Assessment of Incremental Pollution Associated with EPA's Proposed Stays of "Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources"

August 9, 2017

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INTRODUCTION

The Environmental Protection Agency ("EPA" or "the agency") proposes to stay certain provisions of EPA's final rule titled Oil and Natural Gas Sector: Emissions Standards for New, Reconstructed and Modified Sources, 81 Fed. Reg. 35,824 ("2016 Rule" or "NSPS"), first for a period of three months and then for an additional a period of two years. Proposed Rule, Oil and Natural Gas Sector: Emissions Standards for New, Reconstructed and Modified Sources: Three Month Stay of Certain Requirements, 82 Fed. Reg. 27,641 ("three-month stay"); Proposed Rule, Oil and Natural Gas Sector: Emissions Standards for New, Reconstructed and Modified Sources: Stay of Certain Requirements, 82 Fed. Reg. 27,645 ("two-year stay"). The stay period would likely last until the fall of 2019. 82 Fed. Reg. at 27,648. These provisions are currently in effect, and include requirements that affected sources perform leak detection and repair ("LDAR") activities, comply with standards for pneumatic pumps, and obtain certification from professional engineers for closed vent systems used to capture emissions from sources like storage tanks. 82 Fed. Reg. at 27,645; 82 Fed. Reg. at 27,641.

Although EPA provided estimates of industry savings attributable to the two-year stay proposal, the agency did not conduct any analysis of the lost "climate and human health benefits" due to the two-year stay. 82 Fed. Reg. at 27,650. Instead, EPA noted that "[a]lthough there would be foregone benefits as a result of this proposed delay, a quantitative estimate of this effect is not currently available, and therefore the associate foregone benefits are not presented." *Id.* at 27,648.

Our analysis provides quantitative estimates of the emissions (methane, volatile organic compounds ("VOCs"), and hazardous air pollutants ("HAPs")) that would have been prevented by the requirements in the 2016 Rule, but that will occur if EPA goes forward with the proposed stays. As extensively documented by EPA during the promulgation of the 2016 Rule, these emissions have serious harmful effects on human health and climate change. 81 Fed. Reg. at 35,833-40.

The detailed report that follows includes a brief background section on the requirements in the 2016 Rule that EPA has proposed to stay. Section I discusses EPA's assessment of avoided costs from the proposed two-year stay rule and how, using this same methodology and data from EPA's own 2016 Regulatory Impact Analysis ("RIA")[1], the agency could easily have analyzed the additional air pollution resulting from its proposed stays and associated foregone benefits to the public. Table 1 summarizes these findings.

[1] Regulatory Impact Analysis of the Final Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources (May 2016) EPA-452/R-16-002.

Table 1: Incremental Emissions Resulting from the Proposed Two-Year Stay Using EPA's Methodology for Assessing Industry Cost Savings

Source Category	Total Foregone Emissions Reductions [tons]		
	Methane	**VOC**	**HAPs**
Fugitive Emissions	223,351	60,436	2,234
Pneumatic Pumps	17,117	4,740	184

Section II of the Report includes an alternative assessment of the foregone emissions reductions that would result from EPA's proposed two-year stay. Our analysis in Section II uses data from Drillinginfo[2] on current oil and gas well development. Because this dataset contains detailed well location, date, and production data, we are able to identify and analyze specific wells subject to the 2016 Rule, resulting in a more up-to-date estimation of affected wells than the RIA well site estimates relied upon by EPA in the proposed two-year stay and discussed in Section I. We also make a number of conservative assumptions throughout our Section II analysis, such as excluding non-producing wells and wells in states with some form of their own LDAR requirements, to isolate and characterize the impacts of the proposed two-year stay.

In Part A of Section II, we assess the number of already existing wells that are subject to the requirements of the 2016 Rule. In Part B, we estimate emissions reductions from these existing sources that would have resulted from the provisions that EPA has proposed to stay. In Part C, we project the growth in wells subject to the standards over the course of the proposed two-year stay to estimate the number of future wells that would be affected by the stay. In Part D, we model the emissions impacts of the two-year stay for these future wells. In Part E, we model the increased emissions associated with the two-year stay from compressor stations. Part F assesses the increased emissions associated with the two-year stay from pneumatic pumps. In Part G, we use this conservative model to monetize the lost climate benefits due to the two-year stay and provide an illustrative comparison between these foregone benefits and industry cost savings. Table 2 summarizes the findings in Section II.

[2] Drillinginfo is a proprietary database that compiles a wide range of drilling- and production-related information from state oil and gas commissions.

Table 2: Incremental Emissions Resulting From Proposed Two-Year Stay Based on Conservative Analysis of Drillinginfo Data and EPA Regulatory Impact Analysis

	Total Foregone Emissions Reductions* [tons]		
	Methane	**VOC**	**HAPs**
Fugitive Emissions	83,620	23,254	792
Pneumatic Pumps	5,380	2,232	56

*Fugitive emissions estimates are from producing wells and compressor stations in states with no state LDAR requirements. Pneumatic pump emissions estimates are from equipment in states with no LDAR requirements.

Section III of the Report uses the well dataset and affected existing well site estimates described in Section II to provide an estimate of the potential foregone emissions reductions attributable to EPA's proposed three-month stay.

BACKGROUND ON THE 2016 RULE REQUIREMENTS THAT EPA HAS PROPOSED TO STAY

EPA has proposed to stay requirements in the 2016 Rule that sources perform leak detection and repair activities, minimize emissions from pneumatic pumps, and have professional engineers certify closed vent systems.

- **Leak Detection and Repair Standards.** The LDAR standards in the 2016 Rule require affected sources, which include new and modified well sites and compressor stations, to monitor for leaks using instrument-based technologies like infrared cameras and to fix any leaks within 30 days of the monitoring survey. The Rule requires that operators undertake these LDAR surveys twice a year at well sites and complete such surveys quarterly at compressor stations. The deadline for affected facilities to complete their initial surveys was June 3, 2017,[3] one year after the final 2016 Rule was published in the Federal Register.

- **Pneumatic Pump Standards.** In the 2016 Rule, operators are required to reduce methane and VOC emissions from well site pneumatic pumps by 95 percent by routing emissions to an existing control device or process. EPA provided an exemption from the standards for certain pneumatic pumps at non-"greenfield" sites, but only if a professional engineer certifies that it is "technically infeasible" to control emissions from such pumps. These standards for pneumatic pumps have been in effect for over a year.

- **Professional Engineer Certification.** In the 2016 Rule, EPA included closed vent systems as a permissible method of control for centrifugal and reciprocating compressors, pneumatic pumps, and storage vessels. In order to ensure that operators demonstrate that such systems are properly designed to accommodate all potential emissions, EPA incorporated Professional Engineer Certification into the affected sources' respective emission standards. This standard has been in effect for over a year.

[3] The regulations require sources to comply by June 3, 2017 or within 60 days of the commencement of production, whichever is later. Accordingly, some more recently drilled wells that have not yet commenced production may have later compliance deadlines. These sources are discussed more fully in later portions of this report.

SECTION I: INCREASED EMISSIONS RESULTING FROM THE PROPOSED TWO-YEAR STAY BASED ON EPA'S METHODOLOGY FOR CALCULATING INDUSTRY COST SAVINGS

In the notice for the proposed two year-stay, EPA estimated the cost savings associated with the proposed delay in implementing LDAR requirements and pneumatic pump standards. The agency's description of the methodology used to estimate these savings is as follows:

> Using the estimated source counts as presented in Table 3–2 of the 2016 RIA, the EPA estimated a baseline for the capital costs, annual operating and maintenance costs and value of product recovery between 2017 and 2019 for the two requirements. This baseline accounts for the initial three-month stay. Then, the EPA estimated these costs under this proposed stay. Total costs for both actions were calculated as capital costs plus annual costs minus revenue from product recovery.

82 Fed. Reg. 27,648.[4] EPA acknowledges that there would be "foregone benefits as a result of this proposed delay" but claims that "a quantitative estimate of this effect is not currently available, and therefore the associated foregone benefits are not presented." *Id*.

A two-year stay of the 2016 Rule's LDAR provisions will result in additional emissions of methane, VOCs, and HAPs that would otherwise be remediated by these requirements. Methane is a powerful short-term climate forcer with over 80 times the global warming potential of carbon dioxide on a mass basis over the first 20-years after it is emitted. VOCs react with nitrogen oxides to form ground-level ozone, or smog, which causes respiratory and cardiovascular illnesses, exacerbates asthma, and can result in premature death. 81 Fed. Reg. 35,837. Other HAPs emitted by oil and gas sources include benzene, a known human carcinogen. *Id.*

Using the same methodological framework that EPA employed to estimate industry cost savings attributable to the proposed stay, we estimate these additional emissions and foregone benefits to public health, and provide an illustrative projection of their monetized value.[5] This

[4] EPA's estimates of the absolute LDAR compliance costs are conservative, and available data suggest actual compliance costs are likely to be lower than EPA's projections. Moreover, the annual per-well costs associated with completing an LDAR survey are extremely small relative to the revenue generated by oil and gas wells and relative to per-well capital costs. *See* Declaration of Jonathan R. Camuzeaux and Dr. Kristina Mohlin, submitted in support of Environmental Petitioners' Emergency Motion for a Stay, or in the Alternative, Summary Vacatur in the proceedings over EPA's initial 90-day stay (Attachment 1).

[5] We present the estimates of costs and benefits associated with EPA's proposed stays for illustrative purposes, and in response to EPA's own failure to quantify the foregone benefits associated with its proposed stays. Importantly, section 111(a)(1) of the Clean Air Act requires that any standard of performance (or revision to that standard) must "reflect" the degree of emission reduction that is "achievable" using the "best system of emission reduction," taking into account costs, energy requirements, and non-air quality health and environmental factors. As the federal appellate courts have held, the statute neither requires nor contemplates that a revision to a section 111(b) standard satisfy a cost-benefit test. *See, e.g., Portland Cement Ass'n v. EPA*, 486 F.2d 375, 387 (D.C. Cir. 1973); *Essex Chemical Corp. v. Ruckelshaus*, 486 F.2d 427, 437 (D.C. Cir. 1973). Moreover, the courts have held that EPA has significant discretion in weighing costs under section 111, so long as standards are not "exorbitantly costly" or have costs "greater than the industry could bear and survive." *See Essex*, 486 F.2d at 433; *Portland Cement Ass'n v.*

analysis uses EPA's own data from the RIA on estimated source counts for fugitive emissions and pneumatic pumps affected by the 2016 Rule in each year. RIA, Table 3-2, reproduced in Table 3, below.

Table 3: EPA Estimated Annual Affected Source Counts (Reproduced from RIA Table 3-2)

	2017	2018	2019
Fugitive Emissions	38,000	57,000	76,000
Pneumatic Pumps	1,580	2,370	3,160

To assess industry costs in its proposed two-year stay, EPA applied annual capital and operating costs to these source counts. To assess benefits, we apply EPA's own estimates of average annual methane, VOC, and HAP reductions per source to these same source counts. RIA, Tables 3-3 and 3-4. The result is an estimate of total annual emissions reductions that will result from the 2016 Rule in the years 2017, 2018, and 2019 for each of these pollutants.[6] The estimated average annual reductions per source are shown in Table 4.

Table 4: EPA Estimated Annual Emissions Reductions per Source (Reproduced from RIA Tables 3-3 and 3-4)

	Annual Emissions Reductions per Source			
	CH_4 [tons]	VOC [tons]	HAP [tons]	CH_4 (CO_2-e) [metric tons]
Fugitive Emissions	1.8	0.5	0.02	40.4
Pneumatic Pumps	3.3	0.9	0.03	74.4

To account for the fact that the agency's proposed two-year stay would only cover approximately one quarter of calendar year 2017, we attribute only a quarter of the annual 2017 reductions to the two-year stay. We apply the full annual reduction per source to the estimated number of affected sources in 2018 and three-quarters of the reductions in 2019, given the anticipated duration of the stay.

Train, 513 F.2d 506, 508 (D.C. Cir. 1975). Accordingly, EPA must base any change in the compliance deadlines for the 2016 Rule on the appropriate statutory factors, not a simple cost-benefit analysis.

[6] In the RIA, EPA provides data on total annual emissions reduction and total affected source counts in 2020 and 2025. Average annual reductions per source were calculated by dividing total reductions (Table 3-4) by total source counts (Table 3-3). The data for 2020 was used for this analysis. Since EPA's analysis shows very little difference in average annual emissions reduction per source from 2020 to 2025, there should also be little difference between average annual reductions per source in 2020, and those in 2017–2019.

Table 5: Proposed 2-Year Stay Estimated Additional Emissions Using EPA Methodology

		Total Sept. 2017 – Sept. 2019 Emissions Reductions			
		CH_4 [tons]	**VOC [tons]**	**HAP [tons]**	**CH_4 (CO_2-e, 100 year GWP) [metric tons]**
Proposed Stay Foregone Emissions	**Fugitive Emissions**	**223,351**	**60,436**	**2,23**	**5,065,517**
	Pneumatic Pumps	**17,117**	**4,740**	**184**	**388,207**
	Total	***240,468***	***65,176***	***2,418***	***5,453,724***

As analyzed here using EPA's methodology, compared to the 2016 Rule, the proposed two-year stay will result in increased emissions of over 240,000 tons of methane, which is equivalent to 5.45 million metric tons of carbon dioxide at the 100-year global warming potential ("GWP") of 25 (or 18.8 million metric tons carbon dioxide equivalent ("CO2e") at the 20-year GWP of 86). These methane emissions are equivalent to over 1.1 million passenger vehicles or 1.6 coal fired power plants at the 100-year GWP and about 4 million passenger vehicles and 5.5 coal fired power plants at the 20-year GWP. In addition, the stay will result in emissions of over 65,000 additional tons of VOCs and over 2,400 additional tons of HAPs.

The RIA includes a benefits analysis that takes into consideration the social cost of methane estimates ("SC-CH_4") developed by Marten et al in 2014.[7] The SC-CH_4 is derived from direct modeling and is consistent with the modeling assumptions underlying the social cost of carbon ("SC-CO_2"), meaning that assumptions underlying the SC-CH_4 estimate were informed by the same exacting public process used in development of the SC-CO_2.[8] EPA's use of the SC-CH_4 to estimate the monetized climate benefits of the 2016 Rule was appropriate, and in fact constitutes a significant improvement in accuracy over the agency's approach in past rulemakings of using the SC-CO_2 and the global warming potential ("GWP") of methane to approximate the SC-CH_4.

The SC-CH_4 value was published in the peer-reviewed literature, has been closely scrutinized before adoption by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG),[9] was subject to additional internal and external peer review conducted by EPA,

[7] Marten, *et. al.*, Incremental CH_4 and N_2O mitigation benefits consistent with the US Government's SC-CO_2 estimates, *Climate Policy* (2014), *available at* http://www.tandfonline.com/doi/abs/10.1080/14693062.2014.912981 (Attachment 2).

[8] Like the SC-CO_2, the SC-CH_4 is a metric that estimates the monetary value of climate impacts associated with marginal changes in methane emissions in a given year, including changes in agricultural productivity, property damage from increased flood risk, and changes in energy system costs. Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources, 81 Fed. Reg. 35824, 35887 (June 3, 2016).

[9] Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide (August 2016), *available at* https://www.epa.gov/sites/production/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf (Attachment 3). *See also* comments submitted to Docket ID Nos. EPA-HQ-OAR-2017-0346 and EPA-HQ-OAR-2010-0505 by the Institute for Policy Integrity on August 9, 2017 for further discussion of the rigor and appropriate use of the IWG estimates.

and arguably reflects a highly conservative estimate of the harms associated with methane.[10] In a declaration submitted in litigation over the Bureau of Land Management's waste minimization rule for oil and gas facilities on public and tribal lands, an eminent economist and member of the National Academy of Sciences has likewise described the SC-CH_4 as "the best available estimate of the environmental cost of an additional unit of methane emissions."[11] The value has already been used in several other rulemakings to support regulatory analysis.[12]

Using EPA's values for the SC-CH_4, the increased emissions of methane that will result from the proposed stay will incur climate damages with a monetized central estimate of $285.5 million (2016$), compared to EPA's estimated savings of $174 million in compliance costs.[13] RIA Table 4-3. As such, the estimated climate dis-benefits of the proposed stay outweigh the estimated industry cost savings by more than $100 million. This figure underestimates the true net costs associated with EPA's proposed stay, because it does not account for the dis-benefits to public health and welfare that would occur due to increased VOC and HAP emissions under the stay.

[10] *See, e.g.*, Comment submitted by Institute for Policy Integrity, Environmental Defense Fund, Natural Resources Defense Council, and Union of Concerned Scientists supporting the soundness of methodologies that EPA utilized to value the social cost of methane for the 2016 Rule, EPA-HQ-OAR-2010-0505-6945 at 19-22; Comment submitted by Environmental Defense Fund, the Institute for Policy Integrity, and the Natural Resources Defense Council on BLM's use of the SC-CH4 and SC-CO2 for BLM's 2016 Waste Management Rule, BLM-2016-0001-9091 (Attachment 4).

[11] Declaration of Michael Hanemann Submitted In Support of Intervenor-Respondents' Response to Motions for Preliminary Injunction at 17 (Dec. 14, 2016), Civil Case No. 2:16-cv-00285-SWS, *available at* https://www.edf.org/sites/default/files/content/69.1-2016.12.15-Dec-of-M-Hanemann.pdf (Attachment 5).

[12] Standards of Performance for Municipal Solid Waste Landfills, 81 Fed. Reg. 59332 (Aug. 29, 2016); Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills, 81 Fed. Reg. 59276 (Aug. 29, 2016); Waste Prevention, Production Subject to Royalties, and Resource Conservation, 81 Fed. Reg. 83008 (Nov. 18, 2016.

[13] This is based on the average social cost of methane resulting from a three percent discount rate (50th percentile cost), which EPA estimates to be $1,100/MT (2012$) in 2015, rising to $1,300/MT (2012$) in 2020. These values were converted to 2016$, to match EPA's estimate of savings, using a GDP deflator of $1.06 based on Federal Reserve Economic Data analysis from 4Q2012 to 4Q2016.

SECTION II: ASSESSMENT OF INCREASED EMISSIONS DURING THE PROPOSED TWO-YEAR STAY BASED ON ALTERNATIVE ANALYSIS

In addition to the EPA approach reflected in Section I, we have developed an alternate estimate of the foregone emissions attributable to EPA's two-year stay that is more conservative than EPA's methodology. The approach discussed in this section uses current well data from Drillinginfo to estimate the number of affected wells that will no longer have to perform LDAR activities during the two-year period of the proposed stay. Because the Drillinginfo dataset does not contain information for compressor stations or pneumatic pumps, this section relies on information from EPA's Technical Support Document ("TSD") and RIA for the 2016 Rule to estimate affected sources and foregone emissions reductions for compressor stations and pneumatic pumps.[14]

This approach allows for identification of the location of existing wells that would be covered by the stay and a projection of the states that would see new drilling during the proposed two-year stay period, which enables us to focus our analysis on states that currently lack independent LDAR requirements. It also results in a more conservative estimate of increased emissions (and therefore a lower estimate of cost savings to industry) because we project, based on current well development, that fewer wells would be affected than EPA projected when it completed the RIA in 2016. Furthermore, in our analysis of future sources that would likely have been covered under the Rule's LDAR requirements, we assume that new wells will be constructed at a constant uniform rate, and that absent the stay, new wells would be required to perform zero, one, or two LDAR surveys in their first year depending on the part of the year in which they commence construction.

Table 6 below summarizes our findings, and the remainder of this section describes our analysis in more detail.

[14] Section I and II both rely on EPA estimates of source counts and reductions for compressor stations and pneumatics pumps. Section I also relies on EPA reductions and source count estimates for wellsite fugitives (and combines wellsite and compressor station fugitives). However, Section II relies on the methodology described herein to estimate emissions and affected source counts for wellsite fugitives (and therefore presents separate LDAR analytics for well sites and for compressor stations).

Table 6: Summary of Increased Emissions Due to Two-Year Stay Under Conservative Alternative Analysis

	# of Affected Sources	Total Foregone Emissions Reductions [tons]		
		Methane	VOC	HAPs
Fugitive Emissions from Producing Wells in States with No LDAR Requirements	40,872	72,250	20,033	759
Fugitive Emissions from Compressors in States with No LDAR Requirements	272	11,370	3,221	33
Emissions from Pneumatic Pumps in States with No LDAR Requirements	1,090	5,380	2,232	56

A. EPA's Stay Will Allow Thousands of Existing Oil and Natural Gas Facilities to Forego Inspection and Repair of Leaks.

The 2016 Rule applies to facilities "constructed, modified or reconstructed" after September 18, 2015—the date of publication of EPA's proposed rule. 81 Fed. Reg. 35,824, 35844 (June 3, 2016). As described above, EPA's LDAR standards apply to new well sites and compressor stations that have commenced construction after this date. *Id.* at 35,826. The standards also apply to well sites and compressor stations that have been modified after September 18, 2015, and the 2016 Rule defines the particular circumstances that constitute a modification at each of these facilities. For well sites, the 2016 Rule defines a modification to include when a well at an existing site is hydraulically fractured or re-fractured, an operation that is designed to increase production of natural gas. 40 C.F.R. § 60.5365a(i)(3). For compressor stations, the 2016 Rule defines modification to include the addition of a compressor at an existing station, or when one or more compressors at an existing station are replaced with compressors of greater total horsepower. *Id.* § 60.5365a(j).

To analyze the existing number of affected well sites that would be subject to the Rule's LDAR requirements in 2017–2019 but for EPA's proposed stays, we use data from Drillinginfo. We obtained the dataset used in this analysis on July 6, 2017.

Drillinginfo includes information on the "spud date" for wells, which is the date on which drilling commenced. The database also includes information on well "completion dates," or the most recent date on which a well was cleared of flowback gas associated with hydraulic fracturing or re-fracturing. Using the database, we isolated wells with a spud date after September 18, 2015, which would be "new" wells for purposes of the 2016 Rule's LDAR requirements. Separately, we identified wells with a spud date on or before September 18, 2015 but with a completion date after September 18, 2015. This distinct category of sources includes both older, re-fractured wells and new wells at which the initial fracture was delayed until after September 18, 2015, which would qualify as "modified" for purposes of the 2016 Rule's LDAR requirements.

We have further narrowed this dataset in several ways to conservatively approximate the number of wells that would have had to perform LDAR absent EPA's stay. First, we removed offshore wells and wells with a producing status that is either abandoned, noticed to be abandoned, shut in, cancelled, plugged and abandoned, temporarily abandoned, or with a notice of intent to abandon. This yields a total of 21,039 affected wells—10,867 new wells and 10,172 modified wells that were spudded before September 18, 2015 but completed after that date to avoid any double counting of wells that were both spudded and completed after September 18, 2015.

Second, we isolated, excluded, and separately characterized wells that had not yet reported any oil or gas production. Of the 21,039 total wells, 3,224 wells, or about 15 percent, are not yet producing. These wells are affected facilities under the NSPS that will have to perform LDAR surveys within 60 days of first production. While lack of production data is often simply due to a lag in reporting, some of these wells may not yet have commenced production. This latter class of wells will need to complete an initial survey within 60 days of first production. Because that first production date would likely fall within EPA's proposed two-year stay, we have retained these sources as a separate category, but have not attributed any emissions reduction to these wells. Excluding these non-producing wells leaves 17,815 existing, producing wells subject to the 2016 Rule.

Third, a number of states have adopted their own LDAR standards, separate from EPA's requirements. EPA recognized this in its final RIA, in which it excluded from its analysis of the costs and benefits of LDAR new and modified sources in Colorado, Wyoming, Utah, and Ohio, which have mandatory LDAR programs for well sites.[15] Along with these states, California has subsequently adopted LDAR requirements and Pennsylvania provides an exemption from air permitting requirements for well sites if the operator voluntarily performs annual LDAR. Accordingly, we have isolated, excluded, and separately characterized producing wells in these states. The dataset includes 3,393 existing affected wells in such states. Separating these sources results in a conservative estimate of foregone emission reductions, because EPA's 2016 LDAR requirements are more protective than some state standards and so would likely deliver incremental benefits for some of these sources if not for the stay. This analysis is also particularly conservative given that the Pennsylvania provisions addressing LDAR at well sites are not mandatory.

After making these conservative adjustments, there are 14,422 existing, producing wells in states without preexisting LDAR requirements that will not now be required to inspect and repair their leaks because of EPA's stays. As discussed above, however, many of the additional wells that have been excluded from this count in the full dataset would be subject to the 2016 Rule and would nonetheless likely incur climate and health benefits that would be lost under the proposed stays.

[15] EPA, RIA at 3-10. Although EPA indicates in the two-year stay proposal that it evaluated "state fugitive emissions programs" in Texas, 82 Fed. Reg. at 27,646, the agency did not in its RIA include Texas as a state where well sites "are subject to fugitive emissions requirements." RIA at 3-10.

Table 7 summarizes our analysis of the number of existing wells affected by EPA's stays, while Table 8 contains production information for those wells. Figures 1 and 2 include maps of affected wells both nationally and in states without state regulations requiring some form of LDAR.

Table 7: Summary of Existing Affected Well Sites

	New Wells	Modified Wells	All Wells	Producing Wells
Nationwide	10,867	10,172	21,039	17,815
States with No LDAR Requirements	7,512	9,128	16,640	14,422

Table 8: Summary of Oil and Gas Production from Existing Affected Well Sites*

	New Well Production	Modified Well Production	All Wells Production	Low-Producing Wells
Oil [bbl]	396,830,541	482,411,231	879,241,772	19,606,932
Gas [Mcf]	2,477,151,780	3,520,506,608	5,997,658,388	86,754,200

*Estimated oil and gas production data only include months since the completion or recompletion that occurred after September 18, 2015.

Figure 1: Map of Total Existing Affected Well Sources

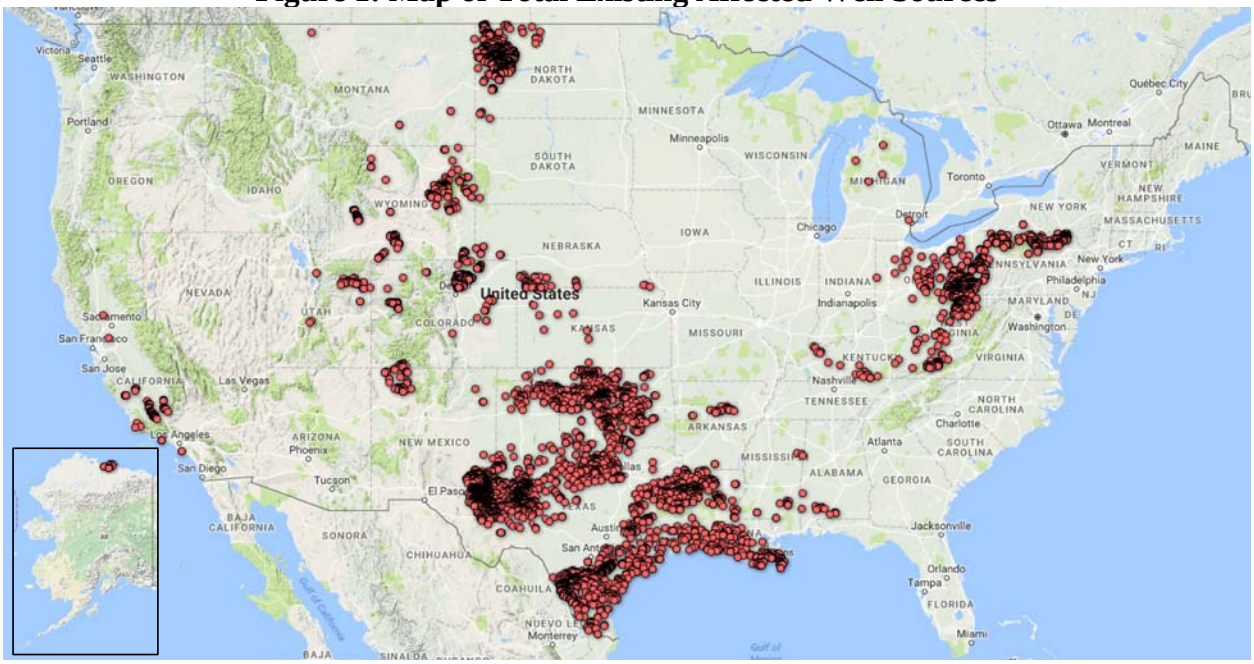
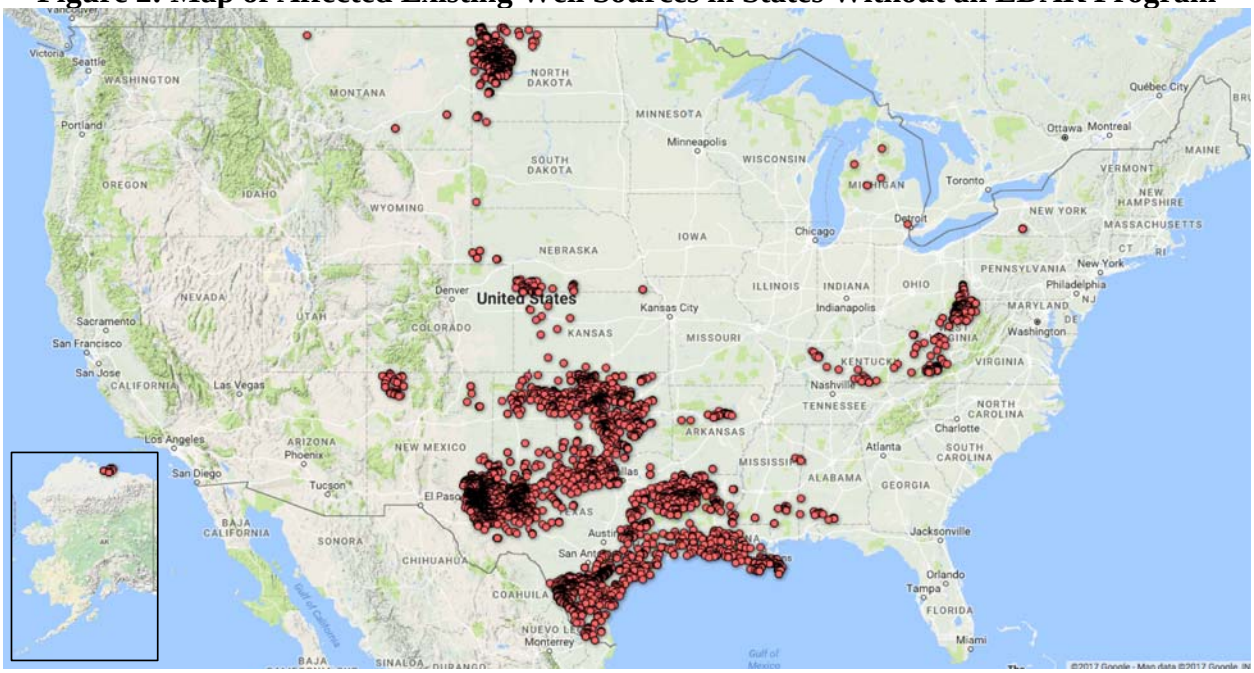


Figure 2: Map of Affected Existing Well Sources in States Without an LDAR Program



B. EPA's Stay of the Leak Detection and Repair Standards Will Result in Additional Emissions of Harmful Methane, VOCs, and HAPs from Existing Well Sites.

Under our more conservative methodology, we estimate the quantity of emissions that would now continue unabated at existing well sites because of EPA's proposed stay. We also quantify the particularly harmful additional emissions that would occur from these sites in ozone non-attainment areas with existing poor air quality in states that lack their own LDAR programs. Finally, because EPA has attempted to rationalize the proposed stay based on the agency's reconsideration of the application of the 2016 Rule LDAR requirements to low-production wells, we analyze the increase in emissions from non-low production wells, which are not a target of reconsideration, due to a two-year stay of the LDAR requirements for all wells.

This analysis uses information in EPA's TSD on average methane and VOC emissions[16] from oil and natural gas well sites, the reductions that EPA estimates will result at well sites due to semiannual LDAR requirements, and the number of affected well sites from our analysis of the Drillinginfo database set forth above. Emissions estimates of HAPs from producing wells are estimated using EPA's HAP-to-methane ratio for equipment leaks from oil and gas well sites.[17]

[16] TSD at Tables 4-3, 4-5. EPA's well site model plants assume a two-wellhead pad. Oil well emissions are based on EPA's estimates for well sites with a gas-to-oil ratio of less than 300 standard cubic feet of gas per stock barrel of oil.
[17] *Id.* at Table 14-1.

Our analysis conservatively assumes, based on EPA's technical analysis, that two LDAR monitoring inspections per year will reduce annual emissions by 60 percent and one LDAR monitoring inspection per year will reduce annual emissions by 40 percent.[18]

We assume that existing sources subject to the 2016 Rule requirements will conduct one initial LDAR inspection this year; because the initial 90-day stay of the Rule was vacated by the U.S. Court of Appeals for the D.C. Circuit, the 2016 Rule is presently in effect and all affected sources are currently required to comply with the standards.[19] We assume that this single, initial LDAR inspection will result in a 40 percent annual emission reduction, consistent with EPA's emissions reduction estimate for annual inspections.[20] Our assumption that sources will perform this initial inspection is conservative, because although sources are currently legally required to conduct LDAR activities, as explained in more detail in Section III, industry groups have suggested that oil and gas operators may not be currently complying with the LDAR requirements.

Because of EPA's proposed stays, we assume that sources will not conduct a second inspection in the first year and will conduct no inspections in the second year. Accordingly, for these existing sources, we assume that EPA's proposed stay will result in a 40 percent reduction in Year 1 and zero reduction in Year 2, as opposed to 60 percent reductions in both Year 1 and Year 2 that would have been achieved if the standards were in effect. We assume that this single, initial LDAR inspection will result in a 40% annual emission reduction, consistent with EPA's emissions reduction estimate for annual inspections.[21]

Table 9 below summarizes the total number of affected existing sites, affected existing producing sites in states without separate state-level LDAR requirements, affected existing producing sites in ozone nonattainment areas, and affected existing low-producing sites along with additional emissions attributable to each of these categories.

[18] *See id.* at Tables 4-9, 4-10. EPA used a conservative estimate of emissions reductions in the TSD. Field evidence has shown greater reductions. *See* Comment of Clean Air Task Force et al on EPA's Proposed NSPS for the Oil and Natural Gas Sector, at Exhibits TA1-TA6, EPA Doc. Id No. EPA-HQ-OAR-2010-0505-7062.
[19] *Clean Air Council v. Pruitt*, --F.3d.--, 2017 WL 2838112 (D.C. Cir. July 3, 2017).
[20] TSD at Table 4-9.
[21] TSD at Table 4-9

Table 9: Summary of Existing Affected Well Sites and Associated Additional Emissions From These Sites Due to Proposed Two-Year Stay

	# of Affected Wells	Total Additional Emissions over Two-Year Stay [tons]		
		Methane	VOC	HAPs
Total Sources	21,039	21,321	5,880	224
Producing Wells in States with No LDAR Requirements	14,422	16,705	4,604	175
Producing Wells in Ozone Non-attainment Area Counties in States with No LDAR Requirements	311	751	209	8
Low-Producing Wells [based on NSPS definition]	2,515	3,139	866	33

*Assumes initial survey achieves 40 percent emissions reduction and no other surveys are conducted (i.e., 40 percent emissions reduction instead of 60 percent in Year 1 and zero percent emissions reduction instead of 60 percent in Year 2).

Of the total existing wells that are subject to the 2016 Rule and do not have to comply with the LDAR requirements during the stay, nearly 70 percent, or 14,422 producing wells, are located in states that do not have their own state regulations requiring LDAR.[22] These incremental sources will remain unregulated during the stay of the 2016 Rule LDAR provisions, and we estimate that these sources will add 16,705 tons of methane emissions, 4,604 tons of VOC emissions, and 175 tons of HAP emissions into the air over the course of the two-year stay.[23]

Additional Ozone-Forming Emissions Will Occur in Areas with Unhealthy Ozone Air Quality. In ozone non-attainment areas, the incremental emissions during the stay from existing sources that would be covered by the 2016 Rule LDAR requirements may have a particularly deleterious effect on local and regional ozone levels. There are 311 existing, producing wells subject to the 2016 Rule in counties that are currently not in attainment with the 2008 National Ambient Air Quality Standards for ozone in states that lack their own LDAR requirements. These sources will add an estimated 209 tons of VOCs to the atmosphere during the two-year stay of the LDAR requirements, which can contribute to the formation of additional ozone and exacerbate smog-related health issues.

Low Producing Wells Account for a Small Fraction of Existing Affected Facilities. Although EPA has granted reconsideration specifically on the application of the LDAR requirements in the final 2016 Rule to low-production wells, EPA has proposed to suspend

[22] *See supra* at 14.

[23] If we were to instead assume that operators have not complied with the 2016 Rule standards currently in effect, and have not conducted this initial inspection, associated emissions from these existing sources would be significantly higher. If no existing wells conduct initial inspections, there could be up to additional 25,057 tons of methane emitted by existing wells over the course of the two-year stay, a 50 percent increase over the 16,705 incremental tons of methane emissions if sources have conducted the initial inspection.

fugitive emissions monitoring for *all* sources, including sources for which the agency has indicated it is not reconsidering the standards. Low-production wells—which EPA defined in the proposed Rule as wells that produce less than 15 barrels of oil equivalent per day—account for just 12 percent of total producing wells in the above dataset of existing wells covered by the 2016 Rule. Higher-producing wells, which are not subject to EPA's grant of reconsideration, account for the vast majority of wells and emissions. The estimated 18,524 non-low production wells covered by the 2016 Rule would emit an estimated 18,182 tons of methane, 5,014 tons of VOCs, and 191 tons of HAPs during the course of the two-year stay, representing roughly 85 percent of the foregone methane reductions from all sources. The estimated 14,736 non-low production wells covered by the 2016 Rule in states with no LDAR requirements would emit an estimated 14,373 tons of methane, 3,960 tons of VOCs, and 151 tons of HAPs during the course of the two-year stay, representing roughly 85 percent of the foregone methane reductions from sources in states with no LDAR requirements.

C. EPA's Stay Will Allow Thousands of Soon-to-be-Built Oil and Natural Gas Facilities to Forego Inspection and Repair of Leaks.

In addition to the already-existing sources that would be subject to the LDAR requirements in the 2016 Rule but for the proposed two-year stay, new wells will be built, and older wells will be newly modified, throughout the duration of that two-year period. Absent a stay, these future sources would have been required to conduct an initial LDAR inspection within 60 days of initial production and semiannual LDAR inspections thereafter. EPA's proposed two-year stay will allow thousands of these future sources to forego LDAR activities that would otherwise have been mandatory during that time. As we discuss in the next section, these foregone inspections would result in substantially higher emissions.

To estimate the number of affected future wells, we first use Drillinginfo data to estimate an annual rate of growth in new wells for each state based on the state's average annual new well count in recent years, from 2012 through 2016. This approach is conservative because it does not account for the modifications of existing wells during this time period, and such modifications would likewise be subject to the standards. As discussed in Part II.A., and summarized in Table 7, modified wells account for 48% of total existing affected sources, so our future well estimates likely substantially underestimate the number of affected future sources and the associate emissions from these wells.[24] We then use the existing well dataset described above to calculate a ratio of producing gas and oil wells to all wells for each state. We apply this "producing-well-to-all-well" ratio for each state to the total new well projection for that state to estimate the annual number of future producing wells for that state. These future-well estimates reflect each state's recent trend in oil and gas development, as well as any state-specific factors that would cause a higher or lower proportion of non-producing wells. The estimate of producing wells conservatively undercounts the number of new wells that would be required to undertake LDAR inspections under the 2016 Rule, as many of the wells that are currently not producing are likely to begin production during the course of the two-year stay. Therefore, the producing-well-

[24] If we were to assume that projections for modified wells in year 1 and year 2 of the stay follow this ratio of modified-to-new wells in the existing dataset, then total forgone emission reductions for existing and future affected well sources could be as much as 40% higher than (1.4 times) the existing analysis, which does not project future well modifications.

to-all-well ratios for each state likely understate the true percentage of wells that would be covered under the LDAR program.

Over the two years of the proposed stay, an estimated 39,318 new producing wells would have been subject to the standards nationwide but would, under the stay, be exempt from the 2016 Rule's LDAR requirements. 26,450 of these producing wells would have been in states that lack their own LDAR program. Table 10 below summarizes the estimates of the numbers of these wells that will be built over the two-year period of the proposed stay.

Table 10: Summary of Future Affected Well Sites*

	All Wells	Producing Wells
Nationwide	49,172	39,318
States with No LDAR Requirements	31,474	26,450

* Includes projections for new wells for the first and second year of the two-year stay. Projections for each state are based on the state growth in new oil and gas wells between 2012 and 2016.

D. EPA's Stay of the Leak Detection and Repair Standards Will Result in Additional Emissions of Harmful Methane, VOCs, and HAPs from Soon-to-be-Built Well Sites.

The proposed stay of the 2016 Rule's LDAR provisions will result in substantial emissions of methane, VOCs, and HAPs from yet-to-be-built wells that would otherwise be prevented by these requirements. As discussed above, additional emissions of these pollutants will have harmful climate and human health effects.

To estimate emissions from future wells that will now continue unabated because of EPA's stay, we follow the methodology described in Part II.B., using information in EPA's TSD on average methane and VOC leak emissions[25] from oil and natural gas well sites. We have also estimated emissions of HAPs from producing wells using EPA's HAP-to-methane ratio for equipment leaks from oil and gas well sites.[26]

Similar to our analysis for existing wells, our analysis of emissions from future wells conservatively follows EPA's technical methodology in assuming that two LDAR monitoring inspections per year will reduce annual emissions by 60 percent and one LDAR monitoring inspection per year will reduce annual emissions by 40 percent.[27] We also assume that without an annual LDAR inspection, there will be no attributable emissions reduction for that year.

[25] TSD at Tables 4-3, 4-5. EPA's well site model plants assume a two wellhead pad. Oil well emissions are based on EPA's estimates for well sites with a gas-to-oil ratio of less than 300 standard cubic feet of gas per stock barrel of oil.
[26] *Id.* at Table 14-1.
[27] *See id.* at Tables 4-9, 4-10.

To estimate foregone LDAR inspections for each year of the stay, we first used Drillinginfo data to estimate an annual rate of growth in new wells for each state based on the state's average annual new well count from 2012 through 2016, as described above. We assume that future wells would be added and begin production at a constant rate for each month of that year. In other words, we assume that the 39,318 total producing wells projected for the 2-year period would be added at a regular rate of 1,638 wells per month during that time. Based on the requirements of the 2016 Rule, we assume each producing future well would conduct a first LDAR inspection two months after the start of production, and subsequent inspections every six months. Because of our projections concerning the rate of new well construction, we assume that wells constructed in the early part of the year would have conducted two inspections, those in the middle part of the year would have conducted one inspection, and the later part of the year may not have conducted any inspections. For wells that would have undergone two inspections per year but for the stay, we assume a foregone 60 percent emissions reduction; for those that would have undergone one inspection per year but-for the stay, we assume a foregone 40 percent emissions reduction; and for wells that would not have undergone any inspections even without the stay, we assume no foregone emissions reduction. As with the analysis in Section I, we apply EPA's own estimates of average annual methane, VOC, and HAP reductions per source.[28] These estimates assume a 60% reduction in emissions; emission reductions are adjusted accordingly to estimate reductions other than 60%, as laid out above.

As described above, 26,450 future producing wells in states without an LDAR program that would otherwise have had to comply with the 2016 Rule LDAR requirements will be exempt from those LDAR requirements during the proposed two-year stay. Consistent with the assumptions described above, we estimate that these sources will emit 55,545 tons of methane, 15,429 tons of VOC, and 584 tons of HAPs over the course of the two-year stay.

Table 11 below summarizes the number of affected future well sites, affected future producing well sites in states without separate state LDAR requirements, and affected future low-producing well sites for each year of the proposed stay, along with additional emissions attributable to each of these categories.

[28] In the RIA, EPA provides data on total annual emissions reduction and total affected source counts in 2020 and 2025. Average annual reductions per source were calculated by dividing total reductions (Table 3-4) by total source counts (Table 3-3). The data for 2020 was used for this analysis. Since EPA's analysis shows very little difference in average annual emissions reduction per source from 2020 to 2025, there should also be little difference between average annual reductions per source in 2020, and those in 2017–2019.

Table 11: Summary of Future Affected Well Sites and Associated Additional Emissions Due to Two-Year Stay*

	# of Projected Affected New Wells Added in Year 1	# of Projected Affected New Wells Added in Year 2	Additional Emissions for New Wells Added in Year 1 [tons]			Additional Emissions for New Wells Added in Year 2 [tons]			Total Additional Emissions over Two-Year Stay [tons]		
			Methane	VOC	HAPs	Methane	VOC	HAPs	Methane	VOC	HAPs
Total Sources	**24,586**	**24,568**	**58,976**	**16,382**	**619**	**23,590**	**6,553**	**248**	**82,566**	**22,935**	**867**
Producing Wells in States with No LDAR Requirements	**13,225**	**13,225**	**39,675**	**11,021**	**417**	**15,870**	**4,408**	**167**	**55,545**	**15,429**	**584**
Low-Producing Well Sources [based on NSPS definition]	**3,446**	**3,446**	**10,339**	**2,872**	**109**	**4,136**	**1,149**	**43**	**14,475**	**4,021**	**152**

* Assumes wells are added at a constant rate per month. Assumes each well will undergo a first inspection two months after the start of production and subsequent inspections every six months. Based on EPA's emissions reduction forecasts, TSD at Tables 4-9, 4-10, this analysis assumes for wells with two inspections per year, there will be a 60 percent emissions reduction foregone; for wells with one inspection per year, there will be a 40 percent emissions reduction foregone; for wells with zero inspections per year, there will be no emissions reduction foregone.

In total, 70,211 existing and future wells would be subject to the 2016 Rule's LDAR requirements over the next two years but for the proposed stay. We project that the 40,872 producing wells located in states without their own LDAR programs will emit a total of 43,056 tons of additional methane, 11,865 tons of additional VOCs, and 452 tons of additional HAPs due to the proposed two-year stay. Table 12 below summarizes the total number of existing and future wells subject to the 2016 Rule, as well as the total amount of foregone emissions reduction due to the proposed two-year stay, for all affected wells, wells in states without separate LDAR programs, and low-producing wells.

Table 12: Summary of Total Existing and Future Affected Well Sources and Associated Emissions

	# of Affected Wells	Total Additional Emissions over Two-Year Stay [tons]		
		Methane	**VOC**	**HAPs**
Total Sources	70,211	103,888	28,815	1,091
Producing Wells in States with No LDAR Requirements	40,872	72,250	20,033	759
Low-Producing Well Sources [based on NSPS definition]	9,409	17,613	4,887	185

E. EPA Has Also Stayed Leak Detection and Repair Requirements for Compressor Stations, Which Are a Significant Source of Emissions but Not Subject to Any Grant of Reconsideration.

EPA has also stayed LDAR requirements for compressor stations, even though it is not reconsidering the applicability of those requirements to such sources. Because Drillinginfo does not compile information on compressor stations, to estimate the impacts of the stay on these sources, we rely on EPA's TSD for the 2016 Rule, Table 9-1, which estimates 480 additional affected compressor stations in the gathering and boosting segment by 2020. Assuming this estimate reflects a constant rate of new development, we calculate that 168 new gathering and boosting compressor stations have been added since September 18, 2015, that 96 new units would be added in the first year of the stay, and that another 96 new units would be added in the second year of the stay. This amounts to a total of 360 units that would be subject to EPA's LDAR requirements but for the proposed stay. We undertook a similar approach to analyzing likely new transmission and storage compressor stations, estimating that 15 transmission and 19 storage facilities subject to the 2016 Rule would be exempt from the LDAR requirements during the two-year stay.[29]

Compressors are a significant source of emissions, and we have estimated the foregone emission reduction benefits from the two-year stay based on the number of affected sources and emissions reductions included in EPA's TSD. Table 13 below sets forth the results of this analysis.

[29] TSD at Table 9-1.

Table 13: Summary of Compressor Station Emissions

	# of Affected Compressor Stations	Total Foregone Emissions Reductions* [tons]		
		Methane	VOCs	HAPs
Gathering and Boosting Compressor Stations	360	13,085	4,551	48
Transmission Compressor Stations	15	628	22	0.02
Storage Compressor Stations	19	2,765	96	0.1
Compressor Stations in States with No LDAR Requirements	272	11,370	3,221	33

* Emissions estimates are based on EPA's Model Plant estimates in Tables 4-7 and 4-8 of the 2016 Rule's TSD. Assumes compressor stations are added at a constant rate per month. Assumes each compressor station will undergo a first inspection two months after the start of production and subsequent inspections every three months. Based on EPA's emissions reduction forecasts, TSD at 137, this analysis assumes for compressor stations with four inspections per year, there will be a 80 percent emissions reduction foregone; compressor stations with three inspections per year, there will be a 70 percent emissions reduction foregone; compressor stations with two inspections per year, there will be a 60 percent emissions reduction foregone; for compressor stations with one inspection per year, there will be a 40 percent emissions reduction foregone; for compressor stations with zero inspections per year, there will be no emissions reduction foregone. For existing sources, the analysis assumes an initial survey achieves 40 percent emissions reduction in the first year, and no other surveys are conducted, resulting in an 80 percent emissions reduction foregone in the second year. Estimates for compressor stations in states with no LDAR requirements include gathering and boosting, transmission and storage compressor stations and are based on the ratio of total emissions from producing wells in states with no LDAR requirements to total emissions in all states (69%).

F. EPA Has Also Stayed Requirements for Pneumatic Pumps, Which Are a Significant Source of Emissions.

EPA has also proposed to stay emission reduction requirements for pneumatic pumps. Drillinginfo does not compile information on pneumatic pumps. Therefore, to estimate the impacts of the stay on these sources, we use EPA's projections in the RIA that 790 new affected pumps would be added annually, as well as the Rule's projected emission reductions from these sources described in the TSD. We did not assume any foregone emission reductions from the existing pneumatic pumps that have been constructed since September 18, 2015. This is because, unlike the LDAR requirements, the compliance deadline for the pneumatic pump standards was not phased in, and so these existing sources had been complying with these requirements for the period prior to EPA's now-vacated 90-day administrative stay. We did, however estimate

foregone emission reductions from the 790 newly constructed affected pumps in both the first and second years of the proposed stay. For these sources, we estimate foregone emissions reductions of 7,797 tons of methane, 3,235 tons of VOCs, and 82 tons of HAPs. Table 14 below sets forth the results of this analysis.

Table 14: Summary of Pneumatic Pump Emissions

	# of Affected Sources	Total Foregone Emissions Reductions* [tons]		
		Methane	VOC	HAPs
Pneumatic Pumps	1,580	7,797	3,235	82
Pneumatic Pumps in States with No LDAR Requirements	1,090	5,380	2,232	56

* Estimates for pneumatic pumps in states with no LDAR requirements are based on the ratio of total emissions from producing wells in states with no LDAR requirements to total emissions in all states (69%).

G. Using This Conservative Estimate of Affected Wells and Emissions Impacts, the Foregone Climate Benefits Due to the Proposed Two-Year Stay Outweigh the Costs Savings for Industry.

For illustrative purposes, we estimate the total avoided costs for industry and the total lost benefit to society as a result of the proposed two-year stay using the conservative estimates of foregone methane emissions reductions listed in Table 6. The cost-benefit analysis in this Section differs from, and is not comparable to, the cost-benefit analysis in Section I because the methodology utilized in this Section, described above, results in a lower, more conservative estimate of affected sources. As a result, this analysis projects both fewer avoided costs for industry and lower lost climate benefits than the analysis utilizing EPA's methodology in Section I.

To estimate industry's total avoided costs in our conservative model, we apply annualized total cost estimates per ton of methane (including projected cost savings from captured natural gas sales) to the additional methane emissions from each source category, using cost estimates derived from the TSD and RIA.[30] We project that operators will avoid $85 million in well site LDAR costs, $9.8 million in compressor station LDAR costs, and $1.3 million in pneumatic pump costs during the two-year stay.

We calculate the total lost climate benefits associated with the total foregone methane emissions reductions for our conservative model by applying the per-ton SC-CH_4 estimate from

[30] Well site LDAR estimates are derived from TSD Table 4-10 (revenue is the weighted average for natural gas and oil wells). Compressor station LDAR estimates are derived from TSD Table 4-11 (weighted average of gathering and boosting, transmission, and storage stations). Pneumatic pump estimates are derived from RIA Table 3-10 ($3.1 million annualized cost divided by 13,000 tons CH4 to arrive at $238.46/ton).

the RIA to the total foregone methane emissions reductions across all source categories.[31] As a result of the two-year stay, we project lost climate benefits with a monetized value of over $104 million due to increased methane emissions.

For our conservative model, we estimate that the lost climate benefits to society outweigh the cost savings to industry by nearly $8 million. This figure does not include monetized lost benefits for the additional VOC and HAP emissions that would occur due to the proposed two-year stay, which would have significant impacts on ozone and harmful public health and welfare effects. Table 15 summarizes our calculations of cost savings and lost climate benefits attributable to the two-year stay.

Table 15: Summary of the Proposed 2-Year Stay Total Costs and Benefits Using Conservative Methodology

Source	Total Sources	Foregone Emissions Reductions Over Two Years (tons CH4)	Annualized cost with savings ($/ton CH4)	Total Avoided Cost / Lost Benefits Over Two Years
Well Site LDAR	40,872	72,250	$1,183	$85,480,000
Compressor Station LDAR	272	11,370	$864	$9,820,000
Pneumatic Pumps	1,090	5,380	$238	$1,280,000
Social Cost of Methane	--	89,000	$1,220	($104,500,000)
			Net Lost Benefit	**($7,920,000)**

SECTION III: ASSESSMENT OF INCREASED EMISSIONS FOR WELLS DURING THE PROPOSED THREE-MONTH STAY

In this section, we apply the approach discussed in Parts II.A. and II.B., using the Drillinginfo dataset, to provide an upper-bound estimate of the number of affected wells that would no longer have to perform leak detection and repair activities during the course of the proposed three-month stay, and to project the additional emissions attributable to that stay. Because the proposed three-month stay is justified as a gap filler until the proposed two-year stay may take effect, from a legal standpoint it does not make sense to separate these two actions with respect to their implications for emissions increases and associated adverse health impacts. Nonetheless, for completeness, we present here an estimation of the increased emissions from the proposed three-month stay standing alone.

In this analysis, we utilize the same dataset of existing affected wells used and described in Part II.A. For the reasons discussed above, this dataset offers a conservative estimate of the number of wells affected by the three-month stay, as non-producing wells and wells in states

[31] RIA Table 4-3 (Social Cost of Methane, 3% average interpolated for 2018, converted to $/short ton). Since RIA figures are in $2012, we have applied a GDP deflator of $1.06 based on Federal Reserve Economic Data analysis from 4Q2012 to 4Q2016.

with independent LDAR programs have been excluded. As noted in Part II.A., the dataset contains a total of 21,039 affected existing wells, and 14,422 producing wells in states with no LDAR requirements.

Like our analysis in Part II.B, this analysis relies on information from EPA's TSD on average methane and VOC emissions[32] from oil and natural gas well sites, the reductions that EPA estimates will result at well sites due to LDAR requirement, and the number of affected well sites from our analysis of the Drillinginfo database set forth above. Emissions estimates of HAPs from producing wells are estimated using EPA's HAP-to-methane ratio for equipment leaks from oil and gas well sites.[33]

For the reasons explained below, we assume that these existing sources have not conducted an initial inspection, and if the proposed stay was not finalized and these sources were required to conduct an LDAR survey during the three months of the proposed stay, that inspection would achieve an 80% reduction of three months' worth of annual uncontrolled emissions. Our assumption of an 80% reduction is based on EPA's estimate of annual emission reductions from quarterly LDAR surveys. [34] We use this value instead of the 60% reduction for a semiannual survey because there should be higher reductions during the first quarter following an inspection.

We project that the three-month stay could result in additional emissions of up to 4,176 tons of methane, 1,151 tons of VOCs, and 44 tons of HAPs from producing wells in states without their own LDAR program. Table 16 summarizes the potential emissions impacts of the three-month stay.

[32] TSD at Tables 4-3, 4-5. EPA's well site model plants assume a two-wellhead pad. Oil well emissions are based on EPA's estimates for well sites with a gas-to-oil ratio of less than 300 standard cubic feet of gas per stock barrel of oil.
[33] *Id.* at Table 14-1.
[34] *See id.* at Table 4-11.

Table 16: Summary of Emissions Impacts and Lost Benefits Due to the Proposed Three-Month Stay

	# of Affected Wells	Total Forgone Emissions Reductions over 90 day Stay (tons)		
		Methane	VOCs	HAPs
Total Sources	21,039	5,330	1,470	56
Producing Wells in State with No LDAR Requirements	14,422	4,176	1,151	44
Producing Wells in Ozone Non-Attainment Area Counties of States with No LDAR Requirements	311	150	42	2
Low-Producing Wells Sources [based on NSPS definition]	2,516	785	217	8

The above assessment of increased emissions resulting from EPA's proposed three-month stay—which assumes that owners and operators are not currently complying with the 2016 Rule LDAR requirements—is a reasonable upper-bound estimate of the harmful pollution impacts associated with this action. While the 2016 Rule is currently in full force and effect, and owners and operators of affected sources are required to comply with its requirements, recent public statements by an official representing a major oil and gas trade association indicate that some in the industry believe "it is not immediately clear how or when facilities must comply with that [2016 Rule compliance] deadline and a subsequent 30-day deadline to begin fixing the leaks."[35] Given this statement and that we will not be able to ascertain the level of compliance until after the reporting deadline has passed, we have no basis for assuming that all affected sources are in compliance with the 2016 Rule at this time or have taken immediate corrective action to fix identified leaks, and believe that the estimate we report above is the best representation of the potential extent of climate and public health impacts that are at stake in this proposed rule.

CONCLUSION

EPA's proposed two-year and three-month stays will allow thousands of sources to avoid implementing emissions control standards set forth in the 2016 Rule. If the proposed stays are finalized, these sources will emit significant amounts of methane, VOCs, and HAPs—emissions that would have been avoided under the 2016 Rule. The adverse public health and welfare impacts of these pollutants such as increased mortality, morbidity and cancer risks associated with VOCs, benzene and formation of secondary pollutants, the contribution of methane to

[35] *See* Dave Reynolds & Lee Logan, *Oil and Gas Official Fears Months of Uncertainty Regarding Methane NSPS*, Inside EPA (Aug. 4, 2017) (Attachment 6).

tropospheric ozone, and crop and plant damage have not been fully monetized and are extensive. Using either EPA's original estimates of affected sources from the 2016 Rule RIA, or more conservative estimates of affected sources based on current well development data, the foregone benefits for the public due to EPA's proposed stays far outweigh the costs avoided by industry.