Date Distributed:

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

SUBCOMMITTEE ON REPAIRS and ALTERATIONS

MINUTES

Meeting of January 16, 2013
Mobile, Alabama

"These minutes are subject to approval and are for committee use only. They are not to be duplicated or quoted for other than committee use. "The National Board of Boiler & Pressure

Vessel Inspectors
1055 Crupper Avenue
Columbus, Ohio 43229-1183
Phone: (614)888-8320
FAX: (614)847-1828

1. Call to Order

The meeting was called to order at 8:00 a.m. by Chairman G. Galanes.

2. Announcements

Secretary J. McGimpsey presented the announcements of events for the week.

3. Adoption of the Agenda

A motion was made and unanimously approved to adopt the presented Agenda.

4. Approval of Minutes of July 17, 2012

A motion was made and unanimously approved to adopt the Minutes of the July 17, 2012 meeting.

5. Review of the Roster (Attachment 1, pages 7-10)

A motion was made and unanimously approved to reschedule the vote for Mr. David Martinez as member of the Subgroups Repair and Alteration General and Specific until the July 17, 2013 meeting.

A motion was made and unanimously approved to reappoint Mr. Angelo Bramucci to both the Subgroups Repair and Alteration General and Specific.

6. Public Review Comments (Attachment 2, page 11)

PR13-0218 Part 3: 2.5.3.2d) SC Repair and Alteration- Please revise the text. The paragraph as written is confusing.

January 2013
A motion was made and unanimously approved 10-0-0-0 to provide a response of #6 (Rejected) with the Action; Need more information.

PR13-0219 ***Part 3: 4.4.1.4 SC Repair and Alteration*** Pre-warming? That is the temperature of the liquid before it is warmed. Revise to read: "... and Table 4.4.1.4 may be used in lieu of notch toughness tests. Table 4.4.1.4 contains minimum liquid temperatures based on metal thickness of the pressure retaining part."

January 2013
A motion was made and unanimously approved 10-0-0-0 to provide a response of #3 (Accepted in principal) with the Action; correct version of revision will be in the 2013 Edition.

PR13-0220 ***Part 3: Table 4.4.1.4 SC Repair and Alteration*** Revise the math symbol. The correct symbol for less than or equal is: <=. There is no slash.

January 2013
A motion was made and unanimously approved 10-0-0-0 to provide a response of #4 (Accepted, changes re incorporated) with the Action; Correct version of revision will be in the 2013 Edition

PR13-0221 ***Part 3, Table 4.4.2*** Delete this table. It should be identical to Table 4.4.1.4. Also the math symbols in Table 4.4.2 need corrected. The slash through the equal sign means not equal. The correct symbol for less than or equal is <=. There is no slash in the symbol.

January 2013
A motion was made and unanimously approved 10-0-0-0 to provide a response of #3 (Accepted in principal) with the action; correct version of revision will be in the 2013 Edition.

PR13-0222 ***Part 3: 4.4.1.3.4 SC Repair and Alteration*** Delete grade70 from the SA-515 reference. There are grades 55, 60, and 65 in addition to grade 70. The table should apply to all.

January 2013
A motion was made and unanimously approved 10-0-0-0 to provide a response of #4 (Accepted, changes re incorporated) with the Action; Correct version of revision will be in the 2013 Edition.

PR13-0223 ***Part 3: 5.5a) SC Repair and Alteration***-Why are R forms exempt from registration? It is expected and many jurisdictions require registration of pressure vessels. It is not logical to register other organizations paper, but not your own. Registration is also a safety issue. There should be cradle to grave documentation for vessels. There is a considerable market in used vessels, and the documentation does not go with the vessels. All repairs and alterations should be registered.

January 2013
A motion was made and unanimously approved 10-0-0-0 to provide a response of #6 (Rejected) with the Action; Committee previously considered, Action not warranted.

7. Interpretations (Attachment 3, page 12)

IN13-0201 ***Part 3, 3.2.2 c), SC on Repair and Alteration,*** **- Question 1**: In accordance with Part3, 5.7.2 c), is the attachment of a repair nameplate to be by a method such as welding, brazing, soldering, or tamper-resistant mechanical fasteners which will not allow easy removal of the nameplate?

January 2013
The SC reviewed the Inquirers question and reply related to attachment of a repair or alteration nameplate using welding, soldering, brazing or by mechanical fasteners. The SC felt that there are no current words in the NBIC text that specifies or requires the method of attachment. The SC decided to propose that the Secretary go back to the National Board staff member who submitted the Inquiry and ask if they would withdraw the item and in-turn the SC would take out a new Action Item to address a code revision for specific attachment requirements of repair or alteration nameplates. There was a motion and the motion was unanimously approved. R. Miletti will be the Project Manager for this item.

IN13-0301 ***Part 3, 3.2.2 c)SC on Repair and Alteration,*** - **Question 1**: Does Part 3, 3.2.2 c) prevent an "R" Certificate Holder with the capabilities within his shop from rolling and welding a shell or other such items as headers, nozzles,(flange to pipe) for replacement in a vessel or boiler has is repairing or altering? (Attachment 3, page 12)

January 2013

The SC reviewed the Inquirers question and reply. The SC discussed the item along with several past interpretations. The SC developed a new question and reply based on existing NBIC text and with a proposed code change to further clarify that an "R" Certificate Holder during manufacturing of parts with welding or fabrication for an ASME component can be done provided the same "R" Certificate Holder installs the welded part. A motion was made and the proposed question and proposed code change to further clarify the interpretation and reply were passed unanimously.

IN13-0401 ***Part 3, 3.2.5, SC Repair and Alteration*****- Question 1**: Is it the intent of the requirements in paragraph 3.2.5 that calculations be both completed and also made available to the Inspector for review prior to the start of any physical work?

January 2013

This Inquiry was reviewed by the SC and because of the complexity related to how review of calculations and approval of calculations is made, the SC assigned R. Cauthon as Project manager to develop a new question and reply. This is considered a Progress report.

8. Action Items (Attachment 4-8, pages 13-45)

NB08-0322 ***Part 3 3.2 SG R/A General*** Add a new paragraph to 3.2 General Requirements for Repairs and Alterations to address change of service for a pressure vessel. These requirements should caution inspectors, owners, repair organizations and jurisdictional authorities of the inherent dangers involved when changing service. A new supplement should be added to address the specific requirements for repairs and alterations of pressure vessels that have been converted from one service to another. A task group representing all three parts of the NBIC has been formed under the leadership of Bob Wielgoszinski. Task group members from R & A are P. Edwards and B. Schulte. (Attachment 4, pages 13-21)

January 2013

A progress report and proposal was presented to the SC by R. Wielgoszinski. A motion was made to approve the proposal. The motion was followed by a discussion that resulted in the motion being withdrawn. R. Wielgoszinski will add a section for change of service from a high pressure boiler to a low pressure boiler and a Review and Comment ballot with the new proposal will be sent to the Main Committee, Subcommittees and Subgroups of Part 1, 2 and 3.

NB10-0110 ***Part 3 S6.19.1 SG R/A Specific, TG DOT*****-** Combine and clarify requirements within S6.15 for TR Forms, S6.18 Preparation of TR-Forms and S6.19 for Reports of Repairs, Alterations and Modifications. Task Group Project Manager- S Staniszewski (Attachment 5, pages 22-27)

January 2013

A progress report and proposal was given by S. Staniszewski. A motion was made to send a Review letter ballot to the R/A SC and R/A SG Specific. The motion passed unanimously.

NB11-0203 ***Part 3, S2.13.9.1 SG on Historical Boilers*** Revise text and Figure to incorporate the correct percentage of wasting allowed. A Task Group consisting of M. Wahl and T. Dillon was assigned. (No Attachment)

January 2013
This item was mistakenly placed on the SC Agenda.

NB11-0701 ***Part 3, S3 5.4 SG Graphite-*** Address Graphite Tube replacement. Task Group Project Manager - C Withers (No Attachment)

January 2013
There was no progress report on this Action Item. The Secretary will contact F. Brown for an update.

NB11-1001 ***Part 3, 3.3.4.9 SG R/A Specific-*** Tube plugging for fire tube boilers. Task Group Project Manager- A. Bramucci, w. Jones, R. Miletti. (Attachment 6, page 27)

January 2013
A progress report was presented to the SC by A. Bramucci. His report described the struggle of the TG to define what requirements are necessary to control tube plugging. Currently some fire tube boiler manufacturers do not endorse tube plugging.

NB11-1201 ***Part 3, 1.8, SG R/A General-*** Revise Part 3, 1.8 "NR" Accreditation requirements to include repairs to ASME Section III stamped components. Task Group Project Manager- C. Withers, P. Edwards, B. Schaefer, B. Wielgoszinski. (No Attachment)

January 2013
A progress report on this Action Item was given by P. Edwards. A proposal will be presented at the July, 2013 meeting.

NB12-0403 ***Part 3 R/A Specific*** CSEF Weld Repair Options using temper bead welding. Task Group Project Manager- G Galanes (Attachment 7, pages 28-44)

January 2013
A progress report and presentation on this Action Item was given by G. Galanes.

NB12-0501 ***Part 3, 3.2.2 c) SG R/A General-*** Hydrostatic testing of pressure parts. Task Group Project Manager- B Wielgoszinski (Attachment 8, page 45)

January 2013
A proposal on this action item was presented to the SC by R. Wielgoszinski. A motion was made to approve the proposal and following discussion, the motion was unanimously approved.

NB12-0801 ***Part 3, SG R/A Specific*** Repair and Alteration of Gasketed PHE's in the field. Task Group Project Manager- E. Ortman, J. Pillow, G. Galanes, B. Wielgoszinski (No Attachment)

January 2013
A progress report was given by E. Ortman, Project Manager. The Task Group will continue to gather information for the next meeting.

NB13-0501 ***Part 3, Figure 3.3.4.6 b) SG R/A Specific***-Add a cautionary or informational note: "Air currents within the tube (i.e. chimney effect) may affect the retention of the shielding gas at the welding arc when using the gas tungsten-arc welding process on the inside of the tube." (No Attachment)

January 2013
The SC felt that a revision was not warranted and a motion was made to close this item. The motion passed unanimously.

9. New Business

10. Future Meetings

July 15-19, 2013, Columbus, Ohio
January 13-17, 2014, San Antonio, TX

11. Adjournment

The meeting was adjourned at 4:00 P.M.

Respectfully Submitted,

Jim McGimpsey, Secretary
:rh

Attendance List Subcommittee Repairs Alterations

Meeting Date: January 16, 2013

Paul Edwards Director, ASME Programs Stone & Webster, Inc. ~~100 Technology Center Drive~~ ~~Stoughton, MA 02072~~ 150 ROYALL ST. CANTON, MA 02021 Ph: 617-589-5690 Fax: 617-589-~~1792~~ 5476 E-mail: paul.edwards@shawgrp.com	Attended: Yes ☑ No ☐ PE *Initial*	**Jim McGimpsey** The National Board 1055 Crupper Ave. Columbus, OH 43229 Ph: 614-431-3233 Fax: 614-847-1828 E-mail: jmcgimp@nationalboard.org	Attended: Yes ☒ No ☐ *Initial*
Mike Webb Xcel Energy 9500 Interstate 76 Henderson, CO 80640 Ph:303-628-2840 Fax: 303-628-2928 E-mail: mike.webb@xcelenergy.com	Attended: Yes ☑ No ☐ *Initial*	**George W. Galanes, PE** Metallurgical Consulting Engineer Diamond Technical Services, Inc./Lisle, IL Office Ph: 630-799-8162 Office 312-925-1341 Cell Fax: ggalanes@diamondtechnicalservices.com	Attended: Yes ☒ No ☐ *Initial*
Bryan Schulte NRG Energy Services 12307 Kurland Drive Houston, TX 77034 Ph: 713-795-1456 Fax: 713-795-1451 E-mail: bryan.schulte@nrgenergy.com	Attended: Yes ☐ No ☒ *Initial*	**Jim Larson** One Beacon Insurance Company 2540 180th Street, East Port Lake, MN 55372 Ph: 952-226-2956 Fax: 952-226-2957 E-mail: jmloghome@earthlink.net + JLARSON@ onecis .com	Attended: Yes ☒ No ☐ *Initial*
James T. Pillow Common Arc Corporation 67 Wyndemere Lane Windsor, CT 06035 Ph: 860-688-2531 Fax: 860-688-2531 E-mail: Jpillow@commonarc.com CELL 860-539-9160	Attended: Yes ☑ No ☐ *Initial*	**Edward Ortman** Alstom Power 175 Addison Road Windsor, CT 06095 Ph: 860-285-2437 Fax: 860-285-3436. E-mail: Edward.m.ortman@power.alstom.com	Attended: Yes ☒ No ☐ EMO *Initial*

Attendance List Subcommittee Repairs Alterations

Meeting Date: January 16, 2013

William Vallance State of Michigan P.O. Box 30254 Lansing, MI 48909 Ph: 517-241-9359 Fax: 517-241-6301 Email: vallancew@michigan.gov	Attended: Yes ☑ No ☐ *Initial*	**James Sekely** Welding Services Inc. 716 Vanderbilt Drive Monroeville, PA 15146 Ph: 412-389-5567 Fax: 724-327-7381 E-mail: jsekely@comcast.net	Attended: Yes ☐ No ☑ *Initial*
Wayne Jones Arise Boiler Inspection and Insurance Company 705 East 4th Street Bay Minette, AL 36507 Ph: 251-937-6225 Fax: E-mail: wayne.jones@ariseinc.com	Attended: Yes ☑ No ☐ *Initial*	**Larry McManamon** Great Lakes Apprenticeship Program 566 W. 95th Street Oak Lawn, IL 60453 Ph: 708.636.6656 Fax: E-mail: Lmac@gLabap.com	Attended: Yes ☐ No ☑ *Initial*
Chad Wayne Bryan State of Tennessee Chief Boiler Inspector Department of Labor and Workforce Development Division of Boiler Inspection 220 French Landing Drive, Second Floor Nashville, Tennessee 37243-1002 Phone :615.741.0488 Fax :615.532.1469 Email: Chad.Bryan@tn.gov	Attended: Yes ☑ No ☐ *Initial*	**Brian Boseo** Graycor Services LLC Two Mid America Plaza, Suite 400 Oakbrook Terrace, IL 60181 7300 Ph: 630-684-~~3016~~ Fax: 630-684-7116 E-mail: brian_boseo@graycor.com	Attended: Yes ☑ No ☐ *Initial*

Attendance List Subcommittee Repairs Alterations

Meeting Date: **January 16, 2013**

Name: Ray Miletti Company: B&W Construction Co. Address: 74 Robinson Ave. City/State/Zip: Barberton, OH. 44203 Ph: 330-860-2589 Ext. Fax: — E-mail: RLMiletti@babcock.com	Name: Rick Valdez Company: ARB, INC. Address: 3500 Pegasus Drive City/State/Zip: Bakersfield, Ca 93308 Ph: (661) 336-6024 Ext. Fax: E-mail: rvaldez@arbinc.com
Name: Thomas White Company: NRG Energy Address: 12301 Kurland Drive City/State/Zip: Houston, TX 77034 Ph: 281-782-4972 Ext. Fax: 713-795-1451 E-mail: tom.white@nrgenergy.com	Name: Angelo Bramucci Company: Alstom Power Inc. Address: 175 Addison Rd. City/State/Zip: Windsor CT 06095 Ph: 860-285-9176 Ext. Fax: E-mail: angelo.c.bramucci@power.alstom.com
Name: Ben Schaefer Company: American Electric Power Address: 1 Riverside Plaza 18th Floor City/State/Zip: Columbus, Ohio Ph: 614-716-1843 Ext. Fax: 614-716-3244 E-mail: bschaefer@aep.com	Name: RANDY CAUTHON Company: ALSTOM POWER INC. Address: 200 GREAT POND City/State/Zip: WINDSOR, CT 06095 Ph: 860-285-3481 Ext. Fax: 860-285-4377 E-mail: randal.t.cauthon@power.alstom.com
Name: Ron Pulliam Company: Babcock & Wilcox-PGG Address: 20 S. Van Buren Ave. City/State/Zip: Barberton, OH 44203 Ph: 330-860-2856 Ext. Fax: E-mail: RLPulliam@babcock.com	Name: David Martinez Company: FM GLOBAL Address: 2100 Reston Parkway City/State/Zip: Reston, VA 20191 Ph: 703-262-6311 Ext. Fax: 703-860-3187 E-mail: david.martinez@fmglobal.com

Attendance List Subcommittee Repairs Alterations

Meeting Date: **January 16, 2013**

Name: Marty Toth Company: Boiler Supply Co. Address: 2950 Foster Creighton City/State/Zip: Nashville, TN 37204 Ph: 615.915.5687 Ext. ~~Fax:~~ Cell 615.504.9004 E-mail: mtoth@boisco.com	Name: BOB WIELGOSZINSKI Company: HSB of CT Address: City/State/Zip: Ph: 860-722-5064 Ext. Fax: E-mail: ROBERT_WIELGOSZINSKI@HSBCT.com
Name: Frank Johnson Company: Toledo Refining CO. Address: 1819 Woodville Rd City/State/Zip: Toledo, Ohio 43616 Ph: 419-386-8450 Ext. Fax: E-mail: Frank.Johnson PBFEnergy.com	Name: Company: Address: City/State/Zip: Ph: Ext. Fax: E-mail:
Name: BRIAN MORELOCK Company: EASTMAN CHEMICAL CO. Address: P.O. BOX 511, B540 City/State/Zip: KINGSPORT, TN 37660 Ph: 423-229-1205 Ext. Fax: 423-229-60099 E-mail: Morelock@eastman.com	Name: Company: Address: City/State/Zip: Ph: Ext. Fax: E-mail:

Members Attendance: 10
SC _Repair and Alteration
Main Committee

Repair and Alteration Subcommittee Public Review Comments

PRC #	Reference Paragraph	Response	Vote A-D-AB-N	Action
PR13-0218	Part 3, 2.5.3	6	10-0-0-0	NEED MORE INFORMATION
PR13-0219	Part 3, 4.4.1.4	3	10-0-0-0	CORRECT VERSION OF REVISION WILL BE IN 2013 EDITION
PR13-0220	Part 3, Table 4.4.1.4	4	10-0-0-0	CORRECT VERSION OF REVISION WILL BE IN 2013 EDITION
PR13-0221	Part 3, Table 4.4.2	3	10-0-0-0	CORRECT VERSION OF REVISION WILL BE IN 2013 EDITION
PR13-0222	Part 3, 4.4.1.3.4	4	10-0-0-0	CORRECT VERSION OF REVISION WILL BE IN 2013 EDITION
PR13-0223	Part 3, 5.5 a)	6	10-0-0-0	COMMITTEE PREVIOUSLY CONSIDERED-ACTION NOT WARRANTED

1. Accepted comment, will incorporate into next draft
2. Accepted comment, no revision required
3. Accepted in principle
4. Accepted, changes are incorporated
5. Accepted for new business action
6. Rejected

IN13-0301

Question: An “R” Certificate Holder is performing a repair on an ASME stamped vessel in the field. To better manage the welding and fabrication work, the “R” Certificate Holder chooses to prefabricate some of the parts in the shop for ultimate use in the field on the vessel being repaired. Are these shop fabricated parts required to be ASME Code stamped and inspected by an Authorized Inspector?

Reply: No, Part 3-3.2.2 c) is meant for parts that are fabricated by organizations other than the R stamp holder for repairs or alterations on which he is working. Motion PASSED.

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

ASME stamping and completion of an ASME data report is not required for parts fabricated by the “R” Certificate Holder that will be used on pressure retaining items being repaired or altered by the same “R” Certificate Holder. The controls for this activity shall be described in the quality control system.

Passed SC RA

Part 2 Revision
New Supplement 9

Supplement 9
Requirements for Change of Service

S9.1 Scope:

This Supplement provides requirements and guidelines to be followed when a change of service or service type is made to a pressure retaining item.

Whenever there is a change of service, the local jurisdiction where the pressure retaining item is to be operated shall be notified for acceptance, when applicable. Any specific jurisdictional requirements shall be met.

S9.2 Classification of Service Changes

S9.2.1 Service Contents

A change in service contents is considered to be any modification to the commodity or contents that the pressure retaining item was originally intended to contain when the pressure retaining item was constructed.

For example, a change:

a) From LP gas service to ammonia service.
b) From lethal to non lethal service.

S9.2.2 Service Type or Change of Usage

A change in service type is considered to be a change of how the pressure retaining item is being used.

For example, a change:

a) From above ground service to underground service for LP gas tanks.
b) From mobile or transport use to stationary use

S9.3 Factors to Consider

Before a change of service is to be made, the owner or user shall consider and evaluate the effects of the new operating conditions or environment on the existing condition and suitability for service of the

pressure retaining item. Various factors will have an impact on the reliability of the pressure retaining item in its new service environment. Changes can be successfully adopted providing there is an understanding of the effect on the pressure retaining item. However, there are some cases where changes are detrimental to the existing pressure retaining item. The owner or user should seek technical guidance of experienced personnel in appropriate areas affected by the change of service (e.g. design, metallurgy, or operations of the pressure retaining item).

The following is a listing of criteria that should be evaluated as appropriate. The criterion is not limited to that listed herein. Other factors may be considered as necessary;

1) Design Consideration:
   a) Thickness of existing vessel material
   b) Vessel or system flow rate or pressure
   c) Weight of vessel with new contents
   d) Existing or additional loads imposed on nozzles and highly stressed areas
   e) Change in pressure or temperature cycling
   f) Compliance to product or industry standards, such as ANSI K61, API 579, or NFPA 58

2) Material Consideration:
   a) Chemical and mechanical properties of existing material or any new material to be added or replaced to assure it has the required strength and toughness to withstand the pressure and temperature effects of the new environment.
   b) Effects of erosion or corrosion
   c) Time dependent effects on service life - creep or fatigue.

3) Environment
   a) Physical condition of the pressure retaining item
   b) Overpressure protection needs
   c) Regulatory environment - Verification of compliance to new or existing jurisdictional rules or regulations.

4) Operational History
   a) A review of current and past operational logs or records should be made to assure that no conditions existed where any further use would render the pressure retaining item hazardous or otherwise unsafe.
   b) Records to be obtained and reviewed would include Data Reports, Repair and Alteration Forms, Inspection reports.

5) Repairs and Alterations Made:

a) A review of any repairs, alterations, reratings, or reconfigurations that have been performed on the pressure retaining item, so as to assure that they will not have a detrimental impact on the intended use.

6) Proposed rework
   a) Any physical work to be performed to restore the material to the existing or intended state or to meet any requirements for the new operating conditions.
   b) Repairs and alterations shall be performed in accordance with NBIC, Part 3.
   c) The effects of heat applied as a result of welding or heat treatment on the material or shaped parts.
   d) The method and extent of any physical or non destructive examination should be considered.
   e) Any physical testing or pressure testing to be performed to determine of verify leak tightness or structural integrity of the pressure retaining item.
   f) The pressure retaining item shall meet the Code requirements for the new environment at the time of change.

7) Documentation
   a) Review existing records that are required to satisfy customer, user, or legal requirements.
   b) Review the need for any marking, stamping, or labeling required for the intended service.
   c) Review the need for developing or revising an inspection plan to ensure safe operation. Refer to Part 2, Section 1.5.2.1 Inspection Plan.

S9.4 Some Examples for Change of Service

The following is a typical list of examples of what constitutes a change in service and some factors to consider. Note: This list is not all inclusive. There may other service changes not mentioned.

Also, the listing of "Factors to Consider" is also not all inclusive. There may be other elements that can influence the safe and reliable operation.

The Owner shall check with the Jurisdiction where the pressure retaining item is to operate in the new environment, and review local building Codes, laws, and regulations for additional requirements or prohibitions against a change of service.

Some examples of Change of Service conditions	
Change	**Some Factors to Consider**
LP gas to ammonia	• PWHT of vessel during construction • Wet-fluorescent magnetic particle testing (WFMT) on

Some examples of Change of Service conditions	
Change	**Some Factors to Consider**
	all internal surfaces • Internal access of vessel is necessary. May need to install manhole.
Ammonia to LP gas	• NFPA-58, paragraph 5.2.1.5 should be consulted. i.e. restriction on maximum volume • Wet-fluorescent magnetic particle testing (WFMT) on all internal surfaces • Internal access of vessel is necessary. May need to install manhole. • Also see, NBIC Part 2, 2.3.6.4
LP gas service: from above ground to underground	• Requires alterations (additional nozzles). • Corrosion protection • See NFPA 58
LP gas to air receiver	• Assurance of vessel cleanliness. i.e. removal of mercaptan. • Appropriateness and number of inspection and drain openings. • Corrosion allowance
Boiler service: Steam to Hot Water	• May require replacement of smaller steam outlet nozzle with larger nozzle to accommodate condensate carryover • Change of Pressure Relief Device
Sulfur dioxide service. Sweet to sour gas service.	• Concern over hydrogen cracking
Inert to Oxidizing atmosphere	• Inspection for damage mechanisms that may be present from previous service life that is detrimental to the vessel in the new environment.
Lethal service to non-lethal	• Design conditions and suitability for service
DOT railcars or ICC transport tanks to stationary service	• Prohibited by DOT regulations (49 CFR 180) for permanent service. • Temporary stationary service permitted as per NFPA 58 • Inspection for damage mechanisms that may be present from previous service life that is detrimental to the vessel in the new environment.

S9.5 Documentation of Change of Service

Any records, forms, or reports required documenting the change of service event that may be required by contract or the jurisdiction where the pressure retaining item operates shall be completed as specified. Such documentation should be retained by the owner or user for future reference or use as needed.

Part 1 Revision
(See next page)

1.4.5.1.1 GUIDE FOR COMPLETING NATIONAL BOARD BOILER INSTALLATION REPORT

1. INSTALLATION: Indicate the type and date of installation — new, reinstalled, or second hand.
2. INSTALLER: Enter the Installer's name and physical address.
3. OWNER-USER: Enter the name and mailing address of the owner-user of the boiler.
4. OBJECT LOCATION: Enter the name of the company or business and physical address where the installation was made.
5. JURISDICTION NO.: Enter the Jurisdiction number if assigned at the time of installation.
6. NATIONAL BOARD NO.: Enter the assigned National Board number.
   Note: Cast-iron section boilers do not require National Board registration.
7. MANUFACTURER: Enter the boiler manufacturer's name.
8. MFG. SERIAL NO.: Enter the assigned boiler manufacturer's serial number.
9. YEAR BUILT: Enter the year the boiler was manufactured.
10. BOILER TYPE: Enter the type of boiler, i.e., watertube, firetube, cast iron, electric, etc.
11. BOILER USE: Enter the service the boiler will be used for, i.e., heating (steam or water), potable water, etc.
12. FUEL: Enter the type of fuel, i.e., natural gas, diesel, wood, etc. If more than one fuel type, enter the types the boiler is equipped for.
13. METHOD OF FIRING: Enter the method of firing, i.e., automatic, hand, stoker, etc.
14. Btu/KW INPUT: Enter the Btu/hr or kw input of the boiler.
15. Btu/KW OUTPUT: Enter the Btu/hr or kw output of the boiler.
16. OPERATING PSI: Enter the allowed operating pressure.
17. ASME CODE STAMP(S): Check the ASME Code stamp shown on the code nameplate or stamping of other certification mark (specify).
18. STAMPED MAWP: Enter the maximum allowable working pressure shown on the nameplate or stamping.
19. HEATING SURFACE SQ. FT.: Enter the boiler heating surface shown on the stamping or nameplate. **Note:** This entry is not required for electric boilers.
20. CAST IRON: Enter the total number of sections for cast-iron boilers.
21. MANHOLE: Indicate whether the boiler has a manway.
22. SPECIFIC ON-SITE LOCATION: Enter the on-site location of the boiler in sufficient detail to allow location of that boiler.

Part 1 Revision

23. PRESSURE RELIEF VALVE SIZE: Enter the inlet and outlet size of all installed boiler safety or safety relief valves.

24. PRESSURE RELIEF VALVE SET PRESSURE: Enter the set pressure of all installed boiler safety or safety relief valves.

25. PRESSURE RELIEF VALVE CAPACITY: Enter the capacity in either lbs. of steam per hour or Btu/hr for each installed boiler safety or safety relief valve.

26. MANUFACTURER: Enter the manufacturer of each installed boiler safety and safety relief valve.

27. LOW-WATER FUEL CUTOFF: Enter the manufacturer's name, type, number, and maximum allowable working pressure of all installed low-water fuel cutoff devices.

28. PRESSURE/ALTITUDE GAGE: Enter the dial range of the installed pressure or altitude gage, cutout valve or cock size, a maximum allowable working pressure, and gage pipe connection size. For steam boilers, indicate gage siphon or equivalent device installed.

29. EXPANSION TANK: Indicate code of construction of installed expansion tank, tank maximum allowable working pressure, and tank capacity in gallons.

30. VENTILATION AND COMBUSTION AIR: Indicate total square inches of unobstructed opening or total cubic feet per minute of power ventilator fan(s) available for ventilation and combustion air.

31. WATER LEVEL INDICATORS: Enter the number of gage glasses and/or remote indicators and connecting pipe size.

32. FEED WATER SUPPLY: Enter the total number of feeding means, connecting pipe size, stop and check valve size, and maximum allowable working pressure.

33. STOP VALVE(S): Enter the number of stop valves installed, valve size, and maximum allowable working

Add new paragraph:

1.5 Change of Service

See NBIC Part 2, Supplement 9 for requirements and guidelines to be followed when a change of service or service type is made to a pressure retaining item.

Whenever there is a change of service, the local jurisdiction where the pressure retaining item is to be operated, shall be notified for acceptance, when applicable. Any specific jurisdictional requirements shall be met.

37. ADDITIONAL REMARKS: Enter any remarks or comments you deem appropriate.

38. INSTALLER'S NAME AND SIGNATURE: Print installer name and registration number and sign completed report.

39. BOTTOM BLOWDOWN CONNECTIONS: Indicate number of valves, valve size, and MAWP. Indicate if piping run is full size to point of discharge.

40. EXTERNAL PIPING ASME CODE AND FUEL TRAIN: Indicate if external piping is ASME Code, if not, indicate what code or standard external piping is manufactured to. Indicate if the fuel train meets the requirements of CSD-1 or NFPA-85, If other indicate code or standard used.

Part 2 Revision

Note: If a vessel has not been properly prepared for an internal inspection, the Inspector shall decline to make the inspection.

1.5.4 POST-INSPECTION ACTIVITIES

a) During any inspections or tests of pressure-retaining items, the actual operating and maintenance practices should be noted by the Inspector and a determination made as to their acceptability.

b) Any defects or deficiencies in the condition, operating, and maintenance practices of the pressure-retaining item shall be discussed with the owner or user at the time of inspection and recommendations made for correction. Follow-up inspections should be performed as needed to determine if deficiencies have been corrected satisfactorily.

c) Documentation of inspection shall contain pertinent data such as description of item, classification, identification numbers, inspection intervals, date inspected, type of inspection, and test performed, and any other information required by the inspection agency, jurisdiction, and/or owner-user. The Inspector shall sign, date, and note any deficiencies, comments, or recommendations on the inspection report. The Inspector should retain and distribute copies of the inspection report, as required.

d) The form and format of the inspection report shall be as required by the Jurisdiction. Where no Jurisdiction exists, forms NB-5, NB-6, or NB-7 (see NBIC Part 2, 5.3) or any other form(s) required by the inspection agency or owner-user may be used as appropriate.

Add new paragraph:
1.6 Change of Service
Supplement 9 provides requirements and guidelines to be followed when a change of service or service type is made to a pressure retaining item.
Whenever there is a change of service, the local jurisdiction where the pressure retaining item is to be operated, shall be notified for acceptance, when applicable. Any specific jurisdictional requirements shall be met.

3.2.5 CALCULATIONS

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

3.2.6 REFERENCE TO OTHER CODES AND STANDARDS

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

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

(a) National Board *Bulletin* - National Board Classic Articles Series;

(b) ASME PCC-1, Guidelines for Pressure Boundary Bolted Flange Joint Assembly;

(c) ASME PCC-2, Repair of Pressure Equipment and Piping.

3.3 REPAIRS TO PRESSURE-RETAINING ITEMS

3.3.1 DEFECT REPAIRS

Add new paragraph:

3.2.7 Change of Service

See NBIC Part 2, Supplement 9 for requirements and guidelines to be followed when a change of service or service type is made to a pressure retaining item.

Whenever there is a change of service, the local jurisdiction where the pressure retaining item is to be operated, shall be notified for acceptance, when applicable. Any specific jurisdictional requirements shall be met.

b) The Inspector, with the knowledge and understanding of jurisdictional requirements, shall be responsible for meeting jurisdictional requirements and the requirements of this Code;

c) The "R" Certificate Holder's Quality System Program shall describe the process for identifying, controlling, and implementing routine repairs. Routine repairs shall be documented on Form R-1 with this statement in the Remarks section: "Routine Repair.";

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

NB 10-0110

S6.14 GENERAL STAMPING REQUIREMENTS

The stamping of or attaching of a nameplate to a pressure-retaining item shall indicate that the work was performed in accordance with the requirements of this Code and any requirements of the Competent Authority. Such stamping or attaching of a nameplate shall be done only with the knowledge and authorization of the Inspector and Competent Authority. The "TR" Certificate Holder responsible for the repair or the construction portion of the modification/alteration shall apply the stamping. For a re-rating where no physical changes are made to the pressure-retaining item, the "TR" Certificate Holder responsible for the design shall apply the stamping. Requirements for stamping and nameplate information are shown in NBIC Part 3, Section 5.

S6.14.1 SPECIFIC "TR" STAMPING AND NAMEPLATE REQUIREMENTS

Comment [s1]: Old S6.19.2

The holder of a "TR" *Certificate of Authorization* is required to affix a stamping or nameplate on the Transport Tank that indicates, as appropriate, that the repair, alteration, or modification has been performed in accordance with the requirements of NBIC Part 3, Supplement 6 and the additional requirements of the code of construction. All repairs, alterations, and modifications, after acceptance by the Registered Inspector, shall have the "TR"
Symbol affixed to the stamping or the nameplate.
The stamping or nameplate information shall satisfy the requirements of (a) thru (g) below:

a) The required data shall be in characters at least 4 mm (5/32 in.) high;

b) The markings may be produced by casting, etching, embossing, debossing, stamping, or engraving;

c) The selected method shall not result in any harmful contamination or sharp discontinuities to the pressure- retaining boundary of the Transport Tank;

d) Stamping directly on the Transport Tank, when used, shall be done with blunt-nose continuous or blunt- nose interrupted dot die stamps. If direct stamping would be detrimental to the item, required markings may appear on a nameplate affixed to the Transport Tank;

e) The "TR" Certificate Holder shall use its full name as shown on the *Certificate of Authorization* or an ab- breviation acceptable to the National Board;

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

g) The date of each repair, alteration, or modification corresponding with the date on the Form TR-1 shall be stamped on the nameplate.

S6.14.2 REMOVAL OF ORIGINAL STAMPING OR NAMEPLATE

If it becomes necessary to remove the original stamping, the Inspector shall, subject to the approval of the Competent Authority, witness the making of a facsimile of the stamping, the obliteration of the old stamping, and the transfer of the stamping. When the stamping is on a nameplate, the Inspector shall witness the transfer of the nameplate to the new location. Any relocation shall be described on the applicable NBIC "TR" Form. The restamping or replacement of a code symbol stamp shall be performed only as permitted by the governing code of construction.

NB 10-0110

Page 216

S6.15 "TR" FORMS

S6.15.1 DOCUMENTATION

Repairs, alterations, or modifications that have been performed in accordance with the NBIC shall be docu- mented on Form TR-1, *Report of Repair, Alteration, or Modification*, as shown in NBIC Part 3, Section 5. Form TR-2, *Report Supplementary Sheet*, shall be used to record additional data when space is insufficient on Form TR-1.

S6.15.2 PREPARATION OF TRFORMS

Preparation of “TR” Forms shall be the responsibility of the “TR” Certificate Holder performing the repairs,
alterations, or modifications. An Inspector shall indicate acceptance by signing the appropriate “TR” form.

S6.15.3
DISTRIBUTION

a) Legible copies of the completed Form TR-1 together with attachments shall be distributed to the owner or user, the Inspector, and the Competent Authority, as required, and the Authorized Inspection Agency responsible for the inspection.

b) Distribution of the Form TR-1 and attachments shall be the responsibility of the organization performing the repair.

S6.15.4 REGISTRATION OF FORM TR-1 AND FORM TR-2

a) Organizations performing repairs, alterations, or modifications under the “TR” program must register such
repairs, alterations, or modifications with the National Board.
b) The repair organization shall maintain a sequential Form “TR” Log that shall identify the following:

1) Form number assigned for Form TR-1;

2) Identify if the activity was a repair, alteration, or modification; and

3) Date sent to the National Board

.

S6.16 ADDITIONAL REQUIREMENTS FOR REPAIRS, ALTERATIONS, OR MODIFICATIONS

S6.16.1 SCOPE

This section provides additional requirements for repairs, alterations, or modifications to DOT Transport Tank pressure-retaining items and shall be used in conjunction with NBIC Part 3.

S6.16.2 REPAIRS OF DEFECTS

Before a repair is made to a defect in a welded joint or base metal, care should be taken to investigate its cause and to determine its extent and likelihood of recurrence. This information shall be made available to the Inspector.

S6.16.3 MODIFICATIONS

All modifications to the pressure-retaining item shall meet the requirements of NBIC Part 3, Section 6.

S6.16.4 DRAWINGS

Drawings or instructions shall be prepared to describe the repair, alterations, or modification. Drawings shall include sufficient information to satisfactorily perform the activity.

S6.16.5 AUTHORIZATION

Repairs, alterations, or modifications to a pressure-retaining item shall not be initiated without the authorization of the Inspector, who shall determine that the repair methods are acceptable and subject to acceptance of the Competent Authority.

NB 10-0110

S6.17 EXAMINATION AND TEST

The following requirements shall apply to all repairs, alterations, or modifications to DOT Transport Tank pressure-retaining items:

a) The integrity of repairs and replacement parts used in repairs, alterations, or modifications shall be verified by examination and test;

b) The “TR” Certificate Holder is responsible for all activities relating to examination and test of repair, alterations, or modifications;

c) Examination and tests to be used shall be subject to acceptance of the Inspector and the Competent Authority.

S6.17.1 METHODS

One, or a combination of the following examination and methods, shall be applied to DOT Transport Tank pressure retaining itmes with the concurrence of the Inspector and the Competent Authority.

a) Liquid Pressure Test
Pressure testing of repairs shall meet the following requirements:

1) Pressure tests shall be conducted using water or other suitable liquid. The test pressure shall be the minimum required to verify the leak tightness integrity of the repair, but not more than 150% of the maximum allowable working pressure (MAWP) stamped on the pressure-retaining item, as adjusted for temperature. When original test pressure included consideration of corrosion allowance, the test pressure may be further adjusted based on the remaining corrosion allowance;

2) During a pressure test where the test pressure will exceed 90% of the set pressure of the pressure relief device, the device shall be removed whenever possible. If not possible, a test gag should be used using the valve manufacturer’s instructions and recommendations;

3) Hold time for the pressure test shall be a minimum of 10 minutes prior to examination by the Inspec- tor. Where the test pressure exceeds the MAWP of the item, the test pressure shall be reduced to the MAWP for close examination by the Inspector. Hold time for close examination shall be as necessary for the Inspector to conduct the examination;

b) Pneumatic Test
A pneumatic test may be conducted. Concurrence of the owner shall be obtained in addition to that of the Inspector and the Competent Authority where required. The test pressure shall be the minimum required to verify leak tightness integrity of the repair, but shall not exceed the maximum pneumatic test pressure of the original code of construction. Precautionary requirements of the original code of construction shall be followed;

c) Nondestructive Examination
Nondestructive examination (NDE) may be conducted. NDE methods shall be suitable for providing meaningful results to verify the integrity of the repair.

NB 10-0110

Page 218

PART 3 — REPAIRS AND ALTERATIONS 2011

S6.18 REPAIRS, ALTERATIONS, OR MODIFICATION REPORTS

a) If repairs, alterations, or modifications are performed on a Transport Tank, i.e., cargo tank, portable tank, or ton tank, the Owner or User shall have the activity performed by a Repair Organization that has a valid "TR" *Certificate of Authorization* issued by the National Board.

b) The repair, alteration, or modification shall be recorded on the Form TR-1. If additional space is needed to properly record the repair, alteration, or modification, Form TR-2 shall be used.

c) It is the responsibility of the "TR" Symbol Stamp Holder to prepare, distribute, and maintain the Form TR-1 and, if required, Form TR-2. The Form(s) shall be distributed as follows:

1) Owner-User;

2) Registered Inspector;

3) Competent Authority (DOT); and

4) National Board.

d) The Form TR-1 shall be signed by a Registered Inspector as defined in NBIC Part 3, S6.7.1.

Page 219

PART 3 — REPAIRS AND ALTERATIONS 2011

.

Page 220

Part 3 – Repairs and Alterations Page 75

Proposed Changes
NB11-1001

1) Engineering evaluation of the defect in the pressure-retaining item shall be conducted using one or more fitness-for-service condition assessment method(s) as described in NBIC, Part 2, 4.4. Engineering evaluation of the condition assessment results shall be performed by an organization that has demonstrated industry experience in evaluating pressure-retaining items as referenced in NBIC, Part 2, S5.3.

2) If engineering evaluation indicates a defect can remain in the pressure-retaining item, a risk-based inspection program shall be developed and implemented based on review and acceptance by the Inspector and, when required, the Jurisdiction. The risk-based inspection program shall be in accordance with the requirements in NBIC, Part 2, 4.4.

3) The fitness-for-service condition assessment and risk-based inspection programs shall remain in effect for the pressure-retaining item until such time that the defect can be completely removed and the item repaired. The fitness-for-service condition assessment method, results of assessment, and method of weld repair shall be based inspection program developed and implemented as required by Paragraph 3.3.4.8. The inspection interval shall not exceed the remaining life of the item, and shall be documented on the FFSA Form and in the remarks section of the Form R-1. The FFSA Form shall be affixed to the Form R-1 when weld repairs are performed in 3.3.4.8. A07

6) A copy of the completed Form R-1 with the completed FFSA Form attached may be registered with the National Board, and when required, filed with the Jurisdiction where the item was installed.

Insert New Para. Here

3.3.5 REPAIR OF ASME SECTION VIII, DIVISION 2 OR 3, PRESSURE VESSELS

3.3.5.1 SCOPE

The following requirements shall apply for the repair of pressure vessels constructed to the requirements of Section VIII, Division 2 or 3, of the ASME Code.

3.3.5.2 REPAIR PLAN

Section 3.3.4.9 TUBE PLUGGING IN FIRETUBE BOILERS

When tube plugging in a firetube boiler is performed, the following requirements should be met:

1. If tube replacement is not practical at the time the defect is found, plugging of tubes in a firetube boiler may be considered and only conducted after authorization by the Inspector and, where required, the jurisdiction.

2. The manufacturer should be consulted and repair procedure evaluated to determine the scope of repair and address operating or safety concerns.

3. If welded repairs or replacement of pressure retaining parts are conducted, all welding and material shall be in accordance to the original code of construction or as noted in the applicable sections of the NBIC.

4. Plugged tubes impact the pressure boundary and the safe and efficient process of combustion in the boiler unit. Thus, when practical, plugs should be removed and the tube replaced.

Rational: An effort to address many jurisdictions and repair organizations concerns with the tube plugging of firetube boilers and procedures that are performed on a continuous basis and to assist in unifying basic requirements following guidelines of the NBIC.
Tube plugging is presently being performed using various processes such as welding, and mechanical methods such as driving and expanding to existing tubes (sleeved or un-sleeved) or tube sheet holes when tubes are removed.
The Task Group considered the scope of the NBIC should only address the repairs that pertain to replacement of tubing or when tubing involves welding in its repair method. The task group felt that the plugging of a tube or tubes in a firetube boiler is a deviation from its original operating parameters and the manufacturer's original design. The NBIC should not address mechanical repair methods, and could not safely determine a repair procedure or process when the various effects on the pressure boundaries, heat transfer and byproducts of combustion are unknown. The Task Group endorse the use of should vs. shall as documented so cases where it is not necessary to consult the manufacturer, particularly if you have an experienced and knowledgeable R stamp holder who can make the necessary design considerations (both structural and performance related). The original Manufacturer may not even exist in some cases.

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Update of EPRI Project on Weld Repair of Grade 91 Piping and Components

George Galanes, Jonathan Parker, John Siefert

NBIC Meeting, Mobile, Alabama
January 14th -17th

Project Objectives

- Ensure that the repair methods used are selected based on accurate technical understanding. Specific aims are to:
  - Understand how to remove damaged material efficiently and without introducing additional problems which could influence future performance
  - Develop the ability to make repairs in Grade 91 steel, which will provide the required service life
  - Develop follow-up inspection and assessment requirements consistent with safe and reliable operation
- **It is absolutely critical to provide a well-engineered solution**

Phase 1 – Rank Repair Performance

- Discussion of Methods and Extent of Excavation,
- Weld Procedure Considerations (including consumables) and Heat Treatment
- Post Repair evaluation of microstructure, damage etc
- Specimen Geometry and Testing Conditions
- Development of Test Matrix, cross weld creep, others?
- Analysis to identify **best option repairs** – 'best option' to be based on factors such as speed of welding, initial quality, creep life

20 weldments were made and tested to fulfill outlined objectives above

Phase 1 Completed

- 20 weldments completed and analyzed
  - Microstructure
  - Hardness
  - Creep tests (1157°F, 625°C and 11.6ksi, 80MPa)
- Phase 1 results enabled a down selection of consumables for a wide variety of engineering considerations

Phase 2 – Application of Best Option Methods to Ex-service Header

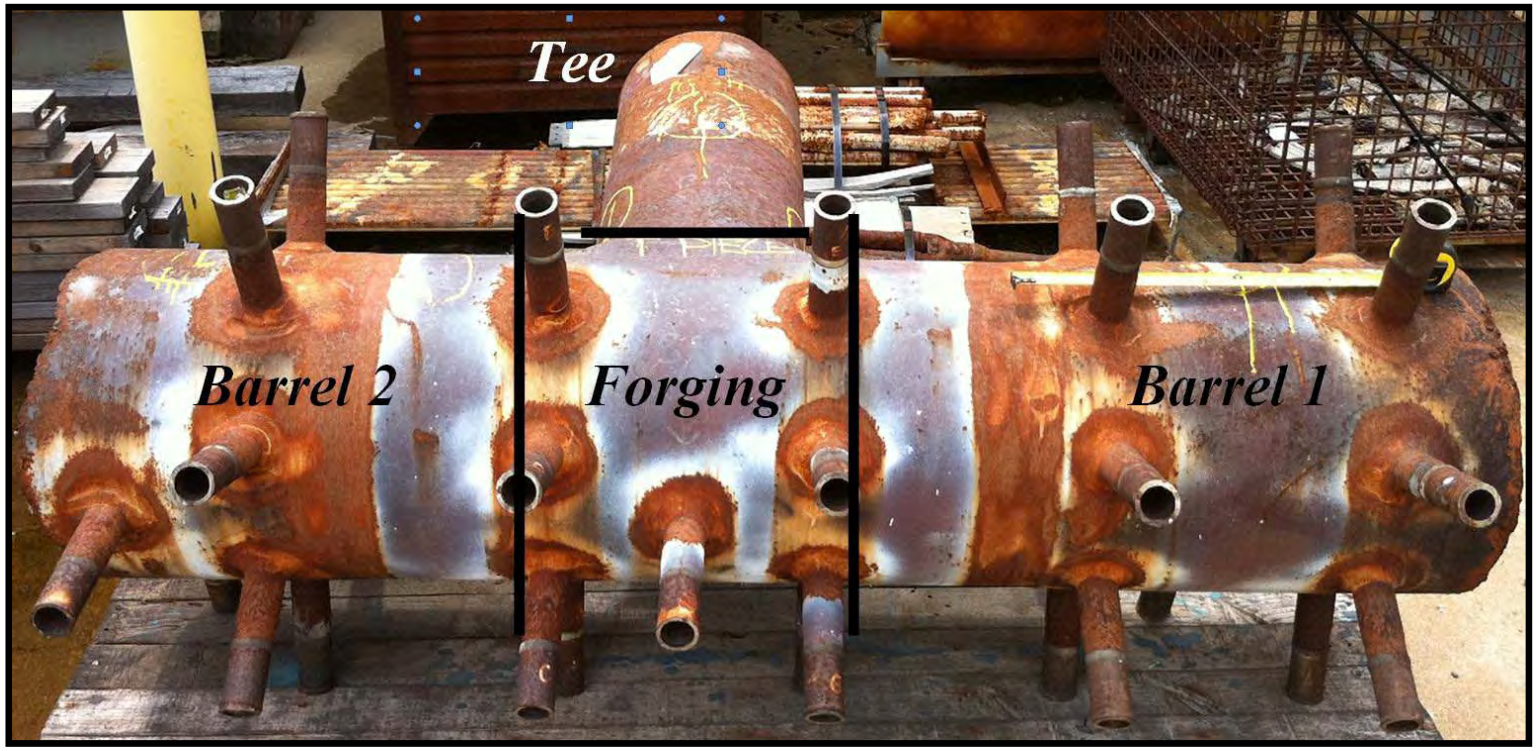
- Discussion of Methods and Extent of Excavation,
- Weld Procedure Considerations (including consumables) and Heat Treatment
- Post Repair evaluation of microstructure, damage etc
- Specimen Geometry and Testing Conditions
- Development of Test Matrix, cross weld creep, others?
- Data Analysis and Report Preparation

Welding Procedures for Phase 2

12 Total Simulations in Ex-service Header

- Three filler metals
  - Single Layer Temperbead + Ni-base Filler Metal (EPRI P87)
  - Single Layer Temperbead + Fe-base Filler Metal (E8015-B8)
  - Normal Welding Procedure + Matching Filler Metal (E9015-B9) + Low PWHT (1250°F, 676°C/2h)
- Four repair scenarios
  - Minor
  - Partial
  - Full (reinforcement left in root)
  - Full (no reinforcement left in root, backing bar utilized)

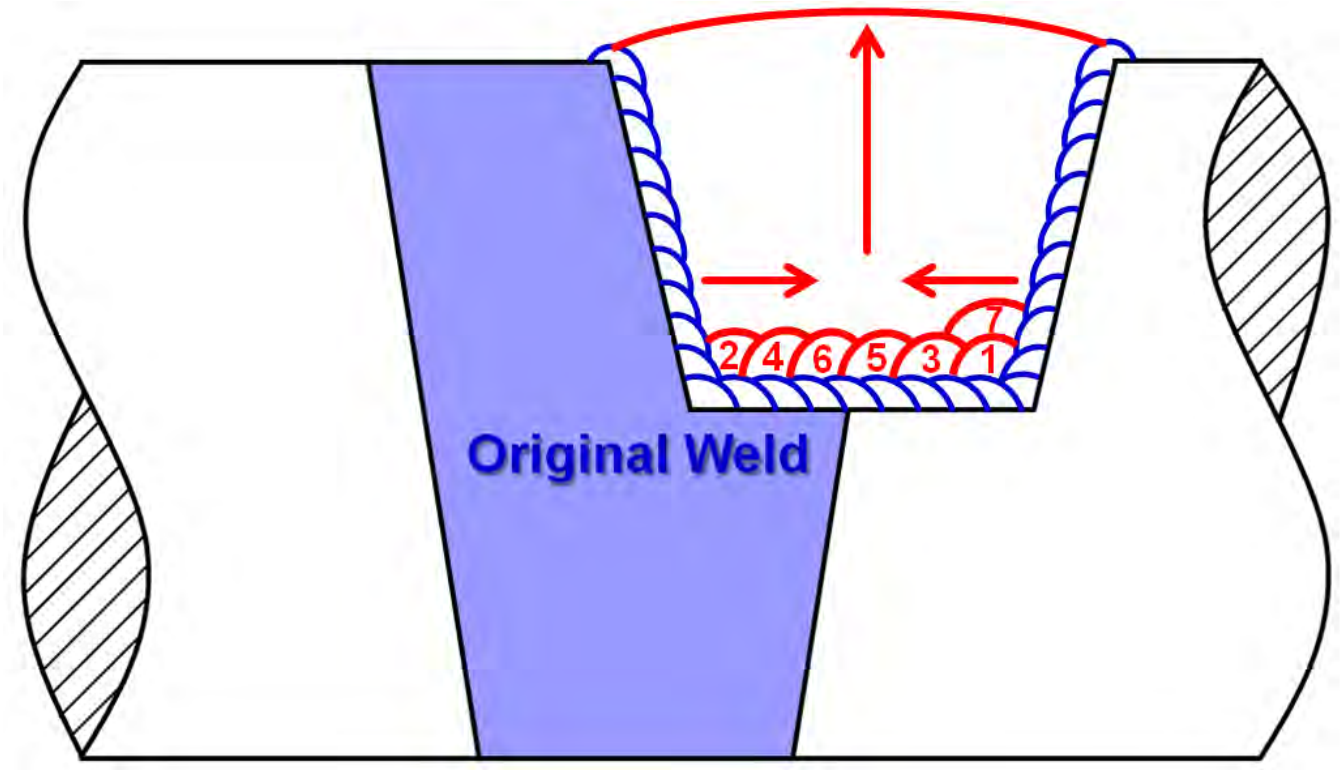
Repairs Conducted in Ex-service Gr. 91 Header



- Minor repair – conducted in barrel 1
- Partial repair – conducted in barrel 2
- Full repair (reinforcement left in root) – conducted in forging
- Full repair (no reinforcement, with backing bar) – conducted between ends cut from barrel 1 and barrel 2

Schematic of Welding Approach – Minor Repair

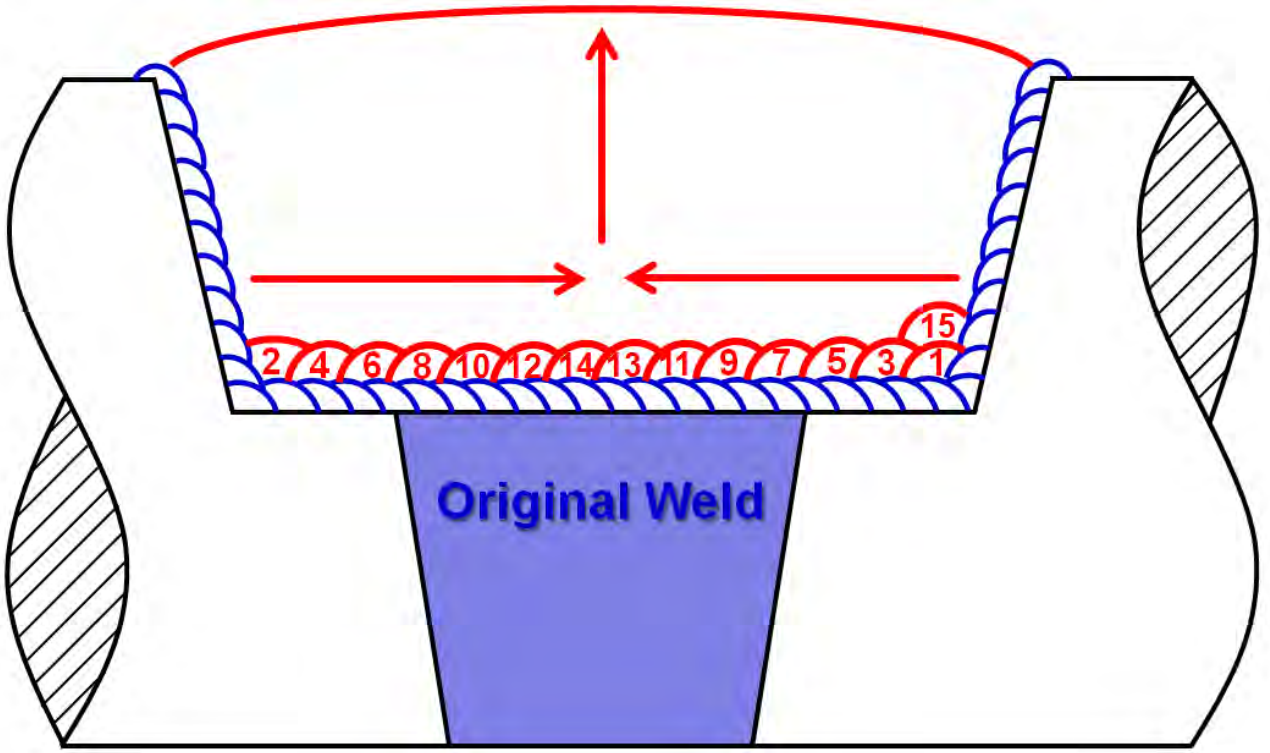
Methodology Specific to E8015-B8 and EPRI P87 Filler Metal



- Blue = 1 single layer of 3/32” (2.5mm) + >50% overlap bead to bead within a layer
  - *Light grind of single layer to remove all slag prior to fill (but NOT half-bead)*
- Red = fill passes of 1/8” (3.2mm) using typical stringer bead procedure
- Note: for E9015-B9, 1/8” (3.2mm) for all fill passes (no single layer temperbead)

Schematic of Welding Approach – Partial Repair

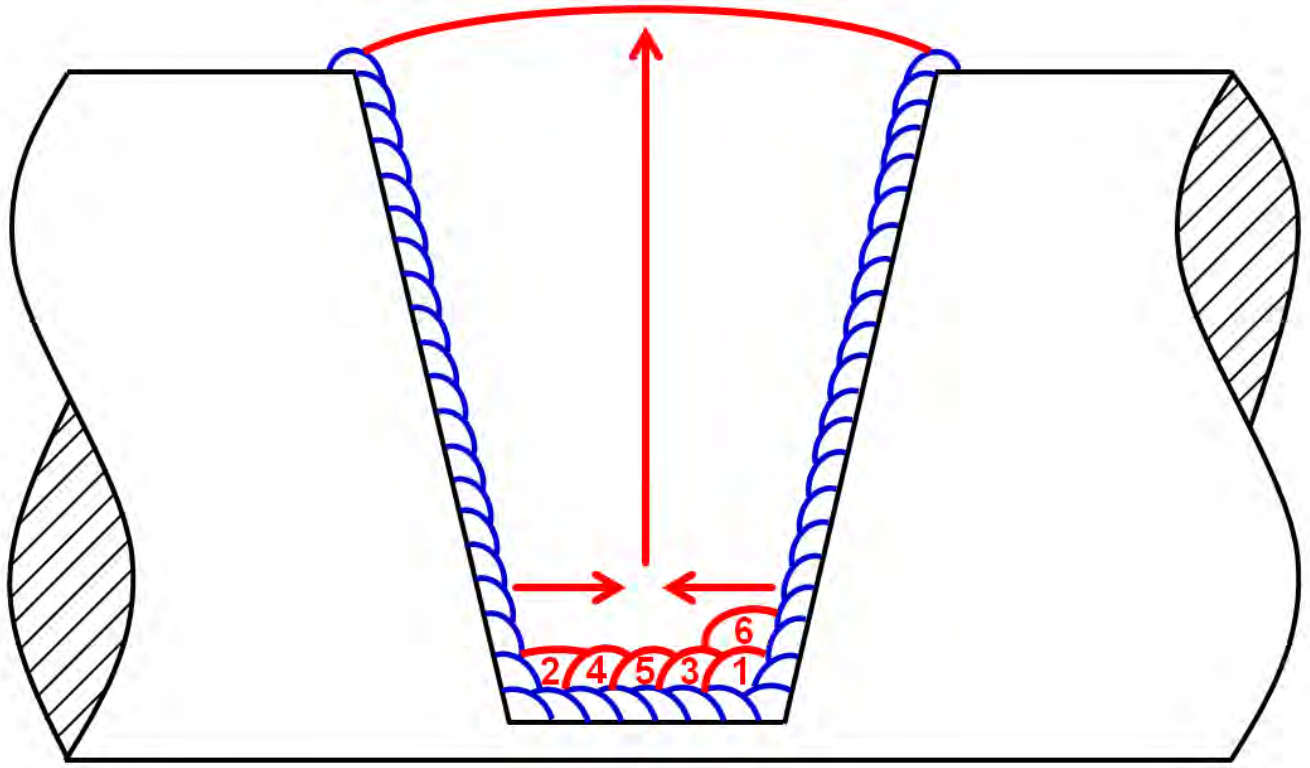
Methodology Specific to E8015-B8 and EPRI P87 Filler Metal



- Blue = 1 single layer of 3/32” (2.5mm) + >50% overlap bead to bead within a layer
  - *Light grind of single layer to remove all slag prior to fill (but NOT half-bead)*
- Red = fill passes of 1/8” (3.2mm) using typical stringer bead procedure
- Note: for E9015-B9, 1/8” (3.2mm) for all fill passes (no single layer temperbead)

Schematic of Welding Approach – Full Repair

Methodology Specific to E8015-B8 and EPRI P87 Filler Metal



- Blue = 1 single layer of 3/32” (2.5mm) + >50% overlap bead to bead within a layer
  - *Light grind of single layer to remove all slag prior to fill (but NOT half-bead)*
- Red = fill passes of 1/8” (3.2mm) using typical stringer bead procedure
- Note: for E9015-B9, 1/8” (3.2mm) for all fill passes (no single layer temperbead)

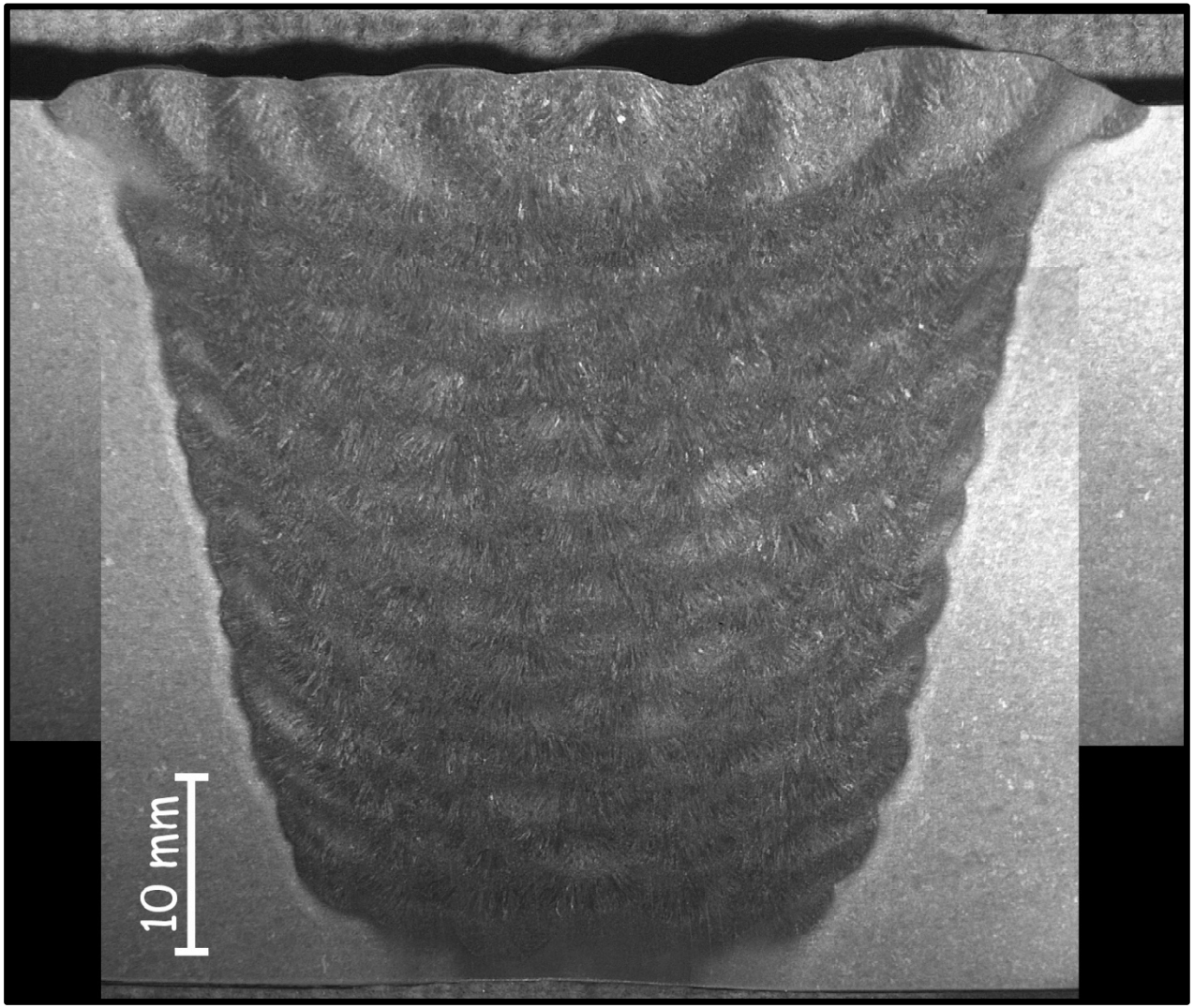
EPRI ELECTRIC POWER RESEARCH INSTITUTE

Table of Welds and Details for Phase 2

TBW = Temperbead, N+PWHT = Normal+1250°F (676°C)/2h

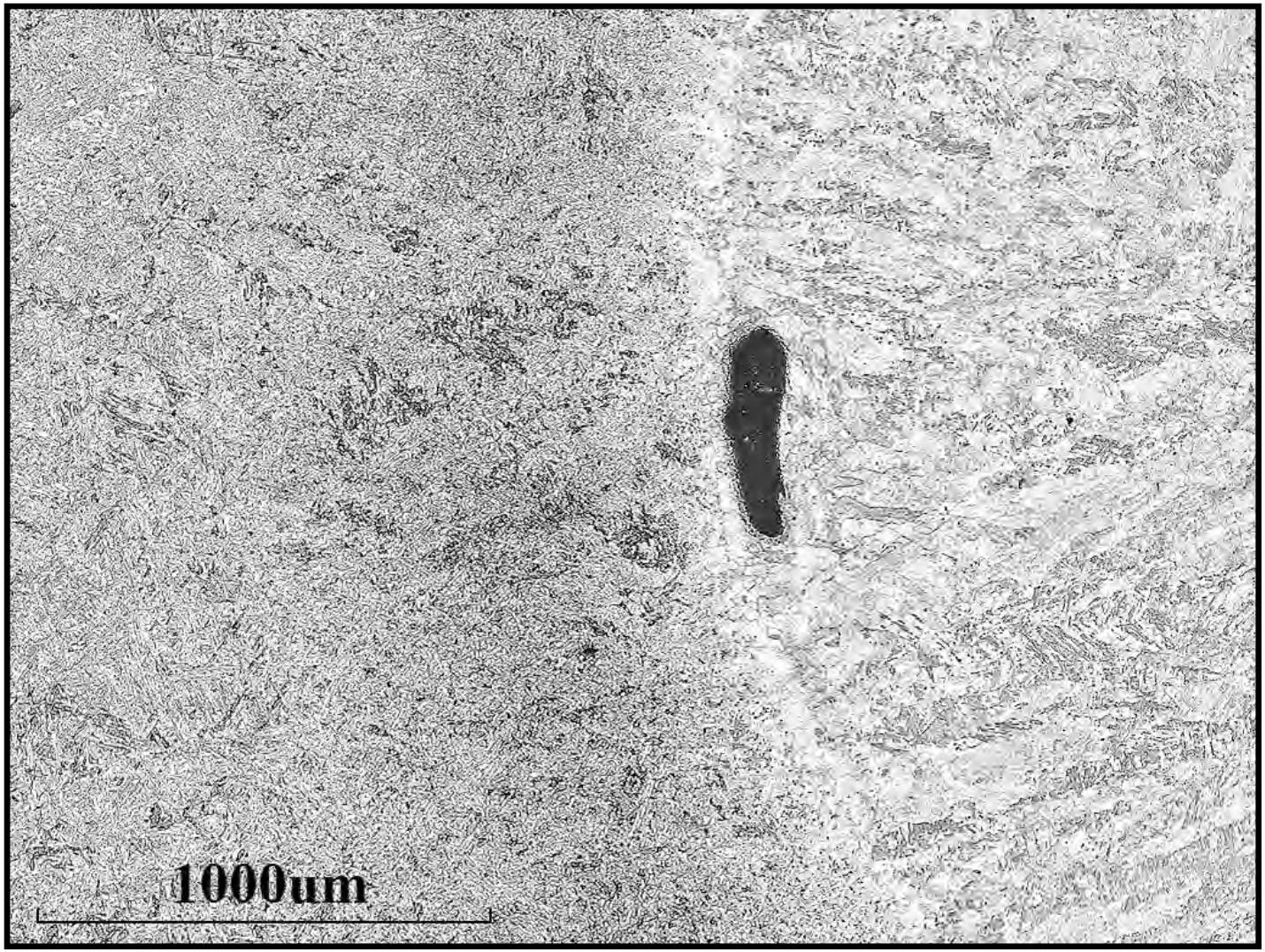
Weld	Procedure	Repair	Weld Metal	
1C	TBW	Minor	3/32” (2.5mm) Butter 1/8” (3.2mm) Fill	E8015-B8
2C	TBW			EPRI P87
3C	N+PWHT		1/8” (3.2mm) Fill	E9015-B9
4C	TBW	Partial	3/32” (2.5mm) Butter 1/8” (3.2mm) Fill	E8015-B8
5C	TBW			EPRI P87
6C	N+PWHT		1/8” (3.2mm) Fill	E9015-B9
7C	TBW	Full *(root reinforcement)*	3/32” (2.5mm) Butter 1/8” (3.2mm) Fill	E8015-B8
8C	TBW			EPRI P87
9C	N+PWHT		1/8” (3.2mm) Fill	E9015-B9
10C	TBW	Full *(backing bar)*	3/32” (2.5mm) Butter 1/8” (3.2mm) Fill	E8015-B8
11C	TBW			EPRI P87
12C	N+PWHT		1/8” (3.2mm) Fill	E9015-B9

Completed Weldment 8C [E8015-B8, TBW, Full]



Completed Weldment 8C [E8015-B8, TBW, Full]

Only one minor defect noted (slag inclusion in butter layer)



EPRI ELECTRIC POWER RESEARCH INSTITUTE

EPRI ELECTRIC POWER RESEARCH INSTITUTE

Update of EPRI Project on T91 Temperbead Approach Using EPRI P87 Filler Metal

George Galanes, John Shingledecker, John Siefert

NBIC Meeting, Mobile, Alabama
January 14th -17th

Scope Planned for 2013 – Destructive Evaluation

- Perform tube-tube weldments (6G position) for two processes:
  - Manual GTAW root + SMAW fill (1/16” diameter electrode preferably)
  - Automated GTAW
- Destructive evaluation should include:
  - ASME Sec. IX + comparison of side and face/root bends
  - Sectioning at 90° intervals to examine the consistency of the procedure
  - *Note – may need multiple weldments to complete scope*

Scope Planned for 2013 – Residual Stresses

- Service exposure (at 1080°F) of tube-tube coupons for each of the procedures
  - Expose for 0.1hr, 1hr, 10hr, 300hr (necessary to determine how fast residual stresses relax)
  - Perform residual stress measurements (method/scope TBD)
    - X-ray diffraction on surface (cap) of coupons (conduct at root if possible – depends on tube ID)
    - Deep-hole drilling to establish stress state through thickness

- ***Anything else NBIC would like to see?***

Together…Shaping the Future of Electricity

NBIC Item 12-0501

Background information in NBIC Part 3, 2011 Edition, 3.2.2

c) When ASME is the original code of construction, replacement parts subject to internal or external pressure fabricated by welding, which require inspection by an Authorized Inspector shall be fabricated by an organization having an appropriate ASME *Certificate of Authorization*. The item shall be inspected and stamped as required by the applicable section of the ASME Code. A completed ASME *Manufacturer's Partial Data Report* shall be supplied by the manufacturer;

The "R" Certificate Holder, using replacement parts fabricated and certified to an ASME Code edition and addenda different from that used for the original construction, shall consider and seek technical advice, where appropriate, for change or conflicts in design, materials, welding, heat treatment, examinations and tests to ensure a safe repair/alteration is performed. Note that work once classified as a repair could now be considered an alteration;

d) When the original code of construction is other than ASME, replacement parts subject to internal or external pressure, fabricated by welding, shall be manufactured by an organization certified as required by the original code of construction. The item shall be inspected and stamped as required by the original code of construction. Certification to the original code of construction, as required by the original code of construction or equivalent, shall be supplied with the item. When this is not possible or practicable, the organization fabricating the part shall have a National Board "R" *Certificate of Authorization*; replacement parts shall be documented on Form R-3 and the "R" Symbol Stamp applied as described in NBIC Part 3, Section 5.

Add new paragraph as follows; New paragraph shown is double underlined.

3.2.2 e)

"Replacement parts addressed by 3.2.2 c) or d) above shall receive a pressure test as required by the original code of construction. If replacement parts have not been pressure tested as required by the original code of construction prior to installation they may be installed without performing the original code of construction pressure test provided the owner, the Inspector and, when required, the Jurisdiction accept the use of one or a combination of the examination and test methods shown in Part 3, Section 4, paragraph 4.4.1 (for repairs) or 4.4.2 (for alterations). The R Certificate Holder responsible for completing the R Form shall note in the Remarks section of the R Form the examination(s) and test(s) performed, and the reason the replacement part was not tested in accordance with the original code of construction.