

# tVOC Sensor QAQC and the Impact on Colorado Oil & Gas Regulation 7

Pamela Rickly, Interim Supervisor  
Oil & Gas Mobile Monitoring Unit



**COLORADO**

**Air Pollution Control Division**

Department of Public Health & Environment

# Overview

- Regulation 7 overview
- Background on sensor QAQC procedures
- Initial findings
  - Operating procedures and deployment measurements
- Evaluation and moving forward



# Colorado Regulation 7

- AQCC put into effect on February 14, 2021
- Minimize ozone precursor emissions from oil and gas activities
- Mandates continuous monitoring requirements at multiple phases of a well's lifecycle
  - 10 days before pre-production, during pre-production operations, and at least 6 months after production begins



# Monitoring Program Timeline

Monitoring required  
for wells drilled  
on/after May 1, 2021

Operators submit  
monthly air  
monitoring reports -  
10 days prior to pre-  
production through six  
months of early  
production

By March, 2022,  
update to the Air  
Commission on  
learnings/insights,  
data observations,  
length of monitoring,  
potential exemptions

Continual assessment  
and improvement



# Sensor Technologies



**SENSIT SPOD  
VOC+MET**

<https://www.gasleaksensors.com/products/sensit-spod-voc-emissions-air-pollutant-monitor.html>



**aeroqual AQS-1  
PM+MET+(VOC+NO<sub>2</sub>+O<sub>3</sub>)**  
<https://www.aeroqual.com/products/aqs-mini-air-quality-stations/aqs-remediation-air-quality-monitor>



**Lunar Outpost Canary  
PM+MET+(VOC+CO+CO<sub>2</sub>+  
NO<sub>2</sub>+ O<sub>3</sub>+O<sub>2</sub>+SO<sub>2</sub>+CH<sub>4</sub>)**  
<https://outpostenvironmental.com/products>

# Sensor Pod (SPOD)

- Colorado first state to use SPODs for oil and gas activity monitoring
- SENSIT SPOD - low cost, solar-powered photoionization detection (PID) system
  - Passively measures total volatile organic compounds (VOCs) in ambient air
  - tVOC range of 0.01 – 2 ppm
  - Integrated cellular service for remote operation
  - Optional met station and triggered canister modules
- Effective screening tool



**SENSIT SPOD  
VOC+MET**

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# Quality Assurance and Quality Control

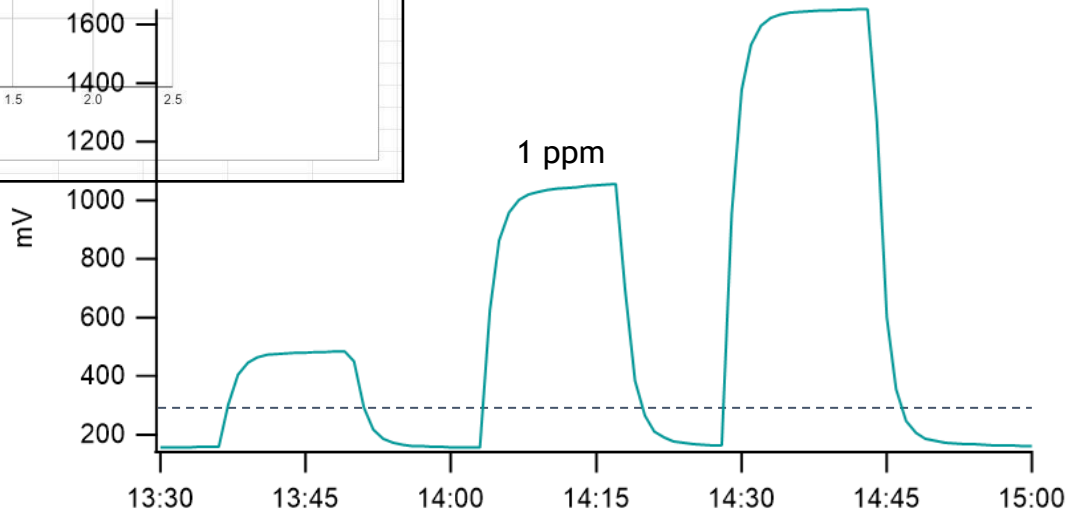
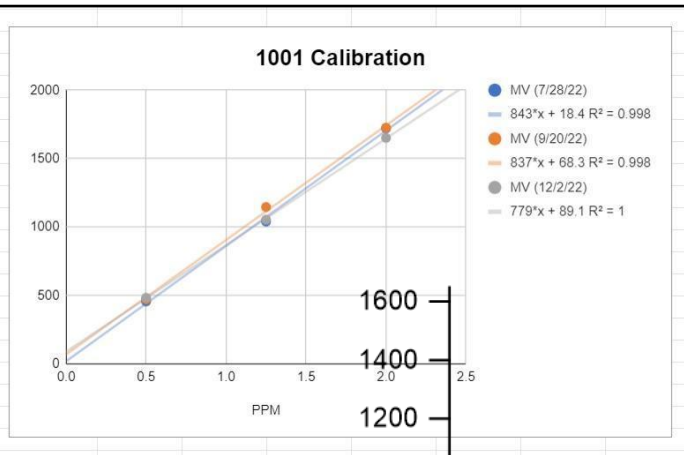
- Procedures established for collecting data within pre-specified tolerance limits
- Calibrations/bump checks - routine measurement of a known test gas by gaseous analyzers
  - Confirm sensor functionality
  - 3 month frequency
- Monitoring data reviewed for accuracy, precision, and bias
  - Meteorological (RH or T), duration from last calibration (age or environmental response)
- Establishing additional validation procedures





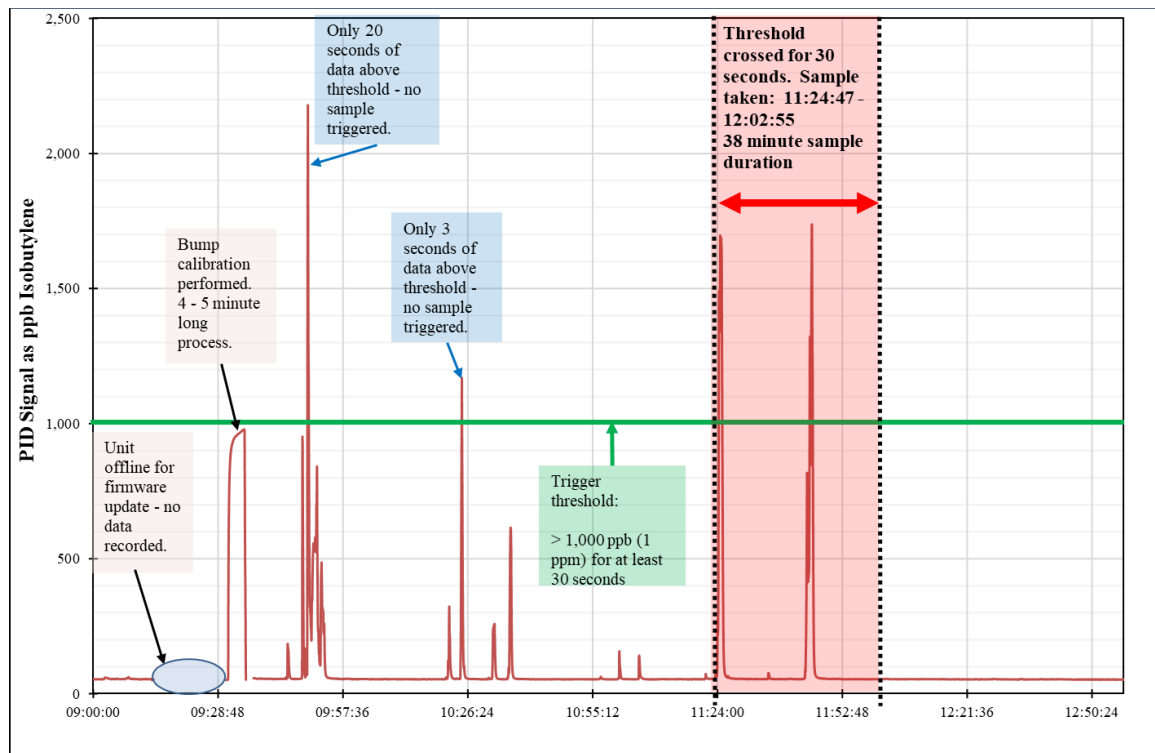
# Case Study: Calibration Assessment

PPM	MV (7/28/22)	MV (9/20/22)	MV (12/2/22)
0.5	456	470.97	483.12
1.25	1,040	1145.82	1053.27
2	1,721	1726.13	1651.30
<b>Slope:</b>	843	837	779
<b>Intercept:</b>	18.4	68.3	89.1
<b>Gain (1/m):</b>	0.00118623962	0.0011947431	0.001283697
<b>Offset (-b):</b>	18.4	68.3	89.1

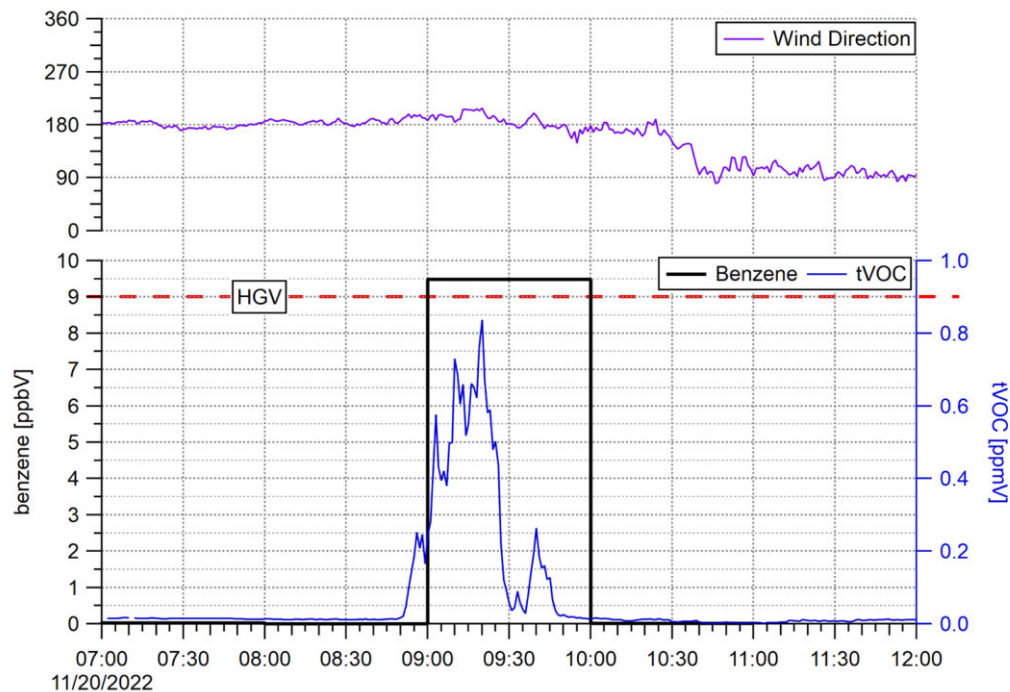




# Case Study: Triggered Canister



# Case Study: Validation through Collocation



# Evaluation and Moving Forward

Beneficial  
screening tool

Simple calibration  
assessment

Easy functional  
testing

Validation for  
other sampling  
tools

Pros

Cons

Lengthy canister  
analysis

Not regulatory  
grade data

In need of  
standardization

Next Steps

Determining how best to use data

- Formatting standard
- Data quality ranking





Plans and reports publicly available

[https://oitco.hylandcloud.com/  
CDPHERMPublicAccess/index.html](https://oitco.hylandcloud.com/CDPHERMPublicAccess/index.html)



# Thank you!



Pamela Rickly, Interim Supervisor  
Oil & Gas Mobile Monitoring Unit (OMM)  
Air Pollution Control Division (APCD)  
Colorado Department of Public Health &  
Environment (CDPHE)

[Pamela.Rickly@state.co.us](mailto:Pamela.Rickly@state.co.us)