

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

**Global Methane Initiative Oil & Gas Subcommittee Meetings,
Krakow, Poland**

October 13, 2011

Milton W. Heath III
Director, Environmental Services
Heath Consultants Incorporated



Agenda

- Gas Plume Imaging – Active and Passive
 - Active Plume Imaging – Remote Sensing – Detection over a path with an illuminated infrared laser.
 - 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

Technology	Capabilities	Limitations	Demonstrated Field Applications
Passive Plume Imaging (Camera)	<ul style="list-style-type: none"> • Detects Leaks • Expedites Emission Detection • Simultaneously Detect Multiple Sources • Mobile System 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Emission Leak Detection • Pipeline Leak Detection • Aerial Leak Detection
Active Plume Imaging (RMLD)	<ul style="list-style-type: none"> • Detects leaks • Expedites emission detection • Portable and Mobile Applications • Built in Calibration to adjust laser drift. 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • All Natural Gas Facilities • Pipeline leak detection – Walking • Pipeline Leak Detection - Mobile

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

RMLD
Remote Methane Leak Detector

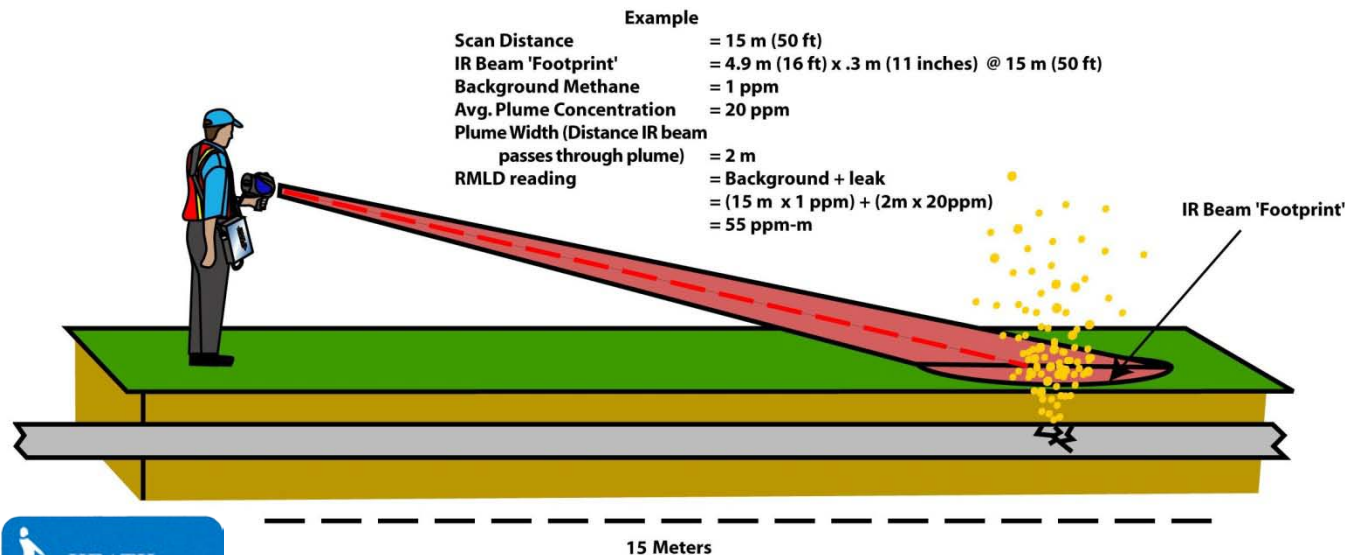


Source: Heath Consultants

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



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.

<..\..\Gas Imaging\New Folder\Eye-C-Gas Videos\Opgal Video Demo.wmv>



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

Compressor Station Blow Down Normal Mode



Compressor Station Blow Down Enhanced Mode



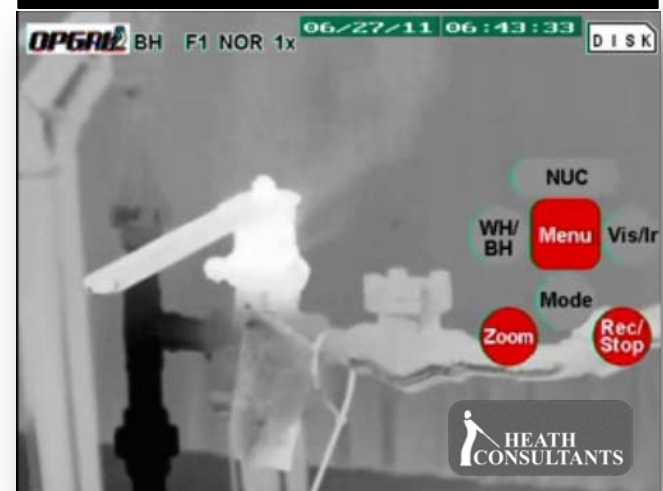
Source: Heath Consultants Incorporated

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.

<..\..\Gas Imaging\New Folder\Eye-C-Gas Videos\Compressor Station Opgal Videos\Elkview,CS6.wmv>

<..\..\Gas Imaging\New Folder\Eye-C-Gas Videos\Compressor Station Opgal Videos\Lanham,CS3.wmv>



Contacts and Further Information

- More detail is available on these practices and over 80 others online at:
epa.gov/gasstar/tools/recommended.html
- For further assistance, direct questions to:

Scott Bartos

EPA Natural Gas STAR Program

[*bartos.scott@epa.gov*](mailto:bartos.scott@epa.gov)

+1 (202) 343-9167

Milton W. Heath III

Heath Consultants Inc.

[*Milt.heath3@heathus.com*](mailto:Milt.heath3@heathus.com)

+1 (713) 844-1304

