Advanced Mobile Leak Detection Solutions

Southern Cross

Tools
Technology
Training

Redefining Traditional Leak Survey Methods

Advanced Mobile Leak Technology (AMLD) Solutions from Southern Cross

INTRODUCTION

Detecting and repairing natural gas leaks in transmission and distribution systems has significant environmental impacts and both economic, and public safety benefits. Methane (CH4) is the primary component of natural gas and it is estimated global oil and gas industries allow as much as 3.6 trillion cubic feet of natural gas to escape into the atmosphere annually. This amounts to approximately $30 billion in lost revenues for these global energy companies2. Methane has far more GHG (Green House Gas) global warming impact than Carbon Monoxide (C02). The impact of Methane is such that it has a global warming potential 86 times greater than CO2 over a 20-year period.

Today, new technology with high-sensitivity mobile Methane / Ethane sensors capable of detecting in parts per billion (PPB) offer a better approach compared to traditional walking surveys for detecting and quantifying natural gas leaks in transmission and distribution systems. Traditional methods of survey deploying a skilled technician with a handheld often miss important leaks. References from various manufacturers indicate that high sensitivity detectors often identify on average three times the number of hazardous leaks compared to traditional methods (approximately 93% of hazardous leaks in a given map compared to 33% with traditional methods on average).

Southern Cross is leading this new wave of technology innovation with its AMLD solution and is re-defining the way we view leak survey by providing faster more reliable data that can be utilized to solve a multitude of issues for our gas utility customers including safety, quality, emissions reductions, and cost-efficiencies. The solution combines decades of field experience with advanced mobile leak detection technology that improves efficiency, accuracy and provides additional value and insight into a utility's assets. In this paper, we are excited to share some insight into this technology and our capabilities. In this way Southern Cross' is providing the best of both worlds - traditional leak detection model with technological benefits of a best-in-class advanced mobile solution.

TRADITIONAL LEAK SURVEY METHODS

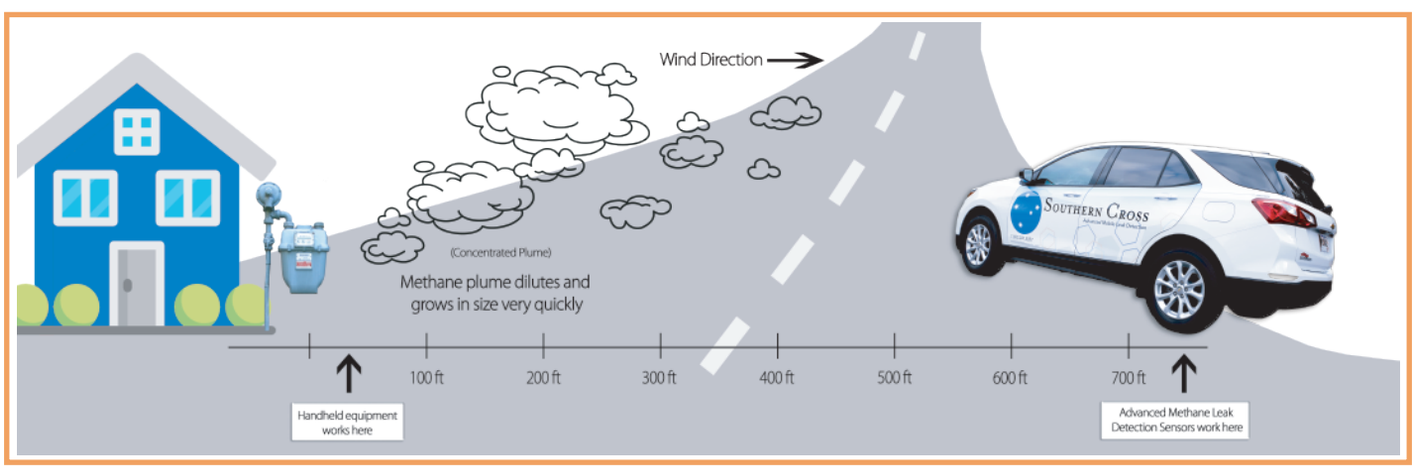
Traditional leak survey methods are slow, time consuming and costly. The leak survey technician has to typically walk near or over the gas mains and service lines and up to each and every meter set in the survey area carrying handheld leak detection instrument. The technician then either inputs the findings in a handheld tablet or fills in some paperwork for reporting purposes. The process is laborious and worst, can lead to missing critical leaks. In a traditional survey, much time is spent on surveying where there aren't any leaks to be found.

What if we could survey large areas of land using today's advance leak detection technologies which then tells us where to go looking for leaks with a very high degree of confidence. More importantly, the solution would tell us where not to look for leaks, while at the same time eliminating false positives. This would let us look at the most critical leaks first, and faster. In essence, this would allow us to prioritize all leak repair activities.

Technology

At the heart of this AMLD solution is a Methane/Ethane detector that is over x1000 times more sensitive than traditional handheld instruments. Combined with big data analytics, environmental conditions such as wind speed and direction, GPS coordinates and Southern Cross' over seven decades of experience, the AMLD system can enhance the value it can deliver to its customers in traditional leak survey, environmental emission quantification, expansion into supporting DIMP modeling and even support our customers in making better decisions around which pipes should be targeted for replacement.

Very high sensitivity Methane/Ethane detectors can measure concentrations of natural gas plumes in parts per billion (PPB). This means that now, natural gas leak plume data can be collected and interpreted from a distance and at a speed and scale not previously possible. Advances in "Big Data" Analytics can then be used to allow better-informed conclusions to be drawn and enable improved decision making and data to support innovation across a number of Leak Survey and detection applications. And gives us the ability to estimate leak density & emissions – the gas flow rate (cubic feet per hour) – of individual leaks or collections of leaks.



Methodology

The vehicular based AMLD system consists of a very high sensitivity Methane / Ethane detector, a sonic anemometer, GPS system and realtime communications to a secured cloud-based system. Data collection performed by driving the vehicle and collecting information on the Methane and Ethane levels together with the environmental conditions such as wind speed and direction, GPS coordinates. This information is sent over a secured communications link in realtime to be processed later.

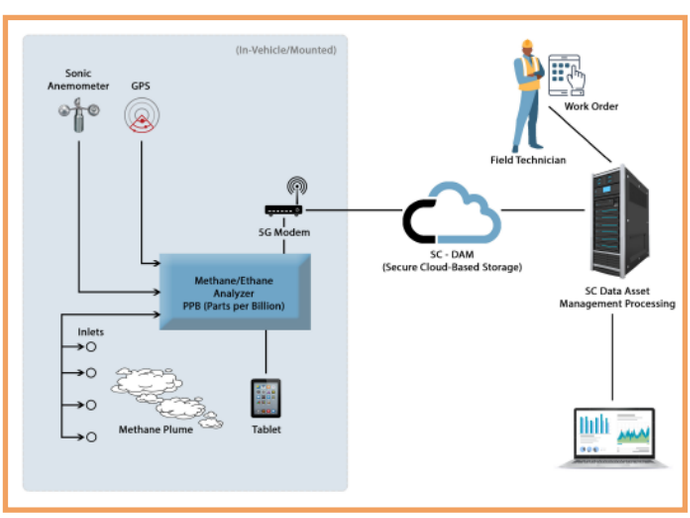
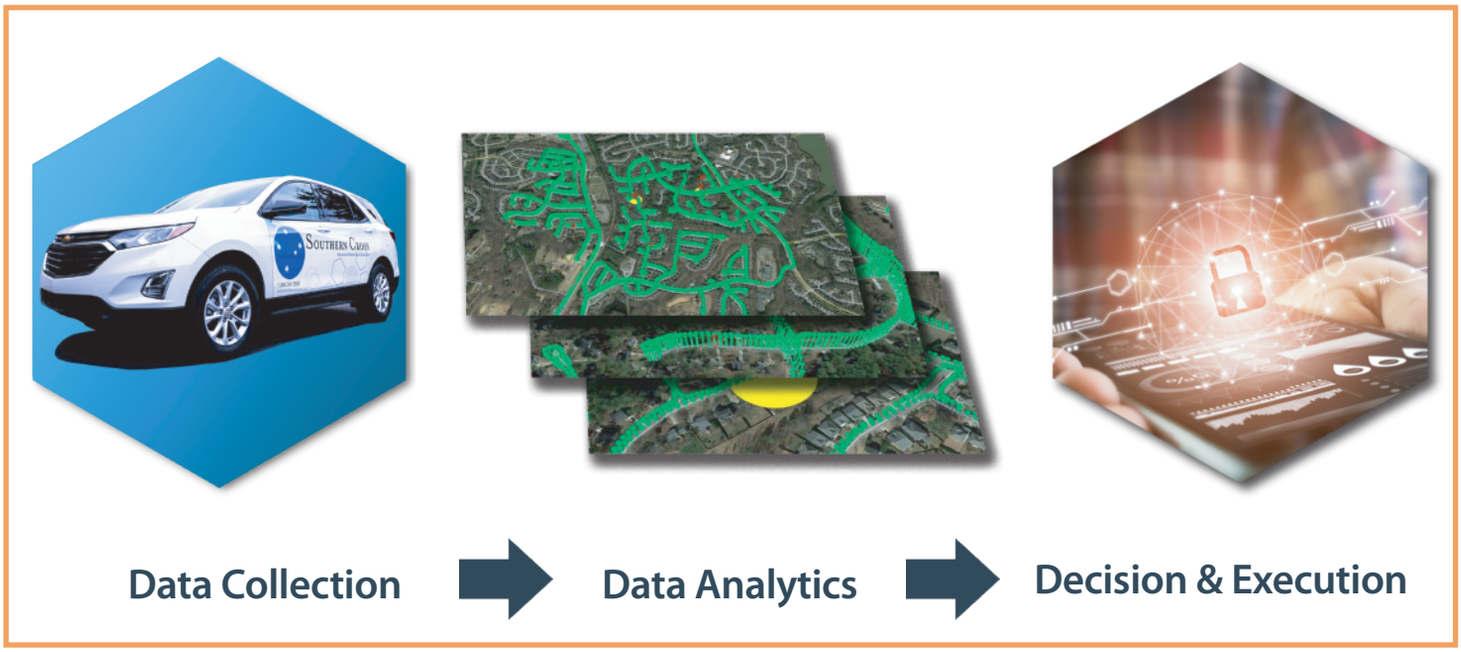


Figure 1.0 Basic Components

Data collection is performed over multiple drives over the same area, usually at nights when the environmental factors are more tempered. Data analytics is then used to ultimately narrow down where traditional surveying needs to be performed based on what the analytics system calculates in the environment combined with GPS and wind data. It is thus a three-step process as shown in Figure 2.0

Figure 2.0 End to End AMLD Process



Driving is simply data collection. Data is collected multiple times over the same area - typically at night. Then, powerful analytics are used to combine the data, removing duplicate and false-positive indications and producing outputs that can be used for analysis and follow up in the field, either for leak survey or other asset integrity management activities.

After all the data is taken, the report generation analytics combine the information and compute a more accurate estimate of the likely leak location, highlighting just those mains and services that need to be searched for the leak. The confidence information from each individual detection is also combined, providing a more accurate prediction as to whether the indication is from a gas leak or not.

Souther Cross has configured the system where the driver at night is only gathering environmental coverage data and is not performing leak survey. Coverage data from multiple drives through an area is processed later and is used to ultimately narrow down where traditional surveying needs to be performed based on what the analytics system calculates in the environment combined with GPS and wind data.

Implications

This ability has enormous implications to how we conduct leak survey using the AMLD technology. Finding leaks through traditional leak survey is highly dependent on weather conditions, knowing where pipelines could be buried combined with an educated understanding of how methane could vent through various ground conditions determines how a technician travel through an area to find a leak. While the traditional model is effective, the sensitivity of the AMLD solution changes the approach by either confirming the presence or a lack of presence of pipeline methane up to distance of several hundred feet. The technician's role then, evolves from knowing exactly where a pipe is buried and trying to walk over where a leak might be to now know that either no methane is present (No Leaks!) or methane is confirmed to be present and the technician needs to pinpoint the source. This means that large areas of land can be surveyed using this technology and the analytics will pinpoint the source of the leaks and rank them by category based on emissions. Now we can mitigate the risks by going first to the areas with the highest emissions and then work our way down. Areas where the AMLD confirms no leaks do not need to be investigated. This saves time and money.

Typical Applications

Regulatory Compliance Survey

DIMP Asset Management

Environmental and Emissions Reduction Programs

Frost Patrol

Auditing Traditional Leak Surveys

Pre-Event and Public Safety Audits

Disaster Recovery

Pre and Post Quality Construction Audits

Who will benefit from this solution?

Many customers, both large and small gas utilities strategically outsource solutions because of resources, risk mitigation, cost or even a lack of expertise. The Southern Cross Advanced Mobile Leak Detection solution (AMLD) provides a pathway to rapid adoption of the latest advance technology that has been preconfigured to meet customer's needs. The solution combines decades of field experience with advanced mobile leak detection technology that improves efficiency, accuracy and provides additional value.

With decades of experience under its belt, Southern Cross believes there is an optimum way to include this advanced mobile leak detection technology as part of the solution for compliance leak survey, emissions quantification ranking and other applications. Our outsourcing model is geared toward providing a solution that meets our customers entire needs using our AMLD solutions combined with traditional solutions in ways where it will deliver the maximum value.

Benefits

Quality - More comprehensive and richer information & digital reporting to identify priority leaks & characterize asset infrastructure.

Risk Mitigation - Prioritizes the most important leaks and investigative areas first, and above all achieve unprecedented efficiency with safety.

Efficiency - Reduce the impact of weather and resource constraints on a project and ensures project delivery on time and on budget.

Richer Information - Useful information for forecasting and planning, pipe replacement prioritization, emissions quantification etc.

- ***Natural gas isn't just used for heating and cooking. Numerous everyday products wouldn't be possible without it: such as vinyl flooring, piping, carpeting, heart valves, and more!***
- ***Methane (CH4) traps 32 times more heat than carbon dioxide over a 100 year horizon.***
- ***The FEC Railway in Jacksonville, FL operates their entire mainline fleet completely on liquid natural gas, resulting in an 80% reduction of Nitrogen Oxides emissions, 50% less CO2 emissions, and little to no emissions of sulfur dioxide or particulate matter.***
- ***Natural gas combustion produces approximately 1/2 as much carbon dioxide per unit of energy compared to coal.***
- ***At mixing ratios, natural gas can create an explosion hazard with significant economic and safety consequences.***

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About Southern Cross

Since 1946, Southern Cross has been an industry leader in providing Pipeline Safety and other Field Services. Today, Southern Cross continues to provide Field Service solutions to the Gas, Electric, Water, & Energy/Oil Industries. Our services include traditional leak survey and inspections, meter deployments including AMI/AMR, locating, professional services such as project management and project controls, and much more. Southern Cross is dedicated to remaining at the forefront of our industry's technological advancements and we are constantly innovating our solutions and methods. Proud of our rich history, confident about our current offerings, and excited for what's next, Southern Cross upholds our reputation as a "Trusted Partner of Utilities Everywhere".

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