Date Distributed: January 30, 2018

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBGROUP REPAIRS AND ALTERATIONS

MINUTES

Meeting of January 9th, 2018
New Orleans, LA

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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 :**

   Chairman Brian Boseo called the meeting to order at 8am.

2. **Introduction of Members and Visitors**
   Members and visitors in attendance introduced themselves.
   Secretary Vallance passed around a member and visitor sign-in sheet. (Attachment Page 1-2)
   19 Members were present.

3. **Announcements**
   The National Board will be hosting a reception at 5:30 PM for all committee members and visitors on Wednesday evening in the Lagniappe room.

   Breakfast and lunch Thursday will be provided for both Committee members and visitors.

   Thursdays NBIC meeting is expected to last until 5pm.

   The July meeting the Sub Committee R/A will is electing a new Chairman as Mr. George Galanes is term limited. Those interested give me your name. To be considered for the Chairmanship you must have served at least two years on the Sub Committee Repairs and Alterations.

4. **Adoption of the Agenda**
   5 new items were added to the agenda:
   17-181 and 18-11, 18-12, 18-13, & 18-14
   A motion was made and unanimously approved to accept the agenda as amended.

5. **Approval of the Minutes of July 18th, 2017 Meeting**
   A motion was made and unanimously approved to accept the July 18, 2017 meeting minutes.

6. **Review of Rosters**
   a. **Membership Nominations**
      - A motion was made and unanimously approved to appoint Frank Johnsons as a member of the Sub Group Repairs and Alterations. This appointment is subject to the approval of the Chairman of the Board of Trustees.

   b. **Membership Reappointments**
      - Joel Amato – SG Repairs and Alterations
      - Larry McManamon – SG Repairs and Alterations
        The Mr. Amato and McManamon have considered not continuing membership on the Sub Group Repairs and Alterations after their term expires.

        Ms. Kathy Moore, Mr. Brian Morelock, and Mr. Tom White are eligible for reappointment to Subgroup Repairs and Alterations.

        A motion was made to reappoint Ms. Kathy Moore, Mr. Brian Morelock, and Mr. Tom White as members of the Subgroup Repairs and Alterations. The motion was unanimously approved. These reappointments are subject to the approval of the Chairman of the Board of Trustees.

Note: Attachments associated with the minutes are those documents that were voted as passed at the Sub Group Repairs and Alterations

7. Interpretations

Item Number: 17-173	NBIC Location: Part 3	Attachment Page 3

General Description: Is adding an elliptical handhole ring on the pressure side considered a routine repair?

Subgroup: Repairs and Alterations

Task Group: Jim Pillow (PM).

Meeting Action:
Jim Pillow presented the interpretation. The committees reply is NO. A motion was made and unanimously approved to move this to the Sub Committee Repairs and Alterations for consideration.

Item Number: 17-175	NBIC Location: Part 3, 3.4.4	Attachment Pages 4-5

General Description: Weld metal buildup classification

Subgroup: Repairs and Alterations

Task Group: Jamie Walker (PM), Eric Cutlip, & Dave Martinez

Meeting Action:
Jamie Walker presented the interpretation. The committees reply is as per the attachment. A motion was made and approved with one abstention to move this to the S C Repairs and Alterations for consideration.

Item Number: 17-176	NBIC Location: Part 3, Section 1	Attachment Page 6

General Description: NBIC repair/replacement activities for parts

Subgroup: Repairs and Alterations

Task Group: Ray Miletti (PM), Rick Valdez, & Monte Bost

Meeting Action:
Ray Miletti presented the interpretation. The committees reply is as per the attachment. A motion was made and unanimously approved to move this to the S C Repairs and Alterations for consideration.

Item Number: 17-177	NBIC Location: Part 3, 2.5.3.6	Attachment Page 7

General Description: Tube to header weld requirements

Subgroup: Repairs and Alterations

Task Group: George Galanes (PM)

Meeting Action:
George Galanes presented the interpretation. The committees reply is No as referenced in the attachment. A motion was made and unanimously approved to move this to the Sub Committee Repairs and Alterations for consideration.

Item Number: 17-178	NBIC Location: Part 3, Section 3	Attachment Page 8

General Description: Omission of service related PWHT alteration classification

Subgroup: SG Repairs and Alterations

Task Group: Monte Bost (PM), Rob Troutt

Meeting Action:
Monte Bost presented the interpretation. The committees reply is Yes as referenced in the attachment. A motion was made and unanimously approved to move this to the Sub Committee Repairs and Alterations for consideration.

Item Number: 17-181	NBIC Location: Part 3,	No Attachment

General Description: O/U Inspector Sequence vs. Production

Subgroup: Repairs and Alterations

Task Group: B. Vallance (PM)

Meeting Action:
Bill Vallance presented the interpretation. After his presentation a motion was made and unanimously approved to close this item with no further action and send the submitter a letter the committee feels this is consulting.

Item Number: 18-11	NBIC Location: Part 3,	Attachment Page 9

General Description:

Subgroup: SG Repairs and Alterations

Task Group: NRTG (Paul Edwards PM, Ben Schaefer)

Meeting Action:
A motion was made and unanimously approved to move this to the Sub Committee Repairs and Alterations for consideration.

8. Action Items

Item Number: NB13-1406	NBIC Location: Part 2, S1	No Attachment

General Description: Add requirements for repair of superheater units

Subgroup: Repairs and Alterations

Task Group: Dave Martinez (PM), Lynn Modinger, Jamie Walker

Meeting Action:
Jamie Walker presented this item which originally started in 2013 by the Locomotive Sub Group. A motion was made to send this action item NB13-1406 back to the Locomotive Sub Group for their consideration to close this item with no further action as the repairs are mostly addressed already in NBIC Part 3.

Item Number: NB16-0303	NBIC Location: Part 3	No Vote Attachment Pages 10-16

General Description: Fillet welded patches

Subgroup: SG Repairs and Alterations

Task Group: B. Boseo (PM), B. Morelock, R Underwood, J. Walker

Meeting Action:
Chairman Brian Boseo turned the meeting over to the Vice Chair Ben Schaefer. Bryan Bosco presented the item attachment. After discussion the committee placed the attachment up for a vote. By a show of hands the item had 11 yes votes and 7 disapprove votes with one member abstaining. By these results the item has failed. Chairman Boseo took over the meeting from the Vice Chairman.

Item Number: NB16-0608	NBIC Location: Part 3, 1.8.2	No Attachment

General Description: Address Nuclear QA program requirements for owner and certificate holder

Subgroup: Repairs and Alterations

Task Group: NR Task Group

Meeting Action:
Paul Edwards gave a progress report

Item Number: NB16-0609	NBIC Location: Part 3, 1.8.7 and 1.8.8	Attachment Pages 17-18

General Description: Add requirements from 1.8.6 l) 2) for Category 2 and 3 for subcontracting services such as calibration activities

Subgroup: Repairs and Alterations

Task Group: NR Task Group

Meeting Action:
Paul Edwards gave a report on the attached item. This action makes alignment of categories 1, 2 &3 in NBIC Part 3. After his presentation a motion was made and unanimously approved to send the Sub Committee Repairs and Alterations for consideration.

Item Number: NB16-0810	NBIC Location: Part 3, 3.4.3 e)	Attachment Page 19

General Description: Add additional example of alteration relating to burners

Subgroup: Repairs and Alterations

Task Group: M. Webb(PM), G. Scribner

Meeting Action:
Mike Webb Presented the attached item to be added to NBIC Part 3. After his presentation a motion was made and unanimously approved to send the Sub Committee Repairs and Alterations for consideration.

Item Number: NB16-1502	NBIC Location: Part 3	No Attachment

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

Subgroup: SG Repairs and Alterations

Task Group: International Repair Supplement Task Group

Meeting Action:
A progress report was given.

Item Number: NB16-2602	NBIC Location: Part 3, Section 9	No Attachment

General Description: Add definitions for practicable and impracticable to glossary

Subgroup: Repairs and Alterations

Task Group: R. Underwood (PM), R. Miletti, J. Sekely

Meeting Action: A progress report was given by Monte Bost.

Item Number: NB17-0301	NBIC Location: Part 3	No Attachment

General Description: Is plugging a leak with a screw an acceptable method of repair?

Subgroup: Repairs and Alterations

Task Group: George Galanes PM

Meeting Action:
George Galanes presented this attached response to the item. After his presentation a motion was made and unanimously approved to close this item with no further action and send a letter to the submitter as per the response in the attachment.

Item Number: NB17-0701	NBIC Location: Part 3	No Attachment

General Description: Add references to NQA Part 2, 2.1.4 and 2.7 to NR program

Subgroup: Repairs and Alterations

Task Group: NR Task Group

Meeting Action: Paul Edwards gave a progress report

Item Number: 17-114	NBIC Location: Part 3, 2.5.3.6	No Attachment

General Description: Controlled fill technique for Grade 91 steel

Subgroup: Repairs and Alterations

Task Group: G. Galanes (PM)

Meeting Action: George Galanes indicated back in the July 2017 meeting National Board Staff sent a letter to the submitter that his request is located in Supplement-8 and if that would satisfy the action item. Since no response has been received after several attempts a motion was made and unanimously approved to close this item with no further action.

Item Number: 17-134	NBIC Location: Part 3, Section 5	No Attachment

General Description: Proposed Revision for registration of Form R-1 with the National Board containing ASME pressure part data reports attached.

Subgroup: Repairs and Alterations

Task Group: P. Shanks (PM), Rob Troutt, Joel Amato, Kathy Moore, Paul Edwards

Meeting Action: P. Shanks gave a progress report.

Item Number: 17-139	NBIC Location: Part 3, 2.2.3	No Attachment

General Description: Performance qualification by independent qualifier

Subgroup: Repairs and Alterations

Task Group: Jim Pillow PM

Meeting Action:
Jim Pillow gave a progress report. He indicated ASME Section IX is acting on a similar item and he wants to see how they will address this before moving forward this this action item.

Item Number: 17-152	NBIC Location: Part 3, 2.5.3	No Attachment

General Description: Revise WM2 and WM6 to allow fill thickness weld repairs to HRSG tube to header welds in steam service

Subgroup: Repairs and Alterations

Task Group: G. Galanes (PM)

Meeting Action:
During the July 2017 meeting the NBIC Main Committee elected to split this into two action items 17-152 and 17-170 and letter ballot them, The results were that both items passed and are address later in these minutes. A motion was made and unanimously approved to close this item.

Item Number: 17-161	NBIC Location: Part 3, 3.3.2	No Attachment

General Description: Routine repair of corrugating rolls

Subgroup: SG Repairs and Alterations

Task Group: George Galanes PM

Meeting Action:
George Galanes presented the item**.** It was recommended to close this item, and send correspondence that states the NBIC considered the request and at this time believes weld repair of corrugated roles should not be considered as routine repairs. A motion was made and unanimously approved to close this item with no further action.

Item Number: 17-168	NBIC Location: Part 3, 1.6	Attachment Pages 20-41

General Description: General revision of NR quality program requirements

Subgroup: SG Repairs and Alterations

Task Group: NR Task Group

Meeting Action:
Paul Edwards presented the attached item. A motion was made and unanimously approved to send this attached item out for a letter ballot to both the Sub Group and & Sub Committee Repairs and Alterations.

Item Number: 17-170	NBIC Location: Part 3, 2.5.3.6	No Attachment

General Description: Revise WM6 to allow fill thickness weld repairs to HRSG tube to header welds in steam service

Subgroup: SG Repairs and Alterations

Task Group: George Galanes PM

Meeting Action: This item was balloted through the NBIC Main Committee and it was passed. A motion was made and unanimously approved to close this item since it passed the NBIC Main Committee ballot.

Item Number: 17-179	NBIC Location: Part 3, Section 5	No Attachment

General Description: R Form Guides

Subgroup: SG Repairs and Alterations

Task Group: Tom White PM , Bill Vallance

Meeting Action: Bill Vallance gave a progress report.

Item Number: 17-180	NBIC Location: Part 3, 2.5.3.6	Attachment Page 42

General Description: Remove "impracticable" from WM6

Subgroup: SG Repairs and Alterations

Task Group: John A. Siefert PM

Meeting Action: J. Siefert presented the attached item. After his presentation a motion was made and unanimously approved to send the Sub Committee Repairs and Alterations for consideration.

Item Number: 18-12	NBIC Location: Part 3,	Attachment Pages 43-60
General Description: WM-6 allow weld metal build-up		
Subgroup: SG Repairs and Alterations **Task Group:** John Seifert PM, George Galanes **Meeting Action:** This new Item was opened this meeting and no action was taken. John Siefert conducted an informational presentation for this action item and 18-13. The presentation is attached for information.		

Item Number: 18-13	NBIC Location: Part 3,	Attachment Pages 43-60
General Description: WM #7 for dissimilar weld metal Gr-91		
Subgroup: SG Repairs and Alterations **Task Group:** John Siefert PM, George Galanes **Meeting Action:** This New Item was opened this meeting and no action was taken. John Siefert conducted an informational presentation for this action item and 18-12. The presentation is attached for information.		

Item Number: 18-14	NBIC Location: Part 3, 1.5	No Attachment
General Description: Review the Authority & Responsibility Requirements-R Manual		
Subgroup: SG Repairs and Alterations **Task Group:** Paul Edwards PM **Meeting Action:** This New Item was opened this meeting and no action was taken at the Sub Group Repairs and Alterations.		

9. Future Meetings

- July 16th-19th, 2018 – Columbus, Ohio
- January 14th-17th – Location TBD at the NBIC Committee

10. Adjournment

Chairman Boseo adjourned the meeting at 3:40 PM

Respectfully submitted,

William Vallance, Secretary
SubGroup Repairs and Alterations.

January 2018 SG R&A Attachments

SG Repairs and Alterations Attendance Sheet - 1/9/18

Name	Company	Phone Number	Email	Signature	Attend Reception?	Bringing Guest?
Brian Boseo	Graycor Industrial Constructors	(630) 684-7300	brian_boseo@graycor.com		Y	
Benjamin Schaefer	AEP	(614) 267-4072	bschaefer@aep.com		X	N
William Vallance	National Board	(614) 888-8320	bvallance@nationalboard.org		Y	NO
Joel Amato	State of Minnesota	(651) 284-5137	joel.amato@state.mn.us			
Nathan Carter	Hartford Steam Boiler	(860) 722-5750	nathan_carter@hsbct.com			
Randal Cauthon	Alstom Power	(860) 285-3481	randal.t.cauthon@power.alstom.com			
Paul Edwards	~~CBI~~ STONE & WEBSTER	281-292-3826 ~~(617) 589-5677~~	~~paul.edwards@cbi.com~~ EDWARDSPH@ASME.ORG	Paul D. Edwards	Y	Y
George Galanes	Diamond Technical Services	(815) 634-2727	ggalanes@diamondtechnicalservices.com		Y	
Craig Hopkins	Seattle Boiler Works	(206) 762-0737	chopkins@seattleboiler.com		Y	
Frank Johnson	PBF Energy	(419) 698-6614	frank.johnson@pbfenergy.com			
Wayne Jones	Arise	(251) 895-8826	wayne.jones@ariseinc.com		Y	
David Martinez	Factory Mutual	(781) 255-4784	david.martinez@fmglobal.com	David Martinez	Y	Y
Larry McManamon	Boilermakers National Apprenticeship Program	(708) 636-6656	lmac@glabap.com			
Ray Miletti	Babcock & Wilcox	(330) 860-2589	rlmiletti@babcock.com		N	—
Kathy Moore	Joe Moore & Company	(919) 832-1665	kathymoore@joemoorecompany.com		Y	NO
Brian Morelock	Eastman Chemical Company	(423) 229-1205	morelock@eastman.com		Y	NO
James Pillow	Common Arc	(860) 688-2531	jpillow@commonarc.com		Y	No
James Sekely	Consultant	(412) 389-5567	jsekely@comcast.net		Y	No
Walter Sperko	Sperko Engineering Services	(336) 674-0600	sperko@asme.org		Y	No
Marty Toth	Boiler Supply Company	(615) 504-9064	mtoth@boisco.com			
Rob Troutt	State of Texas	(512) 638-2727	rob.troutt@tdlr.texas.gov			

Name	Company	Phone Number	Email	Signature	Attend Reception?	Bringing Guest?
Rick Valdez	ARB	(661) 331-6024	rvaldez@arbinc.com		Y	
Jamie Walker	Hayes Mechanical	(773) 292-2707	jwalker@hayesmechanical.com		Y	1
Michael Webb	Public Service Company of Colorado	(303) 885-9393	mike.webb@xcelenergy.com		Y	
Tom White	NRG Energy	(281) 782-4972	thomas.white@nrg.com		Y	0
MONTE BOST	HSB	937-620 3676	Monte_bost@ehsb.com		Y	1
Paul Shanks	oneCIS	832 716 4249	Paul.Shanks@oneCIS.com		N	
MICHAEL QUISENBERRY	ALLEN'S TRI-STATE MECHANICAL	806-316-7174	Michael@allentri.com		Y	1
BRYAN TOTH	STONE AND WEBSTER	828-305-1213	TOTHBM@WESTINGHOUSE.COM		N	
ERIC CUTLIP	Babcock & Wilcox	216 337 0037	evcutlip@babcock.com		N	
DAWN HOLT	Babcock & Wilcox	330-860-1080	drholt@babcock.com		Y	
TIM LEBEAU	SOUTHERN COMPANY	205-992-5396	tclebeau@SOUTHERNCO.COM		N	
Rick Musser	Strasburg Rail Road	717 682-7589	rick@strasburgrailroad.com		—	—
Linn Moedinger	Strasburg RR	717 575-4478	linnwm@supernet.com		Y	1
Gary Teel	State of CA	714 767-1407	gteel@dir.ca.gov		Y	1

PROPOSED INTERPRETATION

Inquiry No.	17-173				
Source	Paul Welch - Arise, Inc.				
Subject	Routine Repair, Part 3, Section 3, 3.3.2(e)(5) and Figure 3.3.4.3-b Adding Handhole Ring on Pressure Side of Pressure Retaining Item				
Edition	2017				
Question	Can this be considered a Routine Repair? The scope of repair will be as described in 2017 NBIC Figure 3.3.4.3-b. Adding an elliptical handhole ring on the pressure side. The shell and ring material is SA-285 Gr. C, will be installed after removal of wasted area around handhole and deposit about 3/8" fillet weld.				
Reply	TBD				
Committee's Question	If acceptable to the Jurisdiction and considered appropriate by the Inspector, may adding a handhole ring as described in Part 3, Section 3, Figure 3.3.4.3-b and meeting the requirements of Part 3, Section 3, 3.3.2(e)(5) be considered a routine repair?				
Committee's Reply	No.				
Rationale					
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					

17-175
PROPOSED INTERPRETATION

Inquiry No.	**17-175**
Source	**Murugappan (?)**
Subject	Part 3, Section 3, Paragraph 3.3.3.d, Weld Metal Build-up, and Section 2, paragraph 2.5.3.1, Welding Method 1
Edition	2017
Question	**1)** A Pressure vessel constructed of P Number 1 Group 1&2 materials to ASME Section VIII Division 1 was Post weld heat treated as nominal thickness was 60mm. Impact testing is not required. When this pressure vessel is repaired for 40mm surface weld metal build-up during service under NBIC and post weld heat treated, can it be considered ~~as~~ a Repair and reported ~~in~~ on Form R-1? **2)** When this pressure vessel is repaired for 20mm surface weld metal build-up during service under NBIC and not post weld heat treated as thickness of weld repair is less than 39mm, can it be considered ~~as~~ a Repair and reported ~~in~~ on Form R-1? **3)** When this pressure vessel is repaired for 40mm surface weld metal build-up during service under NBIC using Paragraph 2.5.3.1 " Welding method-1", can it still be considered ~~as~~ a Repair and reported ~~in~~ on Form R-1? **4)** A Pressure vessel constructed of P Number 1 Group 1&2 materials to ASME Section VIII Division 1 was Post weld heat treated due to client/service requirements(Not a Code requirement). Impact testing is not required. When this pressure vessel is repaired for 20mm surface weld metal build-up during service under NBIC using Paragraph 2.5.3.1 " Welding method-1", can it still be considered ~~as~~ a Repair and reported ~~in~~ on Form R-1? **5)** If the answer to the above question-4 is "No", Shall design Section be signed by Repair organization for alteration?
Reply	1) Yes 2) Yes 3) Yes. Requirements of Paragraph 2.5.3 b) is to be followed. 4) No. It is an alteration and to be reported in Form R-2. 5) No. Design part need not be certified by Repair Organization. Column 7a of Form R-2 can be marked as N/A. A note on Form R-2 shall be made to indicate that it was considered as alteration as original vessel was Post weld heat treated whereas this repair was not post weld heat treated. Attachment Page 5 Attachment
Committee's Questions and Replies	Background A: A pressure vessel **that is in-service** is constructed of P-No.1 Group 1&2 materials in accordance with ASME Section VIII Div. 1 rules. Toughness testing is not required. The nominal thickness of the welded joints is 60 mm. The postweld heat treatment (PWHT) of the pressure vessel was in accordance with the Section VIII Div. 1 requirements. QA1: Is the application of a 40mm thick weld metal surface build-up on the pressure vessel with PWHT in accordance with ASME Section VIII Div. 1 rules considered a repair? RA1: Yes. QA2: Is the application of a 20mm thick weld metal surface build-up on the pressure vessel without

	PWHT as allowed by ASME Section VIII Div. 1 rules considered a repair? RA2: Yes QA3: Is the application of a 40mm **thick** weld metal surface build-up on the pressure vessel without PWHT as allowed by ASME Section VIII Div. 1 rules considered a repair? RA3: Yes, **provided all applicable requirements in 2.5.3 and 2.5.3.1 are met.** Background B: A pressure vessel is constructed of P-No. 1 Group 1 & 2 materials in accordance with ASME Section VIII Div. 1 rules. Toughness testing is not required. Postweld heat treatment (PWHT) is not required by Section VIII Div. 1 rules, but the pressure vessel is PWHT to meet contractual requirements. QB1: Is the application of a 20mm thick weld metal surface build-up on the pressure vessel in accordance with the NBIC Part 3, Section 2, paragraph 2.5.3.1, Welding Method 1, considered a repair? RB1. Yes.

Rationale	The repairs described in QA1 and 2 meet the requirements of the original Code of construction. The repair described in QA3 is an acceptable alternative to the PWHT requirements of the original Code of construction. The use of Welding Method 1 described in QB1 is an acceptable alternative to PWHT of the pressure vessel weld and is considered a repair.				
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					

PROPOSED INTERPRETATION

Inquiry No.	**17-176**				
Source	**Not known**				
Subject	Part 3, Section 3, Repairs to a Pressure Retaining Part				
Edition	2017				
Question	Background: There is a boiler shell which requires repair to be performed. Owner wants repair to be performed under NBIC. However, the boiler shell is certified as S- PART and complete boiler is not certified. In this case, is it permitted to perform the repair under NBIC if all requirement of NBIC are met. Question: Is it permitted to perform repair / alteration activities under NBIC on an item which is certified as PART and not complete vessel or Boiler?				
Reply	TBD				
Committee's Question	Is it permitted to perform a repair in accordance with the NBIC of a Part that has not yet been installed in a pressure vessel or boiler that has not been completed in accordance with the code of construction?				
Committee's Reply	No. The NBIC rules for repairs do not apply to items not yet completed in accordance with the code of construction.				
Rationale	**INTERPRETATION 95-05** **Subject:** Purpose and Scope of the NBIC 1992 Edition with the 1993 Addendum **Question:** At what point following the completion of a new power boiler, heating boiler or pressure vessel may the NBIC be used? **Reply:** When all requirements of the construction code have been met.				
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					

PROPOSED INTERPRETATION

Inquiry No.	**17-177 Use of Welding Method 6 for Tube-To-Header Welds**				
Source	**Not known**				
Subject	Part 3, Section 2, 2.5.3.6, Welding Method 6				
Edition	2017				
Question	Question: Does tube to header weld as shown in ASME B&PVC Sec. I, 2015 ed. Figure PW16.1(a) for P15E materials meet the requirements of 2.5.3.6 for Welding Method 6 for no post weld heat treatment?				
Reply	TBD				
Committee's Question	When it is impracticable to perform postweld heat treatment, may a tube-to-header weld be made using Welding Method 6 in accordance with Part3, Section 2, 2.5.3.6?				
Committee's Reply	No.				
Rationale	As explained in Part 3, Section 2, 2.5.3.6, use of Welding Method 6 is limited, among other things, to butt welds in tubing. The method has not been approved for use on tube-to-header welds.				
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					

17-178 Allen 12-4-17

Purpose: Code Interpretation of NBIC Part 3 (2017 Edition)

Question 1:
An R-Certificate holder omits post weld heat treatment (PWHT) of a vessel at the request of a client, where PWHT was performed in the original construction for service related reasons only. Is the omission of service related PWHT of the vessel considered an alteration and subject to documentation using a Form R2?

Committee Answer: Yes

Rational: Reference Interpretation 95-21

INTERPRETATION 95-21

Subject: Appendix 4, Definition of Alteration

1995 Edition

Question: May an ASME Section VIII, Division 1 pressure vessel that has postweld heat treatment reported on an ASME Manufacturer's Data Report, be repaired by welding without subsequent postweld heat treatment or postweld heat treatment alternatives?

Reply: No. This is an alteration.

NBIC Interpretation Request #18-11

Subject: NBIC Part 3, 3.3.5.2.a and 3.4.5.1.a, 2017 Edition - Repair/Alteration Plans for ASME VIII, Division 2, Class 1 Pressure Vessels

Question: Does the NBIC require a Repair / Alteration Plan for an ASME Section VIII, Division 2, Class 1 vessel to be certified by an engineer when the Manufacturer's Design Report was not required to be certified under the original code of construction?

Proposed Reply: No

Discussion: The 2017 Edition of ASME VIII Division 2 introduced provisions for construction of Class 1 pressure vessels. For Class 1 vessels and parts, when design rules are not provided in ASME VIII-2, Part 4, the Manufacturer is required to either perform a stress analysis in accordance with ASME VIII-2, Part 5, or with acceptance by the AI, use a recognized and accepted design-by-rule method that meets the applicable design allowable stress criteria of ASME VIII-2, Section 4.1.6. If the design cannot be performed using Part 5 or a design-by-rule method, a design method consistent with the overall design philosophy of Class 1 and acceptable to the AI is required to be used.

ASME VIII-2, Section 2.3.3.a, further establishes that a Manufacturer's Design Report for Class 1 vessels must be certified by an engineer (i.e. RPE or equivalent) when either a fatigue analysis is performed or when Part 5 is used to determine the thickness of pressure parts (i.e. when design rules are not provided in Part 4). By exclusion, requirements for certification of a Manufacturer's Design Report have been relaxed for Class 1 design conditions not addressed by Section 2.3.3.a.

By the NBIC reference to "certified by an engineer meeting the criteria of ASME Section VIII Division 2" in the subject paragraphs, a proposed Reply of "No" is offered for those ASME VIII-2, Class 1, conditions where certification of the Manufacturer's Design Report is not required under the original code of construction.

NB 16-0303

CRAIG HOPKINS VOTED NO PRIMARILY BECAUSE I RECOMMEND ON THE LAST LINE OF a), THE WORD "REQUIRED" BE REPLACED WITH "AVAILABLE".

ALSO, I AM CONCERNED THAT THESE PATCHES MAY BE INSTALLED WITHOUT APPROPRIATE EXPERTISE.

NB16-0303
Kathy Moore
to:
bvallance@nationalboard.org
01/09/2018 03:02 PM
Hide Details
From: Kathy Moore <KathyMoore@joemoorecompany.com>
To: "bvallance@nationalboard.org" <bvallance@nationalboard.org>,

I voted no due to the following reasons:

The current use of this repair is under Jurisdictional control and approved on a case by case basis
We are referencing a Code that all Jurisdictions do not have access to.

The encapsulation repair is already accepted in the NBIC.

I still have not heard what the driving force is for this repair.

I do not think this repair returns the vessel to an operationally safe condition.

NB 16-0303
Amato, Joel (DLI)
to:
BVallance@nationalboard.org
01/09/2018 03:08 PM
Cc:
Rob Troutt
Hide Details
From: "Amato, Joel (DLI)" <joel.amato@state.mn.us>
To: "BVallance@nationalboard.org" <BVallance@nationalboard.org>,

Cc: Rob Troutt <Rob.Troutt@tdlr.texas.gov>

Bill,

I do not approve of a fillet weld patch as being a repair. NB16-0303

The NBIC has acceptable permanent methods on how to repair boilers and pressure vessels. A lap patch is not a permanent repair. A lap patch is a temporary repair as described in API 510. The NBIC does not address temporary repairs. I do not want to lower the high standard of the NBIC to allow for lap patch repairs.

The NBIC requires that a boiler or pressure vessel be repaired to the original code of construction. ASME does not have lap patch construction.

The NBIC does reference PCC 2 and API 510 for repairs with jurisdictional approval. If a company wants to perform a temporary lap patch repair then can request permission from the jurisdiction using one of those codes.

Please contact me if you have any questions.

Joel T. Amato
Chief Boiler Inspector
Cell 651-303-2758
Office 651-284-5137

NB-16-0303

JONES

THIS CANNOT BE CLASSIFIED AS A "REPAIR" AS IT IS AN ALTERATION ~~AS~~ AS defined by THE TERM EXISTING MATERIAL

NB - 16-0303

This is a temp. Repair; In discussion 3 of 4 Jurisdiction would not approve the remaining requires removal at next outage,

Rob Tenth

P. EDWARDS - NEGATIVE ON NB 16-0303

I support Bob Wielgoszewski concerns with this item. I also believe that if adopted this needs to be an alteration!

Paul D. Edwards
SG-R/A 1/9/18

Nathan Carter/Monte Bost
NB-16-0303

N.O. VOTE

1) This is ~~not~~ restoring a vessel to the original state, it is altering the vessel.

2) Temporary repairs are not addressed or defined in the NBIC

1.6.6.2 – Quality Program Elements (Category 1)

l) Control of Measuring and Test Equipment

~~The provisions identified in ASME NQA-1, Part 1, Requirement 12 shall apply.~~

~~1) The "NR" Certificate Holder may perform periodic checks on equipment to determine calibration is maintained. When periodic checks are used the method and frequency shall be included in the "NR" Certificate Holder's Quality Assurance Program and if discrepancies are found, shall be resolved to the prior periodic check.~~

~~2) The "NR" Certificate Holder may accept accreditation for calibration activities by National Voluntary Laboratory Accreditation Program (NVLAP), American Association for Laboratory Accreditation (A2LA) or other accrediting body recognized by NVLAP through the International Laboratory Accreditation Cooperation (ILAC) mutual recognition arrangement (MRA) provided the following requirements are met:~~

~~a. Accreditation is to ANSI/ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration Laboratories";~~

~~b. Scope of the accreditation for the calibration laboratory covers needed measurement parameters, ranges and uncertainties;~~

~~c. "NR" Certificate Holder shall specify that calibration reports shall include, laboratory equipment/ standards used and as found and as left data;~~

~~d. The "NR" Certificate Holder shall verify conformance to the requirements of this process; and e. Utilization of this process shall be described and documented in the "NR" Certificate Holders QAM.~~

1.6.7.2 – Quality Program Elements (Category 2)

l) Control of Measuring and Tests Elements

~~Control of Measuring and Test Equipment Measures shall be established and documented to ensure that tools, gages, instruments, and other measuring and testing equipment and devices used in activities affecting quality are of the proper range, type, and accuracy to verify conformance to established requirements. A procedure shall be in effect to ensure that they are calibrated and properly adjusted at specified periods or use intervals to maintain accuracy within specified limits. Calibration shall be traceable to known national standards, where these standards exist, or with the device manufacturer's recommendation.~~

1.6.8.2 – Quality Program Elements (Category 3)

l) Control of Measuring and Test Equipment

~~Control of Measuring and Test Equipment Procedures, methods and frequency of calibration shall be described for all types of measuring and test equipment used to verify quality. Any discrepancies shall be identified and resolved.~~

1.6.6.2 l), 1.6.7.2 l), 1.6.8.2 l)

Add to Category 1, 2, and 3 the following:

The NR Certificate Holder may utilize calibration and test activities performed by subcontractors when surveys and audits are performed. As an alternative to performing a survey and audit for procuring Laboratory Calibration and Test Services, the NR Certificate Holder as documented in their Quality Program may accept accreditation of an International Calibration and Test Laboratory Services by the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) provided this alternative method is described in the NR Certificate Holder' Quality Program and the following requirements are met:

a) The NR Certificate Holder shall review and document verification that the supplier of calibration or test services was accredited by an accredited body recognized by the ILAC MRA encompassing ISO/IEC-17025:2005, "General Requirements for the Competence of Testing and Calibration Laboratories";
b) For procurement of calibration services, the published scope of accreditation for the calibration laboratory covers the needed measurement parameters, ranges and uncertainties.
c) For procurement of testing services, the published scope of accreditation for the test laboratory covers the needed testing services including test methodology and tolerances/uncertainty.
d) The NR Certificate Holder's purchase documents shall include:
    1) Service provided shall be in accordance with their accredited ISO/IEC-17025:2005 program and scope of accreditation;
    2) As-found calibration data shall be reported in the certificate of calibration when items are found to be out-of-calibration;
    3) Standards used to perform calibration shall be identified in the certificate of calibration;
    4) Notification of any condition that adversely impacts the laboratories ability to maintain the scope of accreditation;
    5) Any additional technical and/or quality requirements, as necessary, which may include; tolerances, accuracies, ranges, and standards.
    6) Service suppliers shall not subcontract services to any other supplier.
e) The NR Certificate Holder shall upon receipt inspection, validate that the laboratory documentation certifies that:
    1) Services provided by the laboratory has been performed in accordance with their ISO/IEC-17025:2005 program and performed within their scope; and
    2) Purchase order requirements have been met.

NB16-08-10, Comments by Webb, 6-22-17: (passed SG 1-9-18)

I absolutely endorse Mr. Edwards original thought of merely revising the example of an Alteration, Part 3, 3.4.4 e) to include the details described in accepted Committee action NB16-0810 as example-"j".

While I am not opposed to Mr. Scribner's rendering, I am more aligned to the Alternative-2 offering below as it reads closer to a revision to example "e)" as originally proposed by Mr. Edwards without displacing action NB16-0810:

e) In a boiler, Heat Recovery Steam Generator (HRSG), or Pressure Retaining Item (PRI), an increase in the steaming capacity by means of increasing heating surface, total heat input, firing rate, adjustment, or other modification to the primary or auxiliary heat source, resulting in the steaming capacity exceeding the original Manufacturer's Minimum Required Relieving Capacity (MRRC) as described on the nameplate and or Manufacturer's Data Report.

NB17-168

2017 NBIC Part 3, 1.6

1.6 "NR" PROGRAM REQUIREMENTS

1.6.1 SCOPE

a) This section provides requirements that must be met for an organization to obtain a National Board *Certificate of Authorization* to use the "NR" Symbol Stamp for repair/replacement activities to nuclear items constructed in accordance with the requirements of the ASME Code or other internationally recognized codes or standards for construction or inservice inspection of nuclear facilities.

b) For administrative requirements to obtain or renew a National Board "NR" *Certificate of Authorization* and the "NR" Symbol Stamp, refer to National Board Procedure NB-417, Accreditation of "NR" Repair Organizations.

1.6.2 GENERAL

a) An organization applying for an "NR" *Certificate of Authorization* shall have a written Quality Assurance Program (QAP) that details the specific requirements to be met based on the intended category of activities selected by that organization as described below and shown in Table 1.6.2. Controls used, including electronic capabilities, in the Quality Assurance Program shall be documented in a Quality Assurance Manual (QAM). Controls required to be included within the QAM shall include who, what, when, where, why and how with an understanding that the how can be a reference to an implementation procedure or instruction. Quality activities to be described in the Quality Assurance Program are identified in Section 1.6.5 of this part. Applicants shall address all requirements in their Quality Assurance Program based on the category of activity and scope of work to be performed (organization's capabilities) to which certification is requested.

1) Category 1

Any ASME Code certified item or system requiring repair/replacement activities irrespective of physical location and installation status prior to fuel loading.

2) Category 2

After fuel loading, any item or system under the scope of ASME Section XI requiring repair/replacement activities irrespective of physical location. Based on regulatory or jurisdictional acceptance, Category 2 may be used prior to fuel loading.

3) Category 3

Items constructed to codes or standards other than ASME, requiring repair/replacement activities irrespective of physical location, installation status and fuel loading.

b) Repair organizations performing repairs of pressure relief devices in nuclear service shall meet the additional requirements of NBIC Part 4, Section 4 and NBIC Part 4, Supplement 6.

TABLE 1.6.2

"NR" QUALITY ASSURANCE PROGRAM (QAP) REQUIREMENTS

Category of Activity	Owner	Organizations other than Owner
Category 1	10 CFR Part 50 Appendix B[1,2] and ASME Section III NCA-4000	10 CFR Part 50 Appendix B[1,2] and ASME Section III NCA-4000
Category 2	10 CFR Part 50, Appendix B[1] or NQA-1, Part 1 and ASME Section XI, IWA-4142	10 CFR Part 50, Appendix B[1], supplemented as needed with Owner's QA program; or ASME NQA-1, Part 1; or ASME Section III, -NCA-4000
Category 3	ASME NQA-1, or Specify the Standard to which certification is desired	ASME NQA-1, or Specify the Standard to which certification is desired
Note 1: Code of Federal Regulations (CFR) – rules and regulations published by the executive departments and agencies of the federal government of the United States.		
Note 2: 10 CFR 50 Appendix B – Title 10 of the Code of Federal Regulations Part 50 Appendix B describes the quality assurance criteria for nuclear plants and fuel reprocessing plants.		

1.6.2.1 DEFINITIONS

The NBIC terms and definitions shall be supplemented, as applicable, by the terms and definitions of ASME Section III, Section XI, NQA-1, or other standards specified by the Regulatory Authority.

The following terms are as defined in the NBIC Glossary of Terms Section 9:

a) Authorized Inspection Agency

b) Authorized Nuclear Inspection Agency

c) Jurisdiction

d) "NR" Certificate Holder

TABLE 1.6.2.1

ACRONYMS

ASME	American Society of Mechanical Engineers
Applicant	An Organization applying for "NR" *Certificate of Authorization* (new or renewal)
CFR	Code of Federal Regulations
Code	ASME Code of Construction, Section III, Division I, (NCA, NB, NC,

	ND, NE, NF, NG, and NH) or ASME Section XI Rules for Inservice Inspection of Nuclear Power Plant Components as applicable.
Jurisdiction	Enforcement Authority
NB	National Board of Boiler and Pressure Vessel Inspectors
NBIC	National Board Inspection Code
NB-263, RCI-1	Rules for Commissioned Inspectors
NCA	ASME Section III, Subsection NCA, General Requirements for Division 1 and Division 2
NQA–1*	ASME Quality Assurance Requirements for Nuclear Facility Applications
NR	Nuclear Repair
"NR" CH	"NR" Certificate Holder
QA	Quality Assurance
QAI–1	ASME Qualifications for Authorized Inspection
QAM	Quality Assurance Manual
QAP	Quality Assurance Program
QC	Quality Control
WA	ASME Section III, Division 3, Subsection WA, General Requirements

Note:

* Latest Edition endorsed by the Regulatory Authority

1.6.3 PREREQUISITES FOR ISSUING A NATIONAL BOARD "NR" *CERTIFICATE OF AUTHORIZATION*

Before an organization can obtain a National Board "NR" *Certificate of Authorization*, the organization shall:

a) Have and maintain an inspection agreement with an Authorized Nuclear Inspection Agency accepted in accordance with NB-360, Criteria for Acceptance of Authorized Inspection Agencies for New Construction or accredited in accordance with NB-369, Qualifications and Duties for Authorized Inspection Agencies (AIAs) Performing Inservice Inspection Activities and Qualification of Inspectors of Boilers and Pressure Vessels.
b) Have a written Quality Assurance Program that complies with the requirements of this section and address all controls for the intended category and scope of activities.
c) Have a current edition of the NBIC.
d) Have available ASME Section XI, the code of construction and referenced code sections and standards appropriate for the scope of work to be performed. ASME Section XI and codes of construction (Editions/Addenda) shall meet the requirements of the Regulatory Authority and the owner.

1.6.4 OBTAINING OR RENEWING A NATIONAL BOARD "NR" *CERTIFICATE OF AUTHORIZATION*

a) Before an "NR" *Certificate of Authorization* will be issued or renewed, the applicant must have the Quality Assurance Program and the implementation of the program reviewed and found acceptable by representatives of the National Board, the Jurisdiction, and the Authorized Nuclear Inspection Agency. The Jurisdiction will be the National Board Member Jurisdiction in which the applicant is located or the location where the Quality Assurance Program is demonstrated/implemented. At the request of the Jurisdiction, or where there is no National Board Member Jurisdiction, the National Board representative shall act on behalf of the Jurisdiction. The implementation of the Quality Assurance Program shall be satisfactorily demonstrated by the organization. Demonstration of implementation shall meet the most stringent (classification) code requirements for the scope and category of work to be specified on the *Certificate of Authorization* or as requested by the applicant.

b) If the applicant is an ASME "N" type *Certificate of Authorization* holder, has satisfactorily demonstrated within the last twelve (12) months the implementation of their Quality Assurance Program and can provide documentation that the organization is capable of implementing its Quality Assurance Program as being in compliance with this section, a further hardware verification implementation may not be necessary.

c) The Regulatory Authority or Jurisdiction, upon request to the National Board, may attend the survey process for an "NR" *Certificate of Authorization* to be issued or renewed.

d) The "NR" *Certificate of Authorization* holder shall be subject to an audit annually by the Authorized Nuclear Inspection Agency to ensure compliance with the Quality Assurance Program.

1.6.5 QUALITY ASSURANCE PROGRAM

a) An applicant or a holder of a National Board "NR" *Certificate of Authorization* ("NR" Certificate Holder) shall have and maintain a written Quality Assurance Program. The Quality Assurance Program shall satisfactorily meet the requirements of this section, and Jurisdictional and Regulatory requirements as applicable. The Quality Assurance Program may be brief or voluminous, depending on the circumstances. It shall be treated confidentially by the National Board and available for review by the Survey Team.

b) Each applicant or "NR" Certificate Holder is responsible for establishing and executing a Quality Assurance Program. The applicant or "NR" Certificate Holder may subcontract activities needed to implement the Quality Assurance Program, as limited by ASME Section III and XI, but responsibility for adherence to the Quality Assurance Program remains with the Applicant or "NR" Certificate Holder.

c) These rules set forth the requirements for planning, managing, and implementing the organization's Quality Assurance Program to control and ensure quality is performed and maintained during repair/replacement activities of components, items, parts, and systems for nuclear facilities. These rules are to be the basis for evaluating such programs prior to the issuance or renewal of the National Board "NR" *Certificate of Authorization*. Rules identified in subsections 1.6.6, 1.6.7 and 1.6.8 of this section detail the Quality Assurance Program requirements for each category of activity. These rules are established to meet and follow the requirements specified in NBIC Part 3, Table 1.6.2-1 of this section.

1.6.6 QUALITY ASSURANCE PROGRAM REQUIREMENTS FOR CATEGORY 1 ACTIVITIES

1.6.6.1 SCOPE

Owners or organizations other than owners shall have a written Quality Assurance Program meeting the criteria specified in Table 1.6.2 of this section for Category 1 activities. The following quality elements shall be specified and described within the QAM.

1.6.6.2 QUALITY PROGRAM ELEMENTS

a) Organization

The provisions identified in ASME NQA-1, Part 1, Requirement 1, shall apply in its entirety. The Authority and responsibility for individuals involved in activities affecting quality shall be clearly established and documented throughout the Quality Assurance Program and identified on a functional organizational chart contained within the QA Manual.

b) Statement of Policy and Authority shall:

1) identify the titles of individuals who have the authority and responsibility charged with ensuring the quality program is implemented as described,
2) confirm their freedom in the organization to identify quality problems and to initiate, recommend and provide solutions,
3) include a statement that if there is a disagreement in the implementation of the quality assurance program, the matter is to be referred for resolution to a higher authority and shall be resolved in a manner that will not conflict with code, jurisdiction/regulatory authority or quality program requirements
4) include a statement of the full support of management, and

5) be dated and signed by a senior management official within the organization.

c) Quality Assurance Program (QAP)

The provisions identified in ASME NQA-1, Part 1, Requirement 2, shall apply, except paragraph 301. Additionally, the following criteria shall be used when developing and maintaining the QAP.

1) The Quality Assurance Program as used in this section shall include a written Quality Assurance Manual, with supporting procedures and instructions used to meet all the requirements of this Section.
2) Qualification of non-destructive examination personnel shall be as required by the code of construction or as specified in the owner's Quality Assurance Program.
3) The "NR" Certificate Holder shall be responsible for advising the Authorized Nuclear Inspection Agency of proposed changes to the Quality Assurance Manual to obtain acceptance of the Authorized Nuclear Inspector Supervisor before putting such changes into effect. The "NR" Certificate Holder shall make a current controlled copy of the Quality Assurance Manual available to the Authorized Nuclear Inspector and Authorized Nuclear Inspector Supervisor. The Certificate Holder shall be responsible for notifying the Authorized Nuclear Inspector of QAM changes, including evidence of acceptance by the Authorized Nuclear Inspector Supervisor.
4) The Quality Assurance Manual need not be in the same format or sequential arrangement as the requirements in these rules as long as all applicable requirements have been covered.
5) The "NR" Certificate Holder shall implement and maintain a program for qualification, indoctrination, training and maintaining proficiency of personnel involved with quality functions, including personnel of subcontracted services.
6) The "NR" Certificate Holder shall address in their QAM the requirements for interfacing with the owner specified in 1.6.9 of this section.
~~6)~~7) Specified controls including responsibilities for personnel shall be described in the quality assurance program.

d) Design Control

The provisions identified in ASME NQA-1, Part 1, Requirement 3, shall apply except Paragraph 601. The following additional requirements shall be considered when applicable.

1) The "NR" Certificate Holder shall establish measures to ensure applicable requirements of the

owner's design specifications, owner's requirements, and code of construction requirements are correctly translated into drawings, specifications, procedures and instructions.

2) All design documents, including revisions, shall be verified by the "NR" Certificate Holder to be correct and adequate in accordance with the owner's requirements.
3) Repair/replacement plans shall be completed prior to performing any work, inspections, examinations or testing; however, repair/replacement plans are not required for the design phase of a repair/replacement activity including activities that require design only (except rerating).
4) The repair/replacement plan (see Table 1.6.9) shall identify any applicable Code Edition/Addenda and Code Cases, owner's requirements and the Construction Code Edition/Addenda utilized to perform the work.
5) The repair/replacement plan shall identify expected life of the item when less than the intended life as specified in the owner's design specification.
6) The "NR" Certificate Holder shall ensure that specifications, drawings, procedures and instructions do not conflict with the owner's design specifications. A system must be described in the Quality Assurance Manual to resolve or eliminate such conflicts. Resolution shall consider the Design Specification Requirements, as well as, the owner requirements, Jurisdictional and Regulatory Authority Requirements as applicable.

e) Procurement Document Control

The provisions identified in ASME NQA-1, Part 1, Requirement 4, shall apply. Procurement documents shall require suppliers to provide a Quality Assurance Program consistent with the applicable requirements of ASME Section III and this section:

f) Instructions, Procedures and Drawings

The provisions identified in ASME NQA-1, Part 1, Requirement 5, shall apply. All activities affecting quality shall be prescribed by documented instructions, procedures or drawings appropriate for the scope of work to be performed. Instructions, procedures or drawings shall describe acceptance criteria to ensure quality activities are accomplished.

g) Document Control

The provisions identified in ASME NQA-1, Part 1, Requirement 6, shall apply. The Quality Assurance Program shall detail measures to control the preparation, review, issuance, use, approval and distribution of all documents related to quality as identified in the applicants Quality Assurance Program. Revisions shall meet the same requirements as the originals unless the applicant specifies other measures within their program. Measures shall ensure the latest approved documents represent the repair/replacement activities performed.

h) Control of Purchased Material, Items, and Services

1) The provisions identified in ASME NQA-1, Part 1, Requirement 7 shall apply, except:
   a) Procurement of Authorized Inspection Agency services is not applicable as specified in paragraph 507.
   b) The decision to perform bid evaluation as described in paragraph 300 is the responsibility of the "NR" Certificate Holder.
   c) For Certificates of Conformance specified in paragraph 503 changes, waivers, or deviations including resolution of non-conformances must meet the requirements of ASME Section III and this Section.
   d) The provisions identified in ASME NQA-1, Part 1, Requirement 7, paragraph 700 are not applicable to this section.
2) Documentary evidence for items shall conform to the requirements of ASME Section III, NCA and this Section. Materials shall meet the material certification requirements as specified in ASME Section III, NCA-3800 or NCA-~~3970~~ 4470 as applicable. Documented evidence for ASME stamped items is satisfied by a Manufacturer's Data Report. Utilization of unqualified source material shall meet the requirements of ASME Section III, NCA-~~3855.5~~ 4255.5

3) The "NR" Certificate Holder may obtain items from an owner, provided the owner provides the required documentation and items are identified to meet Code and the Certificate Holders Quality Assurance Program. The "NR" Certificate Holder shall not be required to audit the owner as an approved supplier, provided the items used are exclusively for the owner and the owner procured and controlled the items under the owner's Quality Assurance Program.

4) The Quality Assurance Program shall establish controls to ensure all purchased materials, items, and services conform to the requirements of the owner's design specifications and the code of construction Edition/Addenda used to perform the work. Materials shall meet the requirements specified in ASME Section III, NCA-3800 or NCA-~~3970~~ 4470 as applicable.

5) Add wording from NB16-0609 pending approval

~~h)~~i) Identification and Control of Items

The provisions identified in ASME NQA-1, Part 1, Requirement 8, shall apply and include the following additional requirements.

1) Controls shall assure only correct and acceptable items, parts and components are used or installed when performing repair/replacement activities.
2) Welding, brazing and fusing materials shall be identified and controlled.
3) Required Certified Material Test Reports and Certificates of Conformance shall be received, traceable to the items, reviewed to comply with the material specification and found acceptable.
4) The "NR" Certificate Holder shall utilize checklists to identify required characteristics using accepted procedures, compliance with records received, results of examinations and tests performed, range of ~~valves~~ values when required, and spaces for inclusion of document numbers and revision levels, signatures, / stamps and dates of examinations or tests performed, verified, and/or witnessed by the "NR" Certificate Holder's qualified Representative and Authorized Nuclear Inspector.

~~i)~~j) Control of Processes

The provisions identified in ASME NQA-1, Part 1, Requirement 9, shall apply. Documents used to control processes shall include spaces for signatures, initials, stamps and dates that activities were performed by the Certificate Holder's representative and the Authorized Nuclear Inspector when the processes conform~~s~~ to the specified acceptance criteria as listed on drawings, procedures, instructions, specifications or other appropriate documents including revisions.

~~j~~k) Examinations, Tests and Inspections

The provisions identified in ASME NQA-1, Part 1, Requirement 10, shall apply, except paragraph 700 for inspections during operations is not required.

1) A repair/replacement plan shall be described in the Quality Assurance Manual that addresses required information to perform the work needed for repair/replacement activities. Spaces shall be included for mandatory hold points where witnessing is required by the "NR" Certificate Holder's Qualified Representative, the Authorized Nuclear Inspector or the owner's representative, if required. Work shall not proceed beyond designated mandatory hold points without documented consent as appropriate.
2) The following guidance is provided for information to be included within the repair/replacement plan:
   a. A detailed description of repair/replacement activities to be performed;
   b. Describe any defects and examination methods used to detect the defects;
   c. Defect removal method and requirements for identifying reference points;
   d. Any procedures including revisions utilized; (e.g. welding, brazing, heat treat, examination, testing) and material requirements;
   e. Required documentation and stamping; and
   f. Acceptance criteria used to verify acceptability.

~~f.~~g. Applicable Code editions/addenda and code cases

3) Repair/Replacement plans and evaluations shall be subject to review by the Jurisdictional and Regulatory Authority when required.

~~k)~~l) Test Control

The provisions identified in ASME NQA-1, Part 1, Requirement 11 shall apply. Testing shall be performed in accordance with written test procedures with acceptance criteria clearly defined. Pre-requisites for performing each test to include calibration, equipment, trained personnel, environmental conditions and provisions for data acquisition shall be described. Test results shall be documented and evaluated by qualified personnel.

~~l)~~m) Control of Measuring and Test Equipment

The provisions identified in ASME NQA-1, Part 1, Requirement 12 shall apply.

1) The "NR" Certificate Holder may perform periodic checks on equipment to determine calibration is maintained. When periodic checks are used the method and frequency shall be included in the "NR" Certificate Holder's Quality Assurance Program and if discrepancies are found, shall be resolved to the prior periodic check.
2) The "NR" Certificate Holder may accept accreditation for calibration activities by National Voluntary Laboratory Accreditation Program (NVLAP), American Association for Laboratory Accreditation (A2LA) or other accrediting body recognized by NVLAP through the International Laboratory Accreditation Cooperation (ILAC) mutual recognition arrangement (MRA) provided the following requirements are met:
   a. Accreditation is to ANSI/ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration Laboratories";
   b. Scope of the accreditation for the calibration laboratory covers needed measurement parameters, ranges and uncertainties;
   c. "NR" Certificate Holder shall specify that calibration reports shall include, laboratory equipment/standards used and as found and as left data;
   d. The "NR" Certificate Holder shall verify conformance to the requirements of this process; and
   e. Utilization of this process shall be described and documented in the "NR" Certificate Holders QAM. Note: replace paragraph 2 above with NB16-0609 pending approval

~~m)~~n) Handling, Storage and Shipping

The provisions of ASME NQA-1, Part 1, and Requirement 13 shall apply.

~~n)~~o) Quality Assurance Records

The provisions identified in ASME NQA-1, Part 1, Requirement 17, shall apply, except Paragraphs 400, 500, and 600 are not applicable. The following requirements shall be followed:

1) Records shall be identifiable and retrievable;
2) Records shall be retained consistent with the owner's requirements for duration, location and assigned responsibility;
3) Forms NR-1 and NVR-1 as applicable shall be completed by the "NR" Certificate Holder upon completion of all repair/replacement activities. Completion of forms, registrations and stamping of the "NR" symbol stamp shall meet the requirements of NBIC Part 3, Section 5. A log shall be maintained in accordance with NBIC Part 3, 5.6; and
4) Lifetime and non-permanent records shall be as specified in ASME Section III, NCA-4134, Tables NCA-4134.17-1, and 4134.17-2.
5) Radiographs (digital images or film) may be reproduced provided that:
   a. The process shall be subject to owner's approval;
   b. The "NR" Certificate Holder is responsible for the process used and shall include a system for controlling and monitoring the accuracy so that the image will provide the same information as the original; and
   c. Procedures shall contain requirements for exposure scanning, focusing, contrast, resolution and distinguishing film artifacts as applicable for reproduced images.

6) Records shall be classified, maintained and indexed and shall be accessible to the owner, owner's designee, and the Authorized Nuclear Inspector.
7) When the "NR" Certificate Holder is the owner, designated records and reports received by the owner, shall be filed and maintained in a manner to allow access by the Authorized Nuclear Inservice Inspector. Suitable protection from deterioration and damage shall be provided by the owner. All records and reports shall be retained as specified in the owners QAP for the lifetime of the component or system.

~~o)~~p) Corrective Action

The provisions identified in ASME NQA-1, Part 1, Requirement 16 shall apply.

1) Measures shall be established to ensure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and other non-conformances are promptly identified and corrected.
2) In the case of significant conditions adverse to quality, the measures shall also ensure that the cause of these conditions be determined and corrected to preclude repetition. The identification of significant conditions adverse to quality, the cause, condition, and the corrective action taken shall be documented and reported to the appropriate levels of management.
3) These requirements shall also extend to the performance of subcontractors' corrective action measures.

~~p)~~q) Inspection or Test Status (not to include operating status)

The provisions identified in ASME NQA-1, Part 1, Requirement 14 shall apply. Measures shall be established to indicate inspection and test status of parts, items, or components during the repair/replacement activity. The system used shall provide positive identification of the part, item, or component by means of stamps, labels, routing cards, or other acceptable methods. The system shall include any procedures or instructions necessary to achieve compliance. Procedures shall be provided for the identification of acceptable and unacceptable items and for the control of status indicators. The authority for application and removal of status indicators shall also be specified.

~~q)~~r) Nonconforming Materials or Items

The provisions identified in ASME NQA-1, Part 1, Requirement 15 shall apply. Measures shall be established to control materials or items that do not conform to requirements to prevent their inadvertent use, including measures to identify and control the proper installation of items and to preclude nonconformance with the requirements of these rules These measures shall include procedures for identification, documentation, segregation when practical, and disposition. Nonconforming items shall be reviewed for acceptance, rejection, or repair in accordance with documented procedures. The responsibility and authority for the disposition of nonconforming items shall be defined. Repaired or replaced items shall be re-examined in accordance with the applicable procedures. Measures that control further processing of a nonconforming or defective item, pending a decision on its disposition, shall be established and maintained. Ultimate disposition of nonconforming items shall be documented.

~~r)~~s) Audits

The provisions identified in ASME NQA-1, Part 1, and Requirement 18 shall apply and shall include the following:

A comprehensive system of planned and periodic ~~internal~~ audits of the "NR" Certificate Holder's Quality Assurance Program shall be performed ~~by the "NR" Certificate Holder~~. Audits shall include internal audits by the Certificate Holder and audits by the Authorized Inspection Agency. Audit frequency shall be specified in the organization's Quality Assurance Manual. Audits shall be conducted at least annually for any ongoing code activity to verify compliance with Quality Assurance Program requirements, performance criteria, and to determine the effectiveness of the Quality Assurance Program. When no code work has been performed, the required annual audit need only include those areas of responsibility required to be continually maintained such as

training, audits, organizational structure, and Quality Assurance Program revisions. The Quality Assurance Manual shall as a minimum describe the following:

1) Audits shall be performed in accordance with written procedures or checklists by qualified audit personnel not having direct responsibility in areas being audited;
2) Audit personnel shall be qualified in accordance with the current requirements of ASME NQA-1;
3) Audit results shall be documented and reviewed by responsible management ;for adequacy and effectiveness of the quality assurance program.
4) Requirements for follow-up actions shall be specified for any deficiencies noted during the audit;
5) Audit records and applicable documentation shall be made available to the Authorized Nuclear Inspector for review;
6) Audit records shall include as a minimum;
   a. Written procedures;
   b. Checklists;
   c. Reports;
   d. Written replies; and
   e. Completion of corrective actions.

~~s)~~t) Authorized Nuclear Inspector

Measures shall be taken to reference the commissioned rules for National Board Authorized Nuclear Inspector, in accordance with NB-263, RCI-1 *Rules for Commissioned Inspectors.* The "NR" Certificate Holder shall ensure that the latest documents including the Quality Assurance Manual, procedures and instructions are made available to the Authorized Nuclear Inspector. The Authorized Nuclear Inspector shall be consulted prior to the issuance of a repair/replacement plan by the "NR" Certificate Holder in order that the Authorized Nuclear Inspector may select any in-process inspection or hold points when performing repair/replacement activities. The "NR" Certificate Holder shall keep the Authorized Nuclear Inspector informed of progress of the repair/replacement activity so that inspections may be performed. The Authorized Nuclear Inspector shall not sign Form NR-1 or Form NVR-1, as applicable, unless satisfied that all work carried out is in accordance with this Section. The Authorized Nuclear Inspector and Authorized Nuclear Inspector Supervisor shall have access to areas where work is being performed including subcontractors facilities in order to perform their required duties. The ANI shall be involved in dispositions and verification for non-conformances and corrective actions involving quality or code requirements.

~~t)~~u) Exhibits

Forms and exhibits referenced in the Quality Assurance Manual shall be explained in the text and included as part of the referencing document or as an appendix to the Quality Assurance Manual. Forms shall be controlled and identified to show the latest approved revision, name, and other corresponding references as stated in the Quality Assurance Manual.

1.6.7 QUALITY ASSURANCE PROGRAM REQUIREMENTS FOR CATEGORY 2 ACTIVITIES

1.6.7.1 SCOPE

Owners or organizations other than owners shall have a written Quality Assurance Program meeting one of the criteria specified in Table 1.6.2 of this section. Organizations applying for a Category 2 "NR" *Certificate of Authorization* shall specify in their written Quality Assurance Program which program criteria their Quality Assurance Program follows. Owners shall have a Quality Assurance Program meeting the requirements of either 10 CFR 50, Appendix B or NQA-1 Part 1 and shall include the additional requirements specified in ASME Section XI, IWA-4142 when applicable. Organizations other than the owner shall comply with

requirements specified in either 10 CFR 50, Appendix B supplemented as needed with the owner's QAP; NQA-1 Part 1; or NCA-4000. Organizations may elect to choose to follow all the rules specified in one of the allowed QAP criteria specified in Table 1.6.2 or they may elect to combine or supplement requirements from other specified QAP's. When organizations elect to combine QAP requirements, it shall be clearly specified and understood in the QAM which QAP requirement is being followed for each activity specified in their QAM. The following quality elements shall be specified and described within the QAM.

1.6.7.2 QUALITY PROGRAM ELEMENTS

a) Organization

The authority and responsibility for individuals involved in activities affecting quality shall be clearly established and documented throughout the Quality Assurance Program and identified on a functional organizational chart contained within the QA Manual.

b) Statement of Policy and Authority shall:

1) identify the titles of individuals who have the authority and responsibility charged with ensuring the quality program is implemented as described,
2) confirm their freedom in the organization to identify quality problems and to initiate, recommend and provide solutions,
3) include a statement that if there is a disagreement in the implementation of the quality assurance program, the matter is to be referred for resolution to a higher authority and shall be resolved in a manner that will not conflict with code, jurisdiction/regulatory authority or quality program requirements
4) include a statement of the full support of management, and
5) be dated and signed by a senior management official within the organization.

c) Quality Assurance Program (QAP)

1) Qualification of non-destructive examination personnel shall be as required by the code or as specified in the owner's Quality Assurance Program.
2) Prior to returning an item to service, the owner shall evaluate the suitability of the item subjected to the repair/replacement activity. Corrective actions shall be taken when an item is determined to be deficient or does not satisfy the requirements of this section.
3) The "NR" Certificate Holder shall provide a copy of the Quality Assurance Manual to the owner for review and acceptance. The "NR" Certificate Holder shall make a current controlled copy of the Quality Assurance Manual available to the Authorized Nuclear Inspector and Authorized Nuclear Inspector Supervisor. When a repair/replacement activity is split between the owner and an "NR" Certificate Holder, each Quality Assurance Program shall comply with this section for their respective activities. The owner shall establish interfaces for assuring this section is met for the two Quality Assurance Programs.
4) The "NR" Certificate Holder shall be responsible for advising the Authorized Nuclear Inspection Agency of proposed changes to the Quality Assurance Manual to obtain acceptance of the Authorized Nuclear Inspector Supervisor before putting such changes into effect. The Certificate Holder shall be responsible for notifying the Authorized Nuclear Inspector of QAM changes, including evidence of acceptance by the Authorized Nuclear Inspector Supervisor.
5) The Quality Assurance Manual need not be in the same format or sequential arrangement as the requirements in these rules as long as all applicable requirements have been covered.
6) The "NR" Certificate Holder shall implement and maintain a program for qualification, indoctrination, training and maintaining proficiency of personnel involved with quality functions, including personnel of subcontracted services.
7) The "NR" Certificate Holder shall address in their QAM the requirements for interfacing with the

owner specified in 1.6.9 of this section.

~~7~~8) Specified controls including responsibilities for personnel shall be described in the quality assurance program.

d) Design Control

1) Repair/replacement activities, code edition and addenda used shall correspond with the owner's Inservice Inspection Program unless later code editions and addenda have been accepted by the owner, the Enforcement and/or the Regulatory authority having jurisdiction at the plant site.
2) The repair/replacement plan [see 1.6.7.2 j)] shall identify expected life of the item when less than the intended life as specified in the owner's requirements and the owner shall be advised of the condition.
3) The "NR" Certificate Holder shall assure that specifications, drawings, procedures and instructions do not conflict with the owner's requirements. A system must be described in the Quality Assurance Manual to resolve or eliminate such conflicts. Resolution shall consider the design specification requirements, as well as, the owner Requirements, Jurisdictional and Regulatory requirements as applicable.
4) ASME Section XI establishes that the owner is responsible for design in connection with repair/replacement activities. The "NR" Certificate Holder must ensure that the design specification, drawings, or other specifications or instructions furnished by the owner satisfy the code edition and addenda of the owner's requirements. To satisfy this requirement, the "NR" Certificate Holder shall establish requirements that correctly incorporate the owner's requirements into their specifications, drawings, procedures, and instructions, which may be necessary to carry out the work. The "NR" Certificate Holder's system shall include provisions to ensure that the appropriate quality standards are specified and included in all quality records. These records shall be reviewed for compliance with the owner's requirements and the requirements of ASME Section XI.

e) Procurement Document Control

Procurement documents shall require suppliers to provide a Quality Assurance Program consistent with the applicable requirements of ASME Section III, NCA and this section. Documents for procurement of materials, items, and subcontracted services shall include requirements to the extent necessary to ensure compliance with the owner's requirements and IWA-4000 of ASME Section XI. To the extent necessary, procurement documents shall require suppliers to maintain a Quality Assurance Program consistent with the applicable requirements of the edition and addenda of the code of construction to which the items are constructed. Measures shall be established to ensure that all purchased material, items, and services conform to these requirements.

f) Instructions, Procedures and Drawings

Repair/replacement plans and any verification of acceptability (evaluations) shall be subject to review by Jurisdiction and Regulatory Authorities having jurisdiction at the plant site. Activities affecting quality shall be prescribed by documented instructions, procedures or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative and qualitative criteria for determining that activities affecting quality have been satisfactorily accomplished. The "NR" Certificate Holder shall maintain a written description of procedures, instructions, or drawings used by the organization for control of quality and examination requirements detailing the implementation of the Quality Assurance Program requirements. Copies of these procedures shall be readily available to the Authorized Nuclear Inspector and Authorized Nuclear Inservice Inspector, as applicable.

g) Document Control

The program shall include measures to control the issuance, use, and disposition of documents, such as specifications, instructions, procedures, and drawings, including changes thereto. These measures shall ensure that the latest applicable documents, including changes, are reviewed for

adequacy and approved for release by authorized personnel and distributed for use at the location where the prescribed activity is performed.

h) Control of Purchased Material, Items, and Services

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.

i) Identification and Control of Items

1) Measures shall be established for identification and control of material and items, including partially fabricated assemblies. These measures shall ensure that identification is maintained and traceable, either on the material or component, or on records throughout the repair/replacement activity. These measures shall be designed to prevent the use of incorrect or defective items and those which have not received the required examinations, tests, or inspections.
2) Identification for traceability shall be applied using methods and materials that are legible and not detrimental to the component or system involved. Such identification shall be located in areas that will not interfere with the function or quality aspects of the item.
3) Certified Material Test Reports shall be identified as required by the applicable material specification in ASME Section II and shall satisfy any additional requirements specified in the original code of construction. The Certified Material Test Report or Certificate of Compliance need not be duplicated for submission with compliance documents when a record of compliance and satisfactory reviews of the Certified Material Test Report and Certificate of Compliance is provided. Quality documents shall provide a record that the Certified Material Test Report and Certificate of Compliance have been received, reviewed, and found acceptable. When the "NR" Certificate Holder authorizes a subcontracted organization to perform examinations and tests in accordance with the original code of construction, the "NR" Certificate Holder shall certify compliance either on a Certified Material Test Report or Certificate of Compliance that the material satisfies the original code of construction requirements.

j) Control of Processes

1) The "NR" Certificate Holder shall operate under a controlled system such as process sheets, checklists, travelers, plans or equivalent procedures. Measures shall be established to ensure that processes such as welding, nondestructive examination, and heat treating are controlled in accordance with the rules of the applicable section of the ASME Code and are accomplished by qualified personnel using qualified procedures.
2) Process sheets, checklists, travelers, or equivalent documentation shall be prepared, including the document numbers and revisions to which the process conforms with space provided for reporting results of completion of specific operations at checkpoints of repair/replacement activities.

k) Examinations, Tests and Inspections

1) A repair/replacement plan shall be prepared in accordance with the Quality Assurance Program whenever repair/replacement activities are performed. As a minimum, the repair/replacement plan shall include the requirements specified in ASME Section XI, IWA-4150.
2) In-process and final examinations and tests shall be established to ensure conformance with specifications, drawings, instructions, and procedures which incorporate or reference the requirements and acceptance criteria contained in applicable design documents. Inspection, test and examination activities to verify the quality of work shall be performed by persons other than those who performed the activity being examined. Such persons shall not report directly to the immediate supervisors responsible for the work being examined.
3) Process sheets, travelers, or checklists shall be prepared, including the document numbers and revision to which the examination or test is to be performed, with space provided for recording

results.

4) Mandatory hold/inspection points at which witnessing is required by the "NR" Certificate Holder's representative or the Authorized Nuclear Inspector/Authorized Nuclear Inservice Inspector shall be indicated in the controlling documents. Work shall not proceed beyond mandatory hold/inspection points without the consent of the "NR" Certificate Holder's representative or the Authorized Nuclear Inspector/Authorized Nuclear Inservice Inspector, as applicable.

l) Test Control

1) Testing shall be performed in accordance with the owner's written test procedures, or procedures acceptable to the owner, that incorporate or reference the requirements and acceptance criteria contained in applicable design documents.

2) Test procedures shall include provisions for ensuring that prerequisites for the given test have been met, that adequate instrumentation is available and used, and that necessary monitoring is performed. Prerequisites may include calibrated instrumentation, appropriate equipment, trained personnel, condition of test equipment, the item to be tested, suitable environmental conditions, and provisions for data acquisition.

3) Test results shall be documented and evaluated to ensure that test requirements have been satisfied.

m) Control of Measuring and Test Equipment

1) Measures shall be established and documented to ensure that tools, gages, instruments, and other measuring and testing equipment and devices used in activities affecting quality are of the proper range, type, and accuracy to verify conformance to established requirements. A procedure shall be in effect to ensure that they are calibrated and properly adjusted at specified periods or use intervals to maintain accuracy within specified limits. Calibration shall be traceable to known national standards, where these standards exist, or with the device manufacturer's recommendation.

n) Handling, Storage and Shipping

Measures and controls shall be established to maintain quality requirements for handling, storage, and shipping of parts, materials, items, and components.

o) Quality Assurance Records

Documentation, reports and records shall be in accordance with ASME Section XI, IWA-6000.

1) The owner is responsible for designating records to be maintained. Measures shall be established for the "NR" Certificate Holder to maintain these records [See 1.6.7.2 n) 2)] required for Quality Assurance of repair/replacement activities. These shall include documents such as records of materials, manufacturing, examination, and test data taken before and during repair/replacement activity. Procedures, specifications, and drawings used shall be fully identified by pertinent material or item identification numbers, revision numbers, and issue dates. The records shall also include related data such as personnel qualification, procedures, equipment, and related repairs. The "NR" Certificate Holder shall take such steps as may be required to provide suitable protection from deterioration and damage for records while in his care. Also, it is required that the "NR" Certificate Holder have a system for correction or amending records that satisfies the owner's requirements. These records may be either the original or a reproduced, legible copy and shall be transferred to the owner ~~at his~~ upon request.

2) Records to be maintained as required in NBIC Part 3, 1.6.7.2 n) 1) above shall include the following, as applicable:

a. An index that details the location and individual responsible for maintaining the records;

b. Manufacturer's Data Reports, properly executed, for each replacement component, part, appurtenance, piping system, and piping assembly, when required by the design specification or the owner;

c. The required as-constructed drawings certified as to correctness;

d. Copies of applicable Certified Material Test Reports and Certificates of Compliance;

e. As-built sketch(es) including tabulations of materials repair/replacement procedures, and instructions to achieve compliance with ASME Section XI;

f. Nondestructive examination reports, including results of examinations, shall identify the name and 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;

g. Records of heat treatments may be either the heat treatment charts or a summary description of heat treatment time and temperature data certified by the "NR" Certificate Holder. Heat treatments performed by the material manufacturer to satisfy requirements of the material specifications may be reported on the Certified Material Test Report; and

h. Nonconformance reports shall satisfy IWA-4000 of ASME Section XI and shall be reconciled by the owner prior to certification of the Form NR-1 or NVR-1, as applicable.

3) After a repair/replacement activity, all records including audit reports required to verify compliance with the applicable engineering documents and the "NR" Certificate Holder's Quality System Program, shall be maintained at a place mutually agreed upon by the owner and the "NR" Certificate Holder. The "NR" Certificate Holder shall maintain records and reports for a period of five years after completion of the repair/replacement activity.

4) When the "NR" Certificate Holder is the owner, designated records and reports received by the owner, shall be filed and maintained in a manner to allow access by the Authorized Nuclear Inservice Inspector. Suitable protection from deterioration and damage shall be provided by the owner. These records and reports shall be retained as specified in the owners QAP for the lifetime of the component or system.

5) The original of the completed Form NR-1 or Form NVR-1, as applicable, shall be registered with the National Board and, if required, a copy forwarded to the Jurisdiction where the nuclear power plant is located. A log shall be maintained in accordance with NBIC Part 3, 5.6.

p) Corrective Action

1) Measures shall be established to ensure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and other nonconformances are promptly identified, controlled and corrected.

2) In the case of significant conditions adverse to quality, the measures shall also ensure that the cause of these conditions be determined and corrected to preclude repetition. The identification of significant conditions adverse to quality, the cause, condition, and the corrective action taken shall be documented and reported to the appropriate levels of management.

3) Corrective action requirements shall also extend to the performance of subcontractors' activities.

q) Inspection or Test Status (not to include operating status)

Measures shall be established to indicate examination and test status of parts, items, or components during the repair/replacement activity. The system used shall provide positive identification of the part, item, or component by means of stamps, labels, routing cards, or other acceptable methods. The system shall include any procedures or instructions necessary to achieve compliance. Also, measures shall be provided for the identification of acceptable and unacceptable items. They shall also include procedures for control of status indicators, including the authority for application and removal of status indicators.

r) Nonconforming Materials or Items

Measures shall be established to control materials or items that do not conform to specified requirements to prevent their inadvertent use, including measures to identify and control the proper installation of items and to preclude nonconformance with the requirements of these rules. These measures shall include procedures for identification, documentation, segregation, and disposition.

Nonconforming items shall be reviewed for acceptance, rejection, or repair in accordance with documented procedures. The responsibility and authority for the disposition of nonconforming items shall be defined. Repaired/replaced or altered items shall be re-examined in accordance with the applicable procedures.

Measures that control further processing of a nonconforming or defective item, pending a decision on its disposition, shall be established and maintained. Ultimate disposition of nonconforming items shall be documented.

s) Audits

A comprehensive system of planned and periodic ~~internal~~ audits of the "NR" Certificate Holder's Quality Assurance Program shall be performed ~~by each organization,~~. Audits shall include internal audits by the Certificate Holder and audits by the Authorized Inspection Agency. Audit frequency shall be specified in the organization's Quality Assurance Manual. Audits shall be conducted at least annually to verify compliance with Quality Assurance Program requirements, performance criteria and to determine the effectiveness of the Quality Assurance Program. When no code work has been performed, the required annual audit need only include those areas of responsibility required to be continually maintained such as training, audits, organizational structure, Quality Assurance Program revisions, etc. The Quality Assurance Manual shall as a minimum describe the following:

1) Audits shall be performed in accordance with written procedures or checklists by qualified audit personnel not having direct responsibility in areas being audited;
2) Audit personnel shall be qualified in accordance with the current requirements of NQA-1;
3) Audit results shall be documented and reviewed by responsible management for adequacy and effectiveness of the quality assurance program;
4) Requirements for follow-up actions for any deficiencies noted during the audit;
5) Audit records and applicable documentation shall be made available to the Authorized Nuclear Inspector for review;
6) Audit records shall include as a minimum:
   a. written procedures;
   b. checklists;
   c. reports;
   d. written replies; and
   e. completion of corrective actions.

t) Authorized Nuclear Inspector

Measures shall be taken to reference the commissioned rules for National Board Authorized Nuclear Inspector, in accordance with NB-263, RCI-1 *Rules for Commissioned Inspectors*. The "NR" Certificate Holder shall ensure that the latest documents including the Quality Assurance Manual, procedures and instructions are made available to the Authorized Nuclear Inspector. The Authorized Nuclear Inspector shall be consulted prior to the issuance of a repair/replacement plan by the "NR" Certificate Holder in order that the Authorized Nuclear Inspector may select any in process inspection or hold points when performing repair/replacement activities. The "NR" Certificate Holder shall keep the Authorized Nuclear Inspector informed of progress of the repair/replacement activity so that inspections may be performed. The Authorized Nuclear Inspector shall not sign Form NR-1 or Form NVR-1, as applicable, unless satisfied that all work carried out is in accordance with this section. The Authorized Nuclear Inspector and Authorized Nuclear Inspector Supervisor shall have access to areas where work is being performed including subcontractors facilities in order to perform their required duties. The ANI shall be involved in dispositions and verification for nonconformances and corrective actions involving quality or code requirements.

u) Exhibits

Forms and exhibits referenced in the Quality Assurance Manual shall be explained in the text and included as part of the referencing document or as an appendix to the Quality Assurance Manual. Forms shall be controlled and identified to show the latest approved revision, name, and other corresponding references as stated in the Quality Assurance Manual.

1.6.8 QUALITY ASSURANCE PROGRAM REQUIREMENTS FOR CATEGORY 3 ACTIVITIES

1.6.8.1 SCOPE

Organizations requesting a Category 3 "NR" *Certificate of Authorization* may elect to follow the requirements specified in ASME NQA-1 Part 1 or follow specific Quality Assurance Program requirements outlined in other specified standards as required by the owner, Regulatory Authority or Jurisdiction. Organizations shall specify in the QAM what QAP requirements are followed. When standards other than ASME NQA-1 are followed, the organization shall have available a copy of that standard for review by the NB Survey Team and the ANIA, as applicable. Each organization shall, as a minimum, include in their written QAM the specified elements listed in Category 1 and/or 2 (1.6.6, 1.6.7) QAP requirements. Additional requirements, as specified within NBIC Part 3, 1.6.8 and 1.6.9 shall be included within the QAP. Also, limitations or additions to ASME NQA-1, as specified for Category 1 or 2 may be incorporated and referenced within the QAM.

1.6.8.2 QUALITY PROGRAM ELEMENTS

a) Organization

~~Persons and organization shall have authority and freedom to identify quality problems; initiate, recommend or provide solutions and verify implementation of solutions.~~ The authority and responsibility for individuals involved in activities affecting quality shall be clearly established and documented throughout the Quality Assurance Program and identified on a functional organizational chart contained within the QA Manual.

b) Statement of Policy and Authority shall:

1) identify the titles of individuals who have the authority and responsibility charged with ensuring the quality program is implemented as described,
2) confirm their freedom in the organization to identify quality problems and to initiate, recommend and provide solutions,
3) include a statement that if there is a disagreement in the implementation of the quality assurance program, the matter is to be referred for resolution to a higher authority and shall be resolved in a manner that will not conflict with code, jurisdiction/regulatory authority or quality program requirements
4) include a statement of the full support of management, and
5) be dated and signed by a senior management official within the organization.

c) QAP

The quality assurance program shall be documented by written policies, procedures and instructions. It s~~S~~hall account for special controls, processes, test equipment, tools and skills to obtain quality and for verification of quality by inspections and tests. Indoctrination, training and maintaining proficiency of personnel effecting quality shall be described. The status, ~~and~~ adequacy and effectiveness of the QAP shall be regularly reviewed by management. ~~.~~ The scope shall be included within the written QAM. The "NR" Certificate Holder shall make a current controlled copy

of the Quality Assurance Manual available to the Authorized Nuclear Inspector and Authorized Nuclear Inspector Supervisor. The "NR" Certificate Holder shall address in their QAM the requirements for interfacing with the owner specified in 1.8~~6~~.9 of this section. Specified controls including responsibilities for personnel shall be described in the quality assurance program.

d) Design Control

Established measures to assure ~~approximate~~ applicable quality standards and regulatory requirements are accurately specified and translated ~~included~~ into design documents. Any deviations shall be identified and controlled. Control measures (such as review, approval, release, distribution and revisions) for suitability of materials, parts, equipment, procedures, instructions and processes, shall be performed to ensure adherence to specified design basis requirements. Qualifications, responsibilities and certifications of design personnel shall be clearly defined within the quality assurance program.

e) Procurement Document Control

Documents for procurement of material, equipment and services shall ensure regulatory requirements, design bases and other quality requirements ~~and~~ are included or referenced. Procurement documents shall require contractors or subcontractors provide a Quality Assurance Program consistent with the provisions specified herein. ~~in this NBIC Part 3, 1.8.8.~~ Controls necessary to ensure materials, equipment, and services meet specified design criteria shall be clearly described within the quality assurance program.

f) Instructions, Procedures and Drawings

Activities affecting quality shall be accomplished in accordance with prescribed instructions, procedures or drawings and shall include ~~approximate~~ appropriate quantitative or qualitative ~~qualified~~ acceptance criteria to determine activities are satisfactorily accomplished.

g) Document Control

Shall define measures to control the preparation, issuance, use, review, approval, revisions and distribution of all documents, including procedures, instructions and drawings related to quality. Responsibilities shall be described within the quality program.

h) Control of Purchased~~s~~, Materials, Items and Services

Purchased material, items and services shall conform to the procurement documents. Measures shall be established for source evaluation and selection, objective evidence of quality, inspections at the source and examination of products upon delivery. Effectiveness of quality of suppliers shall be assessed by the applicant or designee at specified intervals. Documented evidence shall be performed and made available to assure materials and services conform to procurement documents, quality procedures and instructions.

i) Identification and Control of Items

Specified controls shall ensure only correct and acceptable items, parts and components are used and installed and traceable to required documents such as certified material test reports, certificates of conformance, or data reports. These controls shall include traceability on the items or on records traceable to the items during fabrication and final acceptance and test.

j) Control of Processes

Documents used to control processes shall be prepared, including the document numbers and revision to which the process conforms and ~~conform to specified acceptance criteria~~ shall include space for providing reporting of results of specific operations at checkpoints of repair/replacement activity, and provide for signatures, initials, stamps and dates for activities performed by the Certificate Holders' representative and the Authorized Nuclear Inspector. Special processes

including welding, nondestructive examinations, heat treating, and bending are performed using qualified and approved procedures and qualified personnel in accordance with applicable codes, standards and other specified criteria.

k) Examinations, Tests and Inspections

A repair / replacement plan, developed in accordance with Table 1.6.9, shall address all required information for performing examinations, tests and inspections including but not limited to:

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

Examinations, tests and inspections shall be performed using trained and qualified personnel. Personnel records for qualification and training shall be available for review.

l) Test Control

Tests shall be performed using~~to~~ written procedures identifying prerequisites, acceptance limits, calibration, equipment, personnel qualifications, environmental conditions, and required documentation. ~~required.~~ Personnel responsibilities shall be described for performance, acceptance/inspection and documenting results.

m) Control of Measuring and Test Equipment

Procedures, methods and frequency of calibration shall be described for all types of measuring and test equipment used to verify quality. Controls shall ensure accuracy within specified limits. Any discrepancies shall be identified and resolved.

n) Handling, Storage and Shipping

Processes or procedures shall be established to prevent damage, deterioration or misuse of material, items or components used and stored. Controls for handling, shipping, storage, cleanliness and preservation shall be specified in the quality program.

o) Records

1) All quality related records shall be classified, identified, verified, maintained, distributed~~,~~ ~~retraceable,~~ retrievable and accessible. When the "NR" Certificate Holder is the owner, designated records and reports received by the owner, shall be filed and maintained in a manner to allow access by the Authorized Nuclear Inservice Inspector (ANII). Suitable protection from deterioration and damage shall be provided by the owner. These records and reports shall be retained as specified in the owner's QAP for the lifetime of the component or system. Records to support evidence of activities affecting quality shall include as applicable:

a. Inspections and acceptance criteria/results
b. Tests performed and supporting reports
c. Procedures/instructions
d. Qualification of personnel, procedures, and equipment
e. Types of observations and results

f. Audits,

g. Nonconformances, and;

h. Corrective actions

~~1~~2) ~~T~~The original of the completed Form NR-1 or Form NVR-1, as applicable, shall be registered with the National Board and, if required, a copy forwarded to the Jurisdiction where the nuclear power plant is located. A log for registration shall be maintained in accordance with NBIC Part 3, 5.6.

p) Corrective Action

1) Measures shall be established to ensure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and other non-conformances are promptly identified and corrected.
2) In the case of significant conditions adverse to quality, the measures shall also ensure that the cause of these conditions be determined and corrected to preclude repetition. The identification of significant conditions adverse to quality, the cause, condition, and the corrective action taken shall be documented and reported to the appropriate levels of management.
3) Corrective action requirements shall also extend to the performance of subcontractors' activities.

~~Measures established to assure conditions adverse to quality are promptly identified and corrected and action taken to preclude repetition.~~

q) Inspection or Test Status

Measures shall be established to indicate inspection and test status of parts, items or components during repair/replacement activity. Measures shall include identification, procedures, control indicators (acceptable, unacceptable) and responsibility of personnel.

r) Nonconforming Material or Items

Measures to control material or items, nonconforming to specified criteria shall be established. Measures shall include identifying, controlling, documenting, reviewing, verifying, dispositioning and segregation when practical.

s) Audits

~~A system of planned and periodic audits shall be established to verify compliance of the Quality Assurance Program. Audits shall include; written procedures, checklists, trained/qualified personnel not having direct responsibility for areas being audited, documentation, review by management and follow up actions when required.~~ A comprehensive system of planned and periodic audits of the "NR" Certificate Holder's Quality Assurance Program shall be performed. Audits shall include internal audits by the Certificate Holder and audits by the Authorized Inspection Agency. Audit frequency shall be specified in the organization's Quality Assurance Manual. Audits shall be conducted at least annually to verify compliance with Quality Assurance Program requirements, performance criteria and to determine the effectiveness of the Quality Assurance Program. When no code work has been performed, the required annual audit need only include those areas of responsibility required to be continually maintained such as training, audits, organizational structure, Quality Assurance Program revisions, etc. The Quality Assurance Manual shall as a minimum describe the following:

1) Audits shall be performed in accordance with written procedures or checklists by qualified audit personnel not having direct responsibility in areas being audited;
2) Audit personnel shall be qualified in accordance with recognized standards, such as NQA-1;
3) Audit results shall be documented and reviewed by responsible management for adequacy and effectiveness of the quality assurance program

4) Requirements for follow-up actions for any deficiencies noted during the audit;
5) Audit records and applicable documentation shall be made available to the Authorized Nuclear Inspector for review;
6) Audit records shall include as a minimum:
   a. written procedures;
   b. checklists;
   c. reports;
   d. written replies; and
   e. completion of corrective actions.

t) Authorized Nuclear Inspector

Qualifications and duties shall be as specified in ASME QAI-1 and NB-263, RCI-1 for the Authorized Inspection Agencies, Authorized Nuclear Inspector and the Authorized Nuclear Inspector Supervisor. ~~for the Authorized Inspection Agencies, Authorized Nuclear Inspector and the Authorized Nuclear Inspector Supervisor.~~ Additional requirements are specified in Sections 1.8~~6~~.6.2 s), 1.8~~6~~.7.2 s), and 1.6~~8~~.9.

u) Exhibits

Quality related forms and exhibits described in the Quality Assurance Program shall be identified, controlled and where applicable included as a reference document within the QAM or referenced procedures.

1.6.9 INTERFACE WITH THE OWNER'S REPAIR/REPLACEMENT PROGRAM (FOR CATEGORIES 1, 2, AND 3 AS APPLICABLE)

Interface with the owner's repair/replacement program shall meet the following:

a) The "NR" Certificate Holder's repair/replacement plan (see Table 1.6.9) shall be subject to the acceptance of the owner and the owner's Authorized Nuclear Inservice Inspector (ANII) and shall be subject to review by the Jurisdiction and Regulatory Authorities having jurisdiction at the plant site.

b) Repair/Replacement activities of nuclear components shall meet the requirements of ASME Section III, ASME Section XI, and/or other applicable standard, and the owner's requirements, and shall be subject to verification by the Jurisdiction and Regulatory Authorities having jurisdiction at the plant site.

c) Documentation of the repair/replacement activities of nuclear components shall be recorded on the Report of Repair/Replacement Activities of Nuclear Components and Systems for Nuclear Facilities, Form NR-1, or Report of Repair/Replacement Activities for Nuclear Pressure Relief Devices, Form NVR-1, in accordance with the NBIC Part 3, Section 5. The completed forms shall be signed by a representative of the "NR" Certificate Holder and the Authorized Nuclear Inspector when the repair/replacement activity meets the requirements of this section. For repair/replacement activities that involve design changes, Form NR-1, or Form NVR-1, as applicable, shall indicate the organization responsible for the design or design reconciliation in accordance with the owner's requirements.

d) The "NR" Certificate Holder shall provide a copy of the signed Form NR-1 or Form NVR-1, as applicable, to the owner, the Enforcement, and the Regulatory Authority if required, and the Authorized Nuclear Inspection Agency. The original Form NR-1 or Form NVR-1, as applicable, shall be registered with the National Board by the "NR" Certificate Holder. A NB registration log shall be maintained by the "NR" Certificate Holder. See NBIC Part 3, Section 5.5 and 5.6.

e) The "NR" Certificate Holder shall provide a nameplate/stamping for repair/replacement activities for each nuclear component unless otherwise specified by the owner's Quality Assurance Program. The

required information and format shall be as shown in NBIC Part 3, Section 5.

Table 1.6.9		
Repair/Replacement Plan Criteria		
	Essential Requirements	Instruction
A	Edition and/or addenda of codes	Including codes of construction, code cases, or standards used for the work performed, the NBIC Code edition, and the owner's requirements.
B	Identification of items	Description of items affected by the repair/replacement activity, including serial numbers, vendor identification, and code classes if applicable.
		Location of installation if applicable.
C	Performance of the Repair/Replacement activity	Description of any defects, and nondestructive examination methods used to detect the defects
		Defect removal method, measurement, and area identification/reference points.
		Applicable welding/brazing procedures, heat treatment, nondestructive examination, and tests.
		Final examination criteria to verify acceptability.
		Preservice examination criteria if applicable.
D	Materials	Original specifications, new material specifications, including heat numbers, code edition/class and reconciliation requirements if applicable.
E	Description of Repair/Replacement activity	Include expected life of the item after completion if different from the original intended life as specified by the design specification. Application of the "NR" code symbol stamp if required.
F	Documentation	Generated as required by the quality assurance program and/or the owner's requirements.
		Retention and submittal in accordance with the quality assurance program and/or the owner's requirements.
G	Evaluations/Acceptance	Evaluations/acceptance by the jurisdictional/regulatory authority as applicable.
H	Testing	Post repair/replacement testing criteria.
		Test acceptance criteria to verify acceptability.
		Types (pneumatic, hydrostatic, system leakage, or other).
I	Design	When applicable, design documents shall be certified by qualified/certified engineer.
J	Authorized Inspection Agency	Authorized Nuclear Inspector review/acceptance.
		Authorized Nuclear Inservice Inspector review/acceptance.
K	Responsibilities for review, verification, and acceptance	Design, quality, work performed, examination/test, and records.
		Owner acceptance of the repair/replacement plan.

17-180 Galanes 12-12-17

2.5.3.6 WELDING METHOD 6

This welding method provides requirements for welding only Grade 91 tube material within the steam boiler Setting. ~~and when it is impracticable to perform local postweld heat treatment (PWHT).~~

The proposed revision shown above is to remove impracticable because this is redundant and is referenced in 2.5.3 below along with inadvisable.

2.5.3 ALTERNATIVE WELDING METHODS WITHOUT POSTWELD HEAT TREATMENT

a) Under certain conditions, postweld heat treatment, in accordance with the original code of construction, may be inadvisable or impractical. In such instances, the following alternative methods may be used.

Rationale: In WM 6 we have seemed to create confusion regarding the word impractical. Instead, since we have used both impractical and inadvisable in 2.5.3 and this applies to all alternative Welding Methods this would seem to suffice and remove confusion by owner's/user's.

18-12 18-13

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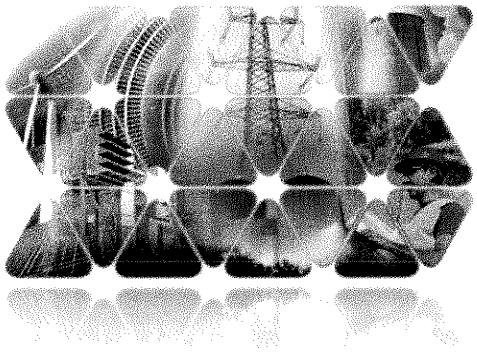
Status Update and Future Initiatives Regarding Alternative Weld Repairs and Fitness for Service



John A. Siefert
Principal Technical Leader

January 2018 NBIC Meetings
New Orleans, LA

Four Key Discussion Points

1. Status of installed alternative weld repairs
2. On-going research supporting alternative weld repairs
3. Future needs and initiatives
   - 2019 edition; incorporation of dissimilar metal combinations, e.g.
     - P15E to P5A and P15E to P8 (ACTION ITEM 18-13 opened Jan. 2018)
   - [2019 or 2021 edition (?)] Weld build-up internal to boiler in T91 and T92 (ACTION ITEM 18-12 opened Jan. 2018)
   - Fitness for service
4. Closing remarks

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Status of Installed Alternative Weld Repairs and Recent Repair Examples

Database – Examples of Welding Method 6

- The following examples reported to EPRI are well-documented

Case Study	Total Repairs	Date	Reason for Repair	Case Study?
1	16	5/2015	Creep damage in attachments in reheater	Yes
2a 2b	>500	3/2016 11/2016	Erosion damage in platen and secondary superheater	Yes
3	12	7/2016	Erosion damage in vertical reheater	No
4	883	4/2016	Damage at dissimilar metal welds in a wingwall panel	Yes
5	22	10/2016	Cut and cleans to remove exfoliated oxide in finishing superheater	No
6a 6b	238	10/2016 03/2017	Long-term overheat (LTOH) due to flame impingement/over-firing in HRSG primary reheat	No

Repairs to Welding Method 6 total ~2,000 to date

Database – Examples of Welding Supplement 8

- The following examples reported to EPRI are well-documented

Case Study	Total Repairs	Date	Reason for Repair	Case Study?
1	~125	N/A	FPL various types of repair [~5-10 individual case studies]	Yes
2	1	10/2016	Steam conditioning valve dissimilar metal weld	Yes
3	3	2006	Superheater pressure tapping points	Yes
4	??	Variable	Header inspection nozzle welds	Yes
5	6	03/2016	Hot reheat stop check valve balancing lines	Yes
6	3	03/2017	Main steam stop check valve balancing line	Yes
7	2	10/2014	Main steam dump valve replacement	Yes
8	3	03/2017	Hot reheat isolation valve equalizer line	Yes
9	7	???	Tube to header replacement	Yes

Repairs to Welding Supplement 8 total ~150 to date

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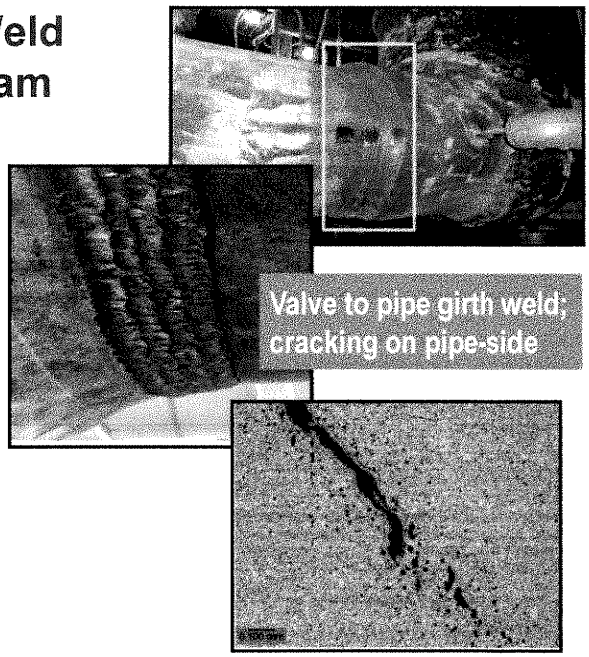
FPL WS8 – Hot Reheat Girth Weld Failure in a Heat Recovery Steam Generator

- 610 mm (24 inch) OD X 27.2 mm (1.072 inch) MWT P91
- Design = 600°C (1110°F)/ 62 barg (900 psig)
- Operating = 595°C (1103°F)/ 52 barg (749 psig)
- 660 mm (26 inch long) circumferential crack at bottom of weld on pipe side weld toe in HAZ including 100 mm (4 inch) thru-wall
- 57,616 hours and 510 cycles at time of failure
- Creep damage (local bending?)



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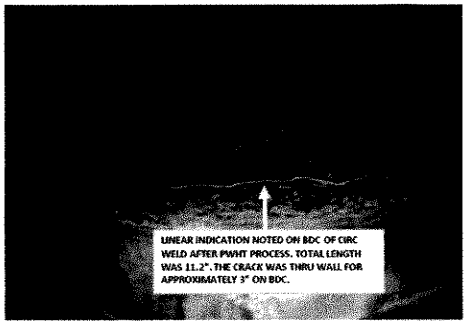
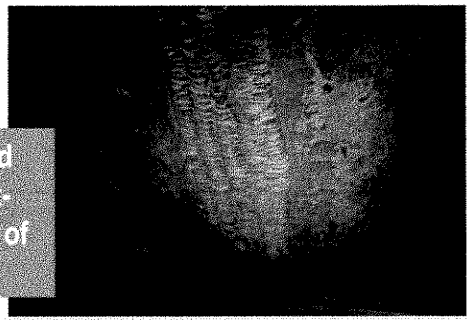
FPL WS8 – Hot Reheat Girth Weld Failure in a Heat Recovery Steam Generator

- **1st repair attempt (cracked):**
  - AWS type -B9 filler with PWHT
  - Weld cracked after PWHT; water present in line during heat treatment
  - 11" long on OD, 3" long thru-wall
- **2nd repair attempt (successful):**
  - ER80S-B8 filler
  - 150°C (300°F) preheat
  - 290°C (550°F) interpass
  - No PWHT
- **Repaired December 2016**
  - >1 year operation to date





Upon removal of weld EPRI to perform post-mortem examination of the repair integrity

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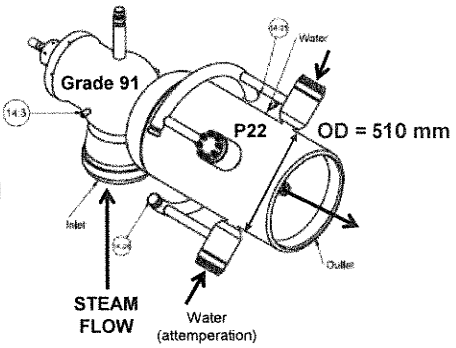
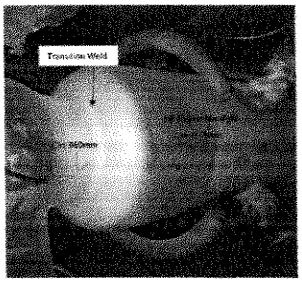
Weld Repair in Steam Conditioning System (UK repair)

- Steam conditioning system on the HP bypass system to the configuration on the right
  - 3 identical HRSGs in fleet
- Design conditions
  - Upstream of attemperation
    - 1062°F (572°C) and 2075 psig (143 barg)
  - Downstream of attemperation
    - 715°F (380°C) and 480 psig (33 barg)





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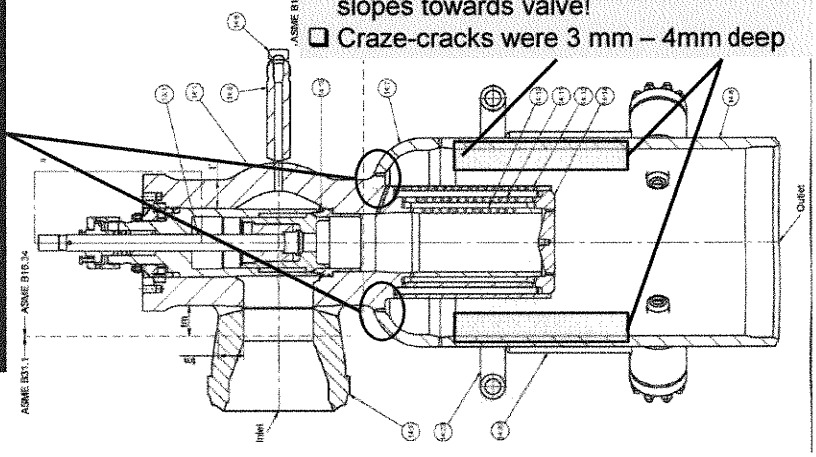
Weld Repair in Steam Conditioning System (UK repair)

- Fatigue crack was present through 2/3 of the weld circumference; maximum depth was 9 mm (25 mm wall thickness)
- Weld metal in this application = -B9
- Crack located at down-stream weld toe
- Weld was made by something like a narrow-gap technique (cap and root similar width).
- Geometry of component made it a difficult grinding operation to maintain constant profile and depth.

- Extensive craze-cracking present upstream of the water sprays (highlighted in red) was observed. Pipe slopes towards valve!
- Craze-cracks were 3 mm – 4mm deep



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Weld Repair in Steam Conditioning System (UK repair)

- Concerns regarding PWHT:
  - Configuration of the Grade 91 valve to P22 would make field PWHT complex and require extensive monitoring
  - Craze cracking the P22 might propagate as a consequence of the PWHT
- Component was scheduled for replacement in 2017
- Repair conducted using AWS type –B8 filler metal and no PWHT in late October 2016; careful attention was given to the surface preparation post-repair to remove stress concentrations
  - Repair recently removed from service after ~1 year of operation

Upon removal of weld EPRI to perform post-mortem examination of the repair integrity

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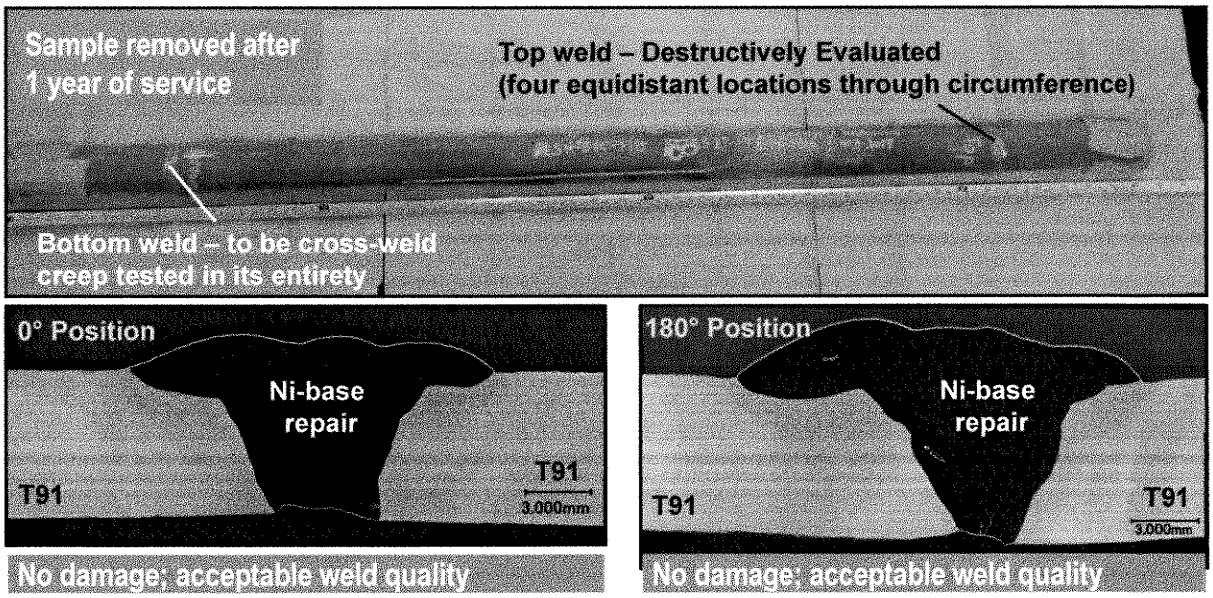
On-going Research Supporting Alternative Weld Repairs

Prairie States Removed WM6 Repair – Post-mortem

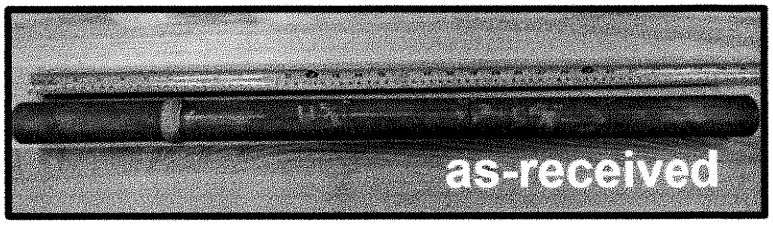


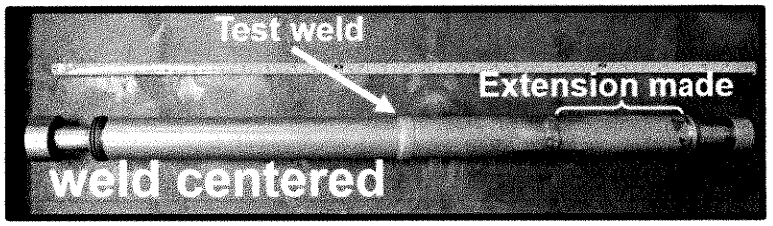
No damage; acceptable weld quality

No damage; acceptable weld quality

Service Exposed Superheat Boiler Tube

- Superheater Tube
  - T91/T91
- Outside diameter
  - 44.5 mm (1.75 inch)
- Wall thickness
  - ~6.35 mm (0.25 inch)
- 1 year in service
- Test weld
  - WM6 repair due to erosion damage





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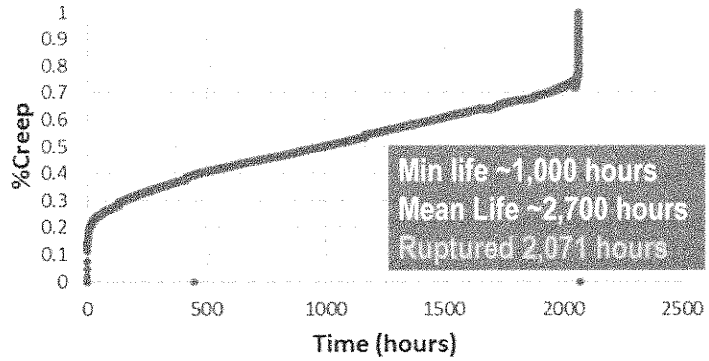
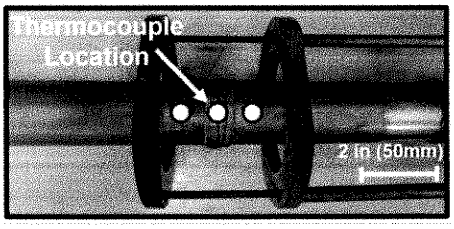
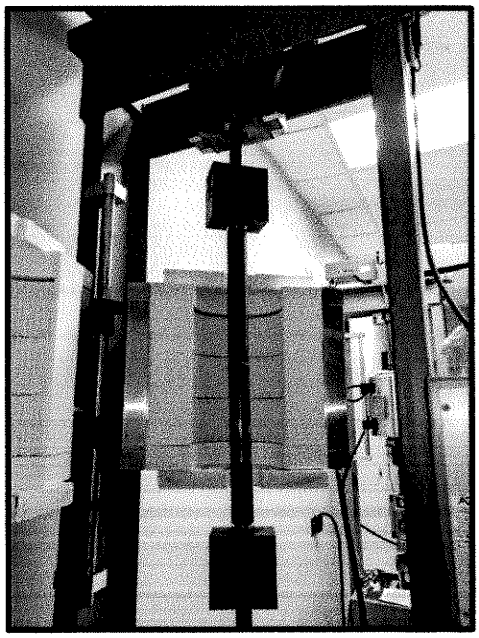
Testing set-up & on-going status







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'Thick-section' Testing of Repairs in DMWs

DMW	Type	PM1	Original Weld	PM2	Repair Excavation	Repair Type	Test Conditions
☆ 1	**Ferritic-Ferritic** Outlet Weld on a Header [No damage]	F91	Type –B8	P22	Minor and Partial	Type –B8 and No PWHT	580°C/80 MPa 580°C/60 MPa 600°C/40 MPa
2	**Ferritic-Ferritic** RT Inspection Port [No damage]	P91	Type –B3	P22	Partial	Type –B8 and No PWHT	580°C/80 MPa 580°C/60 MPa 600°C/40 MPa
☆ 3	**Ferritic-Austenitic** Flow Nozzle [No damage]	P91	ENiCrFe-3	316H	Minor	EPRI P87 and No PWHT	625°C/80 MPa 625°C/60 MPa
4	**Ferritic-Austenitic** Ni-base Transition [No damage]	P91	ERNiCrMo-3	IN625	Minor	ENiCrFe-2 and No PWHT	625°C/80 MPa 575°C/150 MPa

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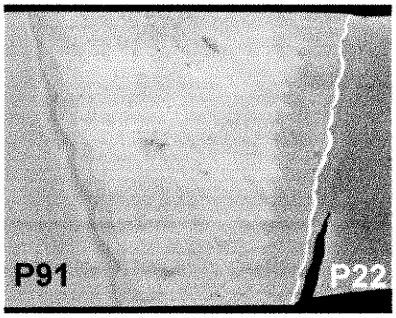
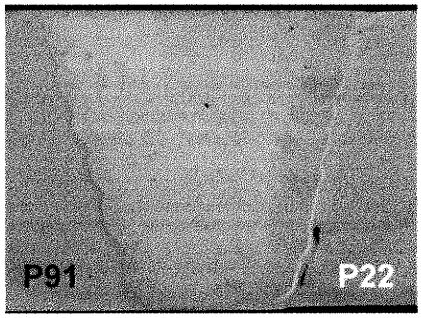
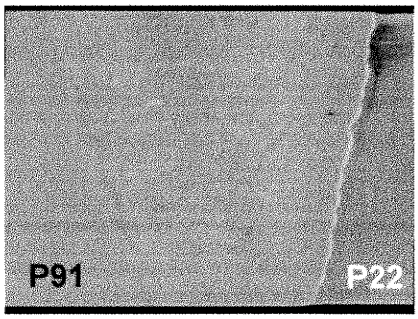
Cross-weld Creep Test Failures in Ex-service DMW



600°C (1112°F)
80 MPa (11.6 ksi)



580°C (1076°F)
60 MPa (8.7 ksi)



600°C (1112°F)
40 MPa (5.8 ksi)

All failures in the ex-service weld are in the P22 HAZ

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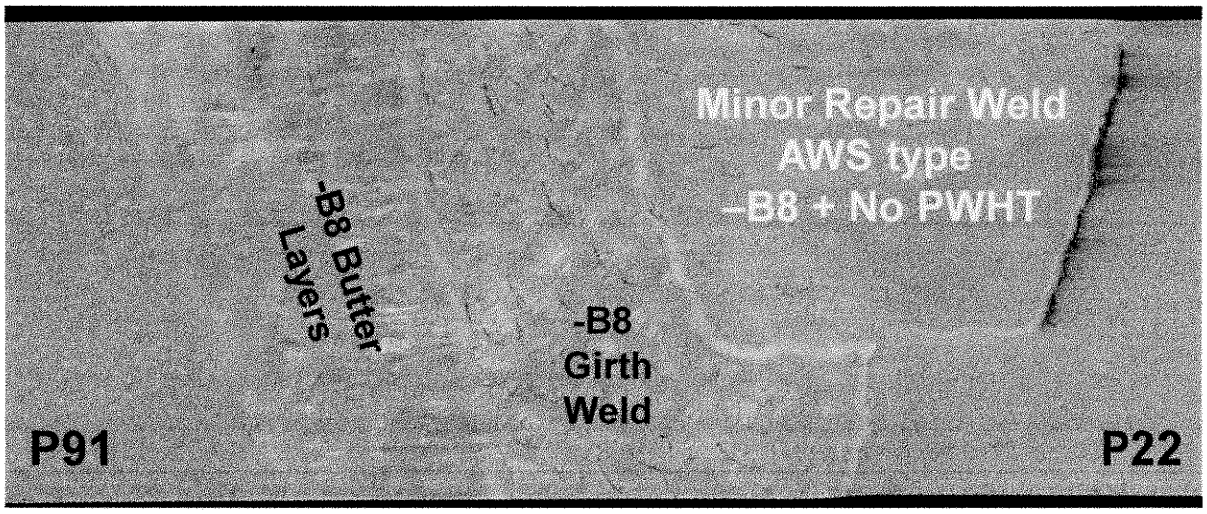
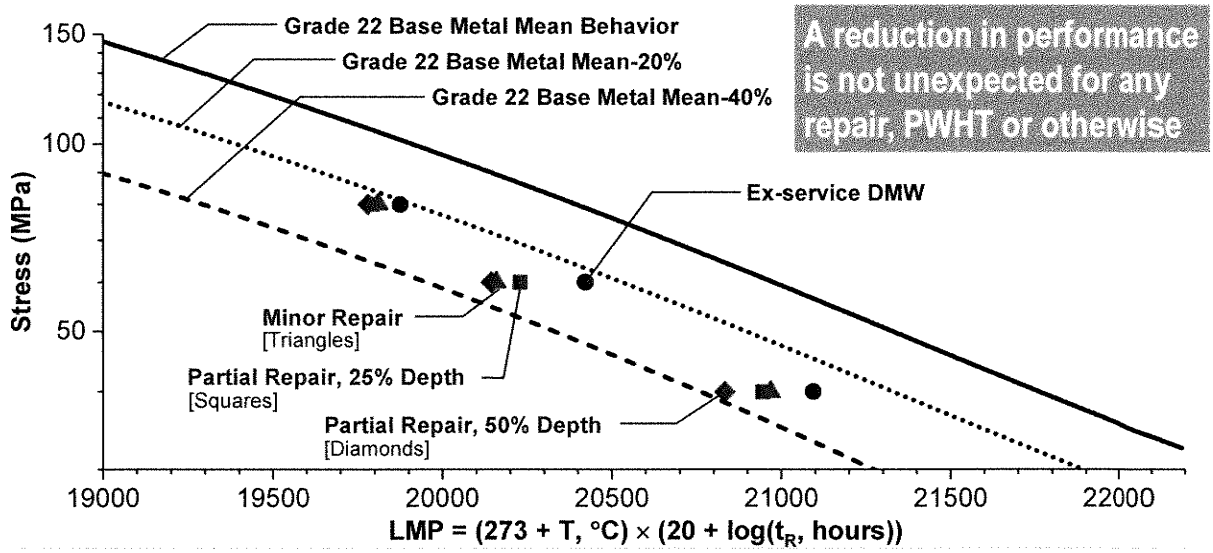
DMW-M1, Macro Sample (600°C; 40 MPa; 10,436h)

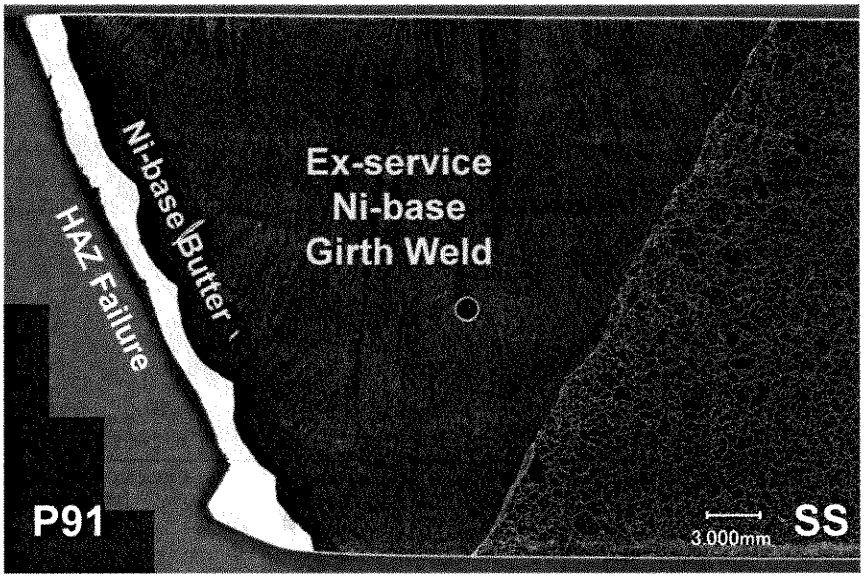


Failure mode for ex-service and repair welds occurs in the P22 HAZ

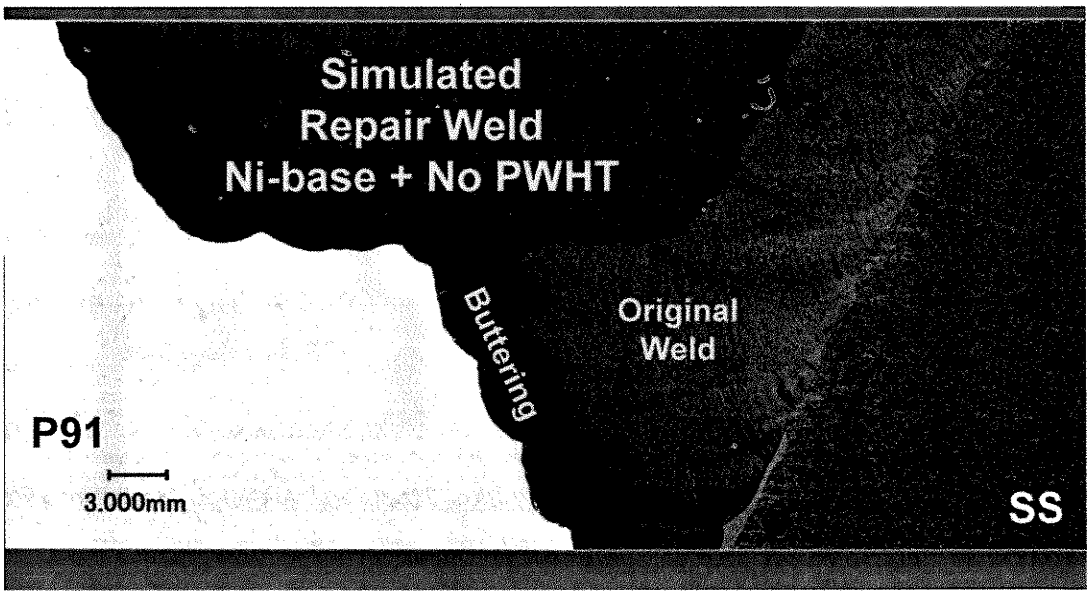
LMP Comparison of Weld Repairs to the Performance of New Grade 22 (NIMS Database) and Ex-service DMW



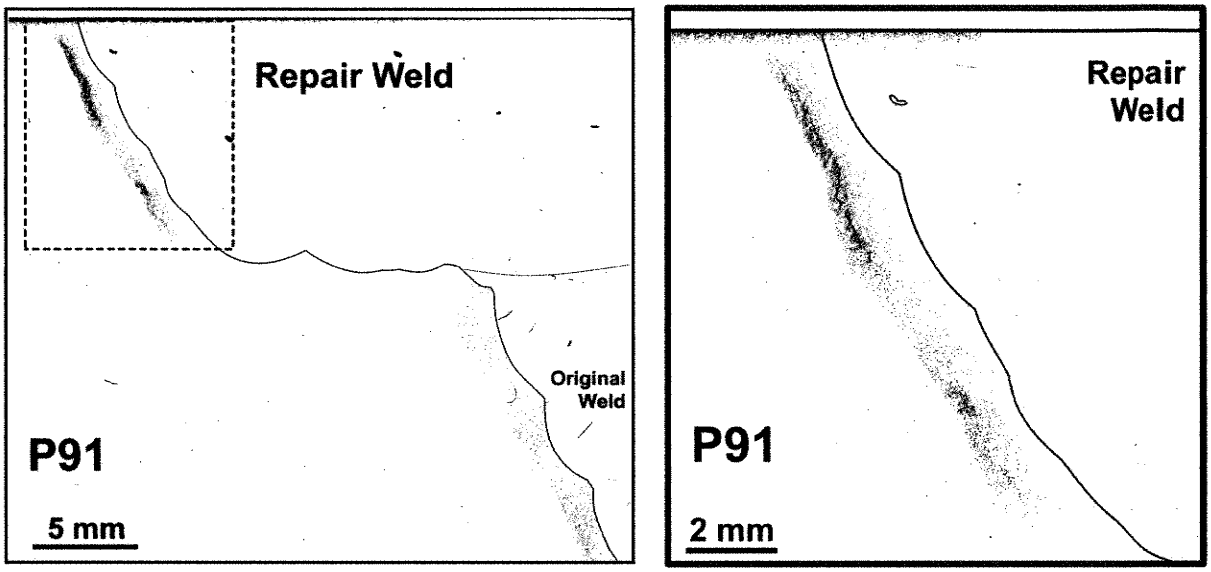
Ex-service DMW; Failure in P91 HAZ



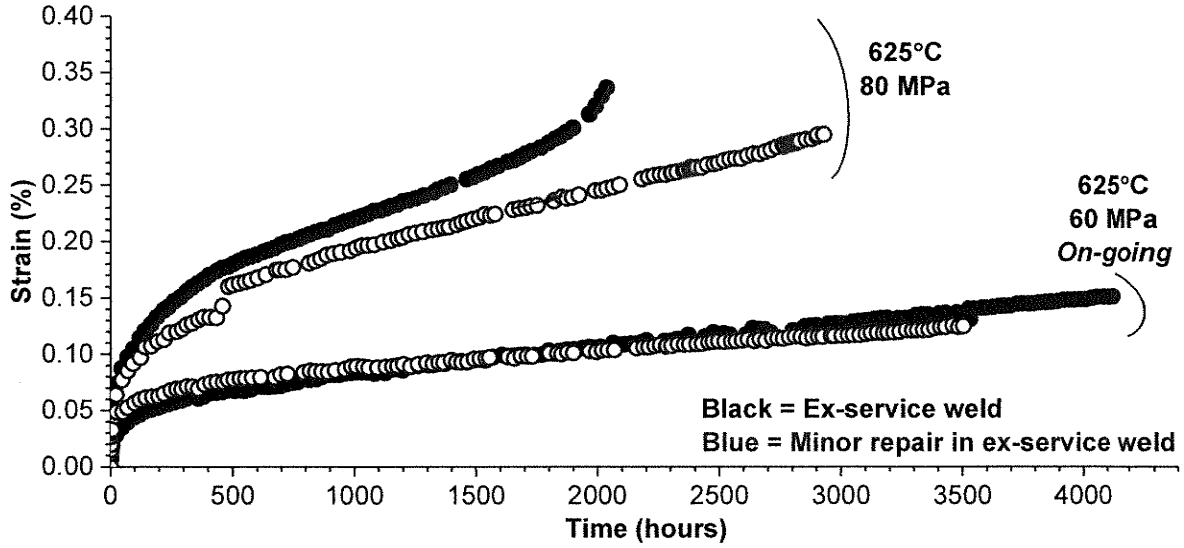
Repaired Ex-service DMW; Failure in P91 HAZ



Repaired Ex-service DMW; As-Polished Macro



Strain:Time Data for Minor Repair



Future Needs and Initiatives

Dissimilar Metal Welds

- Tube to tube repairs; should be a new welding method? If so,
  - **[WM7] P15E to P8 → Ni-base filler metal only without PWHT**
    - This should not be particularly controversial; WM6 already allows for P15E to P15E with Ni-base (effectively all we would like to do is substitute one material with P8)
    - Sufficient supporting data supports this incorporation
  - **[WM8] P15E to P5A → -B8 filler metal only without PWHT**
    - Extensive testing supports this; some would like to see –B3 filler metal without PWHT as an option but at this time we do not have sufficient data
- For Welding Supplement 8
  - New part S8.2.2 "Weld Repair Options for Dissimilar Metal Welds"

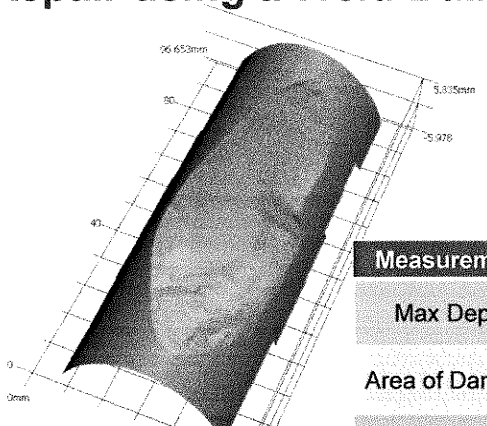
NBIC Part 3; 2017 Edition; 3.3.4.3 Wasted Areas

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.

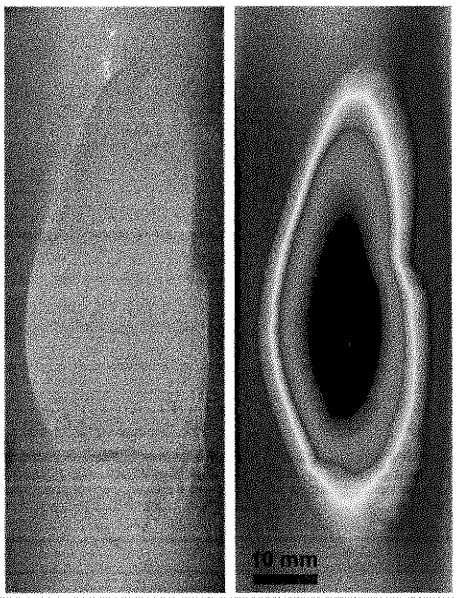
2) The WPS followed shall be qualified for weld metal buildup in accordance with ASME Section IX. When the code of construction required postweld heat treatment (PWHT) for butt welds, the WPS followed for the weld buildup, shall be qualified with PWHT.

Example of Local Erosion in T91/T92 (Ideal example for Repair using a Weld Build-up)



Many examples of local erosion internal to the boiler setting

Measurement	Value
Max Depth	4.6 mm (0.180 inch)
Area of Damage	1,700 mm² (2.65 inch²)
Length	78.9 mm (3.11 inch)
Width	29.5 mm (1.16 inch)



Weld Build-up in T91/T92 – Practical Issues

- 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.
  - ❑ This language was not an issue for low alloy steel tubing which did not require PWHT at the time of new construction
  - ❑ **There is a need for this type of repair in T91 and T92.** However, two issues exist
    1. **How to incorporate into existing Part 3 language?** A new paragraph 3)? A new welding method?
    2. **This example is in need of a 'code case' style consideration. This is due to the difficulty and cost in performing the necessary testing** (e.g. requires pressurized vessel tests). Because the wasted tubing will be internal to boiler, demonstration of weld repair procedure (even with minimal testing) is not a significant safety risk.

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Weld Build-up in T91/T92 – Practical Issues

- We would propose weld repair with over-matching filler metal to that of the tube material (e.g. Ni-base filler metal without PWHT)
- It is likely that this type of repair will exceed the requirements of the application since careful selection of Ni-base filler metal will promote increased erosion/corrosion resistance over that of the ferritic tubing
- Some units (new or replacement) are experiencing significant wastage in <20,000 hours of operation. Tracking of installed repairs on a case-by-case basis would offer more value than experiments

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Fitness For Service

- What does fitness for service mean to you?
  - Varies greatly on personal need and exposure
    - Simple versus complex
    - Difficulty in technology transfer
    - Economic need but prioritization of safety
  - Definition not present in NBIC
- While power generation industry is late to the game, there is an urgent need to adopt FFS methodologies
  - Not all FFS is the same
  - Performing FFS to API-579 does not guarantee relevance. It only guarantees that an assessment was performed to API-579.

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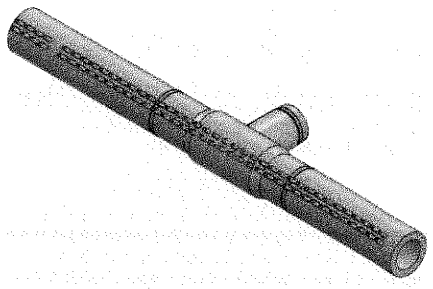
Superheater Outlet Header: Validation of Fitness for Service Methodologies [3002009924]

- Demonstration of a Root Cause Analysis and Condition Assessment linked to fitness for service
- Unique opportunity for validation of fitness for service assessment methodologies based on a component with known damage
- Comparison of the results from in-service non - destructive examination with physical measurements
- Establishes the basis for run/repair/replace decision-making based on analysis of the risk of burst type fracture

If project participation reaches 10 members, burst testing of vessel will be conducted



Details and Contact

- The participant total cost is $50k over two years
- Qualifies for Self-Directed Funds (SDF)

Kent Coleman
(and Jonathan Parker or John Siefert)
kcoleman@epri.com; 704-595-2582

- ***SPN Number: 3002009924***

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Tasks

- The component of interest is an ex-service Grade 22 header with well-pedigreed ligament damage
- Task 1 – Engineering assessment and analysis
  - Review of fabrication, operating and prior inspection records
  - Post-service non-destructive evaluation
  - Analysis and evaluation of methods for assessment
- Task 2 – Pressure test
  - A badly damaged section of the header will be made into a vessel and tested at ambient temperature until leak or burst

Key objective: establish the basis for run/repair/replace decision-making based on analysis of the risk of burst type fracture and as validated by pressure vessel test(s)

Thoughts/Considerations for Fitness for Service

- What makes those who review FFS assessments nervous?
- Can common applications be 'bound' into simplified assessment methodologies which appear as Supplements to Part 2 or Part 3? E.g.
  - Ligament cracking in high temperature headers
  - Long-seam welds in high temperature piping systems
  - Cracking in low temperature drums
  - Etc.
  - This will never incorporate all FFS needs, but may address the most common, say >50% of cases…
- Does the NBIC see itself adopting its own approach to FFS?

Closing Thoughts

Three reports to be made publicly available in 2018:

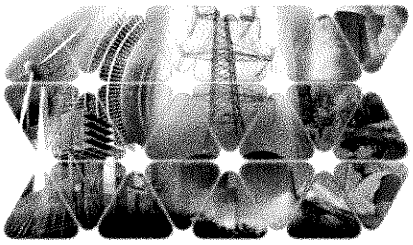
- *Integrated Life Management of Grade 91 Steel Components: A Summary of Research Supporting the Electric Power Research Institute's Well-Engineered Approach.* EPRI, Palo Alto, CA: 2018. 3002012262.
- *Alternative Well-Engineered Weld Repair Options for Grade 91 Steel – Responses to Common Questions and Concerns.* EPRI, Palo Alto, CA: 2018. 3002012182.

Do you have questions/comments/concerns that should be addressed in this document? Please let us know!

- *Alternative Well-Engineered Weld Repair Options for Grade 91 Steel – a Review of Service Experience.* EPRI, Palo Alto, CA: 2018. 3002012183.

Closing Questions/Comments

- Is there more that EPRI can do to help NBIC and/or the industry?
  - It is becoming readily apparent that there is a need to help educate those who participate in the application and/or review of alternative weld repair applications and fitness for service
- If you have reservations regarding:
  - Incorporation of weld repair strategies for DMWs into Part 3 or Welding Supplement 8…
  - Weld build-up repairs internal to the boiler for T91 or T92…
  - Fitness for service…
- Please contact: John Siefert, 704-595-2886 or jsiefert@epri.com so that we can address in the next meeting



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