## Executive Summary

In this paper, we show a simulator-based implementation of the Generalized Likelihood Ratio method to detect leaks and locate biases in pipelines. We compare its leak detection ability, costs, and levels of tuning required to those of other software and hardware leak detection methods.  Both software and hardware methods were researched and compared based on leak detection ability, base cost, cost of implementation, levels of tuning required, and cost of crew required.  The economic comparison includes computing the losses for not detecting the leaks.  The Generalized Likelihood Ratio (GLR) was compared with the ultrasonic, volume balance, and pressure analysis methods.

It was found that GLR is the most economic leak detection method available. GLR finds smaller leaks in the pipeline, which prevents larger leaks from occurring later on.  This results in fewer fines for leaks and also less lost production.  Simulations were run with varying pipe diameters, price of oil, and cost of leak clean up.  Simulations were run for a single pipeline as well as for a gathering/distribution network.   In both cases GLR showed to be the best method.