

PHMSA Research, Technical and Policy Perspectives



Working Group #1 *Gas Gathering*

Steve Nanney & Robert Smith

Pipeline Research and Development Forum
February 19-20, 2020



Good Afternoon and Welcome!

- Gas Gathering Working Group Objective – Identify technical gaps not being addressed by others on which PHMSA could develop a comprehensive research portfolio
 - Solutions are sought in technology and knowledge enabling safe operations
- This group may cover any and all aspects of gas gathering operations
 - The group agenda and audience make up will govern where we cover over the next 2 days
- Before we begin – Lets tally the audience make up



PHMSA Research Perspective

- No Gas Gathering (GG) related funded research to date
- Research Program – GG Areas of Interest? To name a few...
 - Pipe Design and Materials
 - Threat/Damage Prevention (outside force and cathodic protection)
 - Leak Detection
 - Anomaly Detection and Characterization
 - Construction and Decommissioning



- Research Program will build a portfolio over time and record outputs and outcomes through our website



National Pipeline Research and Innovation Test Site

At
U.S. DOT Transportation Technology Center (TTC)
Pueblo, Colorado

CONCEPTUAL VIEW



- Additional Study Areas Identified by Industry
- Fiber optics technology
 - Pipeline material aging
 - Welds on specialty materials
 - Compressor emissions
 - Pressure cycling for fatigue
 - Physical & cyber security

Considerations for projects at TTC

- What project(s) would lend itself well to being conducted at TTC?
 - Near real-world scenarios, can't be performed elsewhere, and/or could benefit from TTC intermodal capabilities
- What are examples of challenges associated with project that would need to be addressed?
 - Confidentiality of data for some aspects, overall security
 - Equipment needs
 - Building and infrastructure needs
- Other considerations?
- Who would be good to provide input for conceptual, types of equipment, and operational needs for launching and maintaining a world class research and test facility



Submitting Research Gap Ideas

Anyone, Anywhere and Anytime via <https://primis.phmsa.dot.gov/matrix/>

PHMSA
U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

Pipeline Technical Resources
[Return to Pipeline Safety Community](#)

Home	Alt MAOP	Cased Crossings and GWUT	Class Location	CRM	DIMP	GT IM	HL IM	High Volume EFV
Low Strength Pipe	LNG Facility Siting	OQ	Pipeline Construction	Public Meetings	R&D	RMWG	Underground Natural Gas Storage	

Research & Development: Identifying Pipeline Safety Research Gaps

Submit Research Gap Suggestions by [following this link](#).

R&D Menu

- Home
- Program Strategy
- Program Performance
- Technology Demonstrations
- Technology Success Stories
- Congressional Mandates
- University Partnerships
- R&D Database
- R&D Project Map
- Meetings/Events
- Links
- Contacts
- Feedback
- Submit R&D Idea

1. BACKGROUND

The Department of Transportation's (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) sponsors Research & Development (R&D) projects focused on providing technological and knowledge solutions that will increase the safety and reliability of the Nation's pipelines. Historically, research gaps are identified and road mapped at public events, held periodically as funding and program actions allow. Although hundreds of attendees usually participate at each event, many stakeholders cannot attend since they either don't have the means or availability.

PHMSA is using this Special Notice to solicit research ideas on a year-round basis to reach the widest set of stakeholders and identify a larger more diverse portfolio of research. The input from this Special Notice will also generate a pool of research ideas for potential future research solicitations.

PHMSA will use submitted research gaps to formulate a research strategy for its Pipeline Safety Research Program.

2. RESEARCH PROGRAMMATIC AREAS/ELEMENTS

The Pipeline Safety Research Program organizes program planning, execution, and tracking around the following subject areas.

Threat Prevention

This area addresses excavation activity damage prevention to all pipeline types and improving sub-surface locating/mapping. Research also addresses preventing or monitoring for other threats whether they are coming from corrosion, outside force damage, etc.

Leak Detection

Research in this area addresses leak detection or monitoring on hazardous liquid and natural gas pipelines, including sub-surface, surface, and airborne-based sensors and deployment platforms. Research also addresses approaches to lessen release volumes from leak/rupture incidents.

Anomaly Detection/Characterization

This area aims to improve the capability to identify and locate critical pipeline defects, and to characterize the severity or interacting nature of such defects. Research in this area includes solutions from within or outside the pipe.

- Regulations
- Advisory Bulletins
- Interpretations

Research & Development Program
Server Version: 3.00.112 Server Time: 01/29/2020 03:04 PM UTC User: Robert Smith

Research Gap Suggestions

Pipeline Safety Gap Suggestion Form

Name of Person Submitting: Email of Person Submitting:

Email address will be used by PHMSA only for verification and follow-up purposes, and will not be released to the public or any other organization.

Stakeholder Type:
[select from choices below]

Gap/Project Title (required):

Main Objective Statement (required):

Identify Major Scope Items for Investigation:

Identify Relevant Subject Matter Experts, Stakeholders, or End User Involvement suggested in Project Scope:

Cost Estimate: Time Estimate (months):

PHMSA Program Element:
[select from choices below]



What are the safety concerns for Gas Gathering Pipelines?

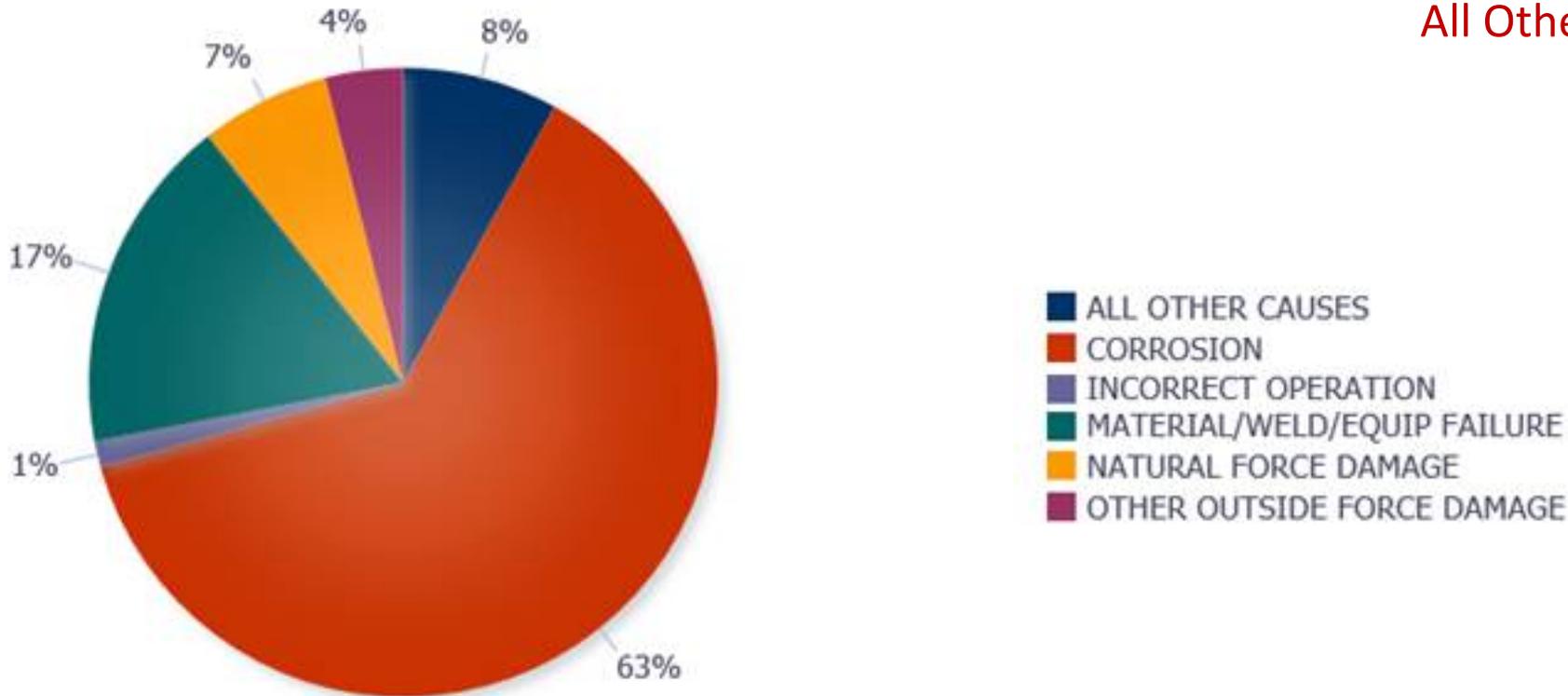
- **More pipe is proposed to be regulated based upon pipeline diameter, pressure, and location proximity in the following areas:**
 1. Design, installation, construction, inspection and testing
 2. Corrosion control
 3. Damage prevention
 4. Public awareness
 5. Establish maximum allowable operating pressure
 6. Line markers
 7. Leakage surveys and repairs
 8. Emergency plans and implementation



What incident causes should we consider?

Regulated Gas Gathering Significant Incidents – 2008-2017

Significant Incident Cause Breakdown 10 Year Average (2008-2017)
System Type: GAS GATHERING State: (All Column Values) Offshore: (All Column Values)



CY 2008 to 2017 Leading Causes:

Corrosion - 63%

Material/Weld/Equipment Failure - 17%

All Other Causes - 8%



Gas Gathering Estimate of Unregulated Mileage

Gas Gathering – Unregulated – PHMSA Estimate – through 2018					Total Miles
Current Estimate					426,109
Gas Gathering - Type A, Area 2 (high stress, $\geq 8.625''$) Proposed in Rulemaking– 2018 Estimate					
Diameter	$\geq 8.625''$ to $< 12.75''$	12.75"	$> 12.75''$ to \leq 16"	$> 16''$	Total Miles
Estimate through 2018	46,094	19,665	12,604	12,500	90,863

$> 12.75''$ diameter gas gathering ~ 25,104 miles



Regulated Gas Gathering Mileage by Class Location

Facility Type	Class 1	Class 2	Class 3	Class 4	Total
Onshore Type A	NA	5,616	2,665	7	8,288
Onshore Type B	NA	1,677	1,670	26	3,373
Offshore	6,183	NA	NA	NA	6,183
Total	6,183	7,293	4,335	33	17,845

2018 Gas Transmission and Gas Gathering Annual Report

NA – not applicable



Regulated Gas Gathering Mileage by Diameter

Pipe Type	12.75-inches or Less	Greater than 12.75-inches	Total
Onshore Type A	6,720	1,568	8,288
Onshore Type B	3,223	150	3,373
Offshore	1,867	4,316	6,183
Total	11,810	6,035	17,845

Type A – defined per 49 CFR 192.8 as $\geq 20\%$ SMYS for steel pipelines and for non-metallic > 125 psig.

Type B – defined per 49 CFR 192.8 as $< 20\%$ SMYS for steel pipelines and for non-metallic ≤ 125 psig.

2018 Gas Transmission and Gas Gathering Annual Report

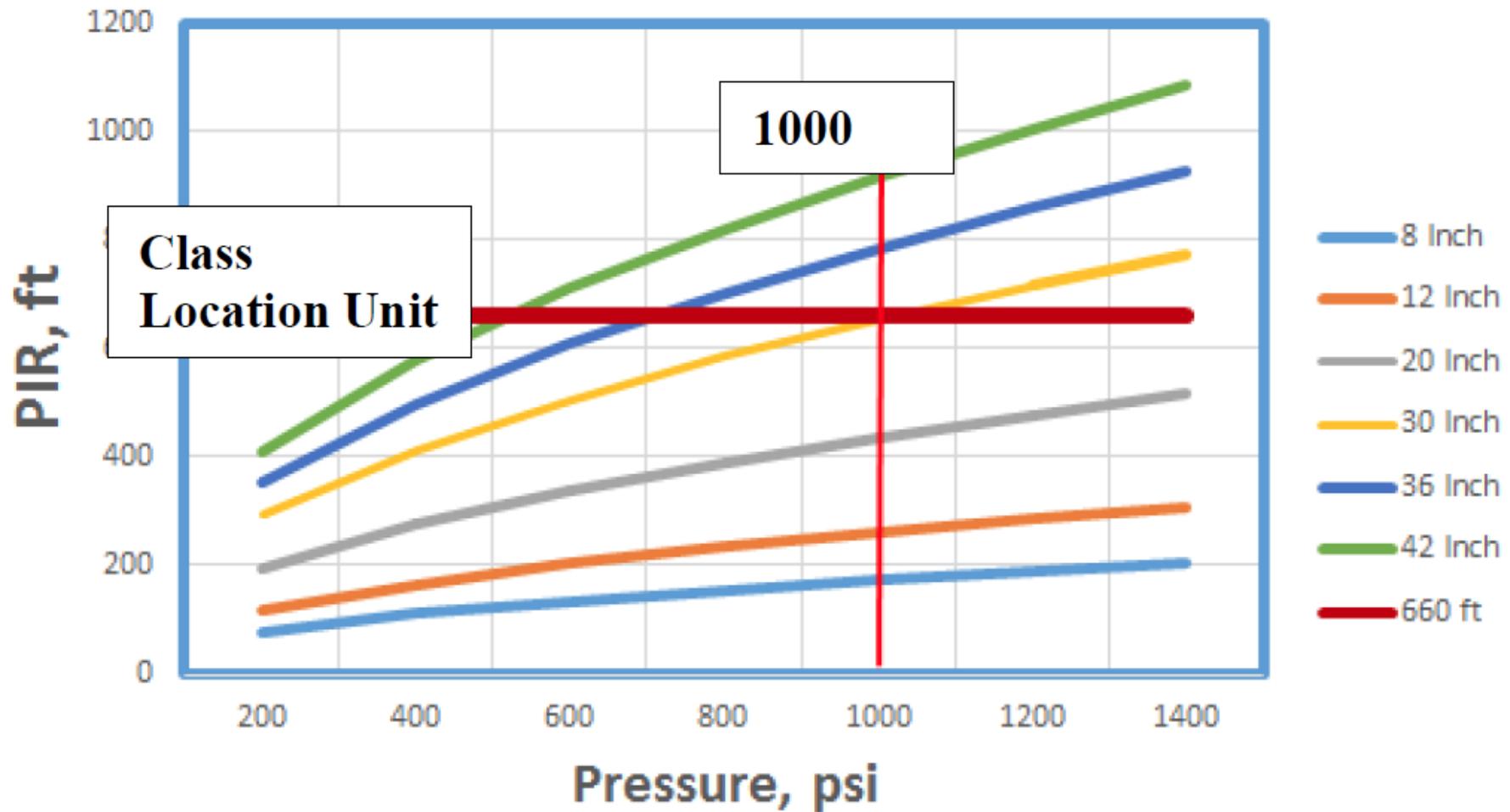


Estimated Unregulated Gathering By Diameter

Diameter (inches)	Unregulated Gathering Miles (Total, no PIR adjustment)
8	32,528
10	13,565
12	19,665
14	1,184
16	11,421
18	798
20	5,338
22	356
24	3,216
>24	2,791



PIR vs Pressure and Diameter



Scope of Newly Regulated Gas Gathering - § 192.8(b) and(c)

GPAC Committee Voting Slides

With regard to the scope of newly regulated gas gathering in § 192.8(b) and (c), the proposed rule as published in the Federal Register and the Draft Regulatory Evaluation, is technically feasible, reasonable, cost-effective, and practicable if PHMSA considers the following:

- Establish an initial framework to build upon based on future information and experience.
- Set a minimum set of requirements for pipelines 8.625 inches in diameter and greater (considering, for example: damage prevention; line markers; public awareness; leak surveys and repairs; design, installation, construction, and initial inspection and testing for new lines; and emergency plans). Give due consideration to the GPAC discussion on leak surveys.
- Consider applying a PIR concept and additional requirements to provide safety and environmental protection for larger diameter pipelines (e.g., greater than 12.75”).
- Ensure that composite pipe is adequately addressed to minimize the impact on its continued use.



Planned PHMSA Research

- R&D study to review the safety, materials and design requirements for in service and future service natural gas transmission and gathering pipelines regulated under 49 CFR Part 192 that use non-steel pipe or steel pipe connected by non-welding techniques.
- A review of such systems is sought operating over 125 psig to 2180 psig pressure and over 100 degrees Fahrenheit. **The following key questions should answered:**
 - Should there be limits for maximum operating pressure and temperature?
 - What should be the operating life span? What parameters should be reviewed, tests conducted, and updated (maintained) to achieve the operating life span?
 - Should these type pipes have a periodic test program to ensure material properties are not degrading? What should be included in an optimum type test program (type of tests, test interval)?
 - What material, design, construction, operating and integrity management aspects of Part 192 or relevant consensus standards should be used?



Planned PHMSA Research

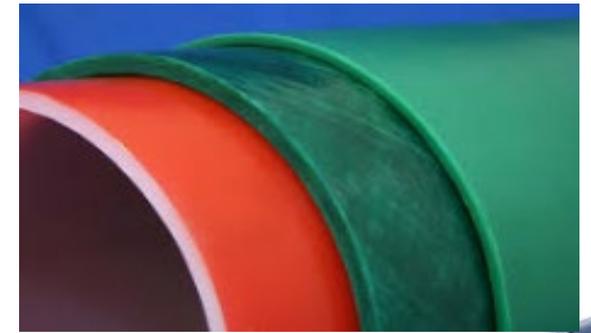
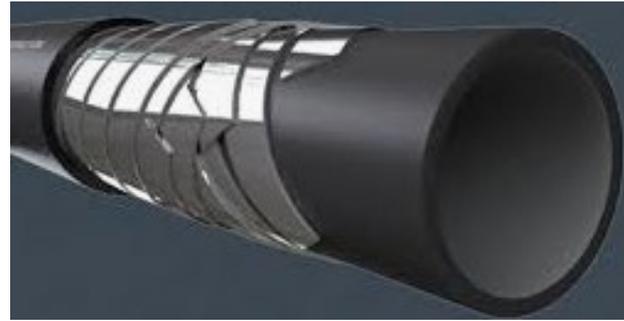
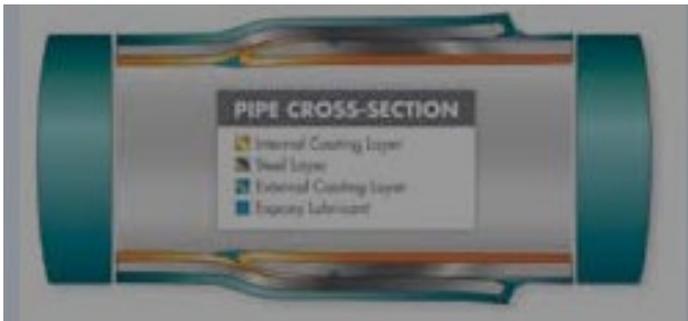
- **The following key questions should be answered:**

- What new items should be added to Part 192 just for the unique properties of the pipe - such as:
 - repair (when? and how?),
 - operating pressure and safe pressure calculations,
 - bending,
 - depth of cover for prevention of 3rd party damage, leakage where there are multiple layers,
 - effects of ultraviolet rays on the pipe for storage and transportation,
 - loss of strength over time,
 - loss of MAOP due to anomaly growth (corrosion, denting, cracking, etc.),
 - pressure cycling and fatigue effects,
 - other chemical/petroleum effects on the pipe,
 - need for cathodic protection, etc.



Planned PHMSA Research

- **The following key questions should be answered:**
 - Under what conditions should or shouldn't - non-steel pipe be allowed in Class 2, 3, and 4 locations, high consequence areas, freeway/railroad crossings, waterways, etc.
 - What type design, construction, maintenance and integrity management activities should be performed, if it is allowed?
 - What Construction Operator Qualifications (OQ) and Operational OQ requirements should be placed on the Pipeline Operator?
 - What should the training program include?



Thank You!/Research Contacts

Sentho White

Director – Engineering & Research
Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(202) 366-2415
Email sentho.white@dot.gov

Robert Smith

Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(919) 238-4759
Email robert.w.smith@dot.gov

Joshua Arnold

Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(202) 366-6085
Email joshua.arnold@dot.gov

Zhongquan Zhou (ZZ)

Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(202)-366-0318
Email zhongquan.zhou@dot.gov

Visit us at <https://www.phmsa.dot.gov/> and search “Research”

