

2022 Western Regional Gas Conference

Pipeline Integrity Threats and Applicable Assessment Methods

August 24, 2022



Overview

- **Awareness of threats to natural gas pipelines and their associated integrity assessment methods**
- **Understand the requirements for baseline and reassessments for HCAs, MCAs, and § 192.710**
- **Overview of related updates from PHMSA's Gas Transmission Final Rule (MegaRule Part 2) from August 4th**

Ramsey Fowler, PE

Integrity Management Service Line Lead

- Based in Denver, Colorado
- B.S. in Mechanical Engineering
 - University of Texas of the Permian Basin
- B.B.A. in Marketing
 - University of Texas at Austin
- PE Licensed in TX, CO, ND, NE, MO, and AR
- 20 years of Oil & Gas Experience
- Past Experience
 - Engineering / Project Management (Professional Service and Consulting)
 - Operations Engineer – DOT 192/195 Pipelines (West Texas Gas)
 - Integrity Management (WTG NGL)
- Ramsey.Fowler@hdrinc.com
- 432-638-7448 (mobile)





Safety Moment









Call 811

Dig this:

- Arizona law defines excavating as “any operation in which earth, rock or other material in the ground is moved, removed or otherwise displaced by means or use of any tools, equipment or explosives and includes, without limitation, grading, trenching, digging, ditching, drilling, auguring, boring, tunneling, scraping, cable or pipe plowing and driving.”
- **Utility depth is not known or guaranteed.** The depth of lines, pipes and cables can change over time. Facilities can be a few inches or several feet below the surface of the earth.
- If you strike an underground utility, stop digging. Call the facility owner/operator directly. Do not attempt to repair damages yourself!
- If you dig up an unknown line, stop working in the immediate area. Call 811 so qualified personnel can be sent to the site to determine if the line is active or abandoned.
- Utility marks are valid for 15 working days. If your project exceeds that timeframe, or if your marks disappear or are destroyed, contact Arizona 811 to have the marks refreshed. Marks must remain “visible and valid” for the duration of your project.
- Never dig outside the boundaries of your ticket or move or destroy locate marks.
- Facility owners and local municipalities mark only what they own and operate up to the point of sale, which is typically the meter. To have privately owned lines marked, you might need to hire a private locating company. Arizona 811 cannot recommend private utility locators; consult the internet or Better Business Bureau to find one.

Know the Code

Utilities are marked in colors based on their type. Locators use the Uniform Color Code for Utility Markings so utilities can always be identified by their specific color, whether they're marked with paint, flags or whiskers:

	Proposed excavation
	Temporary survey
	Electric power
	Natural gas, oil, liquid fuels
	Communications, fiber optics, cable TV
	Water and slurry lines
	Reclaimed water
	Sanitary sewer systems

Exposing & Protecting Buried Facilities/Careful & Prudent Manner

As required by state law, and for your safety, the exact location of all buried facilities **MUST BE EXPOSED WITH HAND TOOLS IN A CAREFUL AND PRUDENT MANNER** when working within 24" of a marked facility. **Even when digging with hand tools, use caution to prevent injuries and damage to the facility.** The uncovered facility must be supported and protected prior to and during your excavation (see Arizona Revised Statutes 40-360.21 for the definition of “Careful and Prudent”). For assistance in safely exposing, supporting, and protecting a facility, contact the member underground facility owner(s)/operator(s) directly.



Digging for any reason?

You must contact Arizona 811 at least two full working days in advance so underground utilities can be located and marked.

It's free. It's easy. It's the law.



**Know what's below.
Call 811 or click Arizona811.com before you dig.**

ARIZONA BLUE STAKE IS NOW ARIZONA 811



§192.917: Threats to Pipeline Integrity

- An operator must identify and evaluate ALL potential threats.... Potential threats include but are not limited to.....
 - 4 Categories in §192.917
 - Time Dependent Threats
 - Stable Threats
 - Time Independent Threats
 - Human Error
 - 22 Root Causes from PRCI

§192.917: Threats to Pipeline Integrity

- Time Dependent Threats
 - External Corrosion
 - Internal Corrosion
 - Stress Corrosion Cracking (SCC)



§192.917: Threats to Pipeline Integrity

■ Stable Threats

- Manufacturing Related Defects (Defective pipe / seam) **Expanded language (existing in 31.8S)**
- Welding Defects (Defective welds) **Expanded language (existing in 31.8S)**
- Fabrication Related Defects (Bends / buckled pipe)
- Construction (Defects)

§192.917: Threats to Pipeline Integrity

- Time Independent Threats
 - 3rd Party Damage / Mechanical Damage (Immediate or Delayed Failure)
 - Incorrect Operational Procedure
 - Weather-Related
 - Outside Force



§192.917: Threats to Pipeline Integrity

- Human Error
 - Operational or Maintenance (O&M) Mishaps **Added**
 - Design or Construction Mistakes **Added**



§192.917: Threats to Pipeline Integrity

▪ Data Gathering, Integration, and Risk Assessment

▪ What's New in the Part 2 Final Rule?

▪ 18 months to gather all pertinent data elements

1. Pipe attributes (diameter, wall thickness, seam type, material properties, ...)
2. Construction (Year installed, bending/joining methods, depth of cover, foreign line crossings, casings, inspection reports, ...)
3. Operational (Class location, leak history, CP performance, flow rates, operational pressures / MAOP, ...)
4. Integrity Assessments (ILI, pressure tests, CIS, CP surveys, direct examinations, ...)

§192.917: Threats to Pipeline Integrity

▪ Data Gathering, Integration, and Risk Assessment

▪ What's New in the Part 2 Final Rule?

▪ 18 months to integrate all pertinent data elements

1. “Identify and analyze special relationships among anomalous information”
2. “Analyze the data for interrelationships among pipeline integrity threats”
3. What combinations increase likelihood or consequences?

§192.917: Threats to Pipeline Integrity

▪ Data Gathering, Integration, and Risk Assessment

▪ What's New in the Part 2 Final Rule?

▪ After the 18 months, the risk assessment must:

1. Analyze failure's affect on HCAs
2. Analyze the likelihood of failure of individual and unique combination of threats
3. Account and compensate for uncertainties
4. Evaluate potential risk reduction from P&MM and reduced remediation and assessment intervals

Assessment Methods

- Which assessments can they be used for?
- **Assessment method must match the threats**

Method	Baseline §192.921	Reassessment §192.937	Non-HCA §192.710
In-Line Inspection	✓	✓	✓
Pressure Test (Sub Part J)	✓	✓	✓
Spike Pressure Test	✓	✓	✓
Direct Examination	✓	✓	✓
Guided Wave Ultrasonic Testing (GWUT)	✓	✓	✓
Direct Assessment	✓	✓	✓
Other Technology	✓	✓	✓
Confirmatory Direct Assessment (CDA)		✓	
MAOP Reconfirmation		✓	✓

§192.710: Assessments beyond HCAs

- **Assessments required outside HCAs where:**
 - SMYS \geq 30 %
 - Class 3 or Class 4 Location -or-
 - Piggable Moderate Consequence Area (MCA)
- **Integrity Assessments:**
 - 10-year Reassessment Interval
 - 14 Years to Complete Baseline Assessment (July 3, 2034)

Assessment Methods: The 'Big' 3

- Pressure Test
- In-Line Inspection
- External Corrosion Direct Assessment (ECDA)



Assessment Methods

▪ In-Line Inspection (ILI)

- Threats: Corrosion, deformation, mechanical damage, cracking, outside forces (With Location)
- Multiple technologies: Deformation, MFL, Ultrasonic, Mapping, ...
- Online and offline testing



Assessment Methods

- **Subpart J - Pressure Test**
 - Threats: Corrosion, deformation, mechanical damage, cracking, outside forces
 - Finds / estimates the largest defect
 - No coating / CP performance



Assessment Methods

- **Spike Hydrotest - §192.917**
 - Required on transmission pressure tests > 30% SMYS
 - 15 min pressure spike to lesser of 1.5 X MAOP or 100% SMYS
 - Threats: Cracking
 - Used in conjunction with Subpart J Pressure Test

Assessment Methods

- **Direct Examination**
 - Visual examination with direct measurement / NDE
 - Corrosion, welds, cracks, deformations
 - Technologies: UT, PAUT, IWEX, X-ray, MPI

Assessment Methods

- **Guided Wave Ultrasonic Testing (GWUT)**
 - Direct access not required
 - Insulation
 - Road and other crossings
 - Screening tool
 - Direct measurement to determine any change to MAOP
 - §192 Appendix F



Assessment Methods

- **Direct Assessments**

- **4 Step Process:**

1. Pre-Assessment
2. Indirect Examination
3. Direct Examination
4. Post Assessment

- **ECDA, ICDA, SCCDA**



Assessment Methods – Direct Assessments

- ECDA – External Corrosion
 - Indirect Examination: CIS, ACVG, DCVG, PCM, Terrain conditions
- ICDA – Internal Corrosion
 - Indirect Examination: PCM (verify DOC for pipeline elevation)
 - **NEW: “Operator must use actual pipeline-specific data, exclusively”**
 - **NEW: NACE SP0206 incorporated by reference**
- SCCDA – Stress Corrosion Cracking
 - Indirect Examination: CIS, DCVG, Terrain conditions
 - Complementary with ILI and pressure testing (spike test)
 - **NEW: NACE SP0204 incorporated by reference**

Assessment Methods

- **Confirmatory Direct Assessment (CDA) §192.931**
 - Follows Direct Assessment Process
 - Threats: Internal and external corrosion only
 - CDA confirms prior assumptions and actions

Assessment Methods

▪ Other Technology

- Operator can demonstrate equivalent understanding of line pipe condition for each threat
- Notify PHMSA in advance in accordance with §192.18
 - 90-day notice required
 - Able to proceed on day 91 if no response from PHMSA

Assessment Methods

- **§192.624: MAOP Reconfirmation**
 - **Pressure Test and Verify Material Records (§192.607)**
 - **Pressure Reduction**
 - **Engineering Critical Assessment (§192.632)**
 - **Pipe Replacement**
 - **Pressure Reduction with PIR \leq 150 Feet**
 - **Alternative Technology (Advance Notification Required)**

Conclusion

- Increased use of data and analysis for threat identification – Can you prove it?
- Assessment methods must match the individual threats
- PHMSA's Gas Transmission Mega Rule #2 Final Rule:
 - Published in Federal Register August 24, 2022
 - Effective date of May 24, 2023
 - <https://www.federalregister.gov/documents/2022/08/24/2022-17031/pipeline-safety-safety-of-gas-transmission-pipelines-repair-criteria-integrity-management>

Questions?

Ramsey.Fowler@hdrinc.com
432-638-7448

HDR