LG&E
a PPL company

Louisville Gas and Electric Company
State Regulation and Rates
220 West Main Street
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Louisville, Kentucky 40232
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Rick E. Lovekamp
Manager Regulatory Strategy/Policy
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Gwen R. Pinson
Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40601

January 31, 2019

RE: ***Louisville Gas and Electric Company Alleged Failure to Comply with KRS 278.495, 807 KAR 5:022, and 49 C.F.R. Part 192***
Case No. 2017-00119

Dear Ms. Pinson:

In accordance with the Kentucky Public Service Commission's Order of March 16, 2018, Ordering Paragraph No. 4 in Case No. 2017-00119, please find Louisville Gas and Electric Company's ("LGE") 2018 Annual Report on the implementation of LG&E's Action Plan. This report will serve as the first annual report for the years 2018 – 2022.

Should you have any questions regarding the enclosed, please contact me at your convenience.

Sincerely,

Rick E. Lovekamp

Rick E. Lovekamp

Louisville Gas and Electric Company
2018 Annual Report
Case No. 2017-00119

In accordance with the Kentucky Public Service Commission's Order of March 16, 2018 in Case No. 2017-00119, Louisville Gas and Electric Company ("LG&E") submit the first annual report for the years 2018 – 2022. The annual report provides a status on the implementation of LG&E's Action Plan and the number of bolted-style coupling systems removed in 2018 from distribution lines having an operating pressure in excess of 60 psig along with observations of the removed couplings.

LG&E developed the Action Plan in collaboration with Daniel Ersoy of the Gas Technology Institute ("GTI"). The Action Plan focused on the removal of couplers in the LG&E transmission and high-pressure distribution systems, prohibited use of couplers going forward except in very limited circumstances and only in lower-pressure environments, and to improve the training and communication efforts to minimize the chances of coupler separations. The Action Plan items align with Section 3 of the GTI Report that was submitted in Case No. 2017-00119 as an attachment to Commission Staff's Second Request for Information.

GTI Report Section 3, Part A: Excavation Guidelines Related to Mechanical Compression Couplings

Action 1: Communicate to employees and contractors how to respond to finding bolted style compression couplings. (Standards Watch "Responses to Exposed Compression Couplings")

Action Taken: A communication was issued on October 24, 2017 providing guidance for employees and contractors when uncovering a bolted style compression coupling. See Exhibit A for the email containing the communication and Exhibit B for the content of the communication.

Status: Complete

Action 2: Communicate to third party excavators how to respond to finding bolted style compression couplings. ("Locate Request #XXXXXXXX - An Important Message from LG&E" automated outbound e-mails)

Action Taken: A process was implemented to send an email to third-party excavators when they are excavating near a facility with a Maximum Allowable Operating Pressure ("MAOP") > 60 psig communicating with actions to take if they uncover a coupling. This process was implemented by February 2, 2018. See Exhibit C and Exhibit D for examples of emails to third-party excavators.

Status: Complete

Action 3: Communicate to employees and contractors to review records for bolted style compression couplings prior to excavating. (Standards Watches "Transmission Pipeline Excavation & Blasting Plan Process Enhancement" and "Records Review prior to Excavation of High Pressure Distribution Facility (> 60 psig MAOP)")

Action Taken: A communication was issued to employees and contractors on November 2, 2017 to review records when excavating near facilities with a MAOP > 60 psig for the presence of bolted style compression couplings. See Exhibit E for the communication and Exhibit F for the contents of the communication.

Status: Complete

Action 4: Develop process to document data on bolted style compression couplings temporarily backfilled.

Action Taken: Forms were developed to document data on bolted style compression couplings when temporarily backfilled. The form was issued through a communication to employees and contractors on November 30, 2017. See Exhibit G for the communication and Exhibit H for the contents of the communication.

Status: Complete

Action 5: Communicate to employees precautions to follow when blasting is occurring near transmission lines with bolted style compression couplings. (Standards Watch "Transmission Pipeline Excavation & Blasting Plan Process Enhancement")

Action Taken: A communication with precautions to take when blasting occurs near LG&E natural gas transmission lines with bolted style compression couplings was issued on October 24, 2017 to employees and contractors. Refer to Exhibits A and B.

Status: Complete

Action 6: Modify systems such that the e-mail to third party excavators (Part A, Action 2) can indicate when the excavation is near an identified bolted style compression coupling rather than just a high pressure pipeline which may have a bolted style compression coupling.

Action Taken: A process has been implemented to send an email to third party excavators when they are excavating near a facility with a MAOP > 60 psig that a bolted style coupling has been identified in the vicinity of where they are excavating. This was implemented by October 16, 2018. Refer to Exhibits C and D.

Status: Complete

GTI Report Section 3, Part B: Compression Coupling Specification, Selection, and Use

Action 1: Develop enhanced specifications for bolted style compression couplings used on lower pressure systems (Temporary installations on 4 - 60 psig systems allowed with management approval when operationally required; <= 3 psig system installations permitted)

Action Taken: Written specifications for steel to steel bolted style mechanical fittings and steel restraints for mechanical couplers were developed by July 2018. LG&E has provided the specifications to its pipe, valve and fitting ("PFV") supplier and the specification will be incorporated into LG&E's contract, which is expected to be

executed by the end of February 2019. Please see Exhibit I for the specification for steel bolted style mechanical fittings and Exhibit J for the specification for steel restraints for mechanical couplings.

The Plastic Pipe Rule (published in the Federal Register on November 20, 2018) will require that only Category 1 style fittings be used to join plastic service. LG&E's current material list does not have a bolted style coupling for plastic pipe that is a Category 1 fitting. Therefore, it will not use a bolted style coupling to join plastic pipe unless or until such a fitting is identified. This change was communicated to applicable Gas Department Operations ("GDO") personnel on January 14, 2019. See Exhibit K for the email containing the communication and Exhibit L for the content of the communication.

Status: Complete

Action 2: Require engineer review prior to installation of bolted compression couplings until such time enhanced specifications (Action 1 In GTI Report Section 3, Part C) is complete.

Action Taken: A communication was issued in November 2017. This Notification of Change ("NOC") included forms to be used when installing bolted style mechanical couplings. Included was a checklist item to consult with engineering for use of restraints. See Exhibit M for the email containing the communication and Exhibit N for the content of the communication.

Status: Complete

GTI Report Section 3, Part C: Compression Coupling Installations, Inspections, and Audits

Action 1: Enhance qualifications for compression coupling installation procedures and conduct bolted compression coupling installation audits.

Action Taken: Qualifications for installing bolted style compression couplings have been enhanced by having both employees and contractors qualify (written and hands-on examination) on bottom out (designed to prevent overtightening by contacting a mating service) and non-bottom out (tighten to a specified torque) through the Industrial Training Services, Inc. ("ITS") system. LG&E Evaluator guides for both styles of couplers have been developed and specific qualifications for individuals are being tracked for bolted style mechanical couplers (OQF2A1 and OQF2A2). Prior to skill evaluations, individuals (employee and contractors) are given an instructor led overview of the importance of manufacturer's instruction in assembling a bolted style coupler.

Checklists for installation and auditing an installation have been developed and will be used if a bolted style coupling is installed. See Exhibit O for the checklist for auditing installation of a bolt and Exhibit P for the checklist for installation of a bolt.

Status: Complete

GTI Report Section 3, Part D: Quality Assurance and Quality Control of Compression Coupling Components

Action 1: Quality assurance and quality control of bolted style compression coupling components.

Action Taken: An inventory checklist was developed for the bolted style couplings that will be used going forward on the Internal Identification Number ("IIN") list used to order material through its pipe, valve and fitting ("PVF") supplier. The inventory review was complete in 2017. The bolted style couplings on the IIN list were added to the warehouse inventory by April 15, 2018.

LG&E amended its PVF contract to have "no change" requirements so LG&E is contacted if a vendor changes ownership or supplier location is changed. Additionally, an inspection checklist was developed by the PVF supplier and it will use the checklist for bolted style couplings ordered. The PVF supplier will also have destructive testing performed annually on bolted style couplings. This amended contract (Exhibit Q) was put in place as of March 1, 2018.

A receipt checklist (Exhibit R) was developed as of April 16, 2018 for the warehouse to be completed when bolted style couplings are received by the warehouse. The IIN description was updated and includes the requirement to complete the checklist when a coupling is received.

Written specifications (Exhibits I and J) for steel to steel bolted style mechanical fittings and steel restraints for mechanical couplers were developed and completed by July 2018. LG&E has provided the specifications to its PFV supplier and the specification has been incorporated into LG&E's contract executed in January 2019.

The Plastic Pipe Rule (published in the Federal Register on November 20, 2018) will require that only Category 1 style fittings be used to join plastic service. LG&E's current material list does not have a bolted style coupling for plastic pipe that is a Category 1 fitting. Therefore, it will not use a bolted style coupling to join plastic pipe unless or until such a fitting is identified. This change was communicated to applicable GDO personnel January 22, 2019. See Exhibits K and L.

Status: Complete

Louisville Gas and Electric Company
2018 Annual Report
Case No. 2017-00119

GTI Report Section 3, Part E: Preventative and Mitigative Measures

Action 1: Implementation of opportunistic removal program of bolted style couplings on systems operating >3 psig.
Action Taken: The opportunistic bolted style coupling removal or encapsulation (for systems > 3 psig) was implemented with a communication for responding to a bolted style coupling finding, which was issued in October 2017. See Exhibits A and B.
Status: Complete

Action 2: Removal of all compression couplings identified on the transmission system.
Action Taken: All compressions couplings were removed from the transmission system by January 3, 2019.
Status: Complete

Action 3: Conduct feasibility study of technologies potentially capable of detecting buried compression couplings.
Action Taken: The feasibility study (Exhibit S) was completed in December 2018.
Status: Complete

GTI Report Section 3, Part F: Continuous Process Improvement and Leading Indicators

Action 1: Continuous process improvement and leading indicators, including incorporating findings into Distribution Integrity Management Program ("DIMP").
Action Taken: The Gas Distribution and Information Technology teams have launched an initiative to revise the risk analysis software to consider the suggested, among other, risk factors associated with the distribution system. As risk identification is improved, analysis will allow a better ranking of infrastructure to be utilized by the DIMP team members to initiate improvements.
Status: In Progress

GTI Report Section 3, Part G: Risk Assessment and Risk Management and Distribution and Transmission Integrity Management

Action 1: Review records of transmission pipelines to identify compression couplings.
Action Taken: A review of the transmission pipelines for compression couplings was complete by October 2017.
Status: Complete

Action 2: Review records of distribution mains with an MAOP > 60 psig to identify compression couplings.

Action Taken: A review of the distribution mains with a MAOP > 60 psig for bolted style compression couplings was complete by the end of 2017. The quality assurance efforts which include mapping of bolted style couplings in the GIS is ongoing. An example of the mapping can be seen in Exhibit T.

Status: Complete

GTI Report Section 3, Part H: Communications

Action 1: Use cross departmental communications.

Action Taken: LG&E fulfilled communication with operations, engineering and integrity groups in determining a coupling's fit-for-service ("FFS") through a communication that was issued on October 24, 2017 providing guidance for employees when uncovering a bolted style compression coupling with pressures > 3 psig or any coupling for pressures > 60 psig. See Exhibits A and B.

A section of the communication states, "Inform your supervisor and have operations, engineering and integrity management consulted to prioritize additional actions (note the excavation will be backfilled, marked and leak surveyed after the backfill if coupler is not immediately removed or encapsulated);". The communication states any coupling in a system with pressures > 60 psig will be removed eliminating FFS analysis to allow the coupling to remain in service. Operations, engineering and integrity personnel will use information gathered from the, "Checklist for Exposed Bolt-Style Coupling (pressures > 3 psig)" to determine how quickly a coupling needs to be removed.

LG&E is fulfilling fitness for purpose ("FFP") communications by developing specifications for bolted style couplings and will provide them to its PVF supplier for bolted style couplings that will be used for systems with pressures less than and equal to 3 psig and up to 60 psig in emergency situations.

LG&E has eliminated the need to determine FFP for bolted style couplings for systems with pressures > 60 psig as they will not be installed.

GDO has also started a formal communication process in 2015 to standardize various types of communications. The process includes other company departments and contractors and documents communications on the GDO Communications Share Point site. This process can be viewed in Exhibit U. An example of a safety communication can be seen in Exhibit V.

Status: Complete

The couplings retired from LG&E's distribution system include the following listed. In accordance with the aforementioned Action Plan Section 3, Part E, a program was implemented for the opportunistic bolted style coupling removal or encapsulation (for systems > 3 psig) in October 2017. Of the couplings removed for analysis, no additional actions have been taken and LG&E will continue the opportunistic removal or encapsulation of distribution couplings. A total of eighteen couplings were removed from service in 2018, with thirteen being retired in place by terminating the pipeline in an upstream location. None of the eighteen couplings were removed from service due to a failure in the coupling or a leak. The five couplings physically removed from the ground were part of a scheduled replacement or retirement of associated gas facilities.

Distribution Couplings removed from the ground:

1) A bolted-style mechanical coupling, number 2018-001, installed in 1953 was removed from service on February 7, 2018 for inspection for defects. The lab report analysis can be viewed in Exhibit W.
2) A bolted-style mechanical coupling, number 2018-002, installed in 1953 was removed from service on February 7, 2018 for inspection for defects. The lab report analysis can be viewed in Exhibit X.
3) A bolted-style mechanical coupling, number 2018-008, installed in 1985 was removed from service on April 25, 2018 for inspection for defects. The lab report analysis can be viewed in Exhibit Y.
4) A bolted-style mechanical coupling, number 2018-022, installed in 1964 was removed from service on October 3, 2018 for inspection for defects. The lab report analysis can be viewed in Exhibit Z.
5) A bolted-style mechanical coupling, number 2018-024, installed in 1983 was removed from service on November 28, 2018 for inspection for defects. The lab report analysis can be viewed in Exhibit AA.

Distribution Couplings retired in place:

1) A bolted-style mechanical coupling, number 2018-016, installed in 1963 was retired from service on July 30, 2018.
2) A bolted-style mechanical coupling, number 2018-019, installed in 1963 was retired from service on July 30, 2018.
3) A bolted-style mechanical coupling, number 2018-Other-Hikes and Goldsmith, installed in 1976 was retired from service on August 10, 2018.
4) A bolted-style mechanical coupling, number 2018-Airport-Hiawatha & Wenona (1) installed in 1981 was retired from service on October 5, 2018.
5) A bolted-style mechanical coupling, number 2018-Airport-Tallulah & Crittenden (1), installed in 1996 was retired from service on October 5, 2018.
6) A bolted-style mechanical coupling, number 2018-Airport-Tallulah & Tug (1), installed in 1984 was retired from service on October 5, 2018.
7) A bolted-style mechanical coupling, number 2018-Airport-Tallulah & Crittenden (2), installed in 1984 was retired from service on October 5, 2018.

8) A bolted-style mechanical coupling, number 2018-Airport-Tallulah & Crittenden (3), installed in 1996 was retired from service on October 5, 2018.
9) A bolted-style mechanical coupling, number 2018-Airport-Hiawatha & Wenona (2), installed in 1981 was retired from service on October 5, 2018.
10) A bolted-style mechanical coupling, number 2018-Airport-Tallulah & Crittenden (4), installed in 1984 was retired from service on October 5, 2018.
11) A bolted-style mechanical coupling, number 2018-Airport-Tallulah & Crittenden (5), installed in 1996 was retired from service on October 5, 2018.
12) A bolted-style mechanical coupling, number 2018-Airport-Tallulah & Tug (2), installed in 1984 was retired from service on October 5, 2018.
13) A bolted-style mechanical coupling, number 2018-Airport-Tallulah & Crittenden (6), installed in 1984 was retired from service on October 5, 2018.

From: Barrows, Aaron

To: Bill Stoll - Stoll Construction; "Bobby Woosley"; Cheatham, Andre [Contractor]; "Cinnamon King - Fishel Co."; "Dan Abbott - Premier Energy"; "David Schoenbachler"; "David Spencer - Southern Pipeline"; David Stoll - Stoll Construction; Gearheart, Eric [Contractor]; Givens, TJ [Contractor]; Graves, Junie [Contractor]; "Hayes Testing"; james.george; "Jamie Lee - Southern Pipeline"; "Jerry Hardy"; jess.woodruff; Jim Linton - Miller Pipeline; "Joe Naylor"; "John Stenger - Premier Energy"; "Justin Johnson - Schardein"; Katrana, David; "Kenny Riley"; "Kimberly Braswell - EnsiteUSA"; [redacted] "Larry Dowell - Southern Pipeline"; "Larry McIntyre"; Martin Ignacio - Petrochem Insulation; Marty Kenney - Schardein; "Pat Mangeot - Maeser"; Paul Garabedian - Surveys and Analysis; "Paul Lee - Southern Pipeline"; Rich Adams - USIC; "Rich Mauldin - Team Fishel"; "Robert Carl Jr."; "Ron Baker - Team Fishel"; [redacted]; "Scott - Western Mountain Inc"; Scott Yaroma - Abel Construction; Shouse, Alvin [Contractor]; [redacted] "Steve Triplett"; TJ Givens; "Todd - Western Mountain Inc"; William Grimes - PECCO; Bielefeld, Dale; Mason, Eric; [redacted]; Barrows, Aaron; Phillips, Isis; Cloyd, Russ; Clyde, Peter; Cummins, Michael; Jaynes, Pam; Ryan, Joe; Satkamp, Mark; Skaggs, John; Stratman, Paul; Branham, Tammy; Keltee, Frederick; Logsdon, Jacob; Logsdon, Verl; Pfister, Tom; Ruble, Andrew; Ta, Ben; McDonald, Rosanna; Murphy, Clay; Rieth, Tom; Walker, Barry; Allison, Maria; Augustine, Chad; Bauer, Elliott; Beatty, Stephen; Benge, Eric; Bischof, David; Duncan, Trevor; Graf, Cody; Harmeling, Dave; Hayes, Justin; Hill, Lesley; Hiner, Brad; Holton, Erin; Lenhart, Brian; McGuire, David; Meade, Craig; Norton, William; Rossi, Justin; Simmons, Damien; Thomas, Zach; Wade, Jim; Wood, Gabriel; Allen, Mike; Bischoff, Chuck; Collins, Mike; Conkright, Rebecca; England, Kirby; Huddleston, Jeff; Hudgins, Natalie; Lawson, BIll; Manska, Duane; Price, Jonathan; Warren, Ricky; Allen, James; Allen, Rodrick; Alvey, Joshua; Baker,Derry; Ballard, Stephen; Benedict, Ronald; Boisvert, Lori [Contractor]; Boone, Chris; Bridgewater, Hollis; Brock, Tom; Bruner, Rodney; Byrum, Frederick; Carwile, Matthew; Clunie, Jeff; Cochran, Janet; Cslank, Joseph; Davis, Janice; Dearing, Don; England, Brian; Evans, Craig; Faith, Chris; Fischer, Darla; Ford, Thomas; Gilkey, Bill; Goetzinger, Lester; Gutterman, Daniel; Hall, Chris; Harrison, Kenneth; Hayden, Daryl; Heath, Joseph; Higgins, Scott; Highland, Brittney; Hinkle, Christopher; Hodson, Darren; Huettig, Greg; Hughes, Rashel; Jackson, Mike; Jewell, Katie; Jones, Nathan; Kingrey, Brian; Medley, Meghan; Miller, Eric; Netherton, Eric; Painter, Ronald E (Contractor) [PPL]; Painter, Sheila [Contractor]; Payne, James; Pendleton, Bob; Perry, Lee; Peyton, Bruce; Poteet, David; Pryor, Arthur; Quill, Michael; Ragland,John; Rice-Locket, Terry; Russell, Brian; Sarles, Jonathan; Shelton, Gary; Smith, Franklin; Springston, Richie; Steed, Mary Jo; Stinson, Herman; Sumner, Steve; Swain, Jamarr; Taylor, Bo; Tuttle, Zachary; Vincent, Todd; Vogel, Scott; Wallace, Jacque; Wallace, Mark; Warren, Barbie; Watkins, Maurice; White, Anthony; White, Eugene; Baker, Joe; Balentine, Lucas; Barnes, Chris; Bell, Clifford; Burton, Mike; Cross, Gene; Darnall, Wayne; Doolin, Dale; Martin, Lee; Roberts, Charlie; Roth, Chris; Vanover, Eric; Akin, Doug; Barr, Gary; Benningfield, James; Blair, Keith; Board, Greg; Burba, Jackie; Burris, Justin; Butler, Larry; Childress, Kyle; Cundiff, Terry; Dages, Shannon; DeSpain, Larry; Eads, David; Edwards, David; Farnsworth, Taylor; Froggett, Nate; Gardner, Chip; Gary, Tim; Gozzard, Kevin; Hamilton, Terry; Hogan, Gene; Hunter, Dale; Jones, Willie; Litton, Terry; Manska, Curtis; Metcalf, Daniel; Miller, Anthony; Mullins, Tommy; Nash, Nathan; Winstead, Angela; Rankin, Tracy; Richey, Curt; Riggs, Clarence (Junie); Roark, Keith; Robinson, Libbie; Scott, Eric; Skaggs, Patrick; Smith, Jonathan; Vessels, Ronnie; Waddle, AJ; Whelan, Greg; White, Chad; White, David; Wiles, Chris; Wilkins, Brian; Williams, Clint; Herndon, Greg; Parrish, Debbie; Stewart, Gregory; Thielen, Laura; Fitzgerald, Chris; Heckel, Anthony; Hunt, Bill; Jones, Mike (Auburndale); Murphy, Tom; Probus, Dennis (LGE); Stephens, Malcolm; Thomas, Lauren; Walton, Ed; Bray, Bob; Davis, John (Auburndale); Dilley, Dana; Durbin, David; Fields, Paul; Ginn, Randy; Grant, Bill; Mills, Kevin; Nall, Russell; Pearson, Jay (Auburndale); Purvis, Greg; Rudolph, Frank; Thompson, Nick; Wheatley, Terry; Wyatt, Greg; Breeding, Patrick; Calebs, Robert; Campbell, Keith; Dodson, Larry; Doty, Dan; Early, Joseph; Griffin, John; Hartlage, Mary; Keys, Jerry; Kress, Mike; Lewellen, Kevin; Mattingly, Carrie; McCauley, Joel; Murphy, Kevin; Paulley, David; Terry, Antoine; Brady, Angela; Carman, Vicki; Clardy, Talley; Clifton, Lisa; Cummins, Aaron; Darragh, Mark; Davis, Nicole; Dowdle, Steve; Dukes, Nathan; Grant, Almond; Keys, Scott; Larkins, Doug; Lembach, Chuck; Murphy, Jerrod; Reesor, Tracy; Seewer, Chad; Simpson, Ryan; Spencer, Steve; Stegner, Natoshia; Weihe, Julie; West, Kay; Wilson, Lynn; Bellar, Lonnie; Kitchen, Nancy; Malloy, John; Lewis, John [Contractor]; Young, Jared [Contractor]

Subject: GDO Communication - Notification of Change - OQ NOC 013-17 Standards Watches for Task F-2A Compression Couplings

Date: Tuesday, October 24, 2017 1:31:06 PM

Attachments: GDO Communication - Notification of Change - OQ NOC 013-17 Standards Watches for Task F-2A Compression Couplings.pdf

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All,

This is a GDO Communication - Notification of Change - OQ NOC 013-17 Standards Watches for Task F-2A Compression Couplings. Please see the attached document and following message for the content of this communication.

All individuals holding Operator Qualification identified covered task **F-2A Join Pipe with Mechanical Fitting Compression** and/or perform excavation operations on LG&E ROW/facilities are required to receive the NOC and verify by signature they understand and will abide by the required change(s).

1) Standards Watch – Responses to Exposed Compression Couplings,
2) Standards Watch – Transmission Pipeline Excavation and Blasting Plan

If more than 15 individuals are in attendance during the NOC meeting(s), additional sign in

sheets can be printed (page 4 of NOC).
The completed Notification of Change (NOC) forms with individual signatures should be returned to Larry Dodson within 15 days of receipt.
Please communicate this Notification of Change with all qualified employees and contract partners.
Thank you,

Aaron Barrows
Gas Business Analyst
Phone – [redacted]
Fax – [redacted]

Gas Distribution Operations Communication of Changes that Affect Operator Qualification Program

(192.805(f))

LG&E/KU will communicate significant changes that affect a Covered Task(s) to the individuals who perform that Covered Task(s). A change may be significant enough to require changes to the qualification process or additional evaluations.

These changes may include but are not limited to:

- Significant modifications to LG&E/KU policies or procedures
- Significant changes in state or federal regulations
- Use of new equipment and/or technology that significantly affects performance of the Covered Task(s)
- New information from equipment or product manufacturers that significantly affects performance of the Covered Task(s)

Responsibility for communication of changes affecting covered tasks

LG&E/KU is responsible for identifying substantive changes affecting an identified Covered Task(s).

LG&E/KU is responsible for revising the evaluation process, as applicable, to include the impact of such changes. LG&E/KU will make a determination as to the level of communication regarding the change that is required.

LG&E/KU will disseminate the information utilizing the notification of change form to all appropriate Managers and Supervisors.

Managers and Supervisors will follow the directions identified on the notification of change form. Depending on the level of change, when required, Managers and Supervisors shall conduct an informational meeting providing the information to all affected employees.

Contractors affected by the change shall be required to conduct employee meetings utilizing the Notification of Change Form. The contractor will be required to submit a copy of the form back to LG&E/KU with employee signatures.

Action for Communication of change

LG&E/KU will evaluate information regarding changes that may affect the written OQ plan and/or an identified covered task(s).

When appropriate, LG&E/KU will establish a team of subject matter experts to evaluate if the written OQ plan and/or Covered Task(s) in question is significantly affected by internal or external changes.

LG&E/KU will assess the effect the changes will have on the written OQ plan and/or covered task(s) and make adjustments to the plan and/or evaluation process as necessary. These adjustments could involve anything from no communication, notification only to qualified individuals, up to and including notification of required training and re-evaluation.

Determining the need to communicate

The need to communicate will vary dependent upon the impact of the change on the Covered Task.

LG&E/KU has established a 3-tiered system for identifying and communicating change.

1. **Level (1)** - Limited to no impact on the OQ program and/or Covered Task and requires no communication or further action

2. **Level (2)** - Moderate impact on the OQ program and/or Covered Task and requires only communication of the change

3. **Level (3)** - Significant impact on the OQ program and/or Covered Task and requires communication of the modification of the OQ program and/or qualification process. Level 3 change may require training and evaluation, as appropriate, for LG&E/KU employees and contractor personnel.

Communication process

In accordance with NOC form, significant changes affecting a Covered Task will be communicated to the individual(s) performing that task as soon as reasonably possible either by e-mail, tailgates, or re-training/qualification.

Notification of Change (NOC) Form (version 2.0)

Date: 10/**23/2017**

NOC # (training office use): **013-17**

NOC initiated by (Name & EE #): **Keith Campbell**

The following OQ Program, Procedure or Task has been modified/changed ***added/deleted (circle):***

Procedure/Policy/Standard Document Number(s) & Description(s):

1) 1 Standards Watch – Responses to Exposed Compression Couplings
2) Standards Watch – Transmission Pipeline Excavation and Blasting Plan

OQ Task Number(s) & Description(s):

Task F-2A Join Pipe with Mechanical Fitting Compression
ASME B31Q:
0691 Joining of pipe – Non bottom out compression coupling
0701 Joining of pipe – Bottom out compression coupling
0711 Joining of pipe – Compression couplings

Indicate Level of change (circle one): Level (1) Level (2) Level (3)

- Modification to company policies or procedures: Yes No
- Use of new equipment and/or technology : Yes No
- Change in State or Federal regulations: Yes No
- New information from equipment or Product manufacturer: Yes No
- If Other reason than above, please explain below:

Brief Description of Change: 1) This NOC addresses the requirement to provide notification to Supervision/Engineering when compression couplings are exposed. **2)** This NOC also addresses the requirement to provide notification to Gas Control when excavation or Blasting operations will take place near pipeline facilities with compression couplings.

Attached to this NOC are the applicable LG&E Standards Watches:

1) Standards Watch – Responses to Exposed Compression Couplings
2) Standards Watch – Transmission Pipeline Excavation and Blasting Plan

Operator Qualification 192.805(f) Notice of Change
SIGN-IN SHEET (Please Print Legibly)

DATE: 10/23/2017

NOC#: 013-17

TASK(S): F-2A Join Pipe with Mechanical Fitting Compression

NOC PRESENTER:

NOC DESCRIPTION: 1) Standards Watch - Responses to Exposed Compression Couplings
2) Standards Watch – Transmission Pipeline Excavation and Blasting Plan

I hereby acknowledge that I have received notification of change of a covered task(s) as required by 49 CFR 192.805(f).

I understand that modifications to policies and procedures may be required, as conditions warrant, and that I understand the Covered Task change and agree to all the requirements contained herein. I understand that compliance with this change is a condition of employment, and that disciplinary action may be taken if I am found in violation of the change.

Last Name/First Name (please print in ink or type)	Signature	LG&E/KU Business Division and/or Contractor Company	Employee #
1.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			

October 27, 2017

Responses to Exposed Compression Couplings

This Gas Standards Watch has been issued to all employees within the Gas Distribution Operations line of business, all design personnel and all pipeline construction contractors to inform them of actions to take if:

- a **bolted style compression coupling** is found in an excavation on a facility with an **MAOP greater than 3 psig** (transmission pipelines and high pressure and medium pressure distribution mains and services);
- or **any type of compression coupling (bolt style or nut follower)** is found in an excavation on a facility with an **MAOP greater than 60 psig** (transmission pipelines and high pressure distribution mains and services).

The following actions should be taken immediately:

- Stop excavating as soon as the compression coupling is identified. Do not expose additional portions of the compression coupling or additional pipe on either side of the compression coupling;
- All personnel other than the backhoe operator should vacate the excavation and the surrounding area. A perimeter should be established around the excavation to keep the public at a distance;
- Perform the following:
  i) Take a picture of the coupler from multiple angles;
  ii) Record the following information, including but not limited to depth of coverage, type of soil and orientation of coupler (in straight run of pipe, close to a fitting, etc.)
- Inform your supervisor and have operations, engineering and integrity management consulted to prioritize additional actions (note the excavation will be backfilled, marked and leak surveyed after the backfill if coupler is not immediately removed or encapsulated);
- The compression coupling will be scheduled for removal or encapsulation taking into consideration operational, engineering and integrity management recommendations.

Please forward this information to any affected personnel.

October 27, 2017 (update)

May 18, 2015 (original)

Pete Clyde

Transmission Pipeline Excavation & Blasting Plan Process Enhancement

This Gas Standards Watch has been issued to all employees within the Gas Distribution Operations line of business, all design personnel and all pipeline construction contractors of safety practices regarding gas transmission pipelines. For gas transmission pipelines that have been in line inspected with a magnetic flux leakage (MFL) tool, the MFL data has been reviewed to identify the presence of any possible bolted style compression couplings. For all other gas transmission pipelines, construction and maintenance records have been reviewed to identify the presence of any possible compression couplings. The only compression couplings identified that are still in service are bolted style compression couplings in the following locations.

1. Regulator station G267 4-inch inlet piping off of the Lees to Cane Run pipeline
2. Regulator station G310 4-inch inlet piping off of the Lees to Campground Road pipeline
3. Regulator station G409 2-inch inlet piping off of the Western Kentucky B pipeline

These couplings will be removed by the spring of 2018.

If an external entity notifies LG&E that they will be blasting or excavating near one of these compression couplings, Gas Control should be notified of the situation and an evaluation should be made of appropriate safety measures. Possible safety measures could include having the blaster lower charge weights, increase distance between charges and the pipeline, drill relief holes on the back side of the charge, have on-site LG&E representatives monitor blasting or excavating activities, writing a contingency shutdown procedure or having LG&E representatives stationed at isolation valves.

Subject: Locate Request #1808080004 - An Important Message from LG&E

LG&E
a PPL company

***** THIS EMAIL IS INTENDED FOR SUPPLEMENTAL INFORMATION ONLY.
THIS IS **NOT A RECORD OF COMPLETION** FOR THE LOCATING OF LG&E'S UNDERGROUND FACILITIES. *****

Ticket #: 1808080004
Ticket Address: WYNFIELD MEWS LN
Caller Name & Phone: RONNIE PAGE [redacted]
Contractor Name & Phone: PAGES GAS LINE SERVICE [redacted]
******* IT HAS BEEN DETERMINED THIS LOCATE REQUEST IS NEAR AN LG&E HIGH PRESSURE NATURAL GAS PIPELINE FACILITY AND A MECHANICAL COUPLER MAY BE PRESENT. *******

DO NOT DIG IN THIS AREA UNTIL ALL UNDERGROUND UTILITY LINES ARE LOCATED. THE LOCATION OF THE NATURAL GAS LINE WILL BE INDICATED BY YELLOW PAINT AND/OR FLAGS. TAKE CARE TO OBSERVE SITE MARKINGS SUCH AS PAINT AND FLAGS. EXCAVATION ACTIVITIES OTHER THAN HANDDIGGING OR VACUUM EXCAVATION ARE PROHIBITED BY STATE LAW WITHIN THE STATUTORY TOLERANCE ZONE OF UNDERGROUND UTILITIES.

IF YOU UNEARTH A BOLTED STYLE MECHANICAL COUPLER SUCH AS THE ONE SHOWN IN THE PHOTO BELOW ON AN LG&E HIGH PRESSURE STEEL GAS PIPELINE, IMMEDIATELY DO THE FOLLOWING:

1. STOP EXCAVATING AS SOON AS THE COMPRESSION COUPLING IS IDENTIFIED. DO NOT EXPOSE ADDITIONAL PORTIONS OF THE COMPRESSION COUPLING OR ADDITONAL PIPE
   ON EITHER SIDE OF THE COMPRESSION COUPLING.
2. VACATE THE EXCAVATION AND SURROUNDING AREA. A PERIMETER SHOULD BE ESTABLISHED AROUND THE EXCAVATION TO KEEP THE PUBLIC AT A DISTANCE.
3. CALL LG&E AT [redacted]

IF YOU WILL NOT BE ONSITE DURING EXCAVATION ACTIVITIES, PROVIDE THIS EMAIL TO THOSE WHO WILL BE.

If you have concerns or questions about the site markings, please contact LG&E at [redacted]

Subject: Locate Request #1808080004 - An Important Message from LG&E

LG&E
a PPL company

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THIS IS NOT A RECORD OF COMPLETION FOR THE LOCATING OF LG&E'S UNDERGROUND FACILITIES. *****

Ticket #: 1808080004
Ticket Address: WYNFIELD MEWS LN
Caller Name & Phone: RONNIE PAGE [redacted]
Contractor Name & Phone: PAGES GAS LINE SERVICE [redacted]
******* IT HAS BEEN DETERMINED THIS LOCATE REQUEST IS NEAR AN LG&E HIGH PRESSURE NATURAL GAS PIPELINE FACILITY AND OUR RECORDS INDICATE THERE IS A MECHANICAL COUPLER PRESENT IN THE AREA. *******

DO NOT DIG IN THIS AREA UNTIL ALL UNDERGROUND UTILITY LINES ARE LOCATED. THE LOCATION OF THE NATURAL GAS LINE WILL BE INDICATED BY YELLOW PAINT AND/OR FLAGS. TAKE CARE TO OBSERVE SITE MARKINGS SUCH AS PAINT AND FLAGS. EXCAVATION ACTIVITIES OTHER THAN HANDDIGGING OR VACUUM EXCAVATION ARE PROHIBITED BY STATE LAW WITHIN THE STATUTORY TOLERANCE ZONE OF UNDERGROUND UTILITIES.

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1. STOP EXCAVATING AS SOON AS THE COMPRESSION COUPLING IS IDENTIFIED. DO NOT EXPOSE ADDITIONAL PORTIONS OF THE COMPRESSION COUPLING OR ADDITONAL PIPE
   ON EITHER SIDE OF THE COMPRESSION COUPLING.
2. VACATE THE EXCAVATION AND SURROUNDING AREA. A PERIMETER SHOULD BE ESTABLISHED AROUND THE EXCAVATION TO KEEP THE PUBLIC AT A DISTANCE.
3. CALL LG&E AT [redacted]

IF YOU WILL NOT BE ONSITE DURING EXCAVATION ACTIVITIES, PROVIDE THIS EMAIL TO THOSE WHO WILL BE.

If you have concerns or questions about the site markings, please contact LG&E at [redacted]

From: Barrows, Aaron

To: Mason, Eric; Bielefeld, Dale; Barrows, Aaron; Phillips, Isis; Cloyd, Russ; Clyde, Peter; Cummins, Michael; Jaynes, Pam; Ryan, Joe; Satkamp, Mark; Skaggs, John; Stratman, Paul; Branham, Tammy; Keltee, Frederick; Logsdon, Jacob; Logsdon, Verl; Pfister, Tom; Ruble, Andrew; Ta, Ben; McDonald, Rosanna; Murphy, Clay; Rieth, Tom; Walker, Barry; Allison, Maria; Augustine, Chad; Bauer, Elliott; Beatty, Stephen; Benge, Eric; Bischof, David; Duncan, Trevor; Graf, Cody; Harmeling, Dave; Hayes, Justin; Hill, Lesley; Hiner, Brad; Holton, Erin; Lenhart, Brian; McGuire, David; Meade, Craig; Norton, William; Rossi, Justin; Simmons, Damien; Thomas, Zach; Wade, Jim; Wood, Gabriel; Allen, Mike; Bischoff, Chuck; Collins, Mike; Conkright, Rebecca; England, Kirby; Huddleston, Jeff; Hudgins, Natalie; Lawson, BIll; Manska, Duane; Price, Jonathan; Warren, Ricky; Allen, James; Allen, Rodrick; Alvey, Joshua; Baker,Derry; Ballard, Stephen; Benedict, Ronald; Boisvert, Lori [Contractor]; Boone, Chris; Bridgewater, Hollis; Brock, Tom; Bruner, Rodney; Byrum, Frederick; Carwile, Matthew; Clunie, Jeff; Cochran, Janet; Compton, Henry; Cslank, Joseph; Davis, Janice; Dearing, Don; England, Brian; Evans, Craig; Faith, Chris; Fischer, Darla; Ford, Thomas; Gilkey, Bill; Goetzinger, Lester; Grider, Casey; Gutterman, Daniel; Hall, Chris; Harrison, Kenneth; Hayden, Daryl; Heath, Joseph; Higgins, Scott; Highland, Brittney; Hinkle, Christopher; Hodson, Darren; Huettig, Greg; Hughes, Rashel; Jackson, Kurt; Jackson, Mike; Jewell, Katie; Jones, Nathan; Kingrey, Brian; Kiser, Shawn; McDavid, Tyler; Medley, Meghan; Miller, Eric; Netherton, Eric; Painter, Ronald E (Contractor) [PPL]; Painter, Sheila [Contractor]; Payne, James; Pendleton, Bob; Perry, Holdan; Perry, Lee; Peyton, Bruce; Poteet, David; Pryor, Arthur; Quill, Michael; Ragland,John; Rice-Locket, Terry; Russell, Brian; Sarles, Jonathan; Shelton, Gary; Smith, Franklin; Springston, Richie; Steed, Mary Jo; Stinson, Herman; Sumner, Steve; Swain, Jamarr; Taylor, Bo; Tuttle, Zachary; Vincent, Todd; Vogel, Scott; Wallace, Jacque; Wallace, Mark; Warren, Barbie; Watkins, Maurice; White, Anthony; White, Eugene; Baker, Joe; Balentine, Lucas; Barnes, Chris; Bell, Clifford; Burton, Mike; Cross, Gene; Darnall, Wayne; Doolin, Dale; Martin, Lee; Roberts, Charlie; Roth, Chris; Vanover, Eric; Akin, Doug; Barr, Gary; Benningfield, James; Blair, Keith; Board, Greg; Burba, Jackie; Burris, Justin; Butler, Larry; Childress, Kyle; Cundiff, Terry; Dages, Shannon; DeSpain, Larry; Eads, David; Edwards, David; Farnsworth, Taylor; Froggett, Nate; Gardner, Chip; Gary, Tim; Gozzard, Kevin; Hamilton, Terry; Hogan, Gene; Hunter, Dale; Jones, Willie; Litton, Terry; Manska, Curtis; Metcalf, Daniel; Miller, Anthony; Mullins, Tommy; Nash, Nathan; Winstead, Angela; Rankin, Tracy; Richey, Curt; Riggs, Clarence (Junie); Roark, Keith; Robinson, Libbie; Scott, Eric; Skaggs, Patrick; Smith, Jonathan; Vessels, Ronnie; Waddle, AJ; Whelan, Greg; White, Chad; White, David; Wiles, Chris; Wilkins, Brian; Williams, Clint; 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Weihe, Julie; West, Kay; Wilson, Lynn; Bellar, Lonnie; Kitchen, Nancy; Malloy, John; Lewis, John [Contractor]; Young, Jared [Contractor]; Bill Stoll - Stoll Construction; Bobby Woosley; Cheatham, Andre [Contractor]; Cinnamon King - Fishel Co.; Dan Abbott - Premier Energy; Darryl Garland; David Schoenbachler; David Spencer - Southern Pipeline; David Stoll - Stoll Construction; Gearheart, Eric [Contractor]; Givens, TJ [Contractor]; Graves, Junie [Contractor]; Hayes Testing; james.george; Jamie Lee - Southern Pipeline; Jerry Hardy; jess.woodruff; jim.linton; Joe Naylor; John Stenger - Premier Energy; Justin Johnson - Schardein; Katrana, David; Kenny Riley; Kimberly Braswell - EnsiteUSA; [redacted] Larry Dowell - Southern Pipeline; Larry McIntyre; Martin Ignacio - Petrochem Insulation; Marty Kenney - Schardein; Pat Mangeot - Maeser; Paul Garabedian - Surveys and Analysis; Paul Lee - Southern Pipeline; Rich Adams - USIC; Rich Mauldin - Team Fishel; Robert Carl Jr.; Ron Baker - Team Fishel; [redacted] Scott - Western Mountain Inc; Scott Yaroma - Abel Construction; Shouse, Alvin [Contractor]; [redacted] Steve Triplett; TJ Givens; Todd - Western Mountain Inc; William Grimes - PECCO

Subject: GDO Communication - Notification of Change - OQ NOC 014-17 Standards Watch for Task F-2A Compression Couplings.pdf

Date: Thursday, November 02, 2017 10:00:30 AM

Attachments: GDO Communication - Notification of Change - OQ NOC 014-17 Standards Watch for Task F-2A Compression Couplings.pdf

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All,

This is a GDO Communication - Notification of Change - OQ NOC 014-17 Standards Watch for Task F-2A Compression Couplings.pdf. Please see the attached document and following message for the content of this communication.

All individuals holding Operator Qualification identified covered task **F-2A Join Pipe with Mechanical Fitting Compression** and/or perform excavation operations on LG&E ROW/facilities are required to receive the NOC and verify by signature they understand and will abide by the required change(s).

1) Standards Watch – Records Review prior to Excavation of High Pressure Distribution Facility (> 60 psi MAOP)

If more than 15 individuals are in attendance during the NOC meeting(s), additional sign in

sheets can be printed (page 4 of NOC).
The completed Notification of Change (NOC) forms with individual signatures should be returned to Larry Dodson within 15 days of receipt.
Please communicate this Notification of Change with all qualified employees and contract partners.
Thank you,

Aaron Barrows
Gas Business Analyst
Phone – [redacted]
Fax – [redacted]

Gas Distribution Operations Communication of Changes that Affect Operator Qualification Program

(192.805(f))

LG&E/KU will communicate significant changes that affect a Covered Task(s) to the individuals who perform that Covered Task(s). A change may be significant enough to require changes to the qualification process or additional evaluations.

These changes may include but are not limited to:

- Significant modifications to LG&E/KU policies or procedures
- Significant changes in state or federal regulations
- Use of new equipment and/or technology that significantly affects performance of the Covered Task(s)
- New information from equipment or product manufacturers that significantly affects performance of the Covered Task(s)

Responsibility for communication of changes affecting covered tasks

LG&E/KU is responsible for identifying substantive changes affecting an identified Covered Task(s).

LG&E/KU is responsible for revising the evaluation process, as applicable, to include the impact of such changes. LG&E/KU will make a determination as to the level of communication regarding the change that is required.

LG&E/KU will disseminate the information utilizing the notification of change form to all appropriate Managers and Supervisors.

Managers and Supervisors will follow the directions identified on the notification of change form. Depending on the level of change, when required, Managers and Supervisors shall conduct an informational meeting providing the information to all affected employees.

Contractors affected by the change shall be required to conduct employee meetings utilizing the Notification of Change Form. The contractor will be required to submit a copy of the form back to LG&E/KU with employee signatures.

Action for Communication of change

LG&E/KU will evaluate information regarding changes that may affect the written OQ plan and/or an identified covered task(s).

When appropriate, LG&E/KU will establish a team of subject matter experts to evaluate if the written OQ plan and/or Covered Task(s) in question is significantly affected by internal or external changes.

LG&E/KU will assess the effect the changes will have on the written OQ plan and/or covered task(s) and make adjustments to the plan and/or evaluation process as necessary. These adjustments could involve anything from no communication, notification only to qualified individuals, up to and including notification of required training and re-evaluation.

Determining the need to communicate

The need to communicate will vary dependent upon the impact of the change on the Covered Task.

LG&E/KU has established a 3-tiered system for identifying and communicating change.

1. **Level (1)** - Limited to no impact on the OQ program and/or Covered Task and requires no communication or further action

2. **Level (2)** - Moderate impact on the OQ program and/or Covered Task and requires only communication of the change

3. **Level (3)** - Significant impact on the OQ program and/or Covered Task and requires communication of the modification of the OQ program and/or qualification process. Level 3 change may require training and evaluation, as appropriate, for LG&E/KU employees and contractor personnel.

Communication process

In accordance with NOC form, significant changes affecting a Covered Task will be communicated to the individual(s) performing that task as soon as reasonably possible either by e-mail, tailgates, or re-training/qualification.

Notification of Change (NOC) Form (version 2.0)

Date: 10/26/2017

NOC # (training office use): 014-17

NOC initiated by (Name & EE #): **Keith Campbell**

The following OQ Program, Procedure or Task has been modified/changed ***added/deleted (circle):***

Procedure/Policy/Standard Document Number(s) & Description(s): Gas Standards Watch
1) Records Review prior to Excavation of High Pressure Distribution Facility (> 60 psi MAOP)

OQ Task Number(s) & Description(s):
Task F-2A Join Pipe with Mechanical Fitting Compression
ASME B31Q:
0691 Joining of pipe – Non bottom out compression coupling
0701 Joining of pipe – Bottom out compression coupling
0711 Joining of pipe – Compression couplings

Indicate Level of change (circle one): Level (1) Level (2) Level (3)

- Modification to company policies or procedures: Yes No
- Use of new equipment and/or technology : Yes No
- Change in State or Federal regulations: Yes No
- New information from equipment or Product manufacturer: Yes No
- If Other reason than above, please explain below:

Brief Description of Change: 1) This NOC addresses the requirement to perform a records review prior to excavating high pressure gas distribution facilities. Couplers identified through the records review within 30-feet of the planned or emergency excavation for high pressure gas distribution facilities will be reported to supervision and will be evaluated by operational, engineering and integrity management personnel for appropriate actions.

Operator Qualification 192.805(f) Notice of Change
SIGN-IN SHEET (Please Print Legibly)

DATE: 10/26/2017

NOC#: 014-17

TASK(S): F-2A Join Pipe with Mechanical Fitting Compression

NOC PRESENTER:

NOC DESCRIPTION: 1) Records Review prior to Excavation of High Pressure Distribution Facility (> 60 psi MAOP)

I hereby acknowledge that I have received notification of change of a covered task(s) as required by 49 CFR 192.805(f).

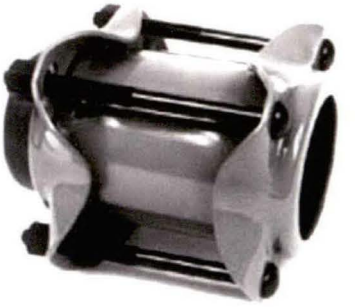
I understand that modifications to policies and procedures may be required, as conditions warrant, and that I understand the Covered Task change and agree to all the requirements contained herein. I understand that compliance with this change is a condition of employment, and that disciplinary action may be taken if I am found in violation of the change.

Last Name/First Name (please print in ink or type)	Signature	LG&E/KU Business Division and/or Contractor Company	Employee #
1.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			

October 27, 2017

Records Review prior to Excavation of High Pressure Distribution Facility (> 60 psi MAOP)

This Gas Standards Watch has been issued to all employees within the Gas Distribution Operations line of business, all design personnel and all pipeline construction contractors to inform them of the requirement to perform a records review prior to excavating high pressure gas distribution facilities. The records review will be performed for planned and emergency work where high pressure gas distribution pipeline facilities (> 60 psig MAOP) will be excavated.



The review will be looking for presence of compression couplers outside the bounds of the excavation that might be effected by the excavation. The records review may be performed by record coordinators, supervisors or field crews. Couplers identified through the records review within 30-feet of the planned or emergency excavation for high pressure gas distribution facilities will be reported to supervision and will be evaluated by operational, engineering and integrity management personnel for appropriate actions.

Please forward this information to any affected personnel.

From: Barrows, Aaron

To: Barrows, Aaron; Phillips, Isis; Cloyd, Russ; Clyde, Peter; Cummins, Michael; Jaynes, Pam; Ryan, Joe; Satkamp, Mark; Skaggs, John; Stratman, Paul; Branham, Tammy; Keltee, Frederick; Logsdon, Jacob; Logsdon, Verl; Pfister, Tom; Ruble, Andrew; Ta, Ben; McDonald, Rosanna; Murphy, Clay; Rieth, Tom; Walker, Barry; Allison, Maria; Augustine, Chad; Bauer, Elliott; Beatty, Stephen; Benge, Eric; Bischof, David; Duncan, Trevor; Graf, Cody; Harmeling, Dave; Hayes, Justin; Hill, Lesley; Hiner, Brad; Holton, Erin; Lenhart, Brian; McGuire, David; Meade, Craig; Norton, William; Rossi, Justin; Simmons, Damien; Thomas, Zach; Wade, Jim; Wood, Gabriel; Allen, Mike; Bischoff, Chuck; Collins, Mike; Conkright, Rebecca; England, Kirby; Huddleston, Jeff; Hudgins, Natalie; Lawson, BIll; Manska, Duane; Price, Jonathan; Warren, Ricky; Allen, James; Allen, Rodrick; Alvey, Joshua; Baker,Derry; Ballard, Stephen; Benedict, Ronald; Boisvert, Lori [Contractor]; Boone, Chris; Bridgewater, Hollis; Brock, Tom; Bruner, Rodney; 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Herndon, Greg; Parrish, Debbie; Stewart, Gregory; Thielen, Laura; Fitzgerald, Chris; Heckel, Anthony; Hunt, Bill; Jones, Mike (Auburndale); Murphy, Tom; Probus, Dennis (LGE); Stephens, Malcolm; Thomas, Lauren; Walton, Ed; Bray, Bob; Davis, John (Auburndale); Dilley, Dana; Durbin, David; Fields, Paul; Ginn, Randy; Grant, Bill; Mills, Kevin; Nall, Russell; Pearson, Jay (Auburndale); Purvis, Greg; Rudolph, Frank; Thompson, Nick; Wheatley, Terry; Wyatt, Greg; Breeding, Patrick; Calebs, Robert; Campbell, Keith; Dodson, Larry; Doty, Dan; Early, Joseph; Griffin, John; Hartlage, Mary; Keys, Jerry; Kress, Mike; Lewellen, Kevin; Mattingly, Carrie; McCauley, Joel; Murphy, Kevin; Paulley, David; Terry, Antoine; Brady, Angela; Carman, Vicki; Clardy, Talley; Clifton, Lisa; Cummins, Aaron; Darragh, Mark; Davis, Nicole; Dowdle, Steve; Dukes, Nathan; Grant, Almond; Keys, Scott; Larkins, Doug; Lembach, Chuck; Murphy, Jerrod; Reesor, Tracy; Seewer, Chad; Simpson, Ryan; Spencer, Steve; Stegner, Natoshia; Weihe, Julie; West, Kay; Wilson, Lynn; Bellar, Lonnie; Kitchen, Nancy; Malloy, John; Lewis, John [Contractor]; Young, Jared [Contractor]; Bill Stoll - Stoll Construction; Bobby Woosley; Cheatham, Andre [Contractor]; Cinnamon King - Fishel Co.; Dan Abbott - Premier Energy; Darryl Garland; Katrana, David; David Schoenbachler; David Spencer - Southern Pipeline; David Stoll - Stoll Construction; Gearheart, Eric [Contractor]; Givens, TJ [Contractor]; Graves, Junie [Contractor]; Hayes Testing; james.george; Jamie Lee - Southern Pipeline; Jerry Hardy; jess.woodruff; jim.linton; Joe Naylor; John Stenger - Premier Energy; Justin Johnson - Schardein; Kenny Riley; Kimberly Braswell - EnsiteUSA; [redacted]; Larry Dowell - Southern Pipeline; Larry McIntyre; Martin Ignacio - Petrochem Insulation; Marty Kenney - Schardein; Pat Mangeot - Maeser; Paul Garabedian - Surveys and Analysis; Paul Lee - Southern Pipeline; Rich Adams - USIC; Rich Mauldin - Team Fishel; Robert Carl Jr.; Ron Baker - Team Fishel; [redacted] Scott - Western Mountain Inc; Scott Yaroma - Abel Construction; Shouse, Alvin [Contractor]; [redacted] Steve Triplett; TJ Givens; Todd - Western Mountain Inc; William Grimes - PECCO

Subject: GDO Safety Communication- OQ Notification of Change - NOC 15 Completion of Forms Associated with Bolted Mechanical Coupler Unearthing and Installation 11 30 2017

Date: Thursday, November 30, 2017 9:29:07 AM

Attachments: GDO Safety Communication- OQ Notification of Change - NOC 15 Completion of Forms Associated with Bolted Mechanical Coupler Unearthing and Installation 11 30 2017.pdf

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All,

This is a GDO Safety Communication- OQ Notification of Change - NOC 15 Completion of Forms Associated with Bolted Mechanical Coupler Unearthing and Installation 11 30 2017. Please see the following message and attached document for the content of this communication:

This change requires a LEVEL 2 Notification of Change.

Attached is a GDO Safety Communication - OQ Notification of Change impacting OQ task F2A - Join Pipe with Mechanical Fitting Compression.

All individuals performing this task and/or performing excavation operations on LG&E and KU gas facilities or ROW are required to receive this NOC and Verify by signature that the understand and will abide by the required changes.

NOC-015 Completion of Forms Associated with Bolted Mechanical Coupler Unearthing and Installation.

This NOC addresses the requirement to complete certain forms whenever bolted style mechanical couplings are unearthed on systems > 3 PSIG MAOP or areinstalled on any pressure system. The audit form (Checklist for Auditing the Installation of Bolt- Style Couplings) will be used only periodically and is not required for each installation.

If more than 15 individuals are in attendance during the NOC meeting, additional sign in sheets may be printed from page 4 of the attached NOC.

All individuals performing this task must review the attached NOC, sign and return the sign in sheet to [redacted] by December 18, 2017.

Thank you,

Aaron Barrows
Gas Business Analyst
Phone – [redacted]
Fax – [redacted]

Gas Distribution Operations Communication of Changes that Affect Operator Qualification Program

(192.805(f))

LG&E/KU will communicate significant changes that affect a Covered Task(s) to the individuals who perform that Covered Task(s). A change may be significant enough to require changes to the qualification process or additional evaluations.

These changes may include but are not limited to:

- Significant modifications to LG&E/KU policies or procedures
- Significant changes in state or federal regulations
- Use of new equipment and/or technology that significantly affects performance of the Covered Task(s)
- New information from equipment or product manufacturers that significantly affects performance of the Covered Task(s)

Responsibility for communication of changes affecting covered tasks

LG&E/KU is responsible for identifying substantive changes affecting an identified Covered Task(s).

LG&E/KU is responsible for revising the evaluation process, as applicable, to include the impact of such changes. LG&E/KU will make a determination as to the level of communication regarding the change that is required.

LG&E/KU will disseminate the information utilizing the notification of change form to all appropriate Managers and Supervisors.

Managers and Supervisors will follow the directions identified on the notification of change form. Depending on the level of change, when required, Managers and Supervisors shall conduct an informational meeting providing the information to all affected employees.

Contractors affected by the change shall be required to conduct employee meetings utilizing the Notification of Change Form. The contractor will be required to submit a copy of the form back to LG&E/KU with employee signatures.

Action for Communication of change

LG&E/KU will evaluate information regarding changes that may affect the written OQ plan and/or an identified covered task(s).

When appropriate, LG&E/KU will establish a team of subject matter experts to evaluate if the written OQ plan and/or Covered Task(s) in question is significantly affected by internal or external changes.

LG&E/KU will assess the effect the changes will have on the written OQ plan and/or covered task(s) and make adjustments to the plan and/or evaluation process as necessary. These adjustments could involve anything from no communication, notification only to qualified individuals, up to and including notification of required training and re-evaluation.

Determining the need to communicate

The need to communicate will vary dependent upon the impact of the change on the Covered Task.

LG&E/KU has established a 3-tiered system for identifying and communicating change.

1. **Level (1)** - Limited to no impact on the OQ program and/or Covered Task and requires no communication or further action

2. **Level (2)** - Moderate impact on the OQ program and/or Covered Task and requires only communication of the change

3. **Level (3)** - Significant impact on the OQ program and/or Covered Task and requires communication of the modification of the OQ program and/or qualification process. Level 3 change may require training and evaluation, as appropriate, for LG&E/KU employees and contractor personnel.

Communication process

In accordance with NOC form, significant changes affecting a Covered Task will be communicated to the individual(s) performing that task as soon as reasonably possible either by e-mail, tailgates, or re-training/qualification.

Notification of Change (NOC) Form (version 2.0)

Date: 11/30/2017	
NOC # (training office use):	NOC 015 - 17
NOC initiated by (Name & EE #):	TOM RIETH / K. Murphy

*The following OQ Program, Procedure or Task has been modified/changed **added/deleted (circle):***

Procedure/Policy/Standard Document Number(s) & Description(s):

Gas Standards Watch 10/27/2017 (11/2/17 issue)–Responses to Exposed Compression Couplings

GOM&I –PO-JO-OT -001 - Joining of Materials By Other Than By Welding

OQ Task Number(s) & Description(s):

Task F-2A Join Pipe with Mechanical Fitting Compression

0691 Joining of pipe – Non bottom out compression coupling

0701 Joining of pipe – Bottom out compression coupling

0711 Joining of pipe – Compression couplings

Indicate Level of change (circle one): Level (1) Level (2) Level (3)

- Modification to company policies or procedures: Yes No
- Use of new equipment and/or technology : Yes No
- Change in State or Federal regulations: Yes No
- New information from equipment or Product manufacturer: Yes No
- If Other reason than above, please explain below:

Brief Description of Change: This NOC addresses the requirement to complete certain forms whenever bolted style mechanical couplings are unearthed on systems > 3 PSIG MAOP or are installed on any pressure system. The audit form (Checklist for Auditing the Installation of Bolt-Style Couplings) will be used only periodically and is not required for each installation.

SIGN-IN SHEET (Please Print Legibly)

DATE: **(issued Date 11 /30 /2017)**

NOC#: 015 -17

TASK(S): F-2A Join Pipe with Mechanical Fitting Compression

NOC PRESENTER:

NOC DESCRIPTION: Bolted Coupler Exposure / Installation Checklists

I hereby acknowledge that I have received notification of change of a covered task(s) as required by 49 CFR 192.805(f).

I understand that modifications to policies and procedures may be required, as conditions warrant, and that I understand the Covered Task change and agree to all the requirements contained herein. I understand that compliance with this change is a condition of employment, and that disciplinary action may be taken if I am found in violation of the change.

Last Name/First Name (please print in ink or type)	Signature	LG&E/KU Business Division and/or Contractor Company	Employee #
1.			
2.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Checklist for Installation of Bolt-Style Couplings

This form will be completed when LG&E employees or LG&E contractors install bolt-style couplings in the LG&E gas system. This form will be completed by a LG&E employee or LG&E contract Pipeline Inspector.

General Information:

1. Name of Employee inspecting bolt-style coupling installation:
2. Name of employee installing coupling:
3. Date of installation:
4. Location:
5. Size of coupling:
6. Type of soil (circle one): Sandy Clay Gravel Topsoil Other
7. Coupling manufacturer and model number: _____
8. System (circle one): Low pressure Elevated pressure Medium pressure

Verify the following

☐ Installing employee verified the condition of the pipe was acceptable for coupling installation

□ Installing employee examined pipe wall for scratches and grooves that could prevent proper seal

☐ Installing employee followed the manufacturer's installation instructions (and instructions were present)

☐ Installing employee properly prepared the pipe surface; cleaned surface as required

☐ Inspected the joint for quality and took required actions if joint was unsatisfactory

☐ Performed leak test

☐ Repaired/replaced fitting if it failed leak test

☐ Consulted with Operations/Engineering to determine if restraints were needed

Make one copy of this form and provide to supervisor. The original form should be included in the main report.

Checklist for Exposed Bolt-Style Coupling (pressures > 3 psig)

This form will be completed when LG&E or LG&E contractors expose a bolt-style coupling in a system where the pressure is > 3 psig (medium and high pressure distribution and transmission) and the coupling will be backfilled. The purpose of the form is to provide Operations, Engineering and Gas Regulatory personnel with information about the bolt style coupling installation.

Precautions:

1. Stop excavation upon discovering the bolt-style coupling in the excavation
2. Set-up a perimeter around the excavation to keep the public away from the excavation

General Information:

1. Contact Employee for the bolt style coupling found:
2. Date of exposure:
3. Location:
4. Size of coupling (based on pipe size if not exposed enough to determine):
5. Type of soil (circle one): Sandy Clay Gravel Topsoil Other (take picture and describe)

Pictures:

1. Take at least two pictures of the coupling. The pictures should be from different angles (additional pictures can be taken).
2. Email pictures to supervisor. Ensure pictures are attached to this form:

Sketch: Provide a sketch on the backside of the form showing the coupling orientation (vertical/horizontal), nearby branches, pipe, valves and fittings, other utilities or structures, etc.

Leak Survey:

1. Use an instrument designed to detect natural gas to check for the presence of natural gas after backfilling the excavation. Include readings in the above sketch in relation to the coupling. If the contact employee is not leak survey qualified they should contact:
    a. Their supervisor to call Gas Regulatory to complete the survey after the excavation is backfilled. Call [redacted]
    b. If Gas Regulatory is not available contact Gas Dispatch to have the survey assigned to a Gas Trouble Technician.

Leak Survey completed at time of backfill (circle one) yes no

Include completed form in the main report and email a scanned copy of the completed form (back and front) to the Distribution Integrity Management (DIM) group.

Checklist for Auditing the Installation of Bolt-Style Couplings

This form will be completed when auditing the installation of bolt-style couplings in the LG&E gas system. This form will be completed by a LG&E employee or LG&E contract Pipeline Inspector.

General Information:

1. Name of Employee auditing bolt-style coupling installation:
2. Name of employee installing coupling:
3. Date of installation:
4. Location:
5. Size of coupling:
6. Type of soil (circle one): Sandy Clay Gravel Topsoil Other
7. Coupling manufacturer and model number: _____
8. System (circle one): Low pressure Elevated pressure Medium pressure
9. Take at least 2 pictures of the installation and attach to the form.

Verify the following

☐ Installing employee verified the condition of the pipe was acceptable for coupling installation

□ Installing employee examined pipe wall for scratches and grooves that could prevent proper seal

☐ Installing employee followed the manufacturer's installation instructions (and instructions were present

☐ Installing employee properly prepared the pipe surface; cleaned surface as required

☐ Inspected the joint for quality and took required actions if joint was unsatisfactory

☐ Performed leak test

☐ Repaired/replaced fitting if it failed leak test

☐ Consulted with Operations/Engineering to determine if restraints were needed

Include completed form in the main report and send a scanned copy of the completed form to the Distribution Integrity Management (DIM) group.

LG&E Standard Specification for Steel to Steel Bolted Mechanical Fittings Specification Number MF-B1

1.0 SCOPE

1.1 This Specification covers the design, manufacture, inspection, testing and shipment of bolted mechanical fittings for use on gas distribution systems (up to and including 60 psig) for joining steel gas piping up to 8-inch in nominal diameter. Mechanical couplings and restraints shall not be used on piping systems that do not meet the above criteria.

2.0 APPLICABLE CODES AND STANDARDS

2.1 Applicable codes and standards:

- Code of Federal Regulations Title 49, Part 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
- ASTM A 36, Standard Specification for Carbon Structural Steel
- ASTM A 53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- ASTM A 242, Standard Specification for High-Strength Low-Alloy Structural Steel
- ASTM A 513, Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
- ASTM A 635, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability
- ASTM A 675, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
- ASTM A 1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- ASTM F 436, Standard Specification for Hardened Steel Washers Inch and Metric Dimensions
- ANSI/ASQ Z1.4, Sampling Procedures and Tables for Inspection by Attributes

2.2 At the time the material is furnished, all standards referred to in this Specification shall be:

- the latest published edition listed in 49 CFR 192; and
- the latest published edition, or an earlier edition approved by the Company.

3.0 GENERAL REQUIREMENTS

3.1 The mechanical fittings furnished in accordance with this Specification shall comply with the requirements of the Code of Federal Regulations Title 49, Part 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards and the requirements set forth in this Specification.

3.2 Where specifications conflict, the more stringent requirement shall be met.

3.3 Each mechanical fitting shall include manufacturer's installation instructions with the fitting.

LG&E Standard Specification for Steel to Steel Bolted Mechanical Fittings Specification Number MF-B1

4.0 DEFINTION

4.1 Mechanical fittings are defined as a connection between piping components employing physical force to develop a seal or produce alignment. Examples of fittings include couplings, caps, adapters, risers and reducers.

5.0 MATERIAL

5.1 Each fitting shall comply with the following:
a. All steel to steel mechanical joints shall be restrained, using restraints described in specification MF-R1

5.2 Each metallic bolted fitting shall also comply with the following:
a. The materials used to manufacture the fitting shall conform to those listed in Table 1, unless otherwise agreed by LG&E. Any changes in fitting materials or suppliers of fitting materials shall be communicated to LG&E and approved by LG&E prior to use.
b. Bolts and brackets are required for bolted fittings. The number of bolts shall be dependent on the size of the fitting, with Table 2 below showing the number of bolts depending on the fitting size.

Table 1: Materials for Bolted Fitting Components

Component	Material [Note 1]
Bolts	Steel: ASTM A 242 (Minimum Tensile Strength 70,000 PSI), 5/8" minimum diameter
Nuts	Steel: ASTM A563 Grade A
Followers	Steel: AISI C1008 / C1010 / C1012, ASTM A 1011, or ASTM A 36/ASME SA 36
Middle Ring	Steel: ASTM A 513 Grade 1010, ASTM A 635, ASTM A 53 Grade B or ASTM A 675 Grade 60
Gasket	Buna-N or Buna-S, max operating temp – 212 F Plain and Conductive: Durometer: 70-75 Shore A Tensile: 2177 PSI, Min. Elongation: 200%, Min. Compression Set- ASTM D395-Method B: 10%, Max. Insulating: Durometer: 70-75 Shore A Tensile: 1706 PSI, Min. Elongation: 250%, Min. Compression Set- ASTM D395-Method B: 15%, Max. Electrical Resistance: Min. 10,000 MegOhms, 5 PSI Pressure, 5000 Volts
Coating	Fusion Bond Epoxy (FBE)
Washers (if required)	ASTM F 436 with a hardness of 38 HRC minimum and 42 HRC maximum
Note 1: The fitting manufacturer may use an equivalent material upon Company approval.	

LG&E Standard Specification for Steel to Steel Bolted Mechanical Fittings Specification Number MF-B1

Table 2: Number of bolts required per fitting size.

Fitting Size	Number of Bolts
2	3
4	4
6	6
8	6

6.0 MECHANICAL TEST DATA

6.1 Mechanical fittings shall be approved only after submission of appropriate test data as required by Code of Federal Regulations Title 49, Part 192. The test data shall be from an independent laboratory, unless otherwise agreed by LG&E.

7.0 INSPECTION / TESTING / QUALITY REQUIREMENTS

7.1 The manufacturer shall have documented procedures for inspection and testing, and certify that the materials used to manufacture the fittings are in accordance with this Specification.

7.2 LG&E reserves the right to inspect and/or test any and all fittings shipped for compliance with this Specification. LG&E's receipt inspection program that may be used to inspect the fittings is in accordance with ANSI/ASQC Z1.4 for an AQL of 2.5 for normal sampling and inspection level II. If a representative sample does not meet the Specification requirements, the entire lot may be rejected and returned at the Supplier's expense. When it is determined that outside laboratory testing is necessary and such tests reveal that the representative sample does not conform to this specification, a claim may be filed with the Supplier for these costs.

7.3 LG&E reserves the right to visit and inspect the manufacturer's facilities to review process, testing and quality control for the manufacturing of mechanical fittings.

7.4 Acceptance of product shall not be used as evidence of effective control of quality by the manufacturer, and shall not absolve the manufacturer of the responsibility for nonconforming products or preclude subsequent rejection by LG&E.

7.5 All materials shall be newly manufactured and no fittings shall be shipped or accepted that are older than six months from the date of manufacture, unless otherwise agreed by LG&E.

8.0 MARKING

8.1 Fittings shall be marked as required by Code of Federal Regulations Title 49, Part 192.63.

9.0 CERTIFICATION

9.1 The Supplier shall submit certification that the products shipped on a specific purchase order are in compliance with this Specification, and conform to the requirements in 49 CFR 192, prior to shipment.

LG&E Standard Specification for Steel to Steel Bolted Mechanical Fittings Specification Number MF-B1

10.0 FIELD FAILURE

10.1 Any fitting which fails as a result of non-conforming material or defects may be repaired, or removed and replaced by LG&E. Notification may be made to the Supplier by LG&E of such failure and the Supplier may inspect the failed fitting, if removed, at a location designated by LG&E. LG&E will keep records of the time, materials, and costs required to find and repair, or remove and replace the failed fitting. If it is determined that a failure is a result of non-conforming material or defects, LG&E may file a claim with the Supplier for payment of reasonable costs attributable to the failure.

LG&E Standard Specification for Steel Restraints for Mechanical Couplings Specification Number MF-R1

1. SCOPE

a. This Specification covers the design, manufacture and shipment of steel restraints for use over non-restraining mechanical fittings on steel gas distribution piping (up to and including 60 psig) up to 8-inch in nominal diameter, where pipe movement may occur. Restraints shall be used on all non-welded mechanical joints on steel-to-steel connections. Mechanical couplings and restraints shall not be used on piping systems that do not meet the above criteria.

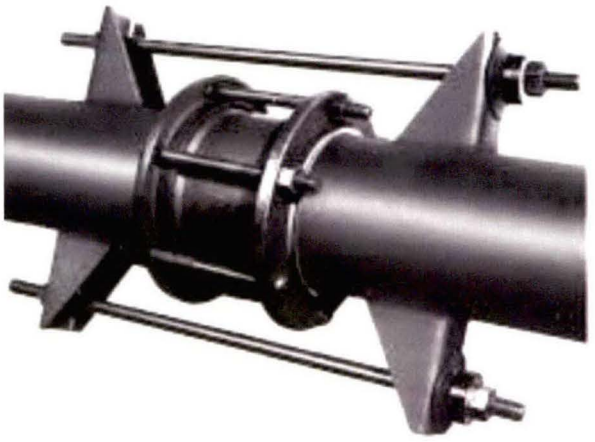
2. APPLICABLE CODES AND STANDARDS

a. Applicable codes and standards:

(a) Code of Federal Regulations Title 49, Part 192.273, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
(b) ASTM A 36, Standard Specification for Carbon Structural Steel

(c) At the time the material is furnished, all standards referred to in this Specification shall be the latest published edition.

3. MATERIAL - JOINT HARNESS



a. Each joint harness shall consist of two lugs, one deflection ring, one stud bolt, and two nuts.

b. Each coupling shall require the installation of two complete joint harness sets at minimum

c. Joint harnesses shall be purchased as kits from the coupling manufacturer only

d. Joint harness kits must be supplied with manufacturer's recommended installation procedures

e. Joint harness kits shall be in sealed plastic packaging or equivalent

LG&E Standard Specification for Steel Restraints for Mechanical Couplings Specification Number MF-R1

f. Lug material shall be ASTM A-20, AISI C-101, or ASTM A283 Gr. C steel

g. Bolts (rods) and nuts shall be ASTM A193 Grade B7/ASTM A194 Grade 2H, or AISI 1045 Steel (76,000 psig minimum)

h. The stud bolt size shall be a minimum of 5/8 inches for pipe diameters of 8 inches or less.

i. The joint harness minimum bolt length shall be based on the middle ring length as shown in Table 2.

Table 2: Joint Harness Minimum Stud Length.

Coupling Middle Ring Length (inches)	Minimum Stud Length (inches)
5	26
7	32
12	38
16	44

From: GDO Communication

To: Phillips, Isis; Bill Stoll - Stoll Construction; Brandon Davidson; Cheatham, Andre [Contractor]; Chuck Strickfaden; David Schoenbachler; David Spencer - Southern Pipeline; [redacted] Gearheart, Eric [Contractor]; Givens, TJ [Contractor]; Graves, Junie [Contractor]; Hayes Testing; James Ball, TruCheck; james.george; Jamie Lee - Southern Pipeline; Jason Uhl; Jeff Culbreth; jess.woodruff; jim.linton; Joe Naylor; Whitaker, Joe [Contractor]; Junior Cassity; Justin Johnson - Schardein; Kenny Riley; Kevin Sell; Kimberly Braswell - EnsiteUSA; [redacted] Larry Dowell - Southern Pipeline; Larry McIntyre; Maria Triplett; Mark Ettenhofer; Mark Stallman; Martin Ignacio - Petrochem Insulation; Marty Kenney - Schardein; Mike Koby; Pat Mangeot - Maeser; Paul Lee - Southern Pipeline; Randy Lash, Olameter; Rich Mauldin - Team Fishel; Rick Wagner; Robert Carl Jr.; Ron Baker - Team Fishel; [redacted] Samantha Bartley - AWP Traffic; Scott Yaroma - Abel Construction; Shouse, Alvin [Contractor]; [redacted] Steve Triplett; Terry Carby; TJ Givens; William Grimes-PECCO; Betts, Bruce; Bielefeld, Dale; Mason, Eric; Griggs, Dara; Hildebrand, Amber; Doty, Dan; Lewis, John [Contractor]; McCauley, Joel; Paulley, David; Terry, Antoine; Young, Jared [Contractor]; Cloyd, Russ; Clyde, Peter; Cummins, Michael; Jaynes, Pam; Ryan, Joe; Satkamp, Mark; Skaggs, John; Stratman, Paul; Branham, Tammy; Keltee, Frederick; Logsdon, Jacob; Logsdon, Verl; Pfister, Tom; Ruble, Andrew; Ta, Ben; McDonald, Rosanna; Murphy, Clay; Rieth, Tom; Walker, Barry; Allison, Maria; Augustine, Chad; Bauer, Elliott; Beatty, Stephen; Benge, Eric; Beumel, Michelle; Bischof, David; Duncan, Trevor; Harmeling, Dave; Hayes, Justin; Hebbeler, Thomas; Hill, Lesley; Hiner, Brad; Holton, Erin; Lenhart, Brian; McGuire, David; Meade, Craig; Neal, Shane; Norton, William; Painter, Sheila; Rossi, Justin; Simmons, Damien; Thomas, Zach; Wade, Jim; Winebrenner, Robin; Wood, Gabriel; Beck, Dave; Wilson, Greg (EW Brown); Collins, Mike; Conkright, Rebecca; England, Kirby; Hall, Jenny; Huddleston, Jeff; Hudgins, Natalie; Lawson, BIll; Manska, Duane; Price, Jonathan; Warren, Ricky; Allen, James; Allen, Rodrick; Alvey, Joshua; Baker,Derry; Ballard, Stephen; Benedict, Ronald; Boisvert, Lori [Contractor]; Boone, Chris; Bridgewater, Hollis; Bruner, Rodney; Byrum, Frederick; Carwile, Matthew; Clunie, Jeff; Cochran, Janet; Compton, Henry; Cook, Brandon; Davis, Janice; England, Brian; Evans, Craig; Faith, Chris; Fischer, Darla; Ford, Thomas; Goetzinger, Lester; Grider, Casey; Hall, Chris; Harrison, Kenneth; Hayden, Daryl; Heath, Joseph; Higgins, Scott; Highland, Brittney; Hines, Jeremy; Hinkle, Christopher; Hodson, Darren; Huettig, Greg; Hughes, Rashel; Jackson, Kurt; Jewell, Katie; Jones, Nathan; Jones, Rebecca; Kingrey, Brian; Kiser, Shawn; McDavid, Tyler; Medley, Meghan; Miller, Eric; Netherton, Eric; Painter, Ronald E [PPL]; Painter, Sheila; Payne, James; Pendleton, Bob; Perry, Holdan; Perry, Lee; Peyton, Bruce; Pryor, Arthur; Quill, Michael; Ragland,John; Russell, Brian; Sarles, Jonathan; Shelton, Gary; Smith, Franklin; Springston, Richie; Stinson, Herman; Sumner, Steve; Swain, Jamarr; Taylor, Bo; Tuttle, Zachary; Vogel, Scott; Wallace, Jacque; Wallace, Mark; Warren, Barbie; Watkins, Maurice; White, Anthony; White, Eugene; Baker, Joe; Balentine, Lucas; Barnette, Lewis; Bell, Clifford; Cross, Gene; Darnall, Wayne; Doolin, Dale; Roberts, Charlie; Roth, Chris; Stocke, Richard; Vanover, Eric; Windmiller, Lafe; Blair, Keith; Board, Greg; Burba, Jackie; Burris, Justin; Childress, Kyle; Dages, Shannon; Edwards, David; Farnsworth, Taylor; Froggett, Nate; Gardner, Chip; Gary, Tim; Gozzard, Kevin; Hunter, Dale; Litton, Terry; Manska, Curtis; Metcalf, Daniel; Miller, Anthony; Mullins, Tommy; Nash, Nathan; Rankin, Tracy; Richey, Curt; Riggs, Clarence (Junie); Scott, Eric; Skaggs, Patrick; Smith, Jonathan; Vessels, Ronnie; Waddle, AJ; Whelan, Greg; White, Chad; White, David; Wiles, Chris; Wilkins, Brian; Williams, Clint; Winstead, Angela; Herndon, Greg; Parrish, Debbie; Stewart, Gregory; Thielen, Laura; Fitzgerald, Chris; Heckel, Anthony; Hunt, Bill; Jones, Mike (Auburndale); Murphy, Tom; Stephens, Malcolm; Thomas, Lauren; Bray, Bob; Davis, John (Auburndale); Dilley, Dana; Fields, Paul; Ginn, Randy; Grant, Bill; Mills, Kevin; Pearson, Jay (Auburndale); Purvis, Greg; Rudolph, Frank; Wyatt, Greg; Campbell, Keith; Chambers, Amanda; Hammond, Craig; Johnson, Sarah; Breeding, Patrick; Calebs, Robert; Dodson, Larry; Early, Joseph; Fisher, Brandon; Griffin, John; Hartlage, Mary; Kress, Mike; Lewellen, Kevin; Mattingly, Carrie; Murphy, Kevin; Carman, Vicki; Clifton, Lisa; Cummins, Aaron; Darragh, Mark; Dowdle, Steve; Dukes, Nathan; Grant, Almond; Keys, Scott; Larkins, Doug; Lembach, Chuck; Murphy, Jerrod; Reesor, Tracy; Seewer, Chad; Simpson, Ryan; Stegner, Natoshia; Weihe, Julie; West, Kay; Wilson, Lynn; Moore, Leeann; Reynolds, Ellen; Chris Fisher; Claypool, Brian; McBride, Keith; Saunders, Eileen; Griffith, Susie; Weatherford, Brent; Zimlich, John; Bellar, Lonnie; Malloy, John

Subject: GDO Communication - NOC 021 Final Plastic Pipe Rule effective 01/22/2019

Date: Monday, January 14, 2019 1:59:43 PM

Attachments: OQ NOC 021 Final Plastic Pipe Rule 1-22-2019.docx

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All,

This is a GDO Communication – [**Level 2**] Notification of Change - OQ NOC [**021**], [**Final Plastic Pipe Rule**]. Please see the attached documents and following message for the content of this communication.

All individuals holding OQ qualifications associated with installing or joining plastic pipe (PE) and/or manage OQ compliance for LG&E/KU are required to receive the **NOC021** and verify by signature they understand and will abide by the required change(s).

If more than 15 individuals are in attendance during the NOC meeting(s), additional sign in sheets can be printed (page 5 of NOC).

The completed Notification of Change (NOC) forms with individual signatures are **required to be returned to Larry Dodson (LG&E/KU OQ Coordinator) by January 31st 2019.** [redacted]

This Notification of Change (NOC) **NOC021**, **Final Plastic Pipe Rule** becomes effective

[01/22/2019]. This is a [**level 2**] NOC, requiring [**Documentation of communication**].
Attached document(s):

- LG&E/KU Notification of Change Form

Please communicate this NOC to all individuals that hold any one and/or all OQ qualifications associated with installing or joining plastic pipe (PE):

0751 - Butt Fusion Manual
0781 – Electrofusion
0761 - Butt Fusion Hydraulic
0691 - Non Bottom-out Compression Coupling
0701 - Bottom-out Compression Coupling
0711 - Compression Coupling
0681 - Stab fitting
0201 - Visual Inspection of Installed Pipe & Components
0641 - Visual Inspection of Pipe & Components Prior to Installation
0901 - Install Plastic Pipe in Ditch
0911 - Install Plastic Pipe in Bore
0921 - Install Plastic Pipe Plow/Pull
0931 - Install Plastic Pipe Plow/Plant
1041 - Install Mechanical Clamp/Sleeve Bolted

Note – This Operator Qualification Level 2 Notification of Change applies to all individuals who install, replace or repair plastic pipe (PE) Company and Business Partners employees.

If you have any questions please contact Keith Campbell [redacted]

Keith Campbell
Manager, Operator Qualification
Cell [redacted]

Have a Safe and Productive Day

Gas Distribution Operations Communication of Changes that Affect Operator Qualification Program

(192.805(f))

LG&E/KU will communicate significant changes that affect a Covered Task(s) to the individuals who perform that Covered Task(s). A change may be significant enough to require changes to the qualification process or additional evaluations.

These changes may include but are not limited to:

- Significant modifications to LG&E/KU policies or procedures
- Significant changes in state or federal regulations
- Use of new equipment and/or technology that significantly affects performance of the Covered Task(s)
- New information from equipment or product manufacturers that significantly affects performance of the Covered Task(s)

Responsibility for communication of changes affecting covered tasks

LG&E/KU is responsible for identifying substantive changes affecting an identified Covered Task(s).

LG&E/KU is responsible for revising the evaluation process, as applicable, to include the impact of such changes. LG&E/KU will make a determination as to the level of communication regarding the change that is required.

LG&E/KU will disseminate the information utilizing the notification of change form to all appropriate Managers and Supervisors.

Managers and Supervisors will follow the directions identified on the notification of change form. Depending on the level of change, when required, Managers and Supervisors shall conduct an informational meeting providing the information to all affected employees.

Contractors affected by the change shall be required to conduct employee meetings utilizing the Notification of Change Form. The contractor will be required to submit a copy of the form back to LG&E/KU with employee signatures.

Action for Communication of change

LG&E/KU will evaluate information regarding changes that may affect the written OQ plan and/or an identified covered task(s).

When appropriate, LG&E/KU will establish a team of subject matter experts to evaluate if the written OQ plan and/or Covered Task(s) in question is significantly affected by internal or external changes.

LG&E/KU will assess the effect the changes will have on the written OQ plan and/or covered task(s) and make adjustments to the plan and/or evaluation process as necessary. These adjustments could involve anything from no communication, notification only to qualified individuals, up to and including notification of required training and re-evaluation.

Determining the need to communicate

The need to communicate will vary dependent upon the impact of the change on the Covered Task.

LG&E/KU has established a 3-tiered system for identifying and communicating change.

1. **Level (1)** - Limited to no impact on the OQ program and/or Covered Task and requires no communication or further action

2. **Level (2)** - Moderate impact on the OQ program and/or Covered Task and requires only communication of the change

3. **Level (3)** - Significant impact on the OQ program and/or Covered Task and requires communication of the modification of the OQ program and/or qualification process. Level 3 change may require training and evaluation, as appropriate, for LG&E/KU employees and contractor personnel.

Communication process

In accordance with NOC form, significant changes affecting a Covered Task will be communicated to the individual(s) performing that task as soon as reasonably possible either by e-mail, tailgates, or re-training/qualification.

Notification of Change (NOC) Form (version 2.0)

Date: **01/11/2019**

NOC # (training office use): **021**

NOC initiated by (Name & EE #): **Keith Campbell**

*The following OQ Program, Procedure or Task has been modified/changed **added/deleted (circle):***

Procedure/Policy/Standard Document Number(s) & Description(s):

Regulatory change - This notification of change specifically deals with the January 22, 2019 Plastic Pipe Rule.

All individuals who install, replace or repair plastic pipe are required to receive this NOC

Note - **The Final plastic Pipe Rule goes into effect on January 22, 2019.**

OQ Task Number(s) & Description(s): Level 2 NOC requiring communication of change to all Individuals holding any and/or all of the following identified covered OQ tasks:

0751 - Butt fusion Manual - 0781 – Electrofusion - 0761 - Butt Fusion Hydraulic - 0691 - Non Bottom-out Compression Coupling - 0701 – Bottom-out Compression Coupling - 0711 - Comp Coupling - 0681 - Stab fitting - 0201 – Visual Inspection of Installed Pipe & Components - 0641 – Visual Inspection of Pipe & Components Prior to Installation - 0901 – Install Plastic Pipe in Ditch - 0911 – Install Plastic Pipe in Bore - 0921 Install Plastic Pipe Plow/Pull - 0931 Install Plastic Pipe Plow/Plant - 1041 Install Mechanical Clamp/Sleeve Bolted -

Indicate Level of change (circle one): Level (1) Level (2) Level (3)

- Modification to company policies or procedures: Yes (No)
- Use of new equipment and/or technology : Yes (No)
- Change in State or Federal regulations: (Yes) No
- New information from equipment or Product manufacturer: Yes (No)
- If Other reason than above, please explain below:

This is a Level 2 NOC requiring communication and documentation to all individuals holding applicable OQ.

Description of Change: The following regulatory changes are required to be communicated:

192.63 – Marking of Materials - The individual installing plastic pipe & components is required to verify that manufacturer markings (Print Line) are present at the time of installation.

Section 192.63 Marking of Materials Section 192.63 currently specifies requirements for the type and content of markings of pipe segments, valves, and fittings. In this final rule, PHMSA revises paragraph (a) to delete paragraphs (a)(1) and (a)(2). The revised paragraph (a) requires that materials be marked in accordance with the appropriate listed specification.

192.281 – Plastic Pipe - All mechanical fittings must be category 1 fittings (Pullout restraint). This requirement restricts the use of bolted style compression couplings on plastic.

Section 192.281 Plastic Pipe Section 192.281 details the requirements for joining plastic pipe. To reduce confusion and promote safety, PHMSA is making several revisions to § 192.281.
For PE joints except for electrofusion must comply with ASTMF2620–12. Paragraphs (e)(3) and (4) are added to require that newly installed mechanical fittings must meet a listed specification and provide Category 1 seal and resistance.

192.329, 192.376 – Installation by Trenchless Excavation – Required to use a weak link when installing plastic pipe using trenchless technology methods. Applicable LG&E procedures addressing weak link; GOM&I-PO-DP-001, GOM&I-PO-DP-002.

Section 192.329 Installation of Plastic Pipelines by Trenchless Excavation The newly added § 192.329 establishes requirements for the installation of plastic pipe by trenchless excavation. During trenchless installation of plastic pipe, operators must now use a weak link as defined in § 192.3 and take practicable steps to avoid striking other underground structures.

Section 192.376 Installation of Plastic Service Lines by Trenchless Excavation Section 192.376 is a new section that establishes new requirements for trenchless excavation installation of plastic service lines. Similar to § 192.329, during trenchless installation of service lines, operators must now take steps to avoid other underground structures and use a weak link device during the pull through process to avoid overstressing the pipeline.

192.720 – Leak repair Clamps - Leak clamps are not acceptable for permanent repair on Plastic Pipe.

Section 192.720 Distribution Systems: Leak Repair. The final rule adds a new § 192.720 prohibiting the use of temporary mechanical leak repair clamps as a permanent repair of plastic pipe used in distribution service.

Operator Qualification 192.805(f) Notice of Change
SIGN-IN SHEET (Please Print Legibly)

DATE:

NOC#: 021

TASK(S): 0751, 0781, 0761, 0691, 0701, 0711, 0681, 0201, 0641, 0901, 0911, 0921, 0931, and/or 1041

NOC PRESENTER:

NOC DESCRIPTION: Regulatory change - Final Plastic Pipe Rule goes into effect on January 22, 2019.

I hereby acknowledge that I have received notification of change of a covered task(s) as required by 49 CFR 192.805(f).

I understand that modifications to policies and procedures may be required, as conditions warrant, and that I understand the Covered Task change and agree to all the requirements contained herein. I understand that compliance with this change is a condition of employment, and that disciplinary action may be taken if I am found in violation of the change.

Last Name/First Name (please print in ink or type)	Signature	LG&E/KU Business Division and/or Contractor Company	Employee #
1.			
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13.			
14.			

From: Barrows, Aaron

To: Barrows, Aaron; Phillips, Isis; Cloyd, Russ; Clyde, Peter; Cummins, Michael; Jaynes, Pam; Ryan, Joe; Satkamp, Mark; Skaggs, John; Stratman, Paul; Branham, Tammy; Keltee, Frederick; Logsdon, Jacob; Logsdon, Verl; Pfister, Tom; Ruble, Andrew; Ta, Ben; McDonald, Rosanna; Murphy, Clay; Rieth, Tom; Walker, Barry; Allison, Maria; Augustine, Chad; Bauer, Elliott; Beatty, Stephen; Benge, Eric; Bischof, David; Duncan, Trevor; Graf, Cody; Harmeling, Dave; Hayes, Justin; Hill, Lesley; Hiner, Brad; Holton, Erin; Lenhart, Brian; McGuire, David; Meade, Craig; Norton, William; Rossi, Justin; Simmons, Damien; Thomas, Zach; Wade, Jim; Wood, Gabriel; Allen, Mike; Bischoff, Chuck; Collins, Mike; Conkright, Rebecca; England, Kirby; Huddleston, Jeff; Hudgins, Natalie; Lawson, BIll; Manska, Duane; Price, Jonathan; Warren, Ricky; Allen, James; Allen, Rodrick; Alvey, Joshua; Baker,Derry; Ballard, Stephen; Benedict, Ronald; Boisvert, Lori [Contractor]; Boone, Chris; Bridgewater, Hollis; Brock, Tom; Bruner, Rodney; Byrum, Frederick; Carwile, Matthew; Clunie, Jeff; Cochran, Janet; Compton, Henry; Cslank, Joseph; Davis, Janice; Dearing, Don; England, Brian; Evans, Craig; Faith, Chris; Fischer, Darla; Ford, Thomas; Gilkey, Bill; Goetzinger, Lester; Grider, Casey; Gutterman, Daniel; Hall, Chris; Harrison, Kenneth; Hayden, Daryl; Heath, Joseph; Higgins, Scott; Highland, Brittney; Hinkle, Christopher; Hodson, Darren; Huettig, Greg; Hughes, Rashel; Jackson, Kurt; Jackson, Mike; Jewell, Katie; Jones, Nathan; Kingrey, Brian; Kiser, Shawn; McDavid, Tyler; Medley, Meghan; Miller, Eric; Netherton, Eric; Painter, Ronald E (Contractor) [PPL]; Painter, Sheila [Contractor]; Payne, James; Pendleton, Bob; Perry, Holdan; Perry, Lee; Peyton, Bruce; Poteet, David; Pryor, Arthur; Quill, Michael; Ragland,John; Rice-Locket, Terry; Russell, Brian; Sarles, Jonathan; Shelton, Gary; Smith, Franklin; Springston, Richie; Steed, Mary Jo; Stinson, Herman; Sumner, Steve; Swain, Jamarr; Taylor, Bo; Tuttle, Zachary; Vincent, Todd; Vogel, Scott; Wallace, Jacque; Wallace, Mark; Warren, Barbie; Watkins, Maurice; White, Anthony; White, Eugene; Baker, Joe; Balentine, Lucas; Barnes, Chris; Bell, Clifford; Burton, Mike; Cross, Gene; Darnall, Wayne; Doolin, Dale; Martin, Lee; Roberts, Charlie; Roth, Chris; Vanover, Eric; Akin, Doug; Barr, Gary; Benningfield, James; Blair, Keith; Board, Greg; Burba, Jackie; Burris, Justin; Butler, Larry; Childress, Kyle; Cundiff, Terry; Dages, Shannon; DeSpain, Larry; Eads, David; Edwards, David; Farnsworth, Taylor; Froggett, Nate; Gardner, Chip; Gary, Tim; Gozzard, Kevin; Hamilton, Terry; Hogan, Gene; Hunter, Dale; Jones, Willie; Litton, Terry; Manska, Curtis; Metcalf, Daniel; Miller, Anthony; Mullins, Tommy; Nash, Nathan; Nevitt, Angela; Rankin, Tracy; Richey, Curt; Riggs, Clarence (Junie); Roark, Keith; Robinson, Libbie; Scott, Eric; Skaggs, Patrick; Smith, Jonathan; Vessels, Ronnie; Waddle, AJ; Whelan, Greg; White, Chad; White, David; Wiles, Chris; Wilkins, Brian; Williams, Clint; Herndon, Greg; Parrish, Debbie; Stewart, Gregory; Thielen, Laura; Fitzgerald, Chris; Heckel, Anthony; Hunt, Bill; Jones, Mike (Auburndale); Murphy, Tom; Probus, Dennis (LGE); Stephens, Malcolm; Thomas, Lauren; Walton, Ed; Bray, Bob; Davis, John (Auburndale); Dilley, Dana; Durbin, David; Fields, Paul; Ginn, Randy; Grant, Bill; Mills, Kevin; Nall, Russell; Pearson, Jay (Auburndale); Purvis, Greg; Rudolph, Frank; Thompson, Nick; Wheatley, Terry; Wyatt, Greg; Breeding, Patrick; Calebs, Robert; Campbell, Keith; Dodson, Larry; Doty, Dan; Early, Joseph; Griffin, John; Hartlage, Mary; Keys, Jerry; Kress, Mike; Lewellen, Kevin; Mattingly, Carrie; McCauley, Joel; Murphy, Kevin; Paulley, David; Terry, Antoine; Brady, Angela; Carman, Vicki; Clardy, Talley; Clifton, Lisa; Cummins, Aaron; Darragh, Mark; Davis, Nicole; Dowdle, Steve; Dukes, Nathan; Grant, Almond; Keys, Scott; Larkins, Doug; Lembach, Chuck; Murphy, Jerrod; Reesor, Tracy; Seewer, Chad; Simpson, Ryan; Spencer, Steve; Stegner, Natoshia; Weihe, Julie; West, Kay; Wilson, Lynn; Bellar, Lonnie; Kitchen, Nancy; Malloy, John; Lewis, John [Contractor]; Young, Jared [Contractor]; Bill Stoll - Stoll Construction; Bobby Woosley; Cheatham, Andre [Contractor]; Cinnamon King - Fishel Co.; Dan Abbott - Premier Energy; Darryl Garland; Katrana, David; David Schoenbachler; David Spencer - Southern Pipeline; David Stoll - Stoll Construction; Gearheart, Eric [Contractor]; Givens, TJ [Contractor]; Graves, Junie [Contractor]; Hayes Testing; james.george; Jamie Lee - Southern Pipeline; Jerry Hardy; jess.woodruff; jim.linton; Joe Naylor; John Stenger - Premier Energy; Justin Johnson - Schardein; Kenny Riley; Kimberly Braswell - EnsiteUSA; [redacted] Larry Dowell - Southern Pipeline; Larry McIntyre; Martin Ignacio - Petrochem Insulation; Marty Kenney - Schardein; Pat Mangeot - Maeser; Paul Garabedian - Surveys and Analysis; Paul Lee - Southern Pipeline; Rich Adams - USIC; Rich Mauldin - Team Fishel; Robert Carl Jr.; Ron Baker - Team Fishel; [redacted] Scott - Western Mountain Inc; Scott Yaroma - Abel Construction; Shouse, Alvin [Contractor]; [redacted] Steve Triplett; TJ Givens; Todd - Western Mountain Inc; William Grimes - PECCO

Subject: GDO Safety Communication- OQ Notification of Change - NOC 15 Completion of Forms Associated with Bolted Mechanical Coupler Unearthing and Installation 11 30 2017

Date: Thursday, November 30, 2017 9:29:07 AM

Attachments: GDO Safety Communication- OQ Notification of Change - NOC 15 Completion of Forms Associated with Bolted Mechanical Coupler Unearthing and Installation 11 30 2017.pdf

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All,

This is a GDO Safety Communication- OQ Notification of Change - NOC 15 Completion of Forms Associated with Bolted Mechanical Coupler Unearthing and Installation 11 30 2017. Please see the following message and attached document for the content of this communication:

This change requires a LEVEL 2 Notification of Change.

Attached is a GDO Safety Communication - OQ Notification of Change impacting OQ task F2A - Join Pipe with Mechanical Fitting Compression.

All individuals performing this task and/or performing excavation operations on LG&E and KU gas facilities or ROW are required to receive this NOC and Verify by signature that the understand and will abide by the required changes.

NOC-015 Completion of Forms Associated with Bolted Mechanical Coupler Unearthing and Installation.

This NOC addresses the requirement to complete certain forms whenever bolted style mechanical couplings are unearthed on systems > 3 PSIG MAOP or areinstalled on any pressure system. The audit form (Checklist for Auditing the Installation of Bolt- Style Couplings) will be used only periodically and is not required for each installation.

If more than 15 individuals are in attendance during the NOC meeting, additional sign in sheets may be printed from page 4 of the attached NOC.

All individuals performing this task must review the attached NOC, sign and return the sign in sheet to [redacted] by December 18, 2017.

Thank you,

Aaron Barrows
Gas Business Analyst
Phone – [redacted]
Fax – [redacted]

Gas Distribution Operations Communication of Changes that Affect Operator Qualification Program

(192.805(f))

LG&E/KU will communicate significant changes that affect a Covered Task(s) to the individuals who perform that Covered Task(s). A change may be significant enough to require changes to the qualification process or additional evaluations.

These changes may include but are not limited to:

- Significant modifications to LG&E/KU policies or procedures
- Significant changes in state or federal regulations
- Use of new equipment and/or technology that significantly affects performance of the Covered Task(s)
- New information from equipment or product manufacturers that significantly affects performance of the Covered Task(s)

Responsibility for communication of changes affecting covered tasks

LG&E/KU is responsible for identifying substantive changes affecting an identified Covered Task(s).

LG&E/KU is responsible for revising the evaluation process, as applicable, to include the impact of such changes. LG&E/KU will make a determination as to the level of communication regarding the change that is required.

LG&E/KU will disseminate the information utilizing the notification of change form to all appropriate Managers and Supervisors.

Managers and Supervisors will follow the directions identified on the notification of change form. Depending on the level of change, when required, Managers and Supervisors shall conduct an informational meeting providing the information to all affected employees.

Contractors affected by the change shall be required to conduct employee meetings utilizing the Notification of Change Form. The contractor will be required to submit a copy of the form back to LG&E/KU with employee signatures.

Action for Communication of change

LG&E/KU will evaluate information regarding changes that may affect the written OQ plan and/or an identified covered task(s).

When appropriate, LG&E/KU will establish a team of subject matter experts to evaluate if the written OQ plan and/or Covered Task(s) in question is significantly affected by internal or external changes.

LG&E/KU will assess the effect the changes will have on the written OQ plan and/or covered task(s) and make adjustments to the plan and/or evaluation process as necessary. These adjustments could involve anything from no communication, notification only to qualified individuals, up to and including notification of required training and re-evaluation.

Determining the need to communicate

The need to communicate will vary dependent upon the impact of the change on the Covered Task.

LG&E/KU has established a 3-tiered system for identifying and communicating change.

1. **Level (1)** - Limited to no impact on the OQ program and/or Covered Task and requires no communication or further action

2. **Level (2)** - Moderate impact on the OQ program and/or Covered Task and requires only communication of the change

3. **Level (3)** - Significant impact on the OQ program and/or Covered Task and requires communication of the modification of the OQ program and/or qualification process. Level 3 change may require training and evaluation, as appropriate, for LG&E/KU employees and contractor personnel.

Communication process

In accordance with NOC form, significant changes affecting a Covered Task will be communicated to the individual(s) performing that task as soon as reasonably possible either by e-mail, tailgates, or re-training/qualification.

Notification of Change (NOC) Form (version 2.0)

Date: 11/30/2017	
NOC # (training office use):	NOC 015 - 17
NOC initiated by (Name & EE #):	TOM RIETH / K. Murphy

*The following OQ Program, Procedure or Task has been modified/changed **added/deleted (circle):***

Procedure/Policy/Standard Document Number(s) & Description(s):

Gas Standards Watch 10/27/2017 (11/2/17 issue)–Responses to Exposed Compression Couplings

GOM&I –PO-JO-OT -001 - Joining of Materials By Other Than By Welding

OQ Task Number(s) & Description(s):

Task F-2A Join Pipe with Mechanical Fitting Compression

0691 Joining of pipe – Non bottom out compression coupling

0701 Joining of pipe – Bottom out compression coupling

0711 Joining of pipe – Compression couplings

Indicate Level of change (circle one): Level (1) Level (2) Level (3)

- Modification to company policies or procedures: Yes No
- Use of new equipment and/or technology : Yes No
- Change in State or Federal regulations: Yes No
- New information from equipment or Product manufacturer: Yes No
- If Other reason than above, please explain below:

Brief Description of Change: This NOC addresses the requirement to complete certain forms whenever bolted style mechanical couplings are unearthed on systems > 3 PSIG MAOP or are installed on any pressure system. The audit form (Checklist for Auditing the Installation of Bolt-Style Couplings) will be used only periodically and is not required for each installation.

SIGN-IN SHEET (Please Print Legibly)

DATE: **(issued Date 11 /30 /2017)**

NOC#: 015 -17

TASK(S): F-2A Join Pipe with Mechanical Fitting Compression

NOC PRESENTER:

NOC DESCRIPTION: Bolted Coupler Exposure / Installation Checklists

I hereby acknowledge that I have received notification of change of a covered task(s) as required by 49 CFR 192.805(f).

I understand that modifications to policies and procedures may be required, as conditions warrant, and that I understand the Covered Task change and agree to all the requirements contained herein. I understand that compliance with this change is a condition of employment, and that disciplinary action may be taken if I am found in violation of the change.

Last Name/First Name (please print in ink or type)	Signature	LG&E/KU Business Division and/or Contractor Company	Employee #
1.			
2.			
4.			
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Checklist for Installation of Bolt-Style Couplings

This form will be completed when LG&E employees or LG&E contractors install bolt-style couplings in the LG&E gas system. This form will be completed by a LG&E employee or LG&E contract Pipeline Inspector.

General Information:

1. Name of Employee inspecting bolt-style coupling installation:
2. Name of employee installing coupling:
3. Date of installation:
4. Location:
5. Size of coupling:
6. Type of soil (circle one): Sandy Clay Gravel Topsoil Other
7. Coupling manufacturer and model number: _____
8. System (circle one): Low pressure Elevated pressure Medium pressure

Verify the following

☐ Installing employee verified the condition of the pipe was acceptable for coupling installation

□ Installing employee examined pipe wall for scratches and grooves that could prevent proper seal

☐ Installing employee followed the manufacturer's installation instructions (and instructions were present)

☐ Installing employee properly prepared the pipe surface; cleaned surface as required

☐ Inspected the joint for quality and took required actions if joint was unsatisfactory

☐ Performed leak test

☐ Repaired/replaced fitting if it failed leak test

☐ Consulted with Operations/Engineering to determine if restraints were needed

Make one copy of this form and provide to supervisor. The original form should be included in the main report.

Checklist for Exposed Bolt-Style Coupling (pressures > 3 psig)

This form will be completed when LG&E or LG&E contractors expose a bolt-style coupling in a system where the pressure is > 3 psig (medium and high pressure distribution and transmission) and the coupling will be backfilled. The purpose of the form is to provide Operations, Engineering and Gas Regulatory personnel with information about the bolt style coupling installation.

Precautions:

1. Stop excavation upon discovering the bolt-style coupling in the excavation
2. Set-up a perimeter around the excavation to keep the public away from the excavation

General Information:

1. Contact Employee for the bolt style coupling found:
2. Date of exposure:
3. Location:
4. Size of coupling (based on pipe size if not exposed enough to determine):
5. Type of soil (circle one): Sandy Clay Gravel Topsoil Other (take picture and describe)

Pictures:

1. Take at least two pictures of the coupling. The pictures should be from different angles (additional pictures can be taken).
2. Email pictures to supervisor. Ensure pictures are attached to this form:

Sketch: Provide a sketch on the backside of the form showing the coupling orientation (vertical/horizontal), nearby branches, pipe, valves and fittings, other utilities or structures, etc.

Leak Survey:

1. Use an instrument designed to detect natural gas to check for the presence of natural gas after backfilling the excavation. Include readings in the above sketch in relation to the coupling. If the contact employee is not leak survey qualified they should contact:
    a. Their supervisor to call Gas Regulatory to complete the survey after the excavation is backfilled. Call [redacted]
    b. If Gas Regulatory is not available contact Gas Dispatch to have the survey assigned to a Gas Trouble Technician.

Leak Survey completed at time of backfill (circle one) yes no

Include completed form in the main report and email a scanned copy of the completed form (back and front) to the Distribution Integrity Management (DIM) group.

Checklist for Auditing the Installation of Bolt-Style Couplings

This form will be completed when auditing the installation of bolt-style couplings in the LG&E gas system. This form will be completed by a LG&E employee or LG&E contract Pipeline Inspector.

General Information:

1. Name of Employee auditing bolt-style coupling installation:
2. Name of employee installing coupling:
3. Date of installation:
4. Location:
5. Size of coupling:
6. Type of soil (circle one): Sandy Clay Gravel Topsoil Other
7. Coupling manufacturer and model number: _____
8. System (circle one): Low pressure Elevated pressure Medium pressure
9. Take at least 2 pictures of the installation and attach to the form.

Verify the following

☐ Installing employee verified the condition of the pipe was acceptable for coupling installation

□ Installing employee examined pipe wall for scratches and grooves that could prevent proper seal

☐ Installing employee followed the manufacturer's installation instructions (and instructions were present

☐ Installing employee properly prepared the pipe surface; cleaned surface as required

☐ Inspected the joint for quality and took required actions if joint was unsatisfactory

☐ Performed leak test

☐ Repaired/replaced fitting if it failed leak test

☐ Consulted with Operations/Engineering to determine if restraints were needed

Include completed form in the main report and send a scanned copy of the completed form to the Distribution Integrity Management (DIM) group.

Checklist for Auditing the Installation of Bolt-Style Couplings

This form will be completed when auditing the installation of bolt-style couplings in the LG&E gas system. This form will be completed by a LG&E employee or LG&E contract Pipeline Inspector.

General Information:

1. Name of Employee auditing bolt-style coupling installation:
2. Name of employee installing coupling:
3. Date of installation:
4. Location:
5. Size of coupling:
6. Type of soil (circle one): Sandy Clay Gravel Topsoil Other
7. Coupling manufacturer and model number: _____
8. System (circle one): Low pressure Elevated pressure Medium pressure
9. Take at least 2 pictures of the installation and attach to the form.

Verify the following

- Installing employee verified the condition of the pipe was acceptable for coupling installation
- Installing employee examined pipe wall for scratches and grooves that could prevent proper seal
- Installing employee followed the manufacturer's installation instructions (and instructions were present
- Installing employee properly prepared the pipe surface; cleaned surface as required
- Inspected the joint for quality and took required actions if joint was unsatisfactory
- Performed leak test
- Repaired/replaced fitting if it failed leak test
- Consulted with Operations/Engineering to determine if restraints were needed

Include completed form in the main report and send a scanned copy of the completed form to the Distribution Integrity Management (DIM) group.

Checklist for Installation of Bolt-Style Couplings

This form will be completed when LG&E employees or LG&E contractors install bolt-style couplings in the LG&E gas system. This form will be completed by a LG&E employee or LG&E contract Pipeline Inspector.

General Information:

1. Name of Employee inspecting bolt-style coupling installation:
2. Name of employee installing coupling:
3. Date of installation:
4. Location:
5. Size of coupling:
6. Type of soil (circle one): Sandy Clay Gravel Topsoil Other
7. Coupling manufacturer and model number: _____
8. System (circle one): Low pressure Elevated pressure Medium pressure

Verify the following

- Installing employee verified the condition of the pipe was acceptable for coupling installation
- Installing employee examined pipe wall for scratches and grooves that could prevent proper seal
- Installing employee followed the manufacturer's installation instructions (and instructions were present)
- Installing employee properly prepared the pipe surface; cleaned surface as required
- Inspected the joint for quality and took required actions if joint was unsatisfactory
- Performed leak test
- Repaired/replaced fitting if it failed leak test
- Consulted with Operations/Engineering to determine if restraints were needed

Make one copy of this form and provide to supervisor. The original form should be included in the main report.

Amendment Four (4) to Contract # 784742 (LG&E) and # 465346 (KU)

THIS AMENDMENT IS entered into, effective as of February 28, 2018, by and between LG&E and KU Services Company and Kentucky Utilities Company, whose address is: 820 W. Broadway, Louisville, Kentucky 40202 and MRC Global (US) Inc. (formerly known as McJunkin Red Man Corporation, hereinafter referred to as "Contractor") whose primary address is 1301 McKinney Street, Suite 2300, Houston, Texas 77010. In consideration of the agreements herein contained, the parties hereto agree as follows:

1.0 ARTICLE 3.0 – PRODUCT QUALITY

1.1 The sub articles listed below shall be added to Article 3.0

3.6 All items received by Contractor and listed on **Attachment 3.6** shall be:

3.6.1 inspected according to the process listed on **Attachment WI-743-012.**

3.6.2 inspected according to the requirements listed on **Attachment KQC F-743-311.**

3.6.3 logged in on **Attachment 3.6.3** at time of receipt.

3.7 Annual destructive testing shall be perform as specified on **Attachment KQC F-743-311**.

2.0 ARTICLE 6.0 – SPECIFIC REPORTING REQUIREMENTS

2.1 Sub article 6.1.7 listed below shall be added:

6.1.7 No Change Requirement – Contractor shall report supplier changes in ownership and changes in supplier location as soon as they are aware of the change. Contractor shall also include No Change Requirement as an agenda item in Quarterly Business Review (QBR) meeting and report any changes. If there have been no changes, Contractor shall state no changes.

3.0 ARTICLE 7.0 – COMPENSATION

3.1 Sub article 7.1.3 listed below shall be added:

7.1.3 The following rates shall apply for the inspection of items listed in **Attachment 3.6**:

Initial Startup Fee (payable upon the initial inspection)	$250.00
Hourly Inspection Rate	$75.00/hour

4.0 STATUS OF CONTRACT

As amended herein, the Contract shall continue in full force and effect.

IN WITNESS WHEREOF, the parties hereto have executed this Amendment on the day and year below written, but effective as of the day and year first set forth above.

LG&E and KU Services Company

By _____
Paul F. Tirey

TITLE: Manager, Supply Chain

Date 2-28-2018

MRC Global (US) Inc.

By _____
DocuSigned by:
6AF38FE63B09441...

Name (print) Karl Witt

Title Senior Regional Vice President

Date March 1, 2018

DS
ES-MRC Global Legal

ATTACHMENT 3.6

IIN	Description	Long Description	Type	Manufacturer	PN#
467094	6"(SDR 11.5) transition fitting, bolted	COUPLING,PIPE,"MAXI-GRIP EZ",INSL,6"IPS X 0.576"WALL,W/ STIFFENER	Transition Fitting	Smith-Blair Maxi-Grip	EZ69A7UMG
467101	4" transition fitting, compression	COUPLING,PIPE,"MAXI-GRIP EZ",INSL,4"IPS X 0.395"WALL,W/ STIFFENER, SDR 11.5	Transition Fitting	Smith-Blair Maxi-Grip	EZ49A7136258
467119	2" transition fitting, compression	COUPLING,PIPE,"MAXI-GRIP EZ",INSL,2"IPS X 0.216"WALL,W/ STIFFENER	Transition Fitting	Smith-Blair Maxi-Grip	EZ29B7UMG
532319	8" transition fitting, bolted	COUPLING,PIPE,"MAXI GRIP EZ,8",PLASTIC PIPE REPAIRS	Transition Fitting	Smith-Blair Maxi-Grip	EZ88B7UMG
3015560	Cap, 6" OD Bolted	CAP,LINE,DRESSER STYLE 31,6",STEEL PIPE,6.625" OD,WITH 1" NPT VENT,P/N 0031-9111-202,ASME SA36,ASTM A513,ANSI A21.11,GRADE 27 BUNA S	Cap	Dresser	0031-9111-202
3015558	Cap, 8" OD Bolted	CAP,LINE,DRESSER STYLE 31,8",STEEL PIPE,8.625" OD,WITH 1" NPT VENT,P/N 0031-9114-202,ASME SA36,ASTM A513,ANSI A21.11,GRADE 27 BUNA S	Cap	Dresser	0031-9114-202
3016488	Cap, 4" Dresser, Bolted	CAP,LINE,4",DRESSER STYLE 31,STEEL PIPE,4.8" OD,WITH 1"NPT VENT,ASME SA36,ASTM A513,ANSI A21.11,GRADE 27 BUNA S	Cap	Dresser	0031-0109-203
3016486	Cap, 6" Dresser, Bolted	CAP,LINE,6",DRESSER STYLE 31,STEEL PIPE,6.9" OD,WITH 1"NPT VENT,ASME SA36,ASTM A513,ANSI A21.11,GRADE 27 BUNA S	Cap	Dresser	0031-0112-203
3016491	Cap, 8" Dresser, Bolted	CAP,LINE,8",DRESSER STYLE 31,STEEL PIPE,9.05" OD,WITH 1"NPT VENT,ASME SA36,ASTM A513,ANSI A21.11,GRADE 27 BUNA S	Cap	Dresser	0031-0115-203
3015559	Cap, 4.5" OD Bolted	CAP,LINE,DRESSER STYLE 31,4",STEEL PIPE,4.5" OD,WITH 1" NPT VENT,P/N 0031-9108-202,ASME SA36,ASTM A513,ANSI A21.11,GRADE 27 BUNA S	Cap	Dresser	0031-9108-202

MRC Global

Gas Products Inspection Process

WI-743-012

Revision 02
Revised 01/30/2018
Quality
Global

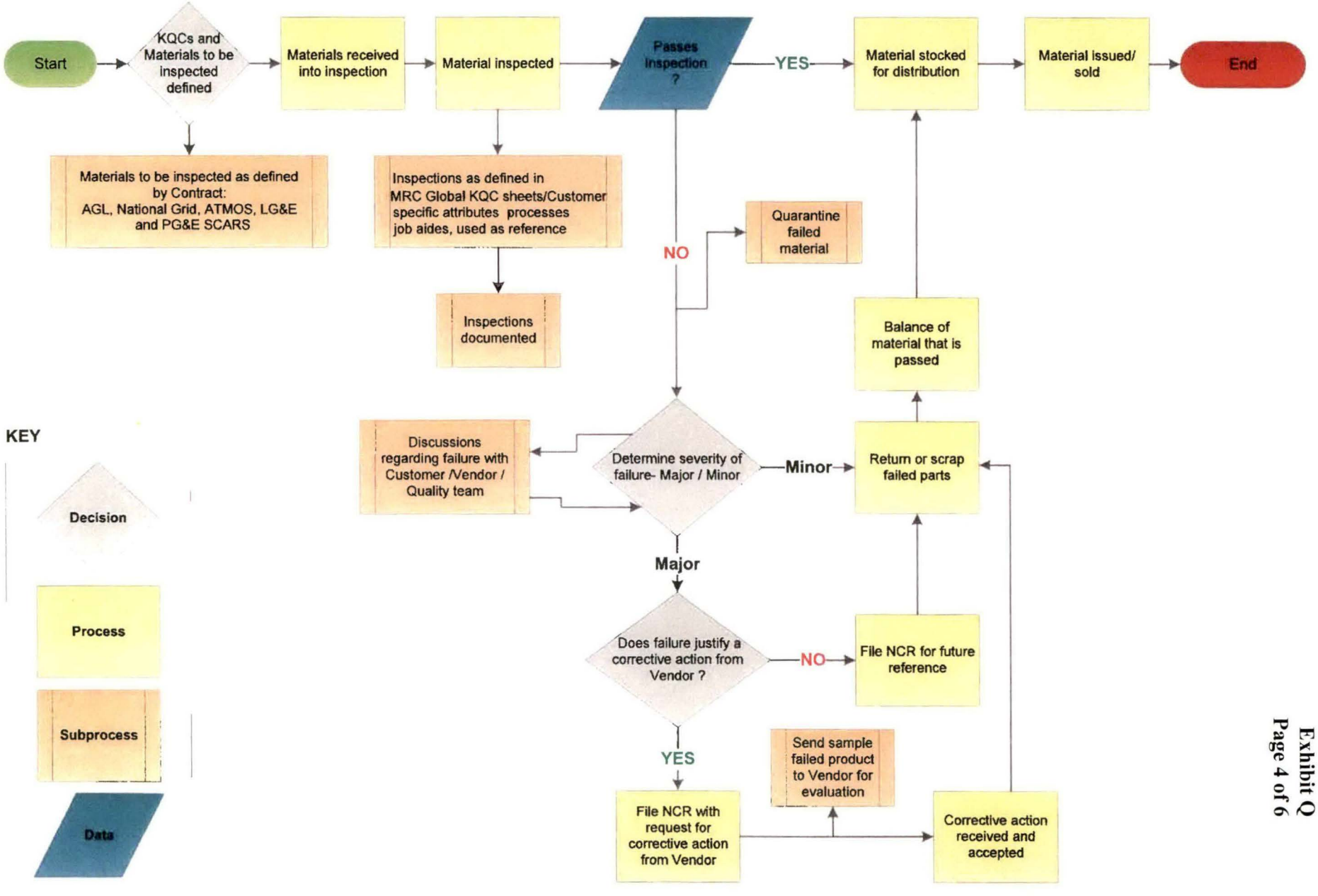

Exhibit Q
Page 4 of 6

Product Type: **Bolted Style Compression Couplings - PE x PE PE x steel steel x steel**

Applicable Specifications: **NA**

All inspection product sampling is per: ANSI Z.1.4, Level S3. (LG & E specific 100% inspection)

***NOTE:** Key Quality Characteristics (KQC's) may be added (or removed) per the agreement of both MRC Global & Customer.*

KQC	KQC Definition: Inspection Point, Part Attribute, Part Characteristic, Etc.	Inspection Type
#1	Confirm product part number: Labeling on part matches packaging, packing list, and MRC description	Visual
#2	Record: Fitting Lot/SO/Heat numbers (as applicable) and manufacture date	Physical
#3	Coating: Fitting is covered evenly with NO signs of rust or corrosion (if applicable)	Visual
#4	Bolts: Confirm bolts are proper diameter in reference to manufacturer spec.	Physical
#5	Gaskets: Sealing gaskets are in perfect condition, no scratches/gouges/protrusions	Visual
#6	: Gaskets should be clean and free of any contamination- grease, oils, dirt, etc.	Visual
#7	: Confirm gaskets are insulated or conductive (match part number / packing list)	Visual
#8	NPT Vents: NPT Threads will be gaged with L1 thread gauge per ASME B1.20.1-2013 (if applicable)	Physical
#9	Cathodic/Tracer wire connection: Check connector is firmly attached and in usable condition (if applicable)	Visual
#10	Installation Instructions: Confirm that it is present and fully legible	Visual
#11		
#12	Annual Testing: see below comments	NA

Comments:

Annual testing of bolted style compression couplings shall be conducted per customer's request.

Testing will include hydrostatic, pull out resistance, and deformation. (as required)

Bolts will include Tensile testing. (as required)

All testing will be done by 3rd party accredited lab.

Attachment 3.6.3

MRC Branch	DATE ON DOCK	DATE of INSPECTION	PURCHASE ORDER / TRANSFER NUMBER	MRC PART NUMBER	LG & E PART NUMBER	PRODUCT DESCRIPTION	INSPECTED PER KQC SHEET #	LG & E ENG. DRAWING NUMBER	QUANTITY RECEIVED	PARTS INSPECTED	PARTS REJECTED	NCR #	QA CODE	HEAT, LOT, or SO NUMBER	MANUFACTURER	MANUFACTURE DATE	PE PIPE MANU. DATE	SUPPLIER	MISC. KQC / COMMENTS / NOTES

Incoming Inspection Checklist

Product Type: **Bolted Style Compression Couplings - PE x PE PE x steel steel x steel**

LG&E IINs Included: **0467094, 0467101, 0467119, 0532319, 3015560, 3015558, 3016488, 3016486, 3016491, 3015559**

All inspection product sampling is LG & E specific 100% inspection

Inspection Criteria

#	Inspection Point, Part Attribute, Part Characteristic, Etc.	Inspection Type	Complete? (Y/N)
#1	Confirm product part number: Labeling on part matches packaging, packing list, and MRC description	Visual	
#2	Record Below: Fitting IIN Number and Quantity Delivered	Physical	
#3	Record Below: Fitting Lot/SO/Heat numbers (as applicable) and manufacture date	Physical	
#4	Coating: Fitting is covered evenly with NO signs of rust or corrosion	Visual	
#5	Installation Instructions: Confirm that it is present and fully legible	Visual	
#6	Include copy of MRC packing slip	Physical	
#7			
#8			
#9			
#10			
#11			
#12			

Comments and Signature/Date:

Coupler Identification Technology Feasibly Study Report

By:

Justin Hayes

A report on existing technologies capable of

Identifying mechanical pipeline couplers

Louisville Gas and Electric

Gas Distribution and Operations

December 2018

Abstract

This report discusses the investigation of methods and existing technologies to determine their feasibility of identifying and locating unmapped bolted compression couplers, both from above ground and from within a remote excavation. The intent of the study is to identify any technologies that could be implemented by LG&E to identify unmapped couplers. In order to be effective this identification needs to occur without the need to expose any couplers. The study resulted in the identification of one technology that potentially meets the needs of LG&E for coupler detection.

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Introduction

LG&E has historically used bolted style mechanical compression couplers on pipelines to complete joints between two lengths of pipe. The mechanical couplers used by LG&E were designed for installation on natural gas pipelines and are safe to use in such applications. If incorrectly installed bolted style mechanical couplers have potential for a "pull-out" of the joint where the pipeline connecting to the bolted style coupler separates from the coupler. The forces leading to pull-out could be caused by a number of sources including: thermal contraction, hydrostatic loading, hydrodynamic loading, overburden, differential settlement, and applied equipment loading. A pull-out occurs when one or a combination of these forces exceeds the ability of the coupler to prevent the pipeline from being removed from the mechanical joint. A pull-out can present risk to both workers and the public, especially when the pull-out occurs with the pipeline in pressurized operation.

Excavation activities can lead to some of the previously mentioned forces and pullout potential. LG&E currently utilizes records research to identify the presence of bolted style couplers prior to excavating high pressure (greater than 60 psig) facilities. Additionally, LG&E has conducted a feasibility study into the current state and availability of technologies that may be useful for the detection and positive identification of bolted style compression mechanical couplers prior to exposing them. This study looked at two specific situations, the first being detection from above the ground when no excavation has occurred. The second is detection from within an existing excavation when there is concern that a coupler may exist upstream or downstream of the excavation and be unexposed at the time.

Study Methodology

This study consisted of three main components. These components were: an initial literature search, discussion with industry experts and technical representatives, and finally field trials of any technologies considered to have possible application to this problem.

The literature search consisted of research in a variety of industry publications as well as a search through databases at the University of Louisville. Search results were broad and focused not on coupler specific technologies, but instead on general "see through" technologies. This is an active area of research with applications ranging from residential applications to military. Funding sources are broad and universities actively engaged in this research are numerous. From this initial research a list of six technologies was identified for further investigation.

The discussions with industry experts and technical representatives consisted of contact with the technical experts from a variety of businesses that either offered a product utilizing the technology or a service utilizing the technology. These conversations involved a thorough discussion of LG&E's intended application of the technology along with a discussion of the technologies capabilities, current application, and anticipated chance of success for the application. Based off these discussion three of the initial six technologies were eliminated from consideration due to sensitivity and noise issues related to this application.

Finally, field trials and observations were attempted for the remaining three technologies with potential application. Only two of the technologies were actually tested in the field. The third technology is currently under use by another utility in Kentucky for this application. Field observations of their use of the technology were planned for 2018, however as of the completion of this report, a field observation has not been able to be coordinated. A supplier of the technology has planned an on-site demonstration in early 2019. The remaining two technologies were both tested in the field. These trials were completed on pipelines with couplers with known locations. The locations of the couplers were determined using the installation reports for the pipeline. A representative of the company offering the technology or service was then brought on site and asked to use the technology to determine if a coupler existed and if so its location. Their results were compared to the known locations of the mechanical couplers.

Technologies Discussion

In this section the reader will find a brief description of each technology considered in this study. They will also find a brief explanation of the results of the study, as it relates the technology to LG&E's intended use. Finally, the author makes recommendations on future considerations of the technology if advances in the technology were to occur.

Acoustic Leak Detection Equipment

This technology is currently used for leak detection in the water industry. There has been preliminary research performed by the AGA on the application of this technology to detection and location of gas leaks. The equipment consists of a highly sensitive accelerometer array placed on or near the soil or object surface (valve boxes, etc). This array will detect vibrations (sound) and amplify them for both signal processing and human audio observation. In the case of leak detection long term observation can be used to measure a change in the acoustic signature which indicates a leak, or a surface movable array can be used to try to pin point a leak.

No references were found in the literature to any ongoing research/application in the detection of pipeline fittings using this technology. The intended application would be for the surface detection of an acoustic signal created by the disturbance in the flow field of gas in a pipeline resulting from the inconsistency in the pipe wall at a coupled joint. In order for this to be successful the acoustic signal would need to be consistently able to be characterized as generated by a mechanical coupler.

This option was removed from consideration upon discussion with an equipment supplier technical expert. The anticipated signal would be both difficult to detect and identify. It is likely that there is not a single coupled joint acoustic signature, and any such characteristics would depend on a number of variables. Additionally, signal sources would usually be deep with no clear path to the surface except through soil which has a highly attenuating effect on any such signals. For this reason the technology is considered infeasible at this time and was not moved to field trials.

Ultrasonic Imaging SONAR

This is a relatively new technology which is currently available on a commercial level from at least one supplier for application in the gas industry. GTI has sponsored research in the use of ultrasonic signals to detect plastic pipelines. Locating plastic mains and services has historically presented an issue for the industry when installed tracer wires fail. Ultrasonic locating equipment is being proposed as an approximate locating device for these instances. The intent would be to create an approximate window of the location and complete the locating operation by excavating. The main operating principle is to impose a mechanical signal on the grounds surface. An array of sensitive accelerometers then detect any reflected signals and interpret differences in density and conduction which indicate dissimilar material interfaces. From this a pipelines location can be approximately determined.

In early conversations with the vendor representative and technical expert it was considered possible that this technology could detect a coupler. There was initial concern about the sensitivity and noise vulnerability of the instrument. The main issue is related to the poor acoustic coupling of most soils which limits resolution and penetration depth.

Field trials were conducted on various size pipelines and couplers and based on the field trials it was determined that the technology is not feasible for LG&E's intended use. It was difficult to determine the location of a pipelines, much less additional indications that would identify the likely presence of a coupler. The resolution of the instrument is insufficient to determine this information. Additionally, the instrument is sensitive to signal noise. This noise in the signal can be caused by a number of factors including, non-homogeneity of the soil, the existence of other underground structures, the presence of ground water, as well as surface improvements and acoustic bridging. Any of these factors are likely to occur in the intended LG&E application of this technology. For these reasons this technology is not considered to be a feasible solution for LG&E.

Differential Magnetometer

This technology operates on the same principles as a metal detector. The difference is that it performs a differential calculation to determine a change in metal content. In a standard metal detector there are two coils. The first "driving coil" creates a magnetic field through and around the coil. This magnetic field penetrates into the ground where it interacts with any ferromagnetic materials. The magnetic field will change as the detector is moved over the ground. This changing magnetic flux in the metallic object will induce localized electrical currents called eddy currents. These electrical currents in turn induce a secondary magnetic field which emanates out from the buried metal object. Part of this secondary magnetic field travels to the surface of the ground. A second coil in the metal detector measures the strength of the magnetic field created by the buried metal object. In the differential magnetometer there is a third coil. When the metal content in the ground is consistent for the length of the detector this first and second sensing coil should detect the same strength of magnetic field. When one of the coils is over a larger buried metal object it should detect a larger magnetic field strength. In this case the differential magnetometer would alert the user that there has been a change in magnetic strength. For this application the technology should detect the additional metal associated with the bolted mechanical coupler.

Unfortunately, there was only one commercially available unit, based on this technology, intended for use in the gas industry. This unit was developed based off research by GTI. It was discovered upon inquiry into the technology that the product line had been discontinued because the results of the unit were inconsistent and insufficient to meet customers' expectations. The representative was unable to source any of the company's discontinued stock for field trials. Due to lack of availability and poor performance this technology is considered to be infeasible at this time. If an improved model is introduced in the future it would be worth considering for this application at that time.

Ground Penetrating Radar (GPR)

This is the most commonly used technology for "see-through" investigations and object identification underground. A signal is emitted in the microwave band of the electromagnetic spectrum (UHF/VHF). A sensor array detects the reflected signals, which allows for information about subsurface structures to be inferred. By using multiple sources and arrays or multiple passes a 3-D reconstruction of underground structures can be created. There is a tradeoff between the penetration depth of the signal and the resolution of the image. The major hurdle to this technology is the elimination of noise from the received signals. These noisy signals can be caused by a wide variety of factors. Some of the most

common are the presence of ground water, non-homogeneity of backfill, dense soils with low transmissibility, and congestion of underground structures including tree roots and utility installations.

In discussion with technical experts at a company offering GPR services, the possible use of this technology for this application was eliminated. This conclusion is confirmed by the experience of the author who has attempted to use GPR in the past for pipeline detection and has had unreliable results. Due to the relatively small difference in size between the coupler and the pipeline the expert was of the opinion that the GPR equipment would not be able to reliably detect the presence of a coupler. Additionally, many of the environments in which this technology would be applied will have many of the factors that cause signal noise, which will further reduce the reliability. Finally, many of the pipelines LG&E would be considering would be at depths that further reduce the reliability and resolution of the GPR technology. For these reasons the author anticipated results similar to the ultrasonic imaging SONAR unit. No field trials were conducted with this technology as a result. This technology is considered infeasible at this time, but may bear future consideration if future advancements can increase reliability and noise elimination effectiveness.

Distributed Acoustic Sensing

This technology is a new and active area of research. It depends on the effects of Rayleigh Scatter of light pulses sent down a fiber optic cable. The principle of this technology is to identify the characteristic acoustic signature associated with couplers using existing fiber optic cables (where installed). As discussed in the acoustic leak detection section above, this technology retains the challenge of identifying a characteristic acoustic signature associated with couplers. This technology is not sufficiently developed at this point to justify further investigation at this time. No commercial off the shelf products were evident while researching this technology. In the future if significant development were to occur this could potentially have limited application for this purpose.

Guided Wave Testing

This technology is referred to as Ultrasonic Guided Wave or Long Range Ultrasonic Testing. Its primary commercial use is as a method of non-destructive examination for corrosion and defects mostly. The most common form of this technology consists of an array of low frequency transducers attached and coupled directly to the pipeline. The array of transducers imposes a torsional mechanical wave signal on the pipeline. The same array detects echo signals that result from changes in cross section or local stiffness. Based off theoretical calculations of wave propagation velocity a predicted location for a point of interest (POI) can be made. There are several major shortcomings of this technology. First is that the pipeline must be excavated and available for access by the service provider. The surface must then be prepped, which will usually involve the removal of any coating or protective installations. Another major drawback is the limited distance the signal can travel, which will require repeated excavations and coating removal.

Discussions with a service provider's technical expert suggested that this technology would be able to reliably detect the existence and location of any mechanical couplers within the test range. In preliminary discussions the technical expert stated that a typical test range would be between 50-75 feet on either side of the signal source. Therefore, when field trials were conducted the signal source was placed 35 feet from the known coupler location. However, when the field trial was conducted it was discovered that the signal reliably traveled much less distance than the 50-75 feet specified by the

technical expert. In the field trial the signal only reliably provided feedback for 10 feet and with reduced reliability for 20 feet. In discussions with the field technician it was discussed that the short signal travel was likely caused by the coating on the buried pipe as well as the heavy clay soil indigenous to the LG&E service territory. Due to the high cost, difficulty in scheduling the necessary third party resources, and the extremely limited test length (under the likely conditions for LG&E's system) this technology is not considered a viable technical solution for the detection of mechanical couplers.

Video Inspection System

This technology is commercially available today through various companies. It consists of two primary components. The first component is a gas tight gland which allows for the insertion and subsequent operation of the camera system in a gaseous environment under pressure. The second is a drive system which forces a cable with a camera head to advance through the gland and pipeline. The camera outputs a signal to a screen where a technician monitors the internal images of the pipe and controls the drive system. The gas tight gland system can attach to common hot tapping equipment such as Mueller or Williamson tapping fittings. The live feed from the camera will allow the operator to see the coupled joint from the inside of the pipeline.

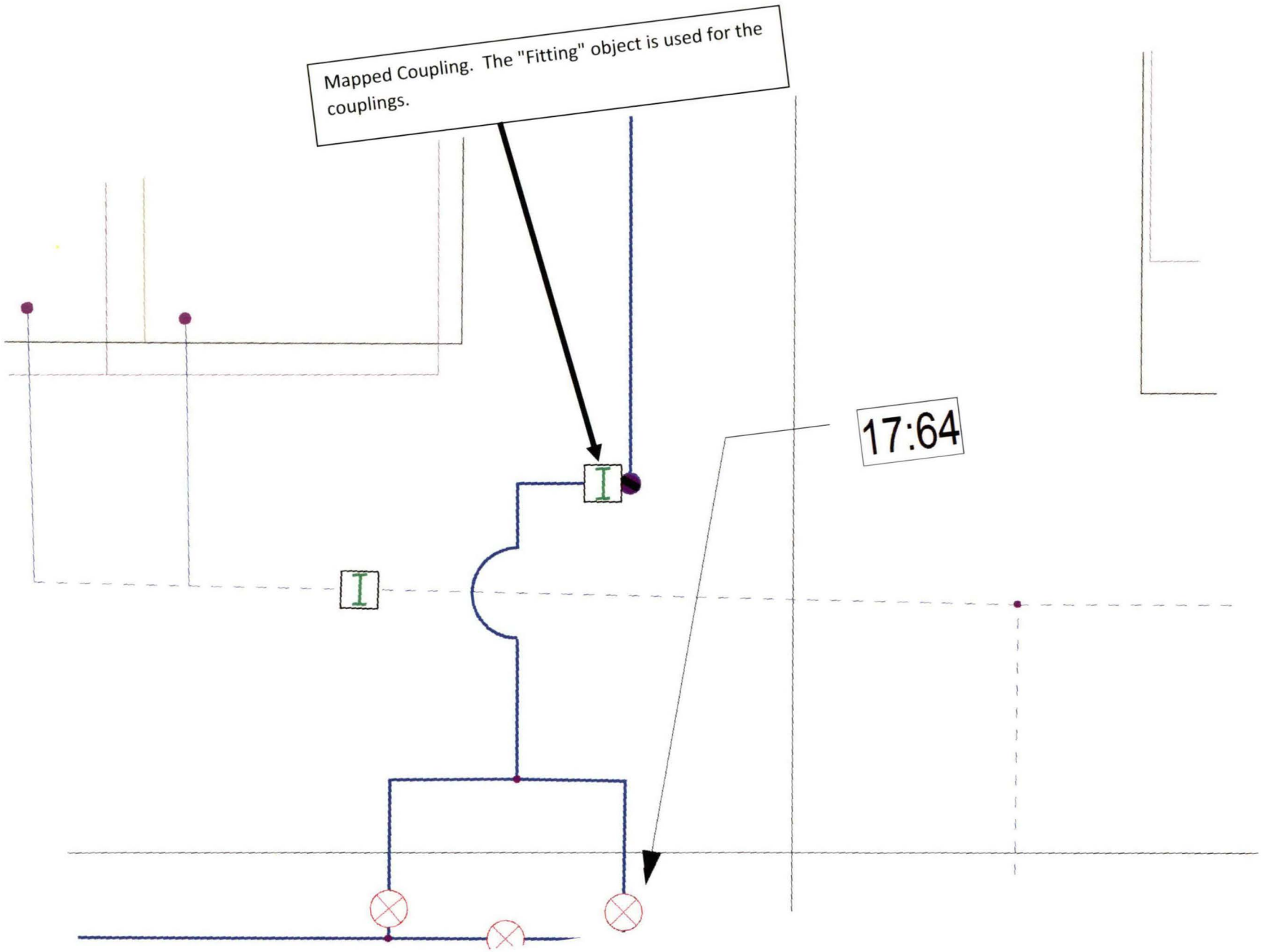
This technology is already being used for this application successfully by other gas operators. Multiple discussions were conducted with engineers at one such operator as a part of this investigation. This practice is widespread in their company to proactively determine if a coupler is inline prior to certain line stopping operations.

With the discovery that this technology is currently being used by other gas utilities for this exact application successfully the technology was considered feasible, and no field trials or further research were considered necessary. Efforts were made to schedule an in situ observation of the use of this technology with one of the operators using the technology. However, as of the writing of this paper no such observation has been successfully scheduled or completed. Additionally, an onsite demonstration was scheduled with a supplier. However, due an emergency need for their services the demonstration had to be rescheduled for early 2019.

A current limitation of the camera system being used is that it is limited to a recommended maximum operating pressure of 60 PSIG. However, the vendor does have a specialty team that can operate the system up to 99 PSIG.

Conclusions

See through technologies investigated in this study did not provide a currently commercially available option that is feasible and reliable to detect a coupling. One technology, which requires exposure of the pipeline, offers a feasible option for coupler detection. This technology is video inspection. The system offers reliable detection of mechanical couplers on a pipeline, and presents advantages and disadvantages as discussed in the technology discussion section of this paper.


Mapped Coupling. The "Fitting" object is used for the couplings.
17:64

LG&E a PPL company	AOP GAS APPROVED OPERATING POLICIES		Distribution Operations
GDO Communications	AOP Number: GAOP - PO - 015	Effective Date: January 15, 2016	
Policy: Gas Distribution Operations Communications			

SECTION 1 – PURPOSE

1.1 This document describes the communication process for specified information within the Gas Distribution Operations (GDO) line of business of the Louisville Gas and Electric Company (hereinafter "LG&E").

SECTION 2 – SCOPE

2.1 Communications described in this document should be made to specified groups of employees within the GDO line of business according to the table in Appendix A based on the method described in this document.

2.2 This policy is applicable to the forms of communications identified in this document.

SECTION 3 – REFERENCES

3.1 This policy does not reference specific codes.

SECTION 4 –RESPONSIBILITIES

4.1 Revisions to this procedure shall be reviewed and approved by the Director Gas Storage & Control, Director Distribution Operations, and reviewed by the Managers of Gas Construction, Gas Distribution Construction & Maintenance, Gas Regulatory Compliance, Gas Storage, Gas Control, and Gas Engineering and Planning.

4.2 Communication Proponent – A communication can be initiated from any of the Gas Distribution Operation departments. The employee who has reason to initiate a communication will be the "communication proponent". The communication proponent shall be responsible for notifying the "Communication Coordinator" and providing all required information for the communication.

4.3 Communications Coordinator – The Communications Coordinator shall distribute communications provided by Communication Proponents to personnel identified in this operating practice and archive the communications in the corporate document retention system as outlined in the recordkeeping section of this policy.

SECTION 5 – DISCUSSION

5.1 N/A

SECTION 6 – PROCEDURE

6.1 GDO Communication Categories

6.1.1 Communications within GDO should be categorized into one of the following categories based on the content and into one or more of the communication types listed in Appendix A.

6.1.1.1 Regulatory

Regulatory communications should include notices of proposed rulemaking, regulatory advisory bulletins, notices of final regulations, regulatory inspection checklists, etc.

6.1.1.2 Standards, Policies & Procedures

Standards, policy and procedure communications should contain updated or new information regarding GDO internal standards, policies, and procedures.

6.1.1.3 Operational

Operational communication should include information regarding GDO operational activities such as: equipment/facility status, operating restrictions, planned outages, system operations, gas quality, pressure restrictions, etc.

6.1.1.4 Safety

Safety communication should include information such as safety incident communications, safety advisories, safety updates, near miss reports, etc.

6.1.1.5 General

General communications should contain information relevant to GDO that is not specific to the regulatory, standards & policies, operational, or safety experience.

6.2 Communication Proponent

6.2.1 Each communication will have a proponent who will send a communication to the Communications Coordinator to be distributed to the group of employees designated in the table in Appendix A. The proponent must include the following information.

6.2.1.1 The category, type and title of the communication.

6.2.1.2 If the communication is relevant to the transmission system.

6.2.1.3 The distribution list for the communication. The table in Appendix A provides a recommended distribution list for each type of communications but some of the employees are optional depending on the communication and should be specified by the proponent.

6.3 Communication Coordinator

6.3.1 The Communication Coordinator will send communications provided by Communication Proponents to appropriate personnel in GDO as directed by the Communication Proponent based on the table in Appendix A.

6.3.2 The Communication Coordinator will use the following format for the communication.

6.3.2.1 Subject line of the e-mail will contain the communication category and document title. An example would be, "GDO regulatory communication – PHMSA Advisory warning on XYZ".

6.3.2.2 The body of the e-mail will include the communication document from the proponent as an attachment, the communication type, the operating class impacted, and the proponent's name. Including the proponent's name will allow questions to be directed to the proponent. The following is an example.

Communication Type: PHMSA Notification

Operating class impacted: Transmission and distribution

Communication Proponent: John Doe.

6.3.3 The Communications Coordinator will archive communications in the methods outlined in the recordkeeping section of this policy.

SECTION 7 – SAFETY

7.1 General safety precautions should be observed.

SECTION 8 – ENVIRONMENTAL

N/A

SECTION 9 – TRAINING AND QUALIFICATIONS

9.1 Training includes the following:

9.1.1 Train communications "***Proponents***" within the GDO organization to send communications to the Communications Coordinator.

9.1.2 Train the "***Communications Coordinator***" to complete all tasks as described within this document.

SECTION 10 – EQUIPMENT

10.1 Proponents and the Communications Coordinator will need standard company desktop or laptop computers.

10.2 The Communications Coordinator will require access to the system used to archive the communications.

SECTION 11 – RECORDKEEPING

11.1 The email from the Proponent and the communications email shall be filed in a Microsoft Outlook folder for later reference. The Outlook folder system shall have the following hierarchy: GDO Communications -> Year-> Category -> Title.

11.2 Each communication shall be scanned into or saved to a document imaging system. The file shall be indexed by category and by operating system impacted. The scan/saved file shall include the e-mail showing to whom and when the communication was sent and a copy of all attachments to the e-mail. All scans shall be to color pdf files with a resolution of at least 300 dpi.

11.3 The communications shall be kept for seven years consistent with the Company's Record Retention policy for other types of employee communications.

SECTION 12 – REVISIONS

12.1 Draft Copy

Appendix A – Communication Matrix

Communication Category and Type	GDO VP		Gas Control and Storage													Gas Regulatory						Gas Distribution, Construction and Engineering													Gas Supply				Other			
					Gas Storage					Gas Control														Gas Distribution					Gas Construction				Gas Engineering									
	GDO Vice-President	Assistant to VP	Director	Sr. Secretary	Manager	Team Leaders	Engineers	Operational	All	Manager	Team Leaders	Engineers	Gas Controllers	Operational	All	Manager	Group Leaders	Engineers	Operational	All	TIMP - Performance Measures Mailbox	Director	Sr. Secretary	Manager	Group Leaders	Team Leaders	Operational	All	Manager	Group Leaders	Team Leads	Inspectors	Manager	Engineers	Director	Sr. Secretary	Manager	All	Manager - Design	Gas Design Technicians	Gas Safety Manager	Gas S&T Consultants
Regulatory																																										
Management of Change[1]			X		X	X*	X	X*		X	X*	X	X*	X*		X	X	X	X*			X		X					X	X			X	X	X						X	
PHMSA Advisory Bulletins	X		X		X	X	X	X*	X*	X	X	X	X*	X*	X*	X	X	X	X*	X*		X		X	X	X	X*	X*	X	X	X	X*	X	X	X		X*	X*	X	X	X	
Integrity Management Performance Measures																																										
Hydrostatic failure of new or existing pipe caused by external, internal or stress corrosion or manufacturing defects (transmission & distribution)			X		X	X	X			X	X	X				P	X*	X			X	X		X*	X*	X*			X				X									
Transmission line leak or failure and cause if known (not reqd if leak can be stopped by greasing or tightening fitting)			X		X	X	X			X	X	X				P	X*	X			X	X											X									
Transmission Repairs or replacements due to stress corrosion cracking			X		X	X	X			X	X	X				P	X*	X			X	X											X									
Removing/reinforcing girth welds or couplings (other than service head adapters) to address potential integrity issues on in-service pipe. This includes fabricated assemblies. (transmission & distribution)			X		X					X						P	X*	X			X	X											X									
Wrinkle bends identified, inspected or removed.			X		X	X	X			X	X	X				P	X*	X			X	X											X									
MAOP exceedance on transmission system.[2]	X		X		X	X	X			X	X	X				P	X*	X			X	X											X		X							
Equipment failures such as regulators, reliefs, gaskets or O-rings excluding those found on customer meter sets and associated relief (transmission & distribution)					X*	X*	X*			X*	X*	X*				X	X*				X	X*		X*	X*	X*			X*	X*	X*		X									
Repairs made due to first, second or third party damage PRIOR to a leak or failure (transmission & distribution)																X	X*				X																					
Quality assurance audits conducted, findings from audits and procedure changes due to audit findings (transmission & distribution)					X*	X*				X*	X*					X	X*				X	X*		X*	X*	X*			X*	X*	X*		X*								X	X
Non-tariff quality gas being put into dry gas system	X*		X		X	X*	X*	X*		X	X*	X*	X*			X	X*	X			X	X		X	X	X	X*		X	X	X	X*	X	X	X*							
Standards, Policies & Procedures																																										
Gas Standard Watches			X		X	X	X	X*		X	X	X	X*	X*		X	X	X	X*			X		X	X	X	X*		X	X	X	X*	X	X	X		X*		X	X	X	X
Construction Standards			X		X	X*	X	X*		X	X*	X		X*		X	X*	X	X*			X		X	X	X*	X*		X	X	X*	X	X	X					X	X	X	X
Approved Operating Practices	X		X		X	X	X	X*		X	X	X	X*	X*		X	X	X	X*			X		X	X	X	X*		X	X	X	X*	X	X	X*				X*	X*	X	X
Operation, Maintenance & Inspection Procedure Changes	X		X		X	X	X	X*	X*	X	X	X	X*	X*	X*	X	X	X	X*	X*		X		X	X	X	X*	X*	X	X	X	X*	X	X	X*		X*	X*	X*	X*	X	X
Operational																																										
Equipment/Facility Status			X		X	X	X	X*		X	X	X	X*	X*		X	X	X	X*			X		X	X	X	X*		X	X	X	X*	X	X	X		X*		X	X		
Operating restrictions			X		X	X*	X	X*		X	X*	X		X*		X	X*	X	X*			X		X	X	X*	X*		X	X	X*	X	X	X					X	X		
Gas quality issues			X		X	X	X	X*		X	X	X	X*	X*	X*	X	X	X	X*	X*	X	X		X	X	X	X*	X*	X				X	X	X		X*	X*	X	X		
Pressure restrictions	X		X		X	X	X	X*	X*	X	X	X	X*	X*	X*	X	X	X	X*	X*		X		X	X	X	X*	X*	X	X	X	X*	X	X					X	X		
Safety																																										
Safety incident communications	X		X		X	X	X	X*	X*	X	X	X	X*	X*	X*	X	X	X	X*	X*		X		X	X	X	X*	X*	X	X	X	X*	X	X	X		X*	X*	X	X	X	X
Safety advisories	X		X		X	X	X	X*	X*	X	X	X	X*	X*	X*	X	X	X	X*	X*		X		X	X	X	X*	X*	X	X	X	X*	X	X	X		X*	X*	X	X	X	X
Safety updates (general safety inforamation)	X		X		X	X	X	X*	X*	X	X	X	X*	X*	X*	X	X	X	X*	X*		X		X	X	X	X*	X*	X	X	X	X*	X	X	X		X*	X*	X	X	X	X
Near miss reports	X		X		X	X	X	X*	X*	X	X	X	X*	X*	X*	X	X	X	X*	X*		X		X	X	X	X*	X*	X	X	X	X*	X	X	X		X*	X*	X	X	X	X
General																																										
AGA/SGA Benchmarking Data requests and results	X		X		X	X	X	X*		X	X	X	X*	X*		X	X	X	X*			X		X	X	X	X*		X	X	X	X*	X	X	X		X		X	X	X	X
General	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

* - Communication required only when applicable to this position or group

1 - MOC approval process is independent of this communication

2 - For MAOP exceedance reporting requirements to regulatory agencies, see OM&I GOM&I-GN-SR-001 Safety Related Condition Reports and OM&I GOM&I-PO-MA-001 Maximum Allowable Operating Pressure

P - Indicates phone call should be made as quickly as possible after detection

From: GDO Communication

To: Phillips, Isis; Bill Stoll - Stoll Construction; Cheatham, Andre [Contractor]; Chuck Strickfaden; David Schoenbachler; David Spencer - Southern Pipeline; [redacted] Gearheart, Eric [Contractor]; Givens, TJ [Contractor]; Graves, Junie [Contractor]; Hayes Testing; James Ball, TruCheck; james.george; Jamie Lee - Southern Pipeline; Jason Uhl; Jeff Culbreth; jess.woodruff; jim.linton; Joe Naylor; Whitaker, Joe [Contractor]; Junior Cassity; Justin Johnson - Schardein; Kenny Riley; Kevin Sell; Kimberly Braswell - EnsiteUSA; [redacted] Larry Dowell - Southern Pipeline; Larry McIntyre; Maria Triplett; Mark Ettenhofer; Mark Stallman; Martin Ignacio - Petrochem Insulation; Marty Kenney - Schardein; Mike Koby; Pat Mangeot - Maeser; Paul Lee - Southern Pipeline; Randy Lash, Olameter; Rich Mauldin - Team Fishel; Robert Carl Jr.; Ron Baker - Team Fishel; [redacted] [redacted] Samantha Bartley - AWP Traffic; Scott Yaroma - Abel Construction; Shouse, Alvin [Contractor]; [redacted] m; Steve Triplett; Terry Carby; TJ Givens; William Grimes - PECCO; Betts, Bruce; Bielefeld, Dale; Mason, Eric; Griggs, Dara; Hildebrand, Amber; Doty, Dan; Lewis, John [Contractor]; McCauley, Joel; Paulley, David; Terry, Antoine; Young, Jared [Contractor]; Cloyd, Russ; Clyde, Peter; Cummins, Michael; Jaynes, Pam; Ryan, Joe; Satkamp, Mark; Skaggs, John; Stratman, Paul; Branham, Tammy; Keltee, Frederick; Logsdon, Jacob; Logsdon, Verl; Pfister, Tom; Ruble, Andrew; Ta, Ben; McDonald, Rosanna; Murphy, Clay; Rieth, Tom; Walker, Barry; Allison, Maria; Augustine, Chad; Bauer, Elliott; Beatty, Stephen; Benge, Eric; Beumel, Michelle; Bischof, David; Duncan, Trevor; Harmeling, Dave; Hayes, Justin; Hebbeler, Thomas; Hill, Lesley; Hiner, Brad; Holton, Erin; Lenhart, Brian; McGuire, David; Meade, Craig; Neal, Shane; Norton, William; Painter, Sheila; Rossi, Justin; Simmons, Damien; Thomas, Zach; Wade, Jim; Winebrenner, Robin; Wood, Gabriel; Beck, Dave; Wilson, Greg (EW Brown); Collins, Mike; Conkright, Rebecca; England, Kirby; Hall, Jenny; Huddleston, Jeff; Hudgins, Natalie; Lawson, BIll; Manska, Duane; Price, Jonathan; Warren, Ricky; Allen, James; Allen, Rodrick; Alvey, Joshua; Baker,Derry; Ballard, Stephen; Benedict, Ronald; Boisvert, Lori [Contractor]; Boone, Chris; Bridgewater, Hollis; Bruner, Rodney; Byrum, Frederick; Carwile, Matthew; Clunie, Jeff; Cochran, Janet; Compton, Henry; Cook, Brandon; Davis, Janice; England, Brian; Evans, Craig; Faith, Chris; Fischer, Darla; Ford, Thomas; Goetzinger, Lester; Grider, Casey; Hall, Chris; Harrison, Kenneth; Hayden, Daryl; Heath, Joseph; Higgins, Scott; Highland, Brittney; Hines, Jeremy; Hinkle, Christopher; Hodson, Darren; Huettig, Greg; Hughes, Rashel; Jackson, Kurt; Jewell, Katie; Jones, Nathan; Jones, Rebecca; Kingrey, Brian; Kiser, Shawn; McDavid, Tyler; Medley, Meghan; Miller, Eric; Netherton, Eric; Painter, Ronald E [PPL]; Painter, Sheila; Payne, James; Pendleton, Bob; Perry, Holdan; Perry, Lee; Peyton, Bruce; Pryor, Arthur; Quill, Michael; Ragland,John; Russell, Brian; Sarles, Jonathan; Shelton, Gary; Smith, Franklin; Springston, Richie; Stinson, Herman; Sumner, Steve; Swain, Jamarr; Taylor, Bo; Tuttle, Zachary; Vogel, Scott; Wallace, Jacque; Wallace, Mark; Warren, Barbie; Watkins, Maurice; White, Anthony; White, Eugene; Baker, Joe; Balentine, Lucas; Barnette, Lewis; Bell, Clifford; Cross, Gene; Darnall, Wayne; Doolin, Dale; Roberts, Charlie; Roth, Chris; Stocke, Richard; Vanover, Eric; Blair, Keith; Board, Greg; Burba, Jackie; Burris, Justin; Childress, Kyle; Dages, Shannon; Edwards, David; Farnsworth, Taylor; Froggett, Nate; Gardner, Chip; Gary, Tim; Gozzard, Kevin; Hunter, Dale; Litton, Terry; Manska, Curtis; Metcalf, Daniel; Miller, Anthony; Mullins, Tommy; Nash, Nathan; Rankin, Tracy; Richey, Curt; Riggs, Clarence (Junie); Scott, Eric; Skaggs, Patrick; Smith, Jonathan; Vessels, Ronnie; Waddle, AJ; Whelan, Greg; White, Chad; White, David; Wiles, Chris; Wilkins, Brian; Williams, Clint; Winstead, Angela; Herndon, Greg; Parrish, Debbie; Stewart, Gregory; Thielen, Laura; Fitzgerald, Chris; Heckel, Anthony; Hunt, Bill; Jones, Mike (Auburndale); Murphy, Tom; Stephens, Malcolm; Thomas, Lauren; Bray, Bob; Davis, John (Auburndale); Dilley, Dana; Fields, Paul; Ginn, Randy; Grant, Bill; Mills, Kevin; Pearson, Jay (Auburndale); Purvis, Greg; Rudolph, Frank; Wyatt, Greg; Campbell, Keith; Chambers, Amanda; Breeding, Patrick; Calebs, Robert; Dodson, Larry; Early, Joseph; Fisher, Brandon; Griffin, John; Hartlage, Mary; Kress, Mike; Lewellen, Kevin; Mattingly, Carrie; Murphy, Kevin; Carman, Vicki; Clifton, Lisa; Cummins, Aaron; Darragh, Mark; Dowdle, Steve; Dukes, Nathan; Grant, Almond; Keys, Scott; Larkins, Doug; Lembach, Chuck; Murphy, Jerrod; Reesor, Tracy; Seewer, Chad; Simpson, Ryan; Stegner, Natoshia; Weihe, Julie; West, Kay; Wilson, Lynn; Moore, Leeann; Reynolds, Ellen; Claypool, Brian; McBride, Keith; Saunders, Eileen; Griffith, Susie; Weatherford, Brent; Zimlich, John; Bellar, Lonnie; Malloy, John

Subject: GDO Safety Communication - Near Miss 10-2-2018.docx

Date: Tuesday, November 20, 2018 1:34:40 PM

Attachments: GDO - Near Miss 1022018.docx

All:

This is a GDO Safety Communication for Near Miss 10-2-2018.
Please see the attached document for the content of this communication.

Thank You,

Tiffany Ogunsanya
Pipeline Safety Management System Analyst
Auburndale Office
Office Phone: [redacted]

Tracking #: YYYY-###
(Assigned by DIMP group)

Checklist for Exposed Bolt-Style Coupling (pressures > 3 psig)

This form will be completed when LG&E or LG&E contractors expose a bolt-style coupling in a system where the pressure is > 3 psig (medium and high pressure distribution and transmission) and the coupling will be backfilled. The purpose of the form is to provide Operations, Engineering and Gas Regulatory personnel with information about the bolt style coupling installation.

Precautions:

1. Stop excavation upon discovering the bolt-style coupling in the excavation
2. Set-up a perimeter around the excavation to keep the public away from the excavation

General Information:

1. Contact Employee for the bolt style coupling found:
2. Date of exposure: 02/07/2018
3. Location: Belmont Road
4. Size of coupling (based on pipe size if not exposed enough to determine): 8"
5. Type of soil (circle one): Sandy Clay Gravel (Topsoil) Other (take picture and describe)

Pictures:

1. Take at least two pictures of the coupling. The pictures should be from different angles (additional pictures can be taken).
2. Email pictures to supervisor. Ensure pictures are attached to this form:

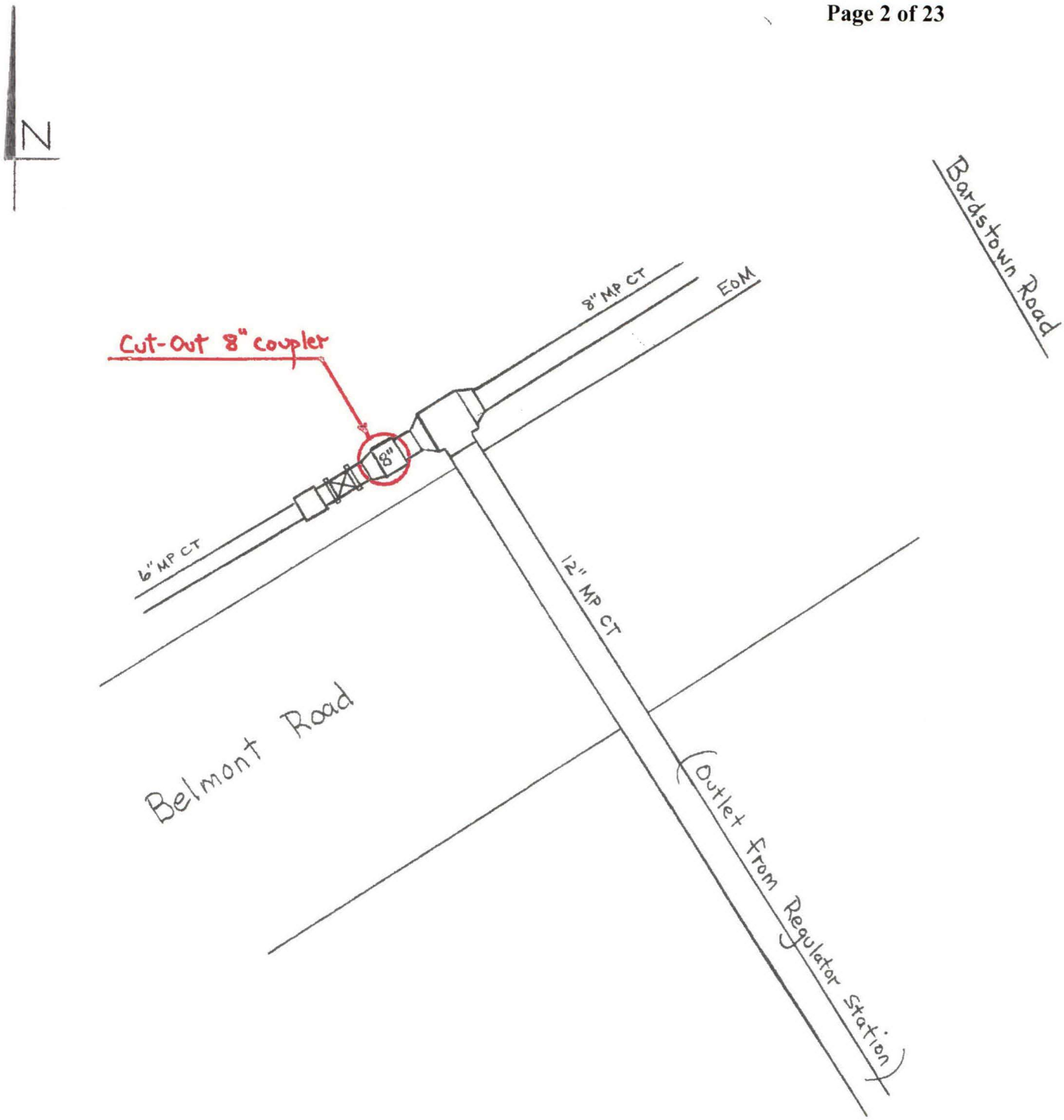
Sketch: Provide a sketch on the backside of the form showing the coupling orientation (vertical/horizontal), nearby branches, pipe, valves and fittings, other utilities or structures, etc.

Leak Survey:

1. Use an instrument designed to detect natural gas to check for the presence of natural gas after backfilling the excavation. Include readings in the above sketch in relation to the coupling. If the contact employee is not leak survey qualified they should contact:
   a. Their supervisor to call Gas Regulatory to complete the survey after the excavation is backfilled. Call [redacted]
   b. If Gas Regulatory is not available contact Gas Dispatch to have the survey assigned to a Gas Trouble Technician.

Leak Survey completed at time of backfill (circle one) yes no

Include completed form in the main report and email a scanned copy of the completed form (back and front) to the Distribution Integrity Management (DIM) group.


N
Bardstown Road
8" MP CT
EoM
Cut-Out 8" coupler
8"
6" MP CT
12" MP CT
Belmont Road
Outlet from Regulator Station


8" Coupler


8" Coupler

Part B- Coupling Information

General Information			Tracking #: 2018-001
Date 8/6/2018	Expense Org 004610	Project 158276	Task COUPLER
Address/Location 3401 Belmont Ct, R-43			
Size 8 inch	Material Steel	Coating CT	MAOP 99
Main/Service Number 119716	Soil Type (from Part A) Unavailable	Manufacturer Possibly Dresser	Model Possibly Style 39
Pipe Connection:	Steel to Steel	Steel to Plastic	Plastic to Plastic

Historical Information	
Installation Date 12/23/1953	Document Source Drawing R-43
Installation Company	Document Source
Foreman	Document Source
Welder	Document Source

GIS Information
Sys Id (of Coupler) Not available- coupler deleted from Smallworld
Screen Capture

Pictures

Figure 1- Top View

Figure 2- Front View

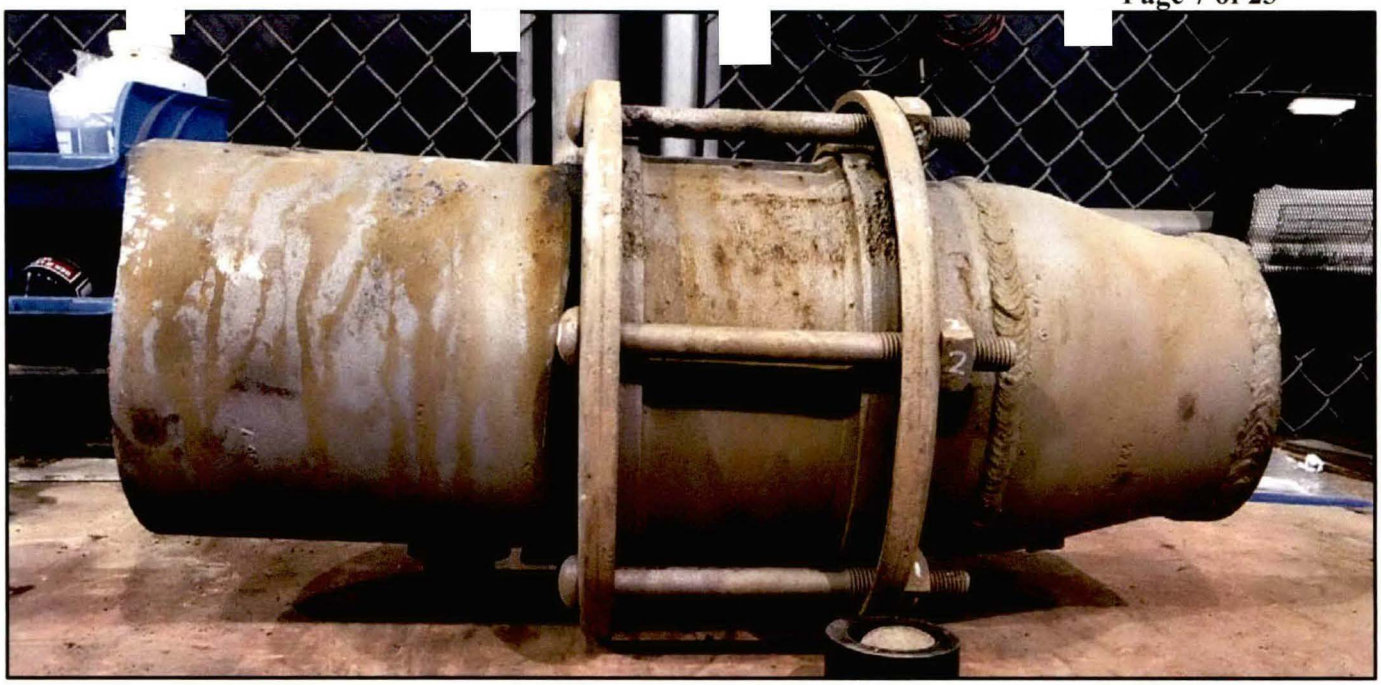


Figure 3- Back View

Figure 4- Bottom View

Figure 5- Left Side View

Figure 6- Right Side View

Part C- Visual Inspection of Coupling

Visual Inspection Performed by: Chad Augustine [redacted] & Elliott Bauer [redacted]

Component Quantities	
Number of Bolts on Coupler Body	6
Number of Reinforcement Rods	0
Number of Lugs	0

Corrosion							
	Pipe A	Pipe B	Coupler Body	Bolts	Rods	Lugs	Nuts
General External Corrosion Present?	Yes, moderate	No	Yes, Severe	Yes, #3 & #4	--	--	Yes, #4
Localized Corrosion Present?	No	Yes, moderate	No	No	--	--	No
Pit Depths	None measured[1]	0.025"	See Chart Below, pictures in comments section	None measured[2]	--	--	None measured[1]
Internal Corrosion?	No	No	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

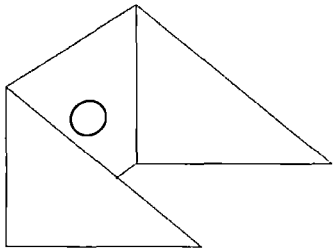
Pit #	Depth (in)
1	0.125
2	0.1
3	0.15
4	0.075
5	0.2
6	0.125

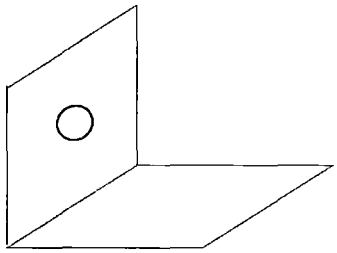
Coupler Body				
Length of Coupler (in.):	6.5 inches			
Bolt	Washer Present	Nut present?		
1	No	Yes		
2	No	Yes		
3	No	Yes		
4	No	Yes		
5	No	Yes		
6	No	Yes		

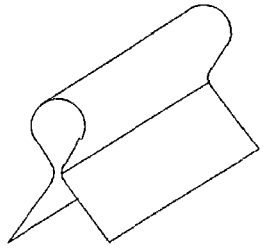
Reinforcement Rods						
Rod	Length (in.)	Diameter (in.)	Washer present at head of bolt?	Washer present at end of bolt?	Nut Present? Type?	Type of rod?
1			No Reinforcement Rods			
2						
3						
4						

Type of Lug

(Please indicate the shape of the lug by circling one below. If the lug shape is different than any preset shape below, sketch the shape.)







None

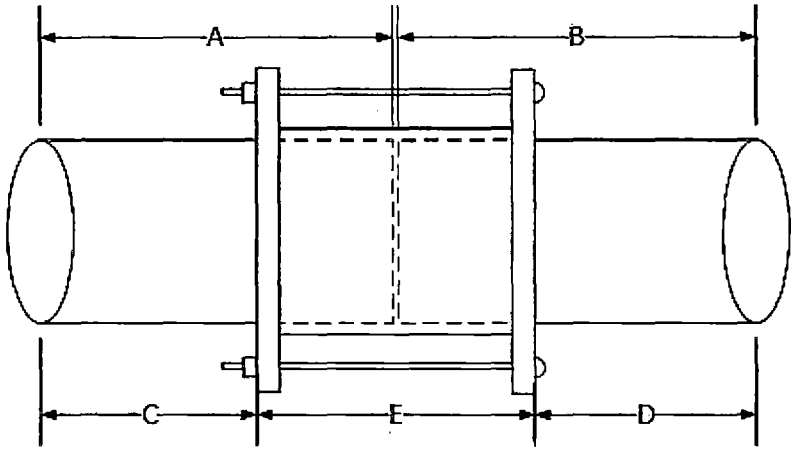
Lugs (Measurements)				
Pipe Side	Lug Number	Thickness (in.)	Circumference (in)	
			Distance to next lug, clockwise	Distance to next lug, counter-clockwise
A	1		No Lugs	
A	2			
A	3			
B	1			
B	2			
B	3			

Lugs (Observations)				
Lug	Lug	Assem	Deformed?	Deflected? (angle of)
A1	B1			
A2	B2			
A3	B3			

No Lugs

Lugs (Weld Quality)						
Pipe Side	Lug Number	Any part detached from pipe?	Welded on all three sides of exterior? If no, describe	Are welds on exterior continuous? If no, describe	Welded on all three sides of interior? If no, describe	Are welds on interior continuous? If no, describe
A	1					
A	2					
A	3					
B	1					
B	2					
B	3					

No Lugs



Stab Depth					
	A	B	C	D	Stab Depth (A-C) or (B-D)
Pipe Side A	12.00"	[redacted]	8.75"	[redacted]	3.25"
Pipe Side B	[redacted]	11.00	[redacted]	8.00"	3.00"
	Sum of stab depths (should be closely equal to measurement E)				6.25"
	Coupler Length (E)				6.50"
	Difference				-.25"

Additional Comments and General Observations

[1] Pit depths are not of measureable depths.

[2] Pit gage is too wide for space between coupler brackets. Could not measure pits on bolts.

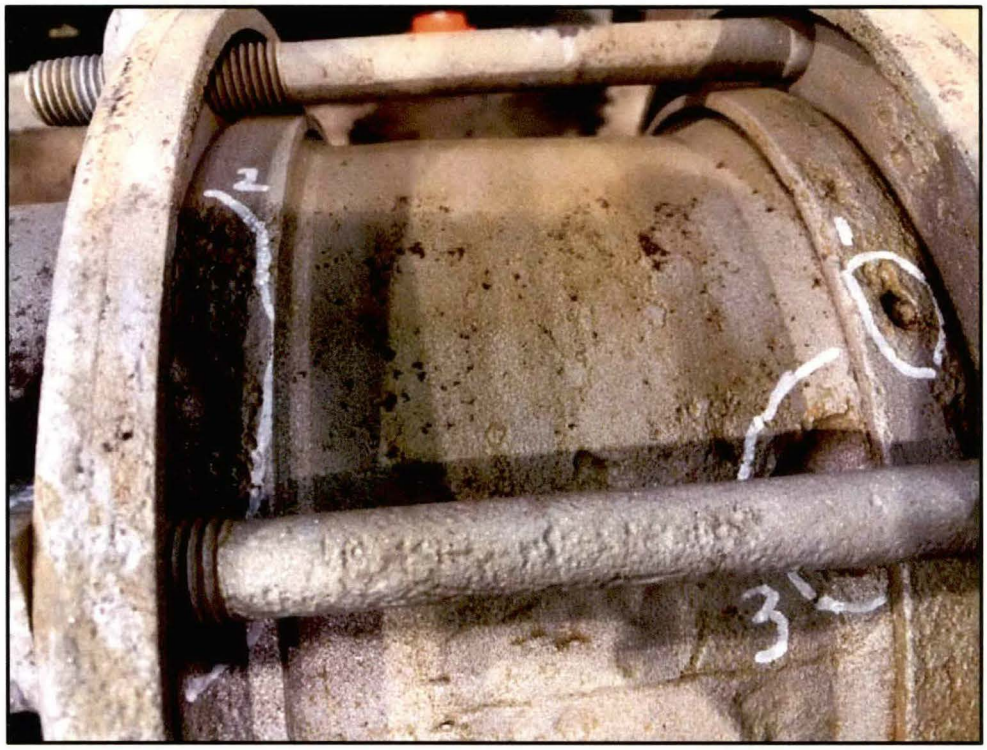


Figure 7- Corrosion Pits #1-#3

Figure 8- Corrosion Pits #4- #6

IMR TEST LABS
A Curtiss-Wright Business Unit
www.imrlouisville.com

4510 Robards Lane
Louisville, KY 40218
T: 1.502.810.9007 | F: 1.502.810.0380

LG&E - Kentucky Utilities
6900 Enterprise Drive
Louisville, KY 40214

September 24, 2018

Attention: Chad Augustine

Report No. 201802062

Metallurgical Evaluation of Coupling and Associated Hardware

Location: 3401 Belmont Court

DESCRIPTION AND PURPOSE

A natural gas pipe section including a coupling was submitted for metallurgical evaluation. The section was an 8" pipe with a Dresser Style 39 Insulating Coupling. The coupling had a reducer on one end but no joint harnesses had been used. Copies of the installation information for the coupling and harnesses were previously provided for this investigation. It was reported that the coupling had been installed in the field at 3401 Belmont Court. The pipe section was subsequently excavated after substantial service duration without failure. It was requested that the general dimensions, weld quality, corrosion condition and mechanical properties of the coupling components be determined as directed.

RESULTS

The submitted pipe section with the coupling is shown in Figures 1 and 2. The coupling consisted of two followers, a middle ring and associated nonmetallic gaskets and sleeves. Six equally spaced bolts with associated nuts secured the coupling components together and against the pipe segments. The general orientation of the coupling was consistent with the supplied information for the specified Dresser Style 39. Prior to receipt, the ends of the pipe segment were labelled as Ends A and B, as shown in Figures 1 and 2. The top of the pipe had been indicated also. The six coupling bolts were arbitrarily numbered as Bolts 1 through 6 around the circumference.

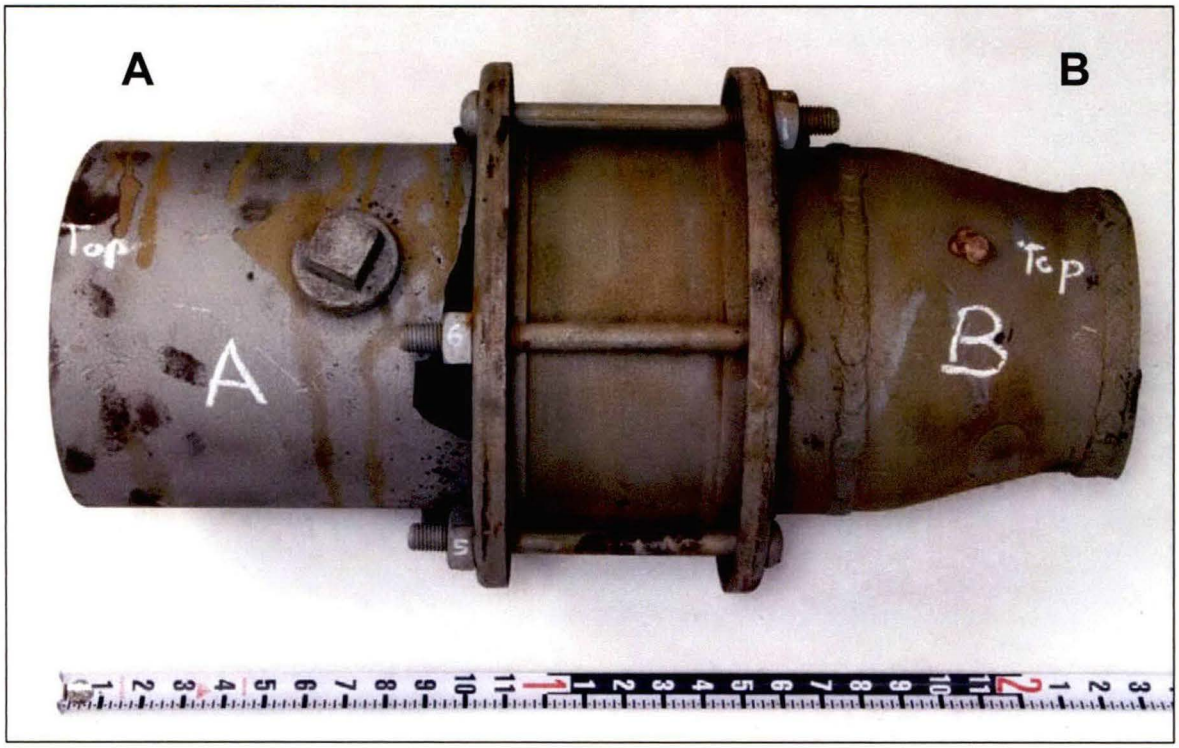


Figure 1. Photograph of the top of the submitted coupling sample. End B was a reducer section.

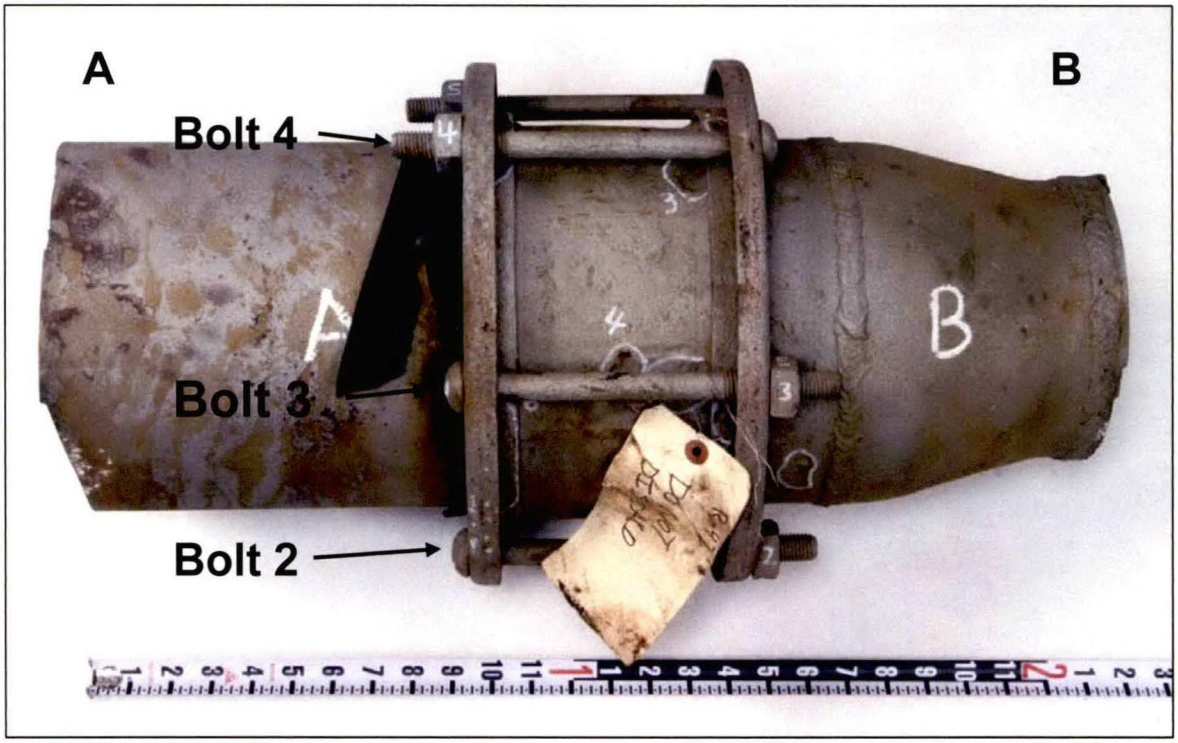


Figure 2. Photograph of the bottom of the submitted pipe sample. Coupling end and bolt number identifications are shown.

SECTION 1- DIMENSIONAL MEASUREMENT

The depth of insertion of each pipe into the coupling was measured, both before and verified after disassembly. The dimensions are provided in Table 1. No requirements were provided for these characteristics.

TABLE 1 – PIPE COUPLING DIMENSIONAL MEASUREMENTS

Component	Depth of Pipe into Coupling	Gap Between Pipes in Coupling
Pipe A	2"	~ ½" (Original sample length – 24 1/4")
Pipe B	2"	

SECTION 2- VISUAL OBSERVATIONS

There were no field attachment welds on the coupling assembly so no weld inspection was required. General surface and corrosion features noted on the coupling are pictured in Figures 3 through 9. Some regions of deep pitting corrosion were circled and numbered upon receipt of the sample in the laboratory. Most of the corrosion damage was present on the bottom of the coupling assembly. Inspection did not reveal any cracking accompanying the corrosion pits. The coupling was significantly corroded but the adjacent pipe surfaces were not. The coupling bolts were also inspected for corrosion alteration. The observations are provided in Table 2. The bolts were corroded but not as severely as some spots on the coupling. The fasteners were not necked down / stretched and no cracks were present. The coupling bolt heads were not marked. The coupling was disassembled during inspection and additional images of the observed features are included as Figures 10 through 12. The interior surfaces were not significantly degraded or corroded. The elastomeric components of the coupling consisted of a pipe separator, insulating sleeve, and two gaskets. Inspection revealed that they appeared to be intact and not degraded.

TABLE 2 – FASTENER VISUAL EXAMINATION RESULTS

Component	Observations
Bolt 1	Not bent or stretched, no gross corrosion
Bolt 2	Not bent or stretched, no gross corrosion
Bolt 3	Not bent or stretched, no gross corrosion
Bolt 4	Not bent or stretched, no gross corrosion
Bolt 5	Not bent or stretched, no gross corrosion
Bolt 6	Not bent or stretched, no gross corrosion

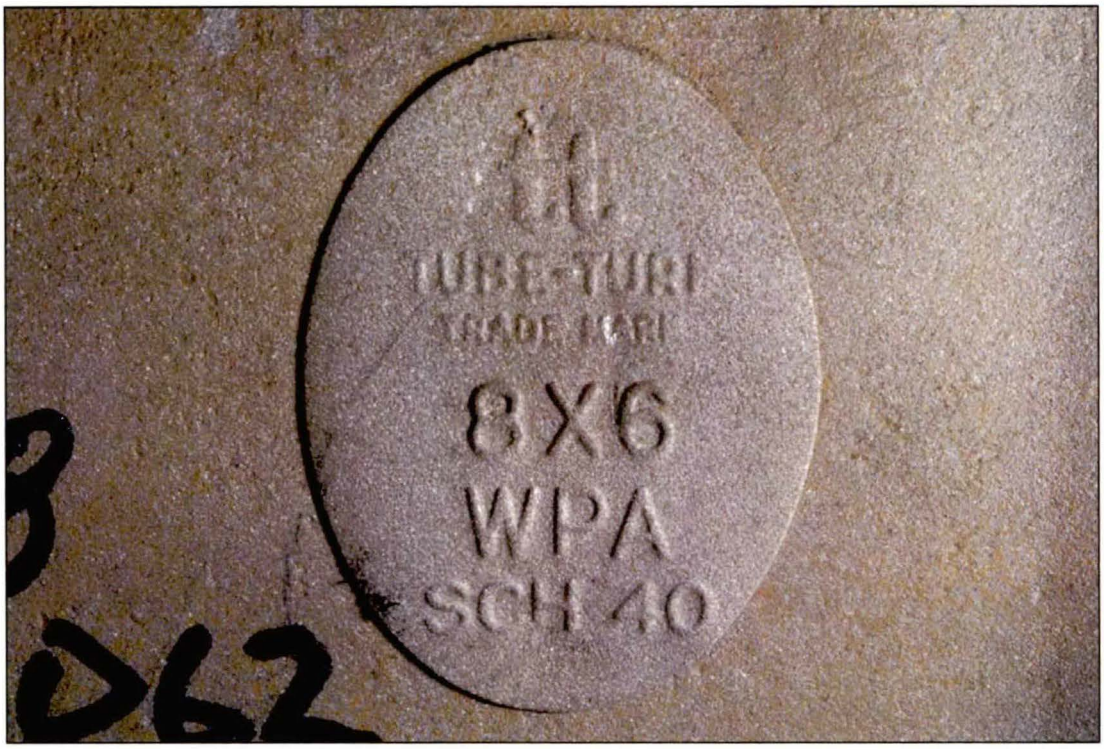


Figure 3. Photograph of an identification tag on the reducer, shown for reference.

Figure 4. Image of a circled corrosion pit on the coupling identified as Location 1.

Figure 5. Image of a circled corrosion pit on the coupling identified as Location 2.

Figure 6. Image of a circled corrosion pit on the coupling identified as Location 3.

Figure 7. Image of a circled corrosion pit on the coupling identified as Location 4.

Figure 8. Image of a circled corrosion pit on the coupling identified as Location 5.

Figure 9. Image of a circled corrosion pit on the coupling identified as Location 6.

Figure 10. Photograph of the separated coupling sections. End A is to the left and End B is to the right in this image.

Figure 11. Image looking into the interior of the coupling which remained affixed to pipe End A.

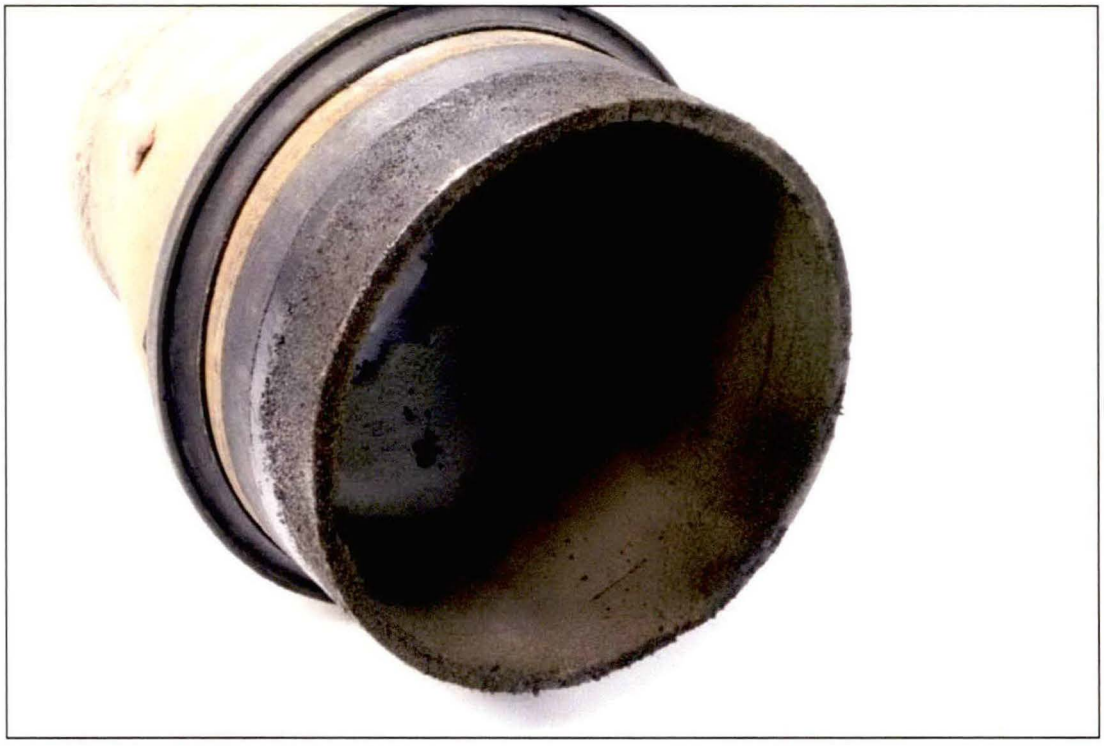


Figure 12. Image looking into the interior of pipe End B. .

SECTION 3- TORQUE TESTING- FOR INFORMATION ONLY

Torque testing was performed on the nuts of the bolts on the pipe coupling sample. A calibrated torque wrench was used to determine breakaway torque on each fastener. The breakaway torque measurements are summarized in Table 3. The six coupling bolts exhibited torque values ranging from 60 to 120 ft.-lbs. Three bolt torque values were below the Dresser Style 39 coupling installation torque recommendation of 75 ft.-lbs. minimum for 5/8" fasteners.

TABLE 3 – FASTENER TORQUE MEASUREMENT

Component	Breakaway Torque	Observations
Bolt 1	85 ft.-lbs.	Satisfied the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 2	120 ft.-lbs.	Satisfied the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 3	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 4	110 ft.-lbs.	Satisfied the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 5	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 6	70 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners

SECTION 4- TENSILE TESTING, ASTM A370-17A

Tensile testing was performed on round specimens that were removed from the six coupling bolts. The tensile mechanical properties of the fasteners were measured and the results are summarized in Table 4. No mechanical property requirements were indicated for the fasteners on the provided Dresser coupling information.

TABLE 4 – FASTENER TENSION TEST RESULTS

Component	Ultimate Tensile Strength, ksi	0.2% Offset Yield Strength, ksi	Elongation, %	Reduction in Area, %
Bolt 1	95.5	57.0	30	69
Bolt 2	92.0	61.5	30	67
Bolt 3	85.5	47.2	29	63
Bolt 4	92.5	52.0	31	65
Bolt 5	90.0	59.5	31	66
Bolt 6	85.5	47.0	31	69

Specimen Dimensions; Diameter 0.35", with gage length of 1.4"
Percent elongation was measured using elongation-after-fracture measurements

SECTION 5- ROCKWELL AND SUPERFICIAL HARDNESS, ASTM E18-17

The coupling did not contain any attachment lugs, so no hardness testing was performed.

SECTION 6- VISUAL AND LIQUID DYE PENETRANT EXAMINATION

The 8" coupling did not contain any attachment rods or lugs, therefore there were no field welds that would require non-destructive inspection.

Respectfully submitted

Brett A. Miller, P.E., FASM, CWI
Technical Director

Concurrence

Phillip Swartzentruber, Ph.D., E.I.T.
Failure Analyst

Tracking #: YYYY-###
(Assigned by DIMP group)

Checklist for Exposed Bolt-Style Coupling (pressures > 3 psig)

This form will be completed when LG&E or LG&E contractors expose a bolt-style coupling in a system where the pressure is > 3 psig (medium and high pressure distribution and transmission) and the coupling will be backfilled. The purpose of the form is to provide Operations, Engineering and Gas Regulatory personnel with information about the bolt style coupling installation.

Precautions:

1. Stop excavation upon discovering the bolt-style coupling in the excavation
2. Set-up a perimeter around the excavation to keep the public away from the excavation

General Information:

1. Contact Employee for the bolt style coupling found:
2. Date of exposure: 02/07/2018
3. Location: Belmont Road
4. Size of coupling (based on pipe size if not exposed enough to determine): 6"
5. Type of soil (circle one): Sandy Clay Gravel (Topsoil) Other (take picture and describe)

Pictures:

1. Take at least two pictures of the coupling. The pictures should be from different angles (additional pictures can be taken).
2. Email pictures to supervisor. Ensure pictures are attached to this form:

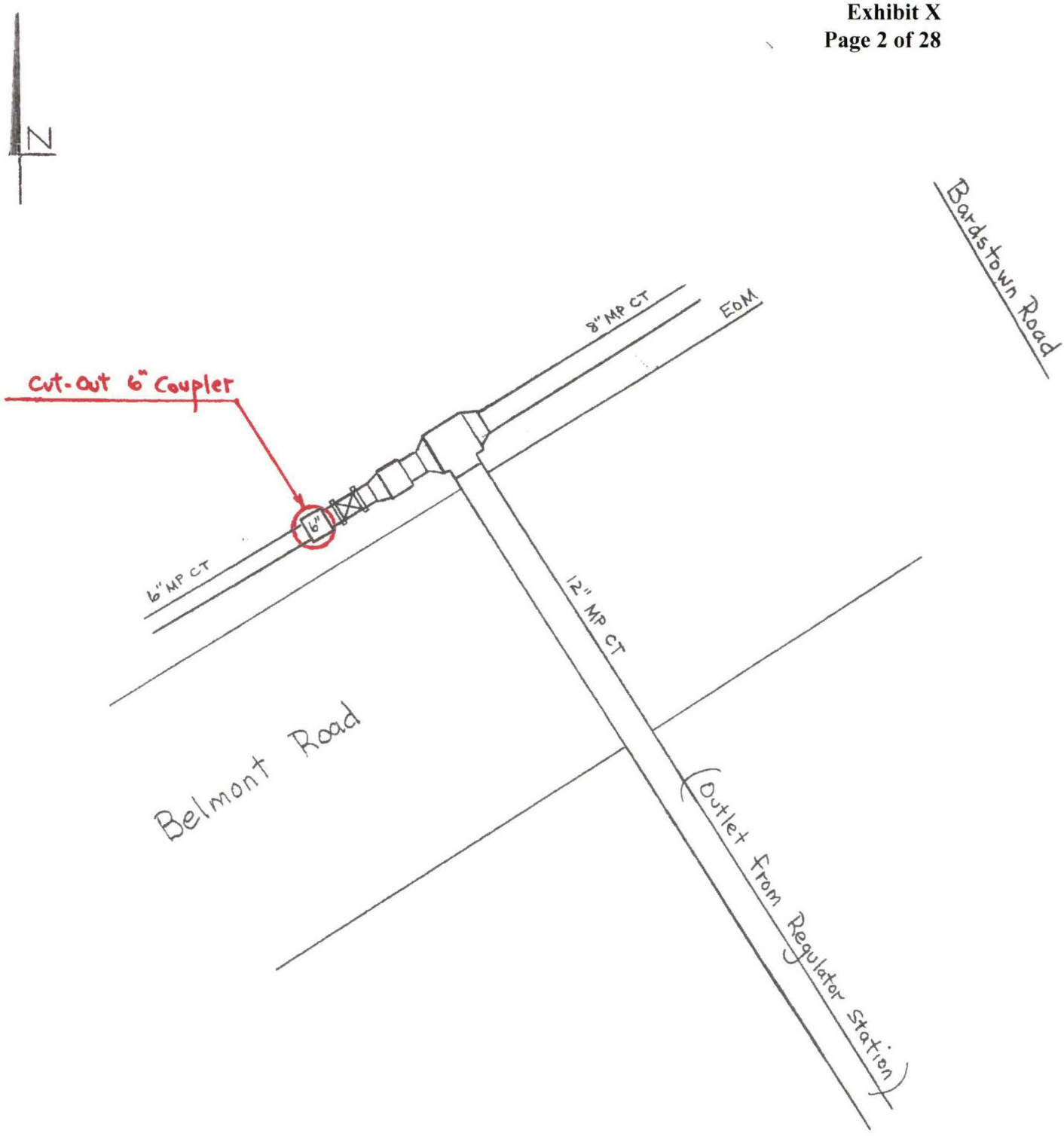
Sketch: Provide a sketch on the backside of the form showing the coupling orientation (vertical/horizontal), nearby branches, pipe, valves and fittings, other utilities or structures, etc.

Leak Survey:

1. Use an instrument designed to detect natural gas to check for the presence of natural gas after backfilling the excavation. Include readings in the above sketch in relation to the coupling. If the contact employee is not leak survey qualified they should contact:
   a. Their supervisor to call Gas Regulatory to complete the survey after the excavation is backfilled. Call [redacted]
   b. If Gas Regulatory is not available contact Gas Dispatch to have the survey assigned to a Gas Trouble Technician.

Leak Survey completed at time of backfill (circle one) yes no

Include completed form in the main report and email a scanned copy of the completed form (back and front) to the Distribution Integrity Management (DIM) group.


N
Bardstown Road
8" MP CT
EoM
Cut-out 6" Coupler
6"
6" MP CT
12" MP CT
Belmont Road
Outlet from Regulator Station


6" Coupler


6" Coupler

Part B- Coupling Information

General Information			Tracking #: 2018-002
Date 8/6/2018	Expense Org 004610	Project 158276	Task COUPLER
Address/Location 3401 Belmont Ct, R-43			
Size 6 inch	Material Steel	Coating CT	MAOP 99
Main/Service Number 119716	Soil Type (from Part A) Unavailable	Manufacturer Unknown[1]	Model Unknown[1]
Pipe Connection:	Steel to Steel	Steel to Plastic	Plastic to Plastic

Historical Information	
Installation Date 12/23/1953	Document Source Drawing R-43
Installation Company	Document Source
Foreman	Document Source
Welder	Document Source

GIS Information
Sys Id (of Coupler) Not available- coupler deleted from Smallworld
Screen Capture

Pictures

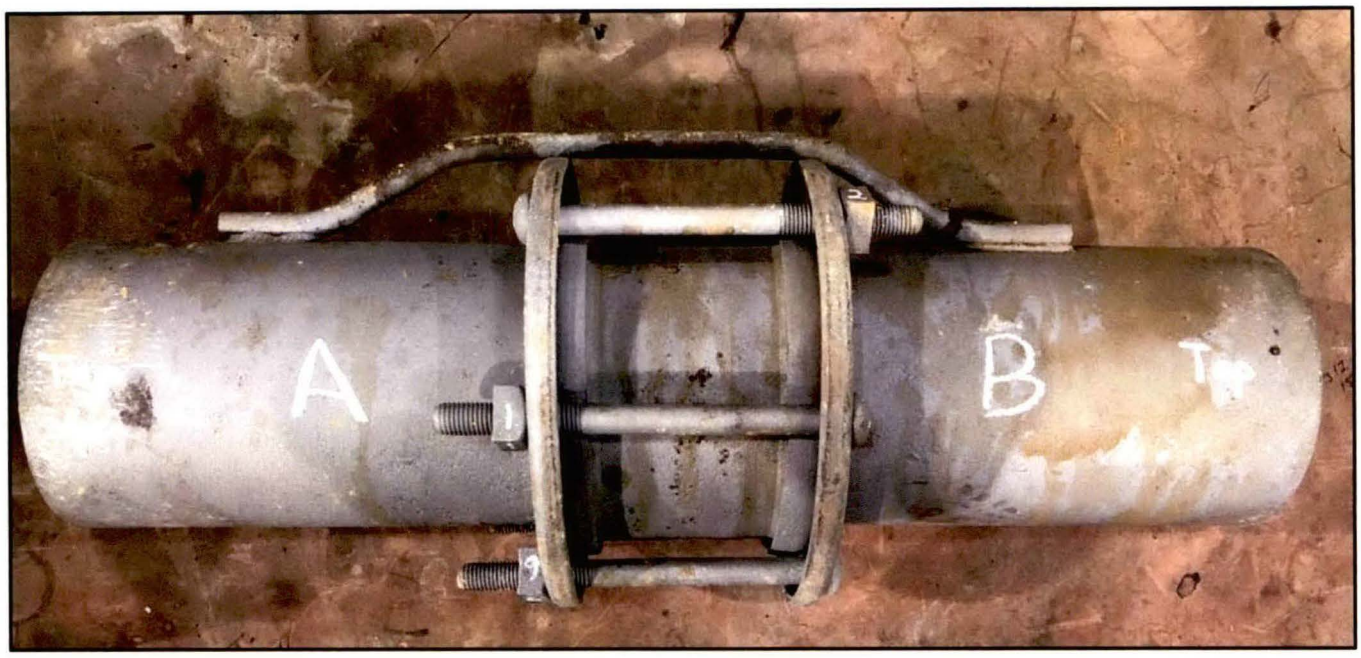


Figure 1- Top View

Figure 2- Front View

Figure 3- Back View

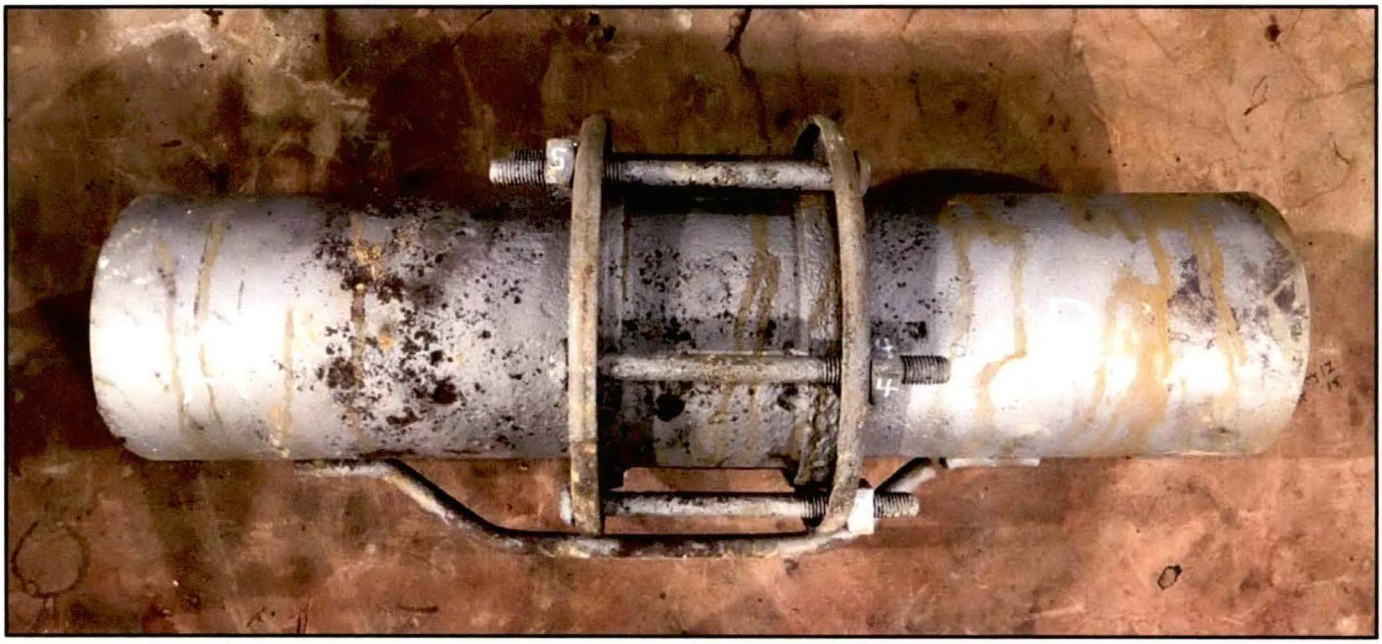


Figure 4- Bottom View

Figure 5- Left Side View

Figure 6- Right Side View

Part C- Visual Inspection of Coupling

Visual Inspection Performed by:

Component Quantities	
Number of Bolts on Coupler Body	6
Number of Reinforcement Rods	1
Number of Lugs	0

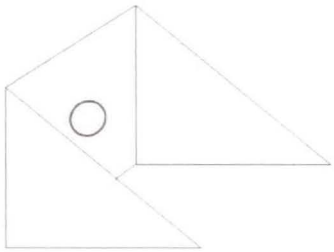
Corrosion							
	Pipe A	Pipe B	Coupler Body	Bolts	Rods	Lugs	Nuts
General External Corrosion Present?	Yes, Severe	Yes, Moderate	Yes, Severe	Yes, #3, 4, & 5	No	--	Yes, #3, 4, & 5
Localized Corrosion Present?	No	No	No	No	Yes	--	No
Pit Depths (in.)	0.20	.115	.180[2]	[2]	[2]	--	[2]
Internal Corrosion?	No	No					

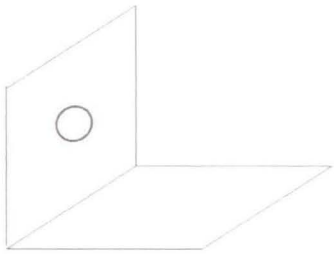
Coupler Body				
Length of Coupler (in.):	6½			
Bolt	Washer Present	Nut present?		
1	No	Yes		
2	No	Yes		
3	No	Yes		
4	No	Yes		
5	No	Yes		
6	No	Yes		

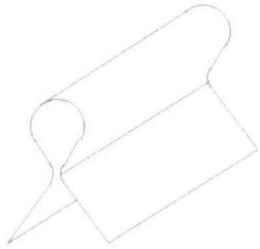
Reinforcement Rods						
Rod	Length (in.)	Diameter (in.)	Washer present at head of bolt?	Washer present at end of bolt?	Nut Present? Type?	Type of rod?
1	19.5[3]	.6215	Not Applicable	Not Applicable	Not Applicable	Plain steel rod

Type of Lug

(Please indicate the shape of the lug by circling one below. If the lug shape is different than any preset shape below, sketch the shape.)







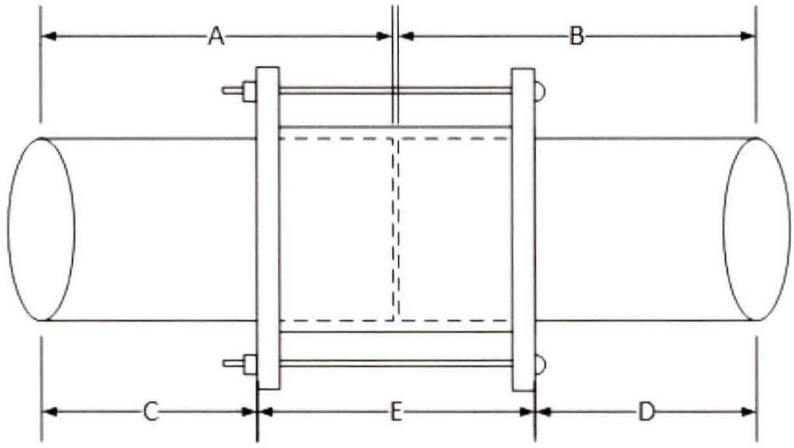
None

Lugs (Measurements)				
Pipe Side	Lug Number	Thickness (in.)	Circumference (in)	
			Distance to next lug, clockwise	Distance to next lug, counter-clockwise
A	1			
A	2			
A	3			
B	1			
B	2			
B	3			

No Lugs

Lugs (Observations)				
Lug	Lug	Assem	Deformed?	Deflected? (angle of)
A1	B1		No Lugs	
A2	B2			
A3	B3			

Lugs (Weld Quality)						
Pipe Side	Lug Number	Any part detached from pipe?	Welded on all three sides of exterior? If no, describe	Are welds on exterior continuous? If no, describe	Welded on all three sides of interior? If no, describe	Are welds on interior continuous? If no, describe
A	1	No	1 Weld on bottom of rod	Yes	Not applicable	Not applicable
B	1	Yes[4]	1 Weld on bottom of rod	Yes	Not applicable	Not applicable



Stab Depth					
	A	B	C	D	Stab Depth (A-C) or (B-D)
Pipe Side A	12.875		10.500		2.375
Pipe Side B		13.500		10.375	3.125
	Sum of stab depths (should be closely equal to measurement E)				5.5
	Coupler Length (E)				6.5
	Difference				1.0

Additional Comments and General Observations

[1] Appears to be a Dresser Style 38 but there are no marking on the coupler to confirm this.

[2] Could not get pit gage into location to measure accurately.

[3] Linear distance, not exact length.

[4] One rod welded on the side was broken. It was already in this condition when the coating was removed. It is assumed that this rod was not broken during the excavation process.

Figure 7- Severe Corrosion on Pipe A

Figure 8- Moderate Corrosion on Pipe B

Figure 9- Severe Corrosion on Coupler

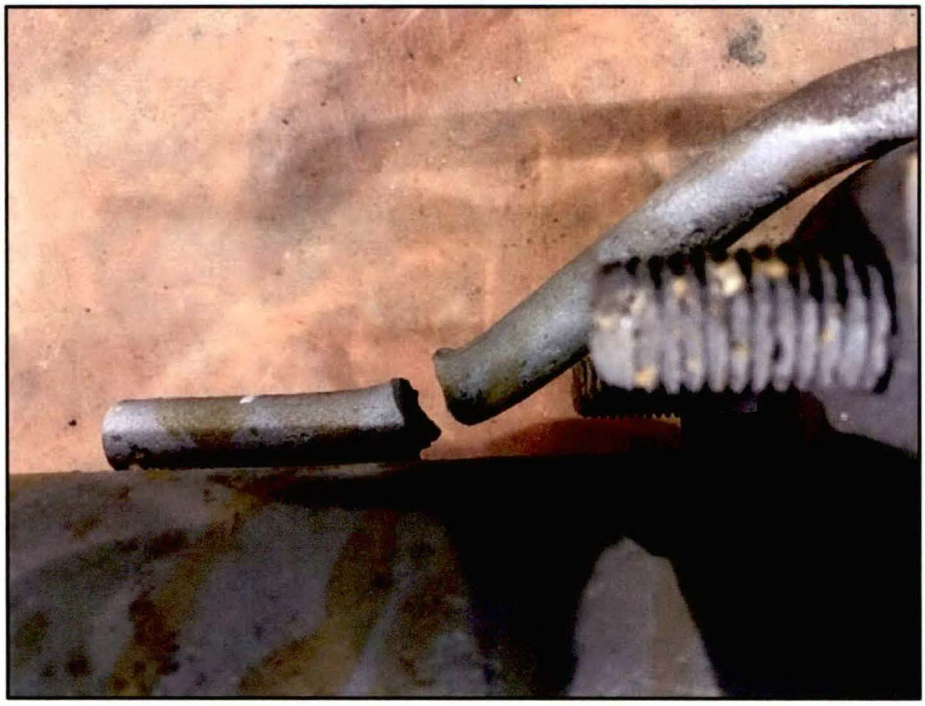


Figure 10- Cracked Rod

IMR TEST LABS
A Curtiss-Wright Business Unit
www.imrlouisville.com

4510 Robards Lane
Louisville, KY 40218
T: 1.502.810.9007 | F: 1.502.810.0380

LG&E - Kentucky Utilities
6900 Enterprise Drive
Louisville, KY 40214

September 24, 2018

Attention: Chad Augustine

Report No. 201802061

Metallurgical Evaluation of Coupling and Associated Hardware

Location: 340 Belmont Court

DESCRIPTION AND PURPOSE

A natural gas pipe section including a coupling was submitted for metallurgical evaluation. The section was a 6" pipe with a Dresser Style 39 Insulating Coupling. A bent rod had been welded to both pipe segments but no harnesses had been added. Copies of the installation information for the coupling were previously provided for this investigation. It was reported that the coupling had been installed in the field at 340 Belmont Court. The pipe section was subsequently excavated after substantial service duration without failure. It was requested that the general dimensions, weld quality, corrosion condition and mechanical properties of the coupling components be determined as directed.

RESULTS

The submitted pipe section with the coupling is shown in Figures 1 and 2. A single welded rod was affixed to the pipe sections but it exhibited a fracture near End B. The coupling consisted of two followers, a middle ring and associated nonmetallic gaskets and sleeves. Six equally spaced bolts with associated nuts secured the coupling components together and against the pipe segments. The general orientation of the coupling was consistent with the supplied information for the specified Dresser Style 39. Prior to receipt, the ends of the pipe segment were labelled as Ends A and B, as shown in Figures 1 and 2. The six coupling bolts had been arbitrarily numbered as Bolts 1 through 6 around the circumference for this inspection.

Figure 1. Photograph of the top of the submitted coupling sample. The rod was fractured prior to laboratory submission.

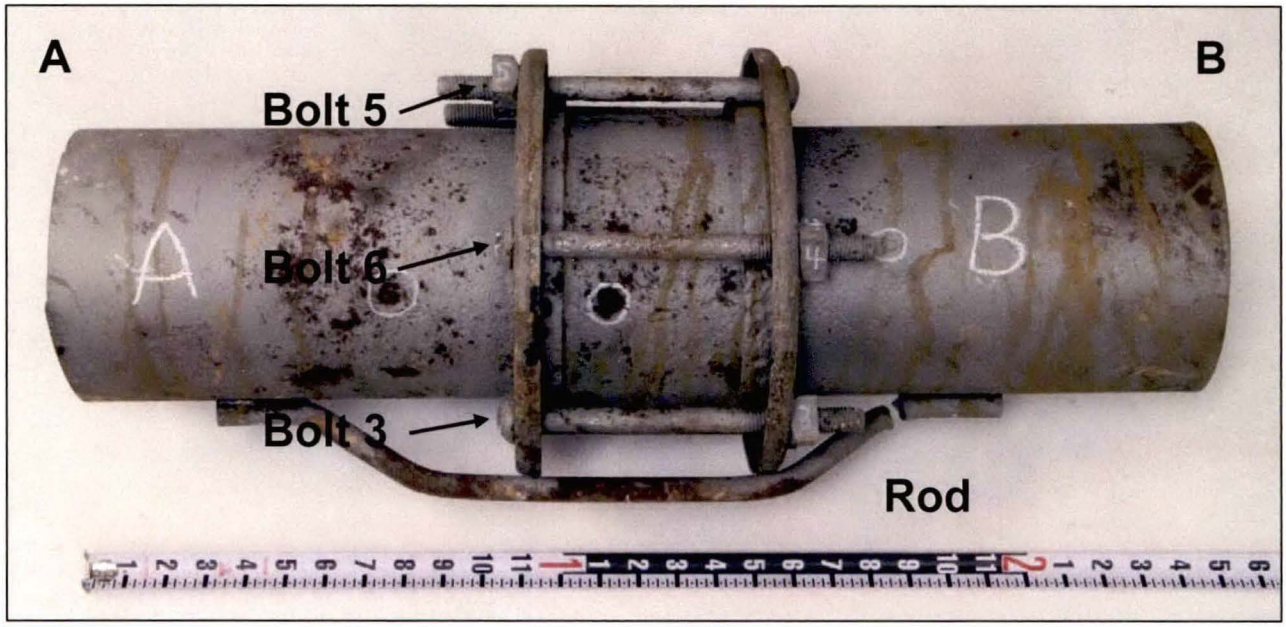


Figure 2. Photograph of the bottom of the submitted sample. Lug, rod and bolt identifications are shown.

SECTION 1- DIMENSIONAL MEASUREMENT

Inspection of the single welded rod revealed that it was relatively straight, but fractured near one end. The depth of insertion of each pipe into the coupling was measured before disassembly. The dimensions are provided in Table 1. No requirements were provided for these characteristics.

TABLE 1 – PIPE COUPLING DIMENSIONAL MEASUREMENTS

Component	Depth of Pipe into Coupling	Gap Between Pipes in Coupling
Pipe A	2"	~ ½" (Original sample length – 27 1/2")
Pipe B	2 ¼"	

SECTION 2- VISUAL OBSERVATIONS

The rod attachment welds were regions of interest on the pipe coupling sample. Each end of the formed rod contained two fillet weld locations; top and bottom. Each weld was inspected visually using a flashlight and magnifying lens. Visual examination was performed initially, and additional visual inspection and dye penetrant inspection were performed after disassembly. For comparison purposes, the welds were rated as substantial fusion, partial fusion, and minimal fusion. The summarized weld fusion and corrosion observations are provided in Table 2. Representative weld regions are shown in Figures 3 through 6. The top of both rod ends were welded but the bottom locations were not welded. No cracking in the welds or base metal heat affected zones (HAZ) was identified.

The rod and coupling bolts were also inspected for corrosion alteration. The observations are provided in Table 3. The fasteners, coupling components and pipe surfaces exhibited significant corrosion in many locations, primarily on the bottom of the assembly. However, the fasteners were not necked down / stretched and no cracks were present. The coupling bolt heads were not marked. The coupling was disassembled during inspection and additional images of the observed features are included as Figures 7 through 12. Removal of the coupling bolts during torque testing did not loosen the pipe segments from the coupling. Substantial attempts were made to remove the pipe segments from the coupling but this could not be done. Visual inspection of the interior surfaces of the components showed that they were not significantly degraded or corroded. The elastomeric components of the coupling consisted of a pipe separator, insulating sleeve, and two gaskets. They could not be thoroughly inspected but they appeared to be intact and not degraded.

TABLE 2 – ROD WELD VISUAL EXAMINATION RESULTS

Component	Weld	Observations
Rod End A	Top	Substantial fusion
	Bottom	No weld
Rod End B	Top	Substantial fusion
	Bottom	No weld

TABLE 3 – FASTENER VISUAL EXAMINATION RESULTS

Component	Observations
Rod	Fractured, some pitting corrosion
Bolt 1	Not bent or stretched, no gross corrosion
Bolt 2	Not bent or stretched, no gross corrosion
Bolt 3	Not bent or stretched, no gross corrosion
Bolt 4	Not bent or stretched, no gross corrosion
Bolt 5	Not bent or stretched, no gross corrosion
Bolt 6	Not bent or stretched, no gross corrosion

Figure 3. Image of the Rod Side A top joint region showing the attachment weld.

Figure 4. Image of the Rod Side B top joint region showing the attachment weld. The rod fracture site is indicated by an arrow.

Figure 5. Image of the Rod Side A bottom joint region showing the absence of a weld.

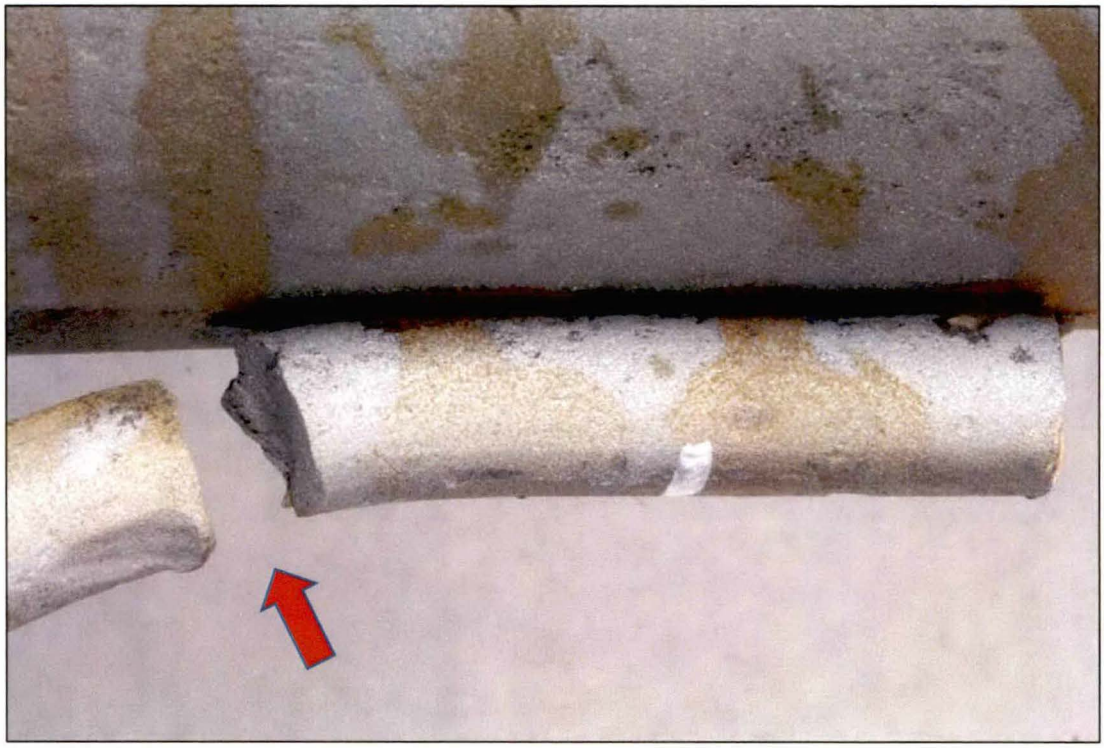


Figure 6. Image of the Rod Side B bottom joint region showing the absence of a weld. The rod fracture location is identified by an arrow.

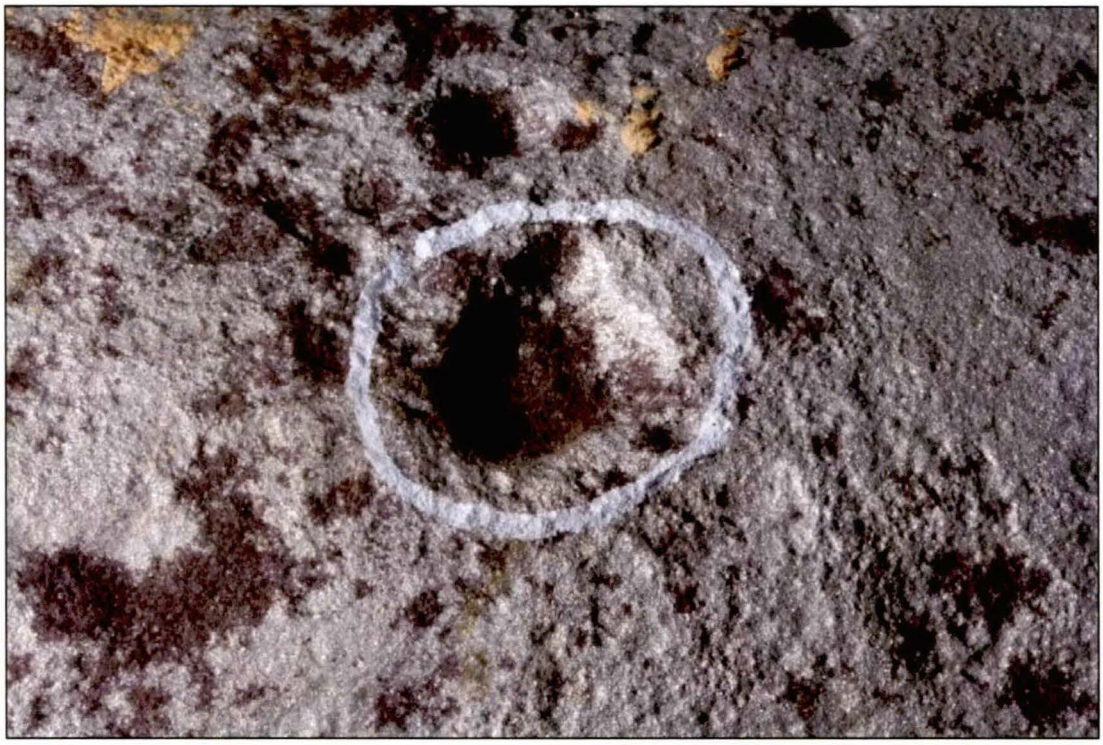


Figure 7. Photograph of a deep corrosion pit on the bottom of the coupling.

Figure 8. Photograph of an additional deep corrosion pit on the bottom of the coupling.

Figure 9. Image showing corrosion to a bolt and the coupling surface.

Figure 10. Photograph of the pipe sample after disassembly of the coupling. The ends of the pipe segments could not be removed from the coupling.

Figure 11. Photograph of the gasket near End A.

Figure 12. Photograph of the gasket at End B.

SECTION 3- TORQUE TESTING- FOR INFORMATION ONLY

Torque testing was performed on the nuts of the studs on the pipe coupling sample. A calibrated torque wrench was used to determine breakaway torque on each fastener. The breakaway torque measurements are summarized in Table 4. The six coupling bolts exhibited torque values ranging from 50 to 100 ft.-lbs. Two bolt torque values were below the Dresser Style 39 coupling installation torque recommendation of 75 ft.-lbs. minimum for 5/8" fasteners.

TABLE 4 – FASTENER TORQUE MEASUREMENT

Component	Breakaway Torque	Observations
Rod 1	N/A	Rod was welded not fastened, and it was fractured
Bolt 1	50 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 2	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 3	80 ft.-lbs.	Satisfied the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 4	80 ft.-lbs.	Satisfied the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 5	N/A	Nut was seized and had to be cut off
Bolt 6	100 ft.-lbs.	Satisfied the 75 ft.-lbs. recommended for 5/8" fasteners

SECTION 4- TENSILE TESTING, ASTM A370-17A

Tensile testing was performed on round specimens that were removed from the single rods and the six coupling bolts. The tensile mechanical properties of the fasteners were measured and the results are summarized in Table 5. No mechanical property requirements were indicated for the fasteners on the provided Dresser coupling information.

TABLE 5 – FASTENER TENSION TEST RESULTS

Component	Ultimate Tensile Strength, ksi	0.2% Offset Yield Strength, ksi	Elongation, %	Reduction in Area, %
Rod 1	65.5	48.0	37	66
Bolt 1	69.5	42.3	34	63
Bolt 2	75.0	45.1	30	50
Bolt 3	74.5	39.8	33	57
Bolt 4	69.5	38.1	36	62
Bolt 5	73.0	38.5	31	58
Bolt 6	79.5	42.7	29	49

Specimen Dimensions; Diameter 0.35" or 0.25", with gage length of 1.4" or 1"
Percent elongation was measured using elongation-after-fracture measurements

SECTION 5- ROCKWELL AND SUPERFICIAL HARDNESS, ASTM E18-17

Since no lugs were used on this coupling no Rockwell hardness testing was required.

SECTION 6- LIQUID DYE PENETRANT EXAMINATION

The coupled pipe section with the fasteners removed were sent to a third party NDE laboratory for inspection. Visual and liquid dye penetrant inspection were performed on the rod welds. Inspection was performed in accordance with the acceptance criteria of API 1104 "Welding of Pipelines and Related Facilities". The inspection results are provided as an appendix. Two representative welds are shown in Figures 13 and 14 with the dye penetrant test media remaining.

Figure 13. Image of the Rod End A top weld after dye penetrant media had been used during inspection.

Figure 14. Image of the Rod End B top weld after dye penetrant media had been used during inspection.

Respectfully submitted

Brett A. Miller, P.E., FASM, CWI
Technical Director

Concurrence

Phillip Swartzentruber, Ph.D., E.I.T.
Failure Analyst

All procedures were performed in accordance with the IMR Quality Manual, current revision, and related procedures; and the PWA MCL Manual F 23 and related procedures. The information contained in this test report represents only the material tested and may not be reproduced, except in full, without the written approval of IMR Test Labs ("IMR"). IMR maintains a quality system in compliance with the ISO/IEC 17025 and is accredited by the American Association for Laboratory Accreditation (A2LA), certificates #1140.03 and #1140.04. IMR will perform all testing in good faith using the proper procedures, trained personnel, and equipment to accomplish the testing required. IMR's liability to the customer or any third party is limited at all times to the amount charged for the services provided. All samples will be retained for a minimum of 6 months and may be destroyed thereafter unless otherwise specified by the customer. The recording of false, fictitious, or fraudulent statements or entries on this document may be punished as a felony under federal statutes. IMR Test Labs is a GEAE S-400 approved lab (Supplier Code T9334).

APPENDIX – VISUAL INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

VISUAL INSPECTION REPORT

Customer: IMR Test Lab Date: 9-18-18
Location of Work: Layl HTL Purchase Order #: 53827 / Job#201802060

****

Location/Weld Area	Accept	Reject	Porosity	Slag	Undercut	Comments
Sample 201802061(6")		X			X	Weld also rejected
Top B						for lack of fusion
Sample 201802061		X	X			Weld also rejected
						for Lack of fusion

Daniel J Hayes Jr.
CWI 00080691
QC1 EXP. 8/1/2021

Results interpreted to CODE: API-1104

INSPECTOR: D J Hayes Jr. Level or (CWI) #: II

Your Independent Laboratory For Complete Non-Destructive Testing

APPENDIX – DYE PENETRANT INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

NDE PENETRANT REPORT

Client: IMR Test Labs — Project: 201802060
Item Description: Weldments — Part No: 201802061 (6")
Drawing No: — — Spec. API
Acceptance Class API-1104 — Procedure HTL-PT-01

WELD		OTHER TEST ITEMS	
Weld Joint		Material	
Weld Process		Processing	
Base Material		Material	
Material Thickness	N/A	Dimensions	N/A
Weld Length/OD		Additional Info	
Surface Condition		Surface Condition	

PRECLEAN: Method Spray & Wipe — Material SKC-S cleaner
Batch No. 15M15K — Drying Time 10mins

PENETRANT: Material SKL-WP-2 penetrant — Batch No. 10J09K
Application Brush — Dwell Time 20 mins

EMULSIFICATION: Material — Batch No.
Application N/A — Emulsification Time N/A

EXCESS PENETRANT REMOVAL: Material SKC-S cleaner — Batch No. 15M15K
Method Towel wipe — Drying Time 10mins.

DEVELOPER: Material SKD-S2 developer — Batch No. 14F04K
Method Spray — Drying Time 5mins — Developing Time 15mins

POSTCLEAN: Material — Batch No.
Method

No. of Parts Accepted — Serial No.'s
No. of Parts Rejected 1 — Serial No.'s 201802060 (6")

OTHER INFORMATION: Top B – Rejected for Lack of Fusion - (possible Cracking from Lack of Fusion)

Top A - Rejected for Lack of Fusion + porosity at termination of weld w/ crack (possible cracking from Lack of Fusion)

INSPECTED BY:	DATE:
[signature] Hoyt III	9-18-18

Your Independent Laboratory For Complete Non-Destructive Testing

Tracking #: YYYY-###
(Assigned by DIMP group)

Checklist for Exposed Bolt-Style Coupling (pressures > 3 psig)

This form will be completed when LG&E or LG&E contractors expose a bolt-style coupling in a system where the pressure is > 3 psig (medium and high pressure distribution and transmission) and the coupling will be backfilled. The purpose of the form is to provide Operations, Engineering and Gas Regulatory personnel with information about the bolt style coupling installation.

Precautions:

1. Stop excavation upon discovering the bolt-style coupling in the excavation
2. Set-up a perimeter around the excavation to keep the public away from the excavation

General Information:

1. Contact Employee for the bolt style coupling found:
2. Date of exposure: 04/25/2018
3. Location: Bertie Ave. @ Thompson Ave.
4. Size of coupling (based on pipe size if not exposed enough to determine): 4" Insulated
5. Type of soil (circle one): (Sandy) Clay Gravel Topsoil Other (take picture and describe)

Pictures:

1. Take at least two pictures of the coupling. The pictures should be from different angles (additional pictures can be taken).
2. Email pictures to supervisor. Ensure pictures are attached to this form:

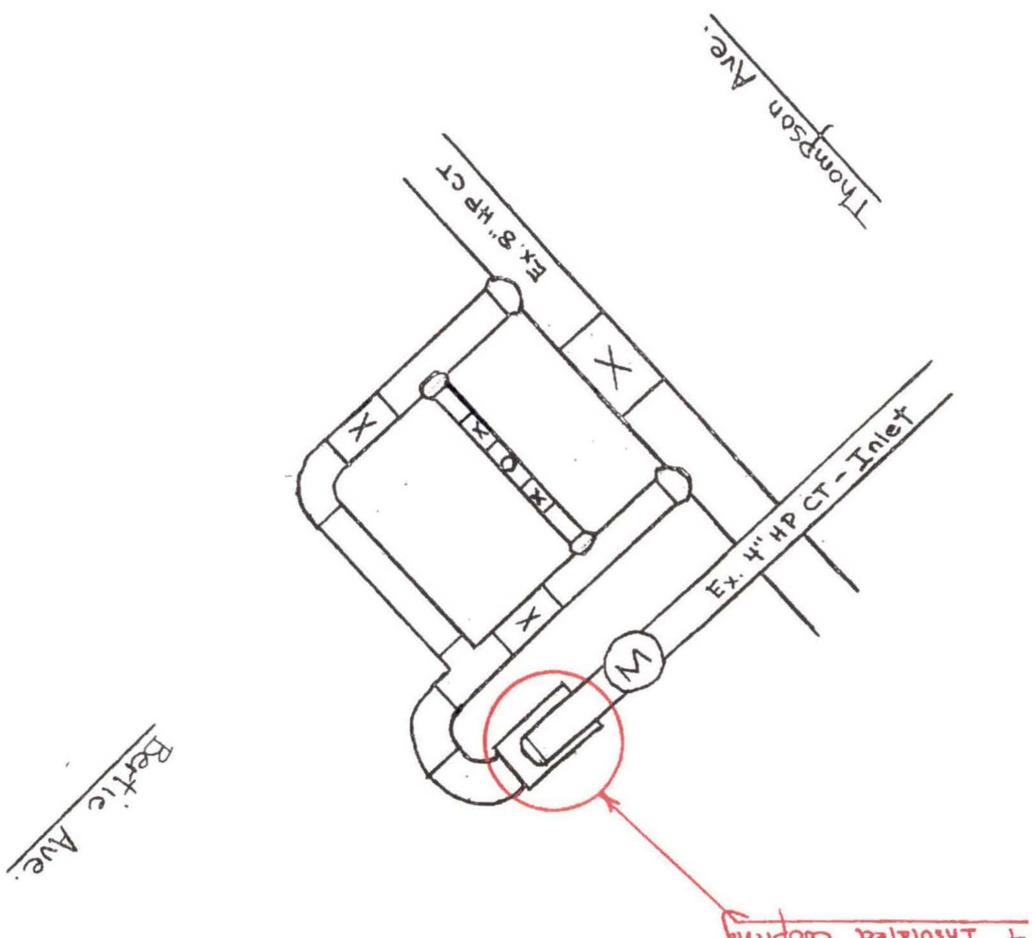
Sketch: Provide a sketch on the backside of the form showing the coupling orientation (vertical/horizontal), nearby branches, pipe, valves and fittings, other utilities or structures, etc.

Leak Survey:

1. Use an instrument designed to detect natural gas to check for the presence of natural gas after backfilling the excavation. Include readings in the above sketch in relation to the coupling. If the contact employee is not leak survey qualified they should contact:
   a. Their supervisor to call Gas Regulatory to complete the survey after the excavation is backfilled. Call [redacted]
   b. If Gas Regulatory is not available contact Gas Dispatch to have the survey assigned to a Gas Trouble Technician.

Leak Survey completed at time of backfill (circle one) yes no

Include completed form in the main report and email a scanned copy of the completed form (back and front) to the Distribution Integrity Management (DIM) group.


Thompson Ave.
Ex. 8" HP CT
Ex. 4" HP CT - Inlet
M
Bertie Ave.
4" Insulated Coupling


United
Rentals
TRENCH SAFE

Part B- Coupling Information

General Information			**Tracking #: 2018-008**
Date 9/13/2018	Expense Org 4610	Project 158276	Task COUPLER
Address/Location Bertie Ave & Thompson Ave, Louisville, KY 40206			
Size 4 inch	Material Steel	Coating Coal Tar	MAOP
Main/Service Number 309448	Soil Type (from Part A) Sandy	Manufacturer Dresser	Model Style 39
Pipe Connection:	Steel to Steel (circled)	Steel to Plastic	Plastic to Plastic

Historical Information	
Installation Date 10/1/1985	Document Source Main Report
Installation Company Southern	Document Source Main Report
Foreman J. Herman (?)	Document Source Main Report
Welder R. Harper	Document Source Main Report

GIS Information

Sys Id (of Coupler)

Not Mapped in GIS

Screen Capture

Pictures

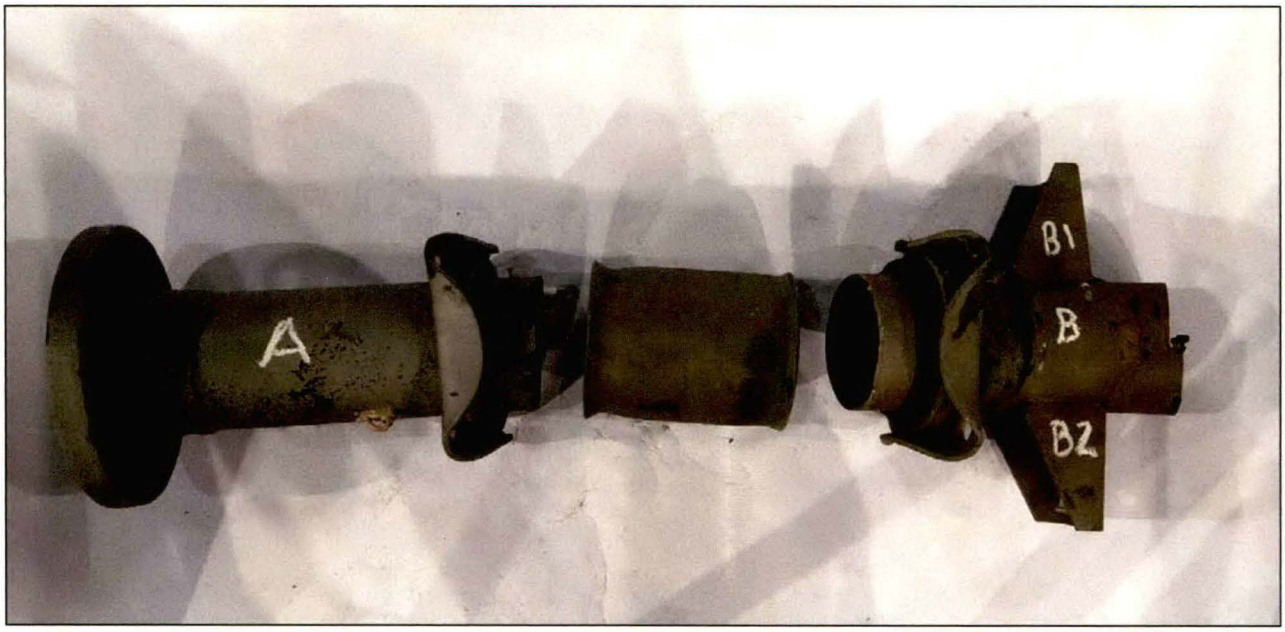


Figure 1- Top View

Figure 2- Front View

Part C- Visual Inspection of Coupling

Visual Inspection Performed by:

Table 1- Component Quantities

Number of Bolts on Coupling Body	0[1]
Number of Reinforcement Rods	0[2]
Number of Lugs	2

[1] This coupling should have 4 bolts. [2] This coupling should have 2 reinforcement rods.

Table 2- Corrosion

	Pipe A	Pipe B	Coupler Body	Bolts	Rods	Lugs	Nuts
General External Corrosion Present?	No	No	No	Not Applicable	Not Applicable	No	Not Applicable
Localized Corrosion Present?	No	No	No	Not Applicable	Not Applicable	No	Not Applicable
Pit Depths	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Internal Corrosion?	No	No					

Table 3- Coupler Body

Bolt	Washer Present	Nut present?
1	There were no bolts turned in so no nuts and washers were either.	
2		
3		

Table 4- Reinforcement Rods

Rod	Length (in.)	Diameter (in.)	Washer present at head of bolt?	Washer present at end of bolt?	Nut Present? Type?	Type of rod?
1	There were not reinforcement rods turned in.					
2						

Type of Lug

(Please indicate the shape of the lug by circling one below. If the lug shape is different than any preset shape below, sketch the shape.)

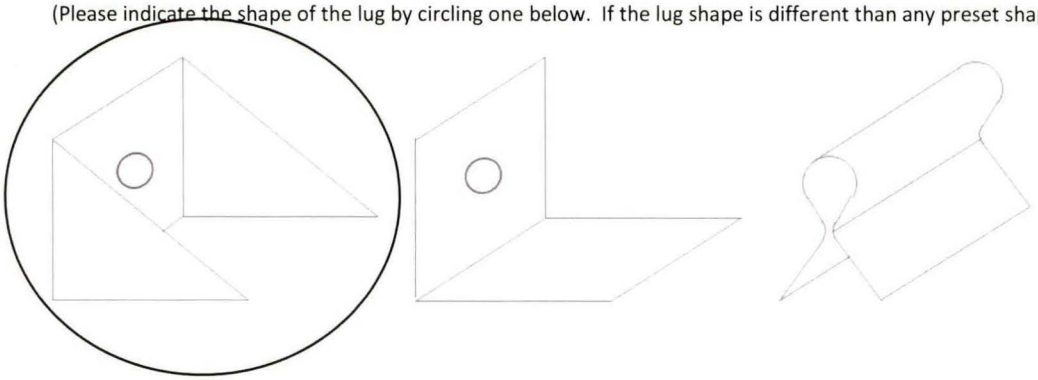


Table 5- Lugs (Measurements)

Pipe Side	Lug Number	Thickness (in.)	Circumference (in)	
			Distance to next lug, clockwise	Distance to next lug, counter-clockwise
B	1	.2200	7.875 Top	8.000 Bottom
B	2	.2210	7.875 Top	8.000 Bottom

Table 6- Lugs (Observations)

Lug	Lug	Assembly sets aligned?	Deformed?	Deflected? (angle of)
A1				
A2				

There were no lugs for pipe side A. It is assumed that the reinforcement rods were threaded through the flange on pipe A.

Table 7- Lugs (Weld Quality)

Pipe Side	Lug Number	Any part detached from pipe?	Welded on all three sides of exterior? If no, describe	Are welds on exterior continuous? If no, describe	Welded on all three sides of interior? If no, describe	Are welds on interior continuous? If no, describe
B	1	No	No[3]	Yes	No[4]	Yes
B	2	No	No[3]	Yes	No[4]	Yes

[3] No weld on rear or bottom exterior. [4] No welds on rear or top interior.

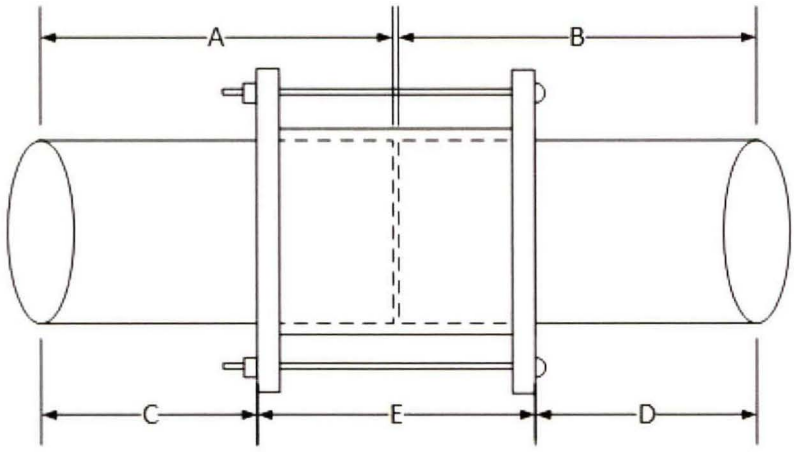


Table 8- Stab Depth

	A	B	C	D	**Stab Depth** (A-C) or (B-D)
Pipe Side A					0
Pipe	Coupling was delivered unassembled, therefore, measurements for stab depths could not be taken.				0
					0
			Coupler Length (E)		
			Difference		

Additional Comments and General Observations

IMR TEST LABS
A Curtiss-Wright Business Unit
www.imrlouisville.com

4510 Robards Lane
Louisville, KY 40218
T: 1.502.810.9007 | F: 1.502.810.0380

LG&E - Kentucky Utilities
6900 Enterprise Drive
Louisville, KY 40214

December 31, 2018

Attention: Chad Augustine

Report No. 201802724

Metallurgical Evaluation of Coupling and Associated Hardware

Location: Bertie Ave. & Thompson Ave., Louisville, KY

DESCRIPTION AND PURPOSE

Components of a natural gas pipe section including a coupling were submitted for metallurgical evaluation. The coupling had been disassembled prior to receipt at IMR Test Labs and none of the rods or coupling bolts were included for analysis. The section was a 4" pipe with a Dresser Style 39 Insulating Coupling. Two joint harnesses were affixed to one of the pipe sections, but not to the other section. Copies of the installation information for the coupling and harnesses were previously provided for this investigation. It was reported that the coupling had been installed in the field at Bertie Avenue and Thompson Avenue in Louisville, KY. The pipe section was subsequently excavated after substantial service duration without failure. It was requested that the general dimensions, weld quality, corrosion condition and mechanical properties of the coupling components be determined as directed.

RESULTS

The submitted pipe section components are shown in Figures 1 and 2. Two lugs of the joint harnesses had been fillet welded to the Pipe B segment. Prior to receipt, the ends of the pipe segment were labelled as Ends A and B, as shown in Figures 1 and 2. The top of the pipe segments were not marked. Lugs B1 and B2 were welded to Pipe B.

Figure 1. Photograph of the likely top of the submitted coupling components.

Figure 2. Photograph of the likely bottom of the submitted coupling components.

SECTION 1- DIMENSIONAL MEASUREMENT

The sets of harness lugs were positioned on opposite sides of the Pipe B segment. The relative orientation of the harness lugs was measured by photographing the assembly from the ends and applying a protractor overlay for angle measurement. The obtained measurements are shown in Figure 3 with the data summarized in Table 1. The harness lugs were straight and not bent. The depth of insertion of each pipe into the coupling could not be accurately measured.

TABLE 1 – LUG SPACING DIMENSIONAL MEASUREMENTS

Component	Angle	Deviation from 180°	Image
Rod B1 / Rod B2	189°	9°	Figure 3

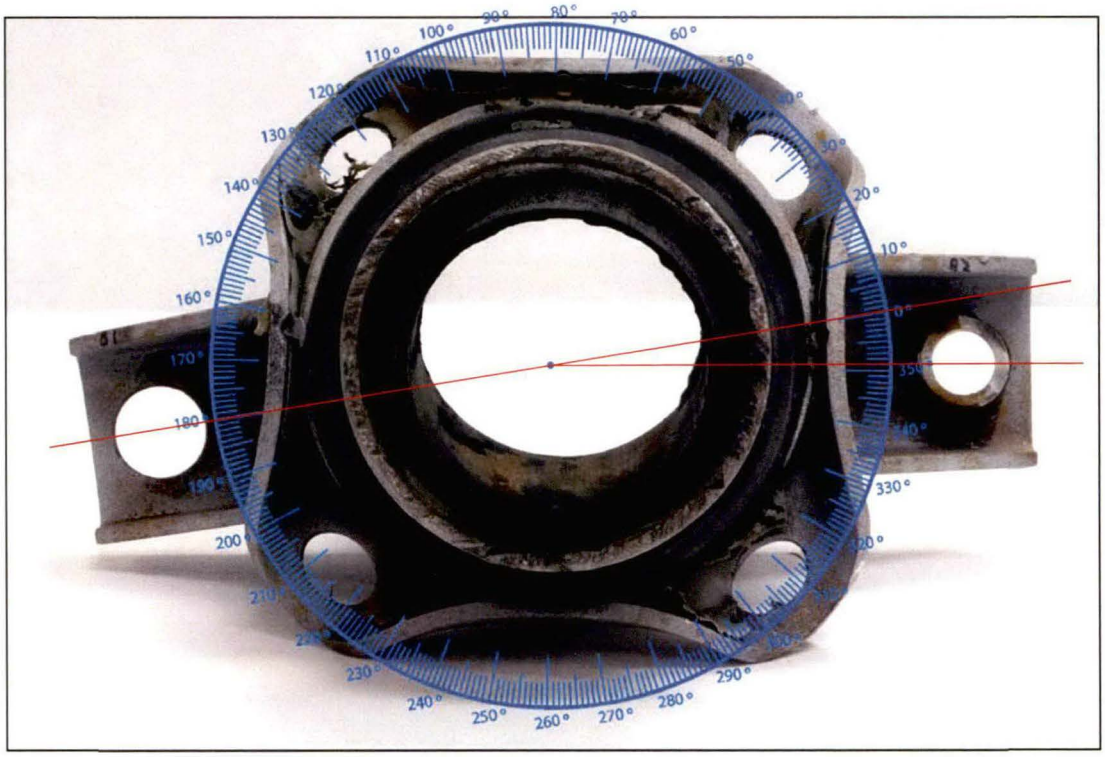


Figure 3. End facing image of the sample at End B. A superimposed protractor shows that the centers of Lugs B1 and B2 were approximately 9° from square.

SECTION 2- VISUAL OBSERVATIONS

The lug attachment welds were regions of interest on the pipe coupling sample. Each lug contained four fillet weld locations; exterior top, exterior bottom, interior top, and interior bottom. Each weld was inspected visually using a flashlight and magnifying lens. It was indicated that welding was performed in accordance with API 1104. General weld inspection was performed initially, followed by

visual inspection by an outside NDE company. For comparison purposes, the welds were rated as substantial fusion, partial fusion, and minimal fusion. The summarized weld fusion and corrosion observations are provided in Table 2. Representative weld regions are shown in Figures 4 through 7. No welding had been performed on the bottom exterior or top interior of the lug joints. It was further noted that the welds contained localized weld discontinuities including undercut, overlap, and spatter in addition to incomplete fusion. No cracking in the welds or base metal heat affected zones (HAZ) was identified. Some superficial pitting corrosion was observed, but no significant material loss had occurred.

Additional images of the components are provided as Figures 8 through 11. No gross corrosion or other anomalies were identified.

TABLE 2 – LUG WELD VISUAL EXAMINATION RESULTS

Component	Location	Weld	Observations
Lug B1	Exterior	Top	Substantial fusion
		Bottom	No weld
	Interior	Top	No weld
		Bottom	Substantial fusion
Lug B2	Exterior	Top	Substantial fusion
		Bottom	No weld
	Interior	Top	No weld
		Bottom	Substantial fusion

Figure 4. Image of the Lug B1 exterior top weld which exhibited substantial fusion except for some overlap.

Figure 5. Image of the Lug B2 exterior top weld which exhibited substantial fusion except for some overlap.

Figure 6. Image of the Lug B1 interior bottom weld which exhibited substantial fusion but was incompletely sand blasted.

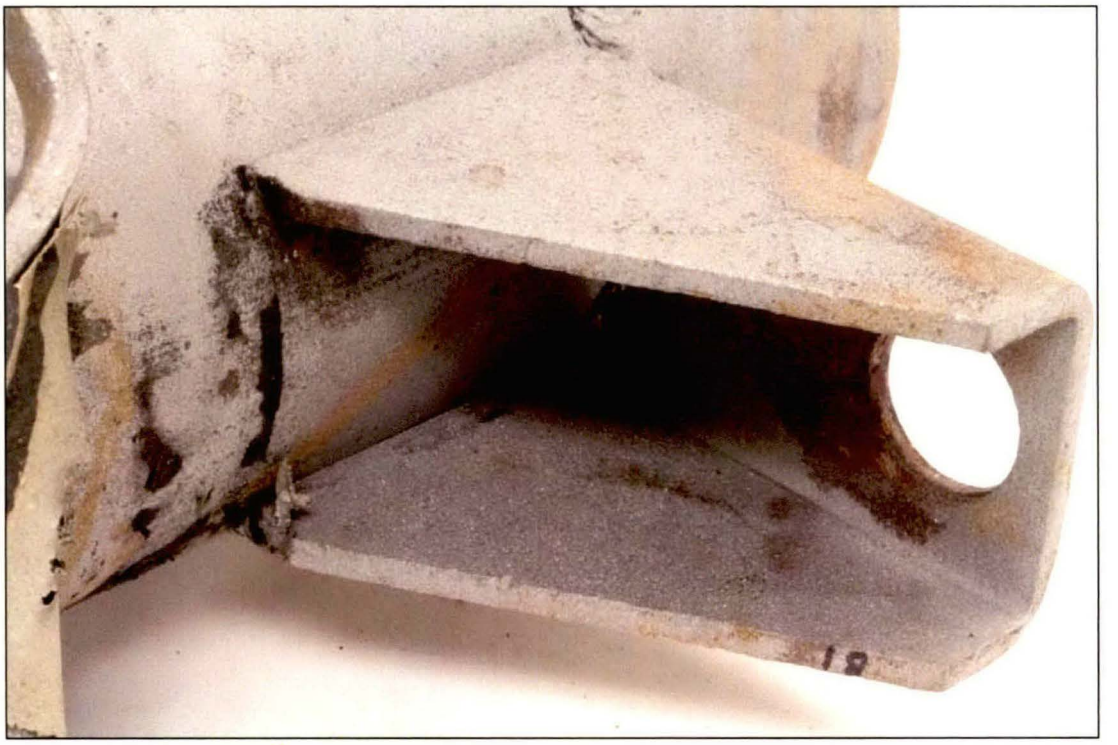


Figure 7. Image of the Lug B1 interior top and exterior bottom locations which were not welded.

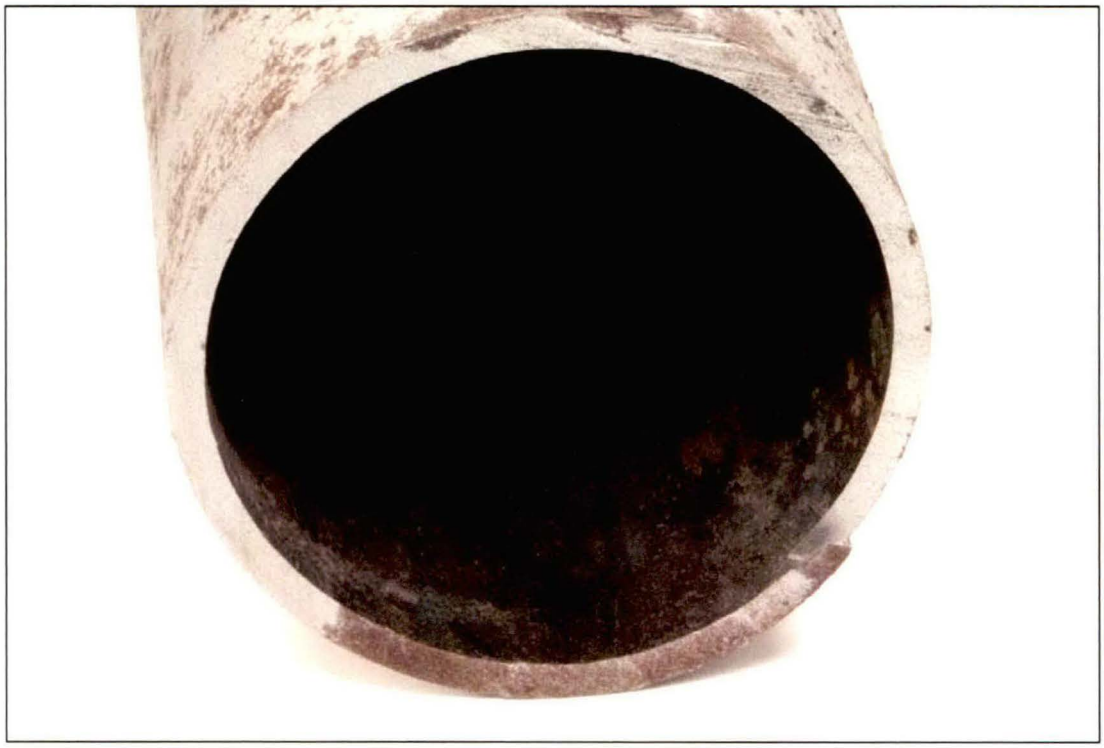


Figure 8. Image of the Pipe A section which had been in the coupling.

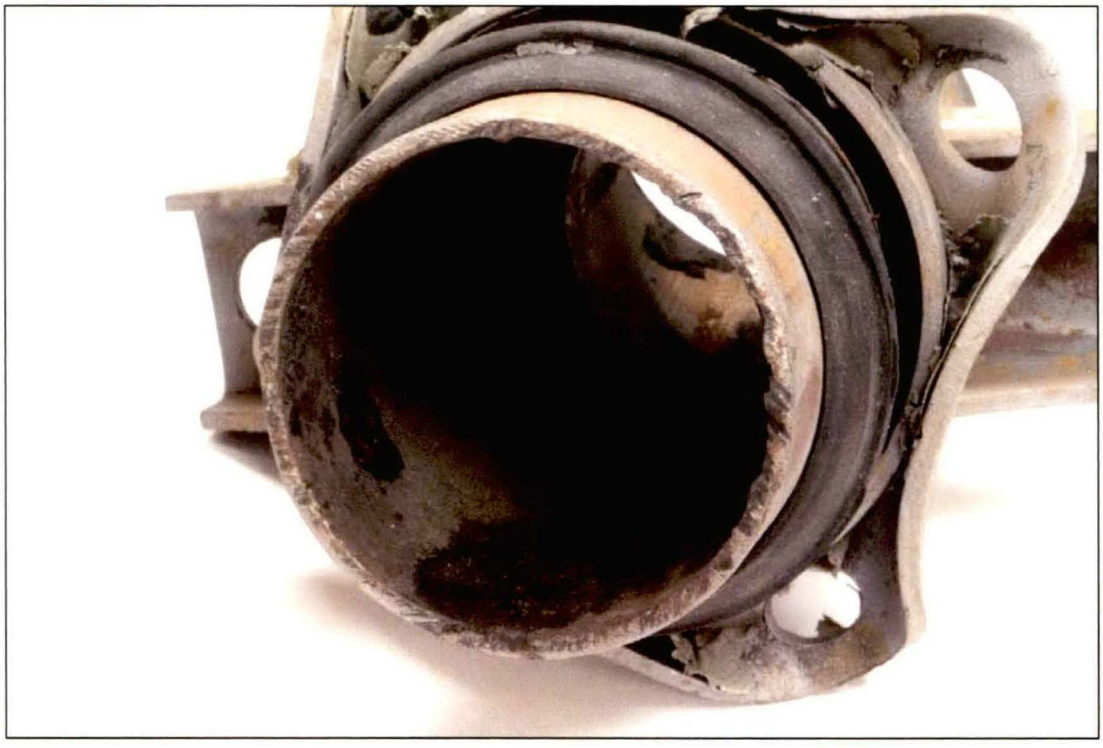


Figure 9. Image of the Pipe B section which had been in the coupling.

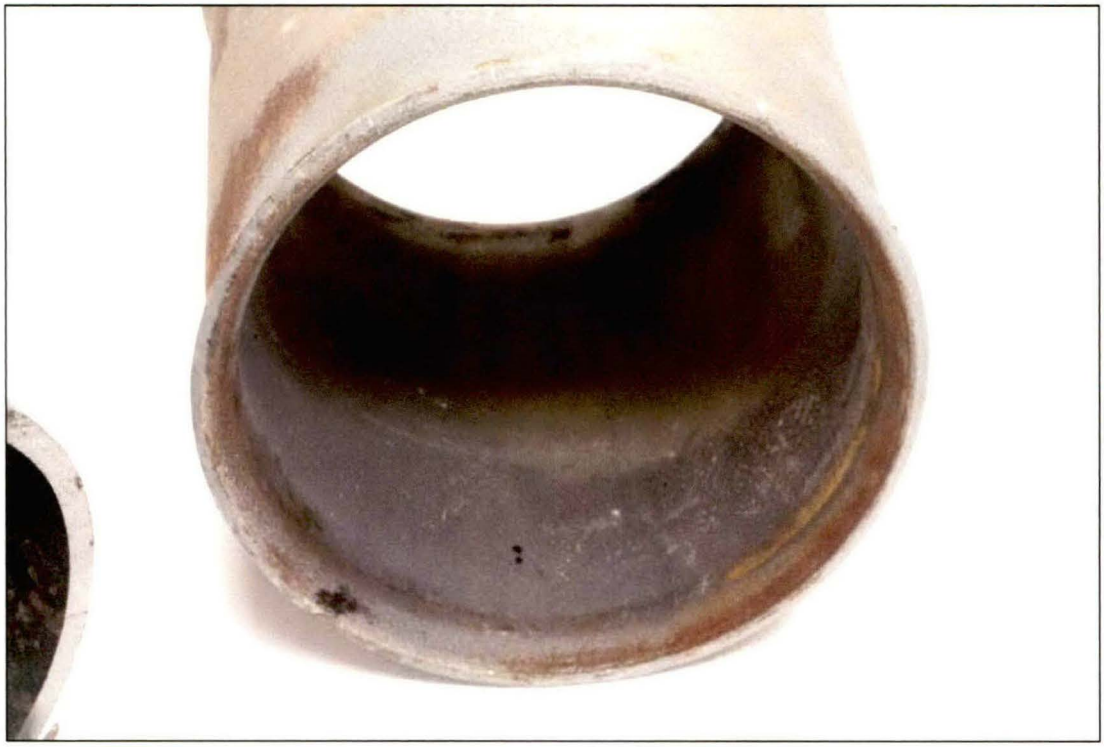


Figure 10. Photograph of the interior of the coupling after disassembly.

Figure 11. Close-up image of the condition of the elastomeric seal within the coupling.

SECTION 3- ROCKWELL AND SUPERFICIAL HARDNESS, ASTM E18-17

Small sections of the two lugs were excised for hardness testing. Rockwell hardness testing was performed on the lugs after the removal of surface roughness by sanding. The obtained results are provided in Table 3 and are suggestive of a moderate strength level. No requirements were provided for comparison.

TABLE 3 – LUG HARDNESS TEST RESULTS – ROCKWELL B - HRBW

Results	Reading 1	Reading 2	Reading 3	Reading 4	Average
Lug B1	70	70	68	71	70
Lug B2	78	76	76	75	76

SECTION 6- NONDESTRUCTIVE EXAMINATION

The Pipe B end was sent to a third party NDE laboratory for inspection. Visual, magnetic particle and liquid dye penetrant inspection were performed on the lug attachment welds. Inspection was performed in accordance with the acceptance criteria of API 1104 "Welding of Pipelines and Related Facilities". The inspection results are provided as Appendices A through C. Two representative welds are shown in Figures 12 and 13 with the dye penetrant test media remaining.

Figure 12. Image of the Lug B1 exterior top weld after magnetic particle media had been used during inspection.

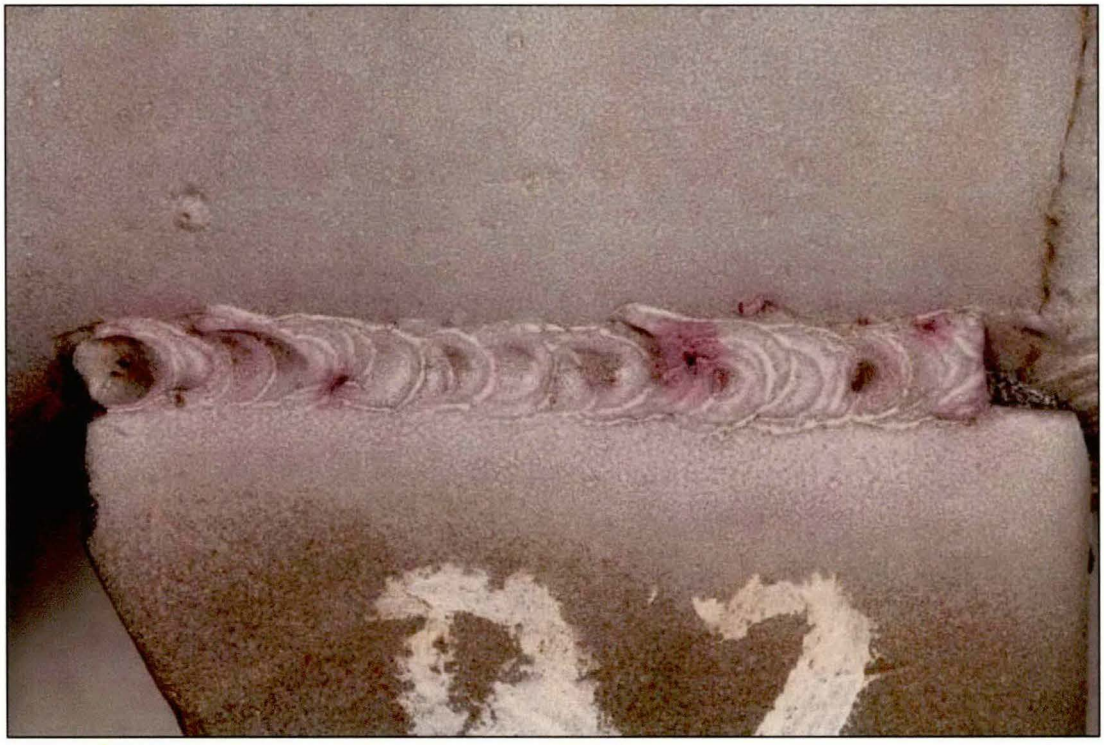


Figure 13. Image of the Lug B2 exterior top weld after dye penetrant media had been used during inspection.

Testing Cert # 1140.03 & 1140.04

Respectfully submitted

Brett A. Miller, P.E., FASM
Technical Director

Concurrence

Phillip Swartzentruber, Ph.D., E.I.T.
Failure Analyst

APPENDIX A – VISUAL INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

VISUAL INSPECTION REPORT

Customer: _____ **Date:** _____

Location of Work: _____ **Purchase Order #:** _____

****

On 12-27-18 personnel of Hayes Testing Conducted a Visual, magnetic partical, and penetrat Inspection for IMR on Job# 201802724 part # 201802724.

Inspection was performed in accordance with API-1104. Results are as follow.

Section B - Butt weld rejected for Lack of fusion to root, and Incomplete penetration

B1- Rejected for Crack and Undercut
B2- Rejected. insufficent weld, and Undercut

Please see attached for mag. partical and penetrat inspection results.

If you have any questions or concerns regarding this report, feel free to conact me at any time

Respectfully Submitted

Daniel J Hayes Jr.
CWI- 00080591
QC1 EXP. 8/1/2021

Results interpreted to CODE: API-1104

INSPECTOR: Daniel J Hayes **Level or CWI #:** II

Your Independent Laboratory For Complete Non-Destructive Testing

APPENDIX B – MAGNETIC PARTICLE INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

MAGNETIC PARTICLE INSPECTION REPORT

Customer Name: IMR Date of Work: 12/20/18

Purchase Order #: 5558T Job #: 201802721

1. Identification:
Item(s) Inspected B1 Description Lug Welds

Location of Item: HTL Part No. 201802724

2. Technique - [✓] Dry Powder [] Wet Fluorescent []Non-Fluorescent

3. Equipment - []Coil []Prods [✓] Yoke []Clamps 4. Current Type [✓] AC []DC

5. AMP Turns

6. Inspection Procedure HTL-MT

7. Inspection Specifications API 1104

8. Type of Indication Found:

1.Crack 2.Linear Surface 3.Linear Subsurface 4.Undercut
5.Non- Relevant 6. NONE

RESULTS: B1-Rejected Crack

9. Sketch/Description

10. Inspection Performed by Hayes Testing Laboratory, Inc. personnel:

Signature [signature] II
Level II Technician

Your Independent Laboratory For Complete Non-Destructive Testing

APPENDIX C – PENETRANT INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

NDE PENETRANT REPORT

HTL

Client: IMR
Project: 201802721
Item Description: LUG Weld
Part No: 201802724 B2
Drawing No:
Spec. API 1104
Acceptance Class API 1104
Procedure HTL MT

WELD		OTHER TEST ITEMS	
Weld Joint		Material	
Weld Process		Processing	
Base Material	N/A	Material	N/A
Material Thickness		Dimensions	
Weld Length/OD		Additional Info	
Surface Condition		Surface Condition	

PRECLEAN: Method Spray/wipe Material SKC-S Aerosol
Batch No. 15M15K Drying Time 10 MINUTES

PENETRANT: Material SKL-WP2 Batch No. 17H13K
Application brush Dwell Time 25 Minutes

EMULSIFICATION: Material Batch No.
Application N/A Emulsification Time

EXCESS PENETRANT REMOVAL: Material towel/wipe Batch No.
Method Drying Time

DEVELOPER: Material SKD-S2 Batch No. 14F04K
Method Spray Drying Time 10 Minutes Developing Time 10 MINS.

POSTCLEAN: Material SKC-S Aerosol Batch No. 15M15K
Method Spray/wipe

No. of Parts Accepted Serial No.'s
No. of Parts Rejected 1 Serial No.'s

OTHER INFORMATION:

B2- Rejected porosity

INSPECTED BY:	DATE:
	12/20/18

Bolt-Style Coupling (pressures > 3 psig)

This form will be completed when LG&E or LG&E contractors expose a bolt-style coupling in a system where the pressure is > 3 psig (medium and high pressure distribution and transmission) and the coupling will be backfilled. The purpose of the form is to provide Operations, Engineering and Gas Regulatory personnel with information about the bolt style coupling installation.

Part A- Discovery of Coupling

Precautions:

1. Stop excavation upon discovering the bolt-style coupling in the excavation
2. Set-up a perimeter around the excavation to keep the public away from the excavation

General Information:

1. Contact Employee for the bolt style coupling found: FRANK Rudolph OR Mike Quill
2. Date of exposure: 10-3-18
3. Location: 34th & BANK BASF Plant
4. Size of coupling (based on pipe size if not exposed enough to determine): 4"
5. Type of soil (circle one): Sandy (Clay) Gravel Topsoil Other (take picture and describe)
6. Soil Density test: □ Type A ☒ Type B □ Type C
7. Status: ☒ Removed □ Abandoned in place □ Backfilled- left in service

Pictures:

1. Take at least two pictures of the coupling. The pictures should be from different angles (additional pictures can be taken).
2. Email pictures to supervisor. Ensure pictures are attached to this form:

Sketch: Provide a sketch showing the coupling orientation (vertical/horizontal), nearby branches, pipe, valves and fittings, other utilities or structures, etc.

Leak Survey:

1. Use an instrument designed to detect natural gas to check for the presence of natural gas after backfilling the excavation. Include readings in the above sketch in relation to the coupling. If the contact employee is not leak survey qualified they should contact:
   a. Their supervisor to call Gas Regulatory to complete the survey after the excavation is backfilled. Call [redacted]
   b. If Gas Regulatory is not available contact Gas Dispatch to have the survey assigned to a Gas Trouble Technician.

Leak Survey completed at time of backfill (circle one) yes no (not applicable)

Include completed form in the main report and email a scanned copy of the completed form (back and front) to the Distribution Integrity Management (DIM) group.

Part B- Coupling Information

General Information			Tracking #: 2018-022
Date 10/26/2018	Expense Org 4610	Project 158276	Task COUPLER
Address/Location 3400 Bank St. Louisville, KY 40212 (34th St. & Bank St., in rear of BASF plant)			
Size 4 inch	Material Steel	Coating Coal Tar	MAOP Unknown
Main/Service Number 197403	Soil Type (from Part A) Type B	Manufacturer Dresser[1]	Model Style 38[1]
Pipe Connection:	Steel to Steel (circled)	Steel to Plastic	Plastic to Plastic

[1] No marking on the coupling. Appears to be a Dresser Style 38.

Historical Information	
Installation Date 1/22/1964	Document Source Main Report
Installation Company A&M	Document Source Main Report
Foreman P. Miles (?)	Document Source Main Report
Welder Unknown	Document Source Main Report

GIS Information
Sys Id (of Coupler) 73385605
Screen Capture

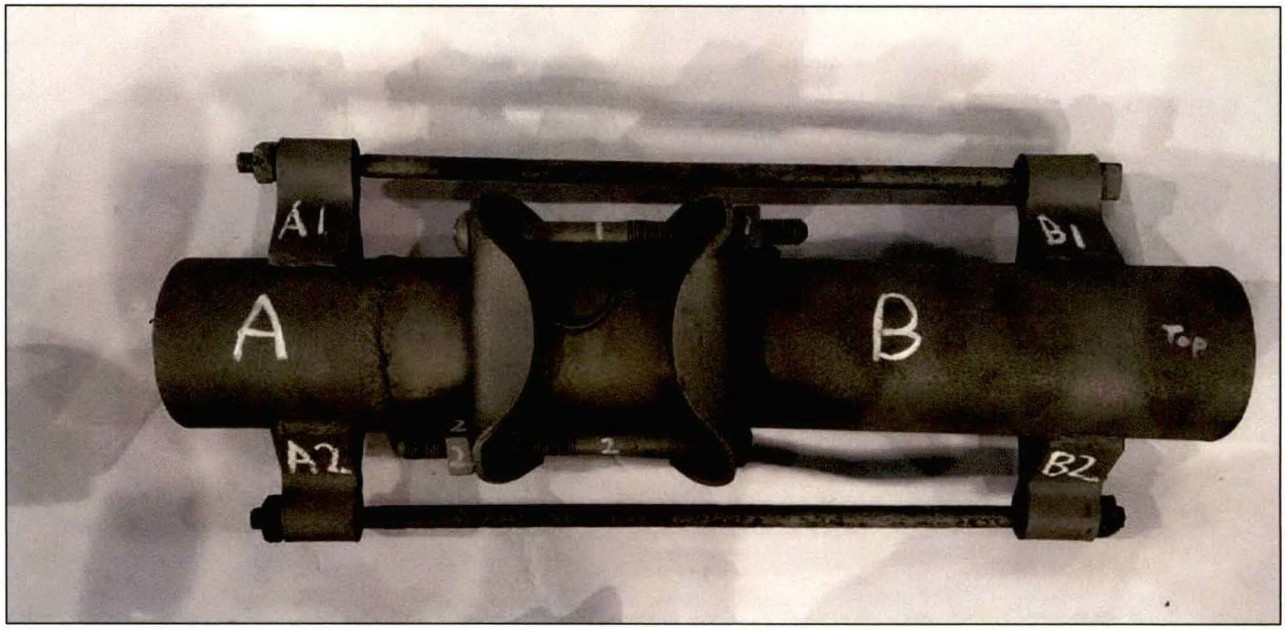


Figure 1- Top View

Figure 2- Front View

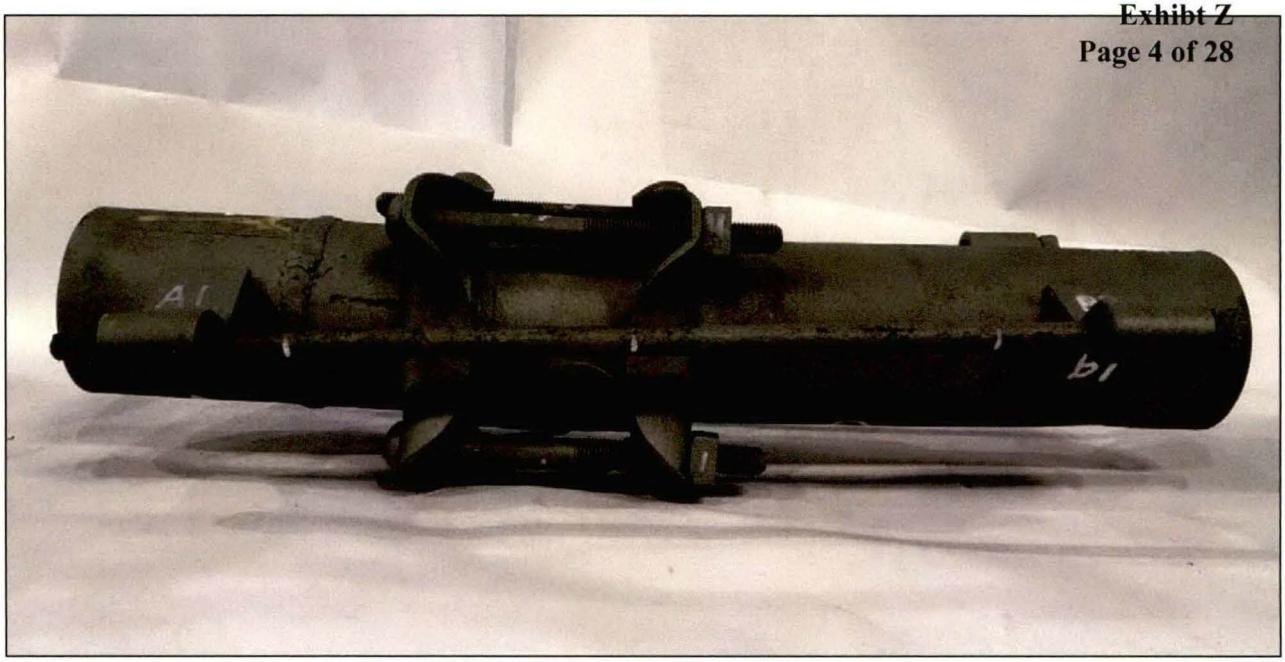


Figure 3- Back View

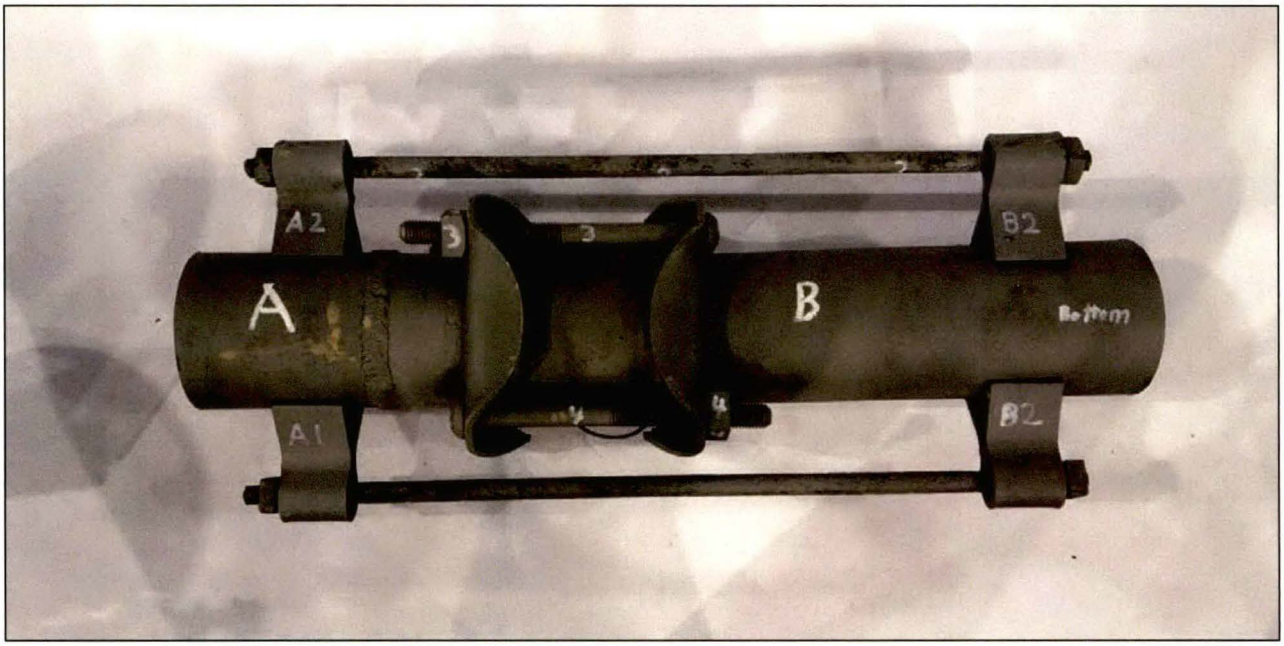


Figure 4- Bottom View

Figure 5- Left Side View

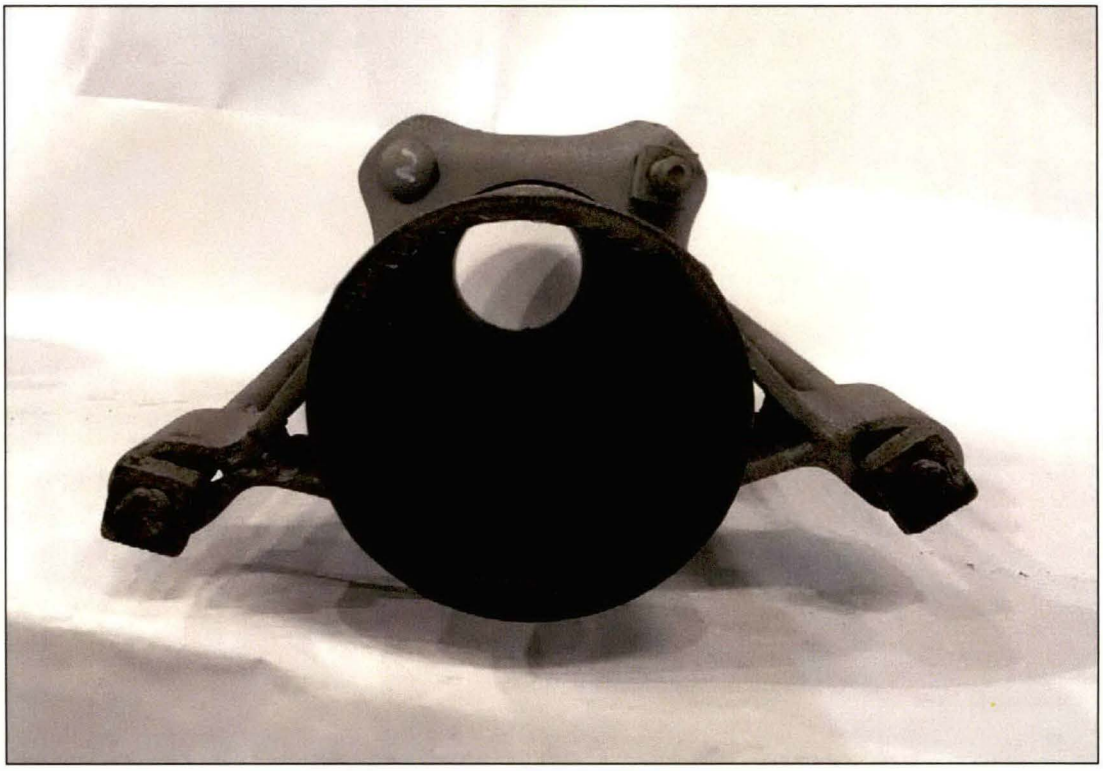


Figure 6- Right Side View

Part C- Visual Inspection of Coupling

Visual Inspection Performed by: C. Augustine [redacted], E. Bauer [redacted], L. Moore [redacted]

Table 1- Component Quantities

Number of Bolts on Coupler Body	4
Number of Reinforcement Rods	2
Number of Lugs	4 (2 each)

Table 2- Corrosion

	Pipe A	Pipe B	Coupler Body	Bolts	Rods	Lugs	Nuts
General External Corrosion Present?	No[2] See picture	No	No	No	Yes	No	No
Localized Corrosion Present?	No	No	No	No	No	No	No
Pit Depths	Not applicable	Not applicable	Not applicable	Not applicable	0.03"	Not applicable	Not applicable
Internal Corrosion?	No	No					

[2] Metal loss on pipe side A, bottom, near coupling.

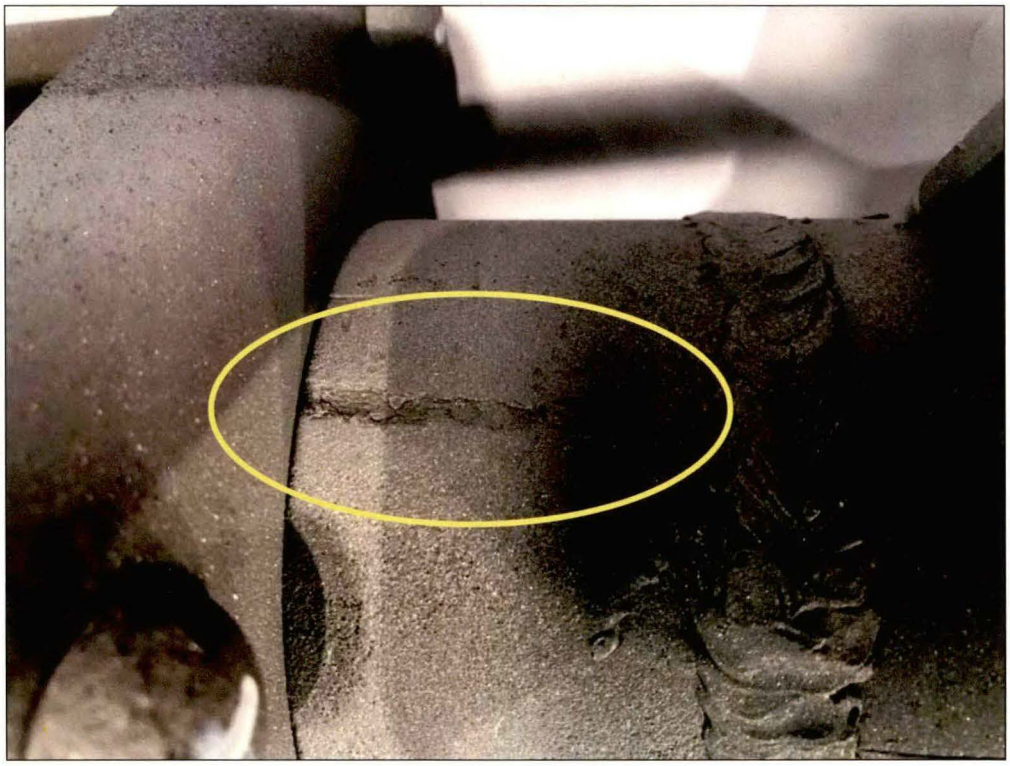


Figure 7- Metal Loss on Pipe A

Table 3- Coupler Body

Bolt	Washer Present	Nut present?
1	No	Yes
2	No	Yes
3	No	Yes
4	No	Yes

Table 4- Reinforcement Rods

Rod	Length (in.)	Diameter (in.)	Washer present at head of bolt?	Washer present at end of bolt?	Nut Present? Type?	Type of rod?
1	24"	0.6115"	No	No	Square	Threaded rod, most likely kit provided.
2	24"	0.6110	No	No	Square	Threaded rod, most likely kit provided.

Type of Lug

(Please indicate the shape of the lug by circling one below. If the lug shape is different than any preset shape below, sketch the shape.)

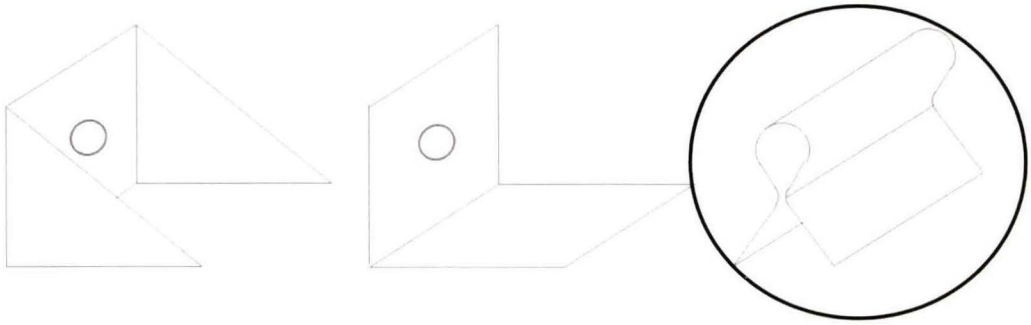


Table 5- Lugs (Measurements)

Pipe Side	Lug Number	Thickness (in.)	Circumference (in)	
			Distance to next lug, clockwise	Distance to next lug, counter-clockwise
A	1	.2665	7.5" Top	6.875" Bottom
A	2	.2425	7.5" Top	6.875" Bottom
B	1	.2740	8.125" Top	6.00" Bottom
B	2	.2455	8.125" Top	6.00" Bottom

Table 6- Lugs (Observations)

Lug	Lug	Assembly sets aligned?	Deformed?	Deflected? (angle of)
A1	B1	No	No	5 degrees (visual)
A2	B2	No	No	10 degree (visual)

Table 7- Lugs (Weld Quality)

Pipe Side	Lug Number	Any part detached from pipe?	Welded on all three sides of exterior? If no, describe	Are welds on exterior continuous? If no, describe	Welded on all three sides of interior? If no, describe	Are welds on interior continuous? If no, describe
A	1	No	No, Top only	Yes	No, Bottom only	No
A	2	No	No, Top only	Yes	No, Bottom only	No
B	1	No	No, Top only	Yes	No, Bottom only	No
B	2	No	No, Top only	Yes	No, Bottom	No[3]

[3] Continuous but not complete from one side of the leg to the other.

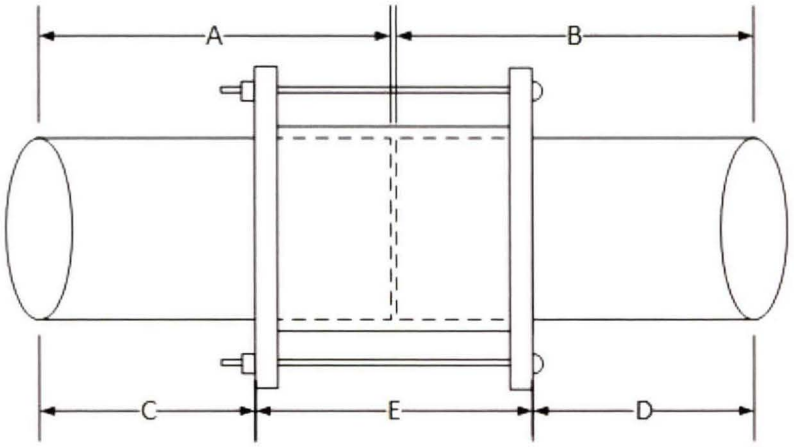


Table 8- Stab Depth

	A	B	C	D	Stab Depth (A-C) or (B-D)
Pipe Side A	11.5		8.0		3.5
Pipe Side B		16		12.625	10.375
	Sum of stab depths (should be closely equal to measurement E)				6.875
				Coupler Length (E)	6.875
				Difference	0

Additional Comments and General Observations

A dent was observed on pipe B.

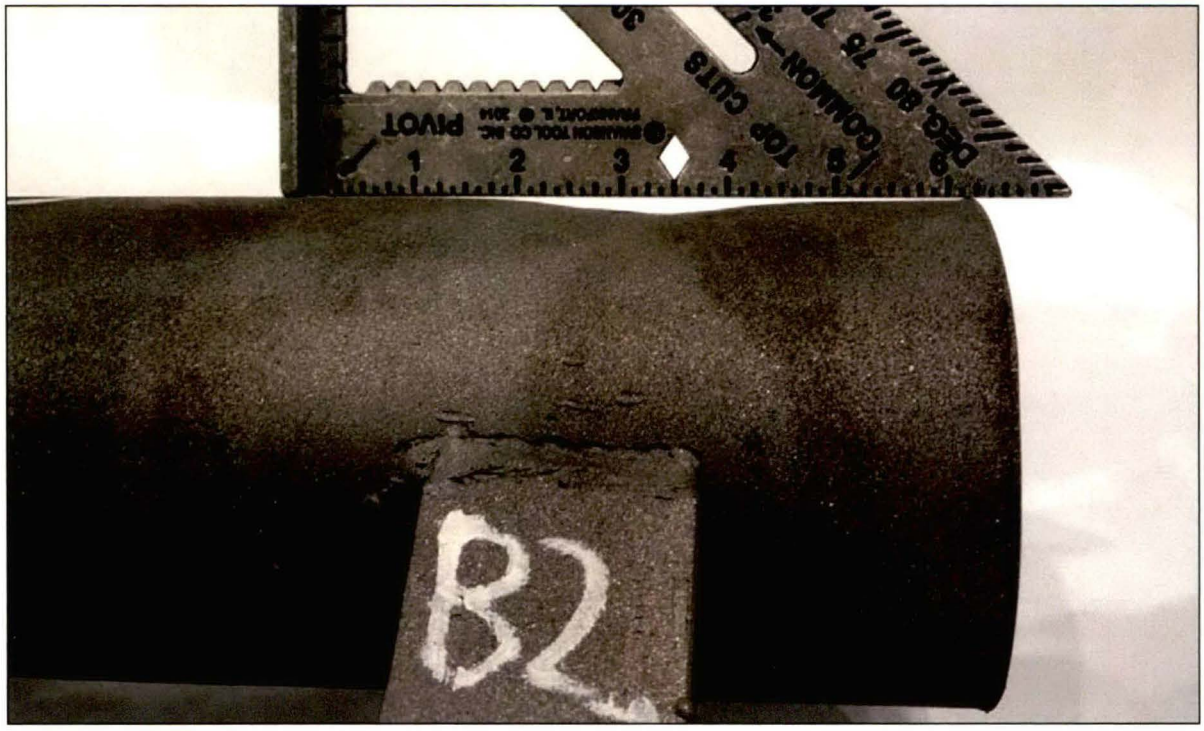


Figure 8- Dent on Pipe B

IMR TEST LABS
A Curtiss-Wright Business Unit
www.imrlouisville.com

4540 Richards Lane
Louisville, KY 40218
T: 1.502.810.9007 | F: 1.502.810.0380

LG&E - Kentucky Utilities
6900 Enterprise Drive
Louisville, KY 40214

Attention: Chad Augustine

Original issued: November 29, 2018
Revision issued: November 30, 2018

Report No. 201802647 Rev. 1

Metallurgical Evaluation of Coupling and Associated Hardware

Location: 34th & Bank Streets

DESCRIPTION AND PURPOSE

A natural gas pipe section including a coupling was submitted for metallurgical evaluation. The section was a 4" pipe with a Dresser Style 39 Insulating Coupling. Two joint harnesses were also affixed to the pipe section. Copies of the installation information for the coupling and harnesses were previously provided for this investigation. It was reported that the coupling had been installed in the field at 34th and Bank Streets. The pipe section was subsequently excavated after substantial service duration without failure. It was requested that the general dimensions, weld quality, corrosion condition and mechanical properties of the coupling components be determined as directed. In addition, it was requested that the circumferential weld on one of the pipe segments be inspected by the most appropriate technique.

RESULTS

The submitted pipe section with the coupling is shown in Figures 1 and 2. Four lugs of the joint harnesses had been fillet welded to the pipe segments. Two rods and associated nuts had been affixed through the welded lugs to apply compression to the coupled joint. The coupling consisted of two followers, a middle ring and associated nonmetallic gaskets and sleeves. Four equally spaced bolts with associated nuts secured the coupling components together and against the pipe segments. The general orientation of the coupling was consistent with the supplied information for the specified Dresser Style 39. Prior to receipt, the ends of the pipe segment were labelled as Ends A and B, as shown in Figures 1 and 2. The top of the pipe was also marked. Lugs A1 and A2 were welded to Pipe A, and Lugs B1 and B2 were welded to Pipe B. The rod between Lugs A1 and B1 was arbitrarily identified as Rod 1, whereas the opposite was Rod 2. The four coupling bolts were arbitrarily numbered as Bolts 1 through 4 around the circumference.

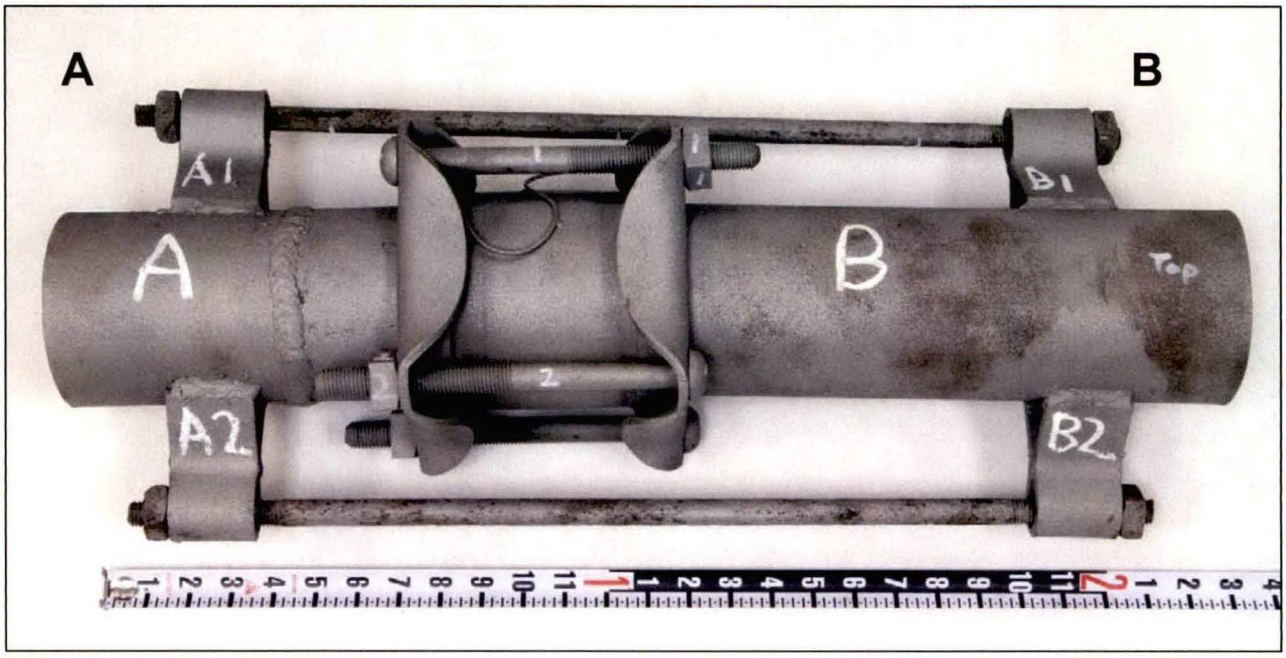


Figure 1. Photograph of the top of the submitted coupling sample.

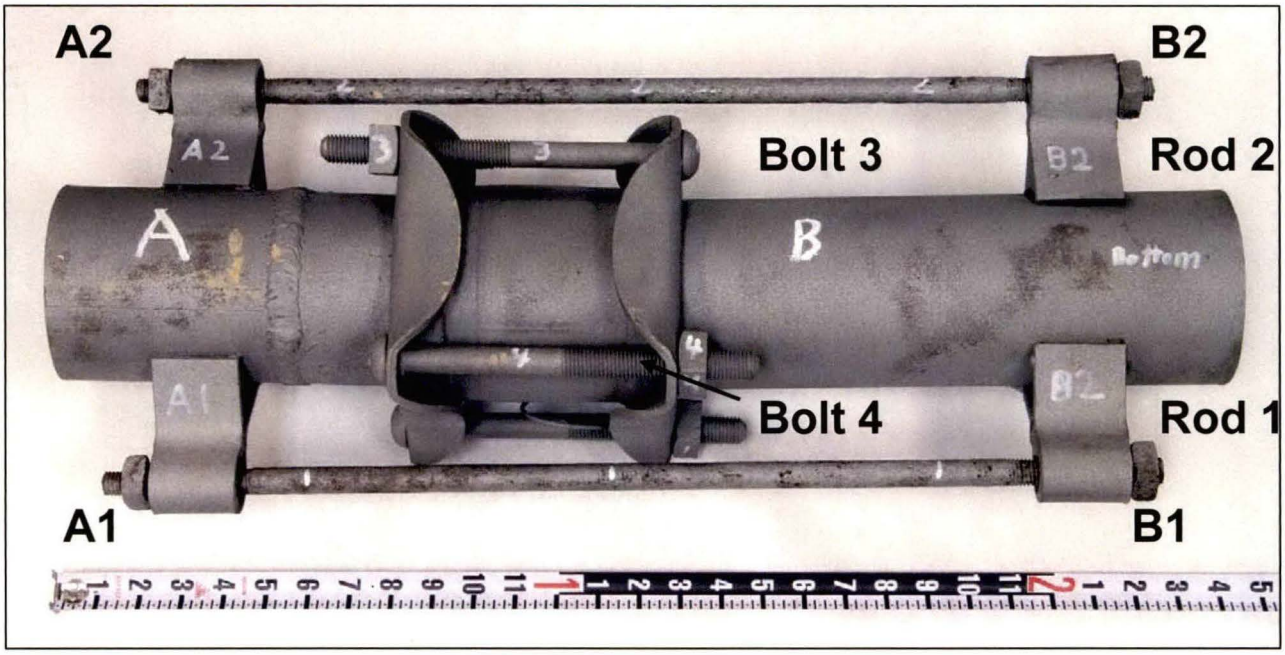


Figure 2. Photograph of the bottom of the submitted sample. Lug, rod and bolt identifications are shown.

SECTION 1- DIMENSIONAL MEASUREMENT

The two sets of harness lugs were positioned on opposite sides of the pipe. The relative orientations of the harness lugs was measured by photographing the assembly from the ends and

applying a protractor overlay for angle measurement. The obtained measurements are shown in Figures 3 and 4 with the data summarized in Table 1. Both harness lugs were straight and not bent. The depth of insertion of each pipe into the coupling was also measured, both before and verified after disassembly. The dimensions are provided in Table 2. No requirements were provided for these characteristics.

TABLE 1 – LUG SPACING DIMENSIONAL MEASUREMENTS

Component	Angle	Deviation from 180°	Image
Rod A1 / Rod A2	191°	11°	Figure 3
Rod B1 / Rod B2	217°	37°	Figure 4

TABLE 2 – PIPE COUPLING DIMENSIONAL MEASUREMENTS

Component	Depth of Pipe into Coupling	Gap Between Pipes in Coupling
Pipe A	3"	~ ½" (Original sample length – 27 1/4")
Pipe B	3"	

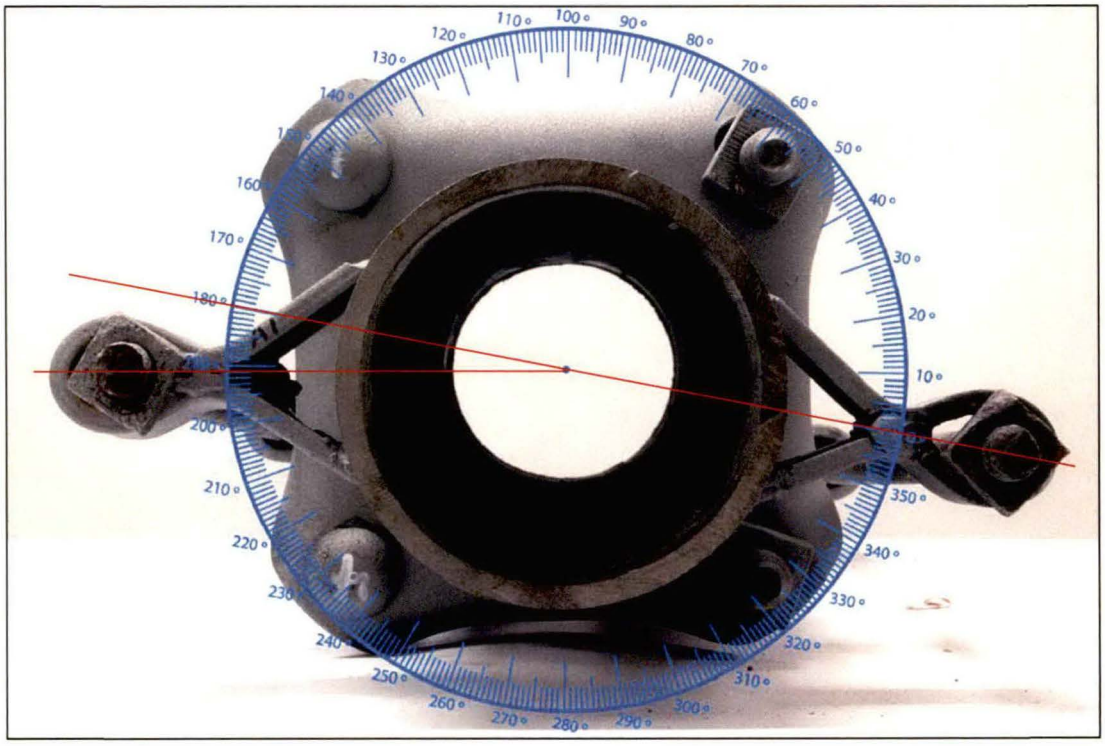


Figure 3. End facing image of the sample at End A. A superimposed protractor shows that the centers of Lugs A1 and A2 were approximately 11° from square.

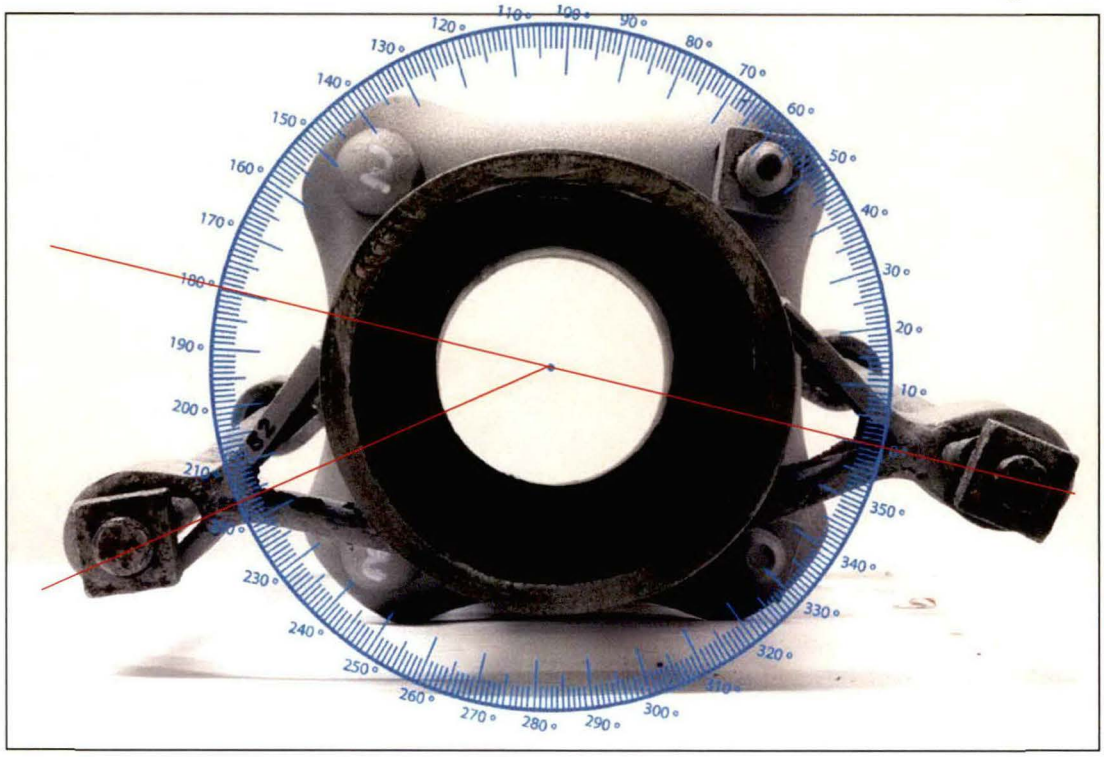


Figure 4. End facing image of the sample at End B. A superimposed protractor shows that the centers of Lugs B1 and B2 were approximately 37° from square.

SECTION 2- VISUAL OBSERVATIONS

The lug attachment welds were regions of interest on the pipe coupling sample. Each lug contained four fillet weld locations; exterior top, exterior bottom, interior top, and interior bottom. Each weld was inspected visually using a flashlight and magnifying lens. It was indicated that welding was performed in accordance with API 1104. General weld inspection was performed initially, followed by visual inspection by an outside NDE company. For comparison purposes, the welds were rated as substantial fusion, partial fusion, and minimal fusion. The summarized weld fusion and corrosion observations are provided in Table 3. Representative weld regions are shown in Figures 5 through 10. No welding had been performed on the bottom exterior or top interior of the lug joints. It was further noted that the welds contained localized weld discontinuities including undercut, overlap, and spatter in addition to incomplete fusion. No cracking in the welds or base metal heat affected zones (HAZ) was identified. Some superficial pitting corrosion was observed, but no significant material loss had occurred.

The harness rods and coupling bolts were also inspected for corrosion alteration. The observations are provided in Table 4. None of the fasteners, lugs, coupling components or pipe surfaces exhibited gross corrosion. The rods exhibited minor corrosion pitting. Images of representative regions are provided as Figures 11 through 13. The fasteners and the lugs were not necked down / stretched and no cracks were present. The coupling bolt heads were not marked. The coupling was disassembled

during inspection and additional images of the observed features are included as Figures 14 through 16. The interior surfaces were not significantly degraded or corroded. A ground wire had been affixed across the coupling. The elastomeric components of the coupling consisted of a pipe separator, insulating sleeve, and two gaskets. Inspection revealed that they appeared to be intact and not degraded.

TABLE 3 – LUG WELD VISUAL EXAMINATION RESULTS

Component	Location	Weld	Observations
Lug A1	Exterior	Top	Partial fusion
		Bottom	No weld
	Interior	Top	No weld
		Bottom	Partial weld
Lug A2	Exterior	Top	Substantial fusion
		Bottom	No weld
	Interior	Top	No weld
		Bottom	Partial weld
Lug B1	Exterior	Top	Substantial fusion
		Bottom	No weld
	Interior	Top	No weld
		Bottom	Partial weld
Lug B2	Exterior	Top	Substantial fusion
		Bottom	No weld
	Interior	Top	No weld
		Bottom	Partial weld

TABLE 4 – FASTENER VISUAL EXAMINATION RESULTS

Component	Observations
Rod 1	Not bent or stretched, minor corrosion pitting
Rod 2	Not bent or stretched, minor corrosion pitting
Bolt 1	Not bent or stretched, no gross corrosion
Bolt 2	Not bent or stretched, no gross corrosion
Bolt 3	Not bent or stretched, no gross corrosion
Bolt 4	Not bent or stretched, no gross corrosion

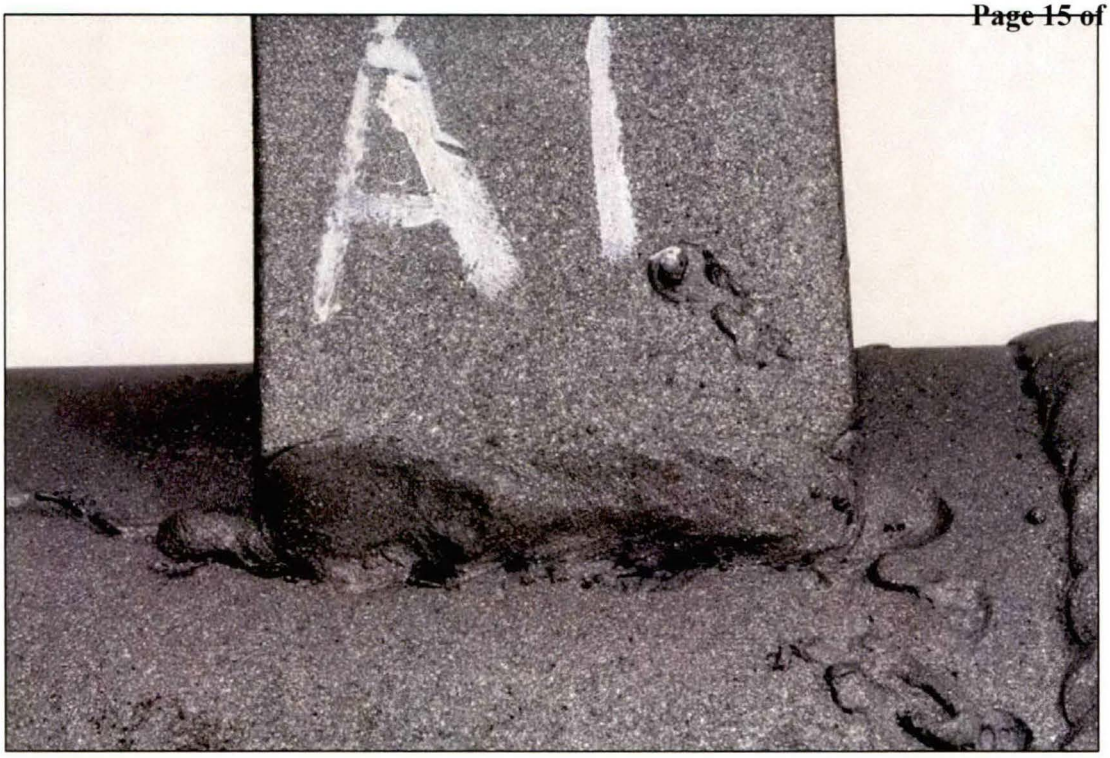


Figure 5. Image of the Lug A1 exterior top weld which exhibited partial fusion except for some undercut and spatter.

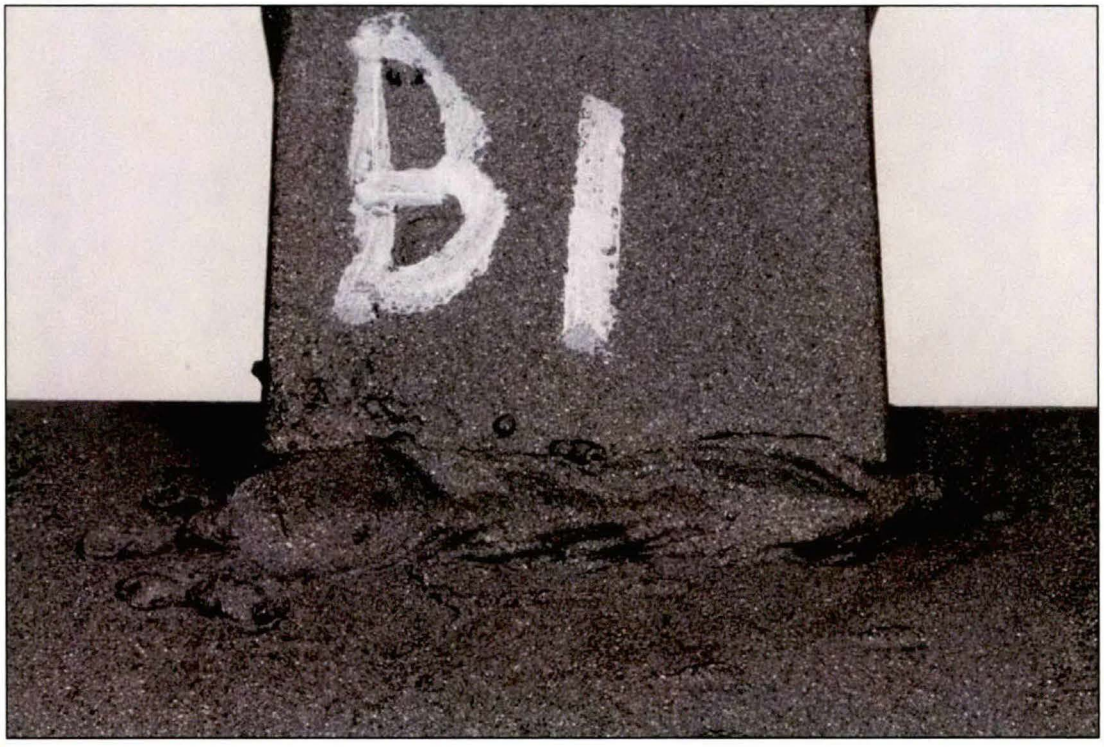


Figure 6. Image of the Lug B1 exterior top weld which exhibited substantial fusion except for some undercut and spatter.

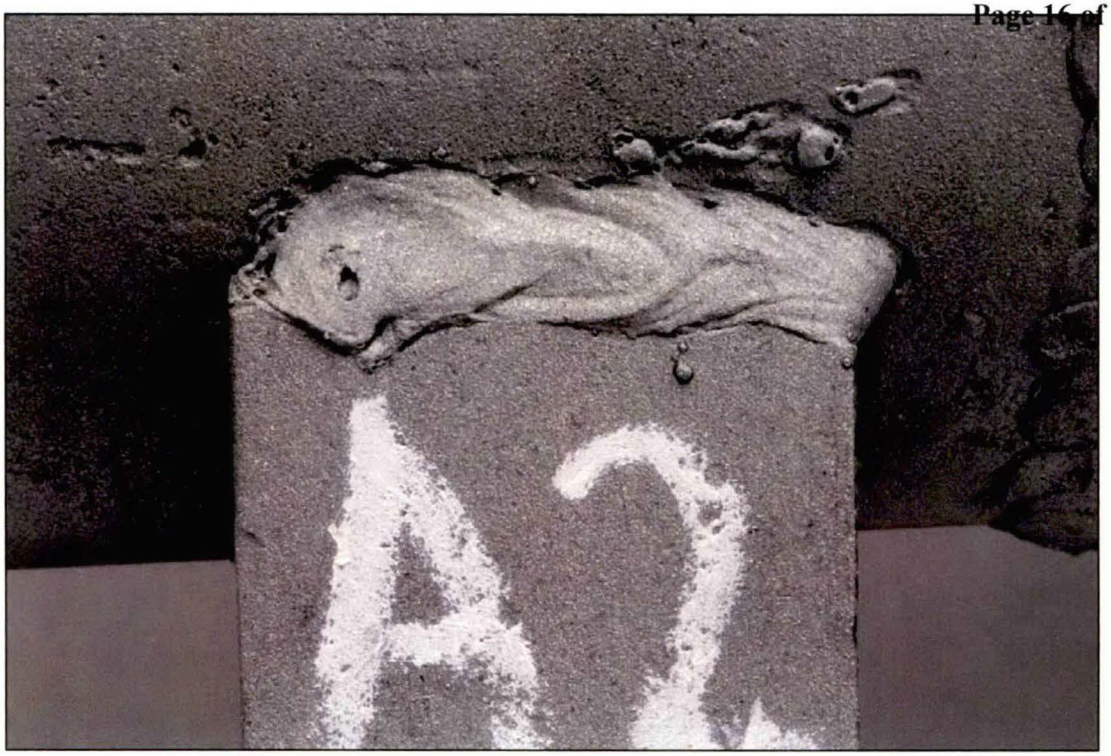


Figure 7. Image of the Lug A2 exterior top weld which exhibited substantial fusion except for some overlap, undercut, and spatter.

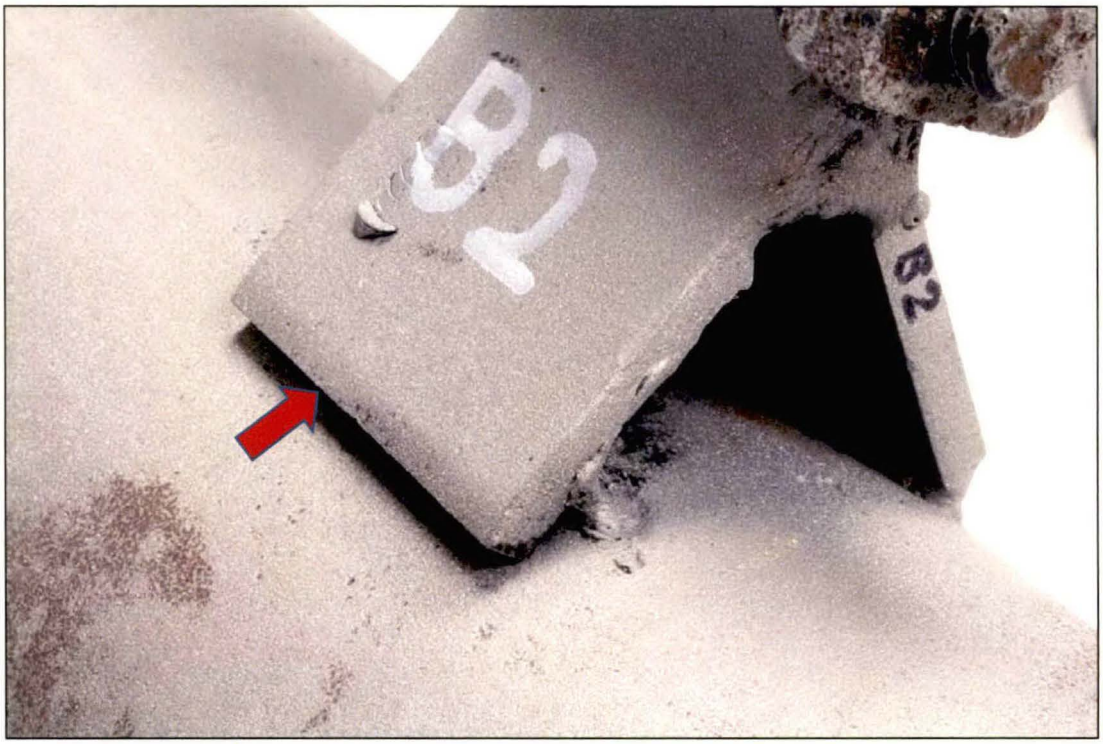


Figure 8. Oblique view of Lug B2 showing that there was no weld securing the bottom of the lug to the pipe (arrow).

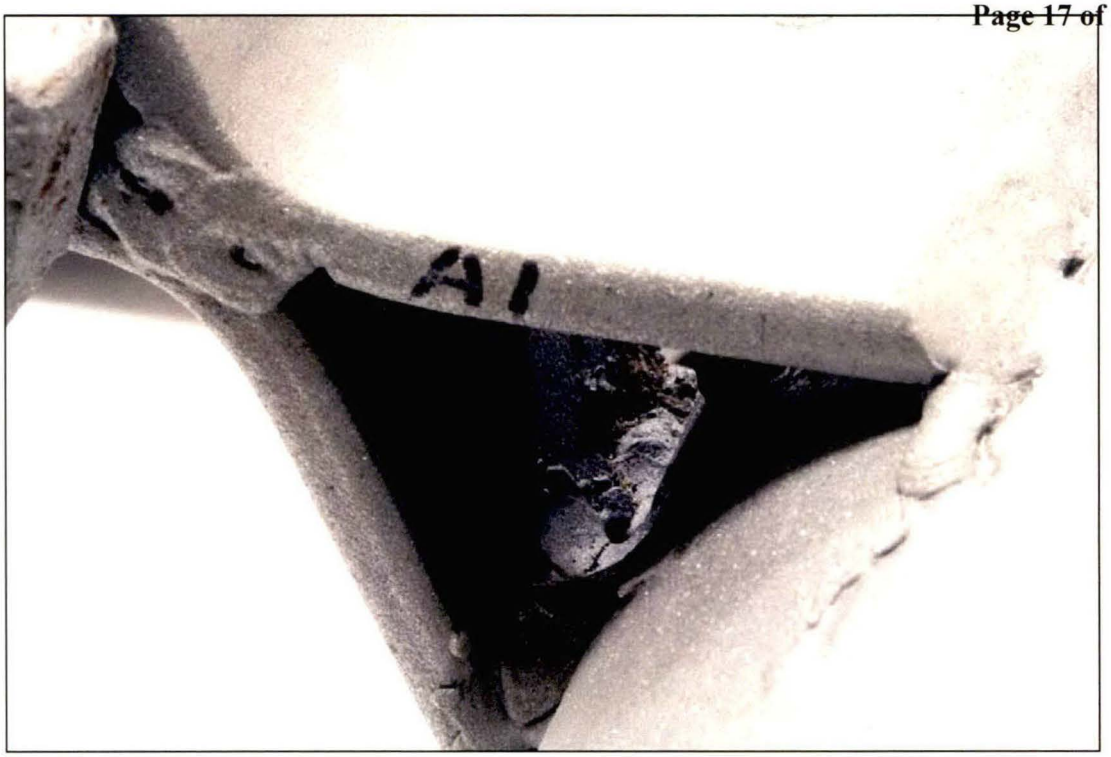


Figure 9. Oblique view of Lug A1 showing the partial weld at the bottom interior location.

Figure 10. Oblique view of Lug B2 showing the partial weld at the bottom interior location.

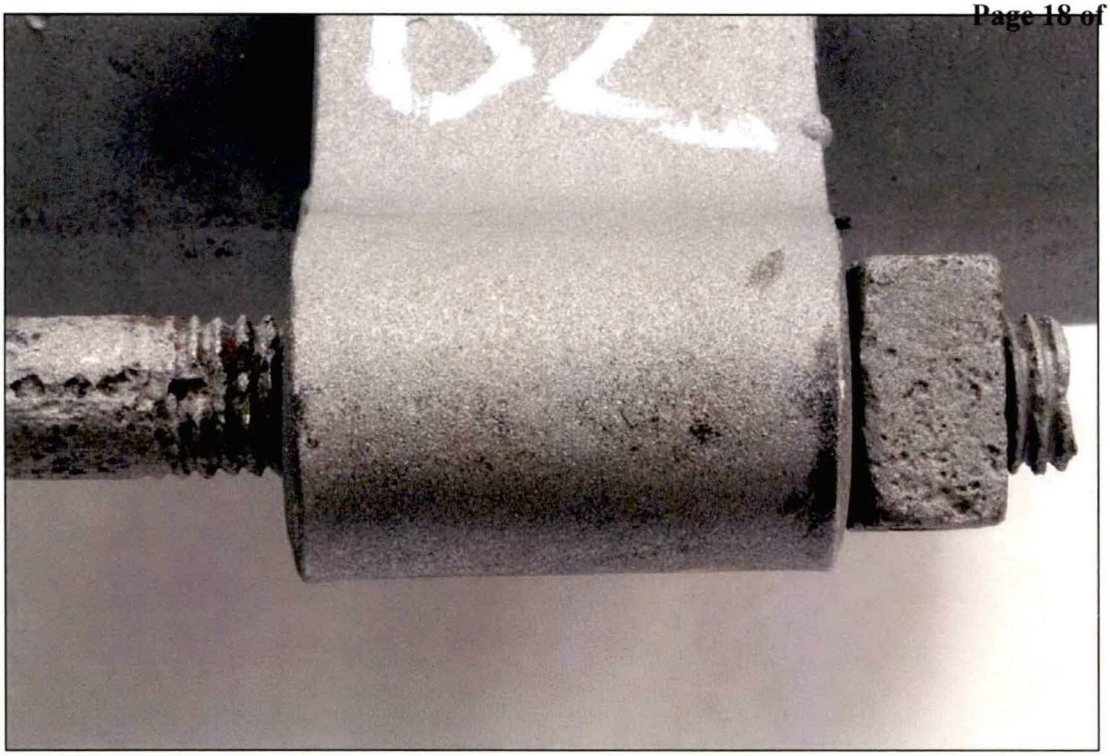


Figure 11. Slight corrosion was apparent on attachment Rod 2 and the associated nut.

Figure 12. Slight corrosion was apparent on an attachment rod in this location.

Figure 13. Photograph of a representative region of the circumferential weld on Section A.

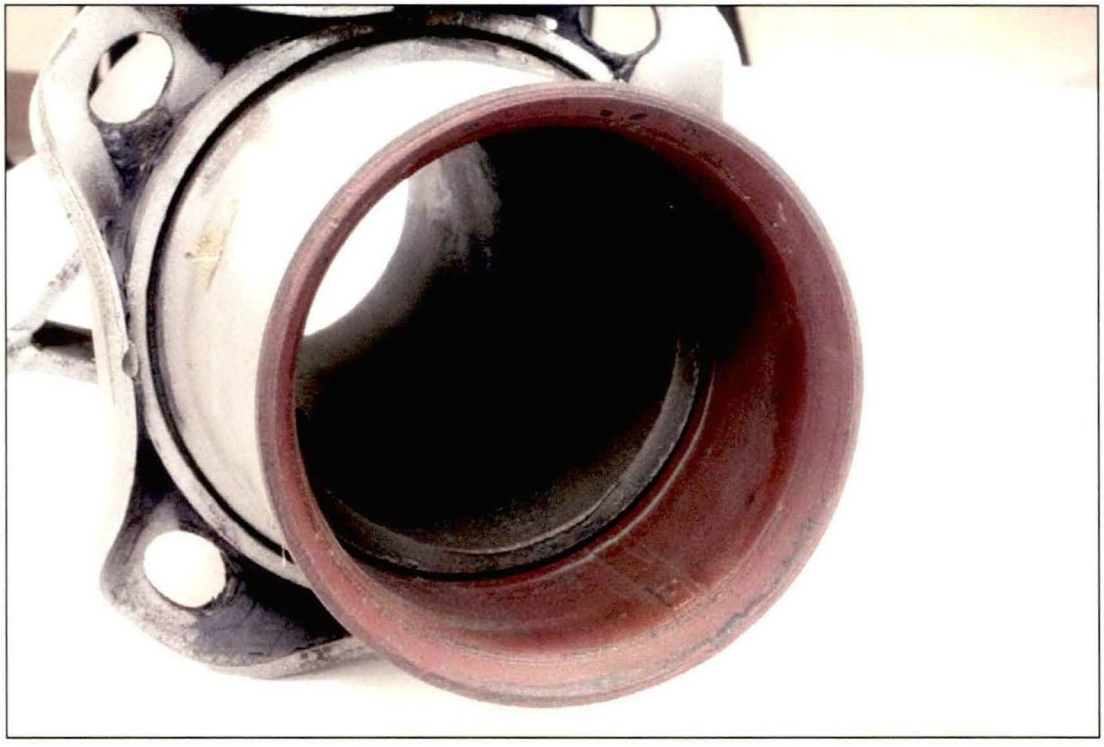


Figure 14. Photograph of the pipe coupling sample after disassembly.

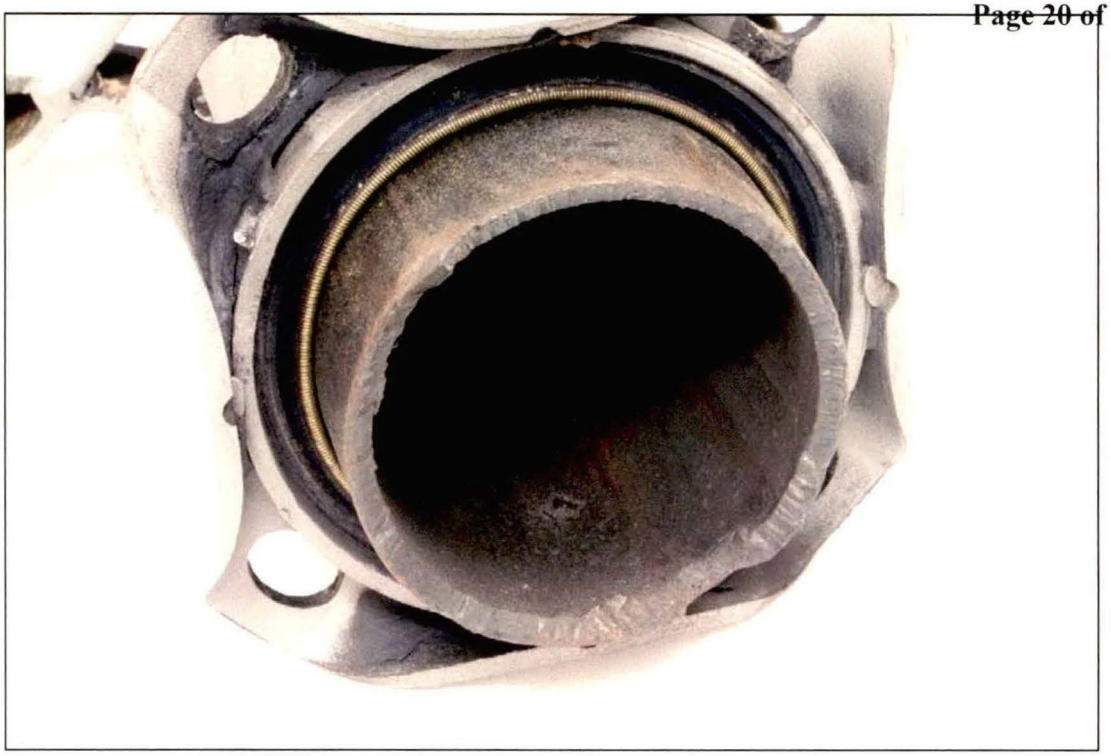


Figure 15. Photograph of the other pipe coupling sample after disassembly.

Figure 16. Photograph of a region of the gasket between the coupled pipe components.

SECTION 3- TORQUE TESTING- FOR INFORMATION ONLY

Torque testing was performed on the nuts of the rods and bolts on the pipe coupling sample. A calibrated torque wrench was used to determine breakaway torque on each fastener. The breakaway torque measurements are summarized in Table 5. The rods were loose and torque could not be measured. Rod fasteners did not have a specified torque requirement. The four coupling bolts exhibited torque values ranging from 45 to 60 ft.-lbs. These bolt torque values were below the Dresser Style 39 coupling installation torque recommendation of 75 ft.-lbs. minimum for 5/8" fasteners.

TABLE 5 – FASTENER TORQUE MEASUREMENT

Component	Breakaway Torque	Observations
Rod 1	N/A	Rod was loose upon receipt
Rod 2	N/A	Rod was loose upon receipt
Bolt 1	50 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 2	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 3	45 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 4	45 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners

SECTION 4- TENSILE TESTING, ASTM A370-17A

Tensile testing was performed on round specimens that were removed from the two harness rods and the four coupling bolts. The tensile mechanical properties of the fasteners were measured and the results are summarized in Table 6. No mechanical property requirements were indicated for the fasteners on the provided Dresser harness or coupling information.

TABLE 6 – FASTENER TENSION TEST RESULTS

Component	Ultimate Tensile Strength, ksi	0.2% Offset Yield Strength, ksi	Elongation, %	Reduction in Area, %
Rod 1	105.0	58.0	23	48
Rod 2	117.0	64.5	21	44
Bolt 1	88.5	50.0	25	52
Bolt 2	90.5	50.0	28	52
Bolt 3	91.5	54.0	28	55
Bolt 4	88.5	50.0	28	53

Specimen Dimensions; Diameter 0.35" with gage length of 1.4"
Percent elongation was measured using elongation-after-fracture measurements

SECTION 5- ROCKWELL AND SUPERFICIAL HARDNESS, ASTM E18-17

Small sections of the four lugs were excised for hardness testing. Rockwell hardness testing was performed on the lugs after the removal of surface roughness by sanding. The obtained results are provided in Table 7 and are suggestive of a moderate strength level. No requirements were provided for comparison.

TABLE 7 – LUG HARDNESS TEST RESULTS – ROCKWELL B - HRBW

Results	Reading 1	Reading 2	Reading 3	Reading 4	Average
Lug A1	85	85	84	84	84
Lug A2	80	78	80	78	79
Lug B1	88	88	89	87	88
Lug B2	87	87	86	87	87

SECTION 6- NONDESTRUCTIVE EXAMINATION

The two separated ends of the disassembled coupling were sent to a third party NDE laboratory for inspection. Visual, magnetic particle and liquid dye penetrant inspection were performed on the lug attachment welds. Inspection was performed in accordance with the acceptance criteria of API 1104 "Welding of Pipelines and Related Facilities". The inspection results are provided as Appendices A through C. Two representative welds are shown in Figures 17 and 18 with the dye penetrant test media remaining.

Radiographic testing was also performed on the circumferential weld on pipe Section A as requested. The inspector determined that radiographic inspection would be the best technique for this weld. The inspection results are provided in Appendix D.

Figure 17. Image of the Lug A1 exterior top weld after dye penetrant media had been used during inspection.

Figure 18. Image of the Lug B1 exterior top weld after dye penetrant media had been used during inspection.

Respectfully submitted

Brett A. Miller, P.E., FASM
Technical Director

Concurrence

Remmel O. Taylor
Senior Metallurgist / Failure Analyst

Revision issued to correct Depth of Pipe Into Coupling measurements that were reported incorrectly

APPENDIX A – VISUAL INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

VISUAL INSPECTION REPORT

Customer: IMR Test Labs **Date:** 11-26-18

Location of Work: Louisville, Ky (HTL) **Purchase Order #:** 5487 FA

****

On 11-26-18 personnel of Hayes Testing Conducted a Visual Inspection For IMR Test Labs on 2 Coupler pipe sections on Job # 201802647. Inspection was performed in accordance with API-1104.

Coupler pipe Section A
Bracket A1 rejected for Undercut and Arc strike on Base material. Cracking on internal weld of Bracket
Bracket A2 rejected for Undercut & Arc Strike on Base Material
Circumferential weld rejected for Undercut & Arc Strike on Base material

Coupler pipe Section B
Bracket B1 rejected Undercut and Arc Strike on Base material and porosity
Bracket B2 rejected Undercut, porosity, Arc Strike on Base Material

Please see attached for further Penetrant, Magnetic particle & Radiographic inspections performed.
Respectfully Submitted

Results interpreted to CODE: API-1104

INSPECTOR: _____ **Level or CWI #:** _____

Daniel J Hayes Jr.
CWI 00080091
QC1 EXP. 8/1/2021

Your Independent Laboratory For Complete Non-Destructive Testing

APPENDIX B – MAGNETIC PARTICLE INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

MAGNETIC PARTICLE INSPECTION REPORT

Customer Name: IMR Test Labs Date of Work: 11-26-18

Purchase Order #: 5487FA Job #: 20180647

1. Identification:
Item(s) Inspected 2 Description Coupler Section Bracket

Location of Item: See Below Part No. See Below

2. Technique - [X] Dry Powder [] Wet Fluorescent []Non-Fluorescent

3. Equipment - []Coil []Prods [X] Yoke []Clamps 4. Current Type [X] AC []DC

5. AMP Turns

6. Inspection Procedure HTLMT

7. Inspection Specifications API 1104

8. Type of Indication Found:

(1).Crack (2)Linear Surface 3.Linear Subsurface 4.Undercut
5.Non- Relevant 6. NONE

RESULTS: See Below for results.

9. Sketch/Description Coupler Section A - Bracket A2- Crack + Lack of Fusion
Coupler Section B - Bracket B1- Unable Crack inside weld
Bracket B2 - Crack
All Areas marked

10. Inspection Performed by Hayes Testing Laboratory, Inc. personnel:

Signature D. J. Hayes
Level II Technician

APPENDIX C – PENETRANT INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

NDE PENETRANT REPORT

Client: IMR
Project: 201802647
Item Description: 4" Std Pipe
Part No: PT A+B
Drawing No:
Spec. API 1104
Acceptance Class API 1104
Procedure HTL-PT

WELD		OTHER TEST ITEMS	
Weld Joint		Material	
Weld Process		Processing	
Base Material	N/A	Material	N/A
Material Thickness		Dimensions	
Weld Length/OD		Additional Info	
Surface Condition		Surface Condition	

PRECLEAN: Method Spray/wipe Material SKC-S Aerosol
Batch No. 15M15K Drying Time 10 MINUTES

PENETRANT: Material SKL-WP2 Batch No. 17H13K
Application brush Dwell Time 25 Minutes

EMULSIFICATION: Material Batch No.
Application N/A Emulsification Time

EXCESS PENETRANT REMOVAL: Material towel/wipe Batch No.
Method Drying Time

DEVELOPER: Material SKD-S2 Batch No. 14F04K
Method Spray Drying Time 10Minutes Developing Time 10 MINS.

POSTCLEAN: Material SKC-S AEROSOL Batch No. 15M15K
Method Spray/wipe

No. of Parts Accepted Serial No.'s
No. of Parts Rejected 2 Serial No.'s See Below

OTHER INFORMATION:

Coupler Section Bracket A1 - Rejected Lack of fusion & Undercut
Coupler Section Bracket A2 - Rejected porosity
Coupler Section Bracket B1 - Rejected porosity, Lack of fusion, Undercut
Coupler Section Bracket B2 - Rejected undercut & porosity

INSPECTED BY:	DATE:
[signature] LT	11-26-18

APPENDIX D – RADIOGRAPHIC INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
2521 Holloway Rd.
Louisville, Kentucky 40299
Phone 502-266-9729

Daily Radiographic Inspection Report

REPORT NO. 1 DATE 11-12-18
SHEET 1 OF 1 RADIOGRAPHER [signature]
INTERPRETER [signature]

CLIENT IMR Test Labs LOCATION Lab # HTL JOB NO. 20180647
P.O. NO. _____ PROCEDURE HTL-RT TECHNIQUE DWE/SWV MATERIAL C/S
SPECIFICATIONS API 1104 ISOTOPE IR-192 CURIES 72.8 FOCAL SIZE .106x.086
FILM TYPE Ty-80 X-RAY _____ KV _____ MA _____
FOCAL SPOT .136 SOURCE/FILM DISTANCE 4½" EXPOSURE TIME :02

WELD	VIEW	ACCEPT	REJECT	CRACK	LACK FUSION	IN. PEN	HOLLOW BEAD	POROS.	BURN THRU	SUCK BACK	SLAG	COMMENTS	PEN. DENSITY
X-1	0°		X			X						Pipe section A	
	1-2		X			X						Circum. weld	
	2-0		X			X							

WORK HOURS _____ TOTAL FILM 3-9½x10
TRAVEL TIME _____ CLIENTS APPROVAL _____

Your Independent Laboratory For Complete Non-Destructive Testing

FM-1/2m

Bolt-Style Coupling (pressures > 3 psig)

This form will be completed when LG&E or LG&E contractors expose a bolt-style coupling in a system where the pressure is > 3 psig (medium and high pressure distribution and transmission) and the coupling will be backfilled. The purpose of the form is to provide Operations, Engineering and Gas Regulatory personnel with information about the bolt style coupling installation.

Part A- Discovery of Coupling

Precautions:

1. Stop excavation upon discovering the bolt-style coupling in the excavation
2. Set-up a perimeter around the excavation to keep the public away from the excavation

General Information:

1. Contact Employee for the bolt style coupling found: D. Dilley
2. Date of exposure: 2018
3. Location: Richmond & Rosedale Reg. Station above ground vertical
4. Size of coupling (based on pipe size if not exposed enough to determine): 1-4" R 1-6" I 1-8" O
5. Type of soil (circle one): Sandy Clay Gravel Topsoil Other (take picture and describe)
6. Soil Density test: □ Type A □Type B □Type C
7. Status: ☒Removed □Abandoned in place □Backfilled- left in service

Pictures:

1. Take at least two pictures of the coupling. The pictures should be from different angles (additional pictures can be taken).
2. Email pictures to supervisor. Ensure pictures are attached to this form:

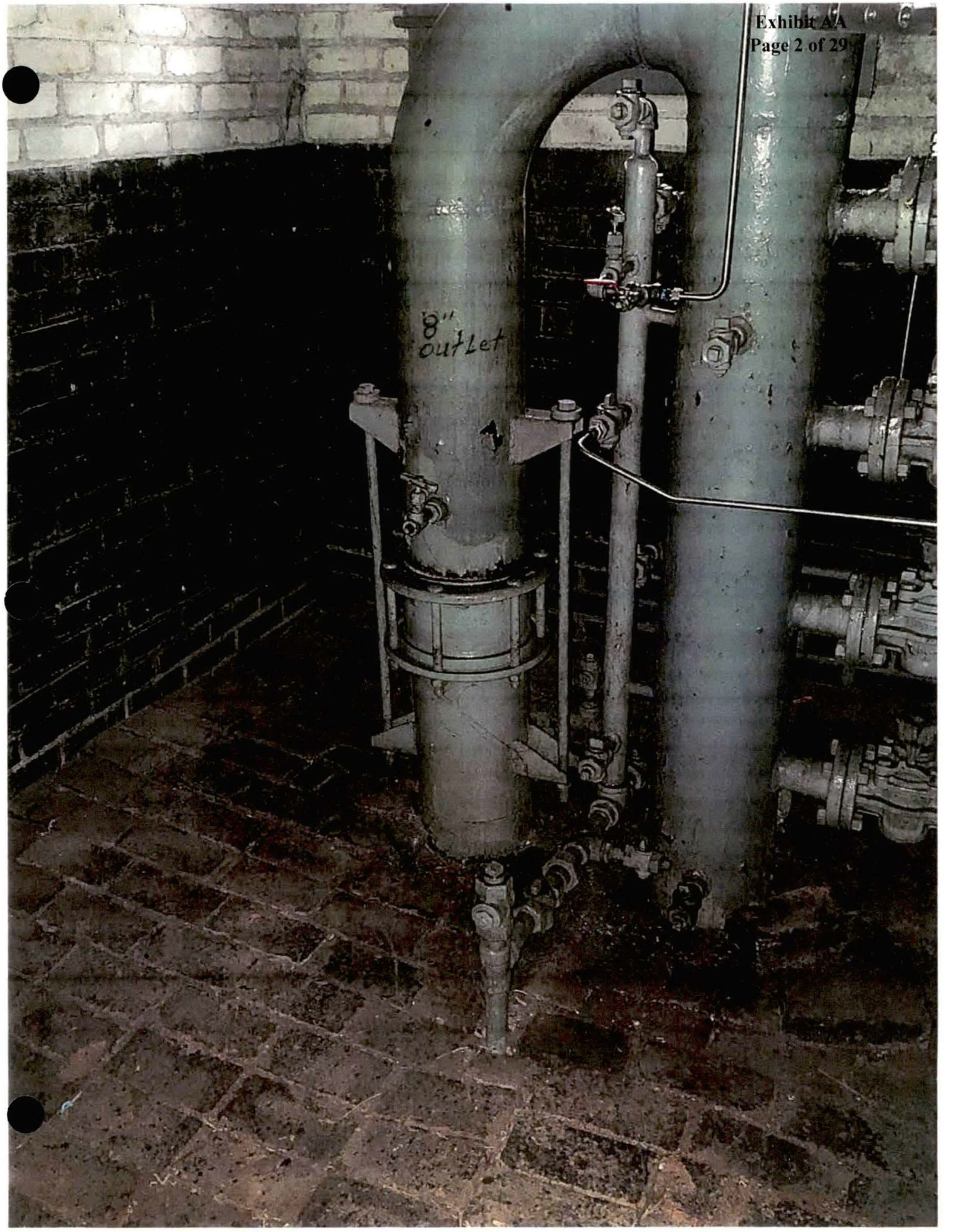
Sketch: Provide a sketch showing the coupling orientation (vertical/horizontal), nearby branches, pipe, valves and fittings, other utilities or structures, etc.

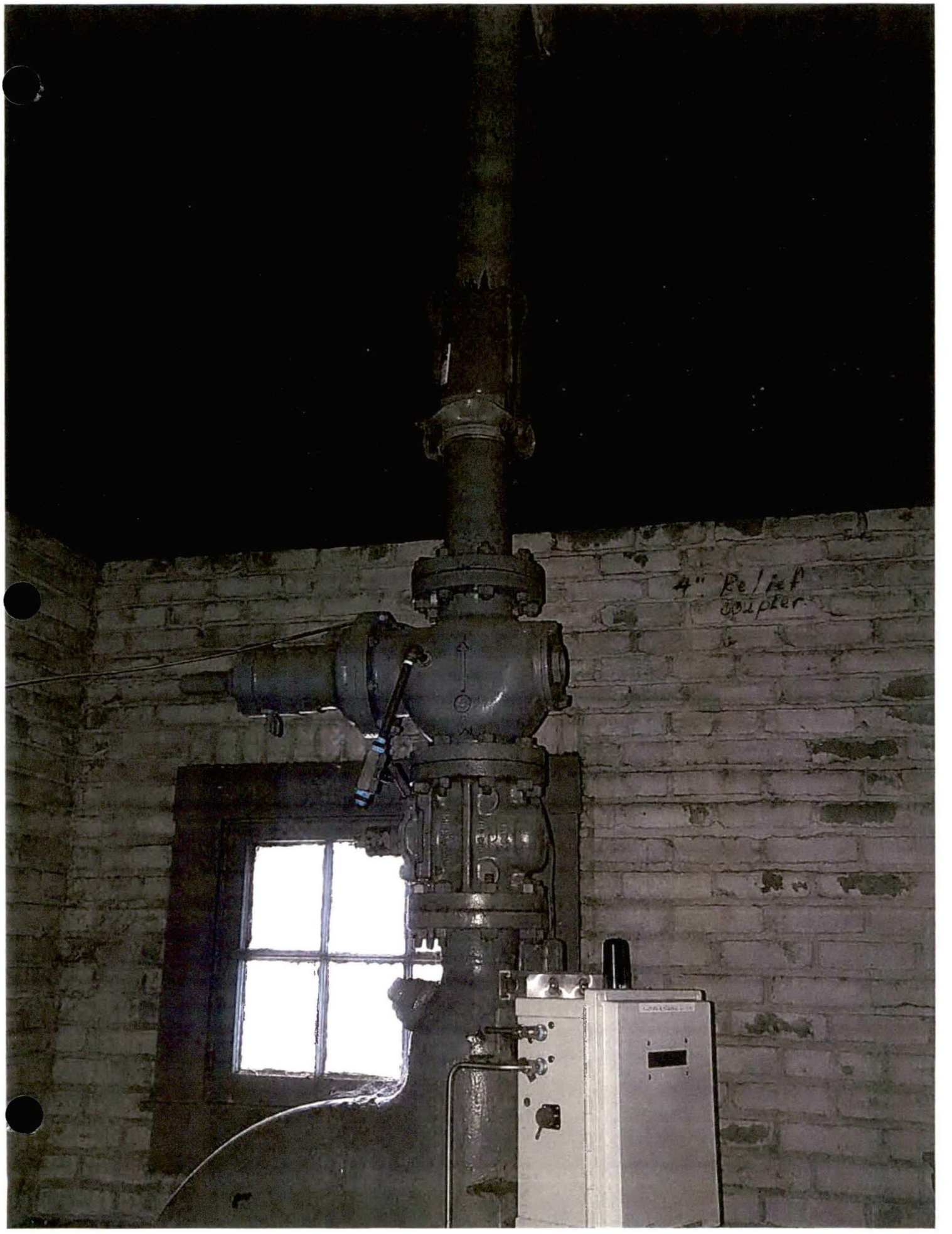
Leak Survey:

1. Use an instrument designed to detect natural gas to check for the presence of natural gas after backfilling the excavation. Include readings in the above sketch in relation to the coupling. If the contact employee is not leak survey qualified they should contact:
   a. Their supervisor to call Gas Regulatory to complete the survey after the excavation is backfilled. Call [redacted]
   b. If Gas Regulatory is not available contact Gas Dispatch to have the survey assigned to a Gas Trouble Technician.

Leak Survey completed at time of backfill (circle one) yes no ~~not applicable~~

Include completed form in the main report and email a scanned copy of the completed form (back and front) to the Distribution Integrity Management (DIM) group.


8"
outlet


4" Relief
Coupler


6"inlet

Part B- Coupling Information

General Information			Tracking #: 2018-024
Date 11/29/2018	Expense Org 4610	Project 158276	Task COUPLER
Address/Location 1826 Rosedale Ave., Richmond & Rosedale Regulator Station R-16			
Size 6 inch	Material Steel	Coating Paint (Aboveground)	MAOP
Main/Service Number 300298	Soil Type (from Part A) Not Applicable	Manufacturer Dresser	Model Style 39
Pipe Connection:	Steel to Steel	Steel to Plastic	Plastic to Plastic

Historical Information	
Installation Date Unknown[1]	Document Source Main Report(s) and Regulator Drawings
Installation Company Unknown[1]	Document Source Main Report(s)
Foreman Unknown[1]	Document Source Main Report(s)
Welder Unknown[1]	Document Source Main Report(s)

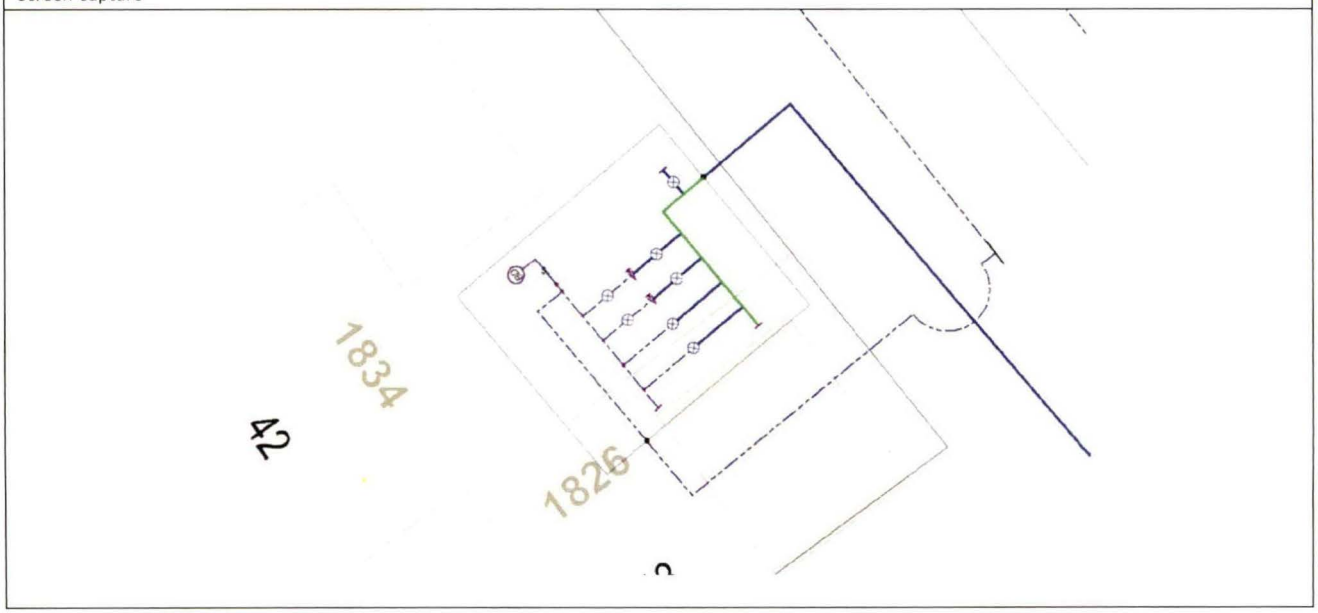
[1] There are several documents of the coupling in the regulator station R-16 at Richmond and Rosedale dating back to 1927. However, none of them specifically document the time of installation of this coupling.

GIS Information

Sys Id (of Coupler)

Does not exist in GIS

Screen Capture



Pictures

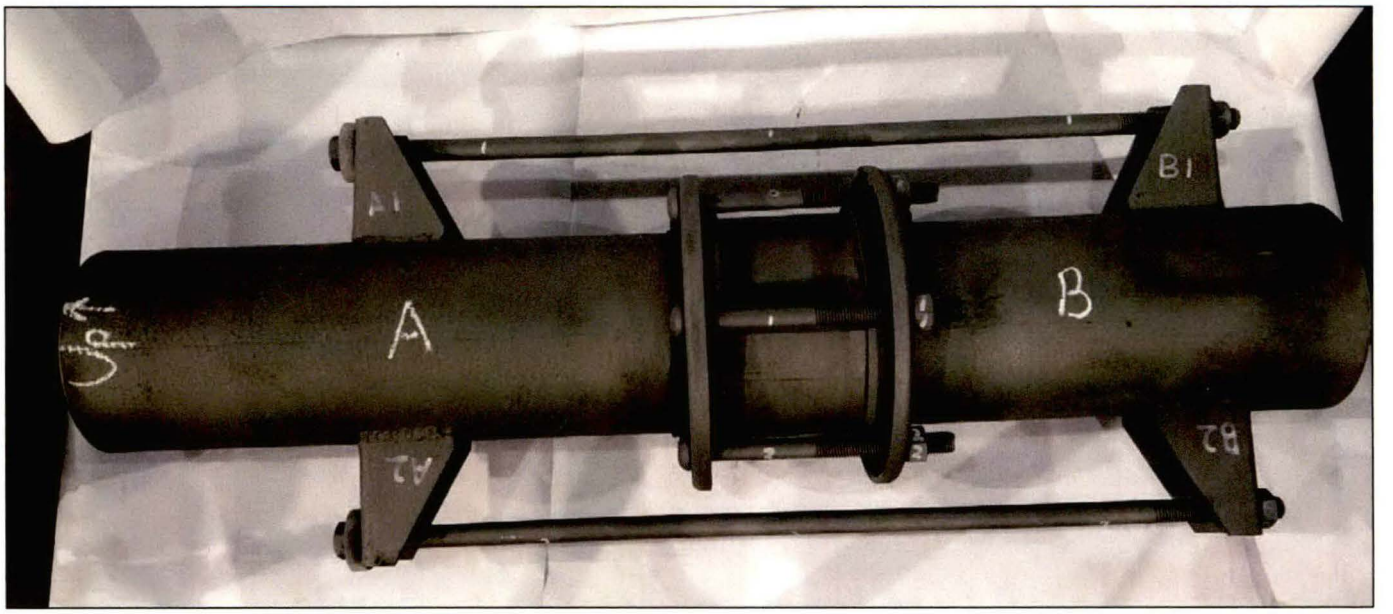


Figure 1- Top View

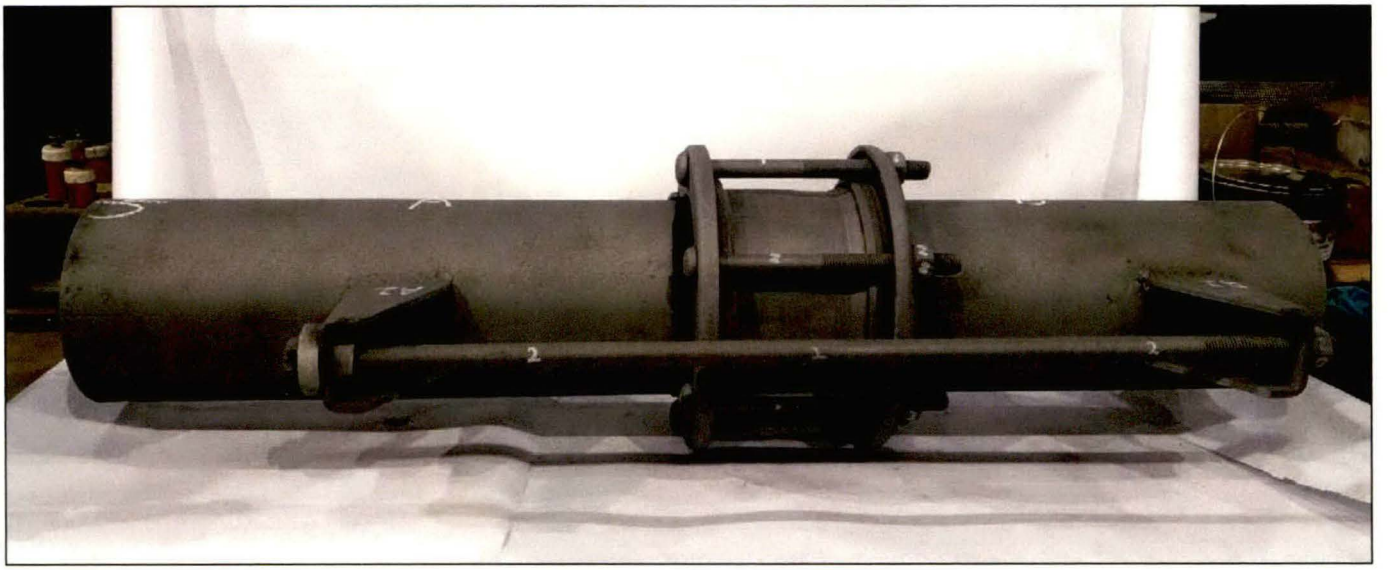


Figure 2- Front View

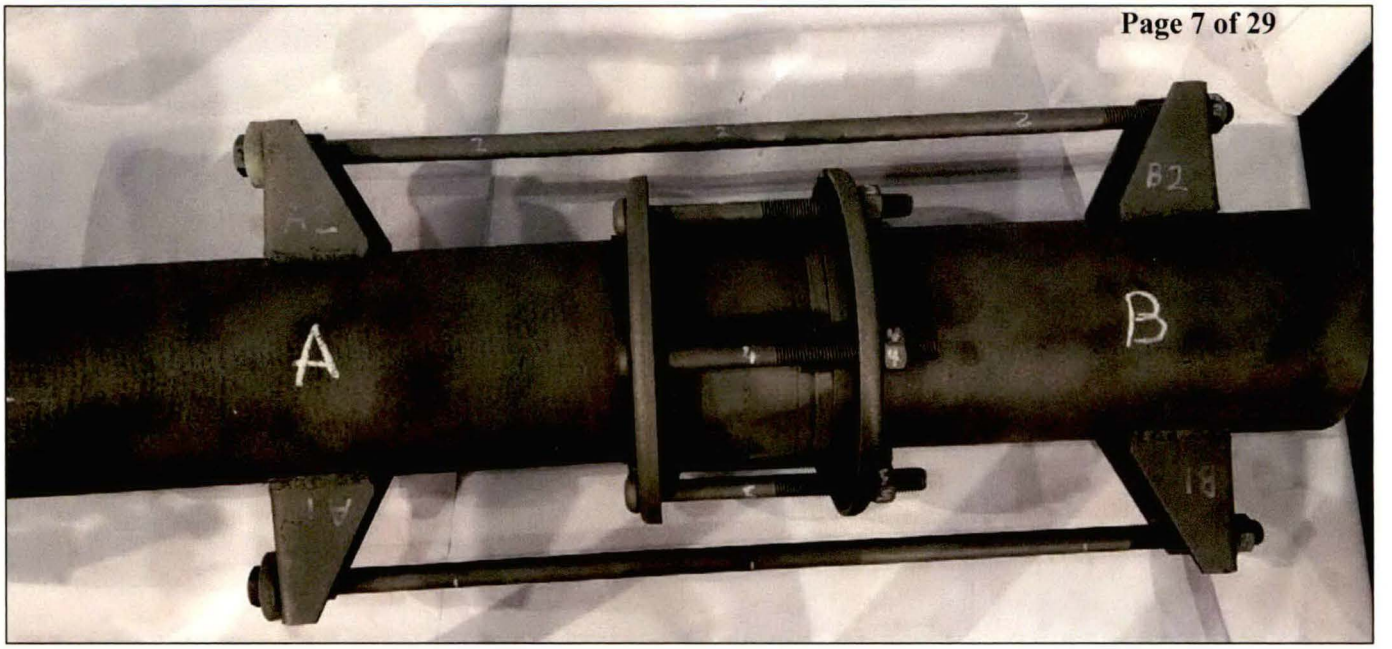


Figure 3- Bottom View

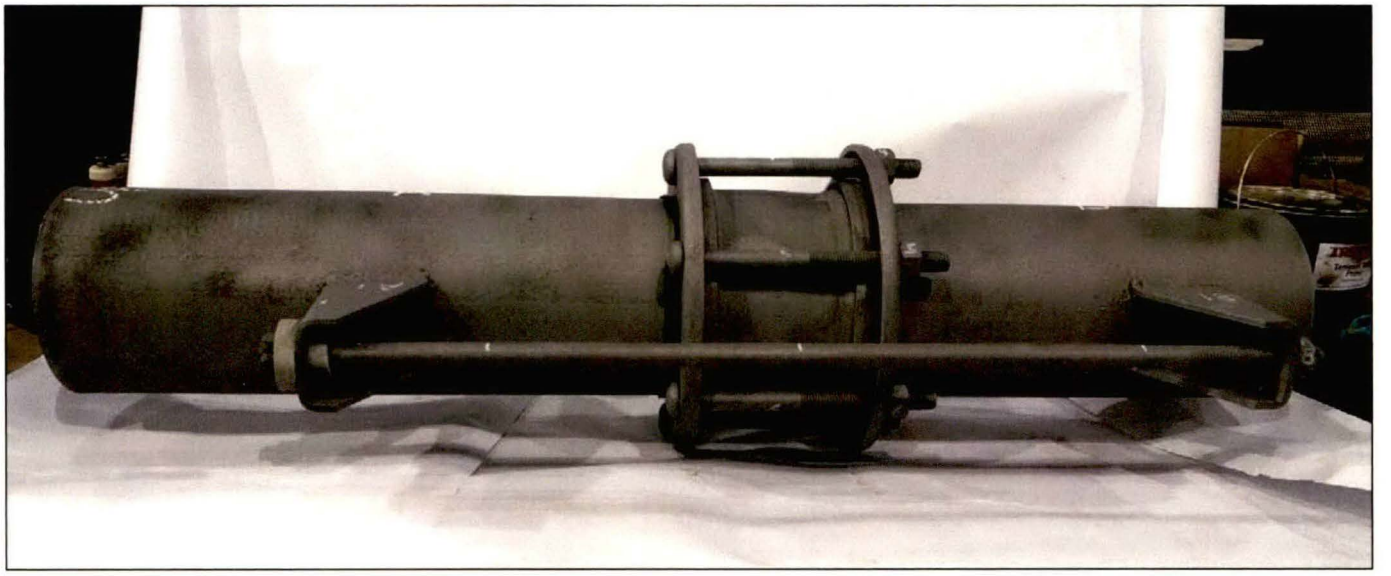


Figure 4- Back View

Figure 5- Left Side View

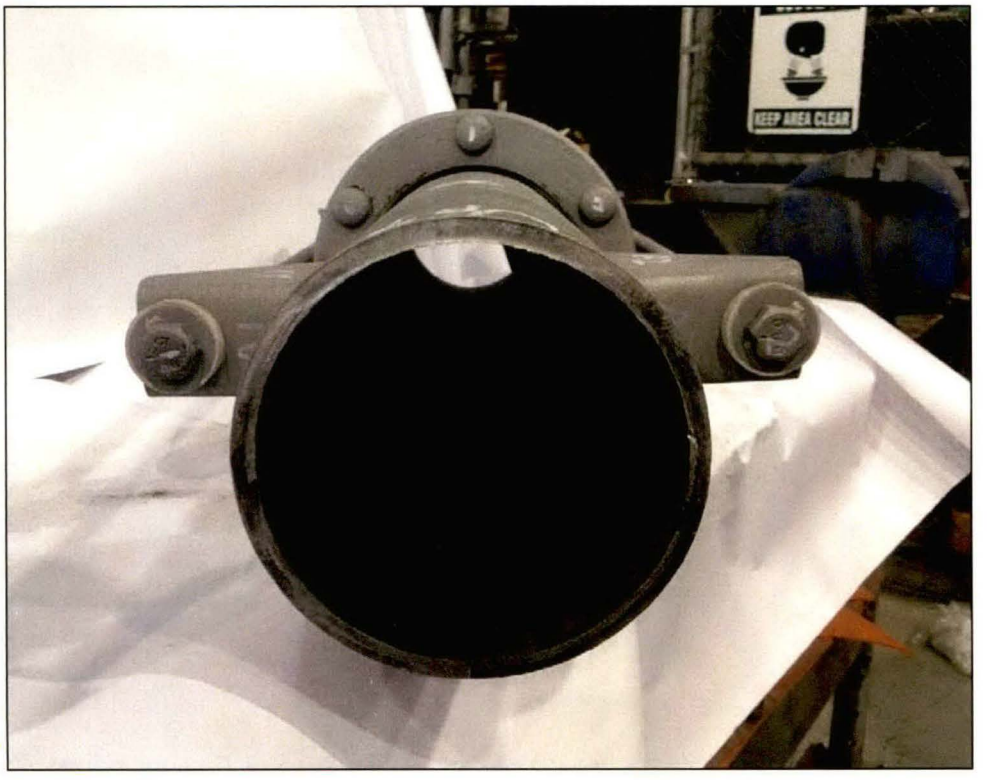


Figure 6- Right Side View

Part C- Visual Inspection of Coupling

Visual Inspection Performed by: Chad Augustine [redacted] & Elliott Bauer [redacted] Date: 12/6/2018

Table 1- Component Quantities

Number of Bolts on Coupler Body	6
Number of Reinforcement Rods	2
Number of Lugs	4 (2 each rod)

Table 2- Corrosion

	Pipe A	Pipe B	Coupler Body	Bolts	Rods	Lugs	Nuts
General External Corrosion Present?	No	No	No	No	No	No	No
Localized Corrosion Present?	No	No	No	No	No	No	No
Pit Depths	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Internal Corrosion?	No	No					

Table 3- Coupler Body

Bolt[1]	Washer Present	Nut present?
1	No	Yes
2	No	Yes
3	No	Yes
4	No	Yes
5	No	Yes
6	No	Yes

[1] Bolt type "DMD" on the head.

Table 4- Reinforcement Rods

Rod	Length (in.)	Diameter (in.)	Washer present at head of bolt?	Washer present at end of bolt?	Nut Present? Type?	Type of rod?
1	30.5	0.7450	Yes[2]	Yes	Yes, hexagonal	Kit provided bolt[3]
2	30.5	.7450	Yes[2]	Yes	Yes, hexagonal	Kit provided bolt[3]

[2] With insulator

[3] Bolt type BBC on head

Type of Lug

(Please indicate the shape of the lug by circling one below. If the lug shape is different than any preset shape below, sketch the shape.)

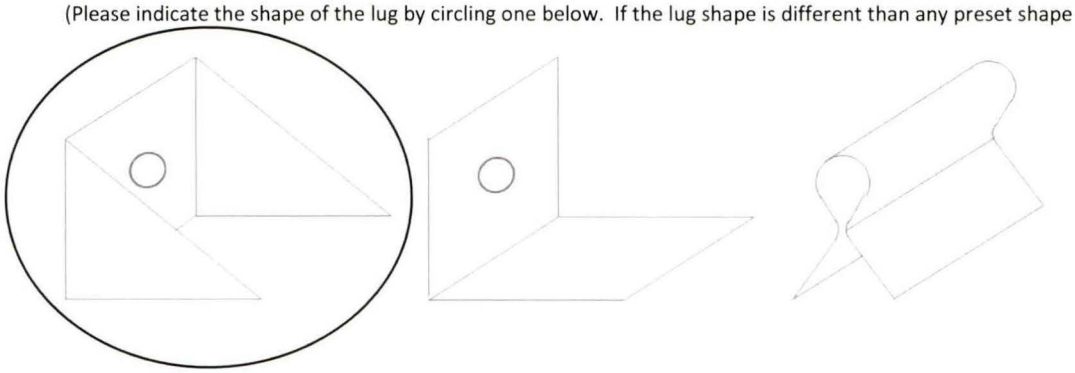


Table 5- Lugs (Measurements)

Pipe Side	Lug Number	Thickness (in.)	Circumference (in)	
			Distance to next lug, clockwise	Distance to next lug, counter-clockwise
A	1	0.2150	Across top: 10.50	Across bottom: 11.00
A	2	0.2365	Across top: 10.50	Across bottom: 11.00
B	1	0.2645	Across top: 10.25	Across bottom: 10.875
B	2	0.2630	Across top: 10.25	Across bottom: 10.875

Table 6- Lugs (Observations)

Lug	Lug	Assembly sets aligned?	Deformed?	Deflected? (angle of)
A1	B1	Yes	No	0°
A2	B2	Yes	No	0°

Table 7- Lugs (Weld Quality)

Pipe Side	Lug Number	Any part detached from pipe?	Welded on all sides of exterior? If no, describe	Are welds on exterior continuous? If no, describe	Welded on all sides of interior? If no, describe	Are welds on interior continuous? If no, describe
A	1	No	Yes[4]	Yes	Yes	Yes
A	2	No	Yes[4]	Yes[5]	Yes	No, one weld is not continuous
B	1	No	Yes[4]	Yes	Yes	Yes
B	2	No	Yes[4]	Yes[5]	Yes	Yes

[4] The rear side of the lugs do not appear to require welding.

[5] Appears to have slight porosity.

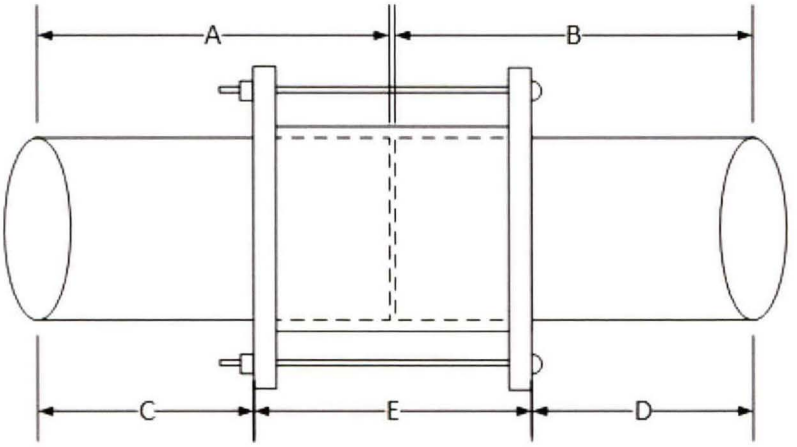


Table 8- Stab Depth

	A	B	C	D	Stab Depth (A-C) or (B-D)
Pipe Side A	22.4375		19.2500		3.1875
Pipe Side B		17.0000		14.0000	3.0000
	Sum of stab depths (should be closely equal to measurement E)				6.1875
	Coupler Length (E)				6.6250
	Difference				-0.4375

IMR TEST LABS
A Curtiss-Wright Business Unit
www.imrlouisville.com

4510 Robards Lane
Louisville, KY 40218
T: 1.502.810.9007 | F: 1.502.810.0380

LG&E - Kentucky Utilities
6900 Enterprise Drive
Louisville, KY 40214

December 31, 2018

Attention: Chad Augustine

Report No. 201802923

Metallurgical Evaluation of Coupling and Associated Hardware

Location: 1826 Rosedale Avenue

DESCRIPTION AND PURPOSE

A natural gas pipe section including a coupling was submitted for metallurgical evaluation. The section was a 6" pipe with a Dresser Style 39 Insulating Coupling. Two joint harnesses were also affixed to the pipe section. Copies of the installation information for the coupling and harnesses were previously provided for this investigation. It was reported that the coupling had been installed in the field at 1826 Rosedale Avenue, Richmond & Rosedale Regulator Station R-16. The pipe section was subsequently excavated after substantial service duration without failure. It was requested that the general dimensions, weld quality, corrosion condition and mechanical properties of the coupling components be determined as directed.

RESULTS

The submitted pipe section with the coupling is shown in Figure 1. Four lugs of the joint harnesses had been fillet welded to the pipe segments. Two rods and associated nuts had been affixed through the welded lugs to apply compression to the coupled joint. The coupling consisted of two followers, a middle ring and associated nonmetallic gaskets and sleeves. Six equally spaced bolts with associated nuts secured the coupling components together and against the pipe segments. The general orientation of the coupling was consistent with the supplied information for the specified Dresser Style 39. Prior to receipt, the ends of the pipe segment were labelled as Ends A and B, as shown in Figures 1 and 2. The top of the pipe was not marked so a top was chosen arbitrarily. Lugs A1 and A2 were welded to Pipe A, and Lugs B1 and B2 were welded to Pipe B. The rod between Lugs A1 and B1 was arbitrarily identified as Rod 1, whereas the opposite was Rod 2. The six coupling bolts were arbitrarily numbered as Bolts 1 through 6 around the circumference.

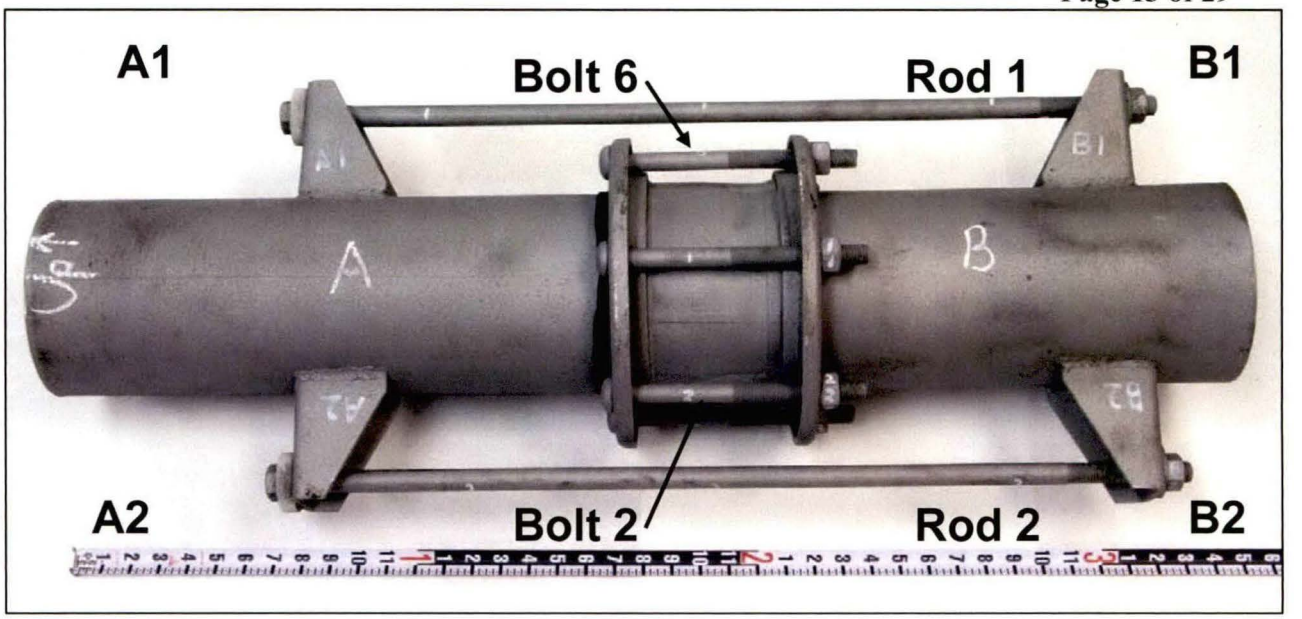


Figure 1. Photograph of the bottom of the submitted sample. Some lug, rod and bolt identifications are shown.

SECTION 1- DIMENSIONAL MEASUREMENT

The two sets of harness lugs were positioned on opposite sides of the pipe. The relative orientations of the harness lugs was measured by photographing the assembly from the ends and applying a protractor overlay for angle measurement. The obtained measurements are shown in Figures 2 and 3 with the data summarized in Table 1. Both harness lugs were straight and not bent. The depth of insertion of each pipe into the coupling was also measured, both before and verified after disassembly. The dimensions are provided in Table 2. No requirements were provided for these characteristics.

TABLE 1 – LUG SPACING DIMENSIONAL MEASUREMENTS

Component	Angle	Deviation from 180°	Image
Rod A1 / Rod A2	180°	0°	Figure 2
Rod B1 / Rod B2	180°	0°	Figure 3

TABLE 2 – PIPE COUPLING DIMENSIONAL MEASUREMENTS

Component	Depth of Pipe into Coupling	Gap Between Pipes in Coupling
Pipe A	3 1/8"	~ ½" (Original sample length – 40")
Pipe B	3"	

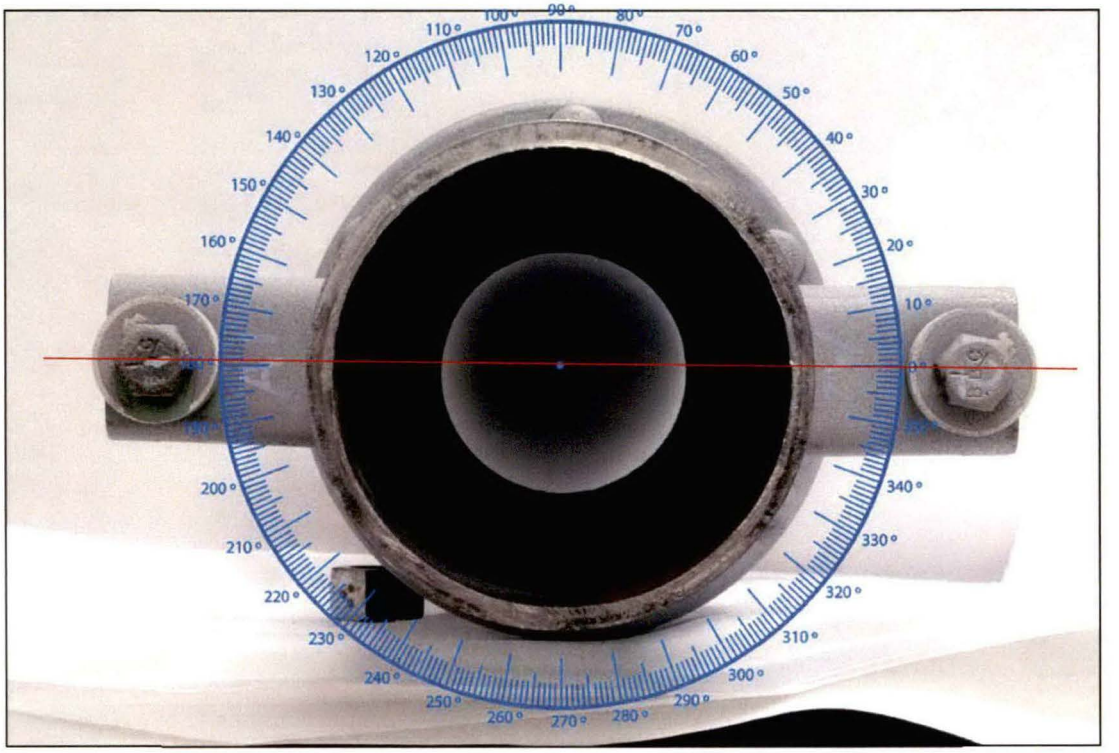


Figure 2. End facing image of the sample at End A. A superimposed protractor shows that the centers of Lugs A1 and A2 were approximately square.

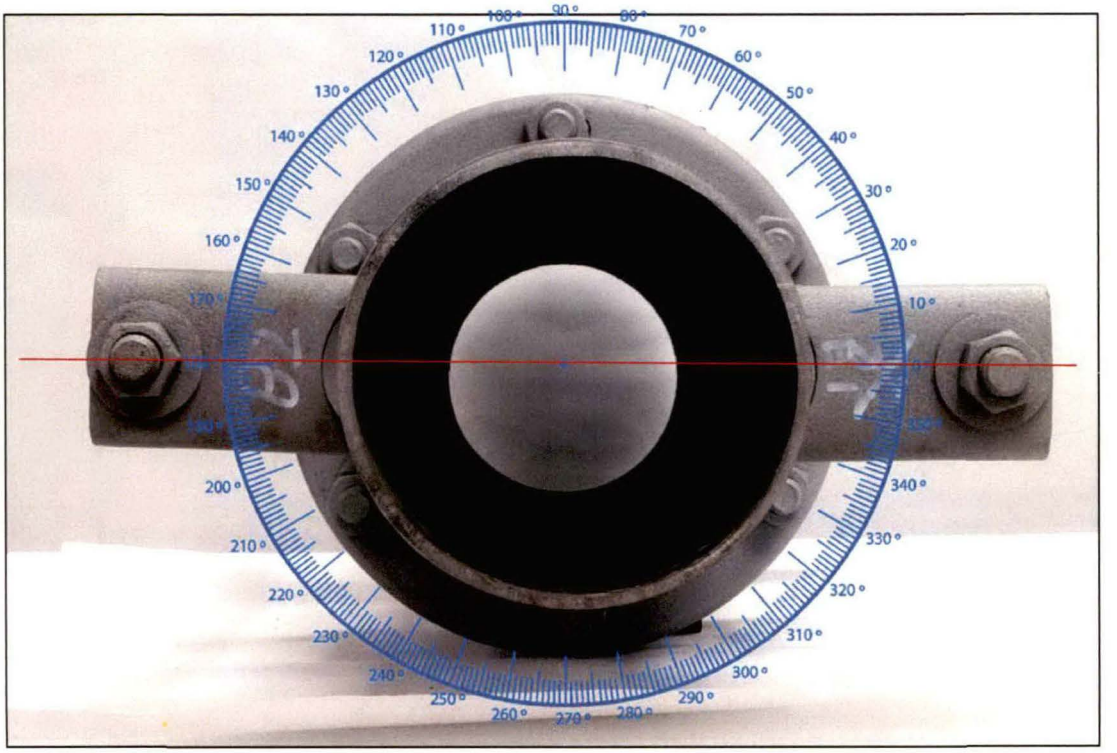


Figure 3. End facing image of the sample at End B. A superimposed protractor shows that the centers of Lugs B1 and B2 were approximately square.

SECTION 2- VISUAL OBSERVATIONS

The lug attachment welds were regions of interest on the pipe coupling sample. Each lug contained four fillet weld locations; exterior top, exterior bottom, interior top, and interior bottom. Each weld was inspected visually using a flashlight and magnifying lens. It was indicated that welding was performed in accordance with API 1104. General weld inspection was performed initially, followed by visual inspection by an outside NDE company. For comparison purposes, the welds were rated as substantial fusion, partial fusion, and minimal fusion. The summarized weld fusion and corrosion observations are provided in Table 3. Representative weld regions are shown in Figures 4 through 8. The lugs were welded in all locations but some welds contained localized discontinuities including undercut, overlap, and spatter in addition to incomplete fusion. No cracking in the welds or base metal heat affected zones (HAZ) was identified. Some superficial pitting corrosion was observed, but no significant material loss had occurred.

The harness rods and coupling bolts were also inspected for corrosion alteration. The observations are provided in Table 4. None of the fasteners, lugs, coupling components or pipe surfaces exhibited gross corrosion. The rods exhibited minor corrosion pitting. The rods exhibited head markings consisting of three radial dashes in addition to the manufacturer identification, as shown in Figure 9. The radial dashes are indicative of the Grade 5 strength designation per SAE J429. The fasteners and the lugs were not necked down / stretched and no cracks were present. The coupling bolt heads were not marked. The coupling was disassembled during inspection and additional images of the observed features are included as Figures 10 through 13. The interior surfaces were not significantly degraded or corroded. The elastomeric components of the coupling consisted of a pipe separator, insulating sleeve, and two gaskets. Inspection revealed that they appeared to be intact and not degraded.

TABLE 3 – LUG WELD VISUAL EXAMINATION RESULTS

Component	Location	Weld	Observations
Lug A1	Exterior	Top	Substantial fusion
		Bottom	Substantial fusion
	Interior	Top	Substantial fusion
		Bottom	Substantial fusion
Lug A2	Exterior	Top	Substantial fusion
		Bottom	Substantial fusion
	Interior	Top	Substantial fusion
		Bottom	Substantial fusion
Lug B1	Exterior	Top	Substantial fusion
		Bottom	Substantial fusion
	Interior	Top	Substantial fusion
		Bottom	Substantial fusion
Lug B2	Exterior	Top	Substantial fusion
		Bottom	Substantial fusion
	Interior	Top	Substantial fusion
		Bottom	Substantial fusion

TABLE 4 – FASTENER VISUAL EXAMINATION RESULTS

Component	Observations
Rod 1	Not bent or stretched, minor corrosion pitting
Rod 2	Not bent or stretched, minor corrosion pitting
Bolt 1	Not bent or stretched, no gross corrosion
Bolt 2	Not bent or stretched, no gross corrosion
Bolt 3	Not bent or stretched, no gross corrosion
Bolt 4	Not bent or stretched, no gross corrosion
Bolt 5	Not bent or stretched, no gross corrosion
Bolt 6	Not bent or stretched, no gross corrosion

Figure 4. Image of the Lug A1 exterior top weld which exhibited substantial fusion except for some overlap and undercut.

Figure 5. Image of the Lug A2 exterior top weld which exhibited substantial fusion except for some overlap and undercut.

Figure 6. Image of the Lug A2 interior bottom weld which exhibited substantial fusion except for some overlap, undercut, and spatter.

Figure 7. Image of the Lug B1 exterior bottom weld which exhibited substantial fusion except for some overlap, undercut, and spatter.

Figure 8. Image of the Lug A2 interior bottom weld which exhibited substantial fusion except for some overlap, and undercut.

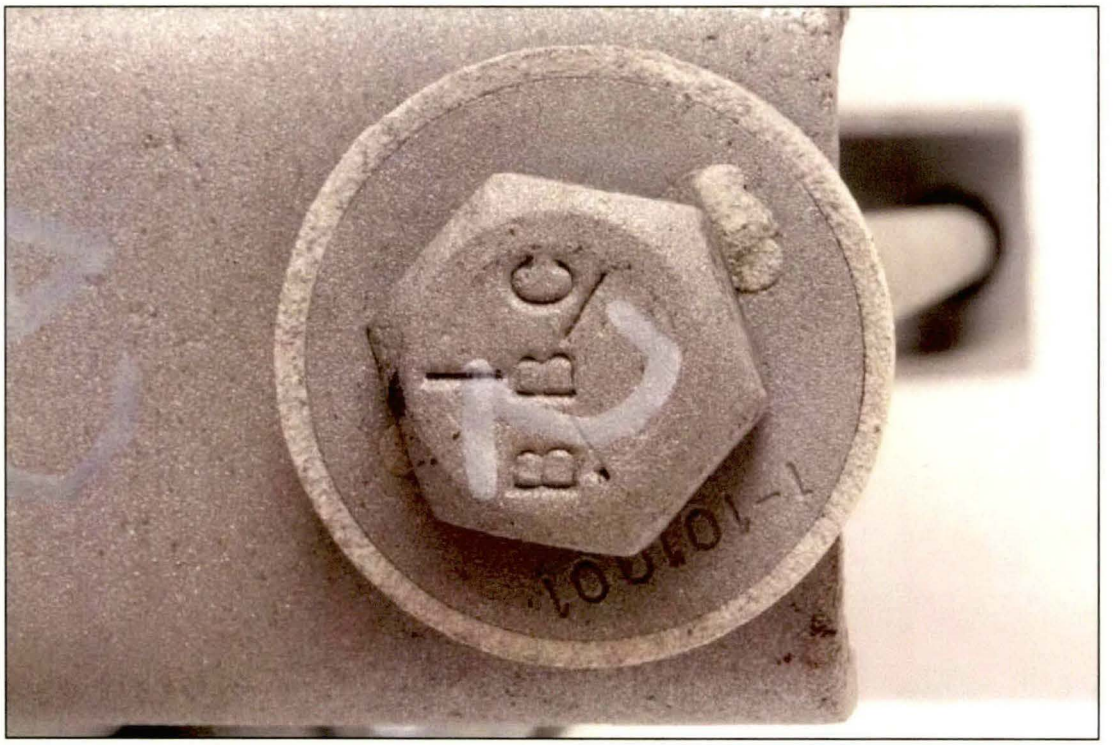


Figure 9. Photograph of the head markings on one of the two rods.

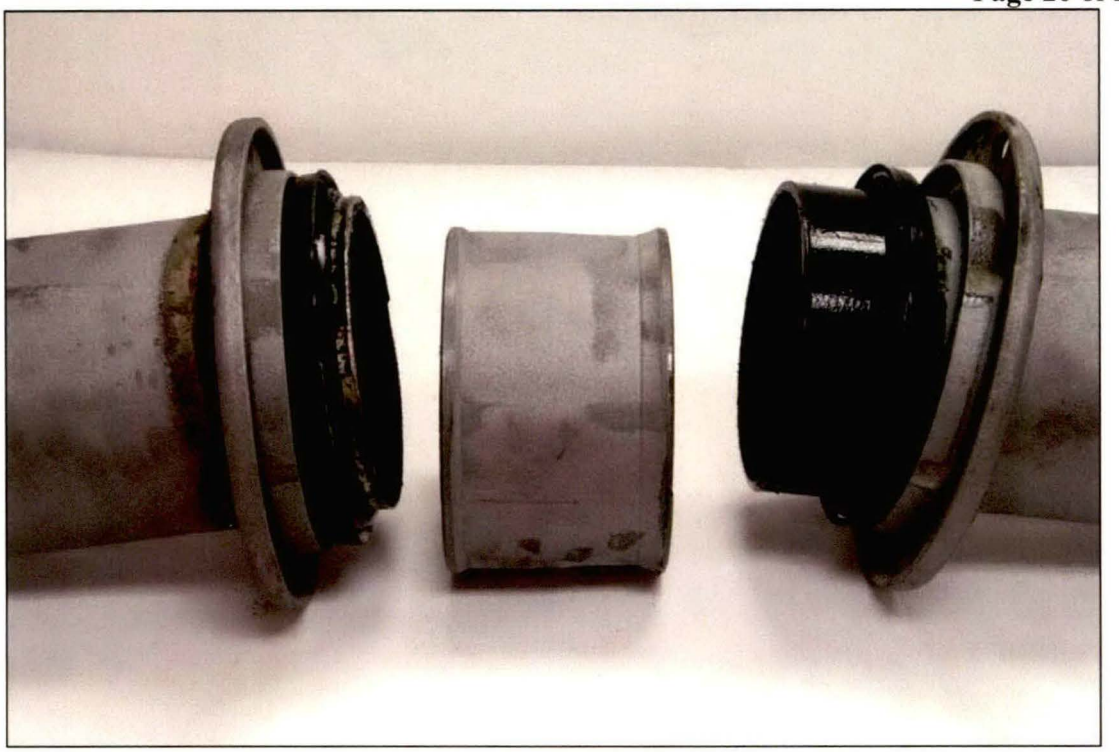


Figure 10. Image of the coupling components after disassembly.

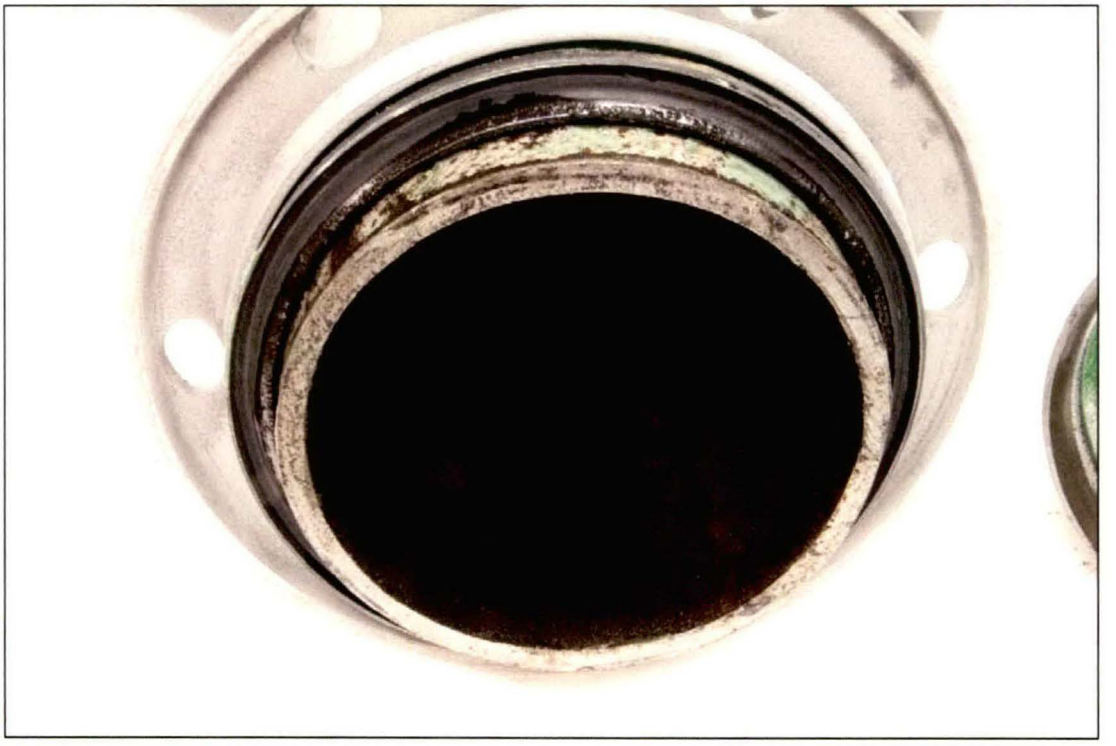


Figure 11. Image of the Pipe A region that had been inside the coupling.

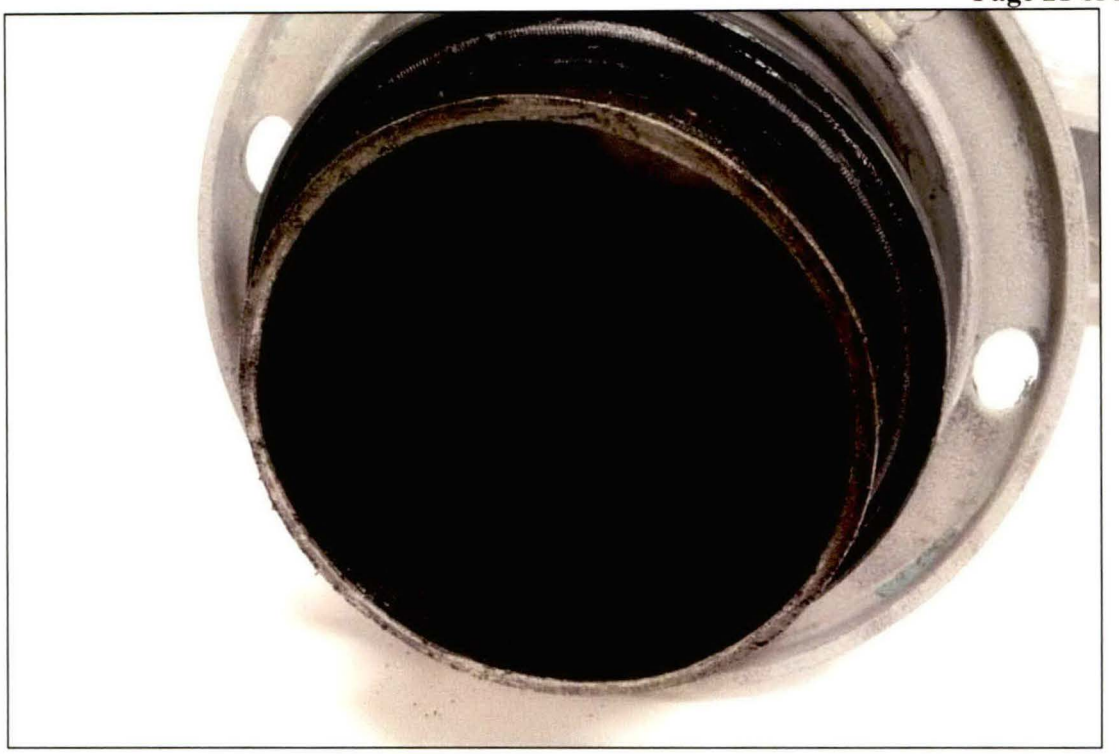


Figure 12. Image of the Pipe B region that had been inside the coupling.

Figure 13. Image of the interior of the coupling after disassembly.

SECTION 3- TORQUE TESTING- FOR INFORMATION ONLY

Torque testing was performed on the nuts of the rods and bolts on the pipe coupling sample. A calibrated torque wrench was used to determine breakaway torque on each fastener. The breakaway torque measurements are summarized in Table 5. Rod fasteners did not have a specified torque requirement. The six coupling bolts exhibited torque values ranging from 60 to 70 ft.-lbs. These bolt torque values were below the Dresser Style 39 coupling installation torque recommendation of 75 ft.-lbs. minimum for 5/8" fasteners.

TABLE 5 – FASTENER TORQUE MEASUREMENT

Component	Breakaway Torque	Observations
Rod 1	50 ft.-lbs.	No requirement
Rod 2	50 ft.-lbs.	No requirement
Bolt 1	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 2	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 3	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 4	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 5	70 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners
Bolt 6	60 ft.-lbs.	Less than the 75 ft.-lbs. recommended for 5/8" fasteners

SECTION 4- TENSILE TESTING, ASTM A370-17A

Tensile testing was performed on round specimens that were removed from the two harness rods and the six coupling bolts. The tensile mechanical properties of the fasteners were measured and the results are summarized in Table 6. The rod bolts did not satisfy the strength requirements for Grade 5 fasteners as indicated by the head markings. No mechanical property requirements were indicated for the coupling fasteners on the provided Dresser harness or coupling information.

TABLE 6 – FASTENER TENSION TEST RESULTS

Component	Ultimate Tensile Strength, ksi	0.2% Offset Yield Strength, ksi	Elongation, %	Reduction in Area, %
Rod 1	116	77.5	21	48
Rod 2	116	76.5	22	48
Bolt 1	89.0	62.0	31	61
Bolt 2	86.5	60.0	32	61
Bolt 3	85.5	59.5	32	61
Bolt 4	87.5	61.0	32	62
Bolt 5	81.0	59.0	33	65
Bolt 6	87.5	61.5	32	61
SAE Grade 5 Fastener Limits (Rods only)	120 minimum	92 minimum	14 minimum	35 minimum

Specimen Dimensions; Diameter 0.35" with gage length of 1.4"
Percent elongation was measured using elongation-after-fracture measurements

SECTION 5- ROCKWELL AND SUPERFICIAL HARDNESS, ASTM E18-17

Small sections of the four lugs were excised for hardness testing. Rockwell hardness testing was performed on the lugs after the removal of surface roughness by sanding. The obtained results are provided in Table 7 and are suggestive of a moderate strength level. No requirements were provided for comparison.

TABLE 7 – LUG HARDNESS TEST RESULTS – ROCKWELL B - HRBW

Results	Reading 1	Reading 2	Reading 3	Reading 4	Average
Lug A1	51	49	69	66	59
Lug A2	71	75	82	81	77
Lug B1	61	64	78	79	70
Lug B2	69	69	83	84	76

SECTION 6- NONDESTRUCTIVE EXAMINATION

The two separated ends of the disassembled coupling were sent to a third party NDE laboratory for inspection. Visual, magnetic particle and liquid dye penetrant inspection were performed on the lug attachment welds. Inspection was performed in accordance with the acceptance criteria of API 1104 "Welding of Pipelines and Related Facilities". The inspection results are provided as Appendices A through C. Two representative welds are shown in Figures 14 through 16 with the inspection test media remaining.

Figure 14. Image of the Lug A1 exterior top weld with a pore identified by NDE.

Figure 15. Image of the Lug A2 exterior top weld after dye penetrant media had been used during inspection.

Figure 16. Image of the Lug A1 exterior top and interior top welds after dye penetrant media had been used during inspection.

ACCREDITED
Testing Cert # 1140.03 & 1140.04

Accredited Nadcap Materials Testing Lab

Respectfully submitted

Brett A. Miller, P.E., FASM
Technical Director

Concurrence

Phillip Swartzentruber, Ph.D., E.I.T.
Failure Analyst

APPENDIX A – VISUAL INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

VISUAL INSPECTION REPORT

Customer: IMR Test Labs **Date:** 12-27-18

Location of Work: Lou, KY **Purchase Order #:** 55587

****

On 12-27-18 personnel of Hayes Testing Conducted a Visual, magnetic particle, and penetrant inspection for IMR on Job# 201802721 part# 201802923.

Inspection was done in accordance with API-1104 and results are as follows.

Section A - A1 rejected for Lack of fusion and Undercut
A2 - rejected for porosity, Arc Burn, Undercut and insufficient weld.

Section B - B1 - rejected for insufficient weld, porosity and Undercut

B2 - rejected for insufficient weld, porosity and Undercut.

Please see attached for mag. particl and pentrant inspection results

Respectfully submitted

Daniel J Hayes Jr.
CWI 00080091
QC1 EXP. 8/1/2021

Results interpreted to CODE: API 1104

INSPECTOR: David J. Hayes Jr. **Level or CWI #:** 1

Your Independent Laboratory For Complete Non-Destructive Testing

APPENDIX B – MAGNETIC PARTICLE INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

MAGNETIC PARTICLE INSPECTION REPORT

Customer Name: IMR Date of Work: 12/20/18

Purchase Order #: 5558T Job #: 201802721

1. Identification:
Item(s) Inspected A1-B1 Description Lug Welds

Location of Item: HTL Part No. 201802923

2. Technique - [✓] Dry Powder [] Wet Fluorescent []Non-Fluorescent

3. Equipment - []Coil []Prods [✓] Yoke []Clamps 4. Current Type [✓] AC []DC

5. AMP Turns

6. Inspection Procedure HTL-MT

7. Inspection Specifications API 1104

8. Type of Indication Found:

1.Crack 2.Linear Surface 3.Linear Subsurface 4.Undercut
5.Non- Relevant 6. NONE

RESULTS: A1-Rejected porosity, crack B1-Rejected porosity

9. Sketch/Description

10. Inspection Performed by Hayes Testing Laboratory, Inc. personnel:

Signature [signature] II
Level II Technician

Independent Laboratory For Complete Non-Destructive Testing

APPENDIX C – PENETRANT INSPECTION RECORD

HAYES TESTING LABORATORY, INC.
Phone 502-266-9729
2521 Holloway Rd.
Louisville, Kentucky 40299

NDE PENETRANT REPORT

HTL

Client: IMR
Project: 201802721
Item Description: Lug Weld
Part No: 201802923 A2-B2
Drawing No:
Spec. API 1104
Acceptance Class API 1104
Procedure HTL-MT

WELD		OTHER TEST ITEMS	
Weld Joint		Material	
Weld Process		Processing	
Base Material	N/A	Material	N/A
Material Thickness		Dimensions	
Weld Length/OD		Additional Info	
Surface Condition		Surface Condition	

PRECLEAN: Method Spray/wipe Material SKC-S Aerosol
Batch No. 15M15K Drying Time 10 Minutes

PENETRANT: Material SKL-WP2 Batch No. 17H13K
Application brush Dwell Time 25 Minutes

EMULSIFICATION: Material Batch No.
Application N/A Emulsification Time

EXCESS PENETRANT REMOVAL: Material towel/wipe Batch No.
Method Drying Time

DEVELOPER: Material SKD-S2 Batch No. 14F04K
Method Spray Drying Time 10 Minutes Developing Time 10 MINS.

POSTCLEAN: Material SKC-S Aerosol Batch No. 15M15K
Method Spray/wipe

No. of Parts Accepted Serial No.'s
No. of Parts Rejected 2 Serial No.'s

OTHER INFORMATION:

A2 - Rejected porosity, crack
B2 - Rejected porosity

INSPECTED BY:	DATE:
	12/20/18