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The Economics of Regulatory Repeal and Six Case Studies

Alan J. Krupnick, Arthur Fraas, Justine Huetteman, and Isabel Echarte

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This report summarizes and provides cross-cutting analyses on a series of RFF reports: The Costs and Benefits of Eliminating or Modifying US Oil and Gas Regulations.

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1. Introduction

The Trump administration has identified increasing oil and natural gas production as a priority for the United States, in part through reducing federal regulatory burdens that the administration says restrict development. President Trump signed Executive Order (EO) 13783 in March 2017, requiring agencies to review existing rules, policies, guidance documents, and related materials that potentially burden the development or use of domestically produced energy resources.[1] This EO also specifically identified for review regulations applicable to the oil and gas sector.

The Trump administration has also focused on reducing regulatory costs across the federal government more broadly under EO 13771, which ordered that two regulations be removed for every regulation implemented[2] and established a regulatory budget approach to rulemaking.[3] Guidance from the Office of Management and Budget (OMB)[4] for implementing EO 13771 emphasized that cost-benefit analysis is required for all major regulations being considered for elimination or modification (as well as for new regulations). But it also laid out the controversial requirement that only the cost savings from repeal be considered in prioritizing rules for repeal as well as in scoring against the costs imposed by new regulations.[5]

2. Objectives

The goals of this project are to catalog the regulations that may be reviewed by the Trump administration and to analyze the potential impacts on industry and the public if the regulations are eliminated, modified, or delayed. These impacts include cost savings to industry and forgone environmental and health benefits from changes to regulations (as costs and benefits are defined in Circular A-4).[6] This project includes three main products. The first is a series of six in-depth cost-benefit analyses.[7] The six rules we analyzed were chosen to include a diverse set of energy-related rules and regulatory impact analyses (RIAs) and are not meant to suggest relative importance or that they are of particular interest to the Trump administration. The rules were chosen to illustrate a variety of technical challenges and opportunities that arise when conducting cost-benefit analyses to support the repeal or modification of the rules.

The second product is this summary report, which compares results across the six analyses. Here we accomplish four main objectives. First, we compare the cost savings and benefits forgone from repealing the six rules under several scenarios, described in detail below. Second, we assess different criteria for prioritizing rule repeal—comparing the prioritization based on cost savings, a metric emphasized by the Trump administration, or

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[1] Executive Office of the President. 2017. Executive Order 13783: Promoting Energy Independence and Economic Growth. *Federal Register* 82(61): 16093, March 28. https://www.federalregister.gov/documents/2017/03/31/2017-06576/promoting-energy-independence-and-economic-growth.

[2] Executive Office of the President. 2017. Executive Order 13771: Reducing Regulation and Controlling Regulatory Costs. *Federal Register* 82(22): 9339, February 3. https://www.federalregister.gov/documents/2017/02/03/2017-02451/reducing-regulation-and-controlling-regulatory-costs.

[3] Catalogue of Oil and Gas Regulations and Non-Regulatory Issues. http://www.rff.org/research/publications/catalogue-oil-and-gas-regulations-and-non-regulatory-issues

[4] Office of Management and Budget. 2017. Guidance Implementing Executive Order 13771, Titled "Reducing Regulation and Controlling Regulatory Costs." April 5. https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2017/M-17-21-OMB.pdf.

[5] Executive Office of the President. 2017. Executive Order 13771: Reducing Regulation and Controlling Regulatory Costs. *Federal Register* 82(22): 9339, February 3. https://www.federalregister.gov/documents/2017/02/03/2017-02451/reducing-regulation-and-controlling-regulatory-costs.

[6] Office of Management and Budget. 2003. Circular A-4, Regulatory Analysis. *Federal Register* 68: 58366, October 9. https://www.federalregister.gov/documents/2003/10/09/03-25606/circular-a-4-regulatory-analysis.

[7] The six reports are available at http://www.rff.org/research/collection/costs-and-benefits-repealing-regulations.

net benefits, the metric preferred by economists. Next, we discuss lessons learned from conducting these cost-benefit analyses. Finally, we discuss modification and selective repeal as alternatives to full repeal and lessons learned from analyzing modifications in our six reports.

The third product is our catalog of federal regulations that affect the oil and gas industry promulgated after 2005. We used this catalog to select the six rules we analyzed in our reports. The summary of our findings is in the appendix and the catalog itself is available on request.

3. The Rules Analyzed

We evaluated the following six rules:

- the Bureau of Land Management's (BLM's) Waste Prevention, Production Subject Royalties, and Resource Conservation rule, hereafter referred to as the BLM methane rule;
- the Environmental Protection Agency's (EPA's) Oil and Natural Gas Sector: Emissions Standards for New, Reconstructed, and Modified Sources New Source Performance Standards, hereafter referred to as the EPA methane rule;
- the Bureau of Safety and Environmental Enforcement's (BSEE's) Oil and Gas and Sulfur Operations in the Outer Continental Shelf-Blowout Preventer Systems and Well Control Rule, hereafter referred to as the well control rule;
- the Pipeline and Hazardous Materials Safety Administration's (PHMSA's) Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, hereafter referred to as the tank car rule;
- the BSEE's and Bureau of Ocean Energy Management's (BOEM'S) Oil and Gas and Sulphur operations on the Outer Continental Shelf—Requirements for Exploratory Drilling on the Arctic Outer Continental Shelf, hereafter referred to as the Arctic rule; and
- the PHMSA Pipeline Safety: Integrity Management Program for Gas Distribution Pipelines rule, hereafter referred to as the gas distribution rule.

Below is a brief description of key features of each rule.

The BLM methane rule regulates methane emissions from all existing oil and gas sources on federal lands. The focus of the rule is to reduce venting and flaring of natural gas through a number of measures, including increasing capture targets, implementing leak detection and repair (LDAR) programs, and the use of certain emissions reduction technology. The costs of this rule are primarily borne by industry, while the benefits accrue to society in the form of avoided damages from emissions reductions valued using the social cost of methane as well as revenues to industry from increased sale of natural gas that is not vented or flared. The Trump administration has finalized repealing the Obama-era rule.

The EPA methane rule regulates methane emissions from new or modified oil and gas sources. The rule requires various control rates or technology and institutes fugitive emissions monitoring and repair (which we refer to as LDAR to be consistent with terminology used in the BLM rule). Like the BLM methane rule, the costs of this rule are primarily borne by industry, while benefits are to society from emissions reductions and to industry through increased sale of natural gas. The Trump administration has proposed revisions to certain provisions to this rule. There has been no movement toward full elimination.

The BSEE well control rule implements a combination of prescriptive requirements and performance standards at offshore drilling operations to prevent an accident like the 2010 *Deepwater Horizon* oil spill. In particular, the rule focuses on ensuring the adequate construction, use, and maintenance of blowout preventers. The costs of the rule are BSEE's enforcement costs as well as industry's compliance costs. The benefits in this rule accrue to society in the form of oil spill risk reduction as well as avoided damages from oil spills, like impacts to ecosystems and economies, and avoided cleanup and containment costs. The rule also results in large benefits to industry from a deregulatory provision that reduced the testing frequency of one piece of equipment. The Trump administration finalized its revision to loosen requirements in the well control rule. (Our analysis was conducted and written prior to publication of the proposed modification.)

The PHMSA tank car rule requires a variety of retrofits to railroad tank cars carrying crude oil and ethanol. The goal of the rule is to reduce the risk of accidents, like the 2013 crude oil train derailment near Lac-Mégantic, Quebec, that resulted in an explosion, killing 47 people. The rule also requires speed restrictions, particularly near urban areas, and better route assessment and planning to ensure safety of a chosen route. The costs primarily result from industry compliance, while the benefits are to society from accident risk reduction and avoided damages from oil and ethanol spills and avoided cleanup and containment costs. The Trump administration recently finalized a rule rescinding the braking provision. At this time, there is no plan to eliminate the other provisions of the rule.

The BSEE and BOEM Arctic rule was promulgated to improve the safety of Arctic oil and gas exploration and development. The rule requires a variety of safety planning and equipment measures beyond what the well control rule requires, though the rule is not yet having effects because drill ships have not conducted exploration activities since the rule's promulgation. Again, the costs are to industry from compliance, and the benefits are to society from reduced oil spill risk (though we note those benefits were not measured in the RIA due to large uncertainties in the risk and consequences of an accident or spill in this area). The Department of the Interior stated that it is considering full rescission or revision of this rule.

The PHMSA gas distribution rule requires integrity management planning on natural gas distribution pipelines. Pipeline companies incur the costs of this rule arising from the development and implementation of an integrity management plan (basically, better and more frequent inspection) and the mitigation of any leaks discovered, while the benefits from avoided damages and fatalities resulting from natural gas leak accidents accrue to society. The Trump administration has not proposed repealing this rule or any of its individual provisions.

4. Methods

First, we will summarize the methodology we used to conduct the six analyses. We describe how we selected the six rules, estimated the cost savings and benefits forgone when repealing the rule, and created the baseline scenarios as well as the additional sensitivity analyses contained in the reports. More detail on those methods can be found in the original reports. Second, we describe the methods we used to compare the six reports' results for this summary, such as how we ensure comparability and how we selected the scenarios to compare. For reference, Table 1 below describes the key terminology used across these reports.

Table 1. Definitions of Key Terminology

Term	Definition
Cost Savings or Avoided Costs	The amount saved by eliminating or modifying the rule (i.e., the reverse of the costs of implementing a rule).
Benefits Forgone	Benefits that would not be realized by eliminating or modifying the rule (i.e., the reverse of the benefits of implementing a rule).
Net Benefits of Repeal or Elimination	The cost savings of a rule minus the benefits forgone with a positive result, meaning eliminating the rule has a positive net welfare effect on society. Net benefits can be negative, in which case they could be termed net costs to society.
Replication	Re-created original RIA and changed nomenclature to put into rule elimination terms: defining costs as cost savings, benefits as benefits forgone and net benefits (costs) as net benefits (costs) of repeal or elimination.
Corrections	Changes to underlying assumptions to bring the replication up to date and comparable across different rules
Baseline	The result of corrections to the replication. All subsequent scenarios are compared to the baseline.
Repeal Baseline	The result of subtracting forgone benefits from costs saved (the reverse of the baseline).
Costs Adjustment Scenarios	Sensitivity analyses using changes to underlying cost parameters/assumptions in the original RIA
Benefits Adjustment Scenarios	Sensitivity analyses using changes to underlying benefit parameters/assumptions in the original RIA
Rule Modification	Changes to the requirements of rule itself (i.e., sources covered, frequency of surveying, as opposed to changes in parameters/assumptions used in the RIA)

4.1 Conducting the Cost-Benefit Analyses

We selected the six rules based on the following procedure. We first consulted our catalog (see Appendix) to find rules that directly affected the oil and gas industry and that were economically significant. We used the OMB definition of economically significant, a rule generating more than $100 million per year in costs or benefits, as these rules would have RIAs to draw from. Next, we chose from this subset rules that industry submitted comments for as part of the Trump administration's call for comments regarding regulatory rollbacks. In addition, we included rules from a mix of agencies. We did not pick rules based on whether they were likely to be controversial.

To conduct our analyses, we first replicated the cost-benefit analyses in the original RIAs accompanying each of the final rules. We then modified the analyses to create a baseline estimate of the impact of the rule on society under today's conditions. This involved correcting inputs where relevant and possible, such as by updating data (for example, using more recent Energy Information Administration natural gas price estimates) or by accounting for sunk costs and benefits. Furthermore, if an RIA originally subtracted cost savings from costs, we added cost savings to the benefits side of the equation (and made corresponding adjustments to the RIA cost estimates) so that our analyses remain consistent with recent guidance from the OMB guidance for EO 13771.[8] We used these changes to create our baseline estimates of the net benefits of keeping the rule (written out in the equation that follows).

[8] OMB (US Office of Management and Budget). 2017. "Guidance Implementing Executive Order 13771, Titled 'Reducing Regulation and Controlling Regulatory Costs." April 5. https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2017/M-17-21-OMB.pdf.

Baseline

Net benefits (of keeping or modifying the rule) = Benefits – Costs

Next, we created our "repeal baseline," which we use to assess the cost savings and benefits forgone of repealing a regulation. We subtract the benefits forgone (i.e., the costs of repealing a rule) from the costs avoided (i.e., the cost savings of repealing a rule) to calculate the net benefits of repeal. The second equation below describes the calculation of the net benefits of repeal.

Repeal Baseline

Net benefits (of repeal) = Costs avoided – Benefits forgone

Next, working from the repeal baseline, we create scenarios by changing at least one underlying cost or benefit assumption of the RIA, such as using a higher compliance cost estimate or assuming that a rule is more effective than estimated in the RIA. To find alternative assumptions and estimates, we looked at information included in the RIAs as well as comments submitted to agencies from environmental groups, think tanks, and industry groups. In this document, we make use of some of these scenarios.

In the original analyses, we also looked at the potential for modifying the rule (while keeping important requirements), such as weakening or strengthening certain provisions. We selected modifications based on comments from environmental groups, think tanks, and industry groups. These results are compared to the baseline rather than the repeal baseline, as we assume the Trump administration would not modify the rule only to repeal it later. We describe some modifications as part of this document.

4.2 Making Rules Comparable

To make the rules comparable, we first convert the cost savings, benefits forgone, and net benefits of repeal into 2012 dollars using the implicit price deflator. OMB's Circular A-4 requires agencies to look at both 3 percent and 7 percent discount rates, and while we analyzed both discount rates in the six reports, we only look at the 3 percent discount rate results in this summary report because the results are qualitatively similar for both discount rates. Some rules use a 10-year period of analysis, while others use a 20- or 50-year period of analysis. The six reports maintained the length of periods used in the original RIA, updating the start year of the analyses where relevant. Our BSEE well control rule analysis, for example, looks at 2018 to 2027, as opposed to 2017 to 2026 as analyzed in the original RIA; the tank car rule analysis looks at 2018 to 2037, while the original RIA looked at 2015 to 2034.

For this cross-cutting report, because each analysis uses a different time period, and rules analyzed over longer periods will have greater net present values of both benefits and costs, we chose to "standardize" the results across the 6 analyses by calculating the 10-year net present value for each of the rules. We chose the 2018 to 2027 time period to provide the most immediately relevant information about the impact of the rules. The BSEE well control rule and the BLM methane rule reports already used that period. The BSEE and BOEM Arctic rule, on the other hand, used a 10-year net present value to estimate net benefits, but because of uncertainty regarding the start of offshore drilling in the Arctic, the original RIA did not assume compliance would begin in 2018. We therefore may overestimate the costs and benefits of the Arctic rule because we are effectively assuming offshore Arctic drilling will begin this year.[9]

The EPA methane rule reported costs and benefits only for 2020 and 2025. We extrapolated costs and benefits over the years 2018 to 2027 using a constant slope (rate of growth) calculated based on the two known years. We find this methodology to be a reasonable estimation of the rule's costs and benefits given that the original RIA estimated a constant slope in affected new or modified sources each year.

[9] In the Arctic rule report, we found that because of discounting, the rule's costs could be far smaller if we assume compliance begins in the future than if we assume compliance begins now. If compliance begins in 20 years, for example, the rule's costs are about half of what they would be if complaince begins now.

The RIA for the PHMSA gas distribution rule used a 50-year time period of analysis, but the costs and benefits are relatively steady each year, so we look only at the costs and benefits from 2018 to 2027 to calculate a 10-year net present value.

The RIA for the PHMSA tank car rule used a 20-year time period of analysis, but the costs and benefits of the rule vary significantly each year; in particular, the costs are mostly front-loaded, while the benefits accrue toward the end of the time period of analysis after investments have been made. To smooth the flow of costs and benefits over the original time period, we take the rule's 20-year net present value and calculate an equal annual value of costs and benefits of the rule, at a constant 3 percent interest rate. We multiply this value by 9.22 (instead of 10) to discount that total to a present value over 10 years.

In RIAs, there are generally uncertainties in measuring benefits and costs that result in multiple benefit, cost, and net benefit estimates, or sometimes no estimate at all. Two rules have high and low benefits (the PHMSA tank car and PHMSA gas distribution rules) and one rule has high and low cost estimates (the BLM methane rule) that carry through each scenario. The BLM methane rule displays the low cost and high cost estimates for the baseline scenario—the variation being the result of uncertainty regarding compliance costs for flaring requirement. The PHMSA tank car rule's low benefits estimate includes only the benefits from avoided minor derailments, while the high benefits estimate includes the benefits from avoided minor and major derailments. The PHMSA gas distribution rule's range of benefits encompass a low and high estimate of effectiveness in reducing accidents on natural gas distribution pipelines. The Arctic rule's RIA did not include a benefits estimate so we are unable to include the benefits forgone or net benefits from repeal as part of this analysis. We include the ranges used in the RIAs in our analyses and in this report.

As discussed above, we created a number of scenarios to test the assumptions of the RIAs. We select three scenarios for each rule to compare in this report. The first scenario we chose is the baseline estimate, described above. The second is the scenario within each report that makes the rule most favorable to repeal (i.e., the greatest net benefits or smallest net costs of repeal). And the third is the scenario within a report that makes the rule least favorable for repeal (i.e., the greatest net costs or smallest net benefits of repeal). We note that the changes made to generate each of those scenarios will not be consistent across the rules, as each rule's analysis has different cost and benefits components. These scenarios are still comparable across rules because we simply adjust a cost or benefit assumption and the overall analysis remains the same otherwise. While the scenarios are not arbitrary, we cannot claim that they represent the range of uncertainties fully. And, in some cases, a lack of data prevented us from developing scenarios we considered appropriate.

Then, we discuss how rules should be prioritized for repeal using either the cost savings criterion or net benefits criterion. We rank rules according to the two paradigms for the repeal baseline scenario. Following this discussion, we discuss lessons learned from conducting cost benefit analyses.

We then move to an assessment of potential rule modifications and lessons learned from that analysis. We do not make quantitative comparisons across rules for modifications.

5. Results of Repeal Analyses

5.1 Comparison Across Rules

In this section, we present the results of our analyses for each rule for the repeal baseline estimate and the estimates that are most or least favorable for repeal. As previously mentioned, in the repeal baseline estimate we updated data (e.g., natural gas price) that has changed since the publication of the original RIA and account for sunk costs and benefits. Below we will describe for each rule what scenario is the most or least favorable for repealing the rule. These scenarios vary significantly and often provide a different conclusion about the net benefits of the rule than the repeal baseline, which shows the importance of factoring uncertainty into the RIA process and how RIAs are more of a guide than a definitive projection about the impact of a rule.

5.1.a. Repeal Baseline

Figure 1 below shows for each rule the benefits forgone (in blue), the cost savings (in gray), and the

net benefits of repeal. The net benefits of repeal are in red if they are negative, meaning that the benefits forgone exceed the cost savings from repeal, or in green if they are positive, meaning the benefits forgone are less than the cost savings from repeal. Thus, a green bar suggests society would benefit (on net) from repealing a rule, while a red bar suggests society would be worse off if a rule were repealed. A hashed area equalizes the costs and benefits, and is included to emphasize that the net benefits or costs are the difference between those two estimates.

What is clear from Figure 1 is that only one rule—the BSEE well control rule—would result in net benefits of repeal according to the baseline estimates. This result occurs partly because the rule's original RIA estimated that most of the benefits were from a deregulatory provision, and in our analysis we assume the Trump administration would not re-instate the prior, more stringent requirement. The RIA acknowledged that environmental and safety benefits were underestimated because BSEE sought to calculate the lower bound of uncertainty regarding how much the rule would reduce the risk of oil spills.[10] The breakeven risk reduction figures are almost all less than 33 percent, so it is plausible that the benefits forgone from repealing the rule would meet or exceed the cost savings of repealing the rule. One other rule, the PHMSA tank car rule, would potentially result in net benefits if repealed. As stated previously, we retain the range of benefits estimates from the original RIAs for each rule. In the case of the PHMSA tank car rule, the low benefits estimate factors in avoided damages from minor derailments only, while the high benefits estimate factors in avoided damages from both minor and major derailments (a major derailment being like the event at Lac Mégantic, Quebec, in 2013). Factoring in benefits from avoided major derailments to be consistent with the Obama rule and to provide an upper end estimate shows that repealing the rule would result in net costs to society. The repeal baseline results show that repealing all six rules would result in net costs to society of over $2 billion because the health and environmental benefits forgone ($11 billion over 10 years) outweigh the savings to industry (up to $9 billion over 10 years). (Note: we excluded the cost savings associated with the Arctic rule from this calculation as its benefits forgone are not quantified in the original RIA.

5.1.b. Least Favorable for Repeal

In this section, we discuss and compare the cost and benefit adjustment scenarios that lead to the lowest net benefits, or largest net costs, of repeal. All of the rules result in net costs of repeal, which are shown graphically in Figure 2. Though some of the RIAs include a range of either costs or benefits, we only use one of those—either the high benefits or low cost—cases to assess what values are truly least favorable for repeal for each rule.

The BLM methane rule scenario that resulted in the largest net costs of repeal used a higher social cost of methane. In this scenario, we use the social cost of methane ($SC\text{-}CH_4$) corresponding to a 2.5 percent discount rate instead of the 3 percent rate used in the baseline, which increases the social cost of methane by about 50 percent on a per ton basis. For the EPA methane rule, using a higher global social cost of methane likewise yields the largest net costs of repeal. Using this $SC\text{-}CH_4$ illustrates how much influence the $SC\text{-}CH_4$ has on the results of these two rules. This scenario specifically shows that if a lower discount rate were to be used—a discount rate still above the 2 percent rate suggested by the Council of Economic Advisers (2017)—the benefits forgone of both of these rules would far outweigh the cost savings of repeal.

[10] The well control rule's original RIA showed that implementing the rule resulted in net benefits. In that RIA, 98% of benefits were estimated to result from a deregulatory provision included as part of the 2016 rule, while only 2% of benefits were estimated to result from environmental and safety benefits. In our baseline, we assumed that the Trump administation would not remove the deregulatory provision, as such a change would increase compliance costs for industry. Therefore, our baseline only assesses foregone environmental and health benefits.

Figure 1. Costs and Benefits of Repealing Six Environmental Regulations: Repeal Baseline

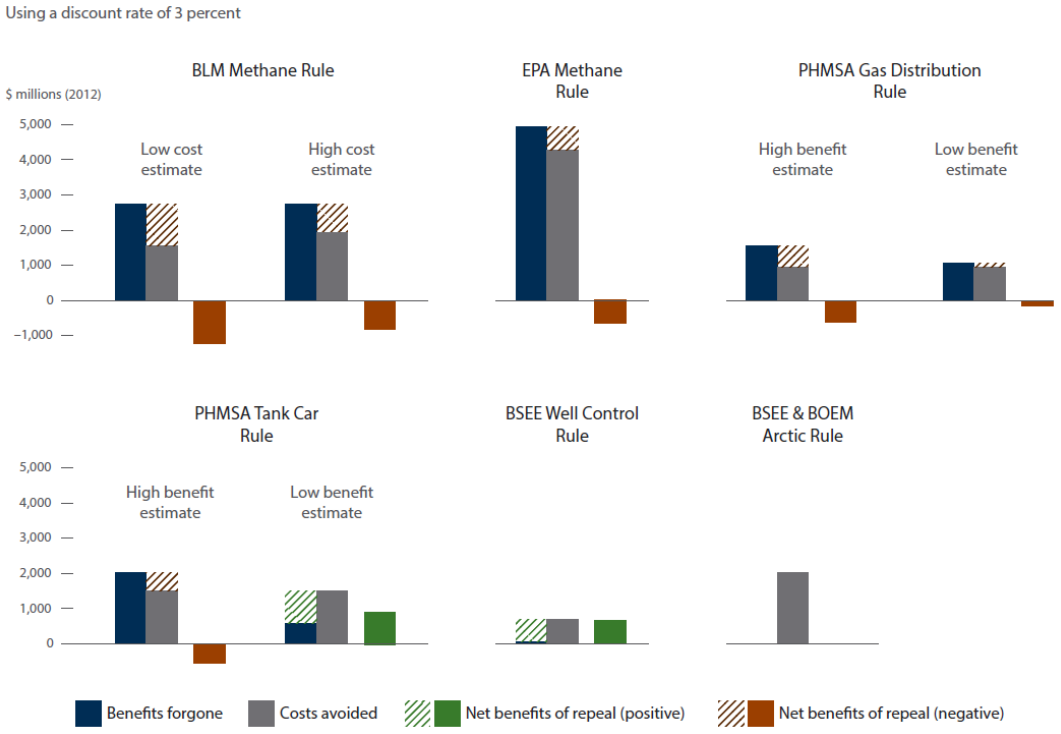
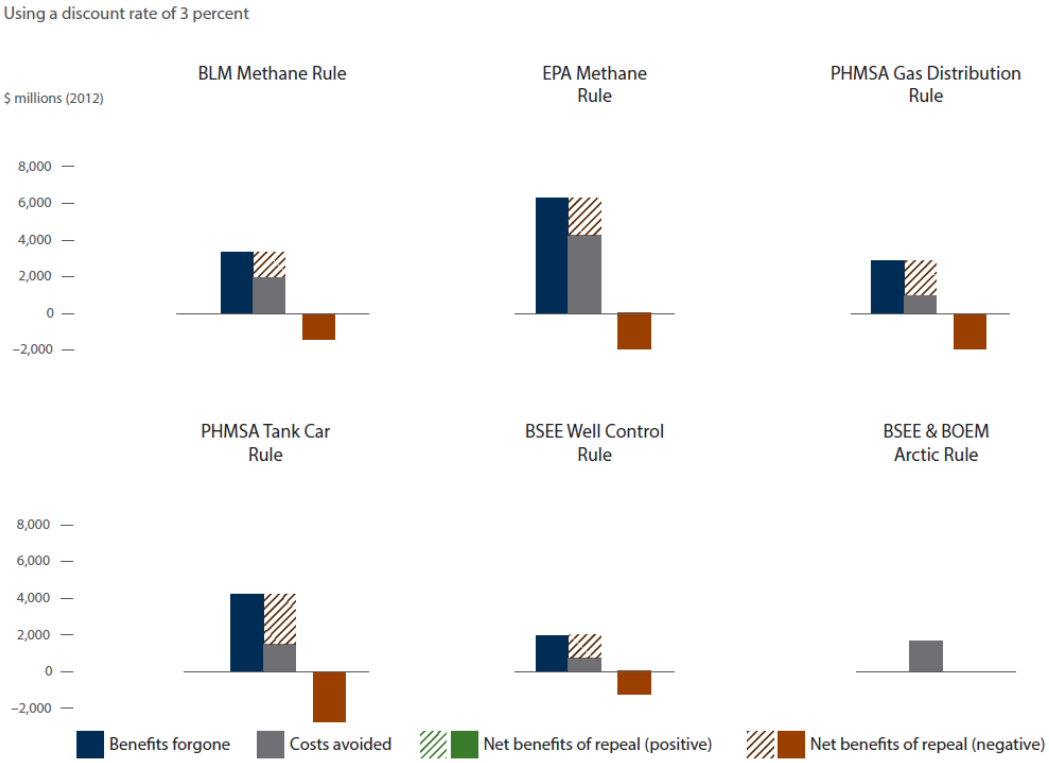


Figure 2. Costs and Benefits of Repealing Six Environmental Regulations: Least Favorable for Repeal



For the PHMSA gas distribution rule, we valued methane reductions using the global SC-CH_4 (as used in the original RIAs for the BLM and EPA methane rules), and this scenario yielded the largest net costs to society of repeal. In the original RIA, PHMSA did not estimate the methane emissions reductions resulting from the reduction in leaks caused by this rule, which in turns means they could not quantify the benefits attributable to these emissions reductions. We estimate the emissions reductions based on the RIA's estimated natural gas captured and sold due to the rule and multiply this value by the global SC-CH_4 (using a 3 percent discount rate).

For the PHMSA tank car rule, we included a sensitivity analysis of the estimated damages of major derailments, and the higher value of this analysis is the scenario that produces the largest net costs to society of repeal, which are nearly five times higher than the baseline.

We modified two assumptions in the BSEE well control rule analysis to get the scenario that is least favorable for repeal. First we assumed a 10 percent reduction in the risk of an oil spill as a result of implementing the rule (as opposed to BSEE's self-described underestimate of 1 percent). The actual level of risk reduction is unknown, and is a figure we explore in more detail in our report. The second change we made was to the estimate of the cost of a catastrophic spill—we use the amount BP paid as a result of the *Deepwater Horizon* spill ($61 billion) instead of the amount BSEE calculated using BOEM models ($211 million). These changes yield a benefits forgone estimate that outweighs the cost savings by over $400 million.

Because the BSEE and BOEM Arctic rule analysis does not include a benefits estimate, our scenario that is least favorable for repeal is the one that would result in the smallest cost savings. We calculate the smallest cost savings when we assume the Arctic offshore drilling season will last longer, thereby reducing the share of the drilling season where operators would be unable to drill. This lowers the costs of the rule and, symmetrically, the cost savings of its repeal. This change reduces costs by 17 percent.

5.1.c. Most Favorable for Repeal

In this section, we discuss and compare the cost and benefit adjustment scenarios that lead to the highest net benefits of repeal. All of the rules show net benefits from repealing the rules, as shown graphically in Figure 3. Again, though some of the RIAs include a range of either costs or benefits, we only use one of those—either the low benefits or high cost—cases to assess what values are truly most favorable for repeal for each rule.

Using the Trump administration's domestic SC-CH_4 is the only scenario where the cost savings outweigh the benefits forgone of the BLM methane rule. The key difference between the Trump administration's SC-CH_4 and the one used previously is that the Trump administration's SC-CH_4 estimate only factors in damages to the United States, whereas the estimate used by the Obama administration when they promulgated the rule factors in global damages. The result is a SC-CH_4 that is between 4 and 14 percent of the figure used by the Obama administration.

For the EPA methane rule, using the American Petroleum Institute's (API's) estimate of the costs of complying with one of the leak requirements, the LDAR requirement increases the costs of the rule nearly threefold. Unlike the repeal baseline, there are net benefits to society of repealing the rule using this adjustment.

PHMSA's gas distribution rule has its highest net benefits of repeal under a scenario in which less natural gas is captured and sold than expected in the repeal baseline. The sale of this captured gas comprises a significant portion of the benefits of this rule, so lowering this expectation causes a dramatic drop in benefits of the rule and thus an increase in the net benefits of repealing the rule, compared to the repeal baseline.

For the PHMSA tank car rule, changing an input used to estimate the number of avoided minor derailments is the scenario most favorable for repeal, meaning there would be fewer derailments avoided from the rule under this scenario.[11]

[11] The input is the number of carloads estimated over the time period in the RIA. This projection was used in the Trump administratipn's RIA for rescinding the braking provision. The total number of carloads shipped each year drops by about one-third from the original RIA. For more information, see Krupnick, Huetteman, and Fraas (2018).

Figure 3. Costs and Benefits of Repealing Six Environmental Regulations: Most Favorable for Repeal

The scenario that results in the largest net benefits of repeal for the BSEE well control rule adjusts inputs to the calculation of benefits. We use a smaller social cost of a spilled barrel of oil (as calculated by Cohen [1986]) to generate this scenario. The net benefits of repeal are only 3 percent larger than in the baseline.

For the Arctic rule, the scenario that produces the largest net benefits of repeal is one in which we use industry estimates of compliance costs. In comments to BSEE and BOEM as the agencies were finalizing the Arctic rule, Shell said the rule's costs were underestimated. Though BSEE and BOEM revised several cost estimates upwards in the final RIA response, they did not use Shell's suggested $6 million daily rig operating cost and instead used a figure closer to $4 million. The higher daily rig operating cost increases the cost savings from repealing this rule by almost 40 percent.

5.2 Prioritizing Rules for Repeal

The idea advanced by the Trump administration in EO 13771 is to estimate a rule's cost savings from repeal and then target those with the highest cost savings for review and repeal.[12] The alternative paradigm is to prioritize rules using the net benefits

[12] Whether *in practice,* the Trump administration has been prioritizing rule repeal or modification using the cost savings criterion is open to debate. Certainly, the administration is regularly touting the cost savings of its regulatory actions and just as regularly ignoring the foregone benefits. And it is attempting in other efforts to diminish foregone benefits through its arguments that ancillary benefits of a rule should not be counted. Our casual observation is that the administration has been focusing on repealing or modifying Obama-era rules that are particularly irritating to the regulated sectors, which may be similar, albeit more informal, than using a cost savings criterion.

of repealing a rule. Here we rank the six rules using both the cost savings and net benefits metrics. In this discussion, we ignore other deregulatory tactics, such as delaying a rule, signaling that the rule will not be enforced, or modifying a rule.

Economists prefer the net benefits metric (a standard welfare economics paradigm) because any deregulatory action is going to have advantages and disadvantages, or cost savings and benefits forgone. If one were only counting the cost savings, there would be nothing to assure that society was made better off as a result of a deregulatory action. A regulation with very high cost savings could be chosen for repeal irrespective of the benefits forgone from its repeal. Cost savings from repeal (and costs from implementing a rule) tend to accrue to the specific regulated parties (and their employees, shareholders, suppliers and customers), while benefits forgone from repeal (and benefits from implementing a rule) largely impact the public. Net benefits, on the other hand, balances those two metrics and better reflects the total impact on society. Using cost savings as the sole indicator for whether or not a rule should be repealed would favor industry (and related stakeholders – as noted above) rather than society as a whole. The net benefits criterion reflects better the effect of repeal on society as a whole.

We are able to use our repeal baseline results (from Section 5.1.a) to look at how a cost saving criterion would prioritize rule repeals. Figures 4 and 5 illustrate these points. Both figures show the ranking of rules according to the cost savings criterion on the left and the net benefits criterion on the right. Figure 4 just shows a ranking, while Figure 5 factors in the relative level of costs savings and net benefits on a numeric scale. Figure 4 shows on the left that a cost saving criterion would prioritize the EPA methane rule for repeal and then the Arctic rule, BLM methane rule, PHMSA tank car rule, PHSMA gas distribution rule, and BSEE well control rule. The right side of the graph shows that the order of the rules switches dramatically when using the net benefits criterion. The rule targeted as the first priority under the cost savings criterion is sixth in the net benefits criterion ranking. The left side of Figure 5 shows that all of these rules should be repealed because they all result in cost savings. On the other hand, the right side of Figure 5 shows that most of the rules should not be repealed according to the net benefits paradigm because the benefits forgone outweigh the costs savings for most of these rules. (The Arctic rule, second on the left, is not included on the right side because the RIA for that rule did not include a benefits estimate.)

Figure 4. Ranking Rules for Repeal Under Two Paradigms

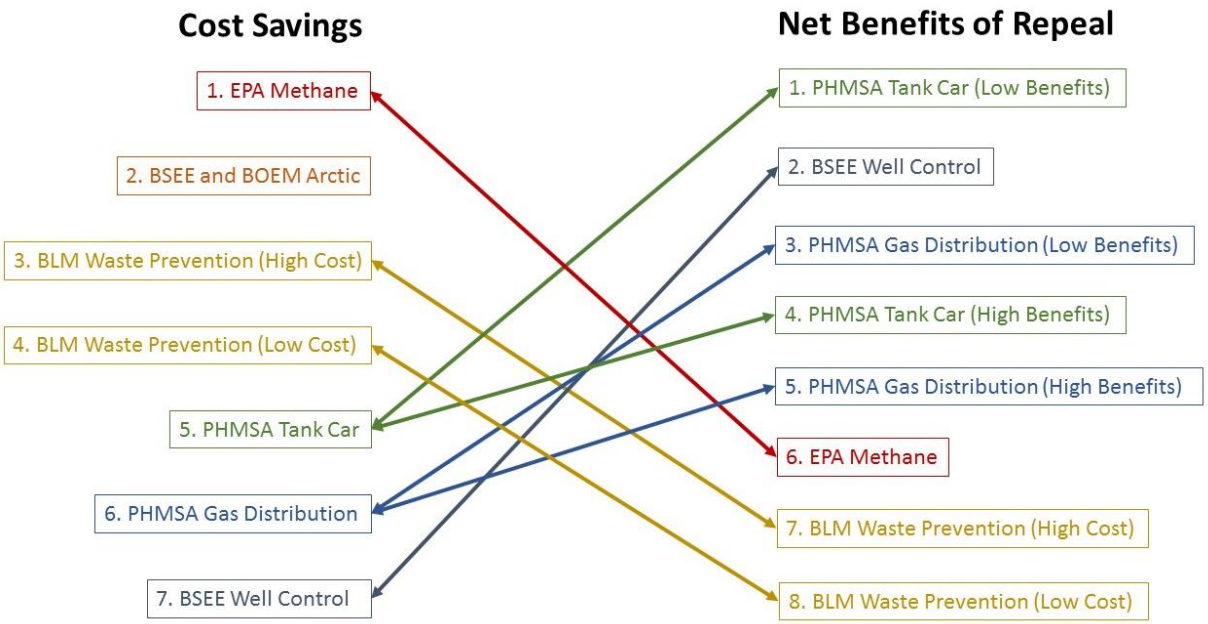
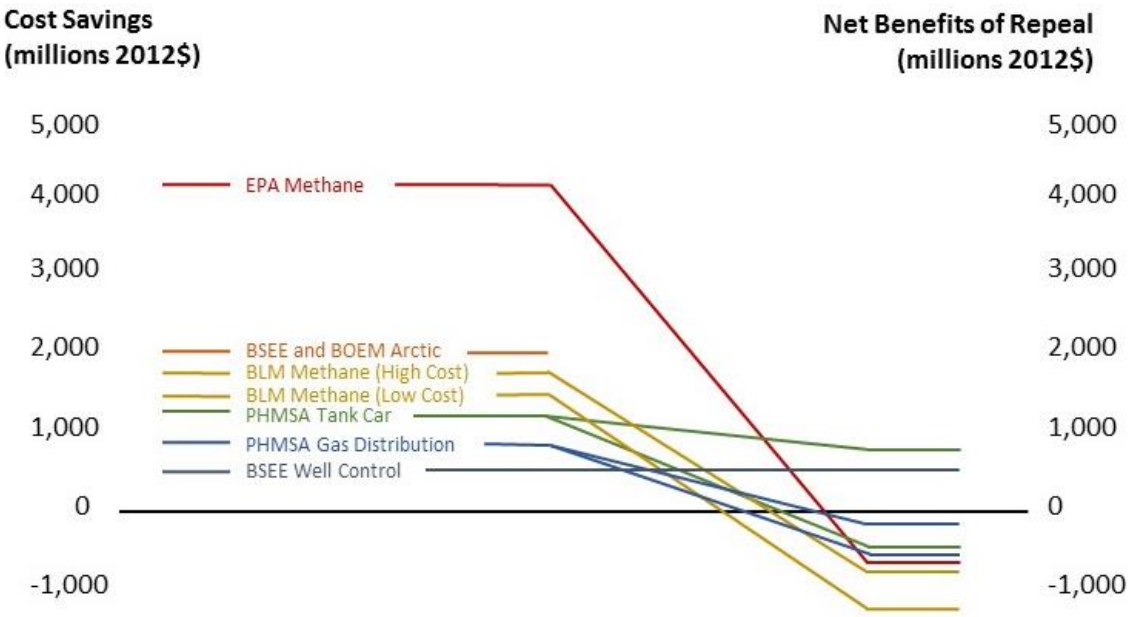


Figure 5. Ranking Rules for Repeal On a Numeric Scale Under Two Paradigms



6. Results of Rule Modification Analyses

Repeal is not the only manner in which an administration can bring about regulatory reform. Agencies can repeal parts of a rule or modify certain requirements (i.e., exempting certain operators or operations, reducing testing frequency, etc.) instead of repealing the whole rule. We include a discussion of selected modifications from our reports for each rule below. We discuss the modifications in terms of keeping the rule, as we would not expect agencies to modify a rule and then repeal it.[13]

For the BLM methane rule, we looked at three modifications that industry suggested would make the rule less stringent and one modification suggested by environmental groups that would make the rule more stringent. Specifically, industry suggested reducing the frequency of LDAR inspections from semi-annual to annual and an environmental group suggested increasing the frequency of LDAR inspections to quarterly. Both frequency modifications decrease the net benefits compared to the baseline. Removing the flaring requirement entirely from the original RIA increased net benefits by 50 percent in the high cost scenario, according to BLM.

In our modification analysis of the EPA methane rule, we examined two issues raised by commenters in urging reconsideration of the 2015 rule: the exclusion of low-production wells from the LDAR provision and a reduction in the frequency of monitoring for LDAR. We focused on the exclusion of low production wells (wells that produce oil and gas below a certain threshold) because EPA included these wells in its final rule after originally proposing to exclude them from the LDAR requirement. Industry has argued that it is not cost-effective to require LDAR for these wells, while environmental groups argue that the emissions rates of these wells are similar to larger wells and thus merit regulation. Based on the percentage of wells that qualify as low production wells in the Drillinginfo database, we found that in the short term, net benefits of the rule increase with the exclusion of low production wells from the original RIA, while in the long term, net benefits of the rule decrease with their exclusion, compared to our baseline. This suggests that, over time, the benefits of including low production wells outweigh the costs and the rule should not be modified to exclude them. In September 2018, EPA proposed a revision to the rule that would require less frequent monitoring for low production wells relative to higher production wells—but does not exclude them from LDAR.

Another modification that we examined for the EPA methane rule was whether to increase or decrease the frequency of monitoring for the LDAR provision (one of the modifications assessed for the BLM methane rule anlaysis). The final rule requires semiannual monitoring, but the RIA explored requiring annual or quarterly monitoring as well. Compared to our baseline, the net benefits of implementing the rule with annual monitoring are higher, while the net benefits of implementing the rule with quarterly monitoring are lower and in fact negative. From a net benefits perspective, annual monitoring is preferable to semiannual monitoring according to our baseline. EPA in fact chose to revise the rule in September 2018 to require only annual monitoring, except for low production wells, where monitoring frequency was rolled back to every two years.

The only modification we examined for the PHMSA tank car rule concerned the braking provision—specifically, whether to eliminate it or increase the number of tank cars it covers. The Trump administration has rescinded this provision on the grounds that the provision's costs outweigh the benefits; however, they significantly reduced the estimation of avoided damages from major derailments from the original RIA, which led them to that determination. Using the assumptions about damages under the original RIA as well as updates included in our baseline, we find that the original rule has net costs (even when factoring in avoided damages from major derailments) without the brake provision, suggesting that the benefits of the provision far outweigh the costs and help justify the net benefits of the rule.

[13] We did not consider rule modifications to the PHMSA gas distribution rule, as we found no compelling or quantifiable modifications proposed by commenters.

The original BSEE well control rule RIA made it difficult to assess modifications to the rule, as it did not include a quantitative assessment of alternatives. Furthermore, the rule only looked at the benefits of the rule as a whole, and did not tie environmental benefits to specific regulatory provisions; so we did not feel comfortable assessing the net benefits of removing individual requirements. We only chose to assess one possible modification that was quantified in the original RIA. As discussed above, the well control rule included a deregulatory provision alongside the regulatory provisions—reducing the blowout preventer pressure testing frequency from once every week to once every 14 days. The RIA also quantified the cost savings of further reducing that requirement to once every 21 days. In BSEE's proposal to modify the well control rule, it did not propose reducing that testing frequency.

Because the BSEE and BOEM Arctic rule RIA did not calculate benefits we only looked at the impact of rule modifications on the costs of the rule. We looked at one industry suggestion, removing the requirement to have a relief rig nearby in case of a loss of well control, and one suggestion from a Harvard Law School group, to include a 10-day buffer period between when operators would be able to complete and abandon a relief well and the expected return of sea ice. The first decreases the costs of the rule almost 60 percent but would possibly increase the risk of an oil spill that goes uncontrolled throughout the winter until sea ice thaws. The second increases the costs of the rule but would, in theory, reduce the risk of an oil spill that continues through the winter.

7. Lessons Learned and Recommendations

The repeal of regulations, while certainly not a new idea, has taken on new life under the Trump administration. While the procedure for conducting RIAs is relatively established, the procedure for doing such analyses for repeal of regulations is not and, further, is somewhat different than the procedure for estimating the costs and benefits of a new rule. Thus, this section presents lessons we learned from recreating and interpreting primarily the Obama-era RIAs and conducting a rule repeal (as well as a rule modification) analysis. Where available, we also looked at the Trump-era repeal of modification RIAs and offer comments where appropriate. Recommendations are presented following a discussion of each of the lessons.

Stakeholders should see the RIA as informative, not as a definitive decisionmaking tool. Agencies are supposed to follow OMB Guidance when developing an RIA (Circular A-4) as well as their own agency guidance for practices about what to include or not include in the calculation of costs and benefits. The six RIAs we examined follow this guidance reasonably well. Still, there is a fair amount of art to this science, particularly when there is large uncertainty regarding a certain assumption or input (discussed further below). The variation in benefits or costs between our most and least favorable scenarios for repeal illustrates how one or two adjustments can result in either net costs or net benefits for the same rule.

Agencies are generally transparent in their RIA calculations, but there are challenges. We found that it was generally possible to replicate agency RIAs, and in this respect the RIAs that are transparent in their calculations. In all six cases, we were able to reproduce the original RIA estimates to within 5 percentage points, relying almost entirely on the RIA itself.

Where a Trump-era RIA for repeal (or modification) was available, we also tried to replicate it. Here we were not as successful. These RIAs generally start with the Obama-era RIA and then offer some modifications of the analysis. These modifications were not always transparent. For instance, the Trump RIA for the PHMSA tank car rule was not clear about some of the data inputs and assumptions, such as the rule phase-in schedule and the number of employees that would need training.

Regarding the sources of data underlying the cost and benefit estimates, the agencies can be incredibly opaque. While in the BLM methane rule RIA, BLM generally cited the sources of equipment cost estimates, BSEE and BOEM did not cite any source in the well control rule for the vast majority of equipment costs. A lack of such information can leave the public without adequate information to judge the quality of information and the underlying assumptions made in RIAs. Therefore, we recommend that agencies be more transparent in their handling of sources of data.

Agencies can be responsive to both industry's and the public's comments. We found a number of specific instances where agencies were responsive to commenters and transparent with the information presented that led to the decision to change (or not change) parts of the rule at the request of stakeholders in the rulemaking process. These instances were often related to specific comments from industry, rather than vague or general comments. We found instances of agencies both tightening rules and relaxing them as a result of comments. On one hand, for example, EPA chose to include low production wells in the final methane rule after receiving comment on the proposed rule that they had a similar potential to emit methane as that of regular wells. On the other hand, after receiving comments from industry groups that the timeline of compliance in the proposed tank car rule was too ambitious given the capacity of retrofit service providers, PHMSA extended compliance deadlines.

Agencies struggle to quantify uncertainties and fill in data gaps. Agencies often struggle to quantify uncertainties, particularly regarding the environmental benefits of rules (and by implication, the benefits forgone of repeal). It is possible that more complete discussions of uncertainty occur outside what is produced in the RIA, but these uncertainties should be more thoroughly and completely addressed. For example, RIAs produce at most two estimates of net benefits for each discount rate, and we found an RIA where one of the estimates seemed to be there to "check a box" rather than as a serious alternative. For example, the low benefits estimate for the tank car rule assumed that no major derailments would occur; however, the regulation was developed because of a major derailment in Canada, so this inclusion of a low benefits estimate could certainly be questioned.[14]

In the face of uncertainties so great that no estimate of a parameter could be made (such as the probability of a future catastrophic oil spill), we found ourselves resorting to a breakeven analysis. This technique finds the parameter value that equates benefits to costs, so values higher than the breakeven point result in net benefits of a regulation while those lower than the breakeven point result in net costs. A discussion can be included in the RIA about the likelihood of this value being exceeded or not. Such analyses should focus decisionmakers on concrete judgments about the likely size of the uncertain parameter, which seems useful to us. Therefore, we recommend that agencies use breakeven analyses to supplement other analyses of benefits in RIAs.

We also recommend that RIAs use multiple scenarios that present the range of benefits estimates—if agencies choose to be conservative with one estimate they should likewise include a scenario that is moderate and one that is more expansive.

For an example of best practice, the EPA methane rule RIA presented several potential LDAR inspection frequencies, which provided us with data to analyze the impacts of changing this frequency instead of repealing the rule altogether. Again, we acknowledge that this puts greater burden on analysts performing RIAs but believe it could be advantageous moving forward to improve RIAs and the rules they inform.

Agencies also struggle to include non-cost metrics and effects. RIAs are supposed to address the effects of a rule on metrics other than costs, such as employment and plant closures. In general, we found RIAs often do not conduct an analysis of these effects. The Obama-era and Trump-era EPA methane rule RIAs did estimate impacts on employment and oil and gas sector production, but the RIAs for the PHMSA tank car rule and gas distribution rules did not include these broader impacts (often they only discuss jobs or full-time equivalent positions created as a direct result of the rule's requirements).

[14] We note, however, that the U.S. rail system has not experienced an equivalent, catastrophic accident. Still we know of no substantive differences between these two systems that makes the U.S. system safer.

There is some scholarly research that estimates the effects of a regulation in general (i.e., not specific regulations) on employment.[15] The situation is worse for plant closures, where the academic literature largely fails to address the issue.[16]

Distributional effects, in terms of the benefits and costs borne by different income groups, age groups, or regions of the country are also typically ignored.

We recommend that the agency develop a research program to improve estimation techniques of non-compliance cost impacts.

Too little attention is given to incorporating state regulations into the baseline. State regulations can affect both original RIAs and repeal RIAs in two ways. First, states may have their own rules that duplicate the planned federal rule or rule repeal. We found that original RIAs were sometimes sensitive to this issue. Several states, for example, published methane rules alongside and following the publication of the BLM and EPA methane rules. But this issue could be more concerning for repeal RIAs because some states, seeing that a rule they value may be repealed in the future, may choose to pass their own rule in response, *so the agency needs to be particularly careful to search for such actions.*

The quality of the original RIA defines the quality of the repeal (or modified) RIA. As previously mentioned, any issues with the original RIA will complicate an RIA for repeal or modification. For example, uncertainty that was not treated well in the original RIA likely will not be treated well in the repeal RIA without further study. The BSEE well control rule RIA could not estimate the share of oil spill risk reduced from implementing the rule and the repeal RIA did not attempt this either.

Compliance with rules is not reflected in RIAs. In our study, we encountered rules that were recently released, released within the last few years, or released nearly a decade ago. This raises important issues of tracking compliance and thus considering sunk costs and benefits for repeal or modification RIAs. Knowing the level of compliance could make a significant difference in the decision to go through a repeal or modification process.

In our analysis, we used the RIA's estimated schedule of compliance, if available, to calculate sunk costs and benefits. This assumes 100 percent compliance, thus possibly leading to an overestimation of costs and benefits. Moreover, where the enforcement effort is uncertain and repeal is being discussed publicly, we could imagine non-compliance occurring on a broad scale. Fortunately, since non-compliance affects both benefits and costs, inaccuracies here do not necessarily lead to bias in the assessment of whether net benefits of repeal are positive or negative. If, however, non-compliance varies by rule (which is likely), the comparison across rules would be affected, as well as the prioritization of rules to repeal.

We recommend that compliance data collection and distribution protocols be created to inform repeal and modification RIAs and other analyses.

Sunk costs and benefits are not being tracked. Although non-compliance affects sunk costs, this concept is important to capture in a repeal or modification RIA even with perfect compliance. If significant investment has been made to comply with a rule, the cost savings that can be

[15] In our brief review of the literature, some studies found no significant effect, while others found that environmental regulation would modestly impact employment (Coglianese and Carrigan 2015). The results of these studies varied from a reduction in employment of 3.4 percent to an increase in employment of less than 1 percent, depending on the industry, methodology, and data sources in each study. But, when it comes to estimating the effects on employment for a specific rule, such approaches are not appropriate. For example, the Morgenstern et al. (2002) model has been commonly used in RIAs. However, Belova et al. (2013) argued against using that model in estimating the employment impacts of new regulations after a reassessment. When extended to measure impacts on different industries and years than the original study, the model produced unreliable results such as implausibly large estimates (Morgenstern et al. 2002; Belova et al. 2013).

[16] A plant can be closed for many reasons that have nothing to do with regulations, such as obsolete technology, falling sales, and increasing energy costs (Kazis et al. 1982). The need for additional environmental spending would likely cause closures for only the most inefficient of plants. Kazis et al. (1982) reports that environmental regulations "merely hastened plant closings which were already imminent." Separating out the effect of a regulation and assigning it a part of a closure is not a task that can be easily or reliably performed.

realized with repeal will be limited and it may not be an efficient use of agency time or resources to repeal the rule, for instance. Sunk costs (and associated benefits) are less of an issue when the rule has only recently been issued and not yet implemented or where costs are largely ongoing operational costs.

We recommend that such costs and benefits be tracked.

Deregulatory provisions promulgated with the original rule change the character of a repeal. Some rules include deregulatory provisions alongside regulatory ones when they are initially implemented. Rules that include deregulatory elements are problematic for repeal RIAs in several ways. First, given the Trump administration's commitment to reducing regulatory burden, it is not realistic to think that deregulatory provisions of a rule would be repealed. Therefore, any analysis of repeal would need to be based on the other provisions of the rule. Second, benefits to industry from deregulatory provisions can be easier to measure than environmental and safety benefits. In one rule we analyzed, the benefits of deregulation were so large that it led the agency to offer an underestimate of the benefits of the regulatory provisions (which result in the environmental benefits of the rule) because the net benefits of the entire rule were highly positive anyway. Such practices would make it easier for an administration to argue for repealing the rule later, as the forgone environmental benefits will appear to be minimal.

We urge agencies to estimate all benefits to the best of their ability, whether deregulatory effects dominate or not.

Data from retrospective analysis were useful in estimating the costs and benefits of repeal. Retrospective analysis, where information is readily and reliably available, can aid in understanding whether a rule has resulted in costs and benefits that align with expectations in the rule's original RIA. By examining the actual (or realized) impact of the rule, agencies can then better understand what would be forgone by repeal, and whether that differs substantially from the expectations of the original RIA. In our analysis of the PHMSA gas distribution rule, we were able to take advantage of such an analysis by updating the frequency of two types of pipeline incidents.[17]

We believe that retrospective analysis of a rule's performance after it has been implemented for a number of years would be fruitful. Such information would provide agencies more data regarding how to best regulate and would enable them to more efficiently modify regulations after the fact.

We recommend that agencies conduct more retrospective analyses to aid in their review of rule effectiveness.

Do more analysis of individual provisions in the original RIA. The main lesson from our modification analyses is that individual provisions in a rule do not always pass a benefit-cost test. Agencies should disaggregate the costs and benefits of a rule's provisions (or group of provisions) as much as possible to permit better crafting of the original rule and more precise decisions on future rule modifications. We recognize however, that the analytical burden on those responsible for RIAs would be raised by following this suggestion. Indeed, some disaggregation of provisions may well run into what economists call the "joint allocation problem," where it is simply impossible to assign costs or benefits among a group of regulatory elements. In this case we would argue that the provisions should be disaggregated only to the point where this problem does not surface.

[17] PHMSA estimated that the rule would reduce between 20 to 50 percent of accidents; in reality, between 2010 and 2016, non-excavation incidents were 11 percent lower than PHMSA estimated they would be without this rule and excavation incidents were 49 percent lower than PHMSA estimated. PHMSA's estimates of the rule's effectiveness were close to what actually happened in the early years of implementation of the rule; however, the agency did not distinguish effectiveness based on type of incident (excavation versus non-excavation), and the RIA might have been improved by including that, particularly given that the avoided damages differ based on incident type. Non-excavation incidents are expected more frequently *and* are more expensive, so the RIA could be overestimating benefits of this rule by not distinguishing by effectiveness based on the type of incident.

Ensure consistency in provision-by-provision analysis. We learned that agencies are often not transparent when they change specific assumptions from the original RIA. When considering whether to repeal a provision of a rule, agencies should be consistent in the assumptions underlying the RIA. They need not maintain the same assumptions as the previous RIA, but the agencies should be transparent in how the change affects conclusions about the rule. They can maintain transparency (as well as account for uncertainty) by including a range of estimates of the impact of a provision, including perhaps estimates that follow the methodology of the original RIA as well as those that make changes and update assumptions.

For example, as previously mentioned, the Trump administration rescinded the braking provision of the PHMSA tank car rule, originally passed under the Obama administration. When the Trump administration reassessed the costs and benefits of the provision, they changed the frequency used to define the high (major derailments) damage probability from the 95th percentile to the 50th percentile. Using some of their updated inputs and the original estimate of avoided damages from major derailments, we reached the opposite conclusion about the provision.

8. Conclusion

In this project, we analyzed the cost savings and forgone benefits of six Obama-era RIAs affecting the oil and gas sector that have been or could be targeted for repeal by the Trump administration. We used these analyses to rank the rules in terms of two different criteria: a cost savings criterion preferred by the Trump administration and a net benefits criterion that is at the heart of welfare economics. Even with our small sample, we clearly show that the rankings are vastly different. And using net benefits as the criterion for whether a rule should be repealed or not, we found that for five out of the six rules analyzed, the benefits forgone outweigh the cost savings, so society would be worse off without those five rules. Needless to say, using cost savings alone to prioritize rules for repeal (or even add up the consequences of a deregulatory agenda) is wrong according to economic theory and highly misleading.

In addition, through exploration of costs and benefits adjustments, we showed that conducting RIAs should be thought of more as a "soft test," as changing one input can dramatically change the conclusion about the net benefits of the rule (or repeal). We found that every rule in our study has at least one possible adjustment that makes it look favorable or unfavorable to repeal.

Doing an RIA is an extremely difficult task, and we commend the agencies for creating the transparent and replicable RIAs we analyzed in this study—a necessary step in estimating the costs and benefits of repeal. That said, we think that agencies could still improve their practices. In particular, we found that uncertainties (primarily in estimating benefits of a rule) need more thorough examination. Agencies often acknowledge uncertainty but ultimately choose to use only one value or an arbitrary range of values without greater exploration of the uncertainty. We employed breakeven analysis to examine the influence of uncertain parameters on outcomes and would recommend this practice be used more often. We also suggest incorporating more scenarios that explore a broader range of assumptions that better reflects the uncertainty in the estimates. Such recommendations follow years of similar entreaties in studies by the National Academies of Sciences, Engineering, and Medicine.[18] On a related note, uncertainties that plague RIAs will carry over when an agency starts looking at the cost savings and benefits forgone of repealing rules, so this recommendation can improve both types of RIAs.

Now that agencies are more seriously considering repealing regulations, we recommend that agencies formulate and publish guidelines designed to inform decisionmakers about the cost savings and benefits foregone of repeal. This will give RIA analysts, as well as stakeholders and the general public, a better understanding of what the full effects of repealing a rule will be. Two important

[18] See, for instance National Research Council (2008) and Institute of Medicine (2013)..

components of repeal RIAs are: what will be done about deregulatory provisions that are part of rules targeted for repeal? And how to assess the extent of compliance with the original rule in order to recognize important changes in the effect of repealing a rule—such as accounting for sunk costs and benefits.

We would also encourage agencies to consider modifications or selective repeal, rather than full repeal of a rule. We found instances where modifying (in particular, relaxing) a rule could increase net benefits (or, at the very least, maintain positive net benefits). This alternative could be preferable to repealing the rule altogether if certain provisions of the rule prove more net beneficial than others. In fact, the Trump administration did not do a full repeal for at least two of the rules we studied and has not yet addressed the PHMSA gas distribution rule.

Further, we find that repeal RIAs and modifications (as well as retrospective analyses) could all benefit from better data collection when tracking compliance and sunk costs and benefits. We had a great deal of difficulty obtaining information on compliance, and for the most part, we had to rely on the agency's expected compliance schedule. When assessing whether to repeal a rule, information about compliance is essential. If substantial compliance with a rule has occurred, it may not be worth it to repeal the rule, as costs cannot be recovered and thus saved after compliance has happened. We found one instance—rescinding the braking provision of the tank car rule—in which the Trump administration did not account for sunk costs and benefits when considering whether to repeal a provision. If railroads complied on the schedule PHMSA projected in its original RIA, railroads would have already committed a significant capital investment in tank cars prior to a rollback in the requirements. Thus, an evaluation of the sunk costs and benefits would be important to any re-evaluation of the benefits and costs of the braking provision.

Finally, agencies should evaluate more options in the RIA to support consideration of alternative regulatory strategies and a range of assumptions to better characterize uncertainties. Agencies should be required to justify their decisions on the record and present a full and transparent analysis to support their regulatory decisions.

Appendix: Catalog Summary

Objectives

The goal of this project was to catalog existing and very recently eliminated federal regulations affecting the development of oil and natural gas resources in the United States to better understand the impacts on the industry and the public if the regulations were lifted or modified. These impacts would include cost savings and forgone benefits and potential effects on oil and gas production, prices, and other factors.

This appendix presents a summary of our catalog of existing federal regulations promulgated after 2005 and relevant to the development and transportation of oil and gas resources. The purpose of the catalog is to document the most burdensome regulations. From this catalog, we selected the six rules to analyze in-depth. The catalog itself is available from the researchers upon request. In this summary, we want to provide an overview of the regulatory landscape in the oil and gas sector and how we categorized these rules, which led to our selections. Note we produced this catalog in September 2017 as we began our analysis. Thus, actions after September 2017 are not reflected in this appendix.

Methods

We have identified rules to list in the catalog through a variety of sources. All economically significant regulations (with costs or benefits exceeding $100 million annually, as defined by Executive Order 12866) are reported in the Office of Management and Budget's (OMB's) Annual Reports, the US Government Accountability Office (GAO) database of regulations,[19] and the database maintained by the American Action Forum.[20] These regulations are promulgated by federal departments, agencies, and commissions. We are also interested in non-economically significant regulations, to the extent industry has been critical of them.

We categorize regulations in a number of different ways. The first is sorting the regulations into three groups based on the scope of the regulatory effects. The first group, **direct**, identifies rules that directly affect oil and gas production up to the "refinery gate."[21] The second group, **indirect**, includes rules affecting the oil and gas industry beyond the refinery gate through to final demand, thus including Corporate Average Fuel Economy (CAFE) rules and rules on electric utilities. The third group, **multi-sectoral**, includes rules that affect the oil and gas industry along with other sectors. Finally, the report identifies non-regulatory federal activities, such as permitting, which industry has targeted as onerous and in need of reform.

We also sought to categorize regulations based on which were most important to review or repeal from the perspective of industry, which might thus make them a priority for regulatory review by the Trump administration. To learn about the industry's views of particular regulations (both economically significant and not), we combed industry and trade association websites, obtained comments from companies, searched public comments in the regulations' dockets,[22] and read comments submitted to agencies in the spring of 2017 in response to a call from the Trump administration for input on burdensome regulations. We focused on comments from the American Petroleum Institute (API), Independent Petroleum Association of America (IPAA), Interstate Natural Gas Association of America (INGAA), American Exploration & Production Council (AXPC), and Association of Oil Pipe Lines (AOPL). We noted when a regulation was mentioned in comments found in any of these sources under "Comment".

[19] GAO Federal Rules Database (http://www.gao.gov/legal/congressional-review-act/overview).

[20] American Action Forum's RegRodeo online tracking tool (https://regrodeo.com/).

[21] For natural gas, the report uses "refinery gate" to include mainline pipelines to the point of local distribution.

[22] Found on the eRulemaking Management Office's website (https://www.regulations.gov/).

The comments submitted to agencies include those sent to the Department of Commerce (DOC)[23] and the Environmental Protection Agency (EPA)[24] in the spring of 2017 as part of agency efforts to comply with President Trump's executive order, "Enforcing the Regulatory Reform Agenda."[25] These comments specifically include those submitted by API,[26,27] IPAA,[28,29] INGAA,[30] and AXPC.[31]

We considered a regulation "important" to industry if it was mentioned in the comments sent to agencies in spring 2017. We considered a regulation "less important" to industry if there were comments on the regulation found on association websites, in rule dockets, or elsewhere. While we do not assess the "importance" of non-regulatory items, they were almost entirely found in the spring 2017 comments to agencies and are therefore likely to be priority issues for industry.

Some regulations were included that were economically significant but we did not identify comments from the five industry associations listed above. But most regulations (particularly economically significant regulations) have comments submitted. In the catalog, we do not include non-economically significant regulations for which we did not find comments, as discussed above.

Some of the rules involve transfers of money from the federal government to outside entities or the reverse. While transfer payments are treated separately and not included in a benefit cost analysis (as per OMB Circular A-4, as such payments reflect a net zero impact), we discuss any issues qualitatively, as they have the potential to impact certain groups more than others. Royalty payments, for example, are considered transfer payments that have no net effect on the economy but increase costs for the oil and gas industry.

And lastly, as noted, we set an approximately ten-year window for gathering regulations (2006-2017).

Departments and Agencies

As for scope across the federal government, rules from the following departments and agencies were included:

- Department of Defense
  - Army Corps of Engineers
- Department of Homeland Security
  - Federal Emergency Management Agency
  - Transportation Security Administration
  - U.S. Coast Guard
  - U.S. Customs and Border Patrol
- Department of Interior
  - Bureau of Indian Affairs
  - Bureau of Land Management
  - Bureau of Ocean Energy Management
  - Bureau of Safety and Environmental Enforcement
  - National Park Service
  - Office of Natural Resources Revenue
  - U.S. Fish and Wildlife Service
- Department of Labor
  - Occupation Safety and Health Administration
- Department of Transportation
  - Federal Railroad Administration

[23] Impact of Federal Regulations on Domestic Manufacturing. https://www.regulations.gov/docket?D=DOC-2017-0001.

[24] Evaluation of Existing Regulations, Docket Number. https://www.regulations.gov/docket?D=EPA-HQ-OA-2017-0190.

[25] Presidential Executive Order on Enforcing the Regulatory Reform Agenda. https://www.whitehouse.gov/the-press-office/2017/02/24/presidential-executive-order-enforcing-regulatory-reform-agenda.

[26] API comments to EPA, May 15, 2017. https://www.regulations.gov/document?D=EPA-HQ-OA-2017-0190-52125.

[27] API comments to DOC, March 7, 2017. https://www.regulations.gov/document?D=DOC-2017-0001-0126.

[28] IPAA comments to EPA, May 15, 2017. http://www.ipaa.org/wp-content/uploads/2017/05/Comments-EPA-Evaluating-Existing-Regulations-05-15-2017.pdf.

[29] IPAA comments to DOC, March 31, 2017. https://www.regulations.gov/document?D=DOC-2017-0001-0086.

[30] INGAA comments to EPA, May 15, 2017. https://www.regulations.gov/document?D=EPA-HQ-OA-2017-0190-35025.

[31] AXPC comments to EPA, May 15, 2017. https://www.regulations.gov/document?D=EPA-HQ-OA-2017-0190-37900.

    - National Highway Traffic Safety Administration
    - Pipeline and Hazardous Materials Safety Administration
- Environmental Protection Agency
- Federal Energy Regulatory Commission
- Securities and Exchange Commission

Summary of Regulatory and Non-Regulatory Items in Catalog

In this section, we present counts of various regulatory and non-regulatory items in the catalog using the identifiers listed above.

Table A-1 provides counts of the status of regulations in our database. Overall, there are 136 total items in our catalog. We include 103 regulations (including four that lack RIN numbers), of which 81 are final and 22 are proposed or have another status. All final rules have dates that they go into effect. Delayed, Stayed, Withdrawn, and Repealed regulations generally do not have effective dates, save for the EPA's delayed accidental release prevention requirements. At the start of this analysis, BLM had given the Office of Management and Budget (OMB) notice of proposed rulemaking to delay its methane waste prevention rule until 2019,[32] but because the delay had not been finalized, we still include the rule's original effective date.

Note the big ramp up of rules in the last two years of the Obama administration. Later, twelve rules affecting the oil and gas sector were placed into the Congressional Review Act process, but only two were actually eliminated. One more rule, DOI's Federal Oil and Gas Valuation and Federal and Indian Coal Valuation Rule, was also repealed but through the rulemaking process.

[32] Waste Prevention, Production Subject to Royalties, and Resource Conservation; Delay and Suspension of Implementation Dates for Certain Requirements. https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201704&RIN=1004-AE54.

Table A-1. Status of Rules by Publication Year and Effective Year

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2019	Total
Published in Federal Register	2	2	4	4	8	2	9	5	3	21	36	7	N/A	103
Effective Date of Final Rules*	2	2	3	4	9	2	8	3	1	12	22	14	1	82
Publication Date of Proposed Rules	0	0	0	0	1	0	0	1	1	1	5	1	N/A	10
Publication Date of Delayed/Stayed/ Repealed/Withdrawn Rules	0	0	0	0	0	0	0	1	0	5	5	1	N/A	12
Publication Date of Rules Considered under CRA	0	0	0	0	0	0	0	0	0	3	8	1	N/A	12
Publication Date of Rules Repealed under CRA	0	0	0	0	0	0	0	0	0	0	2	0	N/A	2

**Sorted by year in which rules that are finalized and still in effect today went into effect, including rules delayed with a later effective date.*

Table A-2. Number of Rules by Department

Department	Regulation Counts	Finalized Regulation Counts*	Stayed, Delayed, Repealed, or Withdrawn
Homeland Security	5	3	1
Defense	1	1	0
Energy	2	2	0
Interior	28	22	5
Labor	4	2	0
Transportation**	20	15	1
Environmental Protection Agency**	46	40	4
Securities and Exchange Commission	1	0	1

**Does not include delayed, stayed, or withdrawn regulations.*
***Includes 4 regulations issued jointly by DOT and EPA, meaning the totals for these columns will be greater than the total number of regulations.*

Table A-2 provides counts of the departments/agencies issuing the rules in our database. They are dominated by the EPA with 46, Interior with 28 and Department of Transportation with 20. This same dominance applies to final rules. Rules that were stayed, delayed, or postponed are included in the last column. EPA, DOI, DOT, and SEC had regulations that were delayed, repealed, or stayed, and DHS had a regulation that was withdrawn. The remaining regulations were (at the completion of our) are proposed regulations.

Table A-3 classifies all 103 rules by their scope and by whether the rule is important to industry or less important (as defined above) in terms of changing or eliminating the rule or not mentioned by industry. Referring to Table 4, there are 51 economically significant rules and 48 non-economically significant rules. Twenty-four are important to industry, 68 are less important, and 11 are not mentioned by the five industry associations. In terms of scope, 37 are direct, 15 are indirect, with most of these being major, and 47 are multi-sectoral.

Table A-4 provides the same information for final rules only.

Table A-3. Economic Significance, Sector, and Importance to Industry

Category	Important to industry	Less important	Not mentioned	Total
Economically Significant	**14**	**31**	**6**	**51**
Direct	6	5	0	11
Indirect	3	8	2	13
Multi-sectoral	5	18	4	27
Non-economically significant*	**10**	**38**	**N/A**	**48**
Direct	5	21	N/A	26
Indirect	0	2	N/A	2
Multi-sectoral	5	15	N/A	20
Undetermined**	**0**	**4**	**0**	**3**
Total	**24**	**68**	**11**	**103**

**Nonsignificant or Other Significant under Executive Order 12866*
***Indicates this type of regulation is a Request for Information and did not contain regulatory action.*

Table A-4. Economic Significance, Sector, and Importance to Industry for Final Rules Only

Category	Important to industry	Less important	Not mentioned	Total
Economically Significant	**11**	**28**	**6**	**45**
Direct	5	4	0	9
Indirect	3	7	2	12
Multi-sectoral	3	17	4	24
Non-economically significant*	**8**	**26**	**N/A**	**34**
Direct	3	14	N/A	17
Indirect	0	2	N/A	2
Multi-sectoral	5	10	N/A	15
Undetermined**	**0**	**2**	**0**	**2**
Total	**19**	**53**	**9**	**81**

**Nonsignificant or Other Significant under Executive Order 12866*
***Indicates this type of regulation is a Request for Information and did not contain regulatory action.*

Turning to comments, all but six regulations in our catalog had comments, as shown in Table A-5 below. Information on the regulations with comments, with comments submitted to agencies in the spring of 2017, and without comments is below. Notably, none of the regulations without comments affected the oil and gas industry directly. It is important to re-emphasize that we included the spring 2017 comments in the broader comments category, so there is some overlap with those first two categories.

When selecting rules for analysis from our catalog, we prioritized economically significant rules and rules considered important by industry, as shown in Table A-6. In addition, we wanted to focus on rules that directly affect the industry but also included one rule with a multi-sectoral scope to ensure we included a balanced mix of agencies.

Table A-5. Comments on Regulations

Category	Direct	Indirect	Multi-Sectoral	CRA Considered	Midnight Regulation *	Final	Stayed	Total
Regulations with Comments	39	14	44	12	13	75	2	97
Regulations with Spring Agency Comments	11	3	10	3	5	19	1	24
Regulations without Comment	0	2	4	0	0	6	0	6

**Midnight Regulation: issued in the lame duck period of the Obama administration (November 9, 2016 through January 20, 2017)*

Table A-6. Rules Selected for In-Depth Analysis of Repeal

Rule	Agency	Year Published	Economic Significance	Scope	Importance to Industry
Waste Prevention, Production Subject to Royalties, and Resource Conservation	BLM	2016	Economically Significant	Direct	Important
Oil and Natural Gas Sector: Emissions Standards for New, Reconstructed, and Modified Sources	EPA	2016	Economically Significant	Direct	Important
Oil and Gas and Sulfur Operations in the Outer Continental Shelf-Blowout Preventer Systems and Well Control	BSEE	2016	Economically Significant	Direct	Important
Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains	PHMSA	2015	Economically Significant	Multi-Sectoral	Important
Oil and Gas and Sulfur Operations on the Outer Continental Shelf-Requirements for Exploratory Drilling on the Arctic Outer Continental Shelf	BSEE & BOEM	2016	Economically Significant	Direct	Important
Pipeline Safety: Integrity Management Program for Gas Distribution Pipelines	PHMSA	2009	Economically Significant	Direct	Important

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