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Gas Leak

Detection and Quantification

26.3.2013

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Introduction

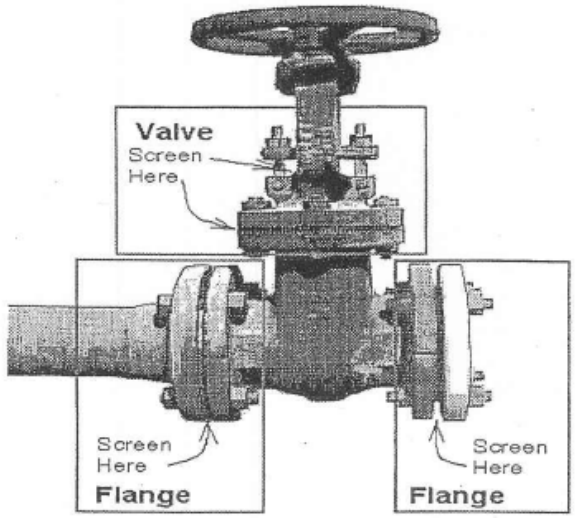
- Safety
- Environment Protection
- Cost Reduction
- Lost Reduction

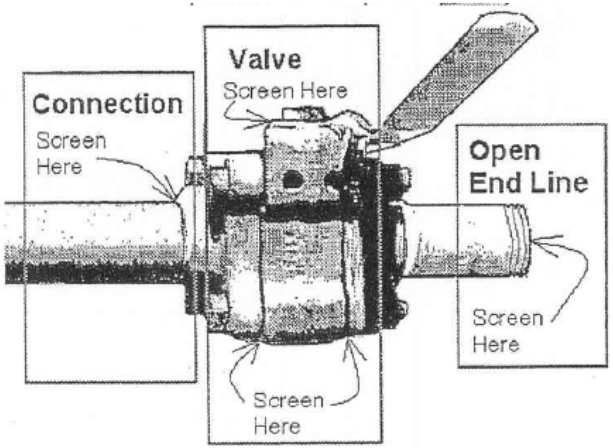
- Detection
- Quantification

Source of Fugitive Emissions

- General emissions types
  - Fugitive (equipment) emissions
  - Process vented emissions
  - Combustion emissions
- Source
  - Intentional
    - controllers, comp. seals, ...
  - Unintentional
    - equipment wear and tear, damage, improper, ...

Source of Methane Emissions





Source: EPA-600/R-96-080; Vol. 8

Fugitive Emissions are natural gas leaks that are emitted to the atmosphere from gas processing equipment.

Fugitive Sources of Emissions:

- Valves
- Seals
- Open Ended Lines
- Flanges
- Connectors
- Fittings
- Meters
- „Underground“ Leaks

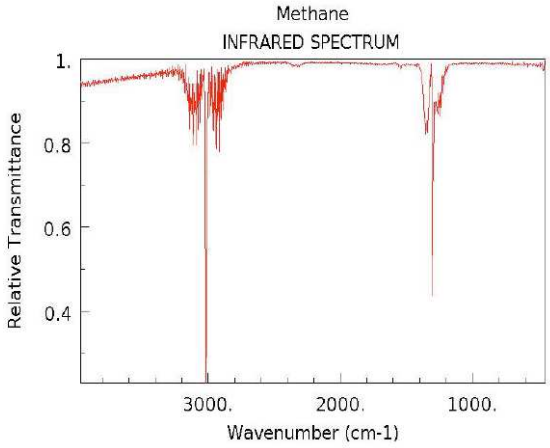
Leaks Detection

Techniques for detection of leaks

- Active
  - Laser, ...
- Passive
  - Ultrasonic
  - Infrared - optical
  - Bubble test, ...

Optical emission detection is a new technology that has been developed to provide rapid, accurate and safe identification of fugitive emission.

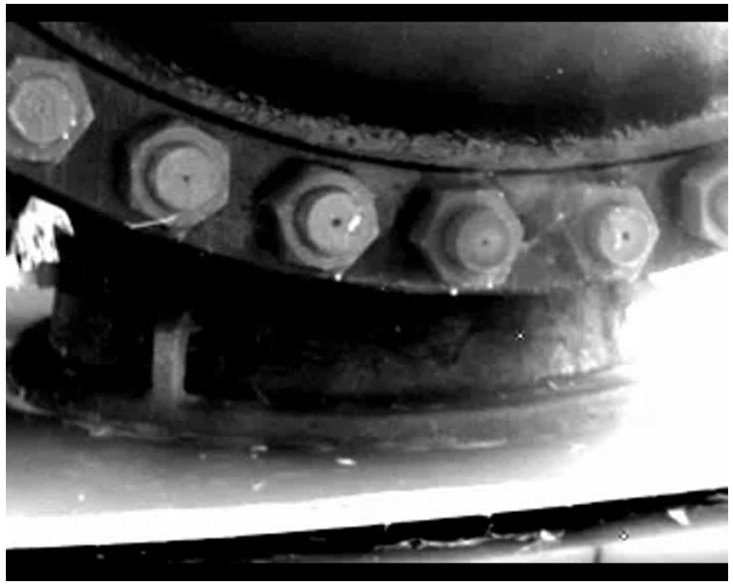
Leaks Detection



Visualization – Infrared Imager

- Cost-effectively scan hundreds of components simultaneously
- Identify exact source of leaks in real-time with video record
- Assessments performed without interruption of operations
- Scan hard-to-reach components from a distance
- Conduct aerial leak surveys over large areas
- Infrared camera with VOC filter

Leaks Quantifications



Techniques for quantification of leaks

- Direct
  - Calibrated Bag
  - Hi Flow Sampler
  - Anemometer
- Computer Models and Simulators
- Indirect Measurement Techniques
  - Tracer methods
  - The plum transect method

Leaks Quantifications

Hi Flow Sampler

- Back pack model
- Intrinsically safe
- Accuracy of calculated leak rate +/- 10%
- Accuracy of reading +/- 5%
- Two detectors sample background and leak sources
- Two measurements are performed at two different flow rates
- Measurement range 0.01 to 100 percent by volume methane

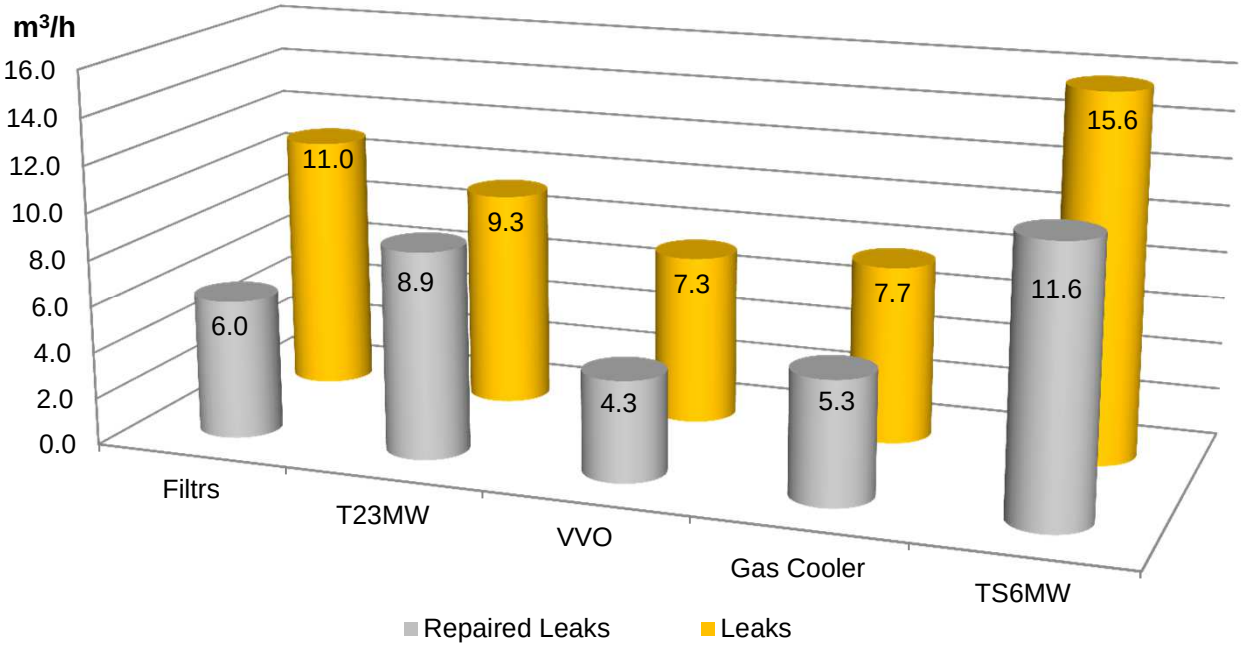
Leaks Quantifications

- When a leak is detected, a video is taken at an angel and range witch optimizes the visibility of the leak.

- The leak details are then recorded and the leak is then marked with a Leak Detection ID Tag.

Graphs

Total gas leaks from identified leaking equipment components at the CS4

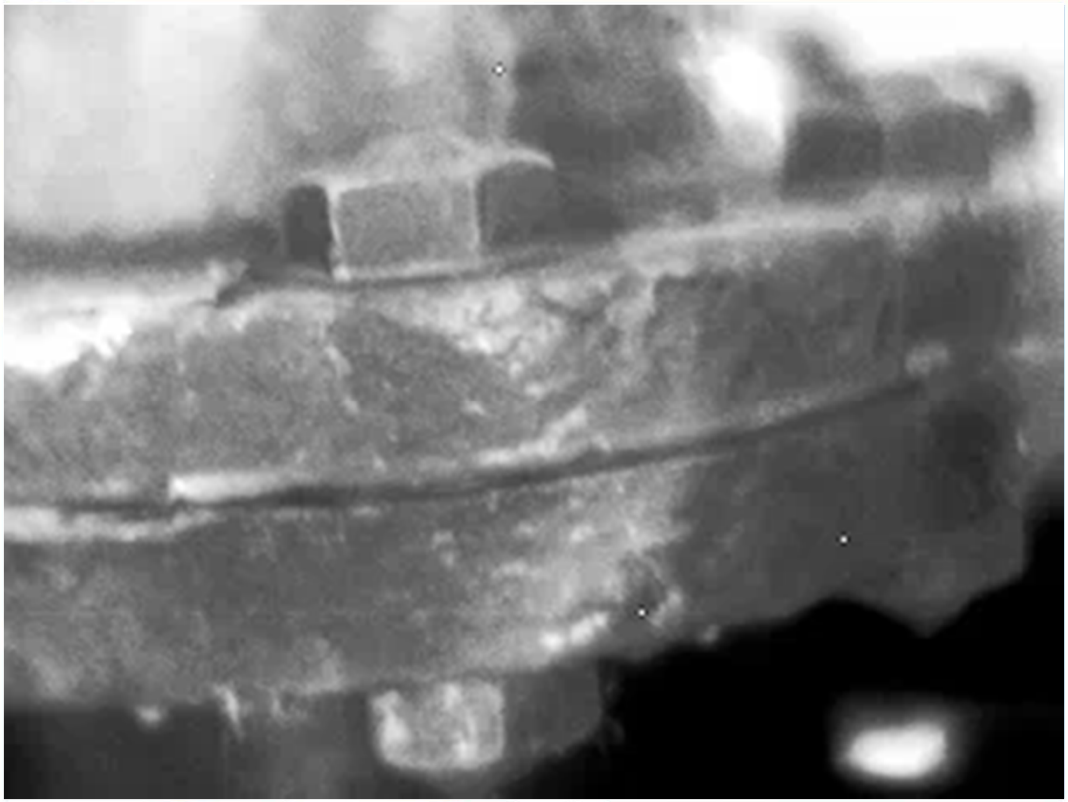


Surveyed components in one processing plants: 9 000 components

- Identified leaking components: 181 (about 2.1%)
- Repaired 81% of the identified leaking components
- Annual methane emissions reductions: 316 236 m^3/year
- Annual savings: € 85 400/year

Source of Methane Emissions

Open Ended Lines



Conclusion

- A successful, cost-effective Inspection & Maintenance program requires measurement of the leaks
- A high volume sampler is an effective tool for quantifying leaks and identifying cost- effective repairs
- A relatively small number of large leaks cause most fugitive emissions
- The business of leak detection is changing dramatically with new technology like infrared cameras that make Inspection & Maintenance program faster and easier

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Questions?

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