGING IN FIRETUBE AND WATERTUBE BOILERS

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

PROPOSED REVISION OR ADDITION

Item No. 23-
Subject/Title Welding Method 4
NBIC Location Part: Repairs and Alterations; Section: 3; Paragraphs: 2.5.3.4 a)
Project Manager and Task Group PM – Tom White
Source (Name/email) Tom White/thomas.white@nrg.com
Statement of Need Reading up on Welding Method 4 in Part 3 I found the wording ambiguous and confusing. I have proposed the following rewrite for 2.5.3.4 – a)
Background Information The second sentence states repair welds shall not penetrate the full thickness. The next sentence contradicts that statement and permits under the certain conditions. I propose the following rewrite for clarity.

Existing Text – 2.5.3.4	**Proposed Text – 3.3.3**
When using this method, the following is required: a) This method is limited to repair welds in pressure retaining items for which the applicable rules of the original code of construction did not require notch toughness testing. The repair depth for temper bead repairs to pressure retaining items is limited to welds not penetrating though the full thickness. Full thickness temper bead weld repairs are permitted under the following conditions: 1) ASME Section VIII, Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to cause harm to vessel material. 2) For tube-to-header welds in steam service. Full thickness weld repairs shall be completed per NBIC Part 3, 3.3.5 with the following requirements: 1) The full thickness repair shall be verified as being full penetration. 2) Volumetric examination of the full thickness weld shall be performed.	When using this method, the following is required: a) This method is limited to repair welds in pressure retaining items for which the applicable rules of the original code of construction did not require notch toughness testing. The repair depth for temper bead repairs to pressure retaining items shall not penetrate the full thickness except as permitted below. ~~is limited to welds not penetrating though the full thickness.~~ ~~Full thickness temper bead weld repairs are permitted under the following conditions:~~ 1) ASME Section VIII, Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to be detrimental ~~cause harm~~ to the vessels material, or 2) ~~For t~~Tube-to-header welds in steam service. Full thickness weld repairs, as permitted above, shall be completed ~~per~~ in accordance with NBIC Part 3, 3.3.5 and ~~with~~ the following additional requirements: 1) The full thickness repair shall be verified as being full penetration. 2) Volumetric examination of the full thickness weld shall be performed.

Thomas White - SG R&A **2/28/2023**

When I read the current verbiage of 2.5.3.4 – a) it was not clear. I have made some editorials changes I would like to see.

Current Wording:

2.5.3.4 WELDING METHOD 4

When using this method, the following is required:

a) This method is limited to repair welds in pressure retaining items for which the applicable rules of the original code of construction did not require notch toughness testing. The repair depth for temper bead repairs to pressure retaining items is limited to welds not penetrating though the full thickness.

Full thickness temper bead weld repairs are permitted under the following conditions:

1) ASME Section VIII, Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to cause harm to vessel material.

2) For tube-to-header welds in steam service.

Full thickness weld repairs shall be completed per NBIC Part 3, 3.3.5 with the following requirements:

1) The full thickness repair shall be verified as being full penetration.

2) Volumetric examination of the full thickness weld shall be performed.

Proposed Wording:

2.5.3.4 WELDING METHOD 4

When using this method, the following is required:

a) This method is limited to repair welds in pressure retaining items for which the applicable rules of the original code of construction did not require notch toughness testing. The repair depth for temper bead repairs to pressure retaining items shall not penetrate the full thickness except as permitted below: ~~is limited to welds not penetrating though the full thickness.~~

~~Full thickness temper bead weld repairs are permitted under the following conditions:~~

1) ASME Section VIII, Division 2 pressure vessels, where application of PWHT on in-service vessels has been demonstrated to be detrimental ~~cause harm~~ to the vessels material, or

2) ~~For t~~Tube-to-header welds in steam service.

Full thickness weld repairs as permitted above shall be completed ~~per~~ in accordance with NBIC Part 3, 3.3.5 and ~~with~~ the following additional requirements:

1) The full thickness repair shall be verified as being full penetration.

2) Volumetric examination of the full thickness weld shall be performed.

1.5.1 OUTLINE OF REQUIREMENTS FOR A QUALITY SYSTEM FOR QUALIFICATION FOR THE NATIONAL BOARD "R" *CERTIFICATE OF AUTHORIZATION*

s) Exhibits

Forms referenced in the Quality System shall be included ~~and may be a~~as part of the referencing document or ~~included~~ as an exhibit or appendix. For clarity, the forms may be completed and identified as examples. Different forms may be utilized without the need for acceptance by the Inspector as long as they contain the same information as the exhibited forms.

2.3 STANDARD WELDING PROCEDURE SPECIFICATIONS (SWPS)

a) One or more SWPSs from NBIC Part 3, Table 2.3 may be used as an alternative to one or more WPS documents qualified by the organization making the repair or alteration, provided the organization accepts by certification (contained therein) full responsibility for the application of the SWPS in conformance with the Requirements for Application as stated in the SWPS. When using SWPSs, all variables listed on the Standard Welding Procedure are considered essential and, therefore, the repair organization cannot deviate, modify, amend, or revise any SWPS. US Customary Units or metric units may be used for all SWPSs in NBIC Part 3, Table 2.3, but one system shall be used for application of the entire SWPS in accordance with the metric conversions contained in the SWPS. The user may issue
supplementary instructions as allowed by the SWPS. Standard Welding Procedures Specifications shall not be used in the same product joint together with the other Standard Welding Procedure Specifications or other welding procedure specifications qualified by the organization. SWPSs may be purchase at the AWS Bookstore at https://pubs.aws.org.

b) The AWS reaffirms, amends or revises SWPSs in accordance with ANSI procedures.

c) The use of previous versions of the listed SWPSs is permitted. Previous versions include Reaffirmed, Amended, or Revised SWPSs regardless of the publication date.

TABLE 2.3

SWPS DESIGNATION: ~~YEAR~~

~~B2.1-1-001: 2020~~	~~B2.1-1-201: 2019~~	~~B2.1-8-215: 2012~~	~~B2.1-1/8-229: 2013~~
~~B2.1-1-002: 2020~~	~~B2.1-1-202: 2019~~	~~B2.1-8-216: 2012~~	~~B2.1-1/8-230: 2013~~
~~B2.1-1-016: 2018~~	~~B2.1-1-203: 2019~~	~~B2.1-4-217: 2021~~	~~B2.1-1/8-231: 2015~~
~~B2.1-1-017: 2018~~	~~B2.1-1-204: 2019~~	~~B2.1-4-218: 2021~~	~~B2.1-1-232: 2020~~
~~B2.1-1-018: 2020~~	~~B2.1-1-205: 2019~~	~~B2.1-4-219: 2021~~	~~B2.1-1-233: 2020~~
~~B2.1-1-019: 2018~~	~~B2.1-1-206: 2019~~	~~B2.1-4-220: 2021~~	~~B2.1-1-234: 2020~~
~~B2.1-1-020: 2018~~	~~B2.1-1-207: 2019~~	~~B2.1-4-221: 2021~~	~~B2.1-1-235: 2020~~
~~B2.1-1-021: 2018~~	~~B2.1-1-208: 2019~~	~~B2.1-5A-222: 2022~~	
~~B2.1-1-022: 2018~~	~~B2.1-1-209: 2019~~	~~B2.1-5A-223: 2022~~	
~~B2.1-8-023: 2018~~	~~B2.1-1-210: 2012~~	~~B2.1-5A-224: 2022~~	
~~B2.1-8-024: 2012~~	~~B2.1-1-211: 2012~~	~~B2.1-5A-225: 2022~~	
~~B2.1-8-025: 2012~~	~~B2.1-8-212: 2012~~	~~B2.1-5A-226: 2022~~	
~~B2.1-1-026: 2018~~	~~B2.1-8-213: 2012~~	~~B2.1-1/8-227: 2013~~	
~~B2.1-1-027: 2018~~	~~B2.1-8-214: 2012~~	~~B2.1-1/8-228: 2013~~	

TABLE 2.3

SWPS DESIGNATION:

B2.1-1-001	B2.1-8-024	B2.1-1-207	B2.1-4-217	B2.1-1/8-227
B2.1-1-002	B2.1-8-025	B2.1-1-208	B2.1-4-218	B2.1-1/8-228
B2.1-1-016	B2.1-1-026	B2.1-1-209	B2.1-4-219	B2.1-1/8-229
B2.1-1-017	B2.1-1-027	B2.1-1-210	B2.1-4-220	B2.1-1/8-230
B2.1-1-018	B2.1-1-201	B2.1-1-211	B2.1-4-221	B2.1-1/8-231
B2.1-1-019	B2.1-1-202	B2.1-8-212	B2.1-5A-222	B2.1-1-232
B2.1-1-020	B2.1-1-203	B2.1-8-213	B2.1-5A-223	B2.1-1-233
B2.1-1-021	B2.1-1-204	B2.1-8-214	B2.1-5A-224	B2.1-1-234
B2.1-1-022	B2.1-1-205	B2.1-8-215	B2.1-5A-225	B2.1-1-235
B2.1-8-023	B2.1-1-206	B2.1-8-216	B2.1-5A-226	

2.4 AWS REFERENCE STANDARDS

The following AWS Standards have been adopted by the NBIC for use as referenced below:

a) AWS B2.1 - Specification for Welding Procedure and Performance Qualification

b) AWS B2.1 BMG - Base Metal Grouping for Welding Procedure and Performance Qualification

PROPOSED REVISION OR ADDITION

Item No.

A 23-35

Subject/Title

Definition of "nonload bearing attachment" (All Parts)

NBIC Location

Part: Repairs and Alterations; Section: 9; Paragraph: 9.1

Project Manager and Task Group

Source (Name/Email)

Donald Kinney / don.kinney@labor.nc.gov

Statement of Need

The term "nonload bearing attachment" is used as a basis for determining a routine repair but is not defined in the NBIC.

Background Information

A Certificate Holder replaces/repairs internal rails/supports for trays or bins that get rolled into an autoclave. These rails/supports are (typically) stitch welded along the inside of the shell. The Certificate Holder believes this is a nonload bearing attachment and performs this work as a routine repair. The attachment of internals is a loading design consideration for ASME Sect. VIII Div.1.

Existing Text	Proposed Text
	"nonload bearing attachment"- Any welded attachment that is not required to be considered a design loading by the original code of construction.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 23-36

Subject/Title

Clarifying Rules for Using Alternative NDE Methods

NBIC Location

Part: Repairs and Alterations & Repairs and Alterations; Section: 4 & 4; Paragraph: 4.2 a) & 4.4 b)

Project Manager and Task Group

Source (Name/Email)

Gary Scribner / gscribner@nbbi.org

Statement of Need

It has been determined that there may be some confusion regarding allowable NDE methods for repairs and alterations. The existing language of 4.2 a) tells the reader that alternative NDE methods acceptable to the Inspector and, where required, the Jurisdiction, may be used provided the requirements of Section 4 are met. However, it is possible that a reader may not familiarize themselves with all of the requirements of Section 4 prior to proposing an alternative NDE method. This change will help clarify and reinforce the requirements for alternative NDE methods for repairs and alterations.

Background Information

This change is being proposed as a result of the U.S. Chemical Safety Bureau's investigation of the Loy Lange Box Company pressure vessel explosion.

Existing Text

4.2 NONDESTRUCTIVE EXAMINATION
a) Nondestructive examination (NDE) requirements, including technique, extent of coverage, procedures, personnel qualification, and acceptance criteria, shall be in accordance with the original code of construction, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). Weld repairs and alterations shall be subjected to the same nondestructive examination requirements as the original welds. Where this is not possible or practicable, alternative NDE methods acceptable to the Inspector and the Jurisdiction where the pressure-retaining item is installed, where required, may be used, provided that all other requirements of this section are met.

4.4 Examination and Test for Repairs and Alterations
a) The integrity of repairs, alterations, and replacement parts used in repairs and alterations shall be verified by examination or test;

b) Testing methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration. Any insulation, coatings, or coverings that may inhibit or compromise a meaningful test method shall be removed, to the extent identified by the Inspector;

Proposed Text

4.2 NONDESTRUCTIVE EXAMINATION
a) Nondestructive examination (NDE) requirements, including technique, extent of coverage, procedures, personnel qualification, and acceptance criteria, shall be in accordance with the original code of construction, standard, or specification selected for the repair or alteration of the pressure-retaining item (see NBIC Part 3, 1.2). Weld repairs and alterations shall be subjected to the same nondestructive examination requirements as the original welds. Where this is not possible or practicable, alternative NDE methods acceptable to the Inspector and the Jurisdiction where the pressure-retaining item is installed, where required, may be used, provided that the following requirements are met:~~provided that all other requirements of this section are met.~~
1) Testing methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration;

2) Alternative NDE methods used for repairs shall be limited to those listed in Part 3, 4.4.1; and

3) Alternative NDE methods used for alterations shall be limited to those listed in Part 3, 4.4.2.

4.4 Examination and Test for Repairs and Alterations
a) The integrity of repairs, alterations, and replacement parts used in repairs and alterations shall be verified by examination or test;

b) ~~Testing methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration.~~ Any insulation, coatings, or coverings that may inhibit or compromise a meaningful test method shall be removed, to the extent identified by the Inspector;

PROPOSED REVISION OR ADDITION

Item No.

A 23-38

Subject/Title

Scope Clarification for Part 3

NBIC Location

Part: Repairs and Alterations; Section: 1; Paragraph: 1.1(a)

Project Manager and Task Group

Source (Name/Email)

Adam Henson / adam.henson@csb.gov

Statement of Need

The owner or user's need to return equipment to service must never compromise the operational safety of the equipment or the process by which the operational safety of the equipment is assured. There is an interpretation that supports this notion by describing subjects permitted to be considered when determining whether a repair or alteration activity is practicable.

Background Information

On April 3, 2017, an explosion occurred at the Loy-Lange Box Company in St. Louis, Missouri. The incident occurred when the bottom head of a pressure vessel called a semi-closed receiver (SCR), which was used in the company's steam generation system, catastrophically failed. The SCR was launched in the air as the result of the explosion and landed on a neighboring business. One employee of the Loy Lange Box Company and three members of the public were fatally injured. The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated this incident and learned during the investigation that the SCR was repaired by an R stamp organization in 2012 five years prior to the incident. During the repair a wasted area of the bottom head of the SCR was flush patched. The cause of the defect was determined to be oxygen pitting corrosion. Evidence gathered during the investigation suggests that the defects in the head were not fully removed during the repair activity. The R stamp organization stated during the investigation that Loy-Lange requested an "emergency repair" following the discovery of a leak from the SCR. The R stamp organization stated further that they interpreted this to mean the repair needed to be completed immediately, presumably so production could resume as normal. The full effect of the R stamp organization's understanding of an "emergency repair" and what bearing that had on the decision they made were not able to be established through the investigation. External pressure to work faster is however understood anecdotally to be determinantal to safety. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link: https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion-/ INTERPRETATION 17-01 Subject: Application of Term "Practicable Edition: 2017 Question: May the desire to save time and/or expense be used solely in determining if a repair and/or alteration activity is practicable? Reply: No. The determination of "practicable" shall be based on technical consideration of the nature and scope of repair and/or alteration activities.

Existing Text	Proposed Text
This part provides requirements and guidelines that apply when performing repairs and alterations to pressure-retaining items.	This part provides requirements and guidelines that apply when performing repairs and alterations to pressure-retaining items. The financial and/or operational concerns of the owner or user associated with loss of use of equipment in need of repair or alteration shall have no bearing on the application of the requirements of this part.

PROPOSED REVISION OR ADDITION

Item No.

A 23-39

Subject/Title

Strengthening Prevention of Defect Recurrence

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: Paragraph 1 (3.3.1)

Project Manager and Task Group

Source (Name/Email)

Adam Henson / adam.henson@csb.gov

Statement of Need

The existing text recommends, but does not require an investigation of the cause, extent, and likelihood of recurrence of defects. The existing text also has no requirement for anyone to act to prevent the recurrence of defects. Where root and/or proximate causes of defects are known, or could be determined, someone needs to act to prevent catastrophic failure of equipment.

Background Information

On April 3, 2017, an explosion occurred at the Loy-Lange Box Company in St. Louis, Missouri. The incident occurred when the bottom head of a pressure vessel called a semi-closed receiver (SCR), which was used in the company's steam generation system, catastrophically failed. The SCR was launched in the air as the result of the explosion and landed on a neighboring business. One employee of the Loy Lange Box Company and three members of the public were fatally injured. The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated this incident and learned during the investigation that the SCR was repaired by an R stamp organization in 2012 five years prior to the incident. During the repair, a wasted area of the bottom head of the SCR was flush patched. The cause of the defect was determined to be oxygen pitting corrosion. Evidence gathered during the investigation suggests that the defects in the head were not fully removed during the repair activity. The R stamp organization stated during the investigation that Loy-Lange requested an "emergency repair" following the discovery of a leak from the SCR. The R stamp organization stated further that they interpreted this to mean the repair needed to be completed immediately, presumably so production could resume as normal. This was not the first time the SCR leaked. The vessel leaked previously in April 2004, August 2012, and November 2012. In addition to causing these leaks oxygen pitting corrosion was also discovered in other parts of Loy Lange's steam system. During the investigation, the CSB noted that no effort was made to determine the extent of the oxygen pitting corrosion in the steam generation system, including the SCR, and that Loy Lange's operating practices up to the date of the incident were such that oxygen levels within the steam generation system were not effectively managed. Had the level of oxygen within the steam generation system been effectively managed following any of the leaks repaired over the years the 2017 incident would not have happened. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link:
https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion-/

Existing Text	Proposed Text
Before a repair is made to a defect in a welded joint or base metal, care should be taken to investigate its cause and to determine its extent and likelihood of recurrence.	Before a repair is made to a defect in a welded joint or base metal, an investigation to determine the cause, extent, and likelihood of recurrence of the defect shall be made by the owner or user of the pressure retaining item. This investigation shall be sufficiently thorough to determine the root cause(s) of the defect. The owner or user shall supply a statement as to how the likelihood of recurrence of the defect shall be reduced. For instance, if the cause of the defect is vehicular impact to equipment bollards may need to be installed in accordance with NBIC Part 1 Section ???, if the cause of the damage is oxygen pitting corrosion operating practices may need adjustment, etc. The time limit for implementing these measures shall be included in the owner or user's statement. This statement shall be signed by a senior member of management of the owner or user of the pressure retaining item. The R Certificate Holder shall attach the statement to the appropriate Form R and shall file the Form R with the National Board. If the cause of the defect cannot be determined through investigation the pressure retaining item should be inspected more frequently until the cause of the defect can be determined in accordance with NBIC Part 2, Section 4.4.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 23-40

Subject/Title

Strengthening Requirements to Ensure Defect Removal

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: 4.1

Project Manager and Task Group

Source (Name/Email)

Adam Henson / adam.henson@csb.gov

Statement of Need

The existing text alludes to the potential need for nondestructive examination (NDE) to ensure complete removal of defects but does not require it. The means to ensure defects have been removed must be understood by all to ensure safety. There is an interpretation of the 2021 NBIC that compounds this issue permitting repair organizations to not follow the requirements of NBIC Part 3, 3.3.4.8 even when the characteristics of the defect cannot be fully established.

Background Information

On April 3, 2017, an explosion occurred at the Loy-Lange Box Company in St. Louis, Missouri. The incident occurred when the bottom head of a pressure vessel called a semi-closed receiver (SCR), which was used in the company's steam generation system, catastrophically failed. The SCR was launched in the air as the result of the explosion and landed on a neighboring business. One employee of the Loy Lange Box Company and three members of the public were fatally injured. The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated this incident and learned during the investigation that the SCR was repaired by an R stamp organization in 2012 five years prior to the incident. During the repair a wasted area of the bottom head of the SCR was flush patched. The cause of the defect was determined to be oxygen pitting corrosion. Evidence gathered during the investigation suggests that the defects in the head were not fully removed during the repair activity. The R stamp organization stated during the investigation that Loy-Lange requested an "emergency repair" following the discovery of a leak from the SCR. The R stamp organization stated further that they interpreted this to mean the repair needed to be completed immediately, presumably so production could resume as normal. To make the repair the R stamp organization cut the SCR shell from the bottom head, leaving the bottom head attached to the skirt. An employee who oversaw the repair stated that they observed pitting corrosion damage in the bottom head. They cut a hole in the center of the head where they believed the corrosion was isolated and applied a flush patch. They believed they removed all corrosion damage through this process. When asked what techniques they relied upon to determine the complete removal of defects the employee replied that they would have been able to see additional pitting and that with the hole cut in the head they were able to match up the patch with the existing metal to verify the thickness of the remaining metal of the head. Besides being able to see differences in the thickness of the patch and the remaining metal of the head, this employee also reported that they would have been able to feel the difference too. Another employee reported measuring the thicknesses of the two pieces with a tape measurer and verified the thickness of both pieces to be ¼ inch. The evidence the CSB gathered demonstrating the likeliness that repair did not remove all defective material from the SCR is discussed in Section 1.6 SCR Post-Failure Examination starting on page 26 of the report. Had all defective material been removed during this repair the incident may not have happened. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link: https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion-/ INTERPRETATION 21-13 Subject: Repair of pressure-retaining items without complete removal of defect Edition: 2021 Question: If the characteristics of the defect cannot be fully established, would the provisions of NBIC Part 3, 3.3.4.8 be applicable? Reply: No.

Existing Text	Proposed Text
Except as provided in NBIC Part 3, 3.3.4.8, a repair of a defect in a welded joint or base material shall not be made until the defect has been removed. A suitable nondestructive examination (NDE) method, such as magnetic particle (MT) or liquid penetrant (PT), may be necessary to ensure complete removal of the defect. If the defect penetrates the full thickness of the material, the repair shall be made with a full penetration weld such as a double buttweld or single buttweld with or without backing. Where circumstances indicate that the defect is likely to recur, consideration should be given to removing the defective area and installing a flush patch or taking other corrective measures acceptable to the Inspector, and when required, by the Jurisdiction.	Except as provided in NBIC Part 3, 3.3.4.8, a repair of a defect in a welded joint or base material shall not be made until the defect has been removed. A suitable nondestructive examination (NDE) method, such as magnetic particle (MT) or liquid penetrant (PT), is necessary to ensure complete removal of the defect. Where the cause of the defect is oxygen pitting corrosion, or similar, the remaining thickness of material left behind shall be verified by a suitable nondestructive test such as ultrasonic thickness measurement. If the defect penetrates the full thickness of the material, the repair shall be made with a full penetration weld such as a double buttweld or single buttweld with or without backing. Where circumstances indicate that the defect is likely to recur, consideration should be given to removing the defective area and installing a flush patch or taking other corrective measures acceptable to the Inspector, and when required, by the Jurisdiction.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 23-41

Subject/Title

Strengthening Requirements for Defect Removal When Patching

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: a)2)

Project Manager and Task Group

Source (Name/Email)

Adam Henson / adam.henson@csb.gov

Statement of Need

The existing text requires the removal of defective material until sound material is reached but provides no requirements or guidance on means to employ to ensure complete removal of defective material. The means to ensure defects have been removed must be understood by all to ensure safety. There is an interpretation of the 2021 NBIC that compounds this issue permitting repair organizations to not follow the requirements of NBIC Part 3, 3.3.4.8 even when the characteristics of the defect cannot be fully established.

Background Information

On April 3, 2017, an explosion occurred at the Loy-Lange Box Company in St. Louis, Missouri. The incident occurred when the bottom head of a pressure vessel called a semi-closed receiver (SCR), which was used in the company's steam generation system, catastrophically failed. The SCR was launched in the air as the result of the explosion and landed on a neighboring business. One employee of the Loy Lange Box Company and three members of the public were fatally injured. The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated this incident and learned during the investigation that the SCR was repaired by an R stamp organization in 2012 five years prior to the incident. During the repair a wasted area of the bottom head of the SCR was flush patched. The cause of the defect was determined to be oxygen pitting corrosion. Evidence gathered during the investigation suggests that the defects in the head were not fully removed during the repair activity. The R stamp organization stated during the investigation that Loy-Lange requested an "emergency repair" following the discovery of a leak from the SCR. The R stamp organization stated further that they interpreted this to mean the repair needed to be completed immediately, presumably so production could resume as normal. To make the repair the R stamp organization cut the SCR shell from the bottom head, leaving the bottom head attached to the skirt. An employee who oversaw the repair stated that they observed pitting corrosion damage in the bottom head. They cut a hole in the center of the head where they believed the corrosion was isolated and applied a flush patch. They believed they removed all corrosion damage through this process. When asked what techniques they relied upon to determine the complete removal of defects the employee replied that they would have been able to see additional pitting and that with the hole cut in the head they were able to match up the patch with the existing metal to verify the thickness of the remaining metal of the head. Besides being able to see differences in the thickness of the patch and the remaining metal of the head, this employee also reported that they would have been able to feel the difference too. Another employee reported measuring the thicknesses of the two pieces with a tape measurer and verified the thickness of both pieces to be ¼ inch. The evidence the CSB gathered demonstrating the likeliness that repair did not remove all defective material from the SCR is discussed in Section 1.6 SCR Post-Failure Examination starting on page 26 of the report. Had all defective material been removed during this repair the incident may not have happened. Full details of the Loy-Lange Box Company Pressure Vessel Explosion are available at this link: https://www.csb.gov/loy-lange-box-company-pressure-vessel-explosion-/ INTERPRETATION 21-13 Subject: Repair of pressure-retaining items without complete removal of defect Edition: 2021 Question: If the characteristics of the defect cannot be fully established, would the provisions of NBIC Part 3, 3.3.4.8 be applicable? Reply: No.

Existing Text	Proposed Text
Before installing a flush patch, defective material shall be removed until sound material is reached. The patch shall be formed to the proper shape or curvature. The edges shall align without overlap. In stayed areas, the weld seams should come between staybolt rows or riveted seams. Patches shall be made from a material whose composition and thickness meet the intended service. Patches may be any shape or size. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted. The completed welds shall meet the requirements of the original code of construction.	Before installing a flush patch, defective material shall be removed until sound material is reached. The soundness of the remaining material shall be verified through nondestructive testing such as ultrasonic thickness measurement testing. The patch shall be formed to the proper shape or curvature. The edges shall align without overlap. In stayed areas, the weld seams should come between staybolt rows or riveted seams. Patches shall be made from a material whose composition and thickness meet the intended service. Patches may be any shape or size. If the patch is rectangular, a minimum radius of not less than three times the material thickness shall be provided at the corners. Square corners are not permitted. The completed welds shall meet the requirements of the original code of construction.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date

PROPOSED REVISION OR ADDITION

Item No.

A 23-49

Subject/Title

Hardness testing of existing materials

NBIC Location

Part: Repairs and Alterations; Section: 3; Paragraph: 3.2.1 a)

Project Manager and Task Group

Source (Name/Email)

Mark Kincs / mark.r.kincs@xcelenergy.com

Statement of Need

Field hardness testing of existing materials may be difficult and produce erroneous results. It is usually unnecessary for determining properties required for selection of welding procedures. Unless needed, it should not be required to be performed. The purpose of verifying existing materials in Paragraph 3.2.1 a) is not to confirm acceptability of existing design, but to determine nominal composition for welding.

Background Information

Field hardness testing is often negatively affected by such factors as material thickness, surface preparation, and vibration. Chemical analysis has a clear correlation to selection of proper welding procedures by determining nominal material composition. Hardness testing has no such clear correlation, and Paragraph 3.2.1 a) does not explain its need. If the intent is that the hardness reading be used to approximate material tensile strength for welding considerations, the need for such information is rare.

Existing Text

The materials used in making repairs or alterations shall conform insofar as possible to the original code of construction or construction standard or code selected, including the material specification requirements used for the work planned. Carbon or alloy steel having a carbon content of more than 0.35% shall not be welded unless permitted by the original code of construction. The "R" Certificate Holder is responsible for verifying identification of existing materials from original data, drawings, or pressure-retaining item records, and identification of the materials to be installed. Consideration shall be given to the condition of the existing material, especially in the weld preparation area. If the existing material cannot be verified (unknown), the "R" Certificate Holder shall perform a chemical analysis and hardness testing, as a minimum, of the unknown material to verify its weldability and strength or may elect to qualify a weld procedure. If there is a question with regard to the weldability characteristics of the material, then competent technical advice should be obtained.

Proposed Text

The materials used in making repairs or alterations shall conform insofar as possible to the original code of construction or construction standard or code selected, including the material specification requirements used for the work planned. Carbon or alloy steel having a carbon content of more than 0.35% shall not be welded unless permitted by the original code of construction. The "R" Certificate Holder is responsible for verifying identification of existing materials from original data, drawings, or pressure-retaining item records, and identification of the materials to be installed. Consideration shall be given to the condition of the existing material, especially in the weld preparation area. If the existing material cannot be verified (unknown), the "R" Certificate Holder shall, at a minimum, perform a chemical analysis of the unknown material to determine its nominal composition for welding considerations. Hardness testing of the material shall additionally be performed, if required to further discern material properties for weld procedure selection. As an alternative to material testing, the “R” Certificate Holder may elect to qualify a weld procedure using a sample of the material. Competent technical advice should be obtained when there are questions regarding material weldability based on test results. The “R” Certificate Holder shall provide information in the repair package satisfactory to the Inspector regarding material weldability and weld procedure selection.

PROPOSED REVISION OR ADDITION

Item No.

A 23-51

Subject/Title

Replace "legal" with "company" in 1.5.1 a) Title Page

NBIC Location

Part: Repairs and Alterations; Section: 1; Paragraph: 1.5.1

Project Manager and Task Group

Source (Name/Email)

Luis Ponce / lponce@nationalboard.org

Statement of Need

The National Board has not adopted the ASME policy regarding company and legal names. Per the ASME policy it is permissible to have two names on a Certificate of Authorization and the quality manual. The 2023 NBIC 1.5.1 a) "legal" term may cause confusion for certificate holders, their AIAs, and review teams.

Background Information

The ASME Guide on Legal Names is available for review.

Existing Text	**Proposed Text**
The title page shall contain the Certificate Holder's legal name, physical address, and scope of work.	The title page shall contain the Certificate Holder's company name, physical address, and scope of work.

	VOTE:						
COMMITTEE	Approved	Disapproved	Abstained	Not Voting	Passed	Failed	Date