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Kristof Verwaest > The Sniffers

WHERE TECHNOLOGY MEETS NATURE: A UNIQUE APPROACH TO BAN ILLEGAL TAPPING

Abstract

Illegal tapping is a growing problem on a worldwide scale. A recent example in Mexico highlights why pipeline managers across the world should be cautious of this costly crime. Besides the financial consequences of illegal tapping, the integrity of the pipeline and the increased risk for a smooth continuous operation can be detrimental for an operator. While in some cases, loss of pressure in the pipeline can be detected using advanced measurement and inspection tools, in other situations, the mass balance does not give a clear answer on the loss of product. In all cases, finding the position of the illegal tap along the pipeline is always a challenge. Illegal taps are installed in a professional manner following the best practices. However, in most cases, a small spill during the installation or during the tapping process itself is highly feasible. One simple drop ending in the soil at 2 - 3 m underground is sufficient to leave a scent trace for sniffing dogs. While these small traces are often difficult to detect or are even undetectable using leak detection equipment, the highly sensitive noses of sniffing dogs can detect these small leaks caused by illegal tapping activities. In this article we will discuss today's challenges regarding illegal tapping and explain sniffing dogs' capabilities.

INTRODUCTION

Oil and natural gas are still the world's leading energy sources with a market value larger than valuable raw material markets combined. An enormous number of pipeline networks across the globe are used to transport these energy resources from exploration and production sites to consumers through extreme geological and hazardous environments. Since these modes of resource transportation are of high value, leakages, pressure loss, faults in structural integrity, as well as illegal tapping can be detrimental to the environment, in the process incurring huge losses for the respective stakeholders as well.

Even with advanced, evolving and cutting-edge technological solutions, pipeline environments require intelligent and unconventional use of pipeline management and inspection approaches. However, new techniques sometimes have major limitations when put into practice. Existing underground pipeline systems are not always designed to be used with the newest techniques and having them adapt to the latest technology requires huge investments, running into billions of dollars.

Due to these technical limitations, as well as high environmental and economic threats, the pipeline leak detection market has raised its demand for a more effective approach to identify leaks in an economic, fast and efficient way.

Unlike high-end technology, simple, conventional methods such as the use of Sniffer Dogs can prove to be the cost-effective, easy-to-deploy and customised offering for pipeline leak detection. Trained sniffing dogs have a natural capability to detect specific smells. The sensitive nose of sniffing dogs, in combination with a lengthy and thorough training journey, makes it possible to search for leaks in underground pipelines.

ADVANCED TECHNOLOGIES: CHALLENGES

To minimise occurrences of physical threats and avoid personal injuries and transportation disruption, a combination of external and internal inspection, as well as detection tactics using technology have been put in place.

Besides the fact that new technologies often show major limitations when applied in practice, underground pipeline systems are not always easily compatible with technologies such as intelligent pigging, fibre optic cables or sensor technology, and adaptation costs require huge investments or set-up expenses. Moreover, underground pipelines that are able to use these leak detection techniques have limits that are often mentioned in barrels per day and leave too much room for error. In turn, this causes a high risk of pollution and increases soil remediation costs up to millions of dollars each week.

“Dogs have helped in writing history and will surely help us writing the future.”

Kristof Verwaest

DOGS CAN GO WHERE MACHINES CAN'T

Sniffing dogs have been found to be extremely effective in these scenarios. They have highly sensitive noses, which are unmatched against high-tech available measuring instruments. Usually, the most advanced detection equipment available today have parts-per-million sensing levels, which are limited when it comes to discovering minuscule leaks of underground pipelines. This equipment must also be handled by multiple technical professionals and is difficult to be used in harsh environments, rural areas and remote locations.

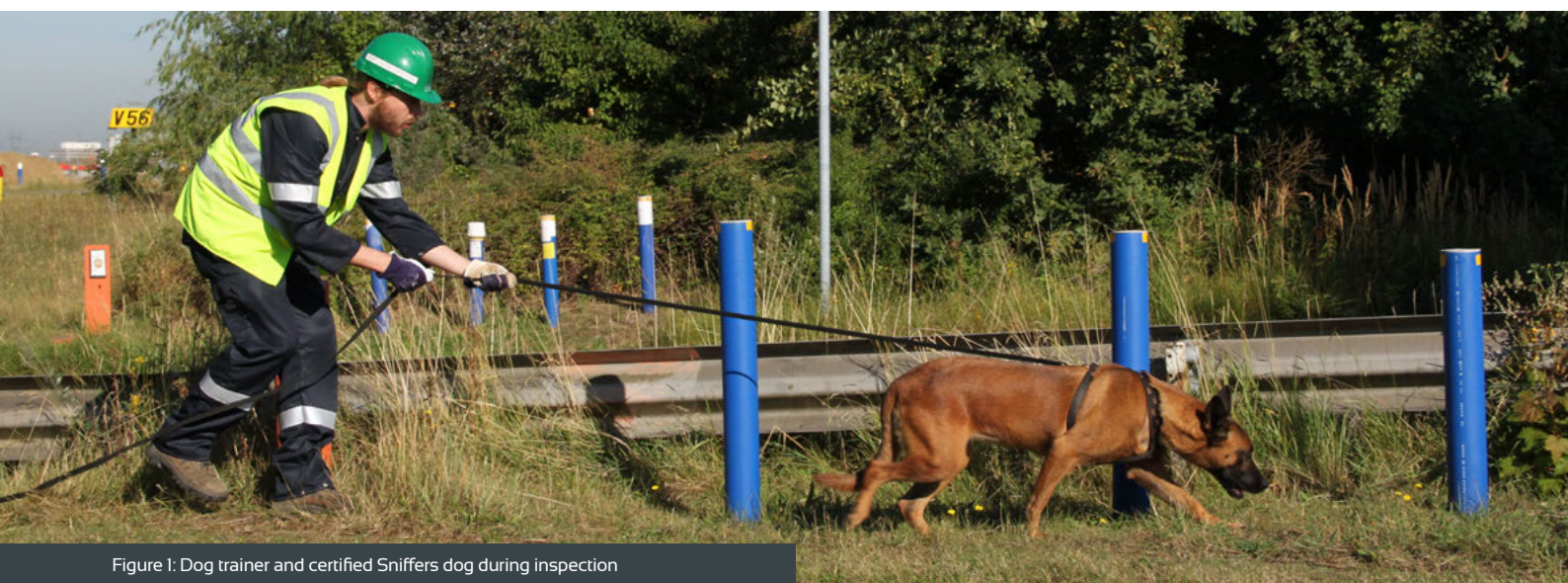


Figure 1: Dog trainer and certified Sniffers dog during inspection

“Leak detection dogs will play a key role to attack the search for illegal tapping and gas-leaks on ageing pipelines.” Kristof Verwaest

On the other hand, dogs naturally have the capability of sniffing up to parts per billion, which makes them more accurate. They can access rural, difficult terrain, making them environmentally apt. They need few handlers, which makes the mission more effective; and can sniff gases, fluids and treated water – substances that limit machines.

Combined with a lengthy and thorough training journey, the mobility of sniffing dogs can access underground pipelines and can bring their nose above pipelines that are in rural areas, through woods, across mountains or through fields. This makes several detection instruments obsolete for such circumstances at an acceptable pace.

For example, Belgian pipeline companies and the country's Ministry of Economic Affairs recognised the capabilities of sniffer dogs as a reliable and efficient survey of the underground pipelines and they included sniffer dogs in the latest official technical standards for pipeline management as a valuable leak detection method.

ILLEGAL TAPPING A MAJOR SOURCE OF CONCERN

With an annual production valued at \$1.7 trillion, a flourishing black market for oil is no surprise. About \$133 billion worth of fuel is stolen or adulterated every year, which fund dangerous practices. According to Oilprice.com, the top five countries accused of oil trafficking are Nigeria, Mexico, Iraq, Russia and Indonesia. It is estimated that Nigeria alone loses \$1.5 billion a month due to pipeline tapping. Just a short while ago, a devastating pipeline explosion due to pipeline tapping in Mexico, killed about 100 people. This might have been an extreme case in Mexico, but it's not limited to this country as the number of illegal tapping is rising in the western countries.

Recent examples in the UK, Germany, France, Indonesia and Mexico have highlighted why pipeline managers across nations should be cautious. Apart from the fact that there are financial consequences of illegal tapping, the structural integrity of the pipeline and the increased risk for a smooth, continuous operation can be damaging for a pipeline operator as well as the environment around it. Sometimes, loss in pressure in the pipeline can be discovered through advanced measurement tools but many times the mass balance does not give a clear picture of the loss of fuel. However, in all cases, the illegal tap is always made difficult to find as it is vital for crooks.



Figure 2: Heading towards a potential leak

To a certain extent, technology is also to blame. As the technology to maintain, monitor and manage pipelines advances, so does the process to install illegal taps in a professional manner - following the best practices.

However, in most cases, a small spill during the installation or during the tapping process itself is highly likely. One small drop ending in the soil at two-three metres underground can leave a scent trace for sniffing dogs. While these small traces are often difficult to detect or are even undetectable using advanced leak detection equipment, the highly sensitive nose of sniffer dogs can pick them up.

QUICK REDRESSAL

The detection of illegal tapping at an early stage is crucial to guarantee both the continuity and the integrity of your pipeline infrastructure. Soil remediation and expensive excavation are additional challenges that need to be avoided at all costs. Unfortunately, in most cases, the theft has already occurred before the illegal tap is detected. In fact, the pipeline owner might not even be aware of these illegal activities at all.

For example, loss of pressure on a pipeline network in Georgia was the first indication of a potential illegal tapping. Several kilometres of underground pipeline in non-residential areas, and so without any permanent observation, nourished the suspicion of an illegal tap. As the first measure, the pipeline manager checked the network every day by guards on horses. However, no single visual indication of fraudulent activity surfaced. Sniffing dogs were hired to screen the suspicious network over 20 kilometres.

Using two teams, each consisting of one sniffing dog and its handler, surveyed the underground pipeline during a two-week project. Supported by armed guards, a specific location in an open area, without any buildings or trees, was identified by both dogs, what seemed to be an impossible location. Detection of the exact location of this illegal tap was a breakthrough for the pipeline manager to avoid financial losses and increased risk due to the integrity of the underground network.

ENHANCING DETECTION WITH DOGS

Multiple industry case studies comparing leak detection dogs to other existing techniques have shown the technical capabilities of dogs to be superior. When it comes to evaluation of the necessary investments, precise leak detection methods with equipment require measurements underground and exactly above the pipeline to meet the higher

“The better I understand technology the more I believe in using dogs.”

Kristof Verwaest



Figure 3: Sniffers dog Senna marking a leak

demands. This method requires manpower to localise the pipeline, drill holes at least at every metre, do leak detection at every metre and for the additional logistical support.

This complex approach to meet future legislation allows for the progress of only a few hundred metres per day. Dogs, on the other hand, have the same detection capacity, even from a distance, and require only one handler per animal to have the progress of multiple kilometres per day. This positions dogs as future legislation proof with a realistic financial budget.

Having said that, measurement equipment can be effective but also has its limitations. Technology meets nature, however, when measurement equipment is used in parallel with sniffing dogs. Both methods have their capabilities and limitations but when combined, it is clearly a win-win situation.

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