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Alan Mayberry, P.E.
Associate Administrator
U.S. Department of Transportation
1200 New Jersey Ave, S.E.
West Building Ground Floor, Room W12-140
Washington, D.C. 20590-0001

Re: Docket ID Number: PHMSA-2021-0039

Dear Associate Administrator Mayberry,

Chevron Corporation ("Chevron" or "we") is one of the world's leading integrated energy companies. We believe affordable, reliable and ever-cleaner energy is essential to enabling human progress. In the United States (U.S.), Chevron has active exploration and production operations for crude oil and natural gas in several states and the Gulf of Mexico; manufactures transportation fuels, lubricants, petrochemicals and additives; and develops technologies that enhance our business and the industry. We aim to grow our traditional oil and gas business, lower the carbon intensity of our operations, and grow new lower carbon businesses in renewable fuels, hydrogen, carbon capture, offsets, and other emerging technologies.

Our strategy is clear – leverage our strengths to safely deliver lower carbon energy to a growing world. Effective methane management is important for lower carbon intensity oil and gas production. Globally, Chevron has adopted an upstream methane intensity target of 2.0 kilograms carbon dioxide equivalent per barrel of oil equivalent (kgCO_2e/boe) by 2028 and has been working to deploy advanced methane detection technologies. Examples of our global emission reduction projects and sample technology deployments are outlined in our methane report.[1]

While implementation of our methane action plan is ongoing, our U.S. onshore operations have some notable early successes. In 2021, our methane intensity for the U.S. onshore production sector was 64% lower than the U.S. sector average, based on data from the U.S. Greenhouse Gas Reporting Program (GHGRP).

Chevron has trialed methane detection technologies in our assets across six continents, including 13 advanced detection technologies and also manual Leak Detection and Repair (LDAR) technologies. Our advanced technology trials have shown that the success of certain technologies is tied to the unique characteristics of the assets and geography where the solution is deployed. For example, in the Permian Basin, we trialed eight different technologies and have selected an aerial light detection and ranging vendor for wider deployment. Aircraft-based technology already employed in the Permian has been successful at detecting methane

[1] https://www.chevron.com/-/media/shared-media/documents/chevron-methane-report.pdf

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emissions across the large operational footprint in a way that allows for targeted and timely follow-up and repair. We are committed to working with U.S. Department of Transportation on this important topic and would welcome further sharing our experience with the deployment of methane detection technology.

The proposed rule by Pipeline and Hazardous Materials Safety Administration (PHMSA) aims to minimize emissions of methane from, and improve public safety of, new and existing onshore gas gathering, transmission and distribution pipelines, underground natural gas storage facilities, and LNG facilities.[2] Chevron believes that methane management is critical to a lower carbon future, and as such, we support many of the methane reduction provisions outlined in the proposed rule. However, based on our methane detection and management experience, there are some key elements of the proposed rulemaking that may render some of the most promising technology solutions ineligible under PHMSA's program, ultimately disincentivizing their use, continued development, and deployment.

Among other rulemaking provisions, PHMSA is proposing to "introduce for all part 192-regulated gas pipelines an Advanced Leak Detection Program (ALDP) performance standard . . . reflecting the capabilities of commercially available advanced technologies and practices."[3] Specifically, for the ALDP, Chevron requests that PHMSA reconsider its proposed concentration-based standard and replace it with a flow rate-based standard; as we demonstrate in this letter, a flow rate-based standard is widely used today for classifying methane leak detection technologies.

The Proposed Leak Detection Technology Standards

Chevron appreciates that PHMSA has intended to include a regulatory framework that would allow for the use of advanced, commercially available detection technologies. PHMSA expects each of the proposed ALDP requirements to provide benefits to both public safety and the environment by directing operators to promptly detect and repair leaks, and to be "reasonable, technically feasible, cost-effective, and practicable for all affected gas pipeline operators."[4] In addition, the language in the rule envisions a scenario in which vehicle or aircraft mounted sensors would be used to perform leakage surveys, followed up by spot-checks and that the standards are intended to be based on commercially available advanced methane leak detection technology.

However, when establishing the criteria for selecting alternative technologies under the ALDP, PHMSA proposed that any leak detection equipment used meet a minimum concentration-based standard of 5 ppm at 5 feet. PHMSA explains that this "choice of leak concentration-based performance standard for leak detection equipment was informed by the goal of (as much as possible) identifying a single performance standard that would be well-suited for leak detection on both aboveground and buried natural gas pipelines."[5] The selection of a concentration-based standard does not meet that expressed goal.

Concentration-based standards are specifically useful for instruments that classify the concentration of methane (or some other gas component) at a specific point location, or within a specific volume of gas. For example, a closed-path IR laser sensor would provide the concentration of methane within the volume of air sitting inside the sensor. Similarly, a Lower

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[2] Proposed Rule, 88 Fed. Reg. 31,890, 31891.
[3] Proposed Rule, 88 Fed. Reg. at 31891.
[4] Proposed Rule, 88 Fed. Reg. at 31933.
[5] Proposed Rule, 88 Fed. Reg. at 31936.

Explosive Limit ("LEL") detection device utilizes a semiconductor to sense gas through conductance effects. For this reason, many portable gas monitors worn by workers in the oil and gas industry capture concentration-based information within the breathing zone of the worker as concentrations can vary significantly over a short distance depending on wind conditions, the density of the gases being measured, and the ventilation of the worker's surroundings.[6] A concentration-based standard is less effective for understanding the relative performance of advanced methane detection technologies.

For *detection* of emissions sources, a concentration-based standard is not as effective and could unintentionally disqualify the use of commercially available advanced leak detection technologies. The proposal outlines the performance of specific technologies used for advanced methane detection, including open path infrared tunable diode laser absorption spectroscopy ("IR-TDLAS"). It appears PHMSA expects that operators may use open path IR-TDLAS on aircraft mounted sensors. However, open path IR-TDLAS sensors may not be able to satisfy the 5 ppm at 5 feet standard. (*See* Appendix 1 attached to this letter for further explanation and hypothetical examples.)

Instead of a concentration-based standard, Chevron urges PHMSA to implement a flow rate-based standard, which could be applied equivalently to different types of technologies and modes of deployment. For emissions mitigation, the ability of the equipment to detect a leak of a given flow is more relevant than the ability of the equipment to meet a concentration-based standard. For the same leak, the concentration at a specific point can vary over time based on wind speed and other environmental conditions. Chevron encourages PHMSA to consider the challenges associated with a concentration-based standard that are noted in the docket.

Chevron recommends that PHMSA use a 10kg/hr emissions detection limit standard to aid in more rapid identification and approvals of advanced technologies. In the preamble to the proposed rule, PHMSA cites a study from the Environmental Defense Fund on methane emissions from gathering lines in the Permian Basin.[7] For each of the aerial surveys performed in that study, all of the leaks detected were above a 10 kg/hr flow rate, demonstrating that an aerial survey approach with a 10 kg/hr detection threshold would be effective for emissions detection for gathering lines.[8]

[6] Most 4-gas monitors include a methane LEL detector along with the concentrations of Hydrogen Sulfide, Carbon Dioxide, and Oxygen. These concentrations are detected in the air that contacts the sensor itself. It is important to note that OSHA instructs that these devices be worn within the breathing zone of the worker, defined as a ten-inch radius of the worker's face.

[7] **Methane Emissions from Natural Gas Gathering Pipelines in the Permian Basin.** Jevan Yu, Benjamin Hmiel, David R. Lyon, Jack Warren, Daniel H. Cusworth, Riley M. Duren, Yuanlei Chen, Erin C. Murphy, and Adam R. Brandt. Environmental Science & Technology Letters 2022 9 (11), 969-974. DOI: 10.1021/acs.estlett.2c00380

[8] In the proposed rule, PHMSA establishes section 192.763(c) that implements an alternative advanced leak detection performance standard. In concept, this alternative would allow for equipment that is less sensitive than that required by the core rule requirements in 192.763; however, as shown in this comment letter, certain technologies may not meet those standards. Therefore, even equipment under the alternative standard would not meet the demonstration of equivalence requirement under 192.763(c). While Chevron appreciates the inclusion of an alternative approach that allows for a broader set of technologies to be used, this should not be the main pathway for approval of aircraft-based IR-TDLAS equipment.

The EPA's Proposed Approach

A flow rate-based standard would also be aligned with the EPA's tiered emissions monitoring approach within its proposed rulemaking for Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources (EPA-HQ-OAR-2021-0317) ("EPA OOOO Series Proposal"). Harmonization of the two proposed standards around the concept of a tiered flow rate-based standard would ultimately allow for greater innovation in, and faster deployment of, alternative technologies. Two Federal agencies developing different standards for the same type of equipment adds unnecessary administrative complexity and duplication of effort without adding additional emission reductions.

Within EPA's OOOO Series Proposal, EPA takes a similar approach to what Chevron is suggesting for PHMSA's consideration. EPA provided a matrix of flow rate-based thresholds for alternative technologies, and then set a screening frequency that would be appropriate for each threshold. To maintain consistency across the Federal approaches to methane emissions monitoring and to allow for continued development of advanced methane detection technologies, PHMSA and EPA should avoid mandating two different standards to cover the same technological approach. While the surveying frequencies for pipelines will likely be different than complex facilities or production sites, the types of surveying technologies should be subject to similar requirements. For more detail on the EPA rule, please see Chevron's comments included in the EPA OOOO Series Proposal rulemaking docket.

In our view, a final rule that specifically allows for a broad set of applicable technologies will facilitate performance improvement and have broader influence beyond the U.S. oil and gas onshore production sector. Within the U.S., the utilization of these technologies at scale in the oil and gas sector would likely provide cost-effective methane management that could be applied in other methane-emitting sectors. If made available internationally, we believe this could enhance capabilities in other countries to improve methane performance in support of efforts like the Global Methane Pledge. Advanced technologies can help drive overall reductions in methane intensity and will be a component of methane management at scale.

Conclusion

Chevron believes that methane management is critical to a lower carbon future and that methane reductions are possible in the energy industry, and in other key sectors. We would be happy to meet with PHMSA as part of this rulemaking process to share our experiences with advanced technologies. Thank you for the opportunity to submit these comments to the rulemaking docket. If you have questions regarding the comments above, please contact Jay Thompson at (202) 408-5844 or thompsonjr@chevron.com.

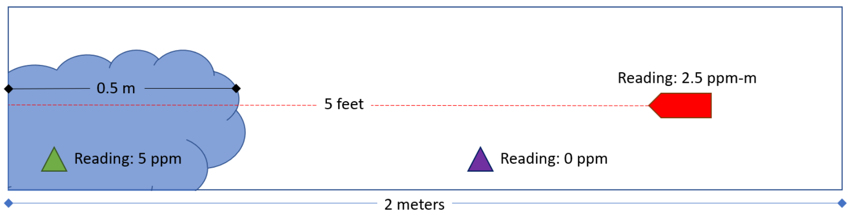
Sincerely,

Karen Knutson

Appendix 1: Hypothetical Examples of Methane Plume Measurements with PPM Standard

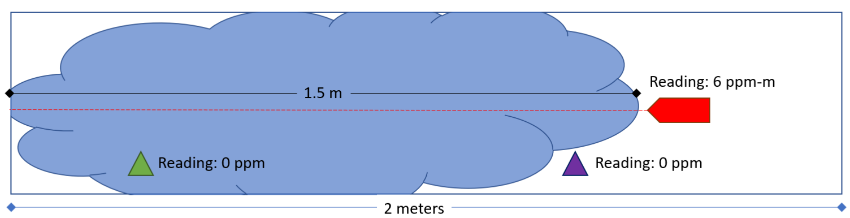
Example 1: 5 ppm plume

The cloud shaped object represents a methane plume of uniform concentration of 5 ppm that is 0.5 m in width. A point sensor, perhaps a semiconductor or closed path IR device, noted by the green triangle, placed in the plume, would record a reading of 5 ppm. A second point sensor, represented by the purple triangle, would read 0 ppm, even at a distance of less than 5 feet. An IR-TDLAS sensor, represented by the red arrow, placed 5 feet from the plume, would give a reading of 2.5 ppm-m as a path-integrated concentration, assuming the device was capable of reading that low.



Example 2: 4 ppm plume

Now consider a second example, a plume of uniform concentration of 4 ppm that is 1.5 meters in width. In this example, the point sensors, if only sensitive to 5 ppm, would each read 0 ppm or a non-detect. However, because the IR-TDLAS laser is now intersecting the lower concentration plume over a larger distance, it would provide a reading of 6 ppm-m.



Given just a slight variation in plume concentration and size, the technologies would pass one scenario but fail the other if using a 5 ppm at 5 feet concentration-based standard, and as such neither scenario proves that a technology is more or less sufficient for detecting methane emissions sources when using a concentration-based standard.

When these simplified illustrations are considered with the fact that gas plumes are not uniform, it shows that using a 5 ppm at 5 feet concentration-based standard is not optimal for detection purposes, and in many cases infeasible to verify from a technology performance perspective. Under real world conditions, wind speed and wind direction also affect the methane concentration at a certain location relative to the leak point, which may lead to variability in the classification of the same leak under different ambient conditions. More importantly, setting a 5 ppm at 5 feet concentration-based standard may unintentionally disqualify the aircraft and vehicle-based surveying equipment that PHMSA clearly intends to be used for compliance with this rule, as many of them use IR-TDLAS equipment.