Implementation of a new regulation for air monitoring around oil and gas development in Colorado

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Oil and gas development

- Over 50,000 wells
- Over ½ are in the Denver-Julesberg Basin in NE Colorado
- Near major cities in Colorado
- Also an ozone non-attainment area
Recent oil and gas monitoring

- 2015 Governor’s Oil and Gas Task Force Report (Recommendation #31b)
  - Funding for a mobile laboratory that could be dispatched to defined locations to monitor ambient air quality and to help determine potential sources
  - Colorado Air Monitoring Mobile Lab (CAMML)

- Sensor deployments
  - Sensit SPOD
  - Total VOC PID sensor
  - Have trigger mechanism so whole air canisters or sorbent tube samples can be taken
  - Canister samples typically for 1-hour to compare to acute health guideline values
Colorado Air Quality Control Commission
Regulation #7

► “CONTROL OF OZONE VIA OZONE PRECURSORS AND CONTROL OF HYDROCARBONS VIA OIL AND GAS EMISSIONS” (5 CCR 1001-9)
► Amended September 2020
► Goal:
  ► To obtain more information regarding potential emissions from pre-production operations (drilling, fracking, millout, flowback, early production)
  ► To determine potential impacts to human health
  ► To obtain more information on innovative monitoring techniques
► VI.C. Air quality monitoring
  ► Owners or operators of drilling operations that begin on or after May 1, 2021, must monitor air quality at and/or around the pre-production and early production operations
► 3 objectives listed in the regulation:
  ► Detect, evaluate, and reduce as necessary hazardous air pollutant emissions
  ► Detect, evaluate, and reduce as necessary ozone precursor emissions
  ► Detect, evaluate, and reduce as necessary methane emissions
Overview of monitoring requirements

- Pollutant(s) and other parameters to be monitored must include at least one of the following:
  - Total VOCs, methane, benzene or BTEX (benzene, toluene, ethyl benzene and xylenes) or other indicator of hydrocarbon emissions
  - Meteorology

- Owners or operators must submit an air quality monitoring plan at least sixty (60) days prior to beginning air quality monitoring
  - Within 14 days of receiving the plan, the Division will consult local governments within 2000’ as part of the review process
  - Owners or operators must receive approval from the Division of the air quality monitoring plan prior to beginning air quality monitoring

- Owners or operators must keep records for a minimum of three (3) years, unless otherwise specified, and upon request make records available to the Division

- Owners or operators must submit monthly reports of monitoring conducted to the Division by the last day of the month following the previous month of monitoring
Monitoring plans must include:

- A description of the monitoring equipment to be deployed
- A description of the meteorological monitoring equipment to be deployed
- The number of monitors and/or sensors to be deployed
- The location and height of the monitoring equipment, including for each phase of operations if location and height of the equipment will change
- A topographic map and plan of the site
- A description of how the placement of monitoring equipment minimizes surface disturbances
- An explanation of how the number and placement of monitoring equipment will be adequate to achieve the desired air quality monitoring objectives
- The standard operating procedures that will be employed
- The quality control and quality assurance procedures
- The data system and operating protocol to be used for data collection
- The methods for collecting and analyzing speciated or other samples of chemical constituents
Records and reporting must include:

- Monthly reports and the data necessary to inform the monthly reports
- The phase of operation
- Activity logs
- For a period of one year after the monthly report, the underlying raw data associated with each monitor
- API number of the well(s)
- Location of the operations
- The date, time, and duration of any monitoring equipment downtime
- The date, time, and duration of operations malfunctions and shut-in periods or other events investigated for influence on monitoring
- A summary of monitored air quality results, including time series plots as hourly or higher time resolution and a statistical summary
- A description of responsive action(s) taken as a result of monitoring results
- Owners or operators must notify the Division and the local government within forty-eight (48) hours of responsive action(s) taken as a result of recorded values in excess of the response level
What has Colorado done to facilitate implementation?

- Developed a guidance document for the Oil and Gas industry/operators
- Worked closely with the Oil and Gas industry to develop monitoring Plan template in Excel
  - Includes 37 worksheets
- Developed monthly reporting template in Excel
  - Includes 28 worksheets
- Most wellpads are 6-12 wells in size, some as few as 1
- Most wells are horizontal
- All wells are specifically identified in monitoring plans
Operator monitoring plans

- To-date, 37 monitoring plans have been submitted for review/approval
  - Some using template, some using own format
- Most plans are using sensors for total VOC’s (TVOC)
- One is utilizing a rotating FLIR camera
- Some also include PM2.5
- Typically 1 meteorological sensor per wellpad
  - Often associated with a sensor unit
- Many are adding triggered canisters to get speciated data in plumes
- Many are adding passive tubes for 2-week exposures
- Typically 3-6 sensors per wellpad, including predominant wind directions or nearby residences
- Typically within 150’ from edge of pad
  - Tall soundwalls can create airflow issues
PID-based TVOC sensors

Lunar Outpost
Canary-S

Sensit
SPOD

Earthveiw
Blubird

Aeroqual
AQS-1
Metal oxide-based TVOC sensors and FLIR

- WSP - USA
  AirWatch

- Terra SLS
  Air Guardian

- CleanConnect
  FLIR
Questions that have arisen

Does a well that commences pre-production activities prior to the rule effective date need to perform monitoring?

- Answer - While it may not be possible to get baseline monitoring, yes, the well should still commence monitoring on or before May 1, 2021

How should data be collected where the wellpad is in an area with no cellular or wifi coverage?

- Answer - Many systems have onboard memory or SD cards that store the data, which can be downloaded on a routine basis

What QA/QC needs to be performed?

- Answer - This can vary, but with PID’s, a monthly bump-test with isobutylene gas is recommended, as well as periodic/quarterly calibrations
Thoughts and the future

- A lot of work and collaboration with the oil and gas industry was needed in a short-time to meet the May 1, 2021 required monitoring start date
  - Monitoring plans need to be submitted for approval at least 60 days prior to commencement of monitoring
  - Need to perform 10 days of baseline monitoring
- Some monitoring plans required an expedited review
- Some operators elected to voluntarily develop plans for approval for operations that commenced or completed prior to the May 1, 2021 required date
- Monitoring reports are starting to come in and are being reviewed
- Storage of all the data for future analysis needed
- Oil and gas development has picked up a lot more quickly than anticipated, so staffing a concern
- Likely that some revisions to the regulation will be needed in the future based on experiences and data analysis
- This is an initial step of an anticipated broader oil and gas monitoring program
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- Regulation #7 can be found at:
  - https://cdphe.colorado.gov/aqcc-regulations