Leak Detection and Quantification of Fugitive Methane Emissions at Natural Gas Facilities

An EPA Best Management Practice

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Measurement Methods

• For leaks up to 10 cfm – Hi Flow Sampler
  10.5 cfm @ $9/Mcf = $49,669

• For leaks 10 – 240 cfm – Vent-Bag Method
  50 cfm @ $9/Mcf = $236,520
  100 cfm @ $9/Mcf = $473,040

• For leaks >180 cfm – Anemometer
  – Used only on vertical open ended line
  – Much more subjective, requires experience.
Hi Flow Sampler Applications

Advantages:
- Total Leak Capture
- Measures Leak Rate Directly
- Can Measure 30 components per hour
- Repair Decision Based on Leak Rate & Repair Costs
Hi Flow Sampler Technology

• Captures Entire Leak
  – Measures Flow Rate (F) and Concentration (sample)
  – Subtracts the background (back) Concentration
  – Leak Rate = F x (sample – back)
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How Much Was That Leak?
Leaking Valve Actuator. Leak measured at 6.74 scfm or $31,882/yr. Estimated to have been leaking at current leak rate for last three years or more. Successfully repaired next day and reduced to zero emissions.

$$$$$
Entire Survey Paid For in recovered gas, Including investment of new Hi Flow Sampler
$$$$$
How Much Was That Leak?
Leaking Actuator on Methanol Injector Pump. Leak Rate at 3.5 cfm or $16,556/yr. Estimated repair <$500.
About Rod Packing Leakage

• Under best conditions leak rate can be expected at a minimum of 11.5 scfh
• Leakage can be reduced through proper monitoring and a cost effective schedule for replacing packing rings & piston rods.
• Step one is to monitor and record baseline packing leakage and piston rod wear.
• Establish a replacement threshold
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Rod Packing Leak Rates at Oklahoma Compressor Station

1 Year Payback Threshold at 55 scfh Equivalent to $4336/yr
Leak Survey Methods

Leak Detection Tools

- Remote Methane Leak Detector (RMLD)
- Soap solution
- Flame Ionization
- Heath Detecto-Pak Infrared
- Catalytic oxidation/thermal conductivity
- Flir Gas Imaging Camera
- Ultrasonic
- Visual
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How Does the RMLD Measure Gas?

Example:

- **Scan Distance**: 15 m (50 ft)
- **IR Beam 'Footprint'**: 4.9 m (16 ft) x 0.3 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
  - Background: (15 m x 1 ppm) + (2m x 20 ppm)
  - Total: 55 ppm-m

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Pump Driven CGI

Ultrasonic
Questions?

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