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

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Air Pollution Control Division
Department of Public Health & Environment

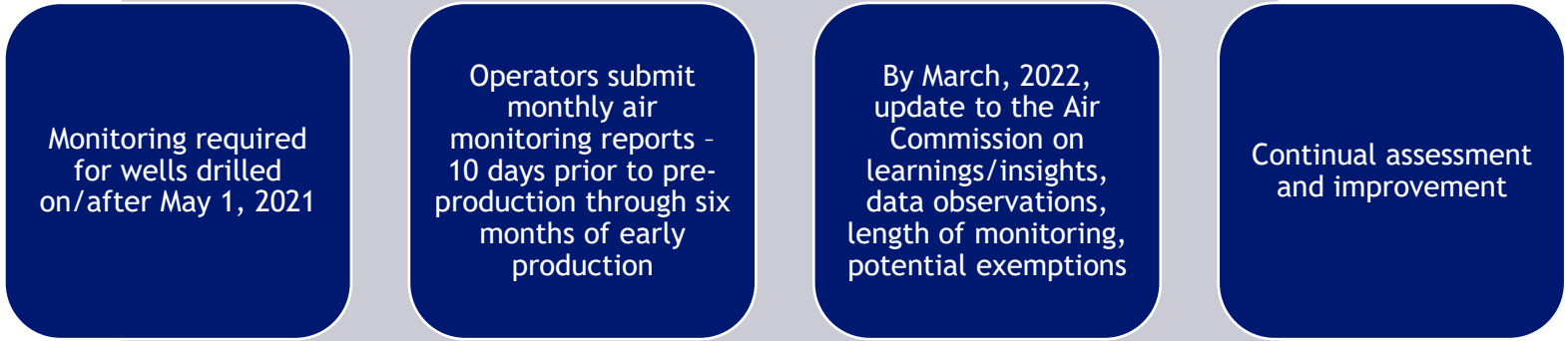
Overview

- 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



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_2+O_3)
https://www.aeroqual.com/products/aqs-mini-air-quality-stations/aqs-remediation-air-quality-monitor

Lunar Outpost Canary
PM+MET+(VOC+CO+CO_2+
NO_2+ O_3+O_2+SO_2+CH_4)
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

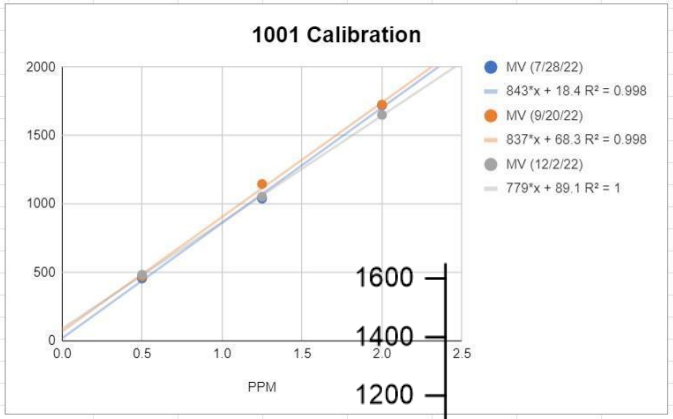
https://www.gasleaksensors.com/products/sensit-spod-voc-emissions-air-pollutant-monitor.html

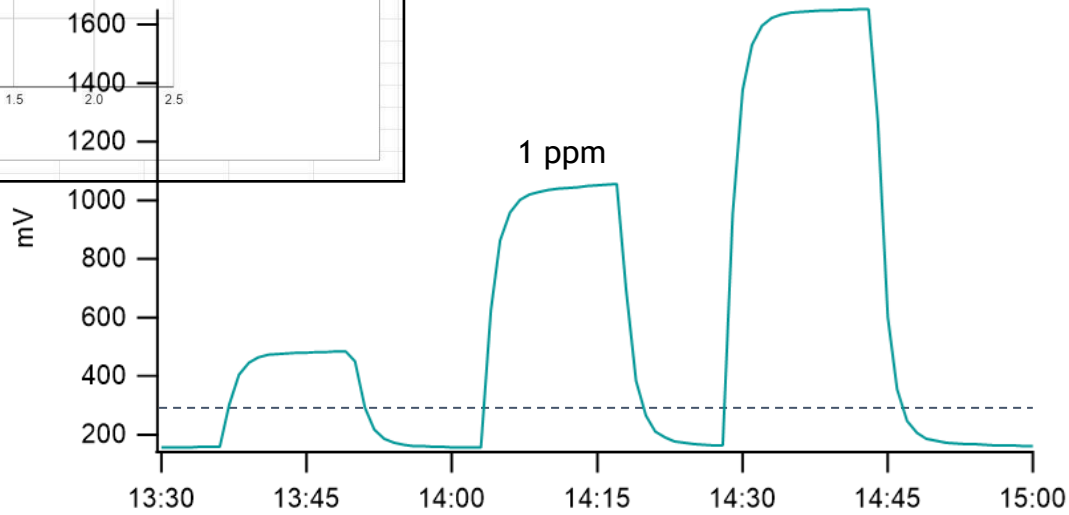
Quality Assurance and Quality Control

- 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

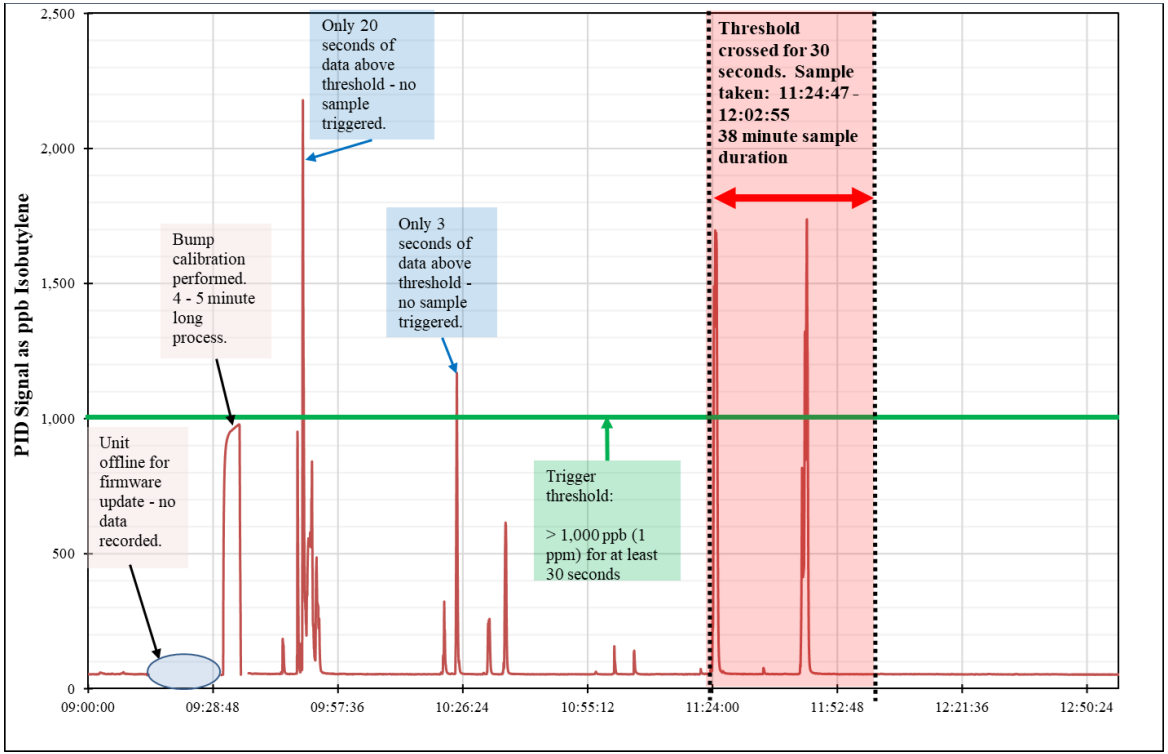
Case Study: Calibration Assessment

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
Slope:	843	837	779
Intercept:	18.4	68.3	89.1
Gain (1/m):	0.00118623962	0.0011947431	0.001283697(
Offset (-b):	18.4	68.3	89.1

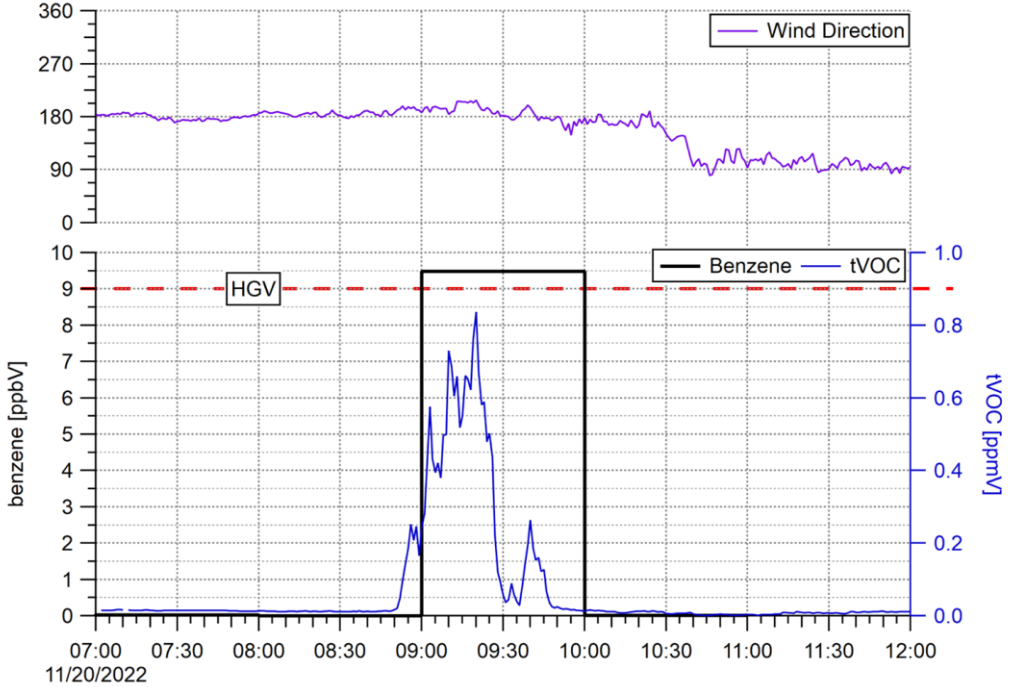




Case Study: Triggered Canister



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

Thank you!

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