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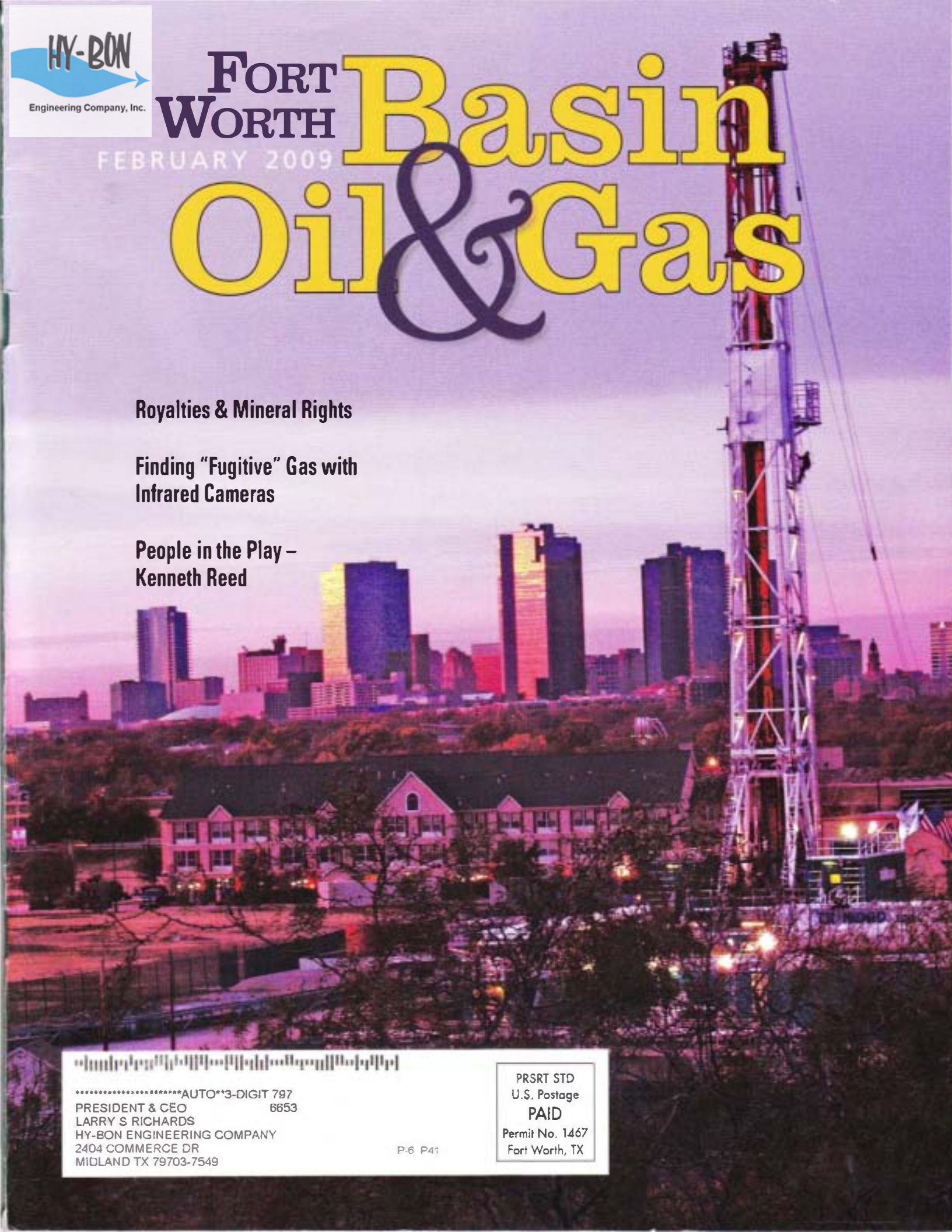
FEBRUARY 2009

# Basin Oil & Gas

**Royalties & Mineral Rights**

**Finding "Fugitive" Gas with Infrared Cameras**

**People in the Play – Kenneth Reed**



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#### 4 Infrared cameras used to locate "fugitive" vent gas

A relatively new use of infrared technology is making it easier for the oil and gas industry, as well as government regulators, to "see" and locate fugitive gas emissions of volatile organic compounds (VOCs).

\* EPA program targets methane emissions

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Fort Worth Basin Oil & Gas provides consistent, local communication about the oil and gas business to industry participants and interested parties in the 25-county area called the Fort Worth Basin. Subscribe FREE online at [www.fwbog.com](http://www.fwbog.com).

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#### On the Cover:

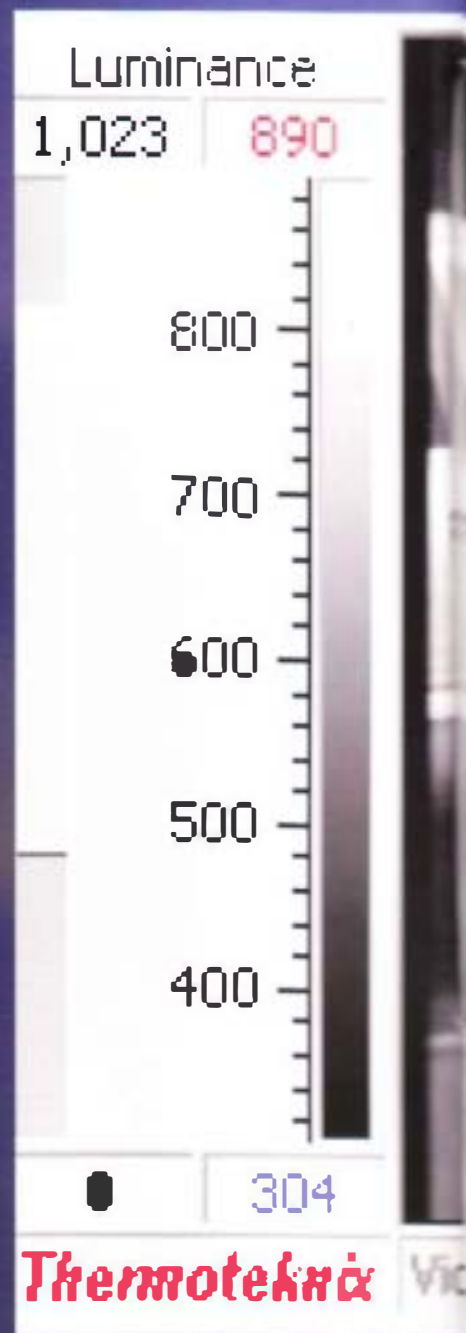
Roughneck Ruben Morano climbs the Trinidad 111 rig to help guide pipe into the hole at a Chesapeake Energy drilling site near the Mercado Juarez Restaurant off Interstate 35W in north Fort Worth.

J.G. Domke photo.

TCEQ survey in progress

# Infrared cameras “fugitive” vent

A relatively new use of infrared technology is making it easier for the oil and gas industry, as well as government regulators, to “see” and locate fugitive gas emissions of volatile organic compounds (VOCs) such as propane, butane, benzene and other gases.





# used to locate gas



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Part of a presentation made by the Texas Commission on Environmental Quality (TCEQ) to illustrate how infrared cameras work, this infrared image shows fumes escaping from a gasoline pump.

Specially-equipped video cameras, such as the FLIR GasFindIR ([www.flir.com](http://www.flir.com)), are capable of scanning large areas from a distance to deliver real-time thermal images of gas leaks. Leaks that would not normally be visible to the naked eye, and in many cases not easily noticed even with other types of detection systems, show up on a video screen or camera viewfinder as black smoke. The camera can also see methane emissions, although methane is not considered a VOC.

The Texas Commission on Environmental Quality (TCEQ) used this infrared photographic technology to perform flyovers of different parts of Texas in 2005 and again in 2007 to look for sources of VOCs, which are precursors to ozone formation, according to Keith Sheedy, a professional engineer with the chief engineer's office at the TCEQ.



A technician uses the FLIR GasFinder camera to identify gas emissions. Hy-Bon Engineering photos.

“Our main concern is to protect human health and the environment and one way is to conduct monitoring. The agency’s monitoring network is one of the largest in the nation,” Sheedy told Texas of Alliance of Energy Producers (Alliance) members at their Abilene meeting this past fall. Texas has 64 air toxicity monitors, more than any other state, and a good number

of them are located in urban areas, Sheedy continued.

In 2005, the TCEQ contracted with a company to fly over industrial sites along the Houston Ship Channel, as well as in the Texas City and Beaumont areas, shooting video with an infrared camera. They also obtained video from a camera on a Texas Parks and Wildlife boat and from a camera in a vehicle driving around the area. In 2007, they repeated the infrared survey, adding other areas along the coast, as well as

*(continued on page 8)*

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Part of a TCEQ presentation illustrating the use of infrared video cameras to identify fugitive emissions, the photo on the left shows a tank as it appears in a normal video frame. The photo on the right, taken with an infrared video camera, shows the same tank emitting gas.

93 oil and gas-related sites in the Barnett Shale producing counties of Denton, Tarrant, Parker and Johnson counties.

The TCEQ felt the infrared surveys could help determine whether significant VOC emissions existed that were previously unknown or were unaccounted for from unconventional sources in the petrochemical and oil and gas industries. The cameras also help the agency identify individual sources of emissions in ar-

reas with elevated air concentrations of pollutants.

In the south Texas area, they saw visible infrared plumes indicating emissions from barges in the ship channel. Plumes were primarily noted at hatches and pressure relief valves. They also saw emissions from "floating" roof tanks, among other sources.

In the Metroplex, some of the unconventional emission sources prompting further investigation are believed to be oil and gas industry storage tank batteries, compressor sites and even produced water storage and disposal sites.

"We're really not out to pick on oil and gas, but we saw a lot of things with the camera and now we have to address them," Sheedy said.

"The camera is a screening tool for us," TCEQ Area Director Ramiro Garcia Jr. added. "An image might show a VOC, but that might be totally in compliance with their authorization. We have to check it out."

Usually, it is not possible for the TCEQ to get enough details from the remotely-obtained infrared images to ascertain exactly what the problem is that is causing the "plumes" of VOC emissions to show up in their video, so it's important to do some site visits to get more information, according to both Sheedy and Garcia.

"Initially, all we had when we got the images from the sites was their location by latitude and longitude," Garcia said. "The first thing we did was identify the site owners and reach out to them."

TCEQ staff also reached out to the energy industry through trade associations such as the Alliance, the Texas Independent Producers and Royalty Owners Association and the Texas Oil and Gas Association (TX-OGA), asking their members to partner with TCEQ in a "find and fix" program. At the current stage of the



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Hy-Bon Engineering's Identify, Quantify, Rectify (IQR) Manager Butch Gidney uses a high flow sampler to quantify a gas leak.

voluntary program, TCEQ has randomly selected 20 sites (10 in the Barnett Shale and 10 along the Texas coast) identified in the 2007 infrared survey to examine further. Participation by site owners is strictly voluntary, but Garcia said owners at all sites had agreed to participate.

"We've reached out to the (energy trade) associations and said 'here are the places we're looking at — if we pick one of your sites, we'll share the image with you, discuss the situation.'" Garcia explained.

"If you're one of the 20 companies who actively participate and address emissions identified, the TCEQ will offer enforcement discretion. We are hoping to learn a great deal from this partnership." Garcia continued. "This partnership will give site owners a chance to get the infrared camera image in their hands to address the issue. Once they have a chance to address the VOCs, we may re-image the site from the ground and work with the owner to resolve any issues."

The survey process will also include a questionnaire for site owners to answer. Results of the survey process should be available within the next six months and Garcia said the agency will share the results with the energy industry.

"We want to work together to also identify things that can be done to keep emissions from occurring industry-wide," Garcia said.

Bill Stevens, executive vice president of the Alli-

ance, said he believes the TCEQ hopes to use the current VOC infrared survey program to help quantify any emissions problems.

"The cameras can give you a visual that there are fugitive emissions, but we don't know how to quantify that," Stevens explained. Our association's commitment is to help the TCEQ find the right information because the industry will be better off if they have as much hard data as possible, instead of making assumptions, Stevens continued.

### Vapor recovery and economic benefits

In addition to the potential environmental benefit that infrared camera surveys can bring, locating and capturing fugitive gas emissions can potentially bring an economic benefit to the energy industry through vapor recovery. Once identified, the leaking gas can often be recovered by use of a vapor

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recovery unit, then sold for a profit. One company that specializes in doing this is Midland-based Hy-Bon Engineering, which purchased some of the approximately \$90,000 infrared cameras ([www.hy-bon.com](http://www.hy-bon.com)). The company offers infrared camera surveys to identify leaks, then works with companies to install the proper equipment to recover the emissions.

Although Hy-Bon's core business is designing and manufactur-

ing vapor recovery equipment, the 55-year-old company decided to offer the infrared camera surveys as a value-added service for its customers to help them identify and measure the quantity of the usually low-flow gas stream, company President Larry Richards said. Then, Hy-Bon can provide "cost-effective methods of capturing that gas to get it into a pipeline," he continued. "Our ultimate goal is we want to sell them the equipment

that captures the gas and helps produce energy with it."

In some cases where a commercial quantity of gas is being recovered and there's access to a relatively low-pressure pipeline, Hy-Bon, as well as other vendors, will provide the vapor recovery equipment and installation at no charge to the energy company, in exchange for a percentage of the gas recovered.

"Most of our projects start out as an environmental project, Richards said. "They'll do vapor recovery on the first location based on environmental concerns, then they get the economic payback of capturing the gas and want to do more locations."

At \$6 per Mcf natural gas, Richards said the cost of installing vapor recovery equipment can be recovered within 90 days in many Texas oil production sectors. Even when natural gas was at \$1.50 Mcf, "most of our projects were at less than a year pay-out," Richards said.

"In East Texas, we have some projects that we did with 16-day pay-outs," Richards continued. "In those particular instances, they didn't realize the volume of gas they had coming off the site, which wound up being 80 to 90 Mcf a day. And that's not unusual for an oil tank battery in Texas. It just depends whether you have a commercial quantity of gas and you have a pipeline you can put it in. The focus hasn't historically been on gas in those facilities, it's been on oil and the gas has been seen as a nuisance."

Natural gas can also be captured off produced water, often in combination with oil production. Typically the gas recovered leaking from oil storage tanks is very rich, very high in Btu content, Richards said. For example, 1,000 Btu is pipeline quality gas, but "storage"

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(continued from page 10)

with more liquid.

“The gas that comes off produced water is a lower Btu, so you have to design the equipment a little differently, but you can capture it and it’s a viable gas stream,” Richards added.

Another area where infrared surveys can be useful is at reciprocating compressor sites, where gas leaks can sometimes be hard to pinpoint and the potential is high for shrinkage in gas volumes from wells to the pipeline meter.

## VOCs not common in core Barnett Shale production counties

Chesapeake Energy says it is the most active driller and the largest leasehold owner in the core and



A vapor recovery system on location uses a new Emerson Scroll compressor and a fully-automated programmable logic controller (PLC) system, which allows the system to effectively capture a wet, low-pressure gas stream.

Tier 1 sweet spots of Tarrant, Johnson and western Dallas counties in the Barnett Shale. Chesapeake spokesperson Jerri Robbins said that Johnson and Tarrant counties do not have VOC emissions since the gas in the Barnett is lean, meaning it is 95 to 96 percent clean methane gas, so it does not contain the liquid hydrocarbons that produce VOC emissions.

However, Robbins pointed out that Chesapeake does recognize that, as the Barnett Shale play moves west toward Hood County (and into the northwest, which is Denton, Decatur, etc. ), liquid hydrocarbons are present. However, Chesapeake is not currently active in those areas.

“In addition, we -- and other operators -- are regulated and required by the EPA (Environmental Protection Agency) to meet strict standards for compressors and must test them every quarter using a third party firm to perform those tests,” Robbins pointed out. “Chesapeake must file a compliance report with the test findings to TCEQ. Because Fort Worth-Dallas is a non-attainment area, the regulations are even more stringent than in other parts of the country, therefore the allowed emissions are even less. Every main line compressor has a catalytic converter -- just like a car -- to control emissions, and they also are fueled by the natural gas we produce, further reducing emissions because natural gas burns cleaner than other fossil fuels.”\*

*By Pamela Percival, Editor.*

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