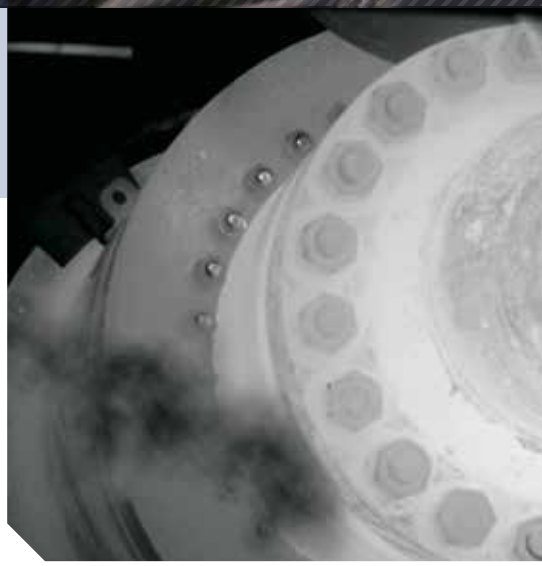
APPLICATION STORY

Optical Gas Imaging at Jonah Energy

Saving Gas and Saving Money Through Regular OGI Surveys

The discovery of a massive methane leak at the Aliso Canyon natural gas storage facility in Los Angeles County in October 2015 brought national attention to safety and environmental concerns over natural gas production, processing, and storage. The well blowout released an estimated 97,100 metric tons of methane and 7,300 metric tons of ethane over a four-month period, making it the largest natural gas leak in US history.



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While it's rare for well sites to emit natural gas at this magnitude, the oil and gas industry, as a whole, loses eight million metric tons of methane to fugitive emissions every year. This equates to lost product for operators; therefore, the industry is faced with how to best find and repair natural gas leaks at potential escape points such as compressor stations, processing plants, hydraulically-fractured wells, and along transportation lines.

The industry standard for leak detection and repair has long been an Environmental Protection Agency (EPA) protocol called Method 21, which relies on toxic vapor analyzers (TVAs) to detect gas leaks. Investigators use TVAs to "sniff" for gas leaks, after which plant engineers investigate further to determine the exact source.

However, an EPA proposal scheduled for approval in June 2016 recommends Optical Gas Imaging (OGI) as an alternative to TVAs, calling it the "Best System of Emission Reduction" at well sites and compressor stations.

Energy Producers Embracing OGI

Among the early adopters of OGI was Jonah Energy, of Sublette County, WY. The company began using legacy FLIR GasfindIR cameras in 2005 to find fugitive emissions at its production facilities. By 2010, Jonah had four full-time employees certified to use FLIR GF320 cameras, the latest generation of OGI technology.

"We inspect 150 facilities every month, and then we inspect the 1700 wells within a one-year period," says Pat Mack, an Environmental Field Technician for Jonah Energy. "Without OGI, we wouldn't be able to find leaks as efficiently. We'd have to rely on old technology, which wouldn't allow us to be as proactive as we are."

The GF320 and other gas imagers are infrared cameras equipped with special filters that allow them to "see" methane and volatile organic compounds (VOCs). These gases

absorb mid-wave infrared radiation, blocking any radiation coming from objects behind them. The camera detects the gas plume as a shadow that stands out against the thermal radiation from the surrounding area. OGI can provide visual confirmation of leaks as small as 0.8 g/hour.

The main advantage of OGI is its ability to scan large areas and visualize gas plumes in real-time. This helps inspectors pinpoint the source of fugitive emissions and begin the repair process immediately, making OGI inspections more efficient than Method 21 surveys. In fact, during a field study conducted for the City of Fort Worth, TX, surveyors determined that scanning with infrared cameras was at least nine times faster than performing Method 21 scans on the same site equipment.

FLIR GF320 optical gas imaging camera

The speed of OGI scans makes it easier for oil and gas producers to survey equipment more often. The EPA notes that more frequent inspections and repairs can reduce fugitive methane and VOC emissions significantly. For example, quarterly surveys can cut emissions by 80 percent, while semi-annual monitoring surveys and repairs can reduce emissions by 60 percent.

Since 2010, Jonah has reduced fugitive emissions by 75 percent. It also reduced repair time from 705 hours to 106, cut labor costs from $58,369 to $7,500, and dropped its gas losses from $348,000 to $20,500. Emissions in tons went from 351 to 31.

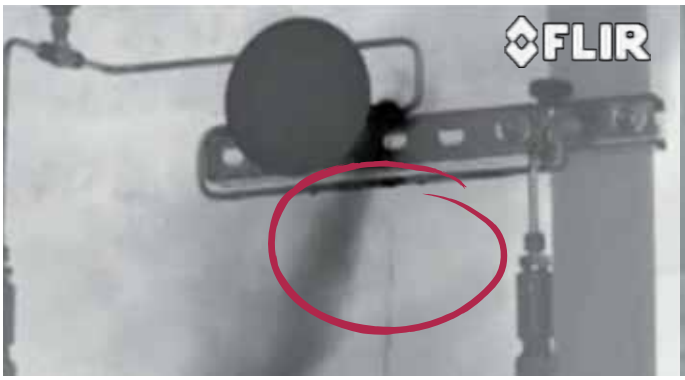
Jonah Energy has publicly stated that their monthly Leak Detection and Repair (LDAR) program using OGI technology has not only been effective, but it has been consistently profitable. Their cumulative gas savings exceeded $5 million in the past 6 years, which more than covered the overall program costs – from OGI equipment and operators to leak repairs and maintenance, including labor and parts.

In public statements to the WY Department of Environmental Quality, Air Quality Division, Jonah Energy concluded:
Since the implementation of Jonah Energy's Enhanced Direct Inspection and Maintenance Program in 2010, we have conducted over 16,000 inspections and have repaired thousands of leaks that were identified by the FLIR camera. Based upon a market value of natural gas of $4 per million Btu, the estimated gas savings from the repair of leaks identified exceeded the labor and material cost of repairing the identified leaks. Additionally, an estimate of hundreds of tons of volatile organic compound emissions have been eliminated from being emitted to the atmosphere.

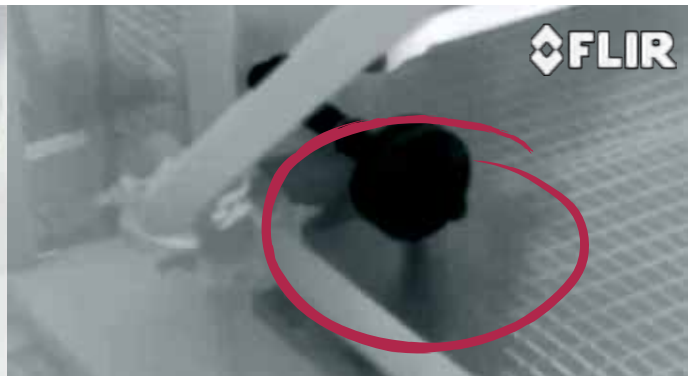
Optical gas camera shows methane leaking from thief hatch

Captured gas leak from production site.

Captured gas leak.



A leaking pressure gauge.



Gas leak is clearly visible on the thermal image.

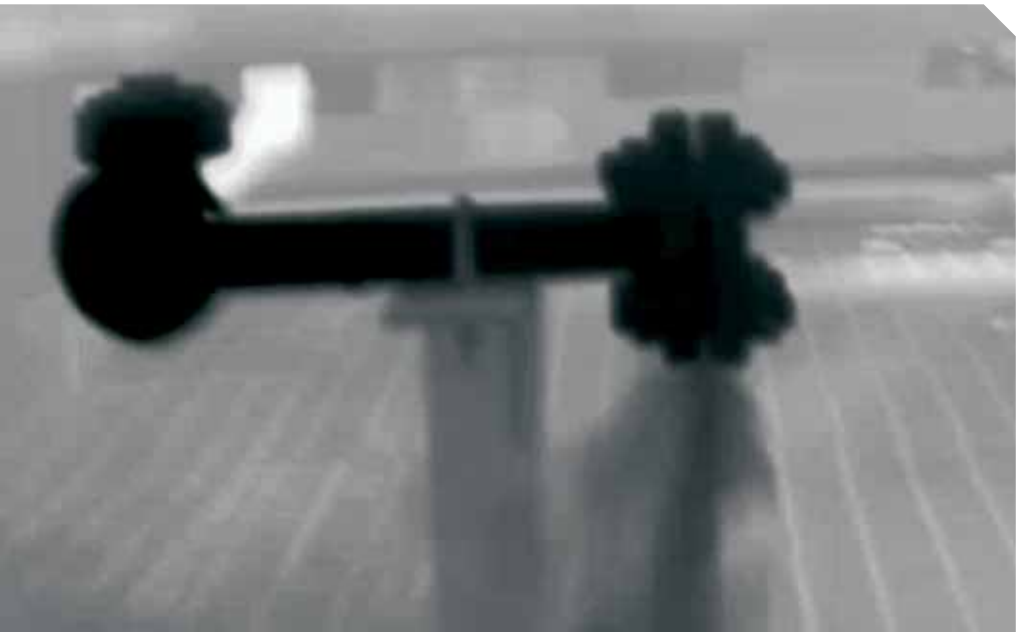
Mack says Jonah's success with its OGI-based LDAR program has several benefits. "Not only are we helping the environment, we're keeping gas in the pipes – which saves money," he explains. "It also keeps the location safer because we don't have an explosive atmosphere."

Worker Safety Concerns

The ability to check for gas plumes from a safe distance is what instructor Ron Lucier finds most important about the FLIR OGI cameras. Lucier teaches at the Infrared Training Center, headquartered in Nashua, N.H. He describes FLIR OGI cameras as "safety cameras" because they allow technicians to check for gas plumes from a distance before entering a well site.

"Methane and other hydrocarbons are not only flammable, but in high concentrations they can cause asphyxiation," Lucier explains. "With TVA gas 'sniffers' you know the gas is there, but you don't know how much. OGI users can immediately see the size of the gas plume – something that's impossible to do with a gas sniffer."

Lucier instructs students to make wide scans of storage tanks to check for gas collecting around thief hatches. Only after they can confirm no leaks should they move in to scan up close. "I've been in numerous situations where I did a wide scan and saw a big plume of gas from a distance – so I avoided walking into a problem," he says.



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Optical gas cameras can scan areas that are impossible to reach with TVAs

State-Level Regulations

OGI is gaining acceptance not only with the EPA and Bureau of Land Management, but also within state environmental agencies. Colorado and Wyoming have already rewritten their inspection rules to permit the use of OGI. Other states, including California, Pennsylvania, North Dakota, and Ohio, are in the process of revising their inspection regulations. In addition, some states are considering whether to allow companies to report methane leaks without worrying about incurring a fine, provided the leak is adequately repaired in the specified time frame.

Overall, changes to state regulations could result in more efficient inspections and repair of leaks. The EPA suggests that taking action at just 10 to 20 percent of sites with gas leaks would result in a 60 percent reduction in methane emissions.

This is good news for Jonah Energy, which worked with the Wyoming Department of Environmental Quality (DEQ) as it developed the new regulations. "We've been ahead of the curve as far as with state regulations, and we've tried to set the bar as far as environmental standards in the field so that other industries will follow," Mack says.

Mack says by working with state regulators on a common goal, his company can help ensure a cleaner environment while keeping their production levels going. "Safety and environmental responsibility are necessary in my line of work. Even a small gas leak can cause huge consequences. FLIR lets us see the problems before they become issues. It's all about a safer today and a greener tomorrow."

FLIR GF320 thermal camera is a preventative maintenance solution to spot leaks in piping, flanges and connections in petrochemical operations.

For more information about thermal imaging cameras or about this application, please visit:

www.flir.com/ogi

The images displayed may not be representative of the actual resolution of the camera shown. Images for illustrative purposes only.
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