PROTECTING PIPELINES

Ian Deacon *examines the importance of understanding the true nature of the pipeline security landscape*

Infrastructure-focused security operators are faced with arguably the most challenging circumstances in modern history. Over the past few years society has seen a surge of extremist activity, political uncertainty and an increase of violence due to war and wider economic shortages. And the lack of effective technology that can tackle these rising security threats is a major global issue.

As a result, assets such as physical perimeters, pipelines and oil reserves are under constant threat of attack from sabotage and theft. As criminals adopt increasingly sophisticated methods, these attacks cause economic damage and heightened safety concerns for operators and governments around the world.

Given their range and remote nature pipelines are particularly vulnerable to the escalating volume and complexity of security threats. Pipelines are vast in length and traverse isolated and remote regions. With over 3 million kilometres of pipeline around the world it is a colossal task to proactively monitor and respond to threats, sabotage and criminal damage.

And for operators there has been a significant technology gap, which has hampered their efforts

> PIPELINES ARE EASY TARGETS FOR DISSIDENTS WHO WISH TO CAUSE MAXIMUM DISRUPTION

to counter this new era of security threats. It is obviously unrealistic to expect foot patrols to provide full 24/7 monitoring of a pipeline. Equally, traditional technologies like aerial surveillance, closed circuit television (CCTV) and ground radars don't have the sufficient range to monitor the entire length of a pipeline.

Altogether, this leaves large inherent gaps in the knowledge that operators have regarding the security of their pipelines. However, the exact nature of threat varies from region to region and country to country. Not every operator is having to deal with the same level or type of threat. If we are to deploy new technology to enhance abilities to detect pipeline abnormalities and criminal activities, then we also need to have a true understanding of the true facts on the ground around the world. This understanding is the crucial step in guiding future decisions on the use of technology that operators are desperately seeking to protect key pipeline infrastructure.

There are two ends to the threat spectrum. On one side there is the threat of large and organised criminal groups turning to pipeline theft in the face of an increasing crackdown on their other illegal businesses – in particular the drugs trade. At the other is the security threats that come from rising political instability in many regions around the world.

CONTRASTING THREATS

Two regions that illustrate the new reality of pipeline security are Mexico and the Middle East. Both regions are experiencing a major increase of threats. In Mexico this threat centres on the exponential rise in fuel theft, and the impact this is having on pipelines throughout the region. In the Middle East, recent news has highlighted the threat of drone attacks on critical Saudi pipeline infrastructures. Explosions, sabotage, and conflict have been rife in the area.

The security threats in both regions are not just having an impact locally – they are additionally causing knock-on effects in the global economy, with fluctuating oil prices a direct result of the situation in the Middle East.

Mexico has over 35,000km of pipelines, and in recent years hundreds, if not thousands, of illegal taps have been used by organised criminal gangs to commit widespread theft. It's been estimated that in Mexico, illegal taps are capable of siphoning off 150,000 barrels of product from pipelines every day, a burgeoning crisis costing the Mexican economy an estimated $3 billion every year.

The fact that fuel thieves have grown so prolific, and their siphoning methods so sophisticated, has created a backlash from the Mexican Government. However, the closure of key pipelines earlier this year caused widespread consumer panic.

The Government's ability to respond is also limited by the fact that physically patrolling the nationwide pipeline network is a near-impossible task. Although it has deployed around 5,000 soldiers to protect the most vulnerable points of the country's pipeline network, these efforts have proven insufficient.

For Mexicans this means even longer queues at the petrol pump. But the pipelines also serve businesses beyond Mexico's borders, and these security interruptions have disrupted supply chains across the

Threats can vary from theft for criminal gain to terrorist attacks designed to cause chaos

Americas. As a result, it is hard to believe that these measures are sustainable as a long-term strategy.

In the Middle East, the nature of the threat is different. Not only are pipelines in the region some of the most remote in the world – in the middle of very inhospitable deserts – but there is a high degree of political and military instability. There are a number of complex overlapping political threats that result from the ongoing conflicts in Syria and Yemen, increasingly muscular foreign policy in Iran, ongoing tensions with Israel and the Qatar diplomatic crisis. The sheer volume of these tensions means there is also a lot of military-grade hardware on the ground.

As a result, the threat to pipelines is not necessarily commercial. Instead pipelines are easy targets for dissidents or state actors who wish to cause disruption to their regional rivals. Indeed, pipelines such as the 'East-West', that transports five million barrels of crude oil day to day to the Red Sea and locations around the world, have been specifically targeted in attacks by rebels in the region.

Unprecedented attacks like this are routinely causing flux in global oil prices, affecting the market substantially for producers and consumers alike. However, even though threats to pipelines in this region have been on the national US security agenda for decades, little has been done to address the issue.

Mexico and the Middle East are far from alone in experiencing these threats. Sub-Saharan Africa, Latin America and South-East Asia are also at the forefront of dealing with these new security threats.

However, recent events in Mexico and the Middle East have made the need for technical innovation plain for operators and regulators around the world. There is an accelerating demand for integrated, smart security solutions to tackle these threats head-on. Action is required, not only to safeguard important assets, but also to stabilise local and international oil prices and economies.

The key to more effective security for pipelines is introducing technology that can detect and pinpoint the location of these issues, and also inform authorities of the nature of the attacks. This will help better direct security responses – preventing incidents becoming full-blown crises and protecting revenues. One of the most advanced technologies that can be

deployed to measure third-party intrusion (TPI) and other criminal threats is distributed acoustic sensing (DAS). This technology allows operators to monitor activity across a pipeline's entire length, giving them access to unique insights that can inform and accelerate the decision-making process.

THE EXACT NATURE OF THREAT VARIES FROM REGION TO REGION AND COUNTRY TO COUNTRY

It works by converting fibre-optic cables, which run alongside a pipeline, into an ecosystem of highly sensitive, individual vibrational sensors. By harnessing Fotech's cutting-edge photonics, advanced artificial intelligence and edge computing systems, its DAS can successfully detect, classify and inform on a range of events and activities, all in real time. It can identify, with clarity and confidence, the different types of disturbances that might impact a pipeline and provide operatives with specific alarms to accelerate the decision-making and response process.

The insights and alerts that DAS provides can be monitored from a central control facility, enabling a controlled decision-making process in high-pressure security scenarios. Security resources can be used more effectively, as operators can see the full scope of any threat incident. If tapping or illegal activity is being done by a large group for instance, this insight will be provided, and contractors know to alert the authorities to deploy a larger force. As a result, DAS-based pipeline intrusion detection systems (PIDS) should be made an integral part of global pipeline security strategies.

With the frequency and history of pipeline instability in regions such as Mexico and the Middle East, the lesson for contractors is to innovate or risk the problem worsening. Authorities can't afford to let the situations escalate. The repercussions are widespread, affecting societies and oil prices worldwide.

Introducing sophisticated monitoring technology that detects threats and tampering at the earliest possible stages is the first step in effectively dealing with these kinds of security threats. Through responsive technology designed to combat evolving security threats, operators can protect their assets and prevent the onset of wider sabotage, theft and criminal activity. The challenges facing operators are complex and multi-faceted. However, for contractors looking for cost-effective solutions, DAS-based systems can provide them with a far greater understanding of the status and integrity of their assets at all times ●

Ian Deacon, Sales & Operations Director at Fotech has over 30 years of experience of successful operations management in high technology arenas including seismology instrumentation and oil and gas downhole solutions.

Physically patrolling a nationwide pipeline network is a near impossible task