



RCA Name Pipeline weld non-conformance
 Report Number 2012-001
 Report Date 7/27/2012

Root Cause Analysis Report

Problem Statement

Focal Point Near miss-Almost had to replace 5 miles of 6" underground oil pipe

When

Start Date 7/8/2012
 Unique Timing After discovering QC was not performed on installation

Where

Component Oil Pipelines
 Location Porter Creek interstate network

Actual Impact		Cost
Cost	Excavation & inspection of 5 weld joints	\$95,000.00
Cost	Radiography	\$25,000.00
Cost	Risk Assesment	\$21,000.00
Customer Service	Damaged reputation with client	\$0.00
Actual Impact Total:		\$141,000.00

Frequency 1 times overall

Frequency Notes Have missed other inspection points but this is the first time an entirely new installation had all inspections points missed.

Potential Impact

Cost	excavate and replace pipeline	\$9,000,000.00
Environmental	New environmental impact study	\$130,000.00
Revenue	potential loss of customer	\$15,000,000.00
Potential Impact Total:		\$24,130,000.00

Report Summaries

Executive Summary

In July of 2012, it was discovered that 5 miles of underground pipe that had been installed did not meet specifications due to out of spec welds and improper radiographic inspection. The client agreed to not replacing the entire pipeline if we repaired the out of spec welds, and if we completed an engineering assesment that included random inspection of 10 other welds, which was successfully completed to their satisfaction.

The welds were out of spec because the wrong weld rod was used and the welds were not inspected. The wrong weld rod was used because the welder was not clear on the specs and he thought the rod used would meet the specs because he used that same rod on a previous job. The welds were not inspected because the weld inspectors were not notified to be there because the project manager didn't think it was necessary.

The improper radiographic inspection was caused by using the wrong film and overexposed x-rays. The wrong film was used because the technician had multiple films available for use and he was unclear on which to use. The x-rays were over exposed because the wrong developing procedure was used.

Solutions include but are not limited to: 1) Pre-scheduling of weld inspections at the beginning of jobs, 2) Have weld inspectors sign off on the weld rod container prior to first use, 3) Conduct pre-job review between welders and inspectors prior to the start of work, 4) Require certified x-ray technicians and verify certification prior to commencing work.

Cause and Effect Summary

In July of 2012, we had a near miss where we almost had to replace 5 miles of pipe after it was discovered that the underground pipe did not meet specifications due to out of spec welds and improper radiographic inspection. The client agreed to not replacing the entire pipeline if we repaired the out of spec welds, and if we completed an engineering assesment that included random inspection of 10 other welds, which was successfully completed to their satisfaction

The welds were out of spec because the wrong weld rod was used and the welds were not inspected. The wrong weld rod was used because the welder was not clear on the specs and he thought the rod used would meet the specs because he used that same rod on a previous job. The welds were not inspected because the weld inspectors were not notified to be there because the project manager didn't think it was necessary and he was trying to complete the job quickly. He was trying to complete the job quickly because they were nearing the end of the project and if they got done ahead of schedule, the team would receive a bonus.

The improper radiographic inspection was caused by using the wrong film and overexposed x-rays. The wrong film was used because the technician had multiple films available for use and he was unclear on which to use. The technician was unclear on which film to use because he was new to the job and had not received much training. The lack of training was caused by technicians employer thinking he was qualified and because they didn't have the staff available to train or mentor him. The x-rays were over exposed because the wrong developing procedure was used because the technician was inexperienced in this area.

Solutions

ID	Label	Description		
1	Solution	Pre-schedule weld inspections at the beginning of pipe installation		
	Cause	Inspectors not told to be at inspection		
	Note			
	Assigned	Brandon Prudent	Criteria	Pass
	Due	8/8/2012	Status	Selected
	Term	Long	Cost	\$0.00
2	Solution	Have welding inspector sign off on weld rod containers before use		
	Cause	wrong welding rods used		
	Note			
	Assigned	Chris Eckert	Criteria	Pass
	Due	8/8/2012	Status	Identified
	Term	Long	Cost	\$0.00
3	Solution	Conduct pre-job review between welders and inspectors prior to the start of work. Assure welders have specs in the field and have reviewed them prior to starting.		
	Cause	Did not have weld spec available in field		
	Note			
	Assigned	Cory Boisoineau	Criteria	Pass
	Due	8/8/2012	Status	Selected
	Term	Short	Cost	\$150.00
4	Solution	Require certified X-ray technicians in the bid specs and followup to verify certification before technicians commence work		
	Cause	radiographer was inexperienced		
	Note			
	Assigned	Cory Boisoineau	Criteria	Pass
	Due	8/8/2012	Status	Selected
	Term	Medium	Cost	\$0.00
5	Solution	Implement Pre-job testing/checks to verify technician competency		
	Cause	Company did not audit for existing knowledge or skills		

Note			
Assigned	Choose	Criteria	Pass
Due		Status	Identified
Term	Choose	Cost	\$1,500.00

6	Solution	When specific exposure, film and testing procedures exist, clearly include in bid specs.		
	Cause	was unsure of what film to use		
	Note			
	Assigned	Chris Eckert	Criteria	Pass
	Due	8/8/2012	Status	Selected
	Term	Medium	Cost	\$0.00

Team

ID	Label	Description	Label	Description
1	First Name	Brandon	Last Name	Prudent
	Phone (1)		Phone (2)	
	Role		Group	
	Email	brandon.prudent@sologic.com		
2	First Name	Chris	Last Name	Eckert
	Phone (1)		Phone (2)	
	Role		Group	
	Email	chris.eckert@sologic.com		
3	First Name	Cory	Last Name	Boisoneau
	Phone (1)		Phone (2)	
	Role		Group	
	Email	cory.boisoneau@sologic.com		

Evidence

ID	Label	Description
1	Evidence	Welding engineer statement
	Cause(s)	pipeline weld standards exist wrong welding rods used 5 welds were out of spec
	Location	
	Link	
	Contributor	Chris Eckert
	Type	Direct Statement
	Quality	☆☆☆☆☆
2	Evidence	Welding Inspector statement
	Cause(s)	Deficiencies were not addressed inspectors not present on job Inspectors not told to be at inspection no quality inspectors on site wrong welding rods used Pipe welds did not meet standards wrong film used welds not inspected used wrong developing procedures Improper radiography Installation specs' required welds to meet standards previous weld xrays were overexposed
	Location	
	Link	
	Contributor	Cory Boisoneau
	Type	Direct Statement
	Quality	☆☆☆☆☆
3	Evidence	Welder Statement
	Cause(s)	welds not inspected welder choose to use them specific use truck not available inspectors not present on job truck was used for multiple types of welding

available on welding truck
 welder thought rod choice would meet specs
 Unclear direction on which rod to use
 multiple types of rods were available to be used
 Thought pipe service was same as past weld jobs.
 Same rod choice in the past met weld specs
 Did not have weld spec available in field
 shortage of trucks in industry

Location

Link

Contributor Cory Boisoneau

Type Direct Statement

Quality ★★☆☆☆

4	<p>Evidence</p> <p>Cause(s)</p> <p>Location</p> <p>Link</p> <p>Contributor</p> <p>Type</p> <p>Quality</p>	<p>Engineering analysis 10-345</p> <p>engineering assessment showed pipeline was fit for purpose determined that welds were adequate for purpose of pipeline</p> <p>shared server</p> <p>G:\engineering docs\</p> <p>Brandon Prudent</p> <p>Document</p> <p>★★★★★</p>
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Evidence Project Manager statement

Cause(s) site construction manager confident welds and xrays were adequate
 inspectors not present on job
 no quality inspectors on site
 Experienced personnel assigned to other jobs
 Installation specs' required welds to meet standards
 Client agreed to base decision on engineering assesment
 Company did not audit for existing knowledge or skills
 Company thought he was sufficiently ready for job
 dug up 10 random welds to check for quality
 All 10 welds passed the quality tests
 client agreed to terms of not replacing pipeline
 save time
 to get job done under required time
 getting close to end of project
 to recieve bonus

Location
Link
Contributor Brandon Prudent
Type Direct Statement
Quality ★★★★★

6 **Evidence** X-ray technician statement
Cause(s) new to job
multiple types of film existed in darkroom
inexperience with this type radiography
was unsure of what film to use
2 types of film existed
Radiographer completed technician program
used wrong developing procedures
New radiography had 2 weeks experience
film type existed in truck
previous radiographer resigned
Radiographer had not received much training
developing procedures existed
new radiography stocked truck with film used
stock was low
went to job with better pay
recently certified
No mentors assigned
Short staffed
radiographer was inexperienced

Location
Link
Contributor Chris Eckert
Type Direct Statement
Quality ★★★★★

Actions & Chart Quality

Custom Actions - 0

Evidence - 0

Termination Points - 0

Cause Types - 0

Unconnected Causes - 0

Empty Cause Boxes - 0

Completed

ID	Label	Description	Assigned	Due Date
351	Action	Check existing projects to verify that welding and inspection requirements were clearly spelled out	Chris Eckert	9/2/2012
	Cause	site construction manager confident welds and xrays were adequate		
	Completed	yes		

Notes

ID	Label	Description
1	Note	Engineering assesment criteria were agreed to by both parties
	Cause	Client agreed to base decision on engineering assesment

Chart Type Legend

- ▶ Transitory
- Non-transitory
- ⊖ Omission - Transitory
- ⊖ Omission - Non-transitory
- ★ Focal Point
- ⊙ Solution Implemented

