Southwest Research Institute®

KEYWORDS

Transmission Pipelines

Distribution Systems

Natural Gas

Liquids Lines

Localized Corrosion

Microbially Influenced Corrosion

In-line Integrity Monitoring

Integrity Assessment Tools

Cathodic Protection

Customized Testing

Pipeline Integrity

Southwest Research Institute® (SwRI®) has been actively serving the needs of the pipeline industry for over 30 years and is an internationally recognized center for mate-rial property, corrosion, fracture mechanics, and failure analysis services for metallic and non-metallic components. The engineering staff has provided both technology development and services to support the natural gas distribution and transmission systems. As part of this effort, SwRI has conducted a wide range of pipeline integrity related programs using both standard and custom testing and computational capabilities and approaches.

Internal Corrosion Direct Assessment (ICDA) Methodology Validation

SwRI led the industry's successful efforts to validate the ICDA methodology to predict possible locations of internal pipeline corrosion. The methodology essentially relies upon a fluid dynamics modeling approach to predict the critical inclination angles for water holdup leading to corrosion. SwRI engineers have taken this approach in a significant new direction by considering the possible variations and uncertainties associated with gas quality, pipeline location, and other variables to predict the probability of water holdup at any given location.

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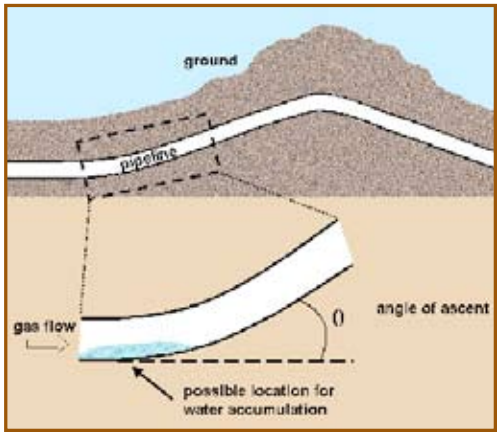
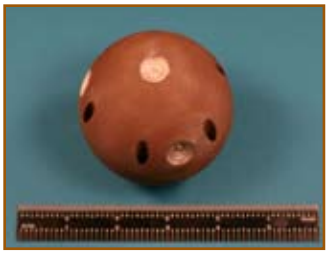


SwRI developed the methodology for Internal Corrosion Direct Assessment (ICDA) of dry gas which identifies the locations most likely to experience corrosion. SwRI is currently expanding the ICDA concept to consider operational uncertainties as well as novel assessment tools capable of exploring non-pigable pipe systems.

Fluidized Sensor Development

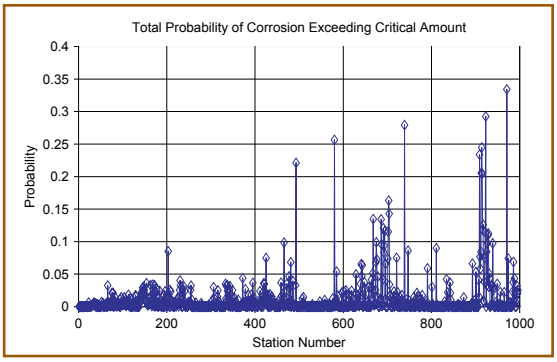
Though the ICDA approach provides valuable information about possible locations for water accumulation and aids in prioritizing inspection locations, it does not actually determine if water is really present and how corrosive it may be. SwRI has recently embarked on a program to develop a distributed wireless sensor network that can be introduced into the pipeline to accomplish this. The sensors are small enough to be used in non-pigable lines and are being designed to "flow" with the entrapped water in the gas stream. In addition, these sensors are autonomous in that they each form part of the backbone of a wireless microcomputer network.



Though originally developed for natural gas transmission pipelines, the concept is also under consideration for use in natural gas distribution systems and liquid pipelines.

Prediction of Reassessment Intervals

SwRI is currently pursuing methodologies to optimize pipeline reinspection intervals for internal and external corrosion. The objectives of this program are to develop easy-to-implement methods based on sound physical principles to estimate (1) external corrosion rates, especially in CP-shielded areas, and (2) internal corrosion rates by considering pipeline-relevant factors for gas and liquid lines.



Other Capabilities

SwRI also has extensive experience in fatigue, corrosion fatigue, and stress corrosion crack testing of pipeline systems including full-scale pipe testing. In addition, SwRI has designed and constructed unique test facilities (e.g., high-pressure microbial corrosion testing), conducted comparative product evaluations, and developed technology needs roadmaps for the pipeline industry.

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SwRI's testing facilities contain over 6,500 square feet for analytical testing as well as space for full-scale testing.

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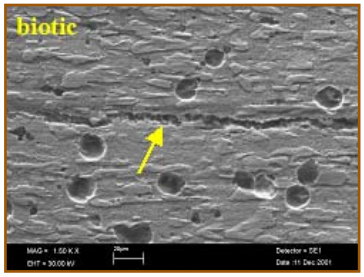
SwRI developed and implemented multi-electrode array sensor (MAS) probes to monitor localized corrosion of chemical process system components in real time.

SwRI designed and constructed a specialized test system to enable examination of microbially influenced corrosion of pipelines at elevated pressures to explore possible telltale fingerprints associated with biotic corrosion.



Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,200 employees who perform contract work for industry and government clients.

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