

GAO Highlights

Highlights of [GAO-17-639](#), a report to congressional committees

Why GAO Did This Study

The U.S. energy pipeline network is composed of over 2.7-million miles of pipelines transporting gas and hazardous liquids. While pipelines are a relatively safe mode of transportation, incidents caused by material failures and corrosion may result in fatalities and environmental damage. PHMSA, an agency within the Department of Transportation, inspects pipeline operators and oversees safety regulations.

2016 pipeline safety legislation included a provision for GAO to examine a variety of topics related to pipeline materials and corrosion. This report addresses: (1) the materials and corrosion-prevention technologies used in the pipeline network and their benefits and limitations and (2) how PHMSA uses data on pipelines and corrosion to inform inspection priorities, among other topics. GAO analyzed PHMSA's 2010–2016 data; reviewed PHMSA regulations; and interviewed PHMSA officials and representatives of nine states selected based on pipeline inspection roles, eight pipeline operators—providing a range of sizes, geographic locations, and other factors—and eight stakeholders selected for expertise on pipeline and corrosion issues.

What GAO Recommends

GAO recommends that PHMSA document the design of its Risk Ranking Index Model and implement a process that uses data to periodically assess the model's effectiveness. The Department of Transportation agreed with our recommendation and provided technical comments, which we incorporated as appropriate.

View [GAO-17-639](#). For more information, contact Susan Fleming at (202) 512-2834 or FlemingS@gao.gov.

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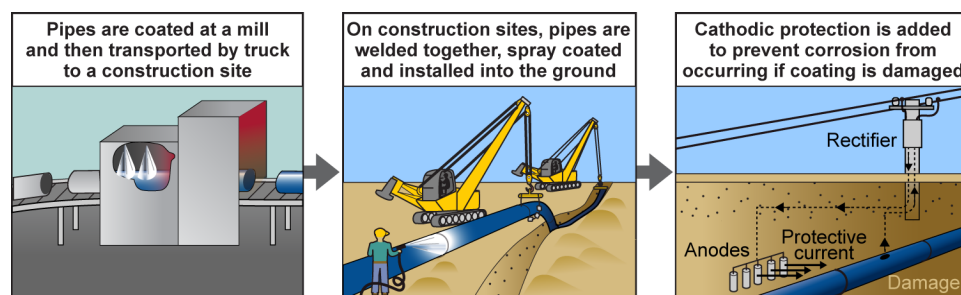
PIPELINE SAFETY

Additional Actions Could Improve Federal Use of Data on Pipeline Materials and Corrosion

What GAO Found

The U.S. gas and hazardous liquid pipeline network is constructed primarily of steel and plastic pipes, both of which offer benefits and limitations that present trade-offs to pipeline operators, as do corrosion prevention technology options. According to data from the Pipeline and Hazardous Materials Safety Administration (PHMSA), over 98 percent of federally regulated pipelines that gather natural gas and other gases and hazardous liquid products, such as oil, and transmit those products across long distances are made of steel. An increasing majority of pipelines that distribute natural gas to homes and businesses are made of plastics. Steel pipelines are manufactured in various grades to accommodate higher operating pressures, but require corrosion protection and cost more than plastics, according to operators and experts. In contrast, plastics and emerging composite materials generally are corrosion-resistant, but lack the strength to accommodate high-operating pressures. Operators use a range of technologies to protect steel pipes from corrosion, including applying coatings and cathodic protection, which applies an electrical current to the pipe. (See fig.) While such technologies are generally considered effective, operators and experts stated that coatings degrade over time and that cathodic protection requires ongoing maintenance and costs to deliver the current over long pipeline distances, among other considerations.

Application and Installation of Pipeline Coating and Cathodic Protection



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

PHMSA uses materials and corrosion data collected from operators in its Risk Ranking Index Model to determine the frequency of PHMSA's inspections of operators based on threats, such as ineffective coatings, to pipeline integrity. PHMSA officials said they used professional judgment to develop their model, but did not document key decisions for: (1) the threat factors selected, (2) their associated weights, or (3) the thresholds for high, medium, and low risk tiers for pipeline segments inspected by PHMSA. Moreover, PHMSA has not used data to assess its model's overall effectiveness, as would be consistent with federal management principles. PHMSA officials said they have not established an evaluation process because they consider the model to be effective in prioritizing inspections. Although PHMSA officials said they analyzed the model when they developed it in 2012, they have not done so since that time and did not document the results of this initial analysis. Without documentation and a data-driven evaluation process, PHMSA cannot demonstrate the effectiveness of the model it uses to allocate PHMSA's limited inspection resources.