Appendix C

NSPS OOOOa RECONSIDERATION – EPA CRITIQUES OF INDUSTRY STUDIES

INGAA WHITE PAPER

SUMMARY:

On June 8, 2018 and June 20, 2018, the Interstate Natural Gas Association of America (INGAA) submitted reports to EPA regarding "Methane Emissions from Natural Gas Transmission and Storage Facilities: Review of Available Data on Leak Emission Estimates and Mitigation Using Leak Detection and Repair."

Results for three recent studies were presented related to fugitive emissions from natural gas systems: (1) a Canadian Association of Petroleum Producers (CAPP) study that updated emissions factors for upstream oil and gas fugitive emissions sources, (2) a Pipeline Research Council International (PRCI) report that examined emissions reported under Subpart W of the Greenhouse Gas Reporting Program, and (3) a California Air Resources Board (CARB) study that utilized Method 21 of appendix A-7 of 40 CFR part 60 to develop correlation equations for different fugitive emissions components based on Method 21 screening values.

INGAA performed an analysis of the results of these three studies, and concluded that:

- fugitive emissions from fugitive emissions components located at compressor stations were overestimated in EPA's model plant analysis
- annual monitoring is more appropriate for compressor stations, instead of the currently required quarterly monitoring

Canadian Association of Petroleum Producers (CAPP) study: INGAA relies on CAPP as evidence that annual monitoring using OGI will achieve 80% emission reductions, a value twice that which EPA uses in the model plant analysis. In 2014, CAPP evaluated the information submitted from eight companies, for a total of 120 facilities to determine if the emissions factors should be updated and concluded there was a net component-weighted reduction of 75% of the emissions across all component categories.

> *EPA Response:* EPA notes "this is not reflective of a 75% reduction in emissions from an annual fugitive emissions monitoring program, as suggested by INGAA."[1]
>
> The CAPP report looks at emission factors for Best Management Practices (BMPs). The BMPs were intended for use in aiding facilities to design programs to target components more likely to leak.

[1] EPA MEMO to Docket No. EPA-HQ-OAR-2017-0483, August 27, 2018, *EPA Analysis of Fugitive Emissions Data Provided by INGAA*, p. 3.

"Given that the BMPs were not regulatory actions and no information is provided in the 2014 study to demonstrate the exact monitoring method/instrument, monitoring frequency, or repair schedule for the facilities represented, EPA is not able to conclude any details about the specific monitoring programs implemented at the individual facilities."[2]

Additionally, EPA has "concerns regarding the comparison of the emissions factors because only one company provided actual measurements of identified fugitive emissions for the 2014 CAPP study. Information from the other seven companies was based on estimated component counts and "leak/no leak" emissions factors."[3]

Pipeline Research Council International (PRCI) report: INGAA makes 3 conclusions from this report, which summarizes emission measurement data for compressor sources reported under Subpart W:

(1) INGAA concludes from the PRCI report that Subpart W data are more recent and robust than the 1996 GRI/EPA study data.

EPA Response: It appears INGAA uses a draft data set from PRCI. EPA cites specific discrepancies in the data INGAA uses and the data in the PRCI report for the number of leak rate measurements and the emission factors used. "Therefore, while relying on the data collected during the PRCI study analysis, it appears that INGAA has done some of their own analyses."[4]

(2) INGAA concludes from the PRCI report that compressor source emissions, predominately seal emissions (either rod packing or wet seals) and isolation valve leakage, are large and account for 80% to 90% of CH4 emissions (considering compressor source emissions plus equipment leak emissions reported under Subpart W).

EPA Response: "[I]solation and blowdown valve emissions, which are accounted as compressor source emissions under Subpart W, are considered to be fugitive emissions components under NSPS OOOOa when these valves are not used for venting (e.g., leakage past a closed blowdown valve). Consequently, the proportion of transmission and storage station emissions subject to the fugitive emissions requirements in NSPS OOOOa is greater than the 10% to 20% suggested by INGAA."[5]

[2] *Id.* at 3.
[3] *Id.* at 3.
[4] *Id.* at 4.
[5] *Id.* at 4.

(3) INGAA concludes from the PRCI report that significant emissions reductions can be made by focusing on large leaks (e.g., those exceeding 2,000 scf NG/hr). This leak rate is approx. 3,500 grams CH_4/hr, which is significantly higher than the 60 g/hr fugitive detection threshold for the OGI equipment specified in NSPS OOOOa. INGAA states that these large leaks represent only about 3% of the measured leaks and represent 63% of the total compressor emissions.

EPA Responses: The effectiveness of a fugitive emissions program is dependent on multiple factors, citing: 1) procedures (at the time of the PRCI study, NSPS OOOOa had not been promulgated, "therefore it is reasonable to assume that some of the OGI monitoring would not meet the procedures required for NSPS OOOOa"); 2) frequency ("as the frequency of monitoring increases, the amount of time a large fugitive emission exists prior to detection decreases"); and 3) repair threshold ("[b]ecause NSPS OOOOa considers monitoring with OGI BSER and the detection threshold for OGI in NSPS OOOOa is 60 g/hr, [] fugitive emission requirements already allow facilities to focus on repairing relatively large sources of fugitive emissions, thus providing significant emission reductions in a cost-effective manner for the transmission and storage segment.").[6]

EPA also disagrees with INGAA's assessments regarding the average number of equipment leak components found to be leaking at transmission stations and storage stations, noting differences in how the OGI measurements are performed under Subpart W and NSPS OOOOa "which are a key factor in the number of fugitive emissions detected."[7]

EPA also disagrees with INGAA's analysis regarding the average number of components found to be leaking at transmission and storage stations, citing INGAA's "erroneous" analysis due to different definitions of "compressor components" for the 1996 GRI/EPA study and Subpart W. "A more direct assessment of the average facility CH_4 equipment leak emissions for transmission and storage facilities can be made by simply summing the CH_4 emissions reported by each facility across all of their equipment components (including both non-compressor and compressor components) and determining the average CH_4 equipment leak emissions across all of the reporting facilities for the transmission and storage sector. This more direct use of the Subpart W reported data shows reasonable agreement between the EPA model plant assessments and the equipment leak emissions reported under Subpart W."[8]

California Air Resources Board (CARB) study: According to EPA, the purpose of this limited-scope study was to develop correlation equations for leaking equipment in dry natural gas

[6] *Id.* at 4-5.
[7] *Id.* at 5.
[8] *Id.* at 6.

service located at production facilities (e.g., gas wells and natural gas processing plants) located in California. INGAA presents an analysis using the CARB correlation equations to demonstrate that "emissions from gas leaks with EPA Method 21 screening values of 500 ppmv may be *extremely* low."[9]

> *EPA Response:* EPA was not able to replicate INGAA's analysis (INGAA used data reported to the GHGRP under Subpart W, an assumed screening value of 50,000 ppm, and the CARB correlation equations).
>
> The information from the CARB study is representative for sites in the state of CA and is not representative of transmission and storage compressor stations (noting the composition of the natural gas is chemically changed at the processing plant which will result in a different emissions profile for components located downstream of the processing plant).
>
> EPA notes specific uncertainties and limitations of the data used to develop the correlation equations for the CARB study, e.g., citing differences in definitions, methods, frequencies, procedures (site-specific monitoring plans), etc. for Subpart W and NSPS OOOOa.[10]

EPA's Overall Conclusions: "In summary, the INGAA White Paper presents an analysis of third-party studies and reports as justification for annual monitoring at compressor stations. INGAA states in their analysis that EPA has underestimated the control effectiveness of annual OGI monitoring and overestimated emissions from fugitive emissions components at compressor stations. EPA has several concerns with the analysis and conclusions presented by INGAA in their White Paper. Based on our review of the conclusions presented by INGAA and the referenced third-party reports, we are unable to conclude at this time that this information supports annual monitoring for compressor stations."[11]

GPA COMPRESSOR WHITE PAPER

SUMMARY:

GPA provided EPA with data for 110 compressor stations ranging in age from less than one year to over 40 years, operated by five different midstream companies in Wyoming, Colorado, Ohio, Oklahoma, and Texas.

GPA stated that there are two overwhelming trends in the data:

(1) leak rates and numbers start low and remain low; and

[9] *Id.* at 6.
[10] *Id.* at 7.
[11] *Id.* at 8.

(2) after the initial monitoring event, leak rates decrease and stay low regardless of frequency.

GPA further stated that based on these trends, the cost-benefit model for quarterly monitoring cannot be substantiated.

EPA Critiques:

- Data uncertainty:

  (1) OGI procedures – The majority of the surveys were not conducted according to the standardized monitoring procedures in the 2016 NSPS OOOOa. "In an attempt to provide a framework that would provide data of higher quality based on our knowledge of OGI at the time of promulgation, the 2016 NSPS OOOOa requires owners and operators to develop company defined area monitoring plans that ensure the OGI equipment used is of a known quality; that environmental conditions and interferences are accounted for; that operators conducting surveys are trained and aware of what components need to be monitored; and that surveys take place within a specific distance of the components that are monitored."[12]

  (2) Environmental Conditions During Surveys – No info provided on the environmental conditions that existed during the monitoring surveys. OGI effectiveness is highly dependent on environmental conditions (EPA provides several examples of how effectiveness is impacted by cloudy conditions, winds, etc.).[13]

  (3) Universe of Components Monitored – In some cases, it's unclear what components were included in the surveys (specific examples provided). In most cases only components regulated by a state program were included in the monitoring survey, which may not be the entire universe of fugitive components covered by the 2016 NSPS OOOOa. The inclusion of additional components or exclusion of components would bias the leak rate.[14]

- Data interpretation:

  (1) Other data suggest the operating mode of the compressor(s) was a key piece of information when detecting fugitive emissions (e.g., when compressors are in standby mode, the detected fugitive emissions are lower). The operating mode of each compressor in the GPA data set was generally unavailable.[15]

[12] EPA MEMO to Docket No. EPA-HQ-OAR-2017-0483, April 17, 2018, *EPA Analysis of Compressor Station Fugitive Emissions Monitoring Data Provided by GPA Midstream*, p. 2.
[13] *Id.* at 2-3.
[14] *Id.* at 3.
[15] *Id.* at 3.

(2) Not all of the data submitted by GPA supports its claim that leak rates sharply decline after leak detection programs are implemented (EPA cites specific examples from the data set). "Due to the wide amount of variability in the data, it was difficult for us to make any conclusions regarding leak rates from the provided information."[16]

EPA's Overall Conclusions: "Based on the analysis presented in this memorandum, we are unable to conclude that the leak rates will sharply decline following the initial survey for compressor stations, especially since many of the compressor stations in this data set experience an increase in leak rates following the initial survey." … "Additionally, information regarding the correlation between compressor operating modes and the number of fugitive emissions identified supports maintaining a more frequent monitoring schedule than the annual monitoring schedule requested by GPA."[17]

API LEAK MONITORING DATA

SUMMARY:

The data submitted by API consisted of monitoring surveys performed at 4,117 well sites located throughout the United States in a variety of different basins. The data included 1,521 single wellhead gas sites, 755 multi-wellhead gas sites, 1,164 single-wellhead oil sites, and 677 multi wellhead oil sites. The data represented *the first monitoring survey for each site*, and all monitoring surveys were conducted using OGI.

EPA Critiques:

- Data Uncertainty:

  (1) Well Site Age – The age of each well site included in API's evaluation was not included in the data set. An initial monitoring survey for a new well site could be expected to have a lower-than-average incidence of fugitive emissions because components have not yet experienced degradation due to wear and tear or lack of maintenance.[18]

  (2) OGI Procedures – No info is provided on how the monitoring surveys were conducted. EPA points out that the sensitivity of the currently available OGI equipment varies based on numerous factors (e.g., ambient conditions, distance to source, visual acuity of the operator, etc.). Without standardization of monitoring procedures (as in the 2016 NSPS OOOOa) it's not possible to determine the quality

[16] *Id.* at 4.
[17] *Id.* at 4-5.
[18] EPA MEMO to Docket No. EPA-HQ-OAR-2017-0483, April 17, 2018, *EPA Analysis of Well Site Fugitive Emissions Monitoring Data Provided by API*, p. 1.

of the monitoring data and whether the operator accounted for environmental conditions, interferences, etc.[19]

(3) Environmental Conditions – No info is provided on the environmental conditions that existed during the monitoring surveys. OGI effectiveness is highly dependent on environmental conditions (citing cloudiness, winds, etc.). It is possible that surveys were conducted under conditions that would not allow the operator to see fugitive emissions.[20]

(4) Production Rates of Well Sites – No info is provided on the production rates of the well sites included in the data set. It would be inappropriate to apply low production wellsite fugitive emissions monitoring data to non-low production well sites.[21]

(4) Universe of Components Monitored – Limited info was provided on the components included in the monitoring surveys. The inclusion of additional components or exclusion of components would likely bias the leak rate.[22]

(5) Equipment Counts – The info on equipment counts at well sites was estimated for the majority of sites. Of the 4,117 well sites included in the data set, only 95 had known equipment counts. Estimates were made for the rest based on default component counts from Subpart W, which will likely bias leak rates. Further, counts in Subpart W do not accurately reflect the entire universe of components that could be present at a well site (e.g., It does not include sources like storage vessels, where thief hatches would be a potential source of fugitive emissions). Because equipment counts do not include components like thief hatches, EPA calls into question whether these types of components were monitored during the surveys. Finally, of the well sites with known equipment counts, all but two are in PA, raising a concern about whether different basins have different leak rates.[23]

(6) Zero-leak Rates – The data set included an unusual number of well sites (44%) reporting no fugitive emissions during the monitoring surveys, raising concerns related to OGI procedures and the need for standardization.[24]

(7) Oil Well Sites – Leak rates for oil well sites in the data provided were more than three times higher than at gas well sites leading EPA to conclude that this data set does not provide justification for exempting oil well sites from fugitive emissions requirements in the 2016 NSPS OOOOa.[25]

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[19] *Id.* at 1-2.
[20] *Id.* at 2.
[21] *Id.* at 2.
[22] *Id.* at 3.
[23] *Id.* at 3.
[24] *Id.* at 4.
[25] *Id.* at 4.

- Leak Rates

  API's evaluation is based on an aggregation of leaks over the total number of components monitored (as estimated). EPA determined a range of leak rates for individual well sites (0% to 13.47%). EPA's own assessment of the data showed leak rates varied widely based on the state/basin location. EPA expressed concerns, again, with the need for standardization of the OGI procedures.[26]

- Emission Factors

  EPA disagrees with the 'updated' emission factors API calculated. API uses equations that are derived from leak studies using Method 21; EPA states these equations do not apply to monitoring using OGI and goes on to say it is not possible to correlate OGI detection capabilities with a Method 21 instrument reading, in ppm. [27]

EPA's Overall Conclusions: "Based on the analysis presented in this memorandum, we are retaining use of the 1.18 leak rate and the emissions factors used in the 2016 NSPS OOOOa. Additionally, we could not use this data set to consider an exemption for oil well sites, because the data presented here demonstrated that our model plant analysis for these well sites was representative. Finally, this data set could not be used to determine how leak rates change over time, as the information in the data set only pertains to the initial monitoring survey at each site."[28]

[26] *Id.* at 4.
[27] *Id.* at 5.
[28] *Id.* at 6.