Heath Consultants’ Overview of Infrared Optical and Laser Leak Detection Technologies in the Natural Gas Industry.

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Agenda

- Gas Plume Imaging – Active and Passive
  - Gas Plume Imaging – Detection of an energy emitting plume specific to an infrared wavelength.
- OPGAL Eye-C-Gas Imaging Camera
- Gas Imaging Pictures and Video of Natural Gas Transmission and Distribution Emission Sources
- Contacts and Further Information
## Technology Overview – Plume Imaging

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<th>Technology</th>
<th>Capabilities</th>
<th>Limitations</th>
<th>Demonstrated Field Applications</th>
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| Passive Plume Imaging (Camera) | • Detects Leaks  
• Expedites Emission Detection  
• Simultaneously Detect Multiple Sources  
• Mobile System | • Qualitative, not quantitative  
• Requires radiance difference between gas and background  
• Some units are not intrinsically safe and require a hot work permit.  
• User Experience & Expertise developed over time. | • Emission Leak Detection  
• Pipeline Leak Detection  
• Aerial Leak Detection |
| Active Plume Imaging (RMLD) | • Detects leaks  
• Expedites emission detection  
• Portable and Mobile Applications  
• Built in Calibration to adjust laser drift. | • Qualitative, not quantitative  
• Methane Specific  
• Requires a background within close proximity to emission source  
• Some units are not intrinsically safe and require a hot work permit | • All Natural Gas Facilities  
• Pipeline leak detection – Walking  
• Pipeline Leak Detection - Mobile |

*Source: Heath Consultants Incorporated*
Technology Comparisons – Infrared Versus. Conventional Technologies

- See it now, see it clearly, see what you were missing before.
- If a picture is worth 100 words a Video is worth 1000. Management WILL be encouraged to take corrective action because of this and in the process;
  - 1) save lives and catastrophic system failure,
  - 2) improve operational integrity and
  - 3) reduce emissions
  - 4) Improve profitability.
What does Active Plume Imaging Look Like?

- Real-time detection of methane leaks
  - Quicker identification & repair of leaks
  - Screen hundreds of components an hour
  - Screen inaccessible areas simply by viewing them

Source: Heath Consultants
Remote Methane Leak Detection

How does it work?

- Works using Tunable Diode Laser Absorption Spectroscopy (TDLAS)
- Specific to methane gas only
- Displays gas reading in parts per million

Example

- Scan Distance = 15 m (50 ft)
- IR Beam ‘Footprint’ = 4.9 m (16 ft) x .3 m (11 inches) @ 15 m (50 ft)
- Background Methane = 1 ppm
- Avg. Plume Concentration = 20 ppm
- Plume Width (Distance IR beam passes through plume) = 2 m
- RMLD reading = Background + leak = (15 m x 1 ppm) + (2m x 20ppm) = 55 ppm-m

Source: Heath Consultants Incorporated
What does passive plume imaging look like

Source: Heath Consultants Incorporated
Eye-C-Gas Video Recordings for you to see firsthand.

Video recording of fugitive leaks detected by Heath Consultants using the Opgal Eye-C-Gas thermal infrared Gas imaging camera.

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OPGAL: EYE-C-GAS
Fugitive Emissions Detection Camera

• A design formed by the demands of the industry.
• Specially designed for the applicative market of natural gas, oil and petrochemical industries.
• Design for intrinsically safe, allowing the inspection at hazardous places in the plant.
• Current Approvals: Class 1, Division 2 & ATEX.
How The Eye-C-Gas Camera Works

- The leaking gas temperature differs from the background temperature,
- The EYE-C-GAS™ camera spectral band coincides with the emissivity (absorbance) spectra of the leaking gas,
- The sensitivity of the EYE-C-GAS™ camera enables the measurement of the difference in signal value, caused by the leaking gas
- EYE-C-GAS™ produces images of infrared energy and display it on a screen, similar to how a camcorder displays video.
Opgal Eye-C-Gas Camera with Normal and Enhanced Mode

Source: Heath Consultants Incorporated
Adjusting Polarization with Eye-C-Gas Camera

Valve Stem Packing - Enhanced, Black Hot Mode

Valve Stem Packing - Normal, Black Hot Mode

Valve Stem Packing - Normal, White Hot Mode

Source: Heath Consultants Incorporated
Eye-C-Gas Video Recordings

Video recording of fugitive leaks detected by Heath Consultants using the Opgal Eye-C-Gas thermal infrared Gas imaging camera.

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Contacts and Further Information

- More detail is available on these practices and over 80 others online at: [epa.gov/gasstar/tools/recommended.html](http://epa.gov/gasstar/tools/recommended.html)

- For further assistance, direct questions to:

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