



A tank as it looks to the naked eye (left) and the same tank as seen using the IR camera (right). A plume such as this would likely result in further investigation of the site by the TCEQ.

MAKING AIR EMISSIONS VISIBLE

TCEQ's use of IR cameras to spot emissions continues to grow



Since the TCEQ acquired its first IR (infrared) camera to track down and monitor air emissions, back in 2005, these cameras have become an indispensable part of the agency's technological toolbox.

"The GasFind IR cameras make us more efficient," said Rosario Torres, air section manager of the Corpus Christi region, who has spent 15 years in the air section. "A site might look perfectly normal to the eye, and then we look at it through the camera, and suddenly we see things that we've never been able to see before. It allows us to pinpoint our investigative and enforcement efforts."

Pushing the Envelope

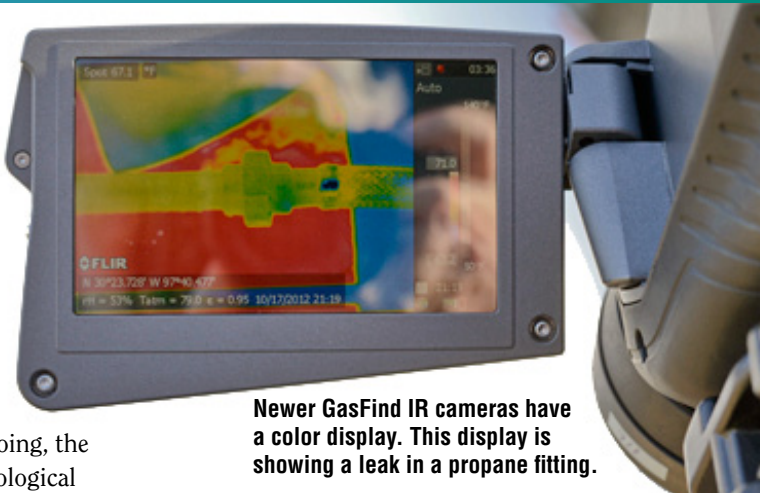
The IR cameras "see" infrared light that is invisible to the naked eye. A special filter allows the camera to visualize the absence of infrared energy at the wavelengths absorbed by hydrocarbon vapors. This spectrum includes the volatile organic compounds (VOCs) that the TCEQ is largely concerned with. The camera shows these emissions as a light or dark plume, depending on temperature settings. A skilled operator who understands the camera and is knowledgeable about the operations of the facility he or she is looking at can spot emissions that warrant further investigation. The camera can operate in most meteorological conditions, with the exception of heavy moisture conditions such as rain or fog.

"Texas is really pushing the envelope when it comes to utilizing science and technology in protecting the environment," said Ramiro Garcia, deputy director of the Office of Compliance and Enforcement. "When I talk to my peers at environmental agencies in other states, they are often amazed at the kind of things we are doing, the way we are adopting technological tools, the way we are open to doing things differently to get better results."

Sharing Our Know-How

At a recent meeting of the Environmental Council of the States, TCEQ Commissioner Carlos Rubinstein discussed the GasFind IR cameras with the chairman of the Puerto Rico Environmental Quality Board (EQB), Pedro J. Nieves Miranda. Nieves Miranda was so impressed that he invited the TCEQ to Puerto Rico to show his organization how the cameras could be of use.

In August, Jason Harris and Claudio Galli of the Houston regional office traveled to Puerto Rico. They and EQB staff



Newer GasFind IR cameras have a color display. This display is showing a leak in a propane fitting.



Rebecca Wiscovith, investigator with the Puerto Rico Environmental Quality Board, using the GasFindIR camera to evaluate potential hydrocarbon emissions from an asphalt plant.

visited gasoline terminals, propane terminals, gasoline storage facilities, and other facilities. Harris and Galli showed the EQB staff how the camera works and what it can find. After a few days, the EQB staff were able to use the camera themselves to conduct their own surveys. For the next two days, they traveled all over the island, observing hot

mix asphalt plants, pharmaceutical manufacturing sites, lead smelters, and other gasoline storage and terminal facilities.

Nieves Miranda said his staff "was impressed by the professionalism and expertise" shown by Harris and Galli.

Beaumont Region

Heather Feldman, director of the Beaumont regional office, said her region uses the cameras for many purposes. She cites an example where the cameras were useful in a complaint investigation. “Citizens were complaining about odors in an area, and although we were able to confirm the odors, we couldn’t determine the source. So we utilized the IR cameras to look at potential sources in the area. We discovered a facility with storage tanks that had bad seals, and VOCs were being vented into the atmosphere. The facility repaired the tanks, and we’ve had no more odor complaints.”

The cameras are also useful during compliance investigations, according to Kathy Saucedo, Beaumont air section manager. “They can show us if flare pilot lights are lighted, if valves and flanges are leaking VOCs, or if there are sources of emissions that neither we nor the company are aware of.”

Dallas–Fort Worth Region

TCEQ Region 4, Dallas–Fort Worth, uses the IR cameras frequently in complaints and investigations of oil and gas facilities in the Barnett Shale. Alyssa Taylor, air section manager, said, “The biggest advantage of the cameras to an air investigator is this: you can’t see most of what you are regulating, it’s invisible. We all have a lot of assumptions about emissions, based on modeling and common sense, but they’re still assumptions. The camera is a tool that gives another set of eyes. You can tell which engines are operating; you can tell which flare is operating; and it allows us from a distance to see if things are operating as expected.

“A skilled operator can use the camera to see if a flare is operating properly. If you see a distinctive plume that’s traveling a long way from the flare, then you know something’s wrong, something’s not combusting properly. So you can get in there and investigate, and it allows you to get the sampling equipment into the plume to get a good reading. There’s a lot less hit-or-miss investigating—you can

really focus your resources because you already know where the problem is.”

Houston Region

In Houston, Air Section Manager Harris (part of the team that went to Puerto Rico) said that the IR cameras have “revolutionized how we do work in the field.” He explained that in his highly industrialized region, investigators use the cameras almost every day, performing field reconnaissance in addition to on-site investigations.

“We frequently send investigators with IR cameras to look at concentrated industrial areas. We will view the facilities from outside the fence line, looking for unreported or underreported VOC emissions. If we see something unexpected, we stop and make contact with facility personnel,” he said.

Harris said he feels that the use of the cameras is directly tied to the improving air-quality readings at Houston monitors, and that his investigators are eager to use the cameras. “They would rather be out there doing investigations that directly improve air quality than in the office looking at reports,” he said. “It’s rewarding for our people, it makes results tangible.”

Harris said that operators of facilities are generally open to looking at what the cameras have found, and quickly act on that information. He gave an example of using the IR cameras to look at flares that are not combusting to maximum efficiency, and helping the facility operator fine-tune the flare to obtain the highest combustion rate, meaning the lowest level of emissions.

Many refineries and other large plants in Texas have purchased IR cameras for themselves and are using them to reduce emissions.

Origins

The TCEQ became aware of the emerging IR camera technology in 2005. “On a tip from a co-worker, I contacted the inventor of the Hawk camera (original name of the GasFind IR camera) and requested a vendor presentation for emissions-inventory staff and management. We were impressed with what the technology offered, and asked for

a follow-up presentation for then-TCEQ Commissioner Ralph Marquez,” explained Russ Nettles of the Air Quality Division.

“Commissioner Marquez was always looking for ways to leverage technology and science to provide useful knowledge to the agency for improving air quality. He was so impressed with the camera that he asked us to use it in an industrial neighborhood area in Houston, Milby Park, to help identify 1-3 butadiene and other VOC emissions. The camera was in the field screening sources the next week, and the rest is history,” Nettles said.

“The bottom line is, this camera actually is better than sliced bread,” added Nettles.

“The Milby Park results were impressive and it resulted in the agency being able to address leaks from fugitive sources,” said Kevin Cauble, also of the Air Quality Division. Next, during the summer of 2005, the agency carried out a project to use the camera from a helicopter, a truck, and a boat to look for unreported and unpermitted VOCs in the Houston Ship Channel area.

Results

“The Hawk camera video images of the hydrocarbon were almost unbelievable and gave us emissions images that we were unable to previously see. This project led directly to significant decreases in VOC emissions from floating-roof storage tanks and barges. This technology has moved the ball farther and faster than any other technology that I am aware of with regards to air-quality improvement,” said Cauble.

The cameras have also been used extensively mounted on helicopters to do airborne surveys over large areas, such as the Barnett Shale and the Eagle Ford Shale. These surveys can quickly look at both general emissions in a region and specific emissions from specific sites. They can also be used in emergency-response scenarios.

The agency currently has 11 GasFind IR cameras, and is in the process of purchasing another one. 🐦



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