



Conduct DI&M at Remote Sites



Technology/Practice Overview

Description

Fluctuations in pressure, temperature, and mechanical stresses on pipeline components, such as valves and seals, eventually cause them to leak methane. Partners reported extending a directed inspection and maintenance (DI&M) program to remote facilities to reduce these gas losses.

A DI&M program concentrates on components that are prone to leak enough methane to make repairs cost-effective. Such components include valve packing, pneumatic controllers and open-ended lines such as vent and drain connections, blowdown lines, pneumatic engine starter motors, and pressure relief valves.

Specialized infrared (IR) cameras exist that detect hydrocarbon emissions due to their absorption of IR light at certain wavelengths. These IR cameras are

typically used for DI&M programs as these provide the ability to screen hundreds of components per hour, including inaccessible equipment. They operate as a typical handheld camera, converting the scanned area into a moving image in real time such that the gas plumes are visible due to their absorption of the IR light. Other instruments commonly used to detect and measure leaks include acoustic leak detectors, soap bubble screening, electronic screening devices (“sniffers”), high volume samplers, and calibrated bags.

Operating Requirements

Conduct a survey to identify leaking components in the first year of a DI&M program. In subsequent years, focus inspection and repair on the components that are the most likely to leak and that represent cost-effective emissions reduction opportunities.

- Compressors/Engines
- Dehydrators
- Directed Inspection & Maintenance
- Pipelines
- Pneumatics/Controls
- Tanks
- Valves
- Wells
- Other

Applicable Sector(s)

- Production
- Processing
- Transmission
- Distribution

Other Related PROs:

Directed Inspection and Maintenance at Compressor Stations, Lessons Learned

Directed Inspection and Maintenance at Gate Stations and Surface Facilities, Lessons Learned

Directed Inspection and Maintenance at Gas Processing Plants and Booster Stations, Lessons Learned

Test and Repair Pressure Safety Valves, PRO No. 602

Economic and Environmental Benefits

Methane Savings

Estimated annual methane emission reductions *362 Mcf per two components (valve and valve stem seal)*

Economic Evaluation

Estimated Gas Price	Annual Methane Savings	Value of Annual Gas Savings*	Estimated Implementation Cost	Incremental Operating Cost	Payback (months)
\$7.00/Mcf	362 Mcf	\$2,700	\$720	\$200	5 Months
\$5.00/Mcf	362 Mcf	\$1,900	\$720	\$200	6 Months
\$3.00/Mcf	362 Mcf	\$1,200	\$720	\$200	10 Months

* Whole gas savings are calculated using a conversion factor of 94% methane in pipeline quality natural gas.

Additional Benefits

- Increased safety
- More reliable operation

Conduct DI&M at Remote Sites (Cont'd)

Applicability

Applies to surface facilities in remote locations.

Methane Emissions

The estimate of methane savings is based on data and Partner information reported in EPA's Lessons Learned studies on Directed Inspection and Maintenance. Valve stem packing leakage ranges from 1 to 24 Mcf per year; open-ended blow-down valve leakage averages 350 Mcf per year and is reported as high as 14,500 Mcf per year. Partners reported methane emission reductions of 1,200 Mcf, which reflects DI&M at 12 remote sites, and 31,000 Mcf per year reduction, resulting from DI&M of 647 remote components.

Economic Analysis

Basis for Costs and Emissions Savings

Methane emissions savings of 362 Mcf per year are estimated for finding and fixing leaks in one open-ended blowdown valve and one control valve stem seal at a remote gas gathering compressor station. Maintenance cost is estimated for tightening the valve stem-packing gland and refurbishing the blowdown valve in place.

Partners report that leak surveys cost \$200 per station when multiple remote stations are surveyed at one time. Refurbishing a blowdown valve may cost \$720 labor and materials with no capital costs.

Discussion

This practice can provide a payback in less than a year when considering leaks that are cost effective to find and fix. Valve stem packing, open-ended blowdown and engine starter vents and pressure relief valve leaks are frequently found to be cost effective to find and fix, with repair often requiring only valve or packing tightening. Implementation of DI&M at remote sites would also lead to safer operation and increased reliability.

EPA provides the suggested methane emissions estimating methods contained in this document as a tool to develop basic methane emissions estimates only. As regulatory reporting demands a higher-level of accuracy, the methane emission estimating methods and terminology contained in this document may not conform to the Greenhouse Gas Reporting Rule, 40 CFR Part 98, Subpart W methods or those in other EPA regulations.

Methane Content of Natural Gas

The average methane content of natural gas varies by natural gas industry sector. The Natural Gas STAR Program assumes the following methane content of natural gas when estimating methane savings for Partner Reported Opportunities.

Production	79 %
Processing	87 %
Transmission and Distribution	94 %