FLIR AMFC Report – draft v2

Contents

1. Project Objectives for FLIR Systems:

- Gather field performance data from our recently released GF77 handheld LWIR gas imaging camera;
- Access comparable data from our existing optical gas imaging technology utilizing cooled InSb MWIR sensor and from other technologies in order to provide the market with a value proposition for the new technology;
- Participate in a forum where industry leaders and regulators can perform their own comparison without external influence.

2. Technology Description

The FLIR GF77 is an infrared camera for optical gas imaging (OGI) that visualizes and pinpoints leaks of methane without the need to shut down equipment. The portable camera also greatly improves operator safety, by detecting emissions at a safe distance, and helps to protect the environment by tracing leaks of methane and certain other gases with similar absorption spectra in the LWIR region.

The technology used to manufacture the GF77 allows a >50% market price point reduction compared to cryo-cooled MWIR sensors typically used to image methane. This price point could allow much wider adoption of OGI technology by industry, resulting in reduced GHG and toxic gas emissions as regulatory-allowed, non-OGI LDAR technologies are known to miss around 50% of leaks due to incorrect usage. (4,5)

A lower price point also allows companies to outfit more employees with OGI cameras, which has the potential to increase the LDAR inspection frequency. Inspection frequency has been shown to be important to reducing overall emission rates. (1,2)

3. AMFC Participation Summary

FLIR personnel found the organization of the study to be very effective. Communication between study organizers and participants, as well as between participants for the purpose of efficient site visits was top notch.

FLIR would like to congratulate the organizers on a job well done.

4. Learnings and Areas of Improvement

Our GF77 operator, who had never used this system previously, found the system to be well designed, easy to use, and effective to find the majority of leaks. In the controlled release test phase of the process, the operator was able to detect the leak for all but the smallest leak rate.

5. Data Product Example

Standard format video, jpeg thermal and jpeg visual imagery was captured at each site. Additionally, the operator captured radiometric sequence files of most leaks which will allow post-processing of the data.

For the purpose of a written report where video is not appropriate, thermal and visual imagery of once of the vent leaks is shown below. The dark shadow under the vent which is visible in the thermal image on the left but not the visual camera image is the venting gas.

6. Performance and Cost Implications

Preliminary results look good given the operator was able to see many leaks and all but the smallest controlled release. The system itself operated as designed and the operator was complimentary as to the ease of operation.

Implications for LDAR programs:

Due to the physics of longwave hydrocarbon gas imaging vs midwave hydrocarbon gas imaging, the GF77 cannot be expected to detect natural gas at the same performance level. However, the system performed very well, and given the price point there is an opportunity to have many more optical gas imaging cameras in use by the petroleum production sector for LDAR. Frequency of LDAR could be increased, leading to less emissions.

Implications for troubleshooting;

Area monitoring systems such as open-path laser, multiple sampling sensors and others all require either a Toxic Vapour Analyzer (TVA) or Optical Gas Imaging camera to be used to locate the source of the leak. The lower price point of the GF77 provides the industry with a tool that may be more cost effective than cooled MWIR OGI (due to < ½ capital cost) and TVA (due to 4X to 10X reduction in operating cost) tools for this purpose. (6, 7)

Implications for continuous monitoring:

Continuous monitoring using optical gas imaging technology has been possible for several years, however cooled MWIR OGI cameras require periodic major overhaul of the internal cryo-cooler. The overhaul involves removal of the sensor from the site, disassembly, lengthy repair or replacement of the cooler assembly, and then reinstallation of the system at the site. This has been a major impediment to the adoption of the technology for fixed remote monitoring.

Uncooled OGI cameras do not require periodic major overhaul as the detector systems have an indefinite lifespan.

This trial has shown that relatively large leaks (ie, “super-emitter” leaks due to upset conditions) at petroleum & natural gas production are readily visible with LWIR uncooled optical gas imaging technology. So-called “super-emitters” are shown to be responsible for the majority of methane emissions. (1,3)

The implication is therefore that fixed, remote OGI is potentially a practical method for monitoring and quickly locating the source of sudden, large leaks at key facilities.

Acknowledgments:

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References:

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