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EPA Methane Regulation & Low Production Wells

The Kansas Independent Oil & Gas Association (KIOGA) represents thousands of independent oil and natural gas explorers and producers, as well as allied service and supply companies. With nearly 3,500 members across the entire state, KIOGA is the lead state and national advocate for the Kansas independent oil and natural gas industry.

Finding a Regulatory Pathway Based on Emission Data Where None Exists for Low Production Wells

Independent producers recognize the importance of environmentally sound regulations to manage industry emissions, including methane. KIOGA supports voluntary efforts by industry to reduce methane emissions. Our members are making constant improvements to the technology being used in the field to reduce, measure and report on emissions. Yet, more work needs to be done. KIOGA has met and will continue to work with the Biden Administration as it considers initiatives to reduce methane and other greenhouse gas emissions.

In January 2021, the International Energy Agency released a regulatory roadmap and toolkit focused on "Driving Down Methane Leaks from the Oil and Gas Industry." The roadmap details that, "understanding the nature and magnitude of your emissions will be critical to designing sound regulations." This is a primary tenet of what KIOGA seeks to convey with the Biden Administration. One key aspect of the independent component of the oil and natural gas production industry is its breadth – spanning from large, high production wells to low production wells. These wells do not all have the same emissions profiles, and those different profiles should be considered in regulations.

Low production wells are those that produce 15 barrels/day (or 90 mcfd) or less. The national average low production oil well is about 2.5 barrels/day and the low production natural gas well is about 24 mcfd. Of the roughly one million active oil and natural gas wells in the United States, about 750,000 are low production wells, typically operated by small businesses. The regulatory structure applied to low production wells is significant because their viability is so dependent on their cost of operation.

The 2016 Environmental Protection Agency (EPA) New Source Performance Standards (NSPS) fugitive emissions regulations created a specific problem for low production wells. When EPA developed its fugitive emissions requirements, it generated its Best System of Emissions Reductions (BSER) technology based on large, hydraulically fractured well sites and its initial proposal applied only to these sites. However, in finalizing the fugitive emissions regulations, EPA expanded their scope to include low production wells, but it never revised the BSER requirements to reflect this broader application. The high production well Leak Detection and Repair (LDAR) program is economically infeasible for low production wells and provides minimal environmental benefits. EPA agreed to reconsider the low production well impact of its fugitive emissions program. In its 2020 revisions to the NSPS, the fugitive emissions program now provides an offramp when well sites fall below 15 barrels/day. The implications for low production wells are further compounded if the EPA regulatory program is based on managing methane. Under the Clean Air Act (CAA), the choice of regulating methane can trigger a nationwide existing facility regulation that would apply EPA BSER technology to the 750,000 low production wells currently in operation.

Industry does not question the need to cost effectively manage its emissions. Many independent producers participate in voluntary actions to reduce emissions — including fugitive emissions.

Industry seeks to find a regulatory pathway designed for the sources it regulates. The 2016 NSPS fugitive emissions program that was designed for large facilities should not be applied to low production well sites. The 2020 NSPS reconsideration moves to correct that error. EPA followed the path it used in its October 2016 Control Techniques Guidelines for low production wells when it excluded them from its model fugitive emissions program. There may be an appropriate low production well program — many states are addressing this issue. When EPA developed its NSPS regulations, it had no emissions profile for low production wells. No extensive profile yet exists. The Department of Energy initiated a study of low production well air emissions that should be completed in September 2021; it has been delayed by the COVID pandemic. If EPA needs to design a low production well program, it should utilize the emissions profile information now being developed by the Department of Energy and then focus on the most cost effective options to address the key sources.

Background & Technical Information

Without its own information, EPA has been subjected to relying on external analyses. Many of these are developed by environmental activist lobbying groups to support their agenda. However, even these do not justify the NSPS fugitive emissions regulations for low production wells.

Environmental groups rely on a number of studies to make their arguments regarding the justification for controlling oil and natural gas production emissions. Several are described below with regard to low production wells. More detail on these and others are available in comments submitted by independent producers to the regulatory docket (Independent Producer Response/Supplemental Comments filed June 17, 2019, to Docket ID No. EPA-HQOAR2017-0483.)

Importantly, most of the emissions data collected at operating sites are done remotely without an understanding of the activities on the site, without knowledge of whether the emission was a fugitive release or a permitted release when a tank was being filled. Sampling was generally ten minutes to an hour, but the value would then be extrapolated to a daily rate and assumed to be constant for the year. While none of these studies were designed to address low production wells, almost all contained some low production well site information.

Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries (ICF Study) – Using the basis in this study, the potential recovery of methane would be 9 mcf/y for the national average low production well (24 mcfd). The gross and net cost effectiveness values would be $222.89/mcf and $221.22/mcf for the national wells. Natural gas currently sells for about $2.50/mcf at the well site.

Quantifying Cost-effectiveness of Systematic Leak Detection and Repair Programs Using Infrared Cameras (Carbon Limits) - For well sites and well batteries, the Carbon Limits study concludes that NSPS LDAR programs are not cost effective at 85% of these sites – a percentage that exceeds the share of natural gas production facilities that are low production wells.

Waste Not: Common Sense Ways to Reduce Methane Pollution from the Oil and Natural Gas Industry (Waste Not) - Its information is largely restatements of the information from the ICF and Carbon Limits reports. The only intriguing element of its recommendations is the realization that a fugitive emissions program needs to differentiate its requirements based on the production volumes of the facility.

Toward a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites (Super-Emitters) - This study was commissioned by the EDF and clearly demonstrates the outcome-based purpose of the effort. It represents an effort to carefully cull data from other efforts and recast it as a new analysis to create the impression that low production wells are "super-emitters". It manipulates data to twist reality for the purpose of convincing EPA and others to regulate low production wells.

Aerial Surveys of Elevated Hydrocarbon Emissions from Oil and Gas Production Sites (Lyon 2016) – Of the 8220 well pads sampled, 4195 were low production wells, averaging 4.1 barrels of oil equivalent/day. Of these, 57 had measurable emissions (1.3 percent). Of these, 37 had tank vent emissions, 8 had tank hatch emissions and 2 had both tank vent and hatch emissions. The remaining 10 (0.2 percent) had emissions from dehydrators, separators, trucks unloading oil from tanks, and unlit or malfunctioning flares. These emissions are not clarified regarding whether the emissions would be considered as fugitive or whether they are from allowable vents or normal operations (e.g., truck unloading). However, it does clearly call into question the benefits of the NSPS LDAR fugitive emission program to address the small percentage of low production wells that would be dealing with nontank emissions.

Methane Emissions from Conventional and Unconventional Natural Gas Production Sites in the Marcellus Shale Basin (Omara Marcellus 2016) - This report has 18 low production wells. The sampling information shows that 11 of them were characterized by having storage tank emissions from vents or hatches. Their average production rate was 13.79 mcfd with calculated emissions of 1.63 mcfd or 0.067 lbs/day. Translating this value to annual emissions results in a calculated value of 0.012 tons/year (tpy). This is approximately 0.3% of the threshold for regulation under EPA's Control Techniques Guidelines for oil and natural gas production facilities.

Assessment of methane emissions from the U.S. oil and gas supply chain (Assessment of Studies) - This EDF report was released with great fanfare during the 2018 World Gas Conference to create the appearance of new data showing methane emissions from the oil and natural gas industry value chain. The report purports to show that emissions are far higher than those reported in the EPA Green House Gases Inventory. The environmentalists then refer to this report as a linchpin of its arguments for changes to the NSPS, particularly regarding the fugitive emissions program with a special focus on low production wells. However, the report hinges on assumptions that emissions form a classic statistical bell curve. If the emissions are not a bell curve, the entire framework for the Assessment of Studies report becomes suspect. Studies show that facility emissions are characterized by "fat tails" where a few pieces of equipment produce the emission and that most wells are low emitting as the graph below shows. Consequently, looking at the nature of the site emissions data, there is little to suggest it is a bell curve. These inadequacies and others undermine the validity of the basis for arguing that the Assessment of Studies provides a basis for the fugitive emissions LDAR programs in the NSPS, particularly in their application to low production wells.

Delving into the details of these reports demonstrates the importance of fully understanding the nature of oil and natural gas emissions. For low production wells, it creates a perspective that most emissions are more likely to come from storage vessels. Managing storage vessel emissions does not require a complex, expensive NSPS type of LDAR program.

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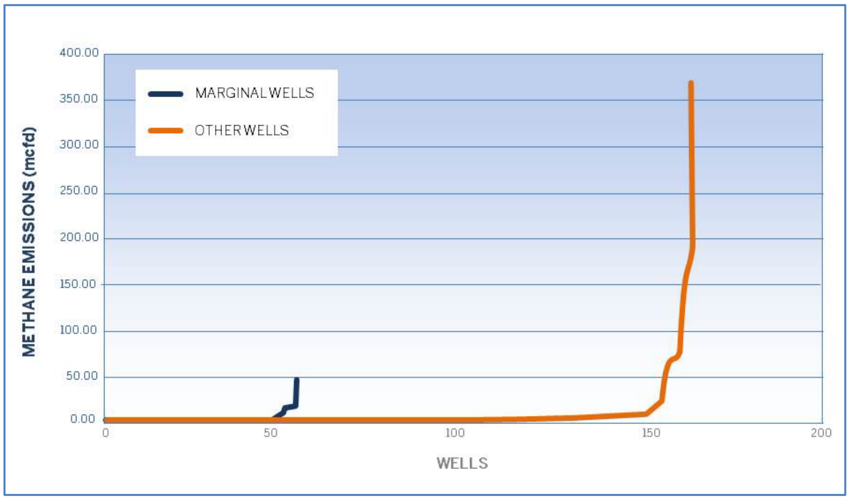
Appendix 1
Manipulating Data to Create the Illusion that Low Producing Wells are "Super-Emitters"

This document addresses data manipulation issues in the environmentalist study submitted to the rulemaking proposal for Subpart OOOOa to distort the role of low producing wells regarding methane emissions. This study was then characterized as the basis for removing the low producing well exclusion for the Subpart OOOOa fugitive emissions program initially proposed by the Environmental Protection Agency (EPA).

Background

Initially, it is important to understand that this study used data from a number of different studies to create its arguments. All of the underlying studies generated their data by driving vehicles with samplers downwind of production sites, hunting for methane plumes. None of them used samples taken on the production site. This creates two issues. First, it measures everything emitted at the site – fugitive emissions and permitted vents. Second, the data are collected over minutes – maybe over an hour – but not over a day. The data in the study are presented as if they were daily emissions but the studies merely scale up hourly estimates. Consequently, an emission that might occur for several hours, but not the full day, would be overstated.

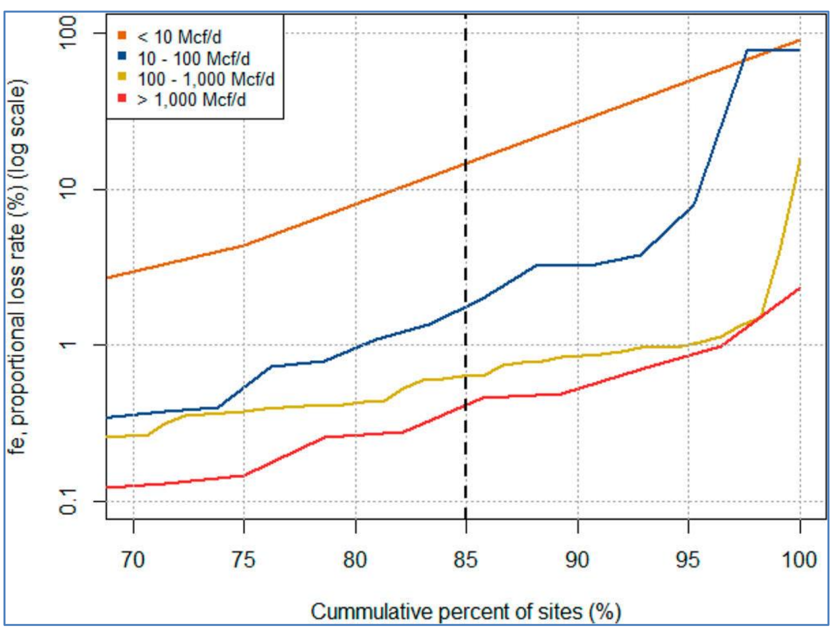
Before turning further to describe the submitted study, it is useful to look at the same data using a direct graph of emissions. In this graph, marginal wells are those with production volumes of 90 mcfd or less.



This graph is consistent with information from other studies showing that a small portion of wells have an emission profile for some reason with high emissions and most wells have really low emissions. Importantly, it also clearly shows that marginal wells – low producing wells in the context of the regulation – have far smaller emissions. But, since this graph is using the same data as the study, it could also be overstating emissions because of scaling short term emissions to a daily amount.

With this background, turning to the presentation of the same material in the study demonstrates how it was manipulated.

Below is the graphic used to present the data. It would suggest that the worst emitting operations – the "super-emitters" – are the smallest wells (the orange line and the blue line). Having directly plotted this data, the obvious issue is how such a result can occur.



It is a busy and confusing graph – it's intended to be. The study uses data analysis tricks to create the appearance that marginal wells are "super-emitters".

First, it shows emissions as a percentage of production rather than actual emissions. Thus, one mcf emitted out of ten mcf produced is 10 percent, but 50 mcf emitted out of 1000 mcf produced is 5 percent. As a result, it skews the perception of the data to imply that low producing wells are large emitters when they are not.

Second, its production volumes are really sales volumes, not the amount extracted from the wellhead. Consequently, a "proportional loss rate" of 50 percent would be the calculated loss divided by the volume sold. If the percentage of loss were calculated based on extracted volumes, the 50 percent "proportional loss rate" would drop to 33 percent because the loss would be added to the sales volume to obtain the extracted volume.

Third, it only shows data from the 70th percentile of information. This excludes all of the virtually zero emissions that dominate the data.

Fourth, it uses a logarithmic scale to present the data. One of the reasons to use logarithmic scales is to flatten curves to make them look more like straight lines.

These observations can be made without conducting an intense investigation of the study. They are obviously intended to contort data to create a specific result. Yet, with all the investigative power at EPA, with all of the research work EPA has conducted, EPA took this contrived study at face value to make its determination to remove the low producing well exclusion in the Subpart OOOOa regulations. That decision – particularly void of any opportunity for public review – should not be allowed to stand.