January 31, 2022

The Honorable Michael S. Regan, Administrator
U.S. Environmental Protection Agency
Docket ID No. EPA-HQ-OAR-2021-0317
Mail Code 28221T
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460
Submittal via Federal eRulemaking Portal, http://www.regulations.gov

Subject: Comments regarding continuous monitoring provisions in the Proposed New Source Performance Standards and Emissions Guidelines for Control of GHG Emissions from the Oil and Natural Gas Sector, Docket ID No. EPA-HQOAR-2021-0317

Dear Administrator Regan:

Chesapeake Energy, Chevron, Devon Energy, Exxon Mobil Corporation, Jonah Energy LLC, and Scientific Aviation appreciate the opportunity to comment on the U.S. Environmental Protection Agency's Proposed New Source Performance Standards and Emissions Guidelines for Control of GHG Emissions from the Oil and Natural Gas Sector, published in the Federal Register on November 15, 2021 (86 Fed. Reg. 63110). We are pleased to provide responses to the solicitation for comments specific to continuous monitoring technology. Generally, continuous monitors are equipment that is deployed in the field and automatically provides frequent, recurrent surveillance of emissions.

The undersigned companies fully support the development of a framework for advanced technologies that monitor sites "continuously." Certain emission sources tend to be unpredictable, some of which can be large. Frequent, recurrent inspections result in discovery of those large (and a number of moderate and some small) emission sources sooner, thereby reducing total emissions. Since manual inspections tend to be episodic and resource intensive, continuous monitors have been developed to provide these frequent, recurrent inspections automatically, thereby detecting emission events more quickly than would occur under manual methods.

EPA correctly identifies that continuous technology requires a different framework than that proposed for episodic screening technologies. EPA notes that triggering optical gas imaging (OGI) surveys too frequently would disincentivize the use of continuous monitoring systems. We believe that this is a risk for disincentivizing the use of episodic screening technologies as well. An annual component level OGI survey is sufficient to identify and mitigate small leaks that are

missed by alternative technologies with higher detection limits. The scientific literature[1,2,3] has shown that a small number of large sources constitute the majority of total emissions from leaks and other malfunctions. Accordingly, the majority of these emissions (the target of the more frequent surveys) are addressable by both screening and continuous monitoring technologies. Therefore, an OGI survey should not be required more than annually when alternative monitoring technologies are deployed, even under the screening options.

A fundamental difference in modality between episodic and continuous technologies is that a continuous technology is in position to confirm the reduction in emissions associated with an emission source repair much more rapidly than even the most frequent OGI schedule could deliver.

The balance of our comments are organized based on the elements EPA proposed for a framework, and requested comment on, with respect to continuous monitoring technologies. Thematically, our comments reflect an assessment of continuous monitoring technologies (1) in the context of equivalency to quarterly OGI inspections and (2) leveraging these systems to speed discovery of large emissions sources.

Key features of our comments include:

1) Operators should develop site specific monitoring plans including:
    a. A rationale for the number and citing of monitors; and
    b. Alerting criteria that obligates an operator to conduct an analysis and take corrective action.
2) Continuous monitoring alerting criteria should result in an analysis to identify the source and take corrective action considering the following:
    a. Operational information including Supervisory Control and Data Acquisition (SCADA) data;
    b. Physical site inspection if necessary; or
    c. Other means appropriate to identifying anomalous emissions.

The number of monitors needed and the placement of the monitors:

In a continuous monitoring configuration, the system relies on variation in wind direction to carry an emission plume to the sensor(s). Large numbers of sensors allow for:

1) shorter time to detection;
2) the ability of the system to discriminate offsite sources from onsite sources; and
3) to triangulate a potential source within the facility.

However, continuous monitoring systems tend to be capital intensive and so the benefits of installing additional monitors should be balanced with the incremental benefit of the next sensor.

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[1] Zavala-Araiza, D., Alvarez, R., Lyon, D. *et al.* Super-emitters in natural gas infrastructure are caused by abnormal process conditions. *Nat Commun* **8,** 14012 (2017). https://doi.org/10.1038/ncomms14012

[2] Adam P. Pacsi, Tom Ferrara, Kailin Schwan, Paul Tupper, Miriam Lev-On, Reid Smith, Karin Ritter; Equipment leak detection and quantification at 67 oil and gas sites in the Western United States. *Elementa: Science of the Anthropocene* 1 January 2019; 7 29. doi: https://doi.org/10.1525/elementa.368

[3] Adam R. Brandt, Garvin A. Heath, and Daniel Cooley Environmental Science & Technology 2016 50 (22), 12512-12520 DOI: 10.1021/acs.est.6b04303

Time to detection is, perhaps, the most critical of these benefits. In concept, as few as one sensor may be acceptable in a region where a monitor can be placed downwind of the facility in the direction of the prevailing wind, provided that is the prevailing wind on a continual basis. Often, there is seasonal variation in prevailing wind direction which should be accounted for in the number of sensors specified for a particular location. Wind analysis can inform where to site a small number of monitors to offer adequate coverage. This should be addressed in a site-specific monitoring plan.

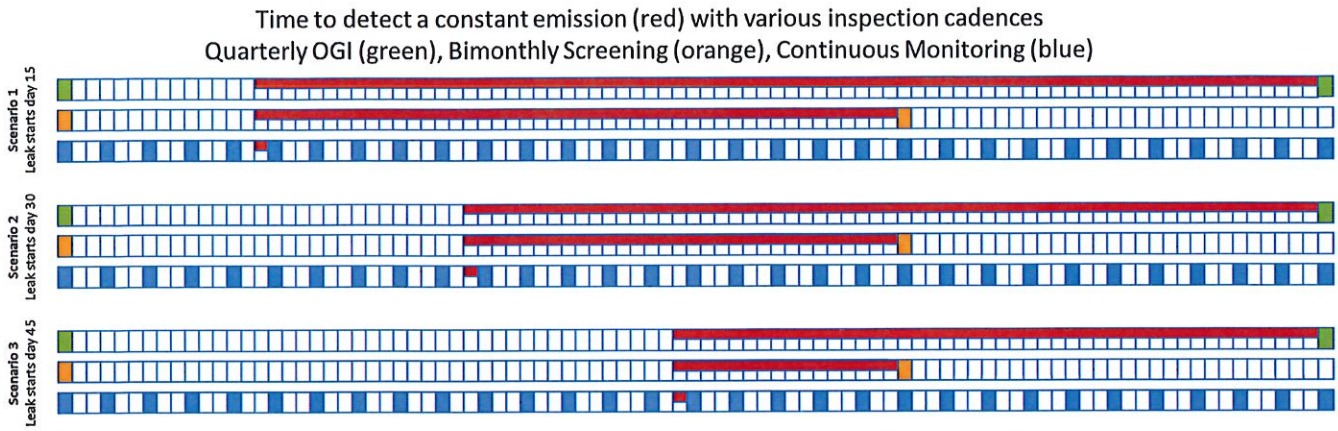
Additional sensors for the ability to discriminate offsite sources and triangulate sources within the facility should be optional since these may aid an operator in identification, but the consequence of not having them is a simply a higher burden of analysis for the operator.

An important feature that should be addressed within a monitoring plan is the proximity of monitors to the nearest source. We recommend that monitors be no closer than one and a half times the height of the nearest source to allow adequate dispersion for detection. We recommend the detection point be no lower than six feet from the ground.

Finally, the monitors should be capable of monitoring on a basis beyond concentration alone because concentration is a function of both meteorological parameters and emissions. Operators have deployed concentration-based monitoring systems in the field and discovered that alerting on a concentration basis results in inconsistent alerting because large emissions at higher wind speeds look the same as low emissions under stagnant conditions. The monitors should provide some indication of the magnitude of emissions such as an estimated flux or plume size.

It is important to keep in mind that continuous monitoring is being compared to quarterly OGI or bimonthly screenings. Thus, identifying "reasonable" coverage should err on the side of a delayed time to detection (perhaps days over hours over minutes) since the net continuous monitoring result would still be up to 15 times faster than quarterly OGI and up to 10 times faster than bimonthly screening,[4] even if it takes three days to detect a particular source, resulting in up to 10-15 times more emissions reduction. See illustration below.

[4] For a continuous monitoring system that could provide one observation of the site for every three days, compared to one observation of the site for every 90 days (quarterly OGI) or one observation of the site for every 60 days (episodic screening). This is highly conservative in favor of episodic monitoring because episodic inspections tend to last minutes to hours and do not provide a full day of surveillance. The assumption to arrive at a 10-15x emissions reductions is that, on average, an emission starts mid-way through the period between inspections.



Minimum response factor to methane / Minimum detection level:
The minimum response factor is only relevant to the extent a system is specified on a whole gas basis. Where there is a minimum detection level in terms of methane, it is redundant to also specify a response factor. The minimum detection level does not need to be any lower than 10 kg/hr for the purposes of considering equivalency to quarterly OGI since 6 times a year episodic screening at 10 kg/hr is equivalent to quarterly OGI. A more frequent inspection than bimonthly (or continuous one) at a similar detection level will yield equivalent or greater reductions through decreasing the time between emission origination and detection from an average of 30 days to an average of a few hours to days.

Frequency of data readings:
The frequency of raw concentration data collection produced by most continuous methane instruments is quite fast (often 1 Hertz or better), however, the relevant frequency is that which can be compared to an action level on either an individual or rolling average basis.

Bearing in mind that the observation window of OGI in the best system of emissions reduction (BSER) determination is a few minutes per source on a four times per year basis (or a few minutes per site on a six times a year basis for screening), the frequency of flux measurements is less of a critical parameter to achieve equivalent emissions results as it is a matter of optimizing to provide input into alerting algorithms. Like the value of a greater density of physical monitors on a site helps in discriminating offsite measurements from onsite or adding triangulation for an operator, more frequent measurements of flux readings will enhance alerting discrimination, minimizing false positives.

How to interpret the monitor data to determine what emissions are a detection versus baseline emissions / How to determine allowable emissions versus leaks:
Interpretation of monitor data relative to baseline emissions should be clearly explained in the monitoring plan. Various options have been evaluated in the field, from a straight action level applied over some period of time to statistical approaches (e.g., anomaly detection). More advanced algorithms, such as machine learning approaches are under development – and the final EPA rule should be written to remain open to these more advanced approaches when adequately developed.

Most importantly, an alerting criterion that obligates an operator to perform an analysis and take corrective action, as appropriate, should be established. Analysis may rely on process information and/or maintenance schedule information to determine if the cause of the emission was either a planned or unplanned maintenance activity that has since ceased. Otherwise, an emission that has an ongoing source should be repaired per the repair schedule applicable to quarterly inspections with OGI. Where an analysis cannot determine a source, an operator should perform an OGI survey (no more frequently than once per quarter) to ensure there is no ongoing emission event.

A baseline may need to be reset upon modification of a facility (e.g., facility modifications that trigger a Management of Change process). Depending on how emissions are impacted by other elements of this rule, a baseline may be less temporally variable.

Meteorological data criteria / Measurement systems data quality indicators / Calibration requirements and frequency of calibration checks:
All of these parameters should be followed as specified by the manufacturer. Different technologies and manifestations of those technologies warrant different approaches and standardization of these features may inadvertently result in a pre-selection of allowable techniques and stifle of further innovation.

How downtime should be handled:
Any uptime requirement should not be especially stringent since in this context, continuous monitoring systems are being evaluated as equivalent to quarterly episodic monitoring rather than to a traditional Continuous Emissions Monitoring Systems (CEMS). Therefore, requiring CEMS uptime requirements would not be appropriate. Any uptime metric should be evaluated on no less than a two-week rolling basis to allow for repair time at remote facilities.

Uptime requirements should also allow for an initial 60-day implementation period since a large scale deployment of sensors can be challenged by fine-tuning parameters such as communications (often relies on cell service or a need to build/configure existing SCADA), power availability (often relies on solar power), or other issues.

Finally, where there is a data outage from a force majeure event there should be an allowable delay of repair for the monitoring system.

How to handle situations where the source of emissions cannot be identified even when the monitor registers a leak:
Operators should perform an OGI inspection where no source can be identified (no more frequently than once per quarter).

Approach to determining equivalency to BSER:
To the extent that the detection limit of the sensor network is at least 10 kg/hr, then an increased frequency of measurement beyond once per two months would result in the same or more emissions reduction. Various combinations of alerting criterion and response times could be modeled to assess the emissions abatement potentials.

We reiterate our appreciation for the opportunity to comment on this rule, and in particular, to provide insights to the operation of continuous monitoring systems that will enable the inclusion of such systems in the final rule. We would welcome the opportunity to discuss any aspect of these comments further. Furthermore, as this process moves forward, we look forward to offering additional thoughts to further build and refine on the concepts offered above.

If you have any additional questions or require additional information, please contact me (Erin Tullos (346) 802-8651, erin@scientificaviation.com) or any cosignatory of this letter.

Sincerely,

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