

# Pipeline Safety

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**Additional Actions Could Improve Federal Use of  
Data on Pipeline Materials and Corrosion  
([GAO-17-639](#)) August 3, 2017**

# U.S. Government Accountability Office

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## Source of This Report

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- The Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016 required GAO to report on a variety of topics including pipeline materials, training, and corrosion prevention technologies for gas and hazardous liquid pipelines.
- The PIPES Act includes several other mandates for GAO reports, which are forthcoming.

## Research Objectives

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1. Describe the pipeline materials and corrosion prevention technologies used in the gas and hazardous liquid pipeline network and their respective benefits and limitations
2. Assess how selected pipeline operators train personnel to manage corrosion and the challenges that exist in ensuring personnel are qualified
3. **Evaluate how PHMSA uses data on pipelines and corrosion prevention to inform its inspection priorities.**

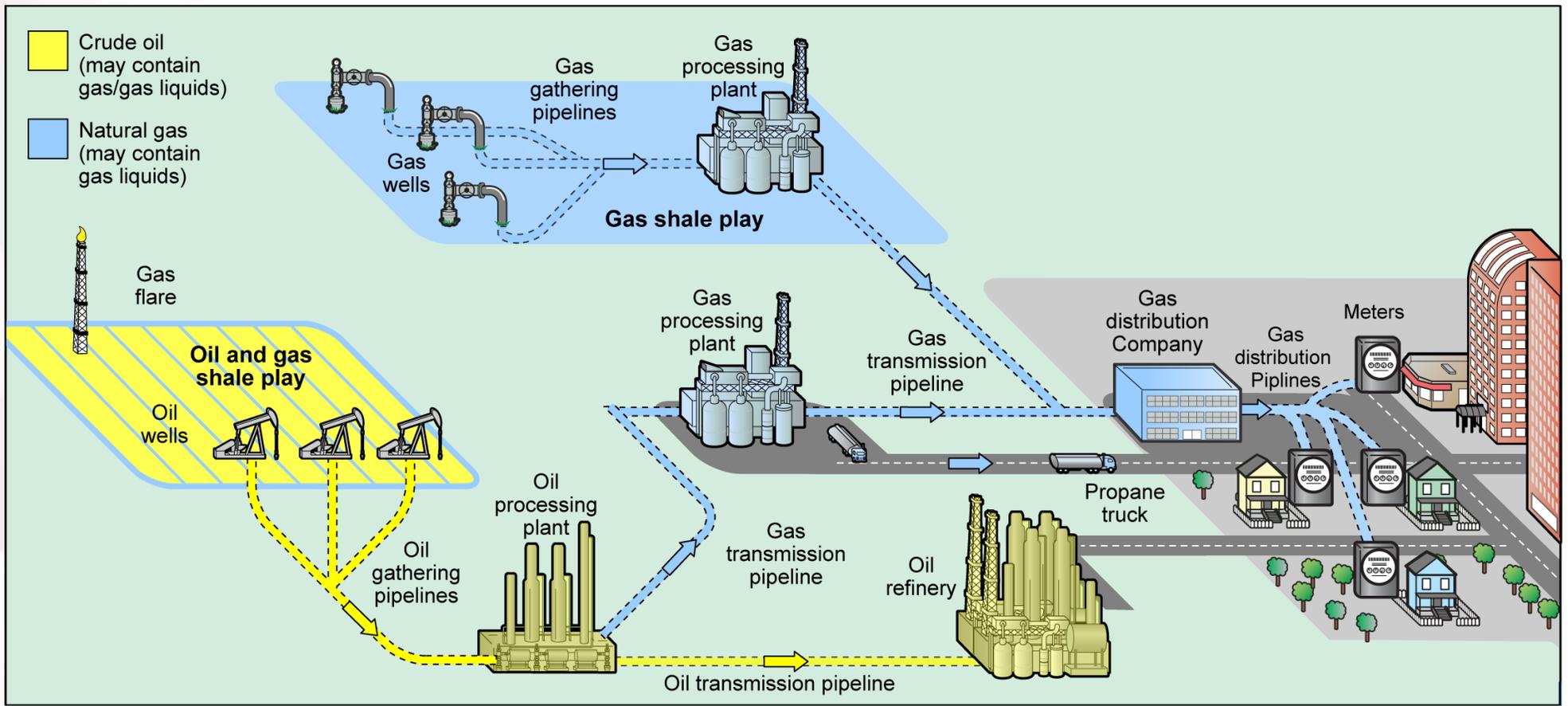
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## Methodology (3<sup>rd</sup> Objective)

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- Analyzed and assessed the reliability of PHMSA inspection and enforcement data
- Evaluated PHMSA's use of these data in its Risk Ranking Index Model which PHMSA uses to rank the relative risk of pipelines and prioritize its annual inspections of pipeline operators.
- We compared PHMSA's approach to risk management guidance developed by GAO and the Office of Management and Budget (OMB), and PHMSA's strategic objectives

# Background: U.S. Energy Pipeline Network



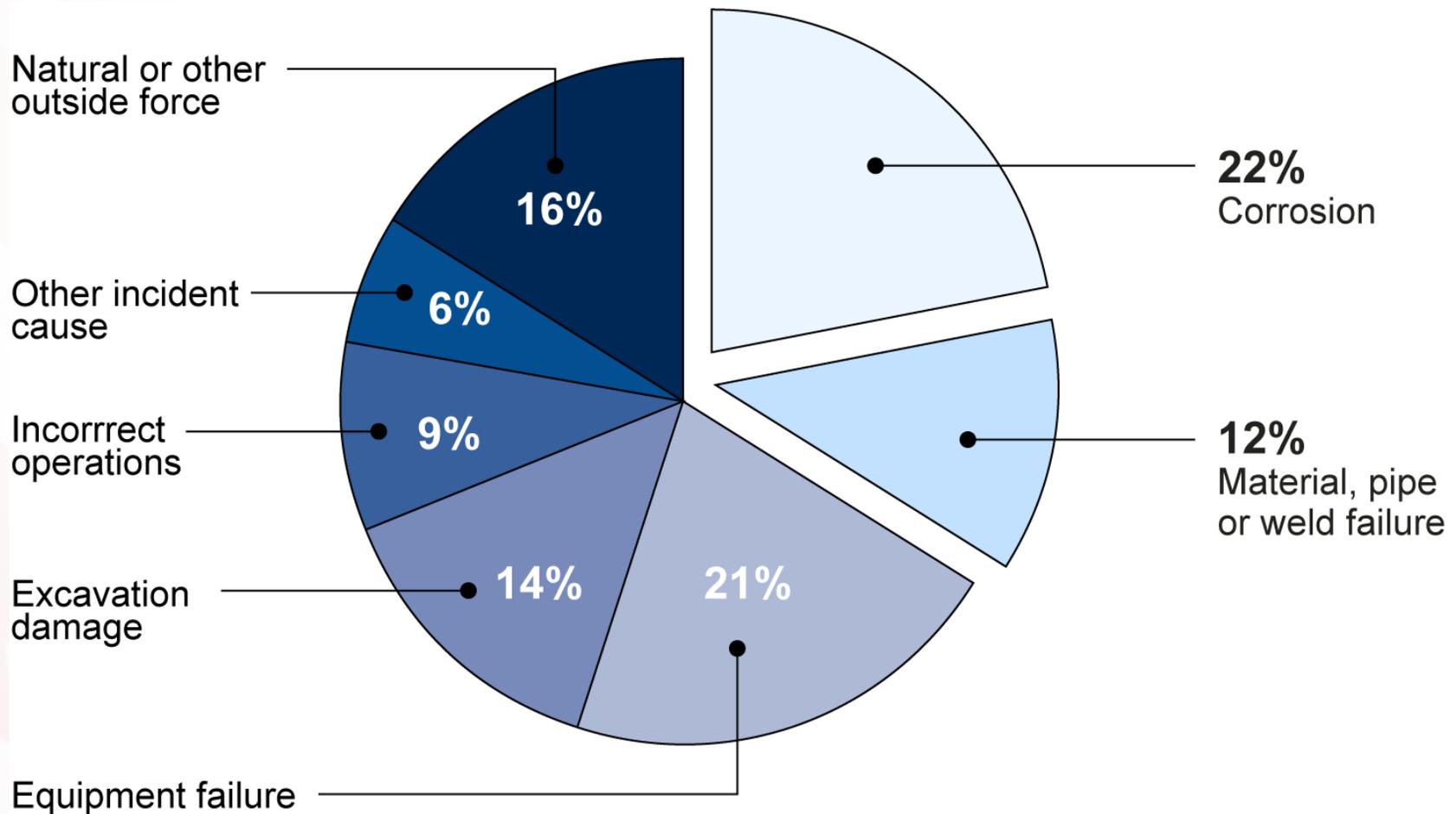
Source: GAO. | GAO-17-639

## Background: Interstate Pipeline Inspections

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- Pipeline operators take primary responsibility for the integrity of their pipelines
- PHMSA and states conduct inspections to ensure operator compliance with federal safety regulations
- PHMSA and certain states conduct periodic integrated inspections of interstate pipelines, reviewing the entirety of an operator's pipeline safety approach
- PHMSA employs about 200 staff across headquarters and 5 regional offices, with about 130 involved in inspections and enforcement of interstate pipelines.

# Operator-Reported Causes of Significant Pipeline Incidents, 2010–2015 (1,737 total)



Source: GAO analysis of Pipeline and Hazardous Materials Safety Administration (PHMSA) information. | GAO-17-639

## Findings: PHMSA's Use of Pipeline Data

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- **PHMSA Uses Data on Pipelines and Corrosion Prevention to Prioritize Inspections, but Lacks a Process to Assess and Validate the Effectiveness of Its Approach**
- PHMSA uses its Risk Ranking Index Model to generate a risk score for each federally inspected pipeline to determine the frequency of federal inspections.
- High, medium, and low risk pipeline systems are inspected at least once every 3, 5, and 7 years, respectively.

# Selected Threat Factors and Weighting Used in the Risk Ranking Index Model

Threat factor	Description	Weight
<b>Unit miles</b>	The number of miles in each pipeline unit subject to inspection	Weighted 0-3 based on proportion of unit miles to total network miles
<b>Bare pipe mileage</b>	Unit miles that lack a protective external coating	Weighted 0-2 based on the proportion of bare pipe to unit miles
<b>Ineffective coating</b>	Unit miles where the protective external coating may not adhere to the pipe	Weighted 2 if ineffective coating is present, or zero if none
<b>Significant incidents</b>	Involving a fatality, injury, or \$50,000 or more in total costs, over the last 5 years	Weighted 0-10 based on the number of incidents and other factors

## PHMSA Lacks Documentation and Data for Key Decisions in Its Risk Ranking Index Model

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- **Selection of threat factors and weights:** Certain threat factors, such as bare pipe, are known as problematic, but PHMSA did not document how weights were set, or whether data was used to determine weight values
- **Thresholds for risk tiers:** PHMSA did not document how it established the risk tiers for RRIM: High = 30+; Medium = 5 to 29; Low = less than 5
- **Inspection frequency:** PHMSA did not document how it determined inspection frequencies of 3, 5, and 7 years for low, medium, and high risk pipelines were appropriate

# PHMSA Has Not Used Data to Evaluate the Model's Effectiveness in Prioritizing Inspections

## Results of PHMSA 2016 Risk Ranking Index Model

Risk Rating	Average length of Pipeline Inspection System	Percent of Pipeline Miles Inspected
High	1,841 miles	More than 70 percent
Medium	358 miles,	Almost 30 percent
Low	49 miles	Less than 1 percent

- 70% of PHMSA inspected pipeline miles inspected every 3 years
- PHMSA has not evaluated the effectiveness of the model to manage its limited inspection resources

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## GAO Recommendations

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To assess and validate the effectiveness of PHMSA's Risk Ranking Index Model in prioritizing pipelines for inspection, GAO recommended that PHMSA:

1. Document the decisions and underlying assumptions for the design of its Risk Ranking Index Model including what data and information were analyzed as part of determining each component of the model;
2. Establish and implement a process that uses data to periodically review and assess the effectiveness of the model in prioritizing pipelines for inspection and document the results of these analyses.



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