Heath Consultants Incorporated
EPA Subpart W Compliance
Leak Detection, Monitoring, Measurement and Calibration.

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Agenda

• Screening Methods & Technologies
• Measurement Requirements, Approach and Technologies
• Calibration Requirements
Screening Methods

How to detect leakage

- Gas Imaging Camera (Passive Infrared)
- Illuminated Infrared Laser Detector (Active Infrared)
- Method 21 using conventional Flame Ionization or Catalytic Oxidation, Thermal Conductivity.
Top 4 Required Direct Measurement Fugitive Sources

- Reciprocating Compressor Packing
- Blow Down Valves
- Unit Valves
- Scrubber Dump Valves

“Follow the vent line to insure you have the correct source”.
Heath Approach to Leak Screening and Monitoring

- Significant Emission Sources should be screened with a Gas Imaging Camera or Method 21 Tool to determine if Direct Measurement is required.

- (Discuss technicalities of the rule in regard to blowdowns.)
What does passive plume imaging look like

Source: Heath Consultants Incorporated
Eye-C-Gas Imaging of Storage Tank Emissions – Leaking Scrubber Dump Valves

Scrubber Dump Valve Leakage through Condensate Storage Tank

Storage Tank Emissions

Source: Heath Consultants Incorporated
Gas Imaging Video Recordings

Video recording of fugitive leaks detected by Heath Consultants using the Opgal Eye-C-Gas thermal infrared Gas imaging camera.
Screening Difficult to Reach Vent Stacks With Electronic Screeners (Method 21) – The Benefits.
Leak Detection Instrumentation should be approached by application.

- The Gas Imaging Camera is the right Choice for Tanks, Blow down Stacks and Open Ended Lines.
- Use of the Illuminated Infrared Methane Laser Leak Detector is an ideal choice for connectors, flanges, Tube Fittings >1/2 inch & difficult to reach piping.
Method 21 Screeners or Sniffers

- Pump Driven CGI
- Pump Driven Infrared Methane Detectors or Flame Ionization
Picarro Solution:
Drive, and Let the Atmosphere Carry The Methane to You!

• TRIAGE: figure out where the leaks are (and aren’t) at a distance, without stopping the car

• LOCALIZE: if you see a leak, use the wind to understand where the source of the gas is

• ATTRIBUTE: don’t get confused by the cows!

• QUANTIFY: concentration means (almost) nothing – the only thing that matters is emission rate
Concentrations 3-5X above background levels over 100’s of square miles ... all from natural gas extraction!

Lots and lots of individual emission sources
Example: Compressor Station in the Denver – Julesburg Basin
45 Second Drive Around Compressor Station Detects Multiple Methane Plumes
Measurement Methods

- For leaks up to 10 cfm – Hi Flow Sampler
  10.5 cfm @ $5/Mcf = $27,594

- For leaks 10 – 240 cfm – Vent-Bag Method
  50 cfm @ $5/Mcf = $131,400
  100 cfm @ $5/Mcf = $262,800

- For leaks >180 cfm – Anemometer or Thermal Flow Meter
  - Used only on vertical open ended lines
Hi Flow Sampler Applications

- **Advantages:**
  - Total Leak Capture
  - Measures Leak Rate Directly
  - Accuracy of Calculated Leak Rate = +/- 5% of reading
  - Can Measure 30 components per hour
  - Repair Decision Based on Leak Rate & Repair Costs
Rod Packing Seals – They ARE leaking so skip screening and perform “Direct Measurement”
Heath Approach to Measuring Rod Packings

- Rod Packing Measurements can only be done reliably with a Hi Flow Sampler.
- Measure Rod Packings for Total Volume outside of building
- Or
- Measure Rod Packing Leak Rates at the compressor
- This task requires training, skill and experience.
3 Cubic Foot Calibrated Vent Measurement Bag
Acoustic Leak Detection

- Estimate through-valve leakage
  - Ultrasonic measurement
  - Leak is >3.1 scf per hour
  - Requires data on valve type, size, and differential pressure
  - Readings upstream and downstream of valve, and on valve body.

- Software estimates the leakage rate depending on decibel level.
Other Alternatives to Vent Stack Measurements using an Anemometer.
Calibration Requirements

• For Subpart w sources, flow meters, pressure gauges & composition analyzers calibrated per §98.3(i) & §98.234(b)
  – ASTM, ANSI, AGA, ASME, API, etc. methods

• §98.3(i) (General Provision) addresses calibration requirements for flow meters and other measurement devices
  – §98.3(i)(1)(i): All measurement devices must be calibrated according to one of the following:
    • Manufacturer’s recommended procedures, or
    • An appropriate industry consensus standard, or
    • Method specified in a relevant subpart of this part

• Document calibration method(s) in the Monitoring Plan
Instrument Calibration

- Initial calibration shall be conducted by the date that data collection is required to begin
- §98.3(i)(4)-(6) include permitted calibration exemptions
- Recalibration frequency specified in subpart or recommended by manufacturer industry consensus standard practice [§98.3(i)(1)(iii)(B)]
- Document calibration method(s) in the Monitoring Plan
- Consult checklists for a more detailed summary of requirements.
Questions?

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