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INNOVATIVE TECHNOLOGIES TO DETECT AND MEASURE LEAKS

Timothy G. Brown
USA

ABSTARCT

Over the past decade, several new technologies have been introduced to detect and measure leaks in natural gas transmission and distribution networks.

These new advances in optical and laser technology for gas leak detection are catching on fast because they are finding more leaks and finding them much faster than the traditional flame ionization (FI) methods.

Mobile Optical (infrared) instruments offer a distinct advantage because the operator can survey transmission lines at speeds up to 40 km/hr. This results in dramatic gains in productivity for the gas companies using the optical instruments for both transmission and distribution leak detection – approximately 6 – 8 times faster than existing technology.

Adapting laser technology to detecting gas leaks has proven to be a major advantage over traditional instruments because the laser can detect PPM-M at 30 meters (100 feet). It is no longer necessary to walk the entire length of a service line to perform a leak inspection. This has resulted in productivity gains of 40 – 50 percent, as reported by gas companies using the laser technology. In most cases, more leaks are detected than with FI instruments.

Because the laser detects leaks from a distance (remotely) this technology can be used to inspect areas such as bridge crossings, overhead rack-mounted piping, gate stations, and compressor stations etc, where other technologies are difficult or impossible to use.
When used in distribution network leak detection the remote laser instruments have a big advantage because fences, dogs and other access barriers can be inspected without making a repeat visit to the property.

Portable optical (infrared) instruments recently introduced have many advantages over the FI leak detectors:

- Self Calibrating (eliminating the need for external calibration gases)
- Requires no fuel for operation (eliminating hydrogen or hydrogen/nitrogen gas for fuel)
- Methane Specific
- Portable or Mobile Applications
- Range of detection – 1 PPM through 100% gas
- Two instruments in one

Gas leak measurement instruments are becoming increasingly popular because they have the capability to measure the actual rate of leakage from a system component. This takes the guesswork out of estimating the rate of leakage. When a leak can actually be measured, it becomes easy to document the improvements (leak repair), or to determine the cost-effectiveness of a leak repair. With accurate leak measurement, the gas company can:

- Determine Fugitive Emissions and Gas Losses From Facilities
- Determine a Cost-Effective Repair Strategy
- Document Emission Controls for Greenhouse Gas Credits

The new technologies that have been introduced over the past decade offer the biggest improvements in gas leak detection and measurement in more than 40 years. Flame Ionization (FI) has been in use worldwide for 40+ years.

Thus far, optical and laser-based instruments have proven to be reliable replacements for FI instruments. The substantial increases in productivity, coupled with finding more leaks may well be the future for gas leak detection and measurement.

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NEW DETECTION METHODS

Mobile Optical Detector

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Remote Laser Detection

Adapting laser technology to detecting gas leaks has proven to be a major advantage over traditional instruments because the laser can detect PPM-M at 30 meters (100 feet). It is no longer necessary to walk the entire length of a service line to perform a leak inspection. This has resulted in productivity gains of 40 – 50 percent, as reported by gas companies using the laser technology. In most cases, more leaks are detected than with FI instruments.

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There are two models of the laser based instruments – one that is not intrinsically safe, and one model that is intrinsically safe (IS).

The intrinsically safe RMLD can be used in the following applications:

- Above ground metering and regulation stations
- Compressor stations
- Standard components – threaded connectors, unions, flanges, valve stem packing, valves, regulators, meters etc.
- Dehydration and cooling towers

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Gas Imaging Camera

The gas imaging camera is used in the following applications:

- Storage tanks
- Unit valves – when compressors are blown down
- Blow down valves with compressors running or pressurized
- Pressure relief valves that are inaccessible or elevated more than 2 meters off the ground
- General leak screening for potential leaks

Portable Optical Detector

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Gas Leak Measurement

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The measurement instruments that are available on the market today are geared towards above ground components, because the leaking component can be totally “encapsulated” by “bagging” the leak and measuring it directly.

Several methods for measuring leaks in the distribution network are being tested. To date, an accurate and reliable method has not been established. There are several ways to estimate the rate of leakage in the distribution network, with safety being the top priority.

Conclusions

The new technologies that have been introduced over the past decade offer the biggest improvements in gas leak detection and measurement in more than 40 years. Flame Ionization (FI) has been in use worldwide for 40+ years.

Thus far, optical and laser-based instruments have proven to be reliable replacements for FI instruments. The substantial increases in productivity, coupled with finding more leaks may well be the future for gas leak detection and measurement.