

Methodology for Assessing the Effects of Plain Dents, Wrinkle Bends, and Mechanical Damage on Pipeline Integrity

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ABSTRACT

According to statistics compiled by the U.S. Office of Pipeline Safety, mechanical damage is one of the primary causes of pipeline failures in the United States. For more than 30 years a significant body of research has been collected in an effort to understand the failure mechanisms and mechanics associated with pipeline defects that include plain dents, wrinkle bends, and mechanical damage involving dents with gouges. In the U.S. organizations such as the Pipeline Research Council International, Gas Technology Institute, and the American Petroleum Institute have led the change in funding these research efforts, as well as other efforts from research organizations around the world.

While some guidance is provided by the ASME B31.4 and B31.8 pipeline codes in assessing pipeline damage, there is no single document that captures the lessons learned from the extensive body of research and experience that currently exists. To a large extent this is related to the complexity of the subject; however, there is a significant need to develop for industry a method for ranking the severity of pipeline damage. At the present time there is no single method for doing this. This paper will provide insights on a proposed three-tiered system to help operators determine which defects represent the most serious threat to the mechanical integrity of their systems. The intent is to provide operators with a grading tool based on research testing, material characteristics, experience, and dent mechanics in order for repairs to be made in a manner that ensures the safe operation of pipeline systems.

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