

## Incorporating Interactive Threats in Kiefner/NYGAS and other Risk Models

**Description:** The project is defining and prioritizing interacting threats that impact pipeline integrity. Once consensus is reached, a more robust treatment of interactive threats will be incorporated in the Kiefner/NYGAS risk model and information will be provided to upgrade other risk models.

**Status:** Subject Matter Experts (SMEs) are working with NYSEARCH and Kiefner team to address the range and impact of various threats on pipeline integrity that can interact.

### BENEFITS

NYSEARCH member operators use various types of risk models to aid decision-making on pipeline integrity management. Current risk models have been developed broadly and serve the industry in scoring and ranking threats to the pipeline. While threats to the pipeline are considered in some models in combination, there is less emphasis in the current models on combinations of threats than individual mechanisms. A project to define, assess and prioritize the practical interaction of threats to a pipeline would aid decision-making, improve safety and address a concern that state and federal regulators have raised regarding integrity management.

### BACKGROUND

The New York Gas Group, the predecessor parent organization of NYSEARCH, developed in the late 1990s, a risk assessment model with Kiefner Inc. The purpose of that effort was to determine the relative level of risk involved in operating the various segments of its transmission pipeline system and to help the operator make sound pipeline integrity decisions regarding operation, maintenance and risk mitigation. Since that time, the model has been updated and used for a variety of applications throughout North America for pipeline integrity assessments.

In 2011, operators and regulators identified the need for an enhanced look at how the known individual threats to a pipeline interact and the impact of interactions in risk assessment. Thus, using the Kiefner model and the background of prior SME work with Kiefner, it was agreed that NYSEARCH members would develop more information on interactive threats and upgrade algorithms for both the Kiefner Risk Model and for use with other risk assessment models.



Figure 1: Exposed Pipe as Part of Integrity Assessment

### TECHNICAL APPROACH

From public workshops with regulators and operator discussions, currently, there is no one common list or definition of interactive threats. Industry and regulators agree that there are some key areas in the integrity management arena that are spelled out in ASME B31.8 S on Gas Transmission and Distribution systems that are the most relevant.

The objective of this project is to identify and quantify effects of interactive threats and to incorporate that methodology into the Kiefner risk assessment model as well as stand-alone software (for users to incorporate into other risk models where appropriate). The nine top threats listed in ASME code are: external corrosion, internal corrosion, stress corrosion cracking, manufacturing related defects, welding/fabrication related defects, equipment, third party/mechanical damage, incorrect operational procedure, and weather-related and outside force. Examples of important combinations to explore are a combination of corrosion and mechanical damage, welds and natural forces (soil movement), etc.

In the project, there are various activities being pursued. Through database research and consortium sharing of information and experiences, both Kiefner and SMEs are analyzing several combinations of interactive threats and developing consensus on what should be the primary considerations. They are looking to those threats that are systematic and repeatable in combination and will develop a methodology for computing a score of the

interaction or relative weighting factors. They will investigate specific examples of interactive threats that are included in the selected list as well as compare that to PHMSA and other databases. Also, they will form a basis for assessing whether combinations of specific risks are greater than the sum of individual risks. Finally, after a thorough review in a GO/NO GO milestone in the project, Kiefner will update the risk model and also provide algorithms or a spreadsheet module that individual funding companies can use with their own risk management software.

### PROGRAM STATUS

The project was initiated in the fall of 2011 and the consortium is actively working on defining and researching the potential combinations of interactive threats. Various approaches are being discussed and Kiefner is using both research results and heavy input by SMEs on recommended combinations.

The project schedule is aggressive and the deliverables for this project are expected by mid-2012.



Figure 2: Assessing Defect Threat

### Highlights

- Collective effort by gas industry SMEs and expert risk modelers to perform a detailed investigation of potential interaction of pipeline integrity threats
- Approaches to scoring and model changes will be based on technical and practical input

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