Who is INGAA?

INGAA represents the majority of the interstate natural gas transmission pipeline companies operating in the U.S., as well as comparable companies in Canada. Its members transport the nation's natural gas through a network of roughly 200,000 miles of pipelines.
The INGAA Foundation

• The INGAA Foundation sponsors research, educational forums and dialogue among stakeholders on a wide variety of issues in connection with interstate natural gas pipelines.

• Membership in the INGAA Foundation is open to natural gas pipelines and companies that provide goods and services to pipelines worldwide, including:
  - Pipelines
  - Construction companies
  - Engineering firms
  - Pipe, compressor manufacturers
  - Other suppliers of goods and services to the pipeline industry
The INGAA Foundation completed a study, “The Role of Pipeline Age in Pipeline Safety,” prepared by Kiefner and Associates in November 2012.

The study reviewed PHMSA incident data from 1992 through 2011.

- This data represented 305,000 pipeline miles and had an incident rate of .00034 per mile per year.

Keifner and Associates conducted an in depth analysis of 2002 - 2009 data to determine if there was a correlation between pipeline age and pipeline safety.
Pipelines in the U.S.

• How old are pipelines?
  - Almost half of the U.S. interstate transmission mileage was installed between 1950 and 1970.
  - Infrastructure installation:
    - 12% installed prior to 1950,
    - 37% installed prior to 1960,
    - 60% installed prior to 1970,
    - 70% installed prior to 1980,
    - 80% instated prior to 1990, and
    - 90% installed prior to 2000.
Pipe installed by decade

Percentage of Pipe Mileage Installed by Decade

Pipe (% of mileage)

- <1920 or Unkn
- 1920-29
- 1930-39
- 1940-49
- 1950-59
- 1960-69
- 1970-79
- 1980-89
- 1990-99
- 2000+
The INGAA Foundation Study

- From 2002 through 2009, 598 incidents occurred that identified pipeline age on the PHMSA incident report.
- Of this data set, 85% (or 507) of the incidents did not have a correlation with pipeline age.
- The study identified six categories where the age of the pipeline could have impacted the cause of the incident:
  - external corrosion
  - heavy rains/floods
  - third party excavations
  - body of pipe (manufacturing related)
  - component-related
  - butt-weld-related
The INGAA Foundation Study Findings

• The safety of a natural gas transmission pipeline is not necessarily related to its age:
  - 85% of pipeline incidents reported to PHMSA from 2002-2009 occurred irrespective of the age of the pipeline.
  - The properties of the steels which comprise natural gas pipelines do not change with time; that is, the pipe does not “wear out.”
  - A well-maintained and periodically assessed pipeline can safely transport natural gas indefinitely
INGAA members’ are committed to pipeline safety

- **Our goal is zero incidents** - a perfect record of safety and reliability for the national pipeline system. *We will work every day toward this goal.*

- **We are committed to safety culture** as a critical dimension to continuously improve our industry’s performance.

- **We will be relentless in our pursuit of improving** by learning from the past and anticipating the future.

- **We are committed to applying integrity management principles on a system-wide basis.**

- **We will engage our stakeholders** - from the local community to the national level - so they understand and can participate in reducing risk.
Approximately 73% of Members’ Mileage Has Been Assessed By YE 2014

Source: PHMSA Annual Report 2004 through 2014, F 7100.2-1; on-shore gas transmission; INGAA Members as of 2015
Note: Assessments beginning with Integrity Management for HCAs in 2004; many members had been using ILI since 1990s
### INGAA Members Pressure Testing History

<table>
<thead>
<tr>
<th>Pressure Test &gt; 1.25 x MAOP</th>
<th>Mileage</th>
<th>Percentage of Mileage</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCAs</td>
<td>10,295.6</td>
<td>88.6</td>
</tr>
<tr>
<td>Non-HCA Class 3 and 4</td>
<td>6,648.4</td>
<td>78.1</td>
</tr>
<tr>
<td>Non-HCA Class 2</td>
<td>13,913.4</td>
<td>78.3</td>
</tr>
<tr>
<td>Non-HCA Class 1</td>
<td>92,612.7</td>
<td>67.2</td>
</tr>
<tr>
<td>All Miles</td>
<td>123,470.0</td>
<td>70.2</td>
</tr>
<tr>
<td>HCAs and Non HCA Class 3 and 4*</td>
<td>16,944.0</td>
<td>84.1</td>
</tr>
</tbody>
</table>

PLSA of 2011 required Secretary to issue regulations for conducting tests for demonstrating material strength for previously untested HCAs > 30% SMYS by July 2013.

INGAA developed a Fitness For Service Process for previously untested pipelines and published it in May 2012; included use of pressure testing or ILI.

*INGAA commitment is to apply FFS for HCAs by 2020 and Non-HCA Class 3 and medium risk Non- HCA Class 1 and 2 by 2030.
What the INGAA Foundation is Doing

Making Safety Personal

Building Interstate Natural Gas Transmission Pipelines: A Primer

Overview of Construction Quality Management Systems

Practical Implementation of Construction Quality Management Systems

Best Practices In Applying API 1104, Appendix A

Specification and Purchase Of Segmentable Induction Bends and Elbows

Safety Management Systems

Guidelines for Parallel Construction of Pipelines

Field Applied Coatings Best Practices

Guidelines for Natural Gas Line Crossings

Guidelines on Winter Construction

Training Guidance For Welding & Coating Construction Workers and Inspectors

Third Party Construction Inspector Guidelines

Pipeline Construction Safety Guidelines

Best Practices In Applying API 1104, Appendix A

Safety Management Systems

Field Applied Coatings Best Practices

Guidelines on Winter Construction

Third Party Construction Inspector Guidelines
Understanding Incidents in 2010s

Average number of annual incidents from 2005 through 2013 per 10,000 miles of onshore gas transmission pipe (by decade of pipe installation)

Rate of Incidents (incident per 10,000 miles)

- Red: Rate of Annual Incidents
- Teal: Rate of Annual Incidents without Natural Force and Other Outside Force Damage
- Yellow: Rate of Annual Incidents without Natural Force, Other Outside Force Damage and Equipment Failures
Construction Related Failures

• For pipelines installed in the 2010 decade there were a total of 11 incidents that occurred from 2010 through 2013.

• Of the 11 incidents that occurred three are attributable to construction.
  - Earth settlement that stressed and broke a one-inch power gas line. (2010)
  - A rupture occurred on a 30-inch pipeline do to mechanical damage that occurred during construction. (2011)
  - During the installation of a new pipeline contact was made with the existing adjacent pipeline. (2010)