

Date Distributed: January 21th, 2015



**THE
NATIONAL
BOARD**
OF BOILER AND
PRESSURE VESSEL
INSPECTORS

SUBCOMMITTEE REPAIRS and ALTERATIONS

MINUTES

*Meeting of January 21, 2015
Orlando, FL*

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 – 8:00 a.m.

2. Announcements

Chairman George Galanes presented announcements for the remainder of the week.

3. Adoption of the Agenda

A motion was made and approved to accept the agenda as amended. Added items; NB14-0704 (revising text for routine weld repairs), new Part 3 Supplement for CSEF steels and define existing material in Part 3 of the NBIC. Mr. Tom White added for consideration of membership for SG R&A, and Angelo Bramucci for SC R&A membership.

4. Approval of Minutes of July 16, 2014 Meeting

A motion was made and approved to accept the Minutes of July 16, 2014.

5. Review of the Roster (Attachment pages 1-7)

Messrs. Brian Boseo, Wayne Jones, and Larry McManomon are eligible for reappointment to the SG on Repair and Alteration pending the approval of the Chairman of the Board of Trustees. A vote will be taken. A motion was made and approved to reappoint Brian Boseo and Larry McManoman to the SG Repair and Alteration pending the approval of the Chairman of the Board of Trustees.

A motion was made and approved for the reappointment Brian Boseo, Wayne Jones, and Larry McManomon to the SG on Repair and Alteration pending the approval of the Chairman of the Board of Trustees

Mr. Joel Amato would like to become a member of the SG on Repair and Alteration. Please view his attached letter of support. A vote will be taken. (Attachment page)

A motion was made and approved to appoint Joel Amato to the SG Repair and Alteration pending the approval of the Chairman of the Board of Trustees.

Ms. Kathy Moore would like to become a member of the SG on Repair and Alteration. A vote will be taken. (Attachment page)

A motion was made and approved to appoint Ms. Kathy Moore to the SG Repair and Alteration pending the approval of the Chairman of the Board of Trustees.

Mr. Tom White would like to become a member of the SG on Repair and Alteration. A vote will be taken. (Attachment page)

A motion was made and approved to appoint Tom White to the SG Repair and Alteration pending the approval of the Chairman of the Board of Trustees.

Mr. James Getter would like to join the SG on Historical Boilers. A vote will be taken.

A motion was made and approved to appoint James Getter to the SG on Historical Boilers pending the approval of the Chairman of the Board of Trustees.

Mr. Robert Reetz has retired from the State of North Dakota therefore resigning from all NBIC Committee duties. A chairman for the SG on Historical Boilers needs to be appointed. A vote will be taken.

No action was taken for appointing a new chairman for the SG on Historical Boilers. The Vice Chairman will be the Acting Chairman.

Angelo Bramucci would like to become a member of the Subcommittee of the Repair and Alterations

A motion was made and approved to appoint Angelo Bramucci to the SG Repair and Alteration pending the approval of the Chairman of the Board of Trustees.

6. Inquiries

IN14-0401 Part 3, 1.2 SC on R and A –

Question 1: The NBIC Part 3 paragraph 1.2 states that a repair shall be carried out “insofar as possible to the section and edition of the ASME code most applicable to the work planned.” If a vessel is constructed using SA-517-E (P-11B) material to ASME Section VIII Div. 1, where production and weld procedure impact tests were required during construction, would a repair to a crack in the shell require production and weld procedure impact testing under the NBIC? Proposed Reply 1: Yes.

Question 2: If the answer to Question 1 is yes and there was no SA-517-E material from the original lot available, would the repair require the addition of new base material (e.g. a flush patch around the area of the crack) so that production impact tests could be performed with the original base metal to the new base metal? Proposed Reply 1: Yes.

Question 3: If the vessel described in Question 1 was to be altered by adding an SA-675 (P-1) pump flange to the shell, would production and weld procedure impact tests be required using the same lot P-1 and P-11B base materials as used in the alteration? Proposed Reply 1: Yes.
(Attachment pages 4-5)

January 2015

Mr. Wielgoszinski provided a report. After consideration, Mr. Wielgoszinski decided to withdraw the inquiry and requested a new item to address impact testing of P11B material.

A motion was made to close this interpretation and open up an action Item.

The new action item will be:

NB15-1405 Part 3-Impact testing of P-11B Material, SC R and A (From IN14-0401)

A task group was formed with Bob Wielgoszinski, as project manager and member Ben Schaefer, Walt Sperko, Monty Bost, and Dave Ford. (Attachment Pages 8-9)

IN14-0701 – Part 3 PWHT of Vessel- SC, R and A Subject: NBIC 2010, Part 3, Post Weld Heat Treatment of a Vessel. Q1. Must a company that performs post weld heat treatment be required to hold an “R” certification? ANS: YES Q2. Is this post weld heat treatment now considered an “Alteration” to this vessel, as per NBIC part 3? ANS: YES Q3. Shall this “Alteration” be documented on a NBIC R-2 form? ANS: YES) (Attachment page 10)

January 2015

Mr. Galanes provided a report.

With Mr. Galanes guiding Subgroup R&A members for responses to the interpretation the SG R&A developed three questions and replies that were presented to the Subcommittee on R&A.

A motion was made and approved with one abstention, (Mr. Milette) to accept the proposed committees questions and replies. The item passed unanimously for consideration by NBIC main committee.

IN14-0801 – Part 3, 3.3.3 s) Question: 2013 NBIC, Part 3, Section 3.3.3, paragraph s)

Is it the intent of the term “minimum required thickness” to mean nominal wall minus corrosion allowance as shown on the manufacturer’s U-1 form? Reply: Yes (Attachment pages 11-12)

January 2015

Mr. Morelock provided a report.

Mr. Trout presented the task groups reworked question and reply from the SG R&A meeting. .

A motion was made and unanimously approved to send the proposed question and reply to the NBIC main committee for consideration.

IN15-0101- Part 3, 3.3.2. e) Question: Is seal welding of inspection opening covers, such as handhole plates or plugs, considered a routine repair in accordance with NBIC, Part 3, paragraph 3.3.2 e)? Answer: No. (Attachment page 13)

January 2015

Mr. Wielgoszinski presented a response to the interpretation and also provided a proposed code change if the SC R&A felt seal welding should be considered a routine repair. A straw vote was taken and the SC decided to answer to the interpretation in lieu of considering the proposed code revision.

A motion was made and unanimously approved to accept the interpretation response.

7. Action Items

NB11-0204 - Part 3 S2 - Review NDE requirements of stayed areas. A Task Group consisting of M. Wahl (PM), J. Larson and F. Johnson is assigned. (No attachment)

January 2015

Mr. Ferrell provided a progress report. No work had been performed on this item.

NB12-0801-Part 3 - Repair and alteration of Gasketed PHEs in the field. (Attachment pages 14-23)

January 2015

Mr. Cauthon presented a progress report informing the committee there is still need for Section VIII Div-1 to incorporate an appendix for PHE vessels for the task group to repair and alteration code requirements. The Sub Committee's task group consists of Mr. Cauthon as the New Project Manager, with new members Nathan Carter, and Bob Wielgoszinski. The task group will monitor progress with ASME Section VIII, Div-1 regarding this item.

NB13-0403-Part 3, S1.9.2 - Installation of Boiler and Arch Tubes. (No attachment)

January 2015

Mr. Ferrell provided a progress report. No work had been performed on this item.

NB13-1401 - Part 3, S.9.2 - SG LB Add wording in this section regarding boiler tube welding. (No attachment)

January 2015

Mr. Ferrell provided a progress report. No work had been performed on this item.

NB13-1404-A - Part 3 S1 - Fillet welded staybolts. (No attachment)

January 2015

Mr. Ferrell provided a progress report. No work had been performed on this item.

NB13-1405 - Part 3, S1.2.9, SG Locomotive - Throttle pipes, dry pipes, superheater headers and front end

steam pipes. (No attachment)

January 2015

Mr. Ferrell provided a progress report. No work had been performed on this item.

NB13-1406 - Part 3, S1, SG Locomotive - Superheater units. (No attachment)

January 2015

Mr. Ferrell provided a progress report. No work had been performed on this item.

NB13-1407 - Part 3, S1, SG Locomotive-Bolts, nuts and studs. (No attachment)

January 2015

Mr. Ferrell provided a progress report. No work had been performed on this item.

NB13-1408 - Part 3, S1, SG Locomotive - Threaded boiler studs-Taper thread and straight thread types.
(No attachment)

January 2015

Mr. Ferrell provided a progress report. No work had been performed on this item.

NB14-0203 - Part 3 - Review this section for **NR** Accreditation requirements. The administrative requirements have been removed and we should have a TG review if we want to remove any of the existing requirements in the NBIC Part 3 before we publish the 2015 Edition. (Attachment Pages 24-25)

January 2015

Mr. Caution presented a document showing the proposed revisions to the 2017 NBIC Part 3 for the accreditation paragraphs. (Attachment)

A motion was made and unanimously approved to send the document out for an up or down letter ballot vote.

NB14-0301 - Part 3 – ~~Manufactured parts~~. Encapsulation (Attachment Pages 26-28)

January 2015

Mr. Wielgoszinski presented a document to be sent out for a Review and Comment letter ballot to the SC R&A and SG R&A.. To accompany the document he requested ASME PCC-2 as background information for sealed box weld repairs..

A motion was made and unanimously approved to send out the documents for a review and comment ballot (Attachment)

NB14-0302 - Part 3, S6 – Addition of TR forms. (Attachment pages 29-37)

January 2015

A task group has been formed with Chuck Withers as the Project Manager, and members Bob Underwood, Kathy Moore and Bill Vallance to address the TR program revisions that need to be incorporated into Part-3.

NB14-0701 - Part 3, 3.2.2 c) - This action item is a result of IN13-0301. The rationalization is to support an intent interpretation that addresses an R-Certificate holder's capability to fabricate ASME pressure parts to be used in a repair or alteration being performed by the same R-Certificate holder who is fabricating the

ASME pressure part. The current words in NBIC Part 3 do not support this. (Attachment pages 39-40)

January 2015

Mr. Wielgoszinski presented a document to send out for an up or down letter ballot vote for the Subcommittee. (Attachment pages)

A motion was made and unanimously approved to present the document to be sent out for an up or down vote.

NB14-2401 - Part 3, S6.5 - Replacing the referenced TR-1 form with a TR-3 form. (Attachment Pages 40-41)

January 2015

A task group of Chuck Withers as the Project Manager, and members Bob Underwood, Kathy Moore and Bill Vallance will address the TR program revisions that need to be incorporated into Part 3.

NB14-2402 - Part 3, S6.3 - TR accreditation. This will be addressed in TR NB document on accreditation of TR certificate holders. The paragraphs referenced will be removed from NBIC part 3 and placed into the NB document. (Attachment pages 42-43)

January 2015

A task group of Chuck Withers as the Project Manager, and members Bob Underwood, Kathy Moore and Bill Vallance will address the TR program revisions that need to be incorporated into Part 3.

NB15-0507 – Part 3, 1.2 f) - This item is a result of PR15-0104 - It is recognized that “DOT” is the US Department of Transportation. “DOT”, however, is used throughout, but is not defined in Part 3. Since the NBIC is an International Standard, in my opinion this should be defined. As this section is the first occurrence of “DOT” in Part 3, this could be handled by the following change, which would also inherently limit the text to the DOT by the inclusion of “i.e.”. Part 3, 1.2 (f) : “the Competent Authority, i.e. the US Department of Transportation (DOT), shall...” (Attachment pages 44-45)

January 2015

Nathan Carter submitted a proposed code change for NBIC Part 3 paragraph: 1.2 f) addressed in PR15-0104.

A motion was made and unanimously approved to define DOT in Part 3, 1.2 f)

NB15-0508 –Part 3, 1.8.7.2 - This item is a result of PR15-0125, PR15-0126, PR15-0127 and PR15-0130 - The personnel qualification programs and documents listed do not comply with 2013 Edition Section XI. Only CP-189 and the ACCP Certification program is listed in IWA-2310, with the exception of SNT-TC-1A, which is valid only until recertification is required, which is a 5 year recommended maximum per SNT-TC-1A 2006. As a result, I interpret IWA-2310 to mean SNTTC-1A is being discontinued and is no longer valid for new Certifications. Also, the ASNT NDT Level II and III programs are not recognized as acceptable for stand-alone use by any current ASME BPV Construction Code, but historically, it may have been. I am assuming that is what is inferred by the term “ASNT”. (Original Attachment pages 46-55)

January 2015

NB15-0508 was motioned and approved to be closed with four new action items opened to address each public review comment separately. These new action items are as follows; NB15-1406 thru NB15-1409.

NB15-1406 A motion was made by George Galanes and unanimously approved to close this item associated with PR15-0125 without changes. (Attachment page 46)

NB14-1407 Part 3 1.8.8.2 A motion was made and unanimously approved to add the wording “brazing and fusing” to 1.8.8.2 QUALITY PROGRAM ELEMENTS to close item associated with PR15-0126. (Attachment pages 47-48)

NB14-1408 Part 3 1.8.7.2 n) A motion was made and unanimously approved to add the wording to change NBIC Part 3 paragraph: 1.8.7.2 n) 2) f) to add ASME Section V Article 2 into the text to close item associated PR15-0127. (Attachment page 49-50)

NB14-1409 Part 3 1.8.7.2 g) A motion was made and unanimously approved to add the wording to change NBIC Part 3 paragraph: 1.8.7.2 g) to eliminate the first seven (7) words of the paragraph and begin the paragraph with the words, Purchase of materials, to close item associated with PR15-0130. (Attachment page 51-52)

NB15-0509- Part 3, 2.5.3.6 – This action item is a result of PR15-0157, PR15-0158, PR15-0156 and PR15-0501. These comments all pertain to Welding method 6. (Attachment pages 53-55)

A motion was made and unanimously approved to add wording to change NBIC Part 3 paragraph: 2.5.3.6 c) 5) d) to add e.g to the 4 filler metal designations to close this item associated with PR15-0156.

A motion was made and approved to correspond with Mr. Kinc as his public review comment PR15-0501 is parallel to PR15-0156.

A motion was made and unanimously approved to open a new action item **NB15-1402** to address PR15-0157 and PR15-0158.

NB15-1402 Humidity, Weld Method 6- A task group was formed with John Siefert as project manager and members Nathan Carter and George Galanes to work on the public review comments PR15-0157 & PR15-0158. (Attachment pages 56-57)

NB15-0510 – Part 3, 3.3.3.4.9 b) – This item is a result of PR15-0119. What about for a brazed boiler, should tube plugging by brazing be considered for inclusion? (Attachment page 58)

January 2015

A motion was made and unanimously approved to take no action on this item associated with PR15-0119 as strength calculations would be impracticable for brazing.

NB15-0511- Part 3, 5.13.5.1- This item is a result of PR15-0120- What about Category 3 repairs/alterations, etc? What if it was performed to an International Code other than Section III or XI? Per the instruction, there isn't a way to address this situation. (Attachment page 59)

January 2015

A task group was formed with the Project Manager as Paul Edwards, with the members as Ben Schafer, Bob Wielgoszinski, and Chuck Withers.

NB15-0512 –Part 3, S3.5.5.b) – This item is a result of PR15-0121. My comment refers to Section VIII, Division 1, Part UGI-79 and UGI-80 referenced on the last line. After reading these paragraphs in whole, I do not understand why only some of the subsections are listed and not the whole of UGI-79 and UGI-80. In my opinion, all of UGI-79 and UGI-80 should be included. (Attachment page 60)

January 2015

A motion was made unanimously approved to accept the language and have this item moved to the Subgroup on Graphite for their review and concurrence. Information should be presented that this Subgroup agrees with the proposed language in PR15-0121.

NB15-0513 –Part 3, S6.14.1- This action item is a result of PR15-0136 and PR15-0122. Fifth line down, "Registered Inspector" is used but is not defined in Part 3. Use of the term "Inspector" and "Registered Inspector" is also used interchangeably in the current published text not under review. Consistency is needed in this Supplement. (Attachment page 61)

January 2015

A task group of Chuck Withers as the Project Manager, and members Bob Underwood, Kathy Moore and Bill Vallance will address the TR program revisions that need to be incorporated into Part 3 for PR15-0122.

A motion was made and unanimously approved to open a new action item **NB15-1410** to address PR15-0136.

NB15-1410 Part 3 Embossing and Nameplates for S6.14.1 f) (Attachment Pages 62-63)

A motion was made and unanimously approved to accept the proposed revision to the 2017 code part 3 S6.14.1.f) that was associated with RP15-0136.

NB15-1003 – Part 3 SG-R and A– Address wording of “ASME Code Symbol Stamp” vs. “Symbol” vs. “Code Symbol” vs. “Stamp” vs. “Certification. (No attachment)

January 2015

A task group was formed with Rob Trout as Project Manager with members Joel Amato and James Pillow to include a possible footnote or harmonize the code wording.

NB15-1101 – Part 3 - Testing and certification of carbon fiber reinforced plastic systems (No attachment)

January 2015

George Galanes gave a progress report that HJ3 Composite Technologies, LLC is expected to give a presentation at the July 2015 meeting.

NB15-1201 - Part 3, 5.6- "R" should be deleted in the text of 5.6 to make the requirement for form logs applicable to "R", "VR", and "NR"; also the title should be changed. (No attachment)

January 2015

A progress report was given and this item requires further information from NB staff for action to be taken.

7. New Business

NB14-0702 Routine Repairs-3.3.2 Part 3- SC R and A

The following repairs shall be considered routine and shall be limited to these categories. (Attachment pages 64-66)

Bob Wielgoszinski presented a proposed revision to the 2017 code. This Action Item was inadvertently left off the July 2014 Subcommittee agenda.

A motion was made and unanimously approved to incorporate this revision into the 2017 code.

NB15-1401 Part 3 – 3.3.4.3, SG, Weld Build-up Thin Walled Tubes

A task group was formed with Walt Sperko as Project manager, members George Galanes and John Siefert. (Attachment pages 67-75)

NB15-1403 Part 3 New Supplement Weld Repair of CSEF Grade 91 Steels

A task group was formed with John Siefert as Project Manager and member George Galanes. (Attachment pages 76-113)

NB15-1404 Part 3-Definition for Existing Material (ref, 1.6.1 i and 3.2.1) (Attachment pages 114-115)

A task group was formed with Wayne Jones as the Project Manager and members Marty Toth, Joel Amato, and Rob Trout to develop a definition or a footnote for the term existing material.

8. Future Meetings

July 2015 – Columbus, Ohio

January 2016–Arizona, (City to be determined.)

9. Adjournment

Respectfully Submitted,

Bill Vallance

Secretary


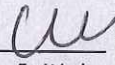
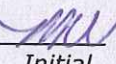



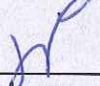
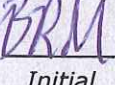
SC on Repairs and Alteration

Member	Title	ExpirDate	Interest Category
Boseo, Brian		7/31/2015	NB Certificate Holders
Edwards, Paul D.		7/31/2015	NB Certificate Holders
Galanes, PE, George W.	Chairman	7/31/2015	Users
Hopkins, Craig		1/31/2016	NB Certificate Holders
Jones, Wayne		1/31/2015	Auth Inpection Agencies
Larson, James P.		7/31/2015	Auth Inpection Agencies
McManamon, Larry		1/31/2015	Labor
Miletti, Ray		7/31/2016	Manufacturer
Morelock, Brian		1/31/2017	Users
Ortman, Edward		9/18/2016	Manufacturer <i>Removed</i>
Pillow, James T.	Vice Chair	7/31/2016	General Interest
Schulte, Bryan		8/31/2015	Users
Sekely, James		7/31/2015	General Interest
Vallance, William	Secretary	1/31/2017	General Interest
Webb, Michael		8/31/2015	Users
<u>Total Members:</u>		<u>14</u>	

Friday, December 19, 2014

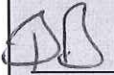
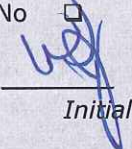
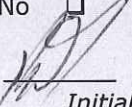

Attendance List Subcommittee Repairs and Alterations

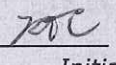
Meeting Date: January 21 2015,

Paul Edwards Director ASME Programs CB&I Construction Department Power Sector 150 Royall Street Canton, MA 02072 Ph: 617-589-5690 Fax: 617-589-1792 Email: paul.edwards@shawgrp.com	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>  Initial	William Vallance The National Board 1055 Crupper Ave. Columbus, OH 43229 Ph: 614-888-8320 Fax: 614-847-1828 E-mail: bvallance@nationalboard.org	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>  Initial
Mike Webb Xcel Energy 9500 Interstate 76 Henderson, CO 80640 Ph: 303-628-2840 Fax: 303-628-2928 E-mail: mike.webb@xcelenergy.com	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>  Initial	George W. Galanes, PE Metallurgical Consulting Engineer Diamond Technical Services, Inc./Lisle, IL Office Ph: 630-799-8162 Office 312-925-1341 Cell Fax: ggalanes@diamondtechnicalservices.com	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>  Initial
Bryan Schulte NRG Energy Services 12307 Kurland Drive Houston, TX 77034 Ph: 713-795-1456 Fax: 713-795-1451 E-mail: bryan.schulte@nrgenergy.com	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>  Initial	Jim Larson One Beacon Insurance Company 2540 180 th Street, East Port Lake, MN 55372 Ph: 952-226-2956 Fax: 952-226-2957 E-mail: jmloghome@earthlink.net	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>  Initial
James T. Pillow Common Arc Corporation 67 Wyndemere Lane Windsor, CT 06035 Ph: 860-688-2531 Fax: 860-688-2531 E-mail: Jpillow@commonarc.com	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>  Initial	Brian Morelock Eastman Chemical Company P.O. Box 511 B54D Kingsport, TN 37660 Ph: 423-229-1205 Fax: 423-229-6099 Email: morelock@eastman.com	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>  Initial

Attendance List Subcommittee Repairs and Alterations

Meeting Date: **January 21 2015,**

Brian Boseo M Graycor Services LLC Two Mid America Plaza, Suite 400 Oakbrook Terrace, IL 60181 Ph: 708-941-3016 Fax: 630-684-7116 E-mail: brian_boseo@graycor.com	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <div style="text-align: center; font-family: cursive;">  Initial </div>	James Sekely Welding Services Inc. 716 Vanderbilt Drive Monroeville, PA 15146 Ph: 412-389-5567 Fax: 724-327-7381 E-mail: jsekely@comcast.net	Attended: Yes <input type="checkbox"/> No <input type="checkbox"/> <div style="text-align: center; font-family: cursive;"> _____ Initial </div>
Wayne Jones Arise Boiler Inspection and Insurance Company 705 East 4 th Street Bay Minette, AL 36507 WJ Ph: 251-937-6225 Fax: E-mail: wayne.jones@ariseinc.com	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <div style="text-align: center; font-family: cursive;">  Initial </div>	Larry McManamon Great Lakes Apprenticeship Program 566 W. 95th Street Oak Lawn, IL 60453 Ph: 708.636.6656 Fax: E-mail: Lmac@gLabap.com	Attended: Yes <input type="checkbox"/> No <input type="checkbox"/> <div style="text-align: center; font-family: cursive;"> _____ Initial </div>
Rob Troutt State of Texas Chief Boiler Inspector Texas Department of Licensing and Regulation Boiler Program 920 Colorado Street Austin, TX 78701 Phone: (512)539-5720 Fax: Email: rob.troutt@tdlr.texas.gov	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <div style="text-align: center; font-family: cursive;">  Initial </div>	Ray Miletti Babcock & Wilcox Construction Company, Inc. 74 Robinson Avenue Barberton, OH 44203 Phone: (330)860-2589 Fax: Email: RLMILETTI@BABCOCK.COM	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <div style="text-align: center; font-family: cursive;">  Initial </div>

Craig Hopkins Seattle Boiler Works, Inc. 500 South Myrtle Street Seattle, WA 98108-3422 Phone: (206)762-0737 Fax: Email: chopkins@seattleboiler.com	Attended: Yes <input type="checkbox"/> No <input type="checkbox"/> <div style="text-align: center; font-family: cursive;"> _____ Initial </div>	<div style="font-family: cursive;"> RANDY CAUTHON ALSTOM POWER INC. 175 ADDISON RD WINDSOR, CT 06095 860-285-3481 randel.t.cauthon@alstom.com VISITOR </div>	Attended: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <div style="text-align: center; font-family: cursive;">  Initial </div>

Attendance List Subcommittee Repairs and Alterations

Meeting Date: January 21 2015,

<p>David Martinez</p> <p>FM Global 2100 Reston Parkway Reston, VA 20191</p> <p>Phone: (703) 262-6311 Fax: david.martinez@fmglobal.com</p>	<p>Attended:</p> <p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p> <p>_____ Initial</p>	<p>Frank Johnson</p> <p>F1819 Woodville Road Oregon, OH 43616-3159</p> <p>Phone: (419) 698-6614 Fax: Email: Frank.Johnson@pbfenergy.com</p>	<p>Attended:</p> <p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p> <p>_____ Initial</p>
<p><u>Name:</u> Joel T. Amato</p> <p><u>Company:</u> State of MN</p> <p><u>Address:</u> 443 Lafayette Rd. N</p> <p><u>City/State/Zip:</u> St. Paul, MN 55155</p> <p><u>Ph:</u> 651-284-5137 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> joel.amato@state.mn.us</p>	<p><u>Name:</u> WALT SPERKO</p> <p><u>Company:</u> SPERKO ENGINEERING</p> <p><u>Address:</u> 4803 ARELWOOD DR</p> <p><u>City/State/Zip:</u> GREENSBORO NC 27406</p> <p><u>Ph:</u> 336-674-0600 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> SPERKO@ASME.ORG</p>		
<p><u>Name:</u> RON PULLIAM</p> <p><u>Company:</u> B&W</p> <p><u>Address:</u> 20 S. VAN BUREN AVE.</p> <p><u>City/State/Zip:</u> BARBERTON, OH</p> <p><u>Ph:</u> 330-860-2856 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> RLPULLIAM@BABCOCK.COM</p>	<p><u>Name:</u> DON COOK</p> <p><u>Company:</u> STATE OF CALIFORNIA</p> <p><u>Address:</u> 1515 CLAY ST #1506 1622-A</p> <p><u>City/State/Zip:</u> OAKLAND CA 94612</p> <p><u>Ph:</u> 510 622-3050 <u>Ext.</u></p> <p><u>Fax:</u> 510 622-3043</p> <p><u>E-mail:</u> dcook@dir.ca.gov</p>		

Attendance List Subcommittee Repairs and Alterations

Meeting Date: January 21 2015,

<p><u>Name:</u> Benjamin Schaefer</p> <p><u>Company:</u> American Electric Power</p> <p><u>Address:</u> 1 Riverside Plaza 18th Floor</p> <p><u>City/State/Zip:</u> Columbus, Ohio 43215</p> <p><u>Ph:</u> 614-716-1843 <u>Ext.</u></p> <p><u>Fax:</u> 614-716-1744</p> <p><u>E-mail:</u> bschaefer@aep.com</p>	<p><u>Name:</u> David Martinez</p> <p><u>Company:</u> FM GLOBAL</p> <p><u>Address:</u> 2100 Reston Parkway</p> <p><u>City/State/Zip:</u> Reston, Ohio</p> <p><u>Ph:</u> 703-262-6311 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> david.martinez@fmglobal.com</p>
<p><u>Name:</u> WARREN TAYLOR III</p> <p><u>Company:</u> DOMINION</p> <p><u>Address:</u> 5000 DOMINION BLVD</p> <p><u>City/State/Zip:</u> GLEN ALLEN, VA 23060</p> <p><u>Ph:</u> 804 317 2584 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> WARREN.Taylor@Dom.Com</p>	<p><u>Name:</u> BOB WIEGOSZINSKI</p> <p><u>Company:</u> HSB GS</p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u> /</p> <p><u>Ph:</u> 860 844 722-5264 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> ROBERT_WIEGOSZINSKI@HSBCT.COM</p>
<p><u>Name:</u> ROBERT UNDERWOOD</p> <p><u>Company:</u> HSB GLOBAL STANDARDS</p> <p><u>Address:</u> 1011 Warrenville Rd Ste 400</p> <p><u>City/State/Zip:</u> Lisle, IL 60532</p> <p><u>Ph:</u> 618-593-6231 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> robert_underwood@hsbct.com</p>	<p><u>Name:</u> Angelo Bramucci</p> <p><u>Company:</u> Alstom Power Inc.</p> <p><u>Address:</u> 175 Addison Rd.</p> <p><u>City/State/Zip:</u> Windsor CT 06095</p> <p><u>Ph:</u> 860-285-9176 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> angelo.c.bramucci@power.alstom.com</p>

Attendance List Subcommittee Repairs and Alterations

Meeting Date: January 21 2015,

<p><u>Name:</u> Monte Bost</p> <p><u>Company:</u> HSB Global Standards</p> <p><u>Address:</u> 1011 Warrensville Rd Ste 400</p> <p><u>City/State/Zip:</u> Lisle, IL 60532</p> <p><u>Ph:</u> 937-620-3676 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> Monte_bost@hsbct.com</p>	<p><u>Name:</u> JOHN SIEFERT</p> <p><u>Company:</u> EPRI</p> <p><u>Address:</u> 1300 WEST W.T. HARRIS BLVD</p> <p><u>City/State/Zip:</u> CHARLOTTE, NC, 28002</p> <p><u>Ph:</u> 704 595 2886 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> jsiefert@epri.com</p>
<p><u>Name:</u> Frank Johnson</p> <p><u>Company:</u> PBF Energy Toledo Refining Co</p> <p><u>Address:</u> 1819 Woodville Rd, Oregon Ohio</p> <p><u>City/State/Zip:</u> Oregon, Ohio 43616</p> <p><u>Ph:</u> 419-386-8450 Cell <u>Ext.</u> 419-697-6614</p> <p><u>Fax:</u></p> <p><u>E-mail:</u> FrankJohnson@PBF Energy.com</p>	<p><u>Name:</u> Nathan Carter</p> <p><u>Company:</u> HSB Global Standards</p> <p><u>Address:</u> One State St.</p> <p><u>City/State/Zip:</u> Hartford, CT 06141</p> <p><u>Ph:</u> 860-722-5750 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> nathan-carter@hsbct.com</p>
<p><u>Name:</u> JAMIE WALKER</p> <p><u>Company:</u> HAYES MECHANICAL</p> <p><u>Address:</u> 5955 S. HARLEM AVE.</p> <p><u>City/State/Zip:</u> CHICAGO, IL 60633</p> <p><u>Ph:</u> 773.292.2707 <u>Ext.</u></p> <p><u>Fax:</u> 773.784.0010</p> <p><u>E-mail:</u> jwalker@hayesmechanical.com</p>	<p><u>Name:</u> Marty Teth</p> <p><u>Company:</u> Boiler Supply Co.</p> <p><u>Address:</u> 2450 Foster Craighton</p> <p><u>City/State/Zip:</u> Nashville TN 37204</p> <p><u>Ph:</u> 615 915-5687 <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u> mteth@boiseco.com</p>
<p><u>Name:</u> Thomas White</p> <p><u>Company:</u> NRG Energy</p> <p><u>Address:</u> 12307 Kurland Drive</p> <p><u>City/State/Zip:</u> Houston, TX 77546</p> <p><u>Ph:</u> 281-782-4972 <u>Ext.</u></p> <p><u>Fax:</u> 713-795-1451</p> <p><u>E-mail:</u> thomas.white@nrg.com</p>	<p><u>Name:</u></p> <p><u>Company:</u></p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u></p> <p><u>Ph:</u> <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u></p>

Attendance List Subcommittee Repairs and Alterations

Meeting Date: January 21 2015,

<p><u>Name:</u> Kathy Moore</p> <p><u>Company:</u> Joe Moore Co</p> <p><u>Address:</u> 1431 State Gavin St</p> <p><u>City/State/Zip:</u> Raleigh NC 27608</p> <p><u>Ph:</u> 919 832 1665 <u>Ext.</u></p> <p><u>Fax:</u> 919 832 8666</p> <p><u>E-mail:</u> Kathy.moore@joemoorecompany.com</p>	<p><u>Name:</u></p> <p><u>Company:</u></p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u></p> <p><u>Ph:</u> <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u></p>
<p><u>Name:</u></p> <p><u>Company:</u></p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u></p> <p><u>Ph:</u> <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u></p>	<p><u>Name:</u></p> <p><u>Company:</u></p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u></p> <p><u>Ph:</u> <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u></p>
<p><u>Name:</u></p> <p><u>Company:</u></p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u></p> <p><u>Ph:</u> <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u></p>	<p><u>Name:</u></p> <p><u>Company:</u></p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u></p> <p><u>Ph:</u> <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u></p>
<p><u>Name:</u></p> <p><u>Company:</u></p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u></p> <p><u>Ph:</u> <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u></p>	<p><u>Name:</u></p> <p><u>Company:</u></p> <p><u>Address:</u></p> <p><u>City/State/Zip:</u></p> <p><u>Ph:</u> <u>Ext.</u></p> <p><u>Fax:</u></p> <p><u>E-mail:</u></p>

Action Item NB15-1405 from Request for Interpretation

Robert V. Wielgoszinski
Hartford Steam Boiler of CT

Item	NB15-1405 <i>(was IN 14-0401)</i>
Purpose	Code Interpretation & possible revision to present Code rules
Scope:	Repairs and alterations to vessels constructed of ferritic materials with tensile properties enhanced by heat treatment, i.e. Part UHT material.
Background	<p>During the construction of liquid propane vessels it is typical to use SA-517 Gr. E (P-No. 11B) for use as heads and shells for propane transport tanks. The ASME Code requires the base materials, welding materials, and the WPS's to be qualified with impact tests. Also, the Code requires production impact testing to be performed. This is where the actual vessel material, actual filler materials, are welded with the actual WPS to be used in production, and the weld coupon is impact tested to meet the specified results of Section VIII. To do so, the Manufacturer of the vessel is sure to purchase enough extra base and filler material to perform these tests.</p> <p>When repairs / alterations are made to these vessels the NBIC requires the rules of the original construction Code to be followed. As such, any new material to be added to a vessel or any WPS's used or any filler metal used for the repair must then be impact tested and meet the results stated in Section VIII. Also, production impacts must therefore be made since this is a mandatory Section VIII requirement. This is usually accomplished by making a weld coupon out of existing material cut from the vessel and welding it to the new material to be added to the vessel, and then impact testing specimens from that coupon. But, not all repairs / alterations lend themselves the ability to take existing material from the vessel. If a small nozzle is added to the vessel, only a few inches of material is taken from the vessel. Or say a crack is to be weld repaired or there is weld metal build up to be made on some worn or wasted area. Then there is no extra material to be taken away from the vessel to run coupons for production impacts. Strict interpretation of the ASME Code would now require a piece of steel to be removed to run production impacts and then a flush patch installed over the area removed.</p> <p>Some individuals look at the words in NBIC, Part 3, Section 1, paragraph 1.2, where it says, "...the standard governing the original construction shall conform, <u>insofar as possible</u>..." gives one the leeway to not require production impacts because it's not possible. Others indicated that it is possible but not practical to cut perfectly good material out of a vessel when there is no need to. And others will say that the ASME clearly requires existing material to be removed to run impact tests. One thing is clear though, and that is there is lack of uniformity in applying these rules. So we are looking to the NBIC to provide some guidance in this matter. The</p>

	<p>Jurisdiction in this case is the US DOT, and 49CFR Chapter 1 § 180.413(a)(1) states that the NBIC is to be followed for repairs and modifications. DOT is also looking to the NBIC for clarification.</p> <p>Depending on the responses to the inquiry it may be prudent revise the Code to be more specific in this area of UHT materials.</p>
Proposed Questions	<p>Question 1: The NBIC Part 3 paragraph 1.2 states that a repair shall be carried out "insofar as possible to the section and edition of the ASME code most applicable to the work planned." If a vessel is constructed using SA-517-E (P-11B) material to ASME Section VIII Div. 1, where production and weld procedure impact tests were required during construction, would a repair to a crack in the shell require production and weld procedure impact testing under the NBIC?</p> <p>Proposed Reply 1: Yes.</p> <p>Question 2: If the answer to Question 1 is yes and there was no SA-517-E material from the original lot available, would the repair require the addition of new base material (e.g. a flush patch around the area of the crack) so that production impact tests could be performed with the original base metal to the new base metal?</p> <p>Proposed Reply 1: Yes.</p> <p>Question 3: If the vessel described in Question 1 was to be altered by adding an SA-675 (P-1) pump flange to the shell, would production and weld procedure impact tests be required using the same lot P-1 and P-11B base materials as used in the alteration?</p> <p>Proposed Reply 1: Yes.</p>

NBIC Interpretation Final 1/22/2015

IN14-0701 - Part 3 PWHT - Subject: NBIC 2010, part 3, Post Weld Heat Treatment of a Vessel.

Q1. Must a company that performs post weld heat treatment be required to hold an "R" certification?

ANS: YES

Q2. Is this post weld heat treatment now considered an "Alteration" to this vessel, as per NBIC part 3?

ANS:

YES

Q3. Shall this "Alteration" be documented on a NBIC R-2 form? ANS: YES

Subject: NBIC 2010 Edition, Part 3, Postweld Heat Treatment of a Vessel

Committee Question 1

An R-Certificate holder decides to perform postweld heat treatment (PWHT) of a vessel at the request of a client, where no PWHT was performed in the original construction. Is the performance of PWHT of the vessel considered an alteration and subject to documentation using a Form R2?

Reply: Yes.

Committee Question 2

For the vessel described above, must the weld procedures used for construction of the vessel be qualified with PWHT?

Reply: Yes.

Committee Question 3

Must the PWHT described above be performed by the R-Certificate holder?

Reply: No, the PWHT may be subcontracted; however the R certificate holder retains the responsibility for the performance of the PWHT.

Rationale: PWHT can reduce the mechanical properties and/or notch toughness of the original vessel material affecting the pressure retaining capability, which is the definition of an alteration in the NBIC.

PROPOSED INTERPRETATION

Inquiry No.	IN14-0801				
Source	William R Chalfant, PBF Energy, Delaware City Refinery				
Subject	2013 NBIC , Part 3, Section 3.3.3 s) and 3.3.4.3.a)				
Edition	2013				
Question	<p>Question #1: 2013 NBIC, Part 3, Section 3.3.4.3.a) When performing weld metal buildup of wasted areas of pressure retaining items in accordance with NBIC Part 3, paragraph 3.3.4.3.a), is the interpretation that the final metal thickness (including base metal and weld metal build up) shall be the calculated minimum required thickness in accordance with the original Code of Construction plus any future corrosion allowance for the desired remaining life?</p> <p>Question #2: 2013 NBIC, Part 3, Section 3.3.3, paragraph s) When replacing a part on a pressure retaining item in accordance with NBIC Part 3, paragraph 3.3.3.s), is it the intent of the term "minimum required thickness" to mean nominal wall thickness minus corrosion allowance as shown on the original Manufacturer's Data Report?</p>				
Reply	<p>Reply #1: Yes.</p> <p>Reply #2: Yes.</p>				
Committee's Question	<p>Question #1: 2013 NBIC, Part 3, Section 3.3.4.3 a) When performing weld metal buildup of wasted areas of pressure retaining items, is the wall thickness required to be restored to the thickness listed on the Manufacturers Data Report?</p>				
Committee's Reply	<p>Reply #1: No. The minimum thickness after build-up shall be the original thickness of the pressure retaining item minus the corrosion allowance.</p>				
Rationale	See Below.				
SC Vote	Unanimous	No. Affirmative	No. Negative	No. Abstain	No. Not Voting
NBIC Vote	Unanimous	No. Affirmative	No. Negative	No. Abstain	No. Not Voting

Negative Vote Comments	
---------------------------	--

Reference:

2013 NBIC Part 3, Section 3.3.3 s): s) 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*.**

2013 NBIC Part 3, Section 3.3.4.3.a)

a) Shells, Drums, Headers

Wasted areas in stayed and unstayed shells, drums, and headers **may be built up by welding, provided that in the judgment of the Inspector the strength of the structure has not been impaired.** Where extensive weld buildup is employed, the Inspector may require an appropriate method of NDE for the completed surface of the repair. For suggested methods of building up wasted areas by welding. (See NBIC Part 3, Figure 3.3.4.3-a).

Rationale:

ASME Section VIII, Division 1 references:

MANDATORY APPENDIX 3 DEFINITIONS

3-2 DEFINITIONS OF TERMS

thickness of vessel wall:

(a) design thickness: the sum of the required thickness and the corrosion allowance (see UG-25).

(b) **required thickness: that computed by the equations in this Division before corrosion allowance is added** (see UG-22).

(c) nominal thickness: except as defined in UW-40(f) and modified in UW-11(g), the nominal thickness is the thickness selected as commercially available, and supplied to the Manufacturer. For plate material, the nominal thickness shall be, at the Manufacturer's option, either the thickness shown on the Material Test Report {or material Certificate of Compliance [UG-93(a)(1)]} before forming, or the measured thickness of the plate at the joint or location under consideration.

NB15-0101
Seal Welding Handholes & Plugs

Subject: Seal welding of handhole covers NBIC, Part 3, Paragraph 3.3.2 (e)?

Question: Is seal welding of inspection opening covers, such as handhole plates or plugs, considered a routine repair?

Reply: No.

NBIC Subcommittee R&A Action Block

<u>Subject</u>	Gasketed Plate Heat Exchangers		
<u>File Number</u>	NB12-0801	<u>Prop. on Pg.</u>	1 thru 9
<u>Proposed Revision</u>	Add examples of routine repairs, repairs, and alterations for gasketed plate heat exchangers and revise R-1 form to include gasketed PHEs.		
<u>Statement of Need</u>	Because of the unique design of the PHE, the current ASME Pressure Vessel and NBIC Codes do not specifically address the design of PHE's, nor the potential repairs or alterations. This is intended to provide guidance to the industry and the Jurisdictions.		
<u>Project Manager</u>	Ed Ortman		

<u>SubGroup</u>	R&A Specific		
<u>SubGroup Negatives</u>		<u>SG Meeting Date</u>	July 16, 2013

<u>SubCommittee Negatives</u>		<u>SC Meeting Date</u>	July 17, 2013
--------------------------------------	--	-------------------------------	---------------

3.2.5 CALCULATIONS

For alterations, calculations shall be completed prior to the start of any physical work. All design calculations shall be completed by an organization experienced in the design portion of the standard used for construction of the item. All calculations shall be made available for review by the Inspector accepting the design.

3.2.6 REFERENCE TO OTHER CODES AND STANDARDS

Other codes, standards, and practices pertaining to the repair and alteration of pressure retaining items can provide useful guidance. Use of these codes, standards and practices is subject to review and acceptance by the Inspector, and when required, by the Jurisdiction. The user is cautioned that the referenced codes, standards and practices may address methods categorized as repairs; however, some of these methods are considered alterations by the NBIC.

In the event of a conflict with the requirements of the NBIC, the requirements of the NBIC take precedence. Some examples are as follows:

- (a) National Board *Bulletin* - National Board Classic Articles Series;
- (b) ASME PCC-1, Guidelines for Pressure Boundary Bolted Flange Joint Assembly;
- (c) ASME PCC-2, Repair of Pressure Equipment and Piping.

3.3 REPAIRS TO PRESSURE-RETAINING ITEMS

3.3.1 DEFECT REPAIRS

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.

3.3.2 ROUTINE REPAIRS

- a) Routine repairs are repairs for which the requirements for in-process involvement by the Inspector and stamping by the "R" Certificate Holder may be waived as determined appropriate by the Jurisdiction and the Inspector. All other applicable requirements of this Code shall be met. Prior to performing routine repairs, the "R" Certificate Holder should determine that routine repairs are acceptable to the Jurisdiction where the pressure-retaining item is installed;
- b) The Inspector, with the knowledge and understanding of jurisdictional requirements, shall be responsible for meeting jurisdictional requirements and the requirements of this Code;
- c) The "R" Certificate Holder's Quality System Program shall describe the process for identifying, controlling, and implementing routine repairs. Routine repairs shall be documented on Form R-1 with this statement in the Remarks section: "Routine Repair.";
- d) Repairs falling within one or more of the following categories may be considered routine:

- 1) Welded repairs or replacements of valves, fittings, tubes, or pipes NPS 5 (DN 125) in diameter and smaller, or sections thereof, where neither postweld heat treatment nor NDE other than visual is re-

5) The following on gasketed plate heat exchangers:

- i) Removal and replacement of heat transfer plates identical to those listed on the Manufacturer's Data Report;
- ii) In kind replacement of tightening bolts;
- iii) A change in welded attachments (e.g. welded feet).

- 3) Weld buildup of wasted areas in heads and shells not exceeding an area of 100 sq. inches (64,520 sq. mm) or a thickness of 25% of nominal wall thickness or 1/2 inch (13 mm), whichever is less;

A11

- 4) Corrosion resistance weld overlay not exceeding 100 sq. in. (64,520 sq. mm).

3.3.3 EXAMPLES OF REPAIRS

- a) Weld repairs or replacement of pressure parts or attachments that have failed in a weld or in the base material;
- b) The addition of welded attachments to pressure parts, such as:
 - 1) Studs for insulation or refractory lining;
 - 2) Hex steel or expanded metal for refractory lining;
 - 3) Ladder clips;
 - 4) Brackets having loadings that do not affect the design of the pressure-retaining item to which they are attached; and
 - 5) Tray support rings.
- c) Corrosion resistant strip lining, or weld overlay;
- d) Weld buildup of wasted areas;
- e) Replacement of heat exchanger tubesheets in accordance with the original design;
- f) Replacement of boiler and heat exchanger tubes where welding is involved;
- g) In a boiler, a change in the arrangement of tubes in furnace walls, economizers, or super heater sections;
- h) Replacement of pressure-retaining parts identical to those existing on the pressure-retaining item and described on the original *Manufacturer's Data Report*. For example:
 - 1) Replacement of furnace floor tubes and/or sidewall tubes in a boiler;
 - 2) Replacement of a shell or head in accordance with the original design;
 - 3) Rewelding a circumferential or longitudinal seam in a shell or head;
 - 4) Replacement of nozzles of a size where reinforcement is not a consideration;

- i) Installation of new nozzles or openings of such a size and connection type that reinforcement and strength calculations are not a consideration required by the original code of construction;
- j) The addition of a nozzle where reinforcement is a consideration may be considered to be a repair, provided the nozzle is identical to one in the original design, located in a similar part of the vessel, and not closer than three times its diameter from another nozzle. The addition of such a nozzle shall be restricted by any service requirements;
- k) The installation of a flush patch to a pressure-retaining item;
- l) The replacement of a shell course in a cylindrical pressure vessel;
- m) Welding of gage holes;
- n) Welding of wasted or distorted flange faces;
- o) Replacement of slip-on flanges with weld neck flanges or vice versa;
- p) Seal welding of buttstraps and rivets;
- q) Subject to the administrative procedures of the Jurisdiction and approval of the Inspector, the replacement of a riveted section or part by welding;
- 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; and
- s) Replacement of a pressure-retaining part with a material of different nominal composition, 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*.
- t) The replacement of a Pressure Relieving Device (PRD) attached by welding, provided the replacement device's relieving capacity is equal to or greater than the PRD-capacity required by the original code of construction.

3.3.4 REPAIR METHODS

u) In a gasketed plate heat exchanger:

- 1) Weld repair of any pressure part (e.g. nozzle repair or in kind replacement of nozzle);
- 2) In kind replacement of frame or pressure plates.

Except as provided in NBIC Part 5, 5.5.4.6, 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 butt weld or single butt weld 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.

3.4 ALTERATIONS

3.4.1 RE-RATING¹⁰

Re-rating of a pressure-retaining item by increasing the maximum allowable working pressure (internal or external) or temperature or decreasing the minimum design metal temperature below which notch toughness testing is required by the original code of construction, shall be done only after the following requirements have been met to the satisfaction of the Jurisdiction at the location of the installation:

- a) Revised calculations verifying the new service conditions shall be prepared in accordance with the "R" Certificate Holder's Quality Control System. Establishing a higher joint efficiency to re-rate a pressure-retaining item is not permitted;
- b) All re-ratings shall be established in accordance with the requirements of the construction standard to which the pressure-retaining item was built;
- c) Current inspection records verify that the pressure-retaining item is satisfactory for the proposed service conditions;
- d) The pressure-retaining item has been pressure tested, as required, for the new service conditions. Any insulation, coatings, or coverings that may inhibit or compromise a meaningful pressure test shall be removed, to the extent identified by the Inspector;
- e) In lieu of pressure testing, alternative methods can be used to ensure the structural integrity of the re-rated pressure-retaining item. The alternative methods shall be documented and subject to review and approval by the Jurisdiction.

3.4.2 ALTERATIONS BASED ON ALLOWABLE STRESS VALUES

For re-rating or re-calculating a new minimum wall thickness for a pressure-retaining item using a later edition/addenda of the original code of construction or selected construction standard or code that permits use of higher allowable material stress values than were used in the original construction, the following requirements shall apply:

- a) The "R" Certificate Holder shall verify, by calculations and other means, that the re-rated item can be satisfactorily operated at the new service condition (e.g., stiffness, buckling, external mechanical loadings);
- b) The pressure-retaining item shall not be used in lethal service;
- c) The pressure-retaining item shall not be used in high-cycle operation or fatigue service (i.e., loadings other than primary membrane stress are controlling design considerations) unless the pressure-retaining item was originally designed for fatigue service and a fatigue analysis is performed;
- d) The pressure-retaining item shall have been constructed to the 1968 edition or later edition/addenda of the original code of construction;
- e) The pressure-retaining item shall be shown to comply with all relevant requirements of the edition/addenda of the code of construction, which permits the higher allowable stress values (e.g., reinforcement, toughness, examination, pressure testing);

¹⁰ Re-rating: Except as provided for Yankee Dryers in Supplement 5, this code does not provide rules for de-rating boilers or pressure vessels; however, when the MAWP and/or allowable temperature of a boiler or pressure vessel is reduced, the Jurisdiction where the object is installed should be contacted to determine if specific procedures should be followed.

- f) The pressure-retaining item shall have a satisfactory operating history and current inspection of the pressure-retaining item shall verify the item exhibits no unrepaired damage (e.g., cracks, corrosion, erosion). Areas of corrosion or erosion may be left in place provided the remaining wall thickness is greater than the minimum thickness for the new design conditions;
- g) The re-rating shall be acceptable to the Inspector and, where required, the Jurisdiction;
- h) All other requirements of Part 3, as applicable, and jurisdictional requirements shall be met;
- i) Use of this paragraph shall be documented in the Remarks section of Form R-2.

3.4.3 EXAMPLES OF ALTERATIONS

- a) An increase in the maximum allowable working pressure (internal or external) or temperature of a pressure-retaining item regardless of whether or not a physical change was made to the pressure-retaining item;
- b) A decrease in the minimum temperature;
- c) The addition of new nozzles or openings in a boiler or pressure vessel except those classified as repairs;
- d) A change in the dimensions or contour of a pressure-retaining item;
- e) In a boiler, an increase in the heating surface or steaming capacity as described on the original Manufacturer's Data Report;
- f) The addition of a pressurized jacket to a pressure vessel;
- g) Except as permitted in NBIC, Part 3, 3.3.3 s);
- 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; and
- i) The addition of a bracket or an increase in loading on an existing bracket that affects the design of the pressure-retaining item to which it is attached.
- j) The replacement of a Pressure Relieving Device (PRD) as a result of work completed on a Pressure-Retaining Item (PRI) that changes the resultant capacity to exceed the Minimum Required Relieving Capacity (MRRC) required by the original code of construction as described on the original Manufacturer's Data Report.

3.4.4 ALTERATION OF ASME CODE SECTION VIII, DIVISION 2 OR 3, PRESSURE VESSELS

- k) The following on gasketed plate heat exchangers:
 - a) A change in heat transfer plate material;
 - b) A change in thickness of heat transfer plates;
 - c) A change in tightening bolt material or grade;
 - d) A change in tightening bolt diameter
 - e) A change in the material or thickness of the frame plate of pressure plates.

The alteration plan shall be reviewed and certified by an Engineer meeting the criteria of ASME Section VIII, Division 2 or 3, as applicable, for an Engineer signing and certifying a Manufacturer's Design Report. The review and certification shall be such as to ensure the work involved in the alteration is compatible with the user's design specification and the Manufacturer's Design Report.

5.13.1 FORM R-1, REPORT OF REPAIR

FORM R-1 REPORT OF REPAIR <i>in accordance with provisions of the National Board Inspection Code</i>	
1. Work performed by (1) _____ <small>(name of repair organization)</small>	(2) _____ <small>(Form Registration No.)</small> (53) _____ <small>(FO No., Job No., etc.)</small>
2. Owner (3) _____ <small>(name)</small> _____ <small>(address)</small>	
3. Location of installation (4) _____ <small>(name)</small> _____ <small>(address)</small>	
4. Item identification (5) _____ <small>(boiler, pressure vessel or piping)</small>	Name of original manufacturer (6) _____
5. Identifying nos.: (7) _____ <small>(mfg. serial no.)</small>	(8) _____ <small>(National Board No.)</small>
	(8) _____ <small>(Jurisdiction No.)</small>
	(8) _____ <small>(other)</small>
	(9) _____ <small>(year built)</small>
6. NBIC Edition/Addenda: (10) _____ <small>(edition)</small>	(10) _____ <small>(addenda)</small>
Original Code of Construction for Item: (11) _____ <small>(name/section/division)</small>	
Construction Code Used for Repair Performed: (11) _____ <small>(name/section/division)</small>	
7. Repair Type: (55) <input type="checkbox"/> Welded <input type="checkbox"/> Graphite Pressure Equipment <input type="checkbox"/> FRP Pressure Equipment	
8. Description of work: (12) <input type="checkbox"/> Form R-4, Report Supplementary Sheet is attached <input type="checkbox"/> FFSA Form (NB-403) is attached <small>(use Form R-4, if necessary)</small>	
<div style="border: 1px solid red; border-radius: 15px; padding: 5px; display: inline-block; color: red;"> <input type="checkbox"/> Gasketed Plate Heat Exchanger </div>	
9. Replacement Parts. Attached are Manufacturer's Partial Data Reports or Form R-3s properly completed for the following items of this report: _____ <small>(name of part, item number, data report type or Certificate of Compliance, mfg. name, and identifying stamp)</small>	
10. Remarks: (15) _____	

CERTIFICATE OF COMPLIANCE

I, (16) _____, certify that to the best of my knowledge and belief the statements 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. (17) _____ expires on (18) _____
 Date (19) _____ Signed (21) _____
(name of repair organization) (authorized representative)

CERTIFICATE OF INSPECTION

I, (22) _____, 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 (23) _____ and employed by (24) _____ of (25) _____
 have inspected the work described in this report on (26) _____, _____ 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.
 Date (19) _____ Signed (27) _____ Commissions (28) _____
(Inspector) (National Board and Jurisdiction No.)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229 NB-66 Rev. 12

Note to Editor: Add as part of line 7

SECTION 5

5.13.4.1 INSTRUCTIONS FOR COMPLETING NATIONAL BOARD FORM "R" REPORTS

A11

These instructions are to be used when completing the National Board Form "R" Reports. When computer generated, the format of the form shall replicate the type and relative location of the information depicted on the Form "R" Reports shown in NBIC Part 3, 5.13.1 through 5.13.4.

1. The name and address of the "R" Certificate Holder performing the work as it appears on the "Certificate of Authorization". On a Form R-2, the organization that performed the design work will complete sheet 1 of 2, and the organization completing the construction activities will complete sheet 2 of 2. A11
2. When registering a Form "R" 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. For re-rating only, the Design Organization registers the Form R-2. Where physical work is also performed, the Construction Organization registers the Form R-2. A11
3. Name and address of the Owner of the pressure-retaining item.
4. Name and address of plant or facility where the pressure-retaining item is installed.
5. Description of the pressure-retaining item, such as boiler or pressure vessel, or piping. Include the applicable unit identification. A11
6. Name of the original manufacturer of the pressure-retaining item. If the original manufacturer is unknown, indicate by, "unknown". A11
7. 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". A11
8. 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". A11
9. Identify the year in which fabrication/construction of the item was completed.
10. Indicate edition and addenda of the NBIC under which this work is being performed.
11. Indicate the name, section, division, edition, and addenda of the original code of construction for the pressure-retaining item. Also indicate the name, section, division, edition, and addenda of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.
12. Provide a summary describing the exact scope of work that was completed to a Pressure-Retaining Item (PRI). The information to be included when describing the scope of work shall consider items such as, the nature of the repair or alteration characterized by the listed examples, the specific location of the work performed to the PRI, the method of repair used to include as applicable, the steps taken to remove a defect or as allowed by NBIC Part 3, 3.3.4.8 to remain in place, the welding process and procedure when used, any special processes required such as PWHT; noting the soak time and temperatures recorded, and any acceptable in-process and final NDE-examinations or tests performed. When additional space is needed to fully describe the scope of work, a Form R-4 shall be used and attached. A11
13. Indicate test pressure applied.

- A11 14. As applicable, identify what 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.
15. Indicate any additional information pertaining to the work involved (e.g., routine repairs, code cases). For Form R-3, the part manufacturer is to indicate the extent he has performed any or all of the design function. If only a portion of the design, state which portion.
- A11 16. Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.
17. Indicate National Board "R" *Certificate or Authorization* number.
18. Indicate month, day, and year that the "R" certificate expires.
19. Enter date certified.
- A11 20. 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.
21. Signature of authorized representative.
22. Type or print name of Inspector.
23. Indicate Inspector's Jurisdiction.
24. Indicate Inspector's employer.
25. Indicate address of Inspector's employer (city and state or province).
26. Indicate month, day, and year of inspection by Inspector. In case of Routine Repairs this shall be the month, day, and year the Inspector reviews the completed Routine Repair package.
27. Signature of Inspector.
28. National Board commission number of Inspector, and when required by the Jurisdiction, the applicable State or Provincial numbers.
- A11 29. Document name and address of organization that purchased the parts for incorporation into the repair or alteration. If the part's origin is unknown or the part was built for stock, so state.
- A11 30. Document name of organization responsible for specifying the code design conditions, if known. If origin of design conditions are unknown, state "unknown".
- A11 31. Document name of organization responsible for performing the code design, if known. If code design organization is unknown, state "unknown".
- A11 32. Name, section, and division of the design code, if known. If the design is unknown, state "unknown"
33. Indicate code edition year used for fabrication.
34. Indicate code addenda date used for fabrication.

35. Indicate the code paragraph reference for formula used to establish the MAWP, if known. If the code reference of the formula is unknown, state "unknown". A11
36. If available, identify component by part's original name, function, or use the original equipment manufacturer's "mark or item number." A11
37. Indicate quantity of named parts.
38. Match line number references for identification of parts and description of parts.
39. Indicate manufacturer's serial number for the named part.
40. Indicate drawing number for the named part.
41. Indicate Maximum Allowable Working Pressure for the part, if known.
42. Use inside diameter for size: indicate shape as square, round, etc.
43. Indicate the complete material specification number and grade.
44. Indicate nominal thickness of plate and minimum thickness after forming.
45. Indicate shape as flat, dished, ellipsoidal, or hemispherical.
46. Indicate minimum thickness after forming.
47. Indicate outside diameter.
48. Indicate minimum thickness of tubes.
49. Complete information identical to that shown on the Form R to which this sheet is supplementary.
50. Indicate the Form R type. Example: Form R-1, Form R-2, Form R-3.
51. Indicate the reference line number from the Form R to which this sheet is supplementary.
52. Complete information for which there was insufficient space on the reference Form R.
53. If applicable, document the unique purchase order, job, or tracking number, assigned by organization performing work. A11
54. Indicate the maximum allowable working pressure of the pressure-retaining item.
55. Indicate the type of repair, e.g., welded, graphite pressure equipment, or fiber-reinforced plastic pressure equipment.

, or gasketed plate heat exchanger.

1.5 Accreditation

- a) Organizations performing repairs or alterations to pressure-retaining items shall be accredited as described in this section, as appropriate for the scope of work to be performed.
- b) Organizations performing repairs outside the scope of the NBIC may be accredited by, and shall meet any additional requirements of, the Jurisdiction where the work is performed.

1.5.1 Accreditation Process

- a) The National Board administers accreditation programs for authorization of organizations performing repairs and alterations to pressure-retaining items in accordance with NB-415 and/or pressure relief valves in accordance with NB-514.
- b) Any organization may apply to the National Board to obtain a Certificate of Authorization for the requested scope of activities. A review shall be conducted to evaluate the organization's quality system. The individual assigned to conduct the evaluation shall meet the qualification requirements prescribed by the National Board. Upon completion of the evaluation, any deficiencies within the organization's quality system will be documented and a recommendation will be made to the National Board regarding issuance of a Certificate of Authorization.
- c) As part of the accreditation process, an applicant's quality system is subject to a review. National Board procedures provide for the confidential review resulting in recommendations to issue or not issue a Certificate of Authorization.
- d) The accreditation programs provide requirements for organizations performing repairs and alterations to pressure-retaining items. ~~Depending upon the expected scope of activities at the time of review, organizations may be authorized to perform design only, metallic or non-metallic repairs, and/or alterations either in the shop only, field only, or shop and field. Repairs and/or alterations to metallic and non-metallic pressure-retaining items are made by welding, bonding and/or mechanical assembly.~~
- e) ~~Organizations desiring to renew or obtain a National Board Certificate of Authorization shall apply to the National Board using forms obtained from the National Board. Application for renewal shall be made prior to the expiration date of the Certificate of Authorization.~~
- f) When an organization has plants or shops in more than one location, the organization shall submit separate applications for each plant or shop. The organization may perform repairs or alterations in its plants, shops, or in the field, provided such operations are described in the organization's Quality System.
- g)f) The Jurisdiction², as defined in Part 3, Section 9, may audit the Quality System and activities of an organization upon a valid request from an owner, user, inspection agency, or the National Board.
- h)g) The NBIC Committee may at any time change the rules for the issuance of Certificates of Authorization and use of the "R" Symbol Stamp. These rules shall become binding on all certificate holders.

1.5.2 National Board "R" Symbol Stamp

- a) ~~All "R" Symbol Stamps shall be obtained from the National Board of Boiler and Pressure Vessel Inspectors. Authorization to use the "R" Symbol Stamp may be granted by the National Board at its absolute discretion to the certificate holder.~~

² Jurisdiction: The National Board member jurisdiction where the organization is located. Alternatively, where the Jurisdiction elects not to perform the review or where there is no Jurisdiction or where the Jurisdiction is the organization's Authorized Inspection Agency, the National Board of Boiler and Pressure Vessel Inspectors will represent the Jurisdiction. At the Jurisdiction's discretion, the Jurisdiction may choose to be a member of the review team if the Jurisdiction chooses not to be the team leader.

- ~~b) a) The "R" Symbol Stamp is furnished on loan by the National Board for a nominal fee. Each organization shall agree if authorization to use the "R" Symbol Stamp is granted, that the "R" Symbol Stamp is at all times the property of the National Board and will be promptly returned upon demand. If the organization discontinues the use of the "R" Symbol Stamp, inspection agreement with an Authorized Inspection Agency, or if the Certificate of Authorization has expired and no new certificate has been issued, the "R" Symbol Stamp shall be returned to the National Board.~~
- ~~e) b) The organization's Quality System shall provide for adequate control of the "R" Symbol Stamp. Provisions may be made for the issuance of the "R" Symbol Stamp for use at various field locations.~~
- ~~d) The holder of a Certificate of Authorization may obtain more than one "R" Symbol Stamp provided the organization's Quality System describes how the use of such stamps is controlled from the location shown on the certificate.~~
- ~~e) An organization shall not permit others to use the "R" Symbol Stamp loaned to it by the National Board.~~
- c) Additional requirements shall be met in accordance with NB-415.

1.6 Quality System

A holder of a National Board Certificate of Authorization shall have and maintain a written Quality System. The System shall satisfactorily meet the requirements of the NBIC and shall be available for review. The Quality System may be brief or voluminous, depending on the projected scope of work. It shall be treated confidentially by the National Board.

1.6.1 Outline of Requirements for a Quality System for Qualification for the National Board "R" Certificate of Authorization

The following is a guide for required features of a Quality System which shall be included in the organization's Quality System Manual. As a minimum, each organization shall address the required features relative to the scope of work to be performed. Organizations shall explain their intent, capability and applicability for each required feature outlined in this section. Work may be subcontracted provided controls are clearly defined for maintaining full responsibility for code compliance by the National Board repair organization certifying the work.

a) Title Page

The name and complete address of the company to which the National Board *Certificate of Authorization* is issued shall be included on the Title Page of the Quality System Manual.

b) Contents Page

The manual should contain a page listing the contents of the manual by subject, number (if applicable), and revision number of each document.

c) Scope of Work

The manual shall clearly indicate the scope and type of repairs or alterations the organization is capable of and intends to carry out.

Item NB14-0301

3.3.3 EXAMPLE OF REPAIRS

- u) The installation of a welded leak box.

3.3.9 ENCAPSULATION

Encapsulation is a repair method to restore the pressure retaining capability of an item by building a new pressure containing boundary over the item in the form of a welded leak box.

a) Welded Leak Box

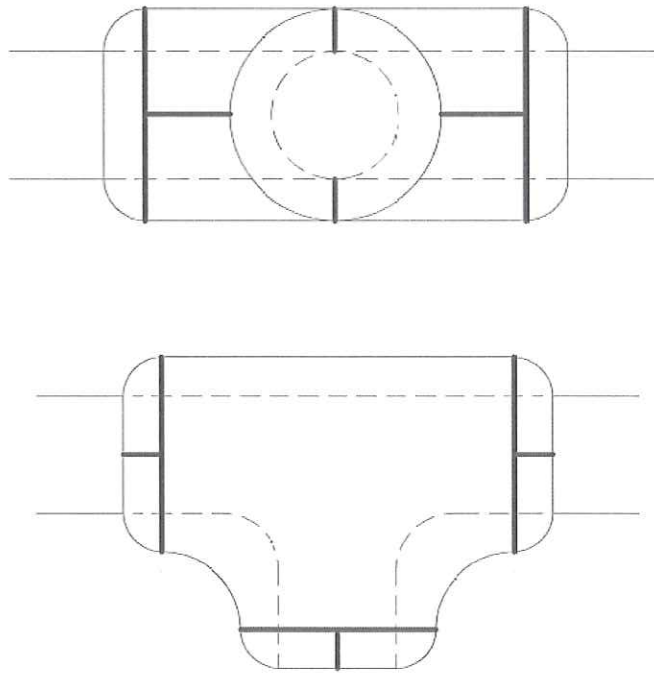
- 1) Welded leak box design consists of a pressure retaining enclosure used to seal off leaking components or reinforce damaged or thinned components. The use of a leak box- is subject to and may be used with concurrence of the inspector and, when applicable, the jurisdiction.
 - a. A leak box can take a variety of shapes (e.g., cylindrical, rectangular, with either flat or formed heads), often following the contour of the component being encapsulated. Leak boxes may be fabricated by welding split pipe, pipe caps, or plates to encapsulate a pressure retaining item. Consideration should be given to add centering guides to aid with the installation. An example of a Welded Leak Box is shown in NBIC Part 3, Figure 3.3.9.
 - b. The annular space between the leak box and the component may be filled with an inert material (i.e., epoxy, sealant, fiber, refractory, etc.) which will support the effectiveness of the repair under pressure.
- 2) A welded leak box shall not be used to encapsulate a crack.
- 3) A Fitness for Service Assessment (FFSA) shall have been performed on the part being encapsulated in accordance with NBIC, Part 2, 4.4.1, supporting the continued service of the item. The leak box shall not remain in place beyond the calculated life of the pressure retaining item.
- 4) Design of the box and fabrication welds shall be in accordance with the original code of construction for the pressure retaining item ~~mm~~ being encapsulated, using original design conditions, taking into account current operating and shutdown conditions. Corrosion resistance, and mechanical properties of the leak box shall be taken into account.
 - a. The leak box design shall consider the potential introduction of new failure modes including that of the encapsulated component (i.e., encapsulated parts, expansion joints, pressure thrust, temperature differential, differential expansion, additional weight, sealant seepage, etc.).
- 5) The following are requirements for the leak box design:
 - a. The welded leak box assembly should be designed with vents and drains to permit venting the leak during assembly.
 - b. The leak box shall fully encapsulate the ~~thinned~~thinned or leaking area to a distance where sound metal is achieved.
 1. The encapsulated component shall be ultrasonically scanned to ensure sufficient wall thickness at the weld locations.
 - c. When sealant is injected between the leak box and the component, consideration shall be given to off-gassing of sealant compounds as they cure.
- 5)6) The WPS followed shall be qualified in accordance with ASME Section IX. When the code of construction requires post weld heat treatment (PWHT) or the encapsulated component required PWHT, the WPS followed shall be qualified with PWHT. As an alternative and with concurrence of the inspector an alternate welding method may be used in accordance with NBIC Part 3, 2.5.3.

- a. The nominal chemical composition of the deposited weld metal shall be compatible with the materials of construction. In addition, the nominal tensile strength of the deposited weld metal shall be equal to or exceed the encapsulated component's specified minimum tensile strength and shall be based on the requirements of the welding consumable.
 - b. When pressure retaining butt welds of the encapsulated component will be welded over, they shall be ground flush and volumetrically examined in accordance with the code of construction to ensure the existing weld is free from defects.
 - c. Longitudinal weld seams of the leak box components shall be staggered at a distance of at least five (5) times the thickness of the thicker component.
 - d. When welding to a component that is under pressure, the following shall be considered in developing the WPS: ppreheat temperature, the effect of process fluid flow on weld cooling rate, the effect of the weldinggg temperature on the strength of the metal under service conditions and the risk of burn through. When possible, consideration should be given to stopping leak to be encapsulated, prior to welding.
- 6)7) Welds shall be subjected to the nondestructive examination method used in the original code of construction or an alternative acceptable to the inspector. In addition, all full penetration longitudinal leak box welds shall be volumetrically examined and evaluated in accordance with the code of construction.
- a. When pressure testing of the leak box is performed, the external pressure collapse of the encapsulated component during the test should be considered when determining the test pressure.
- 7)8) The "R" Stamp Holder performing the alterationrepair shall provide detailed information on the Form R-21, describing the extent of the alterationrepair and include the specific location the work was performed on the item. ~~When a FFSA has been performed as described in NBIC, Part 2, 4.4.1, the remaining life of the item shall be documented on the Report of FFSA Form and in the Remarks section for the Form R-2. The Report of FFSA Form shall be affixed to the Form R-2.~~
- a. The remaining life of the encapsulated pressure retaining item shall be documented on the Report of FFSA in the Remarks section. The Report of FFSA Form shall be affixed to the Form R-1.

DEFINITIONS

Encapsulation – to enclose, seal off or reinforce a component.

FIGURE 3.3.4
Welded Leak Box



5.13.1

FORM R-1, REPORT OF REPAIR

FORM R-1 REPORT OF REPAIR

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

1. Work performed by ⁽¹⁾ (name of repair organization) ⁽²⁾ (Form Registration No.) ⁽⁵³⁾ (PO No., Job No., etc.)
2. Owner ⁽³⁾ (name) (address)
3. Location of installation ⁽⁴⁾ (name) ⁽⁵⁾ (address) USA, Canada, Mexico, etc.
4. Item identification ⁽⁵⁾ (boiler, pressure vessel or piping) Name of original manufacturer ⁽⁶⁾
5. Identifying nos.: ⁽⁷⁾ (mfg. serial no.) ⁽⁸⁾ (National Board No.) ⁽⁸⁾ (Jurisdiction No.) ⁽⁸⁾ (other) ⁽⁹⁾ (year built)
6. NBIC Edition/Addenda: ⁽¹⁰⁾ (edition) ⁽¹⁰⁾ (addenda)
- Original Code of Construction for Item: ⁽¹¹⁾ (name/section/division) ⁽¹¹⁾ (edition/addenda)
- Construction Code Used for Repair Performed: ⁽¹¹⁾ (name/section/division) ⁽¹¹⁾ (edition/addenda)
7. Repair Type: ⁽⁵⁵⁾ ☐ Welded ☒ Graphite Pressure Equipment ☐ FRP Pressure Equipment
8. Description of work: ⁽¹²⁾ ☐ Form R-4, Report Supplementary Sheet is attached ☐ FFSA Form (NB-403) is attached (use Form R-4, if necessary)
9. Replacement Parts. Attached are Manufacturer's Partial Data Reports or Form R-3s properly completed for the following items of this report:
- ⁽¹³⁾ Pressure Test, if applied ⁽¹³⁾ psi MAWP ⁽⁵⁴⁾ psi
- ⁽¹⁴⁾ (name of part, item number, data report type or Certificate of Compliance, mfg. name, and identifying stamp)
10. Remarks: ⁽¹⁵⁾

CERTIFICATE OF COMPLIANCE

I, ⁽¹⁶⁾, certify that to the best of my knowledge and belief the statements 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. ⁽¹⁷⁾ expires on ⁽¹⁸⁾.
 Date ⁽¹⁹⁾, ⁽²⁰⁾ (name of repair organization) Signed ⁽²¹⁾ (authorized representative)

CERTIFICATE OF INSPECTION

I, ⁽²²⁾, 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 ⁽²³⁾ and employed by ⁽²⁴⁾ of ⁽²⁵⁾ have inspected the work described in this report on ⁽²⁶⁾ 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.
 Date ⁽¹⁹⁾, Signed ⁽²⁷⁾ (Inspector) Commissions ⁽²⁸⁾ (National Board and Jurisdiction No.)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229

HB-66 Rev-12

A13

5.13.2

FORM R-2, REPORT OF ALTERATION

Form R-2 Report of Alteration

in accordance with provisions of the National Board Inspection Code

(Form R Registration no.)

(P.O. No., Job No., etc.)

1a. Design performed by: _____
(name of "R" organization responsible for design)

(address)

1b. Construction performed by: _____
(name of "R" organization responsible for construction)

(address)

2. Owner of Pressure Retaining Item: _____
(name)

(address)

3. Location of ^{Service} Installation: _____
(name (USA, Canada, Mexico, etc.))

(address)

4. Item identification: _____ Name of original manufacturer: _____
(boiler, pressure vessel, or piping)

5. Identifying nos: _____
(mfg. serial no.) (National Board No.) (Jurisdiction No.) (other) (year built)

6. NBIC Edition / Addenda: _____
(edition) (addenda)

Original Code of Construction for Item: _____
(name / section / division) (edition / addenda)

Construction Code Used for Alteration Performed: _____
(name / section / division) (edition / addenda)

7a. Description of Design Scope: _____

☐ Form R-4, Report Supplementary Sheet is attached

7b. Description of Construction Scope: _____

☐ Form R-4, Report Supplementary Sheet is attached

Pressure Test, if applied _____ psi MAWP _____ psi

8. 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)

FORM R-2 BACK

A13

9. Remarks: _____

DESIGN CERTIFICATION

I, _____, certify that to the best of my knowledge and belief the statements in this report are correct and that the Design Change described in this report conforms to the *National Board Inspection Code*.
 National Board "R" Certificate of Authorization No. _____ expires on _____
 Date _____ Signed _____
(name of design organization) (authorized representative)

CERTIFICATE OF DESIGN CHANGE REVIEW

I, _____, 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 _____ and employed by _____ of _____ have reviewed the design change as described in this report and state that to the best of my knowledge and belief such change 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.
 Date _____ Signed _____ Commissions _____
(inspector) (National Board and jurisdiction no.)

CONSTRUCTION CERTIFICATION

I, _____, certify that to the best of my knowledge and belief the statements in this report are correct and that all material, construction, and workmanship on this Alteration conforms to the *National Board Inspection Code*.
 National Board "R" Certificate of Authorization No. _____ expires on _____
 Date _____ Signed _____
(name of alteration organization) (authorized representative)

CERTIFICATE OF INSPECTION

I, _____, 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 _____ and employed by _____ of _____ have inspected the work described in this report on _____ 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.
 Date _____ Signed _____ Commissions _____
(inspector) (National Board and jurisdiction no.)

NB-229, Rev. 6, (03/25/13)

FORM R-3, REPORT OF FABRICATED PARTS

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

- ## 5. Identification of Parts

6. Description of Parts

7. Remarks 15

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229

~~NB-230 Rev. 2~~

Form R-3 (back)

(2)

(Form R No.)

CERTIFICATE OF COMPLIANCE

I, (16), certify that to the best of my knowledge and belief the statements in this report are correct and that all material, fabrication, construction, and workmanship of the described parts conforms to the *National Board Inspection Code* and standards of construction cited.

National Board "R" Certificate of Authorization No. (17) expires on (18)

Date (19), (20) Signed (21)
(name of "R" Certificate Holder) (authorized representative)

CERTIFICATE OF INSPECTION

I, (22), holding a valid Commission issued by The National Board of Boiler and Pressure Vessel Inspectors and certificate of competency issued by the jurisdiction of (23) and employed by (24) of (25) have inspected the parts described in this report on (26), and state that to the best of my knowledge and belief the parts comply 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.

Date (26) Signed (27) Commissions (28)
(inspector) (National Board and Jurisdiction No.)

SECTION 5

5.13.4 FORM R-4, REPORT SUPPLEMENTARY SHEET

FORM R-4 REPORT SUPPLEMENTARY SHEET
in accordance with provisions of the *National Board Inspection Code*

1. Work performed by (1) (49)
(name)
(address)
2. Owner (3 or 29) (49)
(name)
(address)
3. Location of installation (name)
(address)
- (2) (49)
(Form "R" referenced)
(53) (49)
(PO No., Job No., etc.)

Reference

Line No.

Continued from Form R-(50)

(51)

(52)

SECTION 5

Date (19), _____ Signed (21) _____ Name (20) (49) _____
(authorized representative) (Name of "R" Certificate Holder)

Date (19) , _____ Signed (27) _____ Commissions (28) _____
(inspector) (National Board and Jurisdiction No)

This form may be obtained from The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Ave., Columbus, OH 43229

NB-231 Rev. 2

5.13.4.1 INSTRUCTIONS FOR COMPLETING NATIONAL BOARD FORM "R" REPORTS

These instructions are to be used when completing the National Board Form "R" Reports. When computer generated, the format of the form shall replicate the type and relative location of the information depicted on the Form "R" Reports shown in NBIC Part 3, 5.13.1 through 5.13.4. *[OR NEW 5.19.4]*

1. The name and address of the "R" Certificate Holder performing the work as it appears on the "Certificate of Authorization". On a Form R-2, the organization that performed the design work will complete line 1b) and the organization completing the construction activities will complete line 1a).
2. When registering a Form "R" 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. For re-rating only, the Design Organization registers the Form R-2. Where physical work is also performed, the Construction Organization registers the Form R-2. *5.6.19.1*
3. Name and address of the Owner of the pressure-retaining item.
4. Name and address of plant or facility where the pressure-retaining item is installed. *used*
5. Description of the pressure-retaining item, such as *of country* boiler or pressure vessel, or piping. Include the applicable unit identification. *used cargo tank portable tank tank*
6. Name of the original manufacturer of the pressure-retaining item. If the original manufacturer is unknown, indicate by, "unknown".
7. 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".
8. 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". *used*
9. Identify the year in which fabrication/construction of the item was completed.
10. Indicate edition and addenda of the NBIC under which this work is being performed.
11. Indicate the name, section, division, edition, and addenda of the original code of construction for the pressure-retaining item. Also indicate the name, section, division, edition, and addenda of the construction code used for the work being performed. If code cases are used, they shall be identified in the "Remarks" section.
12. 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 or alteration (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 or alteration 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 needed to describe the scope of work, a Form R-4 shall be used and attached. Information determined to be of a proprietary nature need not be included, but shall be stated on the Form.

A13

13. Indicate test pressure applied.
14. As applicable, identify what 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.
15. Indicate any additional information pertaining to the work involved (e.g., routine repairs, code cases). For Form R-3, the part manufacturer is to indicate the extent he has performed any or all of the design function. If only a portion of the design, state which portion.
16. Type or print name of authorized representative of the "R" Certificate Holder attesting to accuracy of the work described.
17. Indicate National Board "R" Certificate or Authorization number.
18. Indicate month, day, and year that the "R" certificate expires.
19. Enter date certified.
20. 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.
21. Signature of authorized representative.
22. Type or print name of Inspector.
23. Indicate Inspector's Jurisdiction. (*US or Canadian*)
24. Indicate Inspector's employer.
25. Indicate address of Inspector's employer (city and state or province).
26. Indicate month, day, and year of inspection by Inspector. In case of Routine Repairs this shall be the month, day, and year the Inspector reviews the completed Routine Repair package.
27. Signature of Inspector.
28. National Board commission number of Inspector, and when required by the Jurisdiction, the applicable ~~State or Provincial~~ numbers.
Registration
29. Document name and address of organization that purchased the parts for incorporation into the repair or alteration. If the part's origin is unknown or the part was built for stock, so state.
30. Document name of organization responsible for specifying the code design conditions, if known. If origin of design conditions are unknown, state "unknown".
31. Document name of organization responsible for performing the code design, if known. If code design organization is unknown, state "unknown".
32. Name, section, and division of the design code, if known. If the design is unknown, state "unknown"
33. Indicate code edition year used for fabrication.

34. Indicate code addenda date used for fabrication.
35. Indicate the code paragraph reference for formula used to establish the MAWP, if known. If the code reference of the formula is unknown, state "unknown".
36. If available, identify component by part's original name, function, or use the original equipment manufacturer's "mark or item number."
37. Indicate quantity of named parts.
38. Match line number references for identification of parts and description of parts.
39. Indicate manufacturer's serial number for the named part.
40. Indicate drawing number for the named part.
41. Indicate Maximum Allowable Working Pressure for the part, if known.
42. Use inside diameter for size: indicate shape as square, round, etc.
43. Indicate the complete material specification number and grade.
44. Indicate nominal thickness of plate and minimum thickness after forming.
45. Indicate shape as flat, dished, ellipsoidal, or hemispherical.
46. Indicate minimum thickness after forming.
47. Indicate outside diameter.
48. Indicate minimum thickness of tubes.
49. Complete information identical to that shown on the Form ^TR to which this sheet is supplementary.
50. Indicate the Form ^TR type. Example: Form ^TR-1, Form ^TR-2, Form ^TR-3.
51. Indicate the reference line number from the Form ^TR to which this sheet is supplementary.
52. Complete information for which there was insufficient space on the reference Form ^TR.
53. If applicable, document the unique purchase order, job, or tracking number, assigned by organization performing work.
54. Indicate the maximum allowable working pressure of the pressure-retaining item.
55. Indicate the type of repair, e.g., welded, ~~graphite pressure equipment~~, or fiber-reinforced plastic pressure equipment.

Attachment 2

In addition propose revised words in the code, additional a new second paragraph to be **added** to 3.2.2 c).

ASME stamping and completion of an ASME Manufacturer's Partial Data Report is not required for components fabricated by the "R" Certificate Holder that will be used on pressure retaining items being repaired or altered by the same "R" Certificate Holder. The controls for this activity shall be described in the quality control system.

	Comment	
Canonico	I disapprove of this action because I do not agree that R Stamp holders should be fabricating pressure parts. Pressure parts should be fabricated by an accredited ASME Stamp holder. Furthermore, this action is in direct conflict with what is currently in 3-3.2.2 (c).	This is why the change is being proposed. The intent is not to fabricate complete items, but only to fabricate assemblies that he would use in his repair or alteration.
Reetz	I reaffirm my disapproval of this action and for the same reasons given by myself earlier and by many others who have disapproved for the same reasons.	See response to Bob Reetz below
Riley	Reaffirm Disapproval after initial balloting. The proposed addition to 3.2.2c) to allow R-stamp part manufacture contradicts the first paragraph requiring ASME CoA and Partial Data Report. The reliance on 'controls described in the QC system' as a catch-all for replacement of stamping and data reports is too open ended.	See response to Dr Canonaco. Re: "controls" there are established criteria in ASME Code for similar actions.
Galanes	I disapprove of the proposed code change after giving this item considerable thought. ASME parts should be supplied by an ASME Certificate holder, and not an R-Certificate holder.	See response to Dr Canonico
Edwards	This revision would reverse a long-standing requirement of the NBIC which I believe needs further consideration prior to being adopted. Background on the code and/or industry changes warranting revision of our requirements for fabrication of ASME parts needs to be provided.	See response to Dr Canonico
Schulte	The verbiage proposed for section 3.2.2 provides additional clarification. The AI must accept these parts fabricated by the R Certificate holder, just as he as is	Thanks for your comment

	the case with any other parts or materials utilized.	
Richards	There should be either 1) a limit on a 'part' or 2) allowing the A/I to accept a 'part' for use based on a recognized industry standard/definition.	<ol style="list-style-type: none"> 1) This sounds like a definition for part. See response to Mr Reetz 2) This is ok as long as it's covered in the QC Manual
Riley	Agree with comments from Mrs. Reetz, Webb, and Scribner. (1)The part wording may be similar to the following to address limitation of scope:'A part that is a portion, division, piece, or limited segment of the whole' may be fabricated by the R-Stamp holder (2) Agree with requiring the R-Stamp QC system to include description and controls (3) The R-1 should list the parts fabricated in the description or attach a description so they are clear for future inspectors (4) 3.2.2 should be changed to include the new allowance to make it clear.	
Reetz	My comment is that this new paragraph contradicts what presently is in 3.2.2. I do not approve of this change. If various small parts only are to be included I would not object. A definition of "parts" is clearly needed.	My opinion – defining parts will not only be difficult to do, it will cause more problems than it solves.

Action Item Request Form**8.3 CODE REVISIONS OR ADDITIONS**

Request for Code revisions or additions shall provide the following:

a) Proposed Revisions or Additions

For revisions, identify the rules of the Code that require revision and submit a copy of the appropriate rules as they appear in the Code, marked up with the proposed revision. For additions, provide the recommended wording referenced to the existing Code rules.

Existing Text:

S6.5 Replacement Parts

d) When the original code of construction is other than ASME, replacement parts subject to internal or external pressure fabricated by welding shall be manufactured by an organization certified as required by the original code of construction. The item shall be inspected and stamped as required by the original code of construction. Certification to the original code of construction as required by the original code of construction or equivalent shall be supplied with the item. When this is not possible or practicable the organization fabricating the part may have a National Board *Certificate of Authorization*. Replacement parts shall be documented on Form TR-1 and the "TR" Stamp applied as described in NBIC Part 3, S6.14.

b) Statement of Need

Provide a brief explanation of the need for the revision or addition.

The need is to be consistent with NBIC part 3 for replacement parts fabricated by a TR stamp holder. The parts should be documented on a separate form similar to the one for an R stamp holder completes. The form referenced on the last line should be a TR-3 not 1.

c) Background Information

Provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request that will allow the Committee to adequately evaluate the proposed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate.

When applicable, identify any pertinent paragraph in the Code that would be affected by the revision or addition and identify paragraphs in the Code that reference the paragraphs that are to be revised or added.

Throughout Supplement 6 the work that is done is documented on one form (TR-1). This can be a repair or alteration or modification. To develop a form to also address replacement parts is extremely difficult.

Paragraph S6.5 would be affected.

Action Item Request Form**8.3 CODE REVISIONS OR ADDITIONS**

Request for Code revisions or additions shall provide the following:

a) Proposed Revisions or Additions

For revisions, identify the rules of the Code that require revision and submit a copy of the appropriate rules as they appear in the Code, marked up with the proposed revision. For additions, provide the recommended wording referenced to the existing Code rules.

Existing Text:

S6.3 ACCREDITATION

Organizations performing repairs, alterations, or modifications shall be accredited as in accordance with the National Board "TR" Program.

b) Statement of Need

Provide a brief explanation of the need for the revision or addition.

The need is to discuss in text the accreditation process for a TR program in the supplement.

c) Background Information

Provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request that will allow the Committee to adequately evaluate the proposed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate.

When applicable, identify any pertinent paragraph in the Code that would be affected by the revision or addition and identify paragraphs in the Code that reference the paragraphs that are to be revised or added.

S6.3 ACCREDITATION

Organizations performing repairs, alterations, or modifications shall be accredited as in accordance with **NBIC Part 3, Accreditation, Section 1; Major Section 1.5 and Section 1.5.1.** ~~the National Board "TR" Program.~~

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 1.2 (f)

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text
It is recognized that "DOT" is the US Department of Transportation.

"DOT", however, is used throughout, but is not defined in Part 3.

Since the NBIC is an International Standard, in my opinion this should be
defined. As this section is the first occurrence of "DOT" in Part 3,

this could be handled by the following change, which would also inherently
limit the text to the DOT by the inclusion of "i.e.". Part 3, 1.2 (f):

"the Competent Authority, i.e. the US Department of Transportation (DOT),
shall . . ."

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure
Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email,
rough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Project Committee Referred To:
SC Repairs and Alterations

Comment No. Issued: 04

NB15-0507; PR15-0104

NBIC Part 3 paragraph: 1.2 f)

f) For Transport Tanks, the Competent Authority, i.e. The US Department of Transportation (DOT), shall be consulted for any requirements which it has established since they take precedence for repairs,

National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: October 13, 2014

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 1.8.7.2 n) 2) f)

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text
The personnel qualification programs and documents listed do not comply
with 2013 Edition Section XI. Only CP-189 and the ACCP Certification
program is listed in IWA-2310, with the exception of SNT-TC-1A, which is
valid only until recertification is required, which is a 5 year
recommended maximum per SNT-TC-1A 2006. As a result, I interpret IWA-2310
to mean SNT-TC-1A is being discontinued and is no longer valid for new
Certifications. Also, the ASNT NDT Level II and III programs are not
recognized as acceptable for stand alone use by any current ASME BPV
Construction Code, but historically, it may have been. I am assuming that
is what is inferred by the term "ASNT".

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure
Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email,
rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Comment No. Issued: 25

Project Committee Referred To:
SC Repair and Alteration

NBIC Part 3

1.8.8.2 QUALITY PROGRAM ELEMENTS

j) Examinations, Tests and Inspections

A repair / replacement plan shall address all required information for performing examinations, tests and inspections including but not limited to:

- Establishing hold points
- Identifying procedures, methods, acceptance criteria
- Defects identified, removal methods, welding, brazing, fusing, and material requirements, reference points used for identification
- Evaluations of results

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 1.8.8.2 j)

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text
In the third bullet, consider adding "brazing and fusing" in addition to
welding.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Comment No. Issued: 26

Project Committee Referred To:
SC Repair and Alteration

NB15-1408; PR15-0127

NBIC Part 3 paragraph: 1.8.7.2 n) 2) f)

f) Nondestructive examination reports, including results of examinations, shall identify the ASNT, SNT-TC-1A, CP-189, or ACCP certification level of personnel interpreting the examination results. Final radiographs shall be included where radiography has been performed. Radiographs may be microfilmed or digitally reproduced in accordance with the requirements listed in ASME Section V, Article 2, Mandatory Appendix VI. The accuracy of the reproduction process shall be verified and monitored for legibility, storage, retrievability and reproduction quality;

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: October 13, 2014

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 1.8.7.2 n)2)f) another

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text
Fourth line down. "Radiographs may be microfilmed or digitally

reproduced". Consider making the following addition at the end of the
sentence, "in accordance with the requirements listed in the latest
Edition of ASME Section V, Article 2, Mandatory Appendix VI." This
Mandatory Appendix is titled, "MANDATORY APPENDIX VI DIGITAL IMAGE
ACQUISITION, DISPLAY, INTERPRETATION, AND STORAGE OF RADIOGRAPHS FOR
NUCLEAR APPLICATIONS." It provides rules for the proper considerations in
digitizing analog radiographs and storage requirements, etc.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure
Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email,
rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Project Committee Referred To:

Comment No. Issued: 27

SC Repair and Alteration

NB15-1409; PR15-0130

NBIC Part 3 paragraph: 1.8.7.2 g)

~~When the Owner performs repair/replacement activities, p~~Purchase of materials and small products shall meet the requirements specified in ASME Section XI, IWA 4142. Measures shall be established to ensure that purchased material, items, and services conform to the Owner's requirements and applicable edition and addenda of the Code of Construction and ASME Section XI. These measures shall include identification for material traceability. Provisions shall be identified for source evaluation and objective evidence shall be provided evidencing quality standards for material examination upon receipt.

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: October 13, 2014

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 1.8.7.2 g)

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text
This section does not address the situation when the Owner subcontracts
the repair/replacement for Category 2, only when the Owner performs the
repair/replacement activities.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rhough@nationalboard.org

<u>NB Use Only</u>	
Commenter No. Issued: <u>PR15-01</u>	Project Committee Referred To:
Comment No. Issued: <u>30</u>	<u>SC Repair and Alteration</u>

NB15-0509; PR15-0156

NBIC Part 3 paragraph: 2.5.3.6 c) 5) d)

d) The filler metal shall be limited to an austenitic, nickel-base filler metal having a designation F-No. 43 and limited to the following consumables:
ERNiCr-3 (e.g. Filler Metal 82), ENiCrFe-3 (e.g. INCONEL Welding Electrode 182), ENiCrFe-2 (e.g. INCO-WELD A), ASME B&PV Code Cases 2733 and 2734 (e.g. EPRI P87).

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 7, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 2.5.3.6 5) d)

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text

Filler Metal 82, Inconel Welding Electrode 182, and INCO-WELD A are all Brand names for consumables sold by Special Metals. EPRI P07 is a Brand name, I believe licensed to be sold by Metrode at least. Why are the consumable classifications and Code Cases by themselves not sufficient. Without an "e.g." in the parenthesis after each classification, it can be read that these Brand names are required, which would restrict trade by not allowing other manufacturers from supplying consumables to those classifications and Code Cases.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Project Committee Referred To:

Comment No. Issued: 56

SC Repair and Alteration

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: 10/13/14

Commenter Name: Mark R. Kincs

Commenter Address: Xcel Energy Services Inc.

1518 Chestnut Ave., Minneapolis, MN 55403

Commenter Phone: (612) 630-4152

Commenter Fax: (612) 630-4367

Commenter Email: mark.r.kincs@xcelenergy.com

Section/Subsection Referenced: Part 3 - Section 2.5.3.6 d)

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text

The proposed language references Code Case filler metals acceptable for consideration as F-No. 43 for

welding performance qualifications only (ref. Code Cases 2733 & 2734). Also, the accepted F-No. 43

materials, as presented, allow supply by a single manufacturer only. The following alternative

language is proposed.

"Filler metals shall be austenitic, nickel-based consumables limited to ASME Code Case 2733,

Code Case 2734, or one of the following F-No. 43 materials listed in ASME Section IX:

ERNiCr-3, ENiCrFe-2, or ENiCrFe-3."

Source: ☒ Own Experience/Idea ☒ Other Source/Article/Code/Standard ASME Sect. IX & CC 2733, 2734

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-05

Project Committee Referred To:

Comment No. Issued: 01

SC Repair and Alteration

NB15-1402

NB15-0509

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 7, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 2.5.3.6 c) another

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text

Quantify humid environment. Humid is a relative term. What is Humid to an R-Certificate Holder in North Dakota may not be to an R-Certificate Holder in southern Georgia. I understand the intent here, but really the R-Certificate holder needs to understand Relative Humidity vs. Dewpoint and the concern for Condensate forming on the post repaired "cold" tubes. Also, the repair may occur during the day when the humidity is acceptable, but during the night (potentially when the repair location is not being manned), the temperature may approach the dewpoint resulting in condensation, which may evaporate off of the tubes before the day shift resumes and nobody knows of the moisture contamination. If you state in the code that a Moisture Barrier Coating is required to be applied after the repair, this concern is mitigated.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Project Committee Referred To:

Comment No. Issued: 57

SC Repair and Alteration

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 7, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 2.5.3.6 c)

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text

After the weld repair is completed and the R-1 signed, how is the requirement that the repair region be kept from humid or moist environments to be verified, if for instance there is a delay in the return to service after this specific repair? During consideration of this item, presentations discussed the use of Moisture Barrier Coatings as being adequate to protect the repair region. If this is an adequate solution, which reduces risk, why not list the use of a moisture barrier coating is recommended at the very least, if not requiring its use?

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email, rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Project Committee Referred To:

Comment No. Issued: 58

SC Repair and Alteration

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: October 13, 2014

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 3.3.4.9 b)

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text
What about for a brazed boiler, should tube plugging by brazing be
considered for inclusion? I have no knowledge of its use.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure
Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email,
rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Project Committee Referred To:
SC Repair and Alteration

Comment No. Issued: 19

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, 5.13.5.1 31.

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text

What about Category 3 repairs/alterations, etc? What if it was
performed to an International Code other than Section III or XI? Per the
instruction, there isn't a way to address this situation.

Also, Hyphenate "rerating" to "re-rating" to be consistent with the NBIC.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure
Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email,
rhough@nationalboard.org

NB Use Only	
Commenter No. Issued: <u>PR15-01</u>	Project Committee Referred To:
Comment No. Issued: <u>20</u>	<u>SC Repair and Alteration</u>

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, S3.5.5 b)

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text
My comment refers to Section VIII, Division 1, Part UGI-79 and UGI-80

referenced on the last line. After reading these paragraphs in whole, I
do not understand why only some of the subsections are listed and not the
whole of UGI-79 and UGI-80. In my opinion, all of UGI-79 and UGI-80
should be included.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure
Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email,
rhough@nationalboard.org

<u>NB Use Only</u>	
Commenter No. Issued: <u>PR15-01</u>	Project Committee Referred To:
Comment No. Issued: <u>21</u>	<u>SC Repair and Alteration</u>

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, S6.14.1

Comment/Recommendation: Proposed Solution: ☐ New Text ☒ Revise Text ☐ Delete Text
Fifth line down. "Registered Inspector" is used but is not defined in
Part 3. Use of the term "Inspector" and "Registered Inspector" is also
~~used interchangeably in the current published text not under review.~~
Consistency is needed in this Supplement.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure
Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email,
rhough@nationalboard.org

<u>NB Use Only</u>	
Commenter No. Issued: <u>PR15-01</u>	Project Committee Referred To: <u>SC Repair and Alteration</u>
Comment No. Issued: <u>36</u>	

NB15-1410 0513; PR15-0122

NBIC Part 3 paragraph: S6.14.1 f)

f) The non-embossed Code Symbol stamping, when directly applied on the item or when a nameplate is used shall be applied adjacent to the original manufacturer's stamping or nameplate. A single repair, ~~alteration, or modification~~ stamping or nameplate may be used for more than one repair to a Transport Tank, provided the repair, ~~alteration, or modification~~ activity is carried out by the same certificate holder;

**National Board of Boiler and Pressure Vessel Inspectors
National Board Inspection Code
Submission of Public Review Comment
2015 Draft Edition**

PLEASE SUBMIT ONLY ONE COMMENT/RECOMMENDATION PER PAGE
Make additional copies as needed

Comments Must be Received No Later Than: **October 13, 2014**

Instructions: If unable to submit electronically, please print this form and fax or mail. Print or type clearly.

Date: October 1, 2014

Commenter Name: Nathan Carter

Commenter Address: HSB Global Standards, One State Street, PO Box 299
Hartford, CT 06141-0299

Commenter Phone: 860-722-5750

Commenter Fax: _____

Commenter Email: nathan_carter@hsbct.com

Section/Subsection Referenced: Part 3, S6.14.1 f)

Comment/Recommendation: *Proposed Solution:* ☐ New Text ☒ Revise Text ☐ Delete Text

I understand the intent for numerous repairs throughout the life of a
Transport Tank using one nameplate under the conditions listed. Do you
really mean for infinite "alterations and modifications" to be allowed
under a single nameplate/stamping? Please reconsider this.

Source: ☒ Own Experience/Idea ☐ Other Source/Article/Code/Standard _____

Submit Form To: Robin Hough, Secretary, NBIC Committee, The National Board of Boiler & Pressure
Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, fax 614-847-1828, email,
rhough@nationalboard.org

NB Use Only

Commenter No. Issued: PR15-01

Project Committee Referred To:

Comment No. Issued: 22

SC Repair and Alteration

**NBIC Committee
Action Block**

Subject	Revision to Routine Repairs		
File Number	NB14-0702	Prop. on Pg.	
Proposal	Part 3: Paragraph 3.2 e): Correct to limit the categories of routine repairs.		
Explanation	<p>The lead-in sentence for routine repairs contains a clause that could be mis-read to mean that the four categories of routine repairs that are listed are only suggested rather than an all inclusive list of those repairs that are approved. The first sentence reads "Repairs falling within one or more of the following categories may be considered routine." The word "may" has many times caused concern and debate amongst R stamp holders, Owners, and Inspectors. Some that believe that since it says "may" that other repairs not falling into one of the four categories listed could be a routine repair. This is clearly not the case, nor is it the intention the NBIC. This provision has been in the NBIC for a long time. This proposal is to correct the reading in the first sentence to make it clear that routine repairs are limited to only those categories listed in the subparagraphs that follow.</p> <p>This was confirmed in interpretation NB 04-09: INTERPRETATION 04-09</p> <p>Subject: Part RC-2031, Flush Routine Repairs 2004 Edition with 2004 Addenda</p> <p>Question: May repairs that are not included in RC-2031(a) be performed and documented as routine repairs? Reply: No.</p>		
Project Manager	Robert Wielgoszinski		
Task Group Negatives		TG Meeting Date	

The following repairs may be considered as routine repairs and shall be limited to these categories.

e) ~~Repairs falling within one or more of the following categories may be considered routine:~~

- 1) Welded repairs or replacements of valves, fittings, tubes, or pipes NPS 5 (DN 125) in diameter and smaller, or sections thereof, where neither postweld heat treatment nor NDE other than visual is required by the original code of construction. This includes their attachments such as clips, lugs, skirts, etc., but does not include nozzles to pressure-retaining items;
- 2) The addition or repair of nonload bearing attachments to pressure-retaining items where postweld heat treatment is not required;
- 3) Weld buildup of wasted areas in heads, shells, flanges and fittings not exceeding an area of 100 sq. inches (64,520 sq. mm) or a thickness of 25% of nominal wall thickness or ½ inch (13 mm), whichever is less;
- 4) Corrosion resistance weld overlay not exceeding 100 sq. in. (64,520 sq. mm).

A13

SECTION 3

3.3.3 EXAMPLES OF REPAIRS

- a) Weld repairs or replacement of pressure parts or attachments that have failed in a weld or in the base material;
- b) The addition of welded attachments to pressure parts, such as:
 - 1) Studs for insulation or refractory lining;
 - 2) Hex steel or expanded metal for refractory lining;
 - 3) Ladder clips;
 - 4) Brackets having loadings that do not affect the design of the pressure-retaining item to which they are attached; and
 - 5) Tray support rings.
- c) Corrosion resistant strip lining, or weld overlay;
- d) Weld buildup of wasted areas;
- e) Replacement of heat exchanger tubesheets in accordance with the original design;
- f) Replacement of boiler and heat exchanger tubes where welding is involved;
- g) In a boiler, a change in the arrangement of tubes in furnace walls, economizers, or super heater sections;
- h) Replacement of pressure-retaining parts identical to those existing on the pressure-retaining item and described on the original *Manufacturer's Data Report*. For example:
 - 1) Replacement of furnace floor tubes and/or sidewall tubes in a boiler;
 - 2) Replacement of a shell or head in accordance with the original design;

INTERPRETATION 04-09

Subject: Part RC-2031, Flush Routine Repairs
2004 Edition with 2004 Addenda

Question: May repairs that are not included in RC-2031(a) be performed and documented as routine repairs?

Reply: No.

Action Item Request Form**8.3 CODE REVISIONS OR ADDITIONS**

Request for Code revisions or additions shall provide the following:

a) Proposed Revisions or Additions

For revisions, identify the rules of the Code that require revision and submit a copy of the appropriate rules as they appear in the Code, marked up with the proposed revision. For additions, provide the recommended wording referenced to the existing Code rules.

Existing Text:

NBIC 2013, Part 3**3.3.4.3 WASTED AREAS**

d) Tubes

1) Wasted areas on tubes may be repaired by welding, provided that, in the judgment of the Inspector the strength of the tube has not been impaired. Where deemed necessary, competent technical advice should be obtained from the manufacturer or from another qualified source. This may be necessary when considering such items as size limitations of repaired areas, minimum tube thickness to be repaired, tube environment, location of the tube in the boiler, and other similar conditions.

2) The WPS followed shall be qualified for weld metal buildup in accordance with ASME Section IX. When the code of construction required postweld heat treatment (PWHT) for butt welds, the WPS followed for the weld buildup, shall be qualified with PWHT.

b) Statement of Need

Provide a brief explanation of the need for the revision or addition.

This Item opened to address a minimum wall thickness of base metal and welding processes prior to commencing build-up of wasted areas.

Reference National Boiler Service, Inc. report presented to Black Liquor Recovery Boiler Advisory Committee during October 2013 meeting.

c) Background Information

Provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request that will allow the Committee to adequately evaluate the proposed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate.

When applicable, identify any pertinent paragraph in the Code that would be affected by the revision or addition and identify paragraphs in the Code that reference the paragraphs that are to be revised or added.

See attached report. (8 Pages)

From: Parrish, David [<mailto:david.parrish@fmglobal.com>]
Sent: Thursday, September 25, 2014 11:10 AM
To: George Galanes; jpillow@commonarc.com
Cc: bvallance@nationalboard.org; Martinez, David; Barker, Timothy
Subject: Weld Buildup Wasted Areas - Tubes

Thought your committee members might find attached interesting. It is extracted from the BLRBAC October 2013 meeting minutes (posted on the www.blrbac.org website). Wasted areas of tubes are frequently repaired by "pad" welding – even for leaks. A few operators do not permit pad weld repair if failure could admit water to furnace (smelt-water explosion potential). Some operators replace tube section at next maintenance outage. For remainder, the pad weld becomes a long-term solution that may again leak.

It might be helpful for this industry if a "Welding Method" could be developed for inclusion in Part 3.

Best Regards,

Dave P

Senior Staff Engineering Specialist

FM Global - Engineering Standards, Equipment Hazards

781-255-4734



NATIONAL BOILER SERVICE, INC.

Weld Build Up Research

This report contains the results of *Weld Build Ups* that were performed on the outside diameter of boiler tubes (approx. 180 thick) that were turned down (milled) on a lathe to a thickness of .120", .100", .090", .080", .070" thick to simulate boiler tube thinning for this research.

Weld Build Up of Wasted Area is the correct term for this type of repair in the Boiler and Pressure Vessel industry. Other jargon or terms used to describe this type of repair are Pad Welding (which is most frequently used) and Weld Overlay.

The objective of this research is to identify and/or determine what the welding process is doing to the inside of the tubes after weld build up was performed and at what wall thicknesses the tubes were adversely affected.

The Following Welding Processes were used:

- GTAW (TIG) - 3/32" Filler Metal
- SMAW (Stick) - 3/32" Filler Metal
- GMAW (MIG) (Hard Wire) - .035" Bare Wire Filler Metal

Note: The tubes must be cleaned thoroughly before welding.

The Tube positions when the weld build up was performed was about 45° and Vertical positions to simulate different configurations in a boiler such as vertical (Water-wall Tubes), Flat (Floor or Roof Tubes) and approximately 45° (Arch or Sloped Floor Tubes etc.).

The following photos are of weld build up that were performed on tube specimens that were cut in half to view and inspect the inside of the tubes. A description of our findings is under each photo.

Welding Terms:

- Burn-thru – A hole is burned through the base metal.
- Melt-thru – The welding filler metal is melted through to the inside of the base metal (push-thru).
- Sugaring - Oxidation of the weld or base metal.

Base Metal Designations and Terms:

- * P1 - Carbon Steel Tubes, "SA 178, 210 etc."
- * P3 - Carbon/Moly Steel Tubes, "SA 209 T1"
- * P4 - 1.25% Chrom, Alloy Steel Tubes, "SA 213 T11"
- * P5 - 2.25% Chrom, Alloy Steel Tubes, "SA 213 T22"
- * P8 - Stainless Steel Tubes, "SA 213 TP 304, 308, 316 etc."

Conclusion

From this research, it is our opinion, the GTAW (TIG) process, is not recommended to perform Weld Build Up on P1, P3, P4 or P5 base metals that are below .100" thick. Burn-thru and melt-thru is virtually inevitable.

The GMAW (MIG) process (downhill progression with .035 Wire Size) can be used to Perform Weld Build Up on Tubes as thin as .080" thick, with minimal melt-thru or burn thru.

For stainless base metals (P8), it is not good practice or recommended to perform Weld Build Up on base metals that are below .120" thick. Extreme oxidation (Sugaring) virtually cannot be avoided on the Inside diameter of the tube where no backing or shielding gas is utilized.

Steve Harville

Corporate Quality Control Manager

176 North Industrial Blvd. PO Box 279, Trenton, GA 30752 P: (706) 657-6200 F: (706) 657-4875
www.nationalboiler.com



OD: Carbon Steel (P1) *SMAW (Stick) process with E 7018 - 3/32"* was used on these samples. The Weld Progression was Uphill. On all 4 of these samples the Welder Burned-thru the base metal, as the samples got thinner, the Burn-thru was more frequent.



ID: Carbon Steel (P1) The Burn-thru that you see here is not "Melt-thru" it is "Burn-thru." Holes were actually burned in the base metal and filled back up with the SMAW process as the Welder was welding. Note: .070" sample was too thin to Weld.



OD: Carbon Steel (P1), GTAW (TIG) process with E 70 S2 - 3/32" was used on these samples. The Weld Progression was Uphill. On all 4 of these samples the Welder Melted-thru the base metal, as the samples got thinner, the Melt-thru was more frequent and excessive.



ID: The Melt-thru here is very excessive on the .090\", .080\" and .070\" Samples



OD: Carbon Steel (P1), GMAW (MIG) process with E 70 S2 - .035" Wire was used on these samples. The Weld Progression was Downhill. Uphill is **not** recommended. On all of these samples the Welder had very minimal Melt-thru on all thicknesses of the base metal. The GMAW Process requires the base metal to be very clean. When applying Weld Build Up on Tubes of approximately .120" and below, GMAW (MIG) is the preferred method for Weld Build UP.



ID: Notice the Melt-thru on the Tube ID is very minimal.



OD: **Stainless:** GTAW (TIG) process with E 316L - 3/32" was used on these samples. The Weld Progression was Uphill. On all 3 of these samples the Welder Melted-thru the base metal, as the samples got thinner, the Melt-thru was more frequent and excessive.



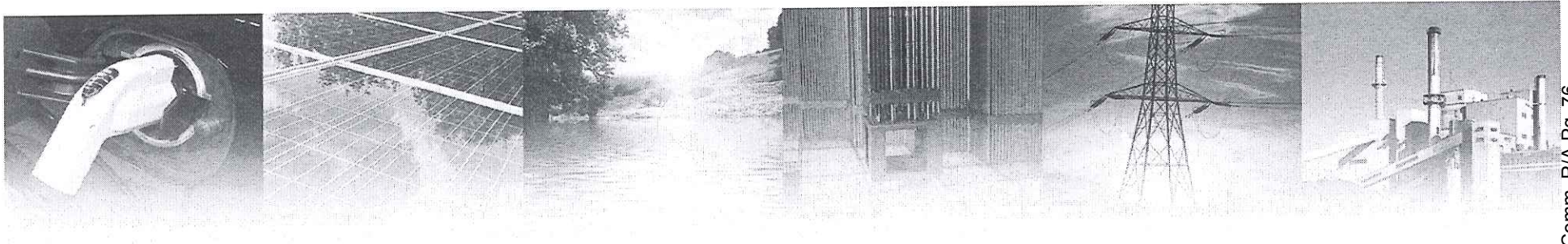
ID: **Stainless:** The Melt-thru on the .100" & .080" thick samples was excessive and "Sugared" (oxidized) the ID of the Tube. This is because the ID of the Tube is not accessible to use a Backing Gas such as Argon to shield the base metal or weld area.



OD: 1-1/4 Chrome (P4), SA 213 T11: Superheat Tube Simulation (with Water in the Tube). GTAW (TIG) process with ER 80S B3- 3/32" was used. The Weld Progression was Uphill. Welder Burned-thru the base metal once on the .090" sample and multiple times on the .070" sample.



ID: 1-1/4 Chrome (P4), SA 213 T11 Superheat Tube Simulation (with Water in the Tube). With water in the Tube, there is little to no indication it is about to burn through the base metal. With the .070" Tube we had to let it cool 3 to 5 minutes between weld passes or between half a weld pass.



Weld Repair of Grade 91 Piping and Components Phase 3 Technology Transfer

***Best Practice Guideline for Well-Engineered Weld Repair of Grade 91
Steel (3002003383)***

John A. Siefert and Jonathan D. Parker
Program 87 Fossil Materials and Repair
National Board Inspection Code Part 3
January 20th, 2015

Program 87 Technology Transfer Week

Location: Brown Hotel, Denver, CO

Date	Subject	Who can attend
Jun 22 Jun 23 (8am-noon)	<u>Weld Repair of Grade 91 Piping and Components – Technology Transfer</u> (SPN 3002001569)	Supplemental Project Funders Only
Jun 23 (1pm-5pm)	New Supplemental Program Launch: <u>Application of Well-Engineered Weld Repairs for Grade 91 and other Creep Strength-Enhanced Ferritic (CSEF) Steels</u> (SPN 3002004332)	Open to Industry for Comment (future meetings for funders only)
Jun 23	Industry Reception	Open to industry
Jun 24	CSEF Interest Group Topic: Life Management of Gr. 91 Steel	Open to industry
Jun 25 Jun 26 (8am-noon)	EPRI Fossil Materials & Repair (P87) Technology Transfer	Program 87 Funders Only

More details on P87 cockpit and EPRI calendar of events

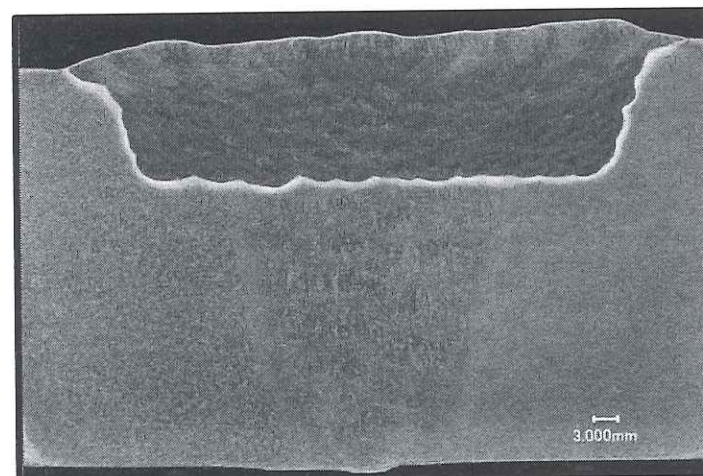
Application of Well Engineered Weld Repairs for Gr. 91 and other Creep Strength Enhanced Ferritic (CSEF) Steels

Objectives and Scope

- Develop and apply well-engineered weld repairs to:
 - Specific components
 - Specific damage mechanisms
 - Other CSEF steels such as Grades 23/24/92

Value

- Increased safety of weld repair through application of a damage tolerant weld design
- Increased inspectability using non destructive evaluation techniques
- Partners will hold one meeting per year to prioritize and agree on broader collaboration



Details and Contact

- The participant cost is \$30k/year with a three years minimum commitment
- Qualifies for Tailored Collaboration (TC) and Self-Directed Funds (SDF)

John Siefert or Jonathan Parker

- jsiefert@epri.com; 704-595-2886
- jparker@epri.com; 704-595-2791

SPN Number: 3002004332

Effectively transfer welding and repair technology through targeted repairs for CSEF Steels

Acknowledgements

- Aside from the principal investigators, there were numerous members and industry experts who contributed to the document:
 - Tim Bacha, Steve Brett, Mike Crichton, David Finch, Phil Flenner, George Galanes, Charles Henley Jeff Henry, Graham Holloway, Erick Liebl, Spencer Luke, Ken Mitchell, Bill Newell, Adam Storey, Bob Worthington
- Contributions from others are welcome and this is by no means an “invitation-only list”

Introduction

- *Best Practice Guideline for Well-Engineered Weld Repair of Grade 91 Steel* (EPRI Report 3002003383) has been made publically available and is available:
 - <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002003833>
- This guideline should be considered as a document which initiates a review process with the National Board for inclusion of material-specific repair methods into the NBIC not currently covered by Welding Method 6

Purpose

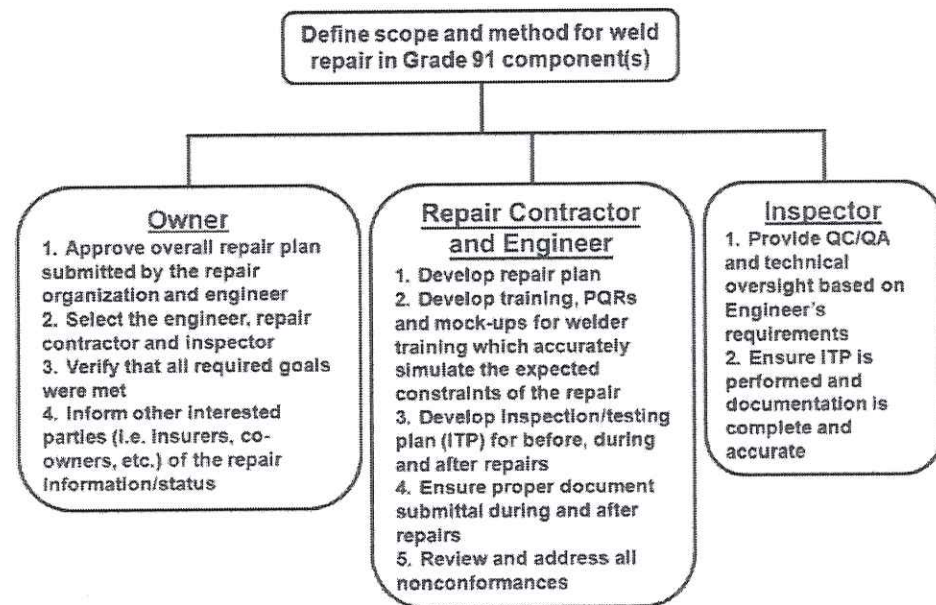
- This guideline describes **best practices** which should be used for fabrication of a **well-engineered weld repair** using **alternative** strategies for ***post-construction*** mitigation of damaged Grade 91 steel components.
 - Although emphasis is on alternative weld repair techniques, the guidance can be utilized to assist in the development of welding procedures where “traditional” PWHT is required

Sections

- Introduction
- Responsibilities
- Acceptable weld repair methods
- General guidelines
- Qualification
- Training and familiarization
- Repair roadmap
- Root cause analysis
- Assessment of base metal
- Selection of welding procedure
- Excavation of defects
- Geometry of weld repair
- Fill technique
- PWHT guidance (where applicable)
- NDE of weld repair
- Post-repair testing
- Post-repair inspection intervals
- Avoidance of stress corrosion cracking
- Conclusions
- References
- 9 Appendices

Responsibilities

- Responsibilities and expectations must be defined for each stakeholder in the repair process:
 - Owner/User
 - Responsible Engineer
 - Repair Contractor
 - Repair Contract Inspector
 - Verification Inspector (or Owner's Inspector)
 - Inspector
 - Quality Assurance
 - Quality Control



Acceptable Weld Repair Methods

Filler	Method	PWHT	Filler Metal AWS Classification	
Matching	Controlled Fill	1250°F (675°C) ¹	SMAW	E9015-B9 ^A
			FCAW	E91T1-B9 ^A
			GTAW	ER90S-B9 ^A
9Cr-1Mo		None	SMAW	E8015-B8
			FCAW	E81T1-B8
			GTAW	ER80S-B8
Ni-base			SMAW	ENiFeCr-4 ^B , ENiCrFe-2 ^C , ENiCrFe-3 ^D
			FCAW	None
			GTAW	ERNiCrFe-4 ^B , ERNiCr-3 ^E

¹Minimum time at PWHT temperature to be conducted to requirements in applied construction code

^AB91 classification is pending for the various Grade 91 matching filler metal product forms

^BAlso known as EPRI P87 filler metal

^CAlso known as INCO-WELD A

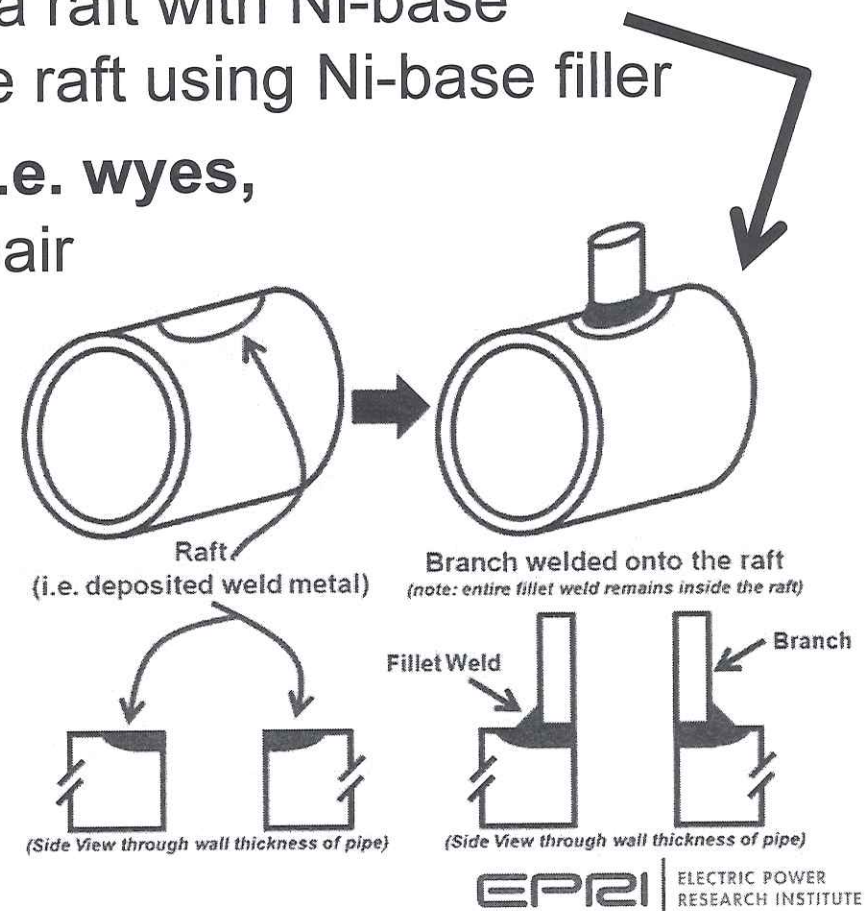
^DAlso known as INCONEL 182

^EAlso known as Filler Metal 82

Note: INCONEL and INCO-WELD are registered trademarks of the Special Metals Corporation family of companies

General Guidelines have been Provided for Each of the Three Welding Methods

- Selection, application and approach for excavation of a given weld repair method is a complex process
 - **For stub to header welds**, a raft with Ni-base filler and weld the stub to the raft using Ni-base filler
 - **For welded components (i.e. wyes, tees, branches)**, a local repair using E8015-B8 until the component can be replaced with a forging
 - **For through-thickness girth welds**, E9015-B9 with a step weld and low PWHT



How One Utility Classified Repair Procedures and the Issue of Permanent vs. Temporary

- “TVA employs two types of repair welding procedures. The first is the so-called “permanent repair”, and the second “temporary repair.” **These terms have little meaning in a literal sense. The choice of the terminology was made for the following reason: permanent repair includes stress-relief.** We use a welding electrode very compatible to the base material and apply a full stress-relief to alleviate the low ductility in the HAZ. We consider that a permanent repair.”

From: “TVA’s Experience with Casings.” *Workshop Proceedings: Life Assessment and Repair of Steam Turbine Casings*. EPRI, Palo Alto, CA: CS-4676-SR. [July 1986]

Permanent vs. Temporary Repair is not a Function of PWHT, but of Design, Damage and Welding Procedure

- “For temporary repairs, two different procedures are used – one with an Inconel electrode and another with a low-alloy electrode. These procedures do not include stress-relief. At some later date, we will remove that temporary repair and put in a permanent repair when we have time, when it is economical and feasible, and other conditions are met.
- **But temporary repairs sometimes run for 15 years, and permanent repairs sometimes crack again after three years. So one cannot call either one permanent or temporary – the quality of the repair seems to be a function of the stress and the thermal cycles for that particular part of the casing.”**

From: “TVA’s Experience with Casings.” *Workshop Proceedings: Life Assessment and Repair of Steam Turbine Casings*. EPRI, Palo Alto, CA: CS-4676-SR. [July 1986]

Qualification

- Where defects were not present in the as-deposited filler metal, there were no issues in qualifying:
 - E9015-B9 + Low PWHT
 - Ni-base + No PWHT
- The only issue arising in qualification was ensuring that E8015-B8 had sufficient ductility to pass the standard 2T side bend test
 - Documented elongation in the filler metal and in the as-welded condition is 14% (as opposed to minimum of 18% for SA-387 Grade 91)
 - **NBIC should consider relaxed qualification requirements for side bend testing of E8015-B8 repairs**
- Language/discussion added to invalidate requirements for QW-290 (i.e. “temper bead” rules)

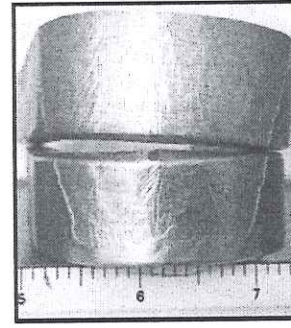
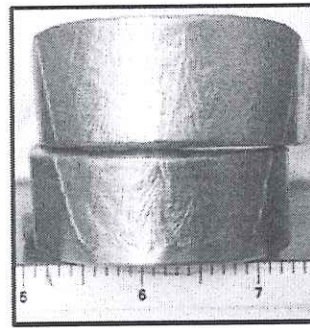
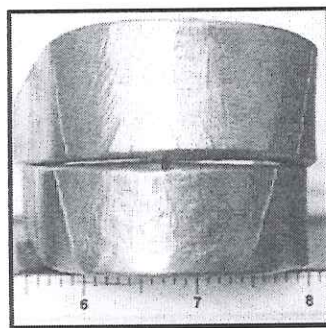
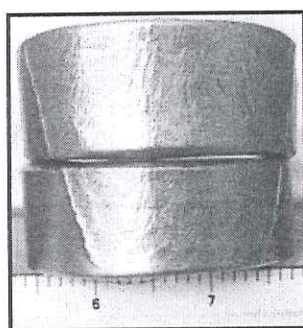
Example of an ASME B&PV Code Section IX PQR Results (Results shown for E9015-B9 + Low PWHT)

Sample	UTS ¹		Failure Location
	ksi	MPa	
RTT1a	100.6	693.8	Base
RTT1b	100.4	692.4	Base
RTT2a	100.8	695.2	Base
RTT2b	100.0	689.7	Base

¹UTS = Ultimate Tensile Strength. The minimum UTS for SA-387 Grade 91 is 85 ksi

Bend ^{1,2}	Results	Comments
1a	Pass	No Cracks Observed
1b	Pass	No Cracks Observed
2a	Pass	<1/8" Crack Observed
2b	Pass	No Cracks Observed
3a	Pass	No Cracks Observed
3b	Pass	No Cracks Observed
4a	Pass	No Cracks Observed
4b	Pass	No Cracks Observed

¹"a" are the "top" bend tests
²"b" are the "bottom" bend tests



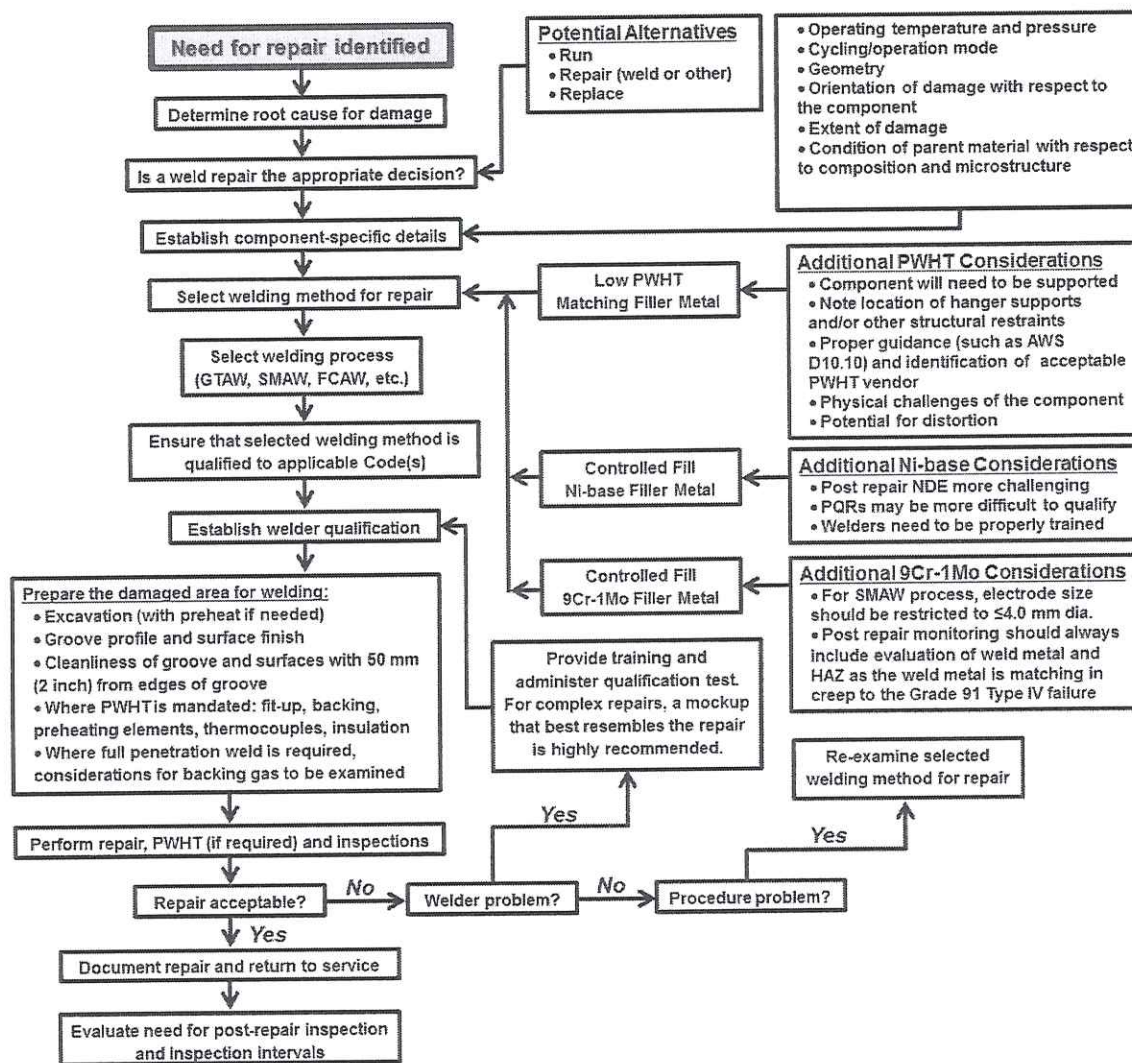
Training and Familiarization

- Must be conscious of the craft labor (capabilities and nationalities)
 - Mock-ups
 - Ni-base versus Fe-base
 - Native language?
 - “TVA uses some special techniques on turbine casings. One is to run mock-up tests. For configurations that restrict access to the weld, it is often necessary to use mirror welding. In such a case, we use a mock-up test to familiarize the welders with the weld area.”

From: “TVA’s Experience with Casings.” *Workshop Proceedings: Life Assessment and Repair of Steam Turbine Casings*. EPRI, Palo Alto, CA: CS-4676-SR. [July 1986]

The use of mock-up tests and careful screening will always be a necessity. The stakes for a weld repair are higher and there may be little margin for error

Repair Roadmap



- This roadmap is not all-inclusive, but intended to be a starting point for the engineer and end-user to write a specification and identify critical steps in the repair process

Root Cause Analysis

- The type of damage
- Location/extent of damage
- And issues in design, operation, fabrication and construction are critical to outlining a well-engineered repair

Design

- Welded construction (i.e. flat end-caps, wyes, tees)
- System loads
- Cold spring
- DMWs
- WSRFs

Operation

- Temperatures above design
- High system loads
- Transients, cycling

Fabrication

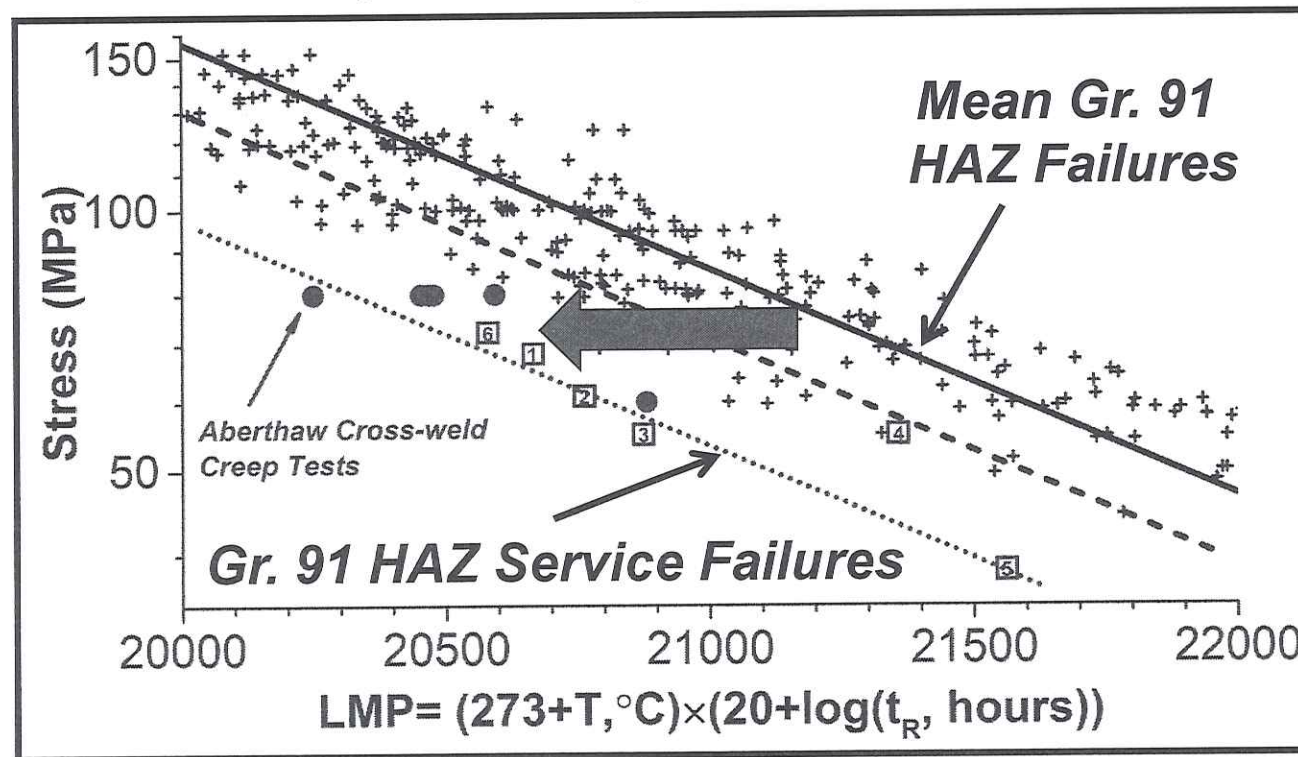
- Composition of materials
- Lack of monitoring of preheat, interpass or PWHT
- Excessive PWHT
- Excessive tempering

Construction

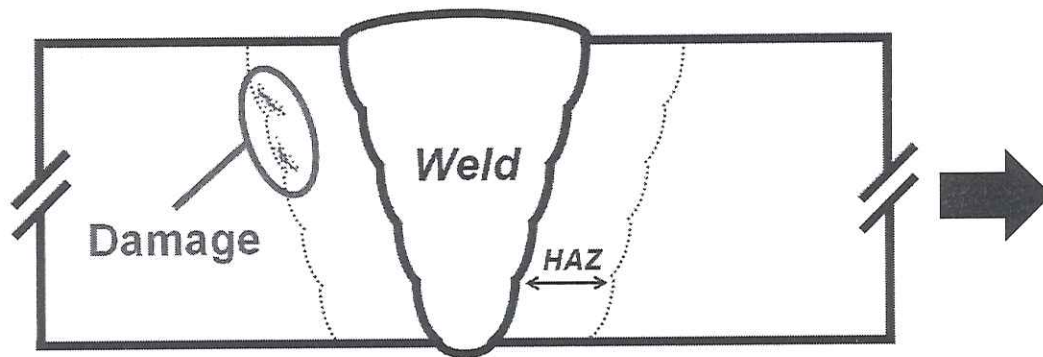
- Temporary weld attachments
- Lack of control of welding consumables
- Repair/remediation
- Quality assurance
- Documentation of work actually performed

Assessment of Base Metal Condition

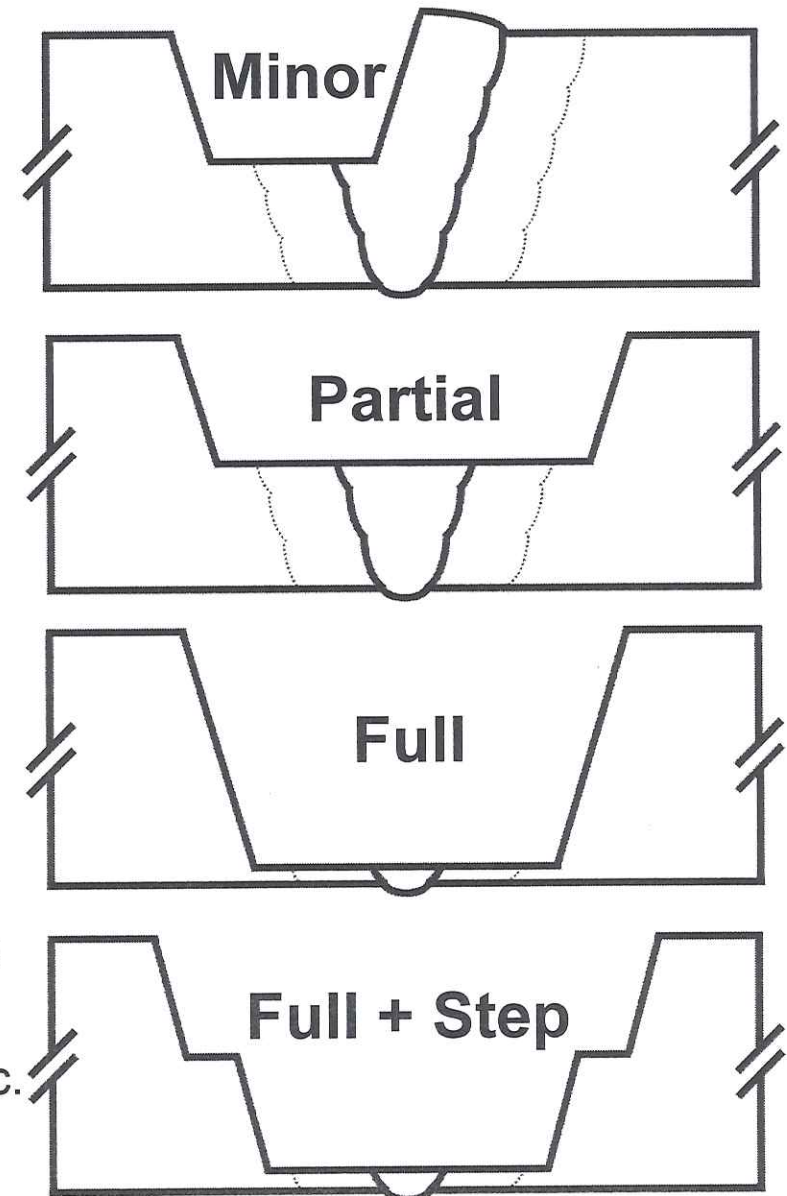
- This is a complex topic that warrants more detail and is the subject of on-going research in Program 87
- **Even a well-engineered weld repair in poorly performing material cannot improve the performance of this material**



Excavation of Damage Requires a Well-Engineered Approach

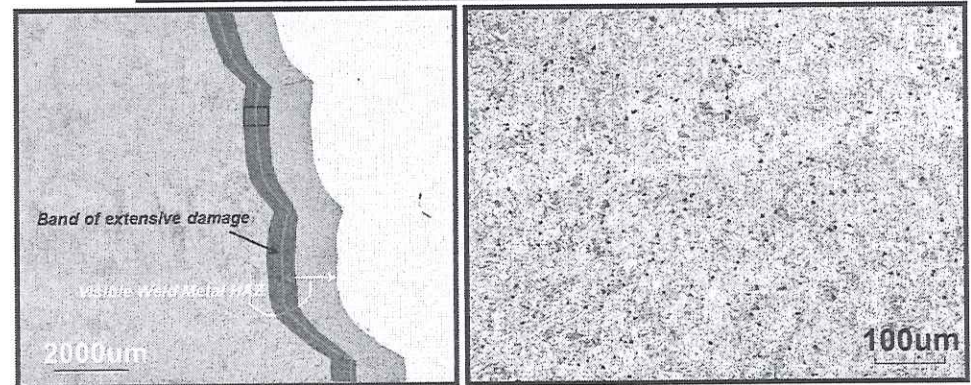
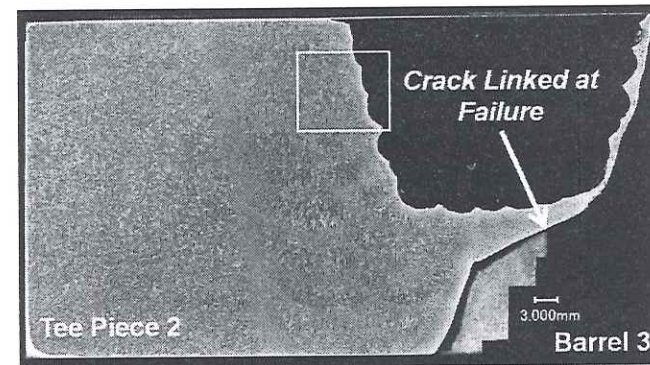
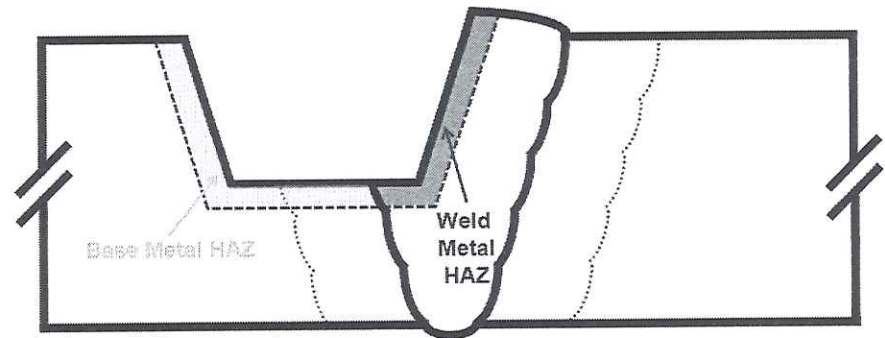


- Where damage is identified in a specific location, key questions arise:
 - Is the parent material identical on both sides of the weld? If not:
 - Composition vastly different?
 - Manufacturing route for material?
 - i.e. Pipe vs. forging vs. casting
 - Is damage expected to be isolated, or present through the thickness of the HAZ?
 - What is the geometry of the weldment?
 - i.e. compound bevel vs. single bevel etc.
 - Urgency of the repair and need for a permanent solution



Repair where the Damage is Excavated with a “Minor Repair” is not Optimal

- In this scenario, a weld metal HAZ is created in the as-deposited filler metal
 - In some cases, extensive damage has been documented in this scenario in EPRI testing
 - Furthermore, **“If weld repairs of CSEF steels are required, it is absolutely essential to avoid making HAZ formed in ex-service weld metal”**
 - From: Kubushiro et al. “Microstructure and Creep Property of Long-term Serviced Mod. 9Cr-1Mo Steels after Repair Welding.” 2014 PVP Conference.



Controlled Fill Technique – 6 Simple Rules

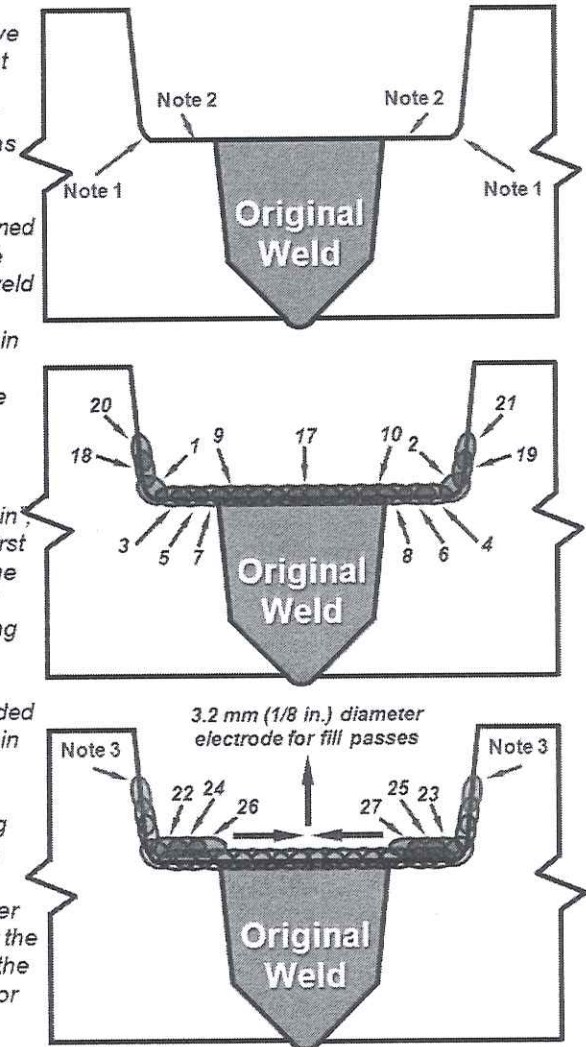
1. Weld starting on the bevel and working to the center of the excavation
2. 50% overlap bead to bead
3. Stringer beads only
4. 300°F (150°C) minimum preheat
5. 550°F (290°C) maximum interpass
6. Electrode diameter limitation
 - **Fe-base:** 2.5 mm (3/32 inch) or 3.2 mm (1/8 inch)
 - **Ni-base:** 3.2 mm (1/8 inch) for beads in contact with bevel and 3.2 mm (1/8 inch) or 4.0 mm (5/32 inch) for fill

Notes:

1. The excavation should have rounded corners to prevent lack of fusion. It may be advisable to use a smaller diameter electrode (such as 2.5 mm or 3/32 in.) to ensure good tie in.
2. The step should be machined at least 10 mm beyond the fusion line of the original weld
3. The fill passes along the bevel should be restricted in height so as to not reduce access to the bottom of the excavation for the welder

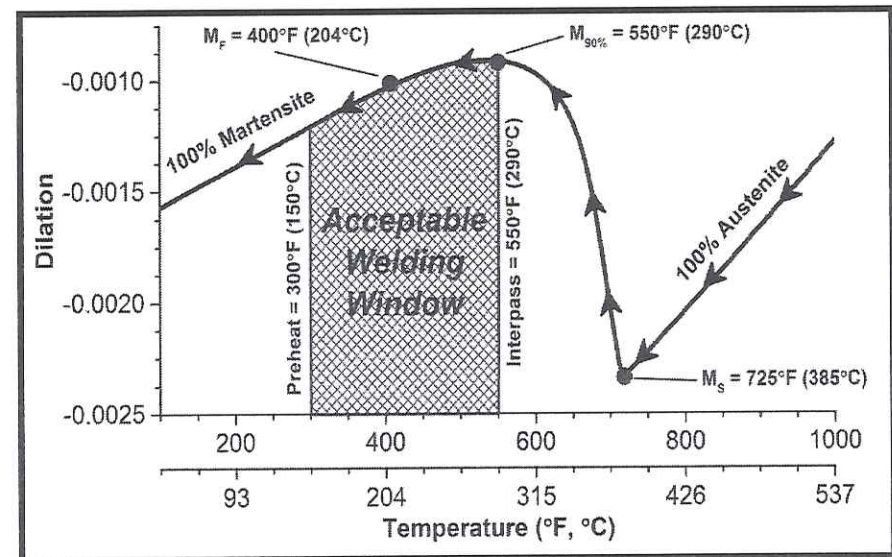
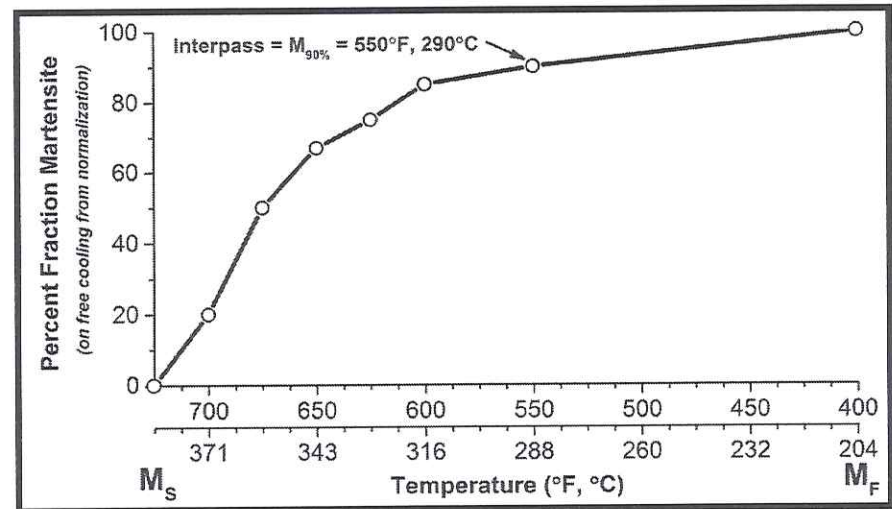
Additional Instructions:

- The fill passes should be conducted working "outside-in", whereby the fill passes are first deposited on either side of the excavation and additional fill passes are deposited welding towards the center of excavation
- 50% overlap is recommended for all welding passes either in contact with the bevel or fill
- Stringer beads only are recommended for all welding passes either in contact with the bevel or fill
- A 2.5 mm (3/32 in.) diameter electrode may be utilized for the weld passes in contact with the bevel but is not mandated nor required for acceptable performance



Justification for Preheat and Interpass Recommendations

- The “acceptable welding window” has been defined by practical and scientific limits:
 - Preheat of 300°F (150°C) to avoid hydrogen induced cracking
 - Interpass of 550°F (290°C) to promote tempering within a layer (i.e. bead to bead)
 - This does not mandate a lower minimum preheat should an end-user wish to utilize a preheat of ~400°F (204°C) or if a construction code mandated it



Post Weld Heat Treatment (PWHT) Guidance is beyond that of AWS D10.10

- Pads must be wrapped onto the parts without gaps and never overlap
- Minimize gaps between heating pads
- In addition to AWS D10.10, it is recommended to have at least one thermocouple installed under each pad
- Thermocouples under pads must be insulated
- A single control thermocouple should not control multiple heaters
- Monitoring or control thermocouples should be located underneath pads in the location of the expected highest temp.
- For thickness transitions, mandate multiple control zones
- Redundancy of control thermocouples
- If possible, ID should be monitored
- Single point monitoring is unacceptable
- Avoid excessively high ramp rates

NDE and Post Repair Testing

- NBIC NB-23 requires that all repairs to pressure-retaining items shall be verified by examination or test. Liquid pressure testing, also known as hydro-testing, is widely used for this purpose.
 - 2013 Edition of the NBIC Part 3, Table 4.4.2
- The NBIC does not restrict post-repair testing to only liquid pressure tests; alternate testing methods are recognized in NBIC, Part 3, 4.4.1
 - Based on critical flaw size calculations, a minimum critical flaw size of ~0.10 inch (3 mm) should be detected by the selected NDE method.
- Post-repair inspection is not considered a single event
 - A recommended base re-inspection interval is every other planned major outage or six years, whichever is less.
 - The Owner/User may expand or compress the re-inspection interval based on trend results from previous inspections.

Stress Corrosion Cracking – 3 Simple Rules

- ***Rule 1 – Apply and keep dry***

- The outside diameter of the weld repair should be coated with a water-resistant coating including ~1 inch (25 mm) beyond the weld on either side of the fusion line
 - Vaseline, paint, WD-40, Crisco, etc.
- The weldment be properly protected from all moisture or preserved “dry” prior to unit startup, especially where the piping is directly exposed to the environment, such as in some combined cycle power plants.

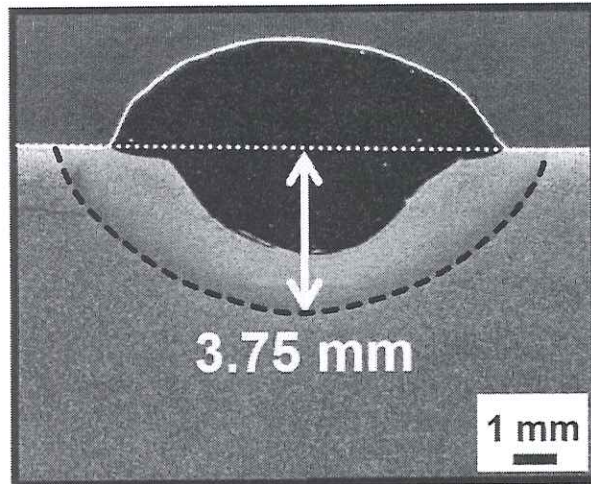
Stress Corrosion Cracking – 3 Simple Rules

- ***Rule 2 – Full penetration weld repairs should undergo a PWHT***
 - For weld repairs that must be made using a full penetration weld, it is recommended that the weldment be made using the matching -B9 consumables and a minimum PWHT of 675°C (1250°F)

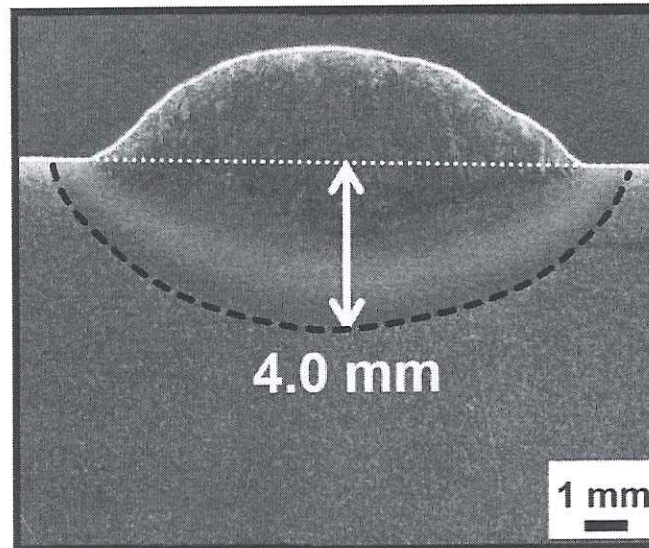
Stress Corrosion Cracking – 3 Simple Rules

Bead on Plate Experiments – Depth of HAZ in Grade 91 Steel

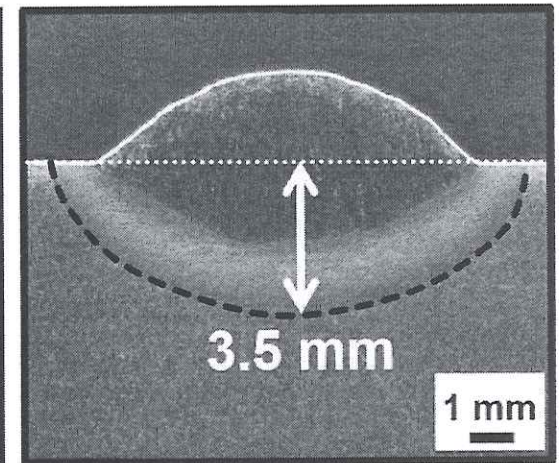
3.2 mm dia., Ni-base



3.2 mm dia., Fe-base



2.5 mm dia., Fe-base



- **Rule 3 – When a land can be left for a full penetration weld, limit the diameter of the electrode in direct contact with the land to 2.5 mm (3/32 inch) or use controlled GTAW process**
 - For weld repairs where a land can be left in the weldment, it is recommended that the land be at least 0.20 inch (5 mm) thick to avoid creating an HAZ that is exposed to the ID surface.

Appendices

More will be added as-required

- **A** – Filler Metal Compositions, as Listed in ASME B&PV Code Section IIC and Code Cases
- **B** – Common Base Metal Compositions for Grade 91 Product Forms as Listed in ASME B&PV Code Section IIA
- **C** – Exemplar Filler Metal Procurement Form
- **D** – Evaluation of Hardenability of Filler Metal E8015-B9 (9Cr-1Mo)
- **E** – Evaluation of Hardenability of Filler Metal E9015-B9 (9Cr-1Mo-VNbN) in the As-welded and Low PWHT Condition
- **F** – Performance of Through-thickness Weld Repairs in Grade 91 Steel
- **G** – Performance of Weld Repairs Using E8015-B8 Filler Metal and Importance of the Grade 91 Parent Metal Condition
- **H** – Effect of the Weld Repair Quality on Performance
- **I** – Effect of Geometry on the Performance of Weld Repairs in Grade 91 Steel

Conclusions

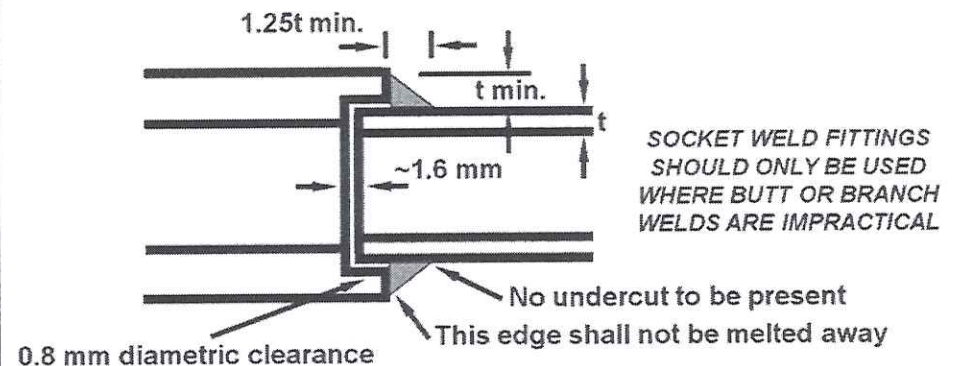
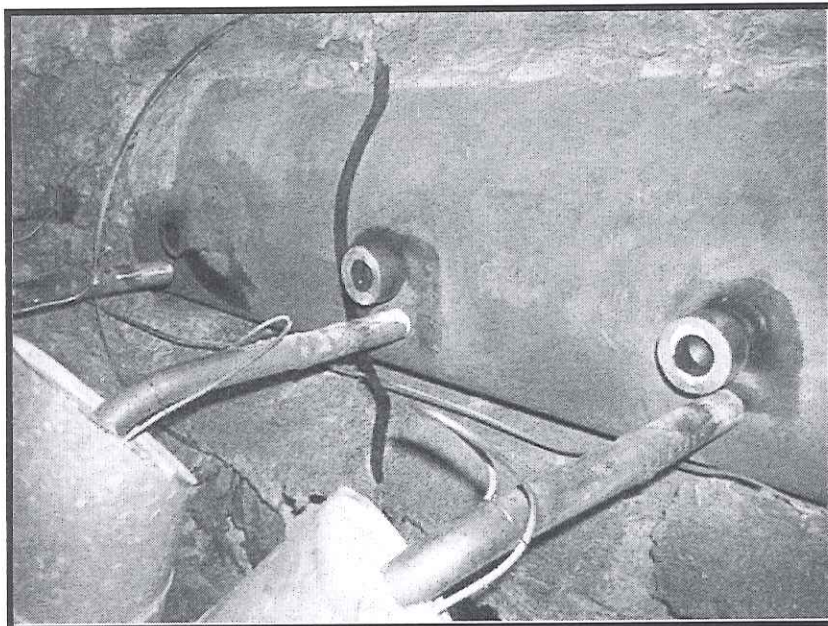
- It is clear that the technical details for “best practice” regarding welding of low alloy bainitic steels do not apply directly to welding of tempered martensitic steel. Thus, repair techniques commonplace for “conventional” low-alloy steels are not directly relevant for repairs on Grade 91 steels.
 - **And the need for an NBIC supplement to address weld repair of Grade 91 steel not covered in Welding Method 6**
- Furthermore, technical definition of the best-option repair in Grade 91 steel components is not a one-size-fits-all approach

Proposed Path Forward

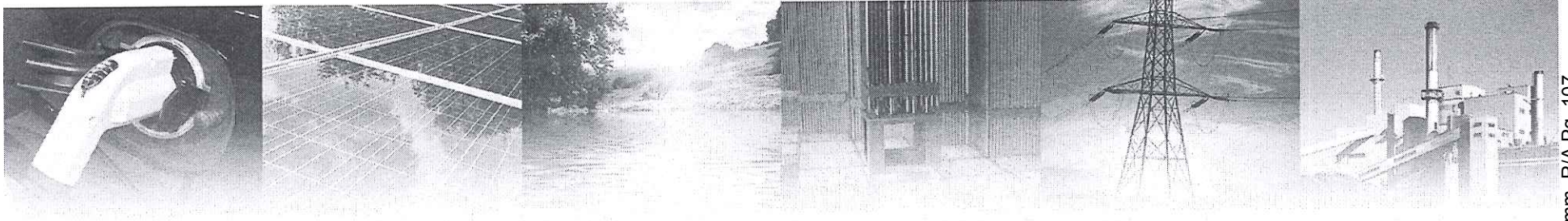
- NBIC committee members to review draft and provide feedback prior to July 2015 meeting
 - EPRI will address any issues, concerns, comments, etc.
- Draft NBIC Supplement covering the balance of repair scenarios for Grade 91 steel to be brought forward by end of 2015 for voting in 2016

Weld Repair of Grade 91 Steel is being Performed or Planned Using Procedures without PWHT

- An HRSG unit was brought off load shortly before a planned outage as a result of a steam leak from a small diameter HP superheater outlet pressure impulse line (incorrect material). Temporary repairs to three lines were carried out using nickel-based GTAW socket welds to allow rapid return to service.



From: *Cold Weld Repair of Ferritic Components – Case Studies of UK Power Stations*. EPRI, Palo Alto, CA: 3002003362. 2014.



Together...Shaping the Future of Electricity

Post Weld Heat Treatment (PWHT) is Complicated

- Additional guidance is provided to supplement AWS D10.10
- Guidance below is for a pipe that is 14 inch OD (356 mm) X 1.25 inch (31.75 mm) wall thickness, horizontally aligned with no thickness transition

Scenario	AWS D10.10	Option 1 ^A	Option 2 ^B	
Control Band Width	3t	3t	12.8t	19.2t
Heated Band Width	20 inches (508 mm)	49 inches (1245 mm)	20 inches (508 mm)	28 inches (711 mm)
Gradient Control Band Width	30 inches (762 mm)	60 inches (1524 mm)	30 inches (762 mm)	38 inches (965 mm)
Reduction in through-wall temperature gradient	0% (52°F, 29°C)	40%	40% (~30°F, 17°C)	60%
^A Increase the heated band width				
^B Change from a soak band width scenario to a control band width scenario				

General Guidelines – Considerations for Weld Method 1 (Matching + PWHT)

- Matching filler metal is used
- Electrode size restricted to $\leq 5/32$ inch (4.0 mm) dia.
- Low PWHT decreases the potential for excessive tempering in the HAZ or base material
- Low PWHT will decrease risk of exceeding the AC_1 for Grade 91
- Low PWHT can be expected to relieve some or most of the welding residual stresses in the component
- Recommend minimum PWHT temperature (1250°F, 675°C) is below ASME B&PV Code minimum specified in Sec. I or B31.1
- Restraints and accommodation of thermal expansion stresses during PWHT need to be addressed
- Where charpy impact toughness tests are required, a low PWHT may not be sufficient to meet the specified requirements

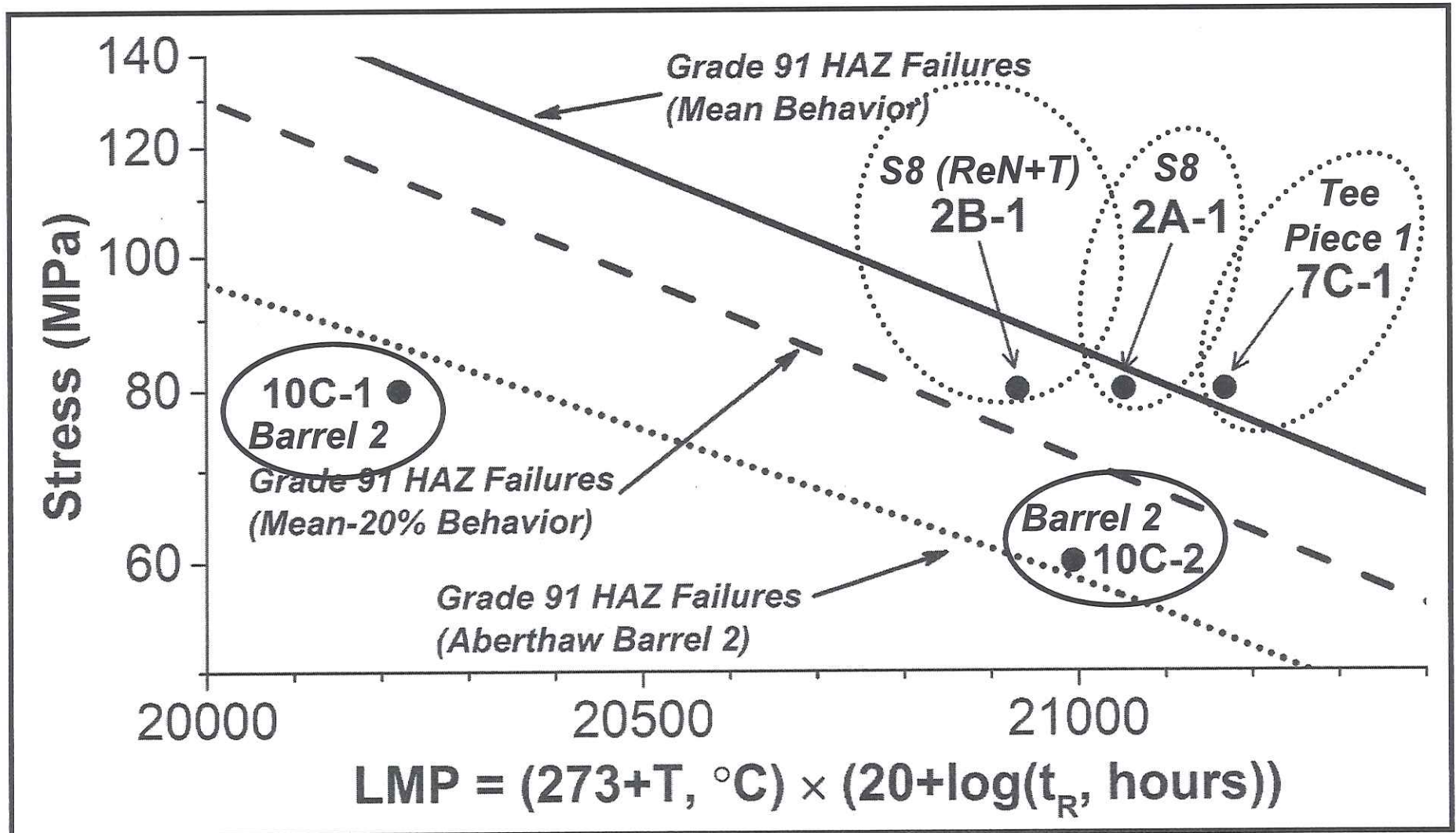
General Guidelines – Considerations for Weld Method 2 (9Cr-1Mo + No PWHT)

- Filler metal matches the creep strength of the Grade 91 HAZ
- Filler metal is less hardenable than matching filler metal and tempers more readily during welding and in service
- No concern for carbon migration as the Cr content is matching to Grade 91 steel
- Electrode size should always be restricted to $\leq 5/32$ inch (4.0 mm) in diameter and more preferably to $\leq 1/8$ inch (3.2 mm)
- Post-repair inspection and inspection intervals will need to include weld metal and HAZ
 - Depending on the creep strength of the base metal, damage may occur in either the HAZ or weld metal or both

General Guidelines – Considerations for Weld Method 3 (Ni-base+ No PWHT)

- The electrode size for fill passes against the bevel should be 1/8 inch (3.2 mm) diameter
- The electrode size for all fill passes can be 5/32 inch (4.0 mm) diameter
- Increased defect tolerance in weld metal
- NDE is more challenging during the repair and following repair
- Tendency to form microfissures and/or lack of fusion defects
 - The defects have not been shown to contribute to a reduction in performance
- The skill of the welder can be an important variable
- The temperature of the component as welding residual stresses may not relax rapidly at temperatures $<550^{\circ}\text{C}$ (1022°F)
- Post-repair inspection and inspection intervals will need to include fusion line and HAZ as there may be a risk for damage in both locations and consistent with reported DMW failures

Results for Four Parent Metal Conditions and the Same Welding Procedure (E9015-B9 + Low PWHT)



Controlled Fill Technique Schematics

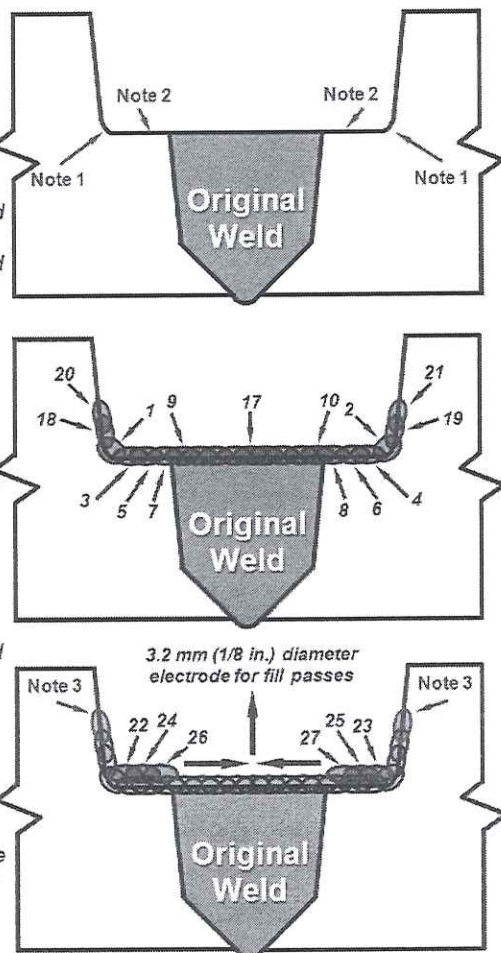
Partial Weld Repair

Notes:

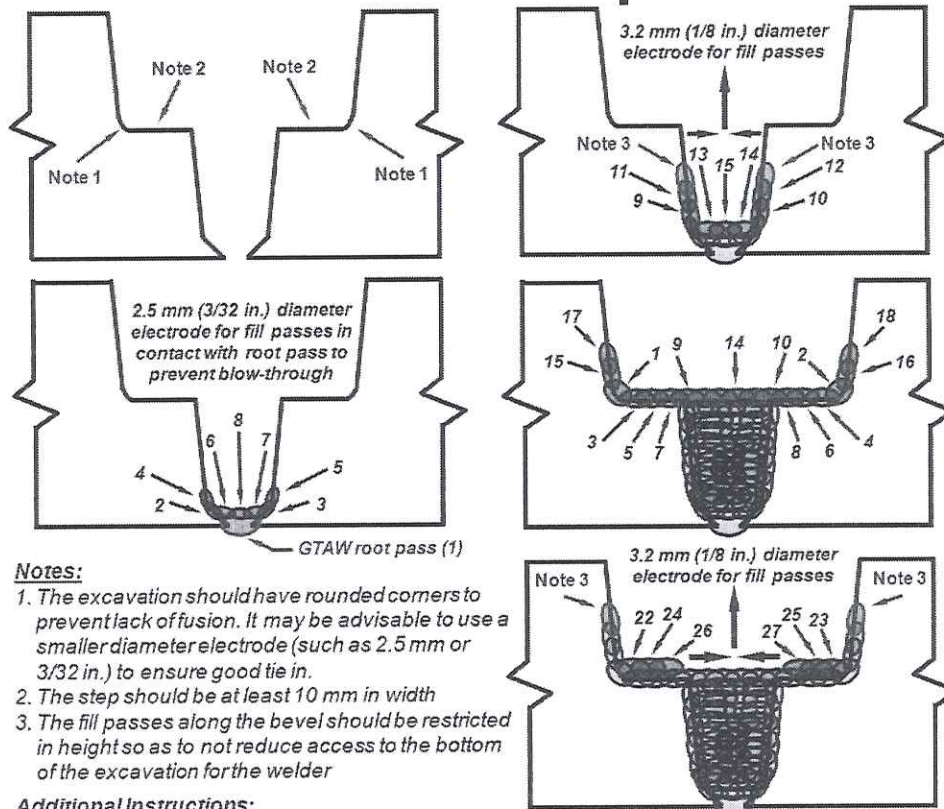
1. The excavation should have rounded corners to prevent lack of fusion. It may be advisable to use a smaller diameter electrode (such as 2.5 mm or 3/32 in.) to ensure good tie in.
2. The step should be machined at least 10 mm beyond the fusion line of the original weld
3. The fill passes along the bevel should be restricted in height so as to not reduce access to the bottom of the excavation for the welder

Additional Instructions:

- The fill passes should be conducted working "outside-in", whereby the fill passes are first deposited on either side of the excavation and additional fill passes are deposited welding towards the center of excavation
- 50% overlap is recommended for all welding passes either in contact with the bevel or fill
- Stringer beads only are recommended for all welding passes either in contact with the bevel or fill
- A 2.5 mm (3/32 in.) diameter electrode may be utilized for the weld passes in contact with the bevel but is not mandated nor required for acceptable performance



Full Weld Repair



Notes:

1. The excavation should have rounded corners to prevent lack of fusion. It may be advisable to use a smaller diameter electrode (such as 2.5 mm or 3/32 in.) to ensure good tie in.
2. The step should be at least 10 mm in width
3. The fill passes along the bevel should be restricted in height so as to not reduce access to the bottom of the excavation for the welder

Additional Instructions:

- The fill passes should be conducted working "outside-in", whereby the fill passes are first deposited on either side of the excavation and additional fill passes are deposited welding towards the center of excavation
- 50% overlap is recommended for all welding passes either in contact with the bevel or fill
- Stringer beads only are recommended for all welding passes either in contact with the bevel or fill
- A 2.5 mm (3/32 in.) diameter electrode may be utilized for the weld passes in contact with the bevel but is not mandated nor required for acceptable performance

Action Item Request Form

NB15-1404

8.3 CODE REVISIONS OR ADDITIONS

Request for Code revisions or additions shall provide the following:

a) Proposed Revisions or Additions

For revisions, identify the rules of the Code that require revision and submit a copy of the appropriate rules as they appear in the Code, marked up with the proposed revision. For additions, provide the recommended wording referenced to the existing Code rules.

Existing Text:

Part 3

1.6.1

Materials

i) The manual shall describe the method used to ensure that only acceptable materials (including welding material) are used for repairs and alterations. The manual shall include a description of how **existing material** is identified and new material is ordered, verified, and identified. The manual shall identify the title of the individual(s) responsible for each function and a brief description of how the function is to be performed.

3.2.1 MATERIAL REQUIREMENTS FOR REPAIRS AND ALTERATIONS

a) 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.

b) Statement of Need

Provide a brief explanation of the need for the revision or addition.

1. Repair organizations are required to add to the quality manual a description of how **existing material** is identified. In 1.6.1 i)

2. Organizations are required to consider and verify existing **material** as part of their responsibility in 3.2.1 a)

These organizations are somewhat confused what is meant by existing material in NBIC Part 3.

c) Background Information

Provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request that will allow the Committee to adequately evaluate the proposed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate.

When applicable, identify any pertinent paragraph in the Code that would be affected by the revision or addition and identify paragraphs in the Code that reference the paragraphs that are to be revised or added.

This was discussed at the NBIC Subgroup Repair and Alteration meeting on January 20, 2015.

These organizations are somewhat confused what existing material is meant in NBIC Part 3. They have asked to add a definition or explanation in Part 3 as what is meant by existing material.

d) Task Group Assigned

Project Manager: Wayne Jones,

Members: Marty Toth, Joel Amato, and Rob Trout