

A Risk-Based Approach to Managing Gas Pipeline Methane Emissions

PHMSA Advisory Bulletin – 2021-0050

The recent PHMSA advisory bulletin from June 7th reminds gas pipeline operators of the PIPES Act of 2020 mandate to address methane emissions through updating their operating and maintenance plans to address the elimination of hazardous leaks and to minimize releases of natural gas. The statute also requires operators to address the replacement or remediation of pipeline facilities that are known to leak based on their material, design or past operating and maintenance history. Compliance is required by December 27, 2021.

Operators' revised plans will be inspected in 2022. PHMSA and state inspectors will evaluate the steps taken to prevent and mitigate both unintentional, fugitive emissions and intentional, vented emissions. PHMSA and state inspectors will also include an evaluation of "how the material present in the pipeline system, design of the system, as well as the past O&M history of the system, contribute to the leaks that occur on the system" and whether operators' plans adequately address reducing leaks due to those factors.

For fugitive emissions, with millions of assets in the gas distribution pipeline system, developing defensible plans is a challenging task. Assets have a range of material types, ages, different gas release volumes based on asset and threat type, different failure probabilities, etc., which make it difficult to address this mandate.

True probabilistic risk models enable operators to predict overall system leaks on a granular basis and, through the consequence models, assess the volume of current and future gas release.

Reliably Predicting System Methane Emissions

How do gas pipeline operators know the right level of activities to reduce methane emissions? And how can they optimize those activities? Probabilistic risk models can provide operators with the ability to address both challenges and develop solid, defensible and forward-looking methane emissions reduction plans for their fugitive emissions.

There are two ways to reduce fugitive gas pipeline emissions: (1) through finding and removing existing leaks and (2) through proactively replacing assets prior to leaking. Probabilistic risk models enable operators to understand fugitive methane emissions,

how they will evolve over time and what actions are required to reduce emissions to specific levels through leak survey and replacement programs. Operators using probabilistic risk models can also optimize their leak survey and replacement programs to reduce methane emissions most effectively.

With scenario assessment tools operators can assess the impact of mitigation activities directly, enabling the development of planning activities to achieve specific methane reduction targets.

Optimized Leak Survey and Replacement Programs

With a predictive, probabilistic approach to risk, targeted leak survey programs can be developed to find and remove leaks in an optimized way. This approach can help operators understand the expected number of leaks in each grid region and expected methane emissions as a result of specific survey activities. Optimized leak survey programs can then be planned considering both risk and methane reductions, leveraging the operator's understanding of the impact of additional leak survey programs on methane reductions to optimize inspection frequencies for methane reduction. The results of these assessments can be fed into a [Leak Survey Management System \(LSMS\)](#) to be used in survey planning.

With a complete picture of risk across the asset base operators can develop optimized replacement programs that consider both risk reduction and methane reduction explicitly. They can understand which assets are most likely to leak in the future and prioritize replacements based on overall risk and future methane reductions. With a quantitative estimate of future leaks and the resulting methane emissions eliminated, operators can look at the Lifetime Methane Reduction Impact (LMRI) of replacement programs — that is, operators can have an explicit estimate of the long-term environmental benefits of the replacement program.

Overall, true probabilistic risk models can provide operators the ability to develop optimized and defensible plans to help address the Pipes Act 2020 methane emissions mandate and be prepared for any future PHMSA and state inspections.