

## Fracking's Most Wanted:

### Lifting the Veil on Oil and Gas Company Spills and Violations

*"Sunlight is said to be the best of disinfectants."*

U.S. Supreme Court Justice Louis D. Brandeis



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## INTRODUCTION

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**H**ydraulic fracturing, also known as fracking, is an intensive industrial process used to extract oil and gas, and typically involves millions of gallons of water mixed with dangerous chemicals. The result: toxic waste, air pollution, thousands of truck trips, excessive noise and other impacts to humans and wildlife.<sup>1</sup> Too often, this dirty industrial process is—literally—in the backyards of families across America.

Communities want to know whether a company interested in fracking in their neighborhoods is a good corporate citizen that abides by the rules established to protect public health and safety, the environment, and quality of life. A credible measure of a company's compliance lies in the documented violations incurred from state or federal regulatory agencies. Public access to this information is particularly important in this context because, unlike other industries, oil and gas wells and associated infrastructure and equipment are widespread and often operate in the middle of residential, rural, and agricultural areas.

Sadly, in most of the United States, neither state nor federal agencies are providing information on violations in a transparent, easily accessible, or comprehensive way.

Corporations aren't providing this information either. The Global Reporting Initiative (GRI)—an international nonprofit organization governed by stakeholders from industry, government, labor, and non-governmental organizations—promotes sustainability reporting to measure impacts and performance. GRI guidelines recommend that oil and gas companies publicly report significant fines and the total number of non-monetary sanctions for noncompliance with laws and regulations. According to GRI, public disclosure of violations and sanctions “helps indicate the ability of management to ensure that operations conform to certain performance parameters.”<sup>2</sup>

Nevertheless, “hardly any companies are doing such reporting,” according to Richard Liroff of the Investor Environmental Health Network, a collaborative partnership of investment managers. Liroff states: “Reporting on violations provides an important quantitative indicator of how well companies are managing environmental risks.”<sup>3</sup>

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## SUMMARY

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NRDC and the FracTracker Alliance (FTA) launched an investigation to determine what information about oil and gas company violations is publicly available, how accessible it is, and whether it provides an adequate understanding about the practices of different companies. We looked at whether information could easily be found on the internet, rather than having to make official requests for information in writing.

We found that information about the frequency and nature of oil and gas company violations is only publically accessible in three states. Although 36 states have active oil and gas development, most state and federal oil and gas regulatory agencies publish little or no information regarding oil and gas companies' compliance records.

Yet in states where data are available, we found significant violations both in number and severity. These violations include a wide range of dangerous infractions like improper well casing, illegal air pollution, failure to conduct safety tests, improper construction or maintenance of waste pits, various spills, contamination of drinking water sources or other water bodies, and non-functional blow-out preventers.

We began by looking at the 36 states with active oil and gas wells (see Appendix A) and examined whether:

- information is available online,
- information is in an easy-to-use and downloadable format,
- incident dates and location data are included,
- there is a comment or text description of the violation,
- the operator name is included, and
- the violated regulation or code is cited.

Easily accessible public violation data is only available in Colorado, Pennsylvania, and West Virginia. Not one state, however, grants public access to the basic set of data parameters that we identified as essential.

There are thousands of oil and gas companies in the United States. We searched the public data from Colorado, Pennsylvania, and West Virginia for records associated with 68 of the largest oil and gas companies operating in the country, based on publicly-available data regarding the amount of acreage leased by each company (see Appendix B). At the end of 2011, these 68 companies held leases covering at least 141 million net acres—more than 6 percent of the country and approximately the size of California and Florida combined.<sup>4</sup>

To capture recent patterns, we analyzed thousands of violations of state law between 2009 and 2013 in Colorado, Pennsylvania, and West Virginia. We also identified companies with especially poor compliance records. At the conclusion of this paper, we identify policy solutions to increase transparency and provide essential information to local officials, regulators, and concerned citizens.

Regulators don't automatically inform local officials or the public when a company violates the law. In most cases, states don't even notify the landowner when a violation has occurred on their property, or neighboring landowners when a violation that could affect their property has occurred. Likewise, hardly any companies publish information about their compliance track record. Perhaps most alarming: many violations are not recorded at all, either because regulators are unaware or they simply choose not to document them.

States need new policies and regulations to ensure that the public can easily find information on violations, and that illegal acts are recorded. Policies should ensure that regulators: (1) disclose essential information to the public, (2) hold violators accountable, and (3) keep repeat offenders out of communities. States need robust compliance programs with sufficient resources, as well as strong enforcement practices, in order to vigorously identify and document all violations.

Violations don't include acts that are currently legal due to weak laws or special loopholes for the oil and gas industry. Loopholes in our federal environmental laws<sup>5</sup> need to be closed and both state and federal environmental laws need to be strengthened to protect public health and the environment.

# FINDINGS

## LIMITED DATA ARE AVAILABLE TO THE PUBLIC

Of the 36 states with oil and gas development, most make basic well location data available on agency websites, as a matter of public disclosure.<sup>6</sup> But data on the compliance records of the companies operating these wells and state-issued violation notices are rare.

Even in the three states that provide some data to the public—Colorado, Pennsylvania, and West Virginia—the information available and its type and format varies widely. The type of violations—and the consequences—are not always clear. For example, in Pennsylvania, one frequently cited violation is filling toxic waste pits too close to the top. However, there is no easily searchable indication of whether or not pit contents actually overflowed the edge; one would have to check whether a field inspector made notes to that effect.

Some states, like Colorado, don't provide any searchable data. On the other hand, those that do, like Pennsylvania and West Virginia, often have numerous violations in general categories that are overly vague. West Virginia's violations database includes the legal code and explanatory comments. These comments, however, contain limited details and many records have none at all.

A recent investigation by the Pennsylvania Auditor General found that the Pennsylvania database contains “vast discrepancies between the field reports of the incidents and the electronic accounting of them.” The investigation found that the Pennsylvania database doesn't include all state violation codes. Therefore, inspectors sometimes neglect to enter violations or use the wrong code, leading to problematic information on hundreds of violations. The inquiry also found that inspectors recorded violations inconsistently. In addition, the Pennsylvania Auditor General found that in many cases the state failed to issue an administrative order when companies adversely impacted water supplies if the company offered a settlement agreement to the affected parties.<sup>7</sup>

On the other hand, Pennsylvania and Colorado deserve recognition for including complaints and inspection reports along with violation notices. West Virginia and Colorado both have separate datasets for spills. Pennsylvania has narrative descriptions that allow more comprehensive analysis of statewide data.

Pennsylvania lists all rule violations separately, whereas Colorado wraps multiple violations into a single Notice of Alleged Violation. This is likely one reason Pennsylvania has so many more violations on file than Colorado. Because data in these three states vary dramatically, comparison or aggregation of specific types of violations across states is not possible nor is it possible to account for differences among the numbers of violations in each state.

## CHART: COMPARING STATE VIOLATION DATABASES

Chart 1 illustrates key aspects of Colorado, Pennsylvania, and West Virginia's data

Database criteria	Colorado	Pennsylvania	West Virginia
Easy-to-use, downloadable format	N	Y	Y
Incident date included on report	Y	Y	Y
Location data (latitude, longitude) included on report	N	N	N
Comment or text description of violation included on report	N	Y	Y
Relevant violation code or regulation cited on report	N	Y	Y

### Some states have multiple databases

In some states, only one agency issues violations to the oil and gas industry, while in others, a citizen interested in finding violation data would have to search multiple databases. For example, Colorado has an oil and gas conservation commission and an environmental protection agency, which are each authorized to issue violations under their respective jurisdiction.

When it comes to health-related violations, a recent analysis of how states respond to and track oil-and-gas-related public health complaints found that health complaints in Colorado can be made to either the oil and gas agency or the health agency.<sup>8</sup> The Pennsylvania Department of Health logs health complaints to the agency related to oil and gas development.<sup>9</sup> West Virginia, however, doesn't track health complaints related to oil and gas activities.<sup>10</sup>

Some states have separate databases depending on the type of incident. West Virginia and Colorado both maintain spill databases separate from violations data. Other states incorporate spills into the violation data. West Virginia's spill database names the stream impacted but does not quantify the extent of contamination or potential groundwater impacts. Colorado, on the other hand, reports whether groundwater or surface water has been impacted, distance to drinking water wells or wetlands, and the depth to the groundwater table. It does not, however, identify the water body or the actual impact.<sup>11</sup>

## Not all illegal acts are written up as violations

Even states that publish their violations data are not necessarily fully reflecting all illegal actions. According to Earthworks, “statistics on violations are not a reliable indicator of noncompliance because not all operators who break the rules are issued violations. For example, in Colorado, even though some inspections are ‘unsatisfactory,’ specific violations of rules may not be recorded.”<sup>12</sup>

If the Colorado Oil and Gas Conservation Commission believes an oil and gas operator has violated a state rule or law, the process begins with a Notice of Alleged Violation (NOAV). Between 2009 and 2013, 2,369 spills were recorded in Colorado, but only a total of 1,022 NOAVs were issued—for spills and all other legal infractions. Since more wells are listed as having spills than are listed with violations, many spills are not considered violations by the state regulators despite the fact that any spill clearly qualifies as a violation under Colorado law.

In West Virginia, it has been reported that environmental regulators prefer to offer “compliance assistance”<sup>13</sup> instead of enforcement, thus avoiding issuing violation notices.

In Pennsylvania, the Department of Environmental Protection (PADEP) does not issue a violation notice, fine, or formal determination for water contamination if the company has taken voluntary action to restore or replace the water supply or reached a private legal settlement with water well owners.<sup>14</sup> The PADEP only recently began making information on these incidents available to the public. Prior to 2014, the public had no way of knowing about all water contamination incidents.<sup>15</sup>

Between 2008 and early 2014, Pennsylvania state regulators found 248 incidents where oil and gas companies damaged private water supplies.<sup>16</sup> According to state records, hundreds of other water complaints have undetermined or not yet determined causes. These cases were uncovered only through investigative file reviews and Right-to-Know requests, and were not reflected in Pennsylvania’s public database of violations.<sup>17</sup>

In some states, violation categories are non-intuitive or misleading. For example, Pennsylvania classifies violations as either ‘administrative’ or ‘environmental health and safety.’ While common sense suggests the latter category would be more egregious, the most serious infractions (e.g. improperly lined pits or improper casing to protect fresh groundwater) are often categorized as ‘administrative’ for reasons not made clear to the public.

## Not all illegal acts are detected

It is virtually certain that some violations are never detected due to inadequate enforcement resources. These violations remain unknown to regulators and the public. It has been well documented that state and federal regulators do not have the resources to conduct all necessary inspections. For example, Colorado has less than 40 inspection staff for 52,198 active wells—that’s more than 1,000 wells per inspector.<sup>18</sup> As recently as 2013, a nationwide investigation found that “the

ratio of wells to inspectors remains extremely high” and that in 2011, West Virginia had 20 enforcement staff for 56,814 wells.<sup>19</sup>

Another recent investigation found that many spills at Marcellus Shale well sites in Pennsylvania—which ultimately resulted in fines—were reported by local residents. Oil and gas companies on site either ignored these spills or were unaware of them. While inspectors identified some of the spills, there was not enough oversight by companies or inspectors to ensure that these violations were detected by the responsible parties.<sup>20</sup>

## State enforcement is much too weak

Our investigation found that states too often allow companies to continue to operate even after regulators identify a serious pattern of noncompliance.

For example, Maralex Resources was issued a NOAV for failing to comply with a Colorado requirement to test the structural integrity of at least ten wells. Maralex Resources also had small gas leaks in at least 20 wells and well pads with failed reclamation. Yet, Colorado allowed the company to continue to operate despite these numerous citations.<sup>21</sup>

In 2012, Colorado assessed a total of only \$287,600 statewide in fines for oil and gas violations by all companies.<sup>22</sup> These costs are miniscule compared to the millions of dollars it costs to drill a single unconventional well<sup>23</sup> and the potential profit of tens of millions of dollars per well,<sup>24</sup> and are not economically meaningful incentives for compliance.

In another example of the lack of consequences for noncompliance, Pennsylvania did not issue a cease and desist order to U.S. Energy Development Corporation until after the company had violated the law 302 times over the course of two years. Even after the order was issued, the company was able continue to operate existing wells.<sup>25</sup> Texas may be more aggressive in this aspect, since the Texas Railroad Commission maintains a list of more than 3,000 companies banned from operating in the state.<sup>26</sup>

## Other states

As part of our research, we examined some of the states that do not publish their data via the internet. In Arkansas and Ohio, information must be requested from the state, data are compiled in an Access database—an uncommon format, and relevant data are scattered throughout various tables and queries. In Ohio, citizens are required to submit a formal request for inspection and violation records for specific operators. Arkansas does not include a description of violations, but merely cites the legal code provision that was violated, and violation documents do not include the name of the responsible operator.

In Texas and North Dakota, citizens must pay for access to data and the data are extremely cumbersome to analyze and may not capture all violation issues.<sup>27</sup> While North Dakota has a website that provides volumes of material released during incidents, the site does not incorporate other important information such as complaints and notices of violation.



## Federal Violations

Federal agencies, including the U.S. Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the Bureau of Land Management (BLM), and the U.S. Forest Service, all oversee various aspects of oil and gas development. Yet information on federal violations is difficult for the public to obtain.

In 2011, the Department of the Interior provided the Natural Resources Committee of the U.S. House of Representatives with information on drilling violations that had occurred on federal lands from 1998 to 2011.<sup>28</sup> This information is not generally available to the public. There were 2,025 safety and drilling violations issued to 335 companies, with fines totaling \$273,875. No post-2011 information is available to the public on a website.

The EPA has an online inspection and violation tracking system called Enforcement and Compliance History Online (ECHO).<sup>29</sup> Here, the public can search federal environmental violations in any industry, including oil and gas extraction, but they must know the Standard Industrial Classification (SIC) code for the industry of interest. Unfortunately, ECHO does not provide information about all federal violations, nor does it provide all information about federal violations that it does include. For example, we selected several incidents at random and found important information such as dates or operator identification missing. The EPA did not reply to our inquiries about these issues. The EPA regions also post some violation documents online, but not on one central, easily accessible website. Each of the ten EPA regions posts its own violations by division, requiring the public to search multiple websites for information.

The federal government also has an important role in ensuring safe working conditions for oil and gas workers. According to its records, OSHA conducted 2,074 inspections for oil and gas extraction activities from 2009 to 2013, an average of about 415 per year in a country with about 1.1 million oil and gas wells.<sup>30</sup> Unfortunately, OSHA does not make data regarding violations easily available in a downloadable format. OSHA provides a graph of fatal occupational injuries in the private sector oil and gas extraction industry from 2003 to 2012, but the data are aggregated and there is no specific information, such as location or type of incident.<sup>31</sup>

## WHO OWNS THE NATION'S OIL AND GAS WELLS?

The oil and gas industry is made up of many players. Colorado has a staggering 3,485 operators—125 of which operate more than 100 wells each. For this report, we looked at 68 of the largest oil and gas companies operating in the United States, based on public information on the acreage leased by each company. We also included acreage leased by a company's known subsidiaries. At the end of 2011, these 68 companies held leases covering at least 141 million acres of American land—that's approximately the size of California and Florida combined.<sup>32</sup>

Turnover of oil and gas well ownership can be very high. New companies are constantly formed, while others go out of business, merge, form joint ventures, or sell their regional interest to a competitor. Therefore, many operators are legally responsible for wells that they own but did not drill. The record of violations associated with these wells usually remains with the operator that received the violation and is considered the responsible party. Therefore, an operator that acquires a large amount of wells from another operator with a cleaner track record will lower its ratio of violations per well (VpW). Conversely, some operators may increase their VpW if they sell many wells.

## METHODS

We examined the total number of wells operated by each of the 68 companies and associated subsidiaries in Colorado, Pennsylvania, and West Virginia, regardless of the year drilled, to show the full scale of activity. Then, to capture recent patterns of violations, we analyzed spills and violations, (or alleged violations in Colorado) that occurred between 2009 and 2013. This captures key years of the unconventional oil and gas boom that has been enabled by advanced fracking techniques.

Because the number of wells per operator can vary widely, we considered the VpW for each company. While that analysis may sound relatively straightforward, there are several caveats with the data. First, since violations were only tracked for five years—but operators own many wells that were drilled prior to 2009—the VpW are much smaller than they would be if we calculated violations only for wells drilled from 2009 to 2013. Second, differing oil and gas laws and enforcement practices result in significantly different VpW scores from state to state. The ratio for a given operator may vary due to state laws, level of enforcement activity, and/or enforcement practices. Lower VpW could be due to either more or less effective enforcement in any given state. In addition to VpW, we also calculated Spills per Well (SpW) in Colorado and West Virginia, the two states in our three-state analysis that have separate spill databases.

## RESULTS FOR 68 COMPANIES: 2009–2013

State	Total violations	Most violations per company	Total spills	Most spills per company	Highest Violation per Well ratio	Highest Spill per Well ratio
Colorado	235	53	1,933	358	0.07	0.16
Pennsylvania	3,978	589	unavailable	unavailable	7.70	unavailable <sup>33</sup>
West Virginia	364	92	4	2	2.25	0.04

### Colorado: Top Five Violators from 2009-2013

Company	Number of violations	Number of wells
Chevron	53	1,426
WPX	25	5,560
Noble	19	10,704
Encana	17	6,815
Pioneer	16	2,561

### Pennsylvania: Top Five Violators from 2009-2013

Company	Number of violations	Number of wells
Chesapeake	589	2,618
Cabot	494	1,108
Talisman	362	963
Range Resources	281	7,088
EXCO	241	5,014

### West Virginia: Top Five Violators from 2009-2013

Company	Number of violations	Number of wells
EQT	92	502
Chesapeake	80	371
Cabot	71	92
Antero	38	234
CNX	37	578

Pennsylvania issued the most violations between 2009 and 2013, with one company responsible for 589, almost 15 percent of all violations issued. Another 14 companies were issued more than 100 violations during this time period. There is a huge disparity between the number of violations issued in Pennsylvania and other states, but we cannot be sure as to the explanation—perhaps a combination of different levels of inspection and enforcement, procedures, format of public data, or number of wells. For example, Pennsylvania lists all violations separately with distinct violation numbers, while Colorado wraps multiple violations into a single Notice of Alleged Violation with one identification number. Also, more inspections typically lead to more violations.

Even though Pennsylvania's numbers look high in comparison to other states, many Pennsylvania citizens still report that their complaints are ignored by regulators. We do not, therefore, believe Pennsylvania's numbers capture all illegal activities.

## FRACKING'S TEN MOST WANTED

### Top 10 Violators

Across Colorado, Pennsylvania, and West Virginia, these companies had the most violations overall.

1. Chesapeake Energy
2. Cabot Oil and Gas
3. Talisman Energy
4. Range Resources
5. EXCO Resources
6. ExxonMobil
7. EQT Corporation
8. Anadarko Petroleum Corporation
9. Shell
10. Penn Virginia Corporation

### Top Violators by State<sup>34</sup>

#### Colorado

Most alleged violations: Chevron

Most spills: Noble Energy

Most alleged violations and spills per well: Antero Resources

#### Pennsylvania

Most violations: Chesapeake Energy

Most violations per well: Penn Virginia Corporation

#### West Virginia

Most violations: EQT Corporation

Most violations per well: Penn Virginia Corporation

Most spills: EXCO Resources

Most spills per well: EXCO Resources

#### Federal public lands

Most violations: WPX Energy

### **Chevron: Most alleged violations in Colorado: 53**

Chevron was issued 53 alleged violations in Colorado between 2009 and 2013, more than any other operator.

Between 2009 and 2013, Chevron received 53 NOAVs<sup>35</sup> pertaining to the safety of underground injection wells.<sup>36</sup> Injection wells are used to dispose of wastewater, including fracking fluids and naturally occurring produced water from underground, and sometimes to increase pressure in an underground formation to improve production. Federal law requires safeguards that prevent injection wells from contaminating underground drinking water sources. The most common way to demonstrate that an injection well is not endangering underground drinking water is a mechanical integrity test. Chevron's injection well violations include many failed mechanical integrity tests. In some instances, Chevron did not conduct the tests within the required timeframe.

### **Noble Energy: Most spills in Colorado: 358**

Noble Energy caused 358 spills in Colorado between 2009 and 2013—more than any other operator.

The Colorado Oil and Gas Conservation Commission issued only 19 NOAVS to Noble Energy from 2009 to 2013. However, the Commission's database includes records for 358 spills by Noble Energy in the same time period. Of those 358 incidents, 89 impacted groundwater and 11 impacted surface water. Only 78 incident reports detailed the surface area of the spills, making it difficult to determine relative severity.<sup>37</sup> Even so, in 2011, Noble Energy received the Colorado Oil & Gas Conservation Commission's Outstanding Operator Award for environmental protection.<sup>38</sup> Most recently, Noble was responsible for a spill of more than 7,000 gallons of crude oil into the Cache la Poudre River. Regulators stated that the spill did not affect drinking water, but the oil spill was visible as far as a quarter of a mile away from the source.<sup>39</sup>

### **Antero Resources: Most violations and spills per well in Colorado**

Antero was issued .07 violations per well in Colorado between 2009 and 2013, more than any other operator in our study. During the same period, Antero also was responsible for the most spills per well in Colorado, 0.16.

In 2010, a Colorado business owner observed a paraffin-like material with a strong condensate odor in water seeping from a gravel pit. A pipeline carrying oil and gas wastewater water from 36 wells on five well pads in the Colorado River floodplain had leaked, contaminating groundwater. The owner reported that he used the water for a year after the pipeline was installed. It is unknown when the leak started. Water sampling revealed high levels of benzene, a known carcinogen, as well as toluene and total xylenes in monitoring wells. Antero was fined \$150,000.<sup>40</sup> The business owner used

water from the pit for crop irrigation and sometimes disposed of it in the Colorado River.

In 2011, Antero was responsible for a wastewater spill at a site that—although required to implement best management practices to contain any unintentional release of fluids—did not have adequate controls in place. The spill was not reported for more than 24 hours. In 2009, a wastewater spill flowed into a tributary of Dry Creek, which is within the External Buffer Zone of the City of Rifle's Public Water Supply. It took almost a month for Antero to notify regulators.<sup>41</sup>

### **Chesapeake Energy: Most violations in Pennsylvania: 589**

Chesapeake was issued 589 violations in Pennsylvania between 2009 and 2013, more than any other operator in our study.

Chesapeake Energy operates across the country and is one of the top companies in the United States in terms of acres leased. In 2010, PADEP found that Chesapeake neglected to properly case and cement gas wells and, therefore, allowed natural gas to leak into and contaminate the underground drinking water for 16 local families. In February 2011, three tanks on a drill site in Avella, Pennsylvania caught fire and injured three subcontractors due to improper management by Chesapeake of condensate, a natural gas liquid. The two violations led the PADEP to fine Chesapeake more than \$1 million.<sup>42</sup> In 2011, Chesapeake violated Pennsylvania's requirement for erosion and sediment control to prevent water pollution 35 times—more than any other company in the state.<sup>43</sup>

### **Penn Virginia Corporation: Most violations per well in Pennsylvania and West Virginia**

Penn Virginia received 177 violations in Pennsylvania between 2009 and 2013. The company only operates 23 wells in the state, resulting in a staggering 7.7 violations per well. Similarly, the company was cited with nine violations in West Virginia, where it currently operates only 4 wells, resulting in 2.25 violations per well. In 2012, Penn Virginia sold most of its holdings in the Appalachian Basin,<sup>44</sup> which might explain these egregious ratios. As mentioned earlier, the record of violations remains with the operator that originally receives the violation, so the VpW increases as operators sell wells.

Penn Virginia's violations include nine violations at one well alone, including improper cementing of casing around the well, failure to report the problem or submit plans to ameliorate it, and an improperly lined pit.<sup>45</sup> One of Penn Virginia's horizontally fracked wells in Potter County, Pennsylvania received five violations, including: poorly constructed pit and tanks; failure to adopt required pollution prevention measures; and "failure to properly store, transport, process or dispose of residual waste."<sup>46</sup> At another site, Penn Virginia was cited for failure to promptly report



that it had received notice that a water supply had been affected by its oil and gas activities, and for failure to restore or replace an impacted water supply.<sup>47</sup>

### **EQT Corporation: Most violations in West Virginia: 92**

EQT was issued 92 violations in West Virginia between 2009 and 2013, more than any other operator.

In 2009, EQT was found responsible for spilling 50 gallons of crude oil and drip gas into West Virginia's West Fork stream.<sup>48</sup> In 2010 and 2011, two spills occurred at another EQT wellpad in West Virginia within eight months, both times spilling onto a neighbor's farm.<sup>49</sup> One spill was about 1,700 gallons of fracking fluid. The volume of the other spill was not documented. According to the West Virginia Department of Environmental Protection's database, EQT's violations include water pollution, working without permits, and failure to properly construct pads to prevent leakage. Explosions on EQT sites have also killed or severely injured workers.<sup>50</sup>

### **EXCO: Most spills and spills per well in West Virginia**

During the five-year period from 2009-2013, there were only four spills recorded in the West Virginia database for the 68 companies in our investigation—25 of which were operating wells in West Virginia during that period. EXCO Resources, with two of those spills and eight wells, had the most spills and most spills per well in the state. In 2009 there was a spill of 840 gallons of wastewater in Kanawha County.<sup>51</sup> Unfortunately we could find no additional information about this spill. Since we are aware of other spills in West Virginia by the companies on our list during this time period, such as a 2011 spill in Harrison County by Antero<sup>52</sup> and two spills by EQT in 2011 in Taylor County,<sup>53</sup> it seems that the database is not capturing all spills in the state.

### **WPX Energy: Most violations on federal lands: 98**

WPX's predecessor Williams was issued 98 violations per well on federal lands between 1998 and 2011, more than any other operator.

An investigation of spills in the top 15 oil and gas states in 2013 found that the largest spill was 2.8 million gallons of produced water at a WPX site.<sup>54</sup> The spill was on public land in Wyoming's Powder River Basin, an area already severely damaged by oil and gas production as well as coal mining. Despite extensive research, we could find no other public information about this spill. In a 2010 incident, fracking flowback was spilled at a Williams site in Colorado. Almost 6,000 gallons of wastewater spilled, and more than half of that made its way to Cottonwood Gulch, which flows into the Colorado River. Wastewater flowed into the river for a few hours before it was discovered. Fortunately, enforcement officials concluded that the contamination level in Cottonwood Gulch and the Colorado River was too low to violate any regulatory standards.<sup>55</sup>

## **Lessons from the coal mines**

The Surface Mining Control and Reclamation Act (SMCRA) governs surface coal mining operations and the reclamation of abandoned mines. Though it is not fully and effectively enforced,<sup>56</sup> this law still provides some useful models for enforcement of oil and gas regulations. These regulatory tools can reduce the environmental and health risks from coal mines and should also be applied to the oil and gas industry.<sup>57</sup> These regulatory tools can reduce the environmental and health risks from coal mines and should also be applied to the oil and gas industry:

Inspectors are required to take enforcement action when a violation is detected. If a violation is not abated within the timeframe established by an inspector, the inspector must issue a cessation order and impose requirements to remedy the violation.

Inspectors are vested with full legal authority to shut down mining operations when violations pose an imminent threat to the public or a significant, imminent threat to the environment.

Corporate officers or agents may be assessed civil penalties or be prosecuted for willfully and knowingly failing to halt violations of the law.

The federal government maintains a computer database of outstanding violations, and cannot issue a permit for any operation owned or controlled by any person, corporation, or other entity with outstanding violations.

Citizens can ask the government to check the violations database for information about individual operators.

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## POLICY SOLUTIONS

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There are straightforward mechanisms to increase public information on oil and gas violations to improve environmental performance and safety. These approaches should be adopted by state and federal regulators to help protect public health and the environment, increase transparency, improve accountability, and provide essential information to the public and decision-makers.

Centralizing data on oil and gas enforcement activities would allow the public to identify recurring problems and repeat offenders, understand how enforcement is being conducted, and determine whether complaints and incidents are being effectively addressed.<sup>58</sup>

Public access to this information is particularly important in the oil and gas context because, unlike other industries, oil and gas wells and associated infrastructure and equipment are numerous, distributed over a large geographic area, and often operate in the middle of residential areas. Indeed, residents may even be forced to accept a wellpad or waste storage site within a few hundred feet of their home where state or local regulation is loose or where drilling occurs on a “split estate.”<sup>59</sup>

With oil and gas activities occurring in residential areas, it is essential that the public have access to enforcement information to hold companies and regulators accountable.

In addition, oil and gas operations are exempt from critical federal environmental protections.<sup>60</sup> For all of these reasons, the oil and gas industry has a unique potential to negatively impact public health, private property, and quality of life—all without the community’s permission and often without advance notice to the community. Policy solutions are, therefore, needed to protect the environment and deter future violations by oil and gas companies. State and federal oil and gas regulators must use their full authority to ensure that communities are provided with information about the companies operating in their midst, problems are quickly remediated, and companies are held accountable.

### POLICY RECOMMENDATIONS FOR STATE AND FEDERAL REGULATORS

#### I. Disclose essential information to the public

- Collect and centralize data on all oil and gas enforcement activities, including citizen complaints, inspections, violation notices, and penalties issued, and incidents, including spills, leaks, blowouts, and worker injuries.
- Make all information easily accessible on a public, searchable website, managed by government, in real time.

- Make it easy for citizens to sign up for instant notification of any incidents reported in their community using a variety of methods (email, text messaging, voicemail, postal mail),<sup>61</sup> track complaints and subsequent enforcement actions taken in response, and obtain the aggregate data needed for public health and environmental research and analysis.
- Require companies to notify landowners, tenants, nearby residents and businesses, and local officials when incidents occur on or near their property or water sources.
- Maintain a 24-hour, toll-free hotline to allow citizens and workers to report problems, make complaints, and track their status—anononymously if they prefer.
- Ensure that workers have whistleblower protections.

#### II. Hold violators accountable

- Ensure strong and consistent enforcement by eliminating the authority of inspectors and other enforcement staff to reduce penalties or decline to issue notices of violation at their personal discretion.
- Set a clear penalty structure with minimum, mandated fines and an escalating penalty structure that increases consequences based on the significance and pattern of noncompliance. If there are maximum allowable penalties, they must be greater than the cost of compliance to deter violations.
- Ensure robust and ample inspection and enforcement capacity.

#### III. Keep repeat offenders out of communities

- Automatically reject permit applications and federal lease offers from companies with a pattern of noncompliance. Under current law, the Bureau of Land Management must deny leases to any operator out of compliance with reclamation requirements, but it is not mandatory for other types of violations.<sup>62</sup>
- Institute non-discretionary standards for shutting down companies.
- Require any company submitting a bid or request for a lease, easement, right-of-way, or permit to certify that it is currently in compliance with all safety and environmental requirements and that it has met all obligations for any prior violations. This certification must cover all operations within the regulator’s jurisdiction. Companies who provide false certifications should be prosecuted.

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## APPENDIX A: STATES WITH ACTIVE OIL AND GAS WELLS

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1. Alabama	10. Indiana	19. Nebraska	28. Pennsylvania
2. Alaska	11. Kansas	20. Nevada	29. South Dakota
3. Arizona	12. Kentucky	21. New Mexico	30. Tennessee
4. Arkansas	13. Louisiana	22. New York	31. Texas
5. California	14. Maryland	23. North Carolina	32. Utah
6. Colorado	15. Michigan	24. North Dakota	33. Virginia
7. Florida	16. Mississippi	25. Ohio	34. Washington
8. Idaho	17. Missouri	26. Oklahoma	35. West Virginia
9. Illinois	18. Montana	27. Oregon	36. Wyoming

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## APPENDIX B: COMPANIES INCLUDED IN THE ANALYSIS

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1. Anadarko Petroleum Corporation	18. ConocoPhillips	37. Husky Energy	51. Quicksilver Resources
2. Antero Resources	19. Contango Oil and Gas	38. Laredo Petroleum	52. Range Resources
3. Apache Corporation	20. Continental Resources	39. Linn Energy	53. Reliance Industries Limited
4. Approach Resources	21. Delta Petroleum	40. Marathon Oil Corporation	54. Rosetta Resources
5. Berry Petroleum Company	22. Denbury Resources	41. MDU Resources Group	55. Sandridge Energy
6. BHP Billiton	23. Devon Energy	42. Murphy Oil Corporation	56. Shell
7. Bill Barrett Corporation	24. DTE Energy	43. Newfield Exploration Company	57. SM Energy Company
8. Breitburn Energy Partners	25. El Paso Energy	44. Noble Energy	58. Southwestern Energy
9. Cabot Oil and Gas	26. Encana Corporation	45. Occidental Petroleum Corporation	59. Statoil
10. Carrizo Oil and Gas	27. Energen Corporation	46. Penn Virginia Corporation	60. Stone Energy Corporation
11. Chesapeake Energy	28. EOG Resources	47. Petroleum Development Corporation	61. Swift Energy Company
12. Chevron	29. EQT Corporation	48. Pioneer Natural Resources	62. Talisman Energy
13. Cimarex Energy	30. EXCO Resources	49. Plains Exploration and Production	63. Ultra Petroleum
14. Clayton Williams Energy	31. ExxonMobil	50. Questar Corporation	64. Unit Corporation
15. CNOOC (China National Offshore Oil Corporation)	32. Forest Oil		65. Vaalco Energy
16. CNX Gas/CONSOL Energy	33. GMX Resources		66. Venoco
17. Comstock Resources	34. Goodrich Petroleum Corporation		67. Whiting Petroleum
	35. Hess Corporation		68. WPX Energy
	36. Highmount Exploration and Production		

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## APPENDIX C: SOURCES OF DATA

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### **PENNSYLVANIA:**

Pennsylvania Department of Environmental Protection database:

[http://www.portal.state.pa.us/portal/server.pt/community/oil\\_and\\_gas\\_reports/20297](http://www.portal.state.pa.us/portal/server.pt/community/oil_and_gas_reports/20297)

### **COLORADO:**

1. Colorado Oil and Gas Conservation Commission database:

<http://cogcc.state.co.us/>

2. Colorado Department of Public Health and the Environment database:

<http://www.colorado.gov/cs/Satellite/CDPHE-AP/CBON/1251596520285>

### **WEST VIRGINIA**

West Virginia Department of Environmental Protection database:

<http://www.dep.wv.gov/oil-and-gas/databaseinfo/Pages/OGD.aspx>

# APPENDIX D: SPILLS AND VIOLATIONS BY COMPANY IN THREE STATES<sup>63</sup>

	COLORADO							PENNSYLVANIA			WEST VIRGINIA					Three States		
	Violations (NOAV)	Spills	Wells	VpW	SpW	CDPHE Air Quality Violation Cases	CDPHE Cases Per Well	Violations	Wells	VpW	Spills	Violations	Wells	VpW	SpW	Violations	Wells	VpW
Anadarko	6	342	7082	0	0.05	48	0.0068	229	949	0.24						235	8031	0.03
Antero Resources	9	22	136	0.07	0.16	14	0.1029	9	16	0.56		38	234	0.16		56	386	0.15
Apache			42	0	0		0	7	135	0.05						7	177	0.04
Approach Resources																0	0	
Berry Petroleum (now subsidiary of Linn)	8	10	751	0.01	0.01		0					2	23	0.09		10	774	0.01
BHP Billiton			11	0	0		0									0	11	0
Bill Barrett Corp	10	56	1560	0.01	0.04	11	0.0071									10	1560	0.01
Breitbart Energy			26	0	0		0									0	26	0
Cabot Oil and Gas			112	0	0		0	494	1108	0.45		71	92	0.77		565	1312	0.43
Carrizo Oil and Gas Inc	8	6	176	0.05	0.03	2	0.0114	117	170	0.69		2	9	0.22		127	355	0.36
Chesapeake		8	91	0	0.09	1	0.011	589	2618	0.22		80	371	0.22		669	3080	0.22
Chevron	53	116	1426	0.04	0.08	5	0.0035	63	750	0.08			19	0		116	2195	0.05
Cimarex Energy								16	0	***		2	912			18	912	0.02
Clayton Williams Energy			15	0	0		0									0	15	0
CNOOC																0	0	
CNX Gas								126	4599	0.03		37	578	0.06		163	5177	0.03
Comstock Resources																0	0	
ConocoPhillips	4	22	636	0.01	0.03	2	0.0031	72	1082	0.07						76	1718	0.04
Contango Operators			4	0	0		0									0	4	0
Continental	4	3	98	0.04	0.03		0		2	0			1	0		4	101	0.04
Delta Petroleum Corp	3	17	165	0.02	0.1	6	0.0364		8	0						3	173	0.02
Denbury Resources																0	0	
Devon			13	0	0		0		1	0		3	2			3	16	0.19
DTE Energy																0	0	
El Paso Energy	1	6	172	0.01	0.03		0									1	172	0.01
Encana	17	222	6815	0	0.03	137	0.0201	3	14	0.21						20	6829	0
Energren			61	0	0		0									0	61	0



	COLORADO										PENNSYLVANIA			WEST VIRGINIA					Three States		
	Violations (NOAV)	Spills	Wells	VpW	SpW	CDPHE Air Quality Violation Cases	CDPHE Cases Per Well	Violations	Wells	VpW	Spills	Violations	Wells	VpW	SpW	Violations	Wells	VpW			
EOG Resources	4	10	235	0.02	0.04		0	91	800	0.11						95	1035	0.09			
EQT								153	2281	0.07	1	92	502	0.18	0	245	2785	0.09			
EXCO Resources								241	5014	0.05	2	8	45	0.18	0.04	249	5059	0.05			
ExxonMobil	4	98	1301	0	0.08	28	0.0215	236	5813	0.04		6	56	0.11	0	246	7170	0.03			
Forest Oil Corporation			11	0	0		0									0	11	0			
GMX Resources Inc																0	0				
Goodrich Petroleum Corp																0	0				
Hess			42	0	0		0	15	9	1.67						15	51	0.29			
Highmount Exploration & Production																0	0				
Husky Energy			15	0	0		0									0	15	0			
Laredo Petroleum																0	0				
Linn Energy			8	0	0		0		24	0			1	0	0	0	33	0			
Marathon	8	5	265	0.03	0.02		0		5	0	1		7			8	277	0.03			
MDU Resources Group	1	1	26	0.04	0.04	4	0.1538									1	26	0.04			
Murphy oil			18	0	0		0		2	0						0	20	0			
Newfield Exploration								8	6	1.33						8	6	1.33			
Noble energy	19	358	10704	0	0.03	70	0.0065	13	67	0.19			8	0	0	32	10779	0			
Occidental	12	40	1260	0.01	0.03	28	0.0222					2				14	1260	0.01			
Penn Virginia Corp								177	23	7.7		9	4	2.25	0	186	27	6.89			
Petroleum Development Corp	10	222	3412	0	0.07	38	0.0111	16	765	0.02		5	46	0.11	0	31	4223	0.01			
Pioneer	16	164	2561	0.01	0.06	10	0.0039		1	0			16	0	0	16	2578	0.01			
Plains Exploration			1	0	0		0									0	1	0			
Questar	1	2	54	0.02	0.04	16	0.2963									1	54	0.02			
Quicksilver	2	3	79	0.03	0.04		0						2	0	0	2	81	0.02			
Range								281	7088	0.04			14	0	0	281	7102	0.04			

	COLORADO							PENNSYLVANIA			WEST VIRGINIA				Three States		
	Violations (NOAV)	Spills	Wells	VpW	SpW	CDPHE Air Quality Violation Cases	CDPHE Cases Per Well	Violations	Wells	VpW	Spills	Violations	Wells	SpW	Violations	Wells	VpW
Reliance Industries									1	0					0	1	0
Rosetta Resources			80	0	0		0								0	80	0
Sandridge															0	0	
Shell	2	6	221	0.01	0.03		0	221	1679	0.13					223	1900	0.12
SM Energy			1	0	0		0	9	16	0.56					9	17	0.53
Southwestern	3		59	0.05	0		0	130	565	0.23					133	624	0.21
Statoil													21	0	0	21	0
Stone Energy Corp								15	19	0.79		7	78	0	22	97	0.23
Swift Energy															0	0	
Talisman								362	963	0.38					362	963	0.38
Ultra Petroleum			18	0	0		0	160	257	0.62					160	275	0.58
Unit Corp	1												1	0	1	1	1
Vaalco															0	0	
Venoco			3	0	0		0								0	3	0
Whiting Petroleum	4	11	401	0.01	0.03	8	0.02								4	401	0.01
WPX	25	183	4326	0	0.03	8	0.0014	125	136	0.92			0	0	150	4462	0.03
Totals	235	1933	44493	0.01	0.04	436	0.01	3978	36986	0.11	4	364	3042	0	4577	84521	0.05

## APPENDIX E: COMPANIES AND THEIR SUBSIDIARIES AND AFFILIATES

Operator	Subsidiary 1	Subsidiary 2	Subsidiary 3	Subsidiary 4	
Anadarko	Kerr-McGee Corporation	Lance Oil & Gas Company	Howell Petroleum Corporation		
Apache	Edge	Miller	Phoenix		
Berry	LinnCo	LINN			
Breitbart	Terra	Phoenix			
Cabot	Cody				
Carrizo	Monument				
Chevron	Texaco	Unocal			
Cimarex	Columbus Energy	Key Production			
CNX	Consol				
ConocoPhillips	Conoco	Phillips	Burlington Resources		
Contango	Republic				
Delta	Par				
El Paso	EP				
EQT	Equitable				
ExxonMobil	XTO				
Hess	Amerada Hess				
MDU	Fidelity	WBI	Centennial		
Murphy	El Dorado				
Occidental	Oxy	Vintage			
Penn Virginia	PVR				
Petroleum Development Corporation	PDC	PDCE			
Plains	PXP	Latigo	Nuevo	Arguello	
Questar	QEP				
SM	Saint Mary's	SMEC	Nance	SMT	
Southwestern	SEECO	SWN			
Ultra	UP				
Veneco	TexCal				
WPX	Williams, former parent company	WPX Energy Appalachia LLC	WPX Energy Rocky Mountain LLC	WPX Energy Ryan Gulch LLC	

## Endnotes

- 1 Concerned Health Professionals of New York, "Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction)," July 10, 2014, <http://concernedhealthny.org/compendium/>; Forrest, R., "No More Drilling in the Dark: Exposing the Hazards of Natural Gas Production and Protecting America's Drinking Water and Wildlife Habitats," 2011. [www.nwf.org/news-and-magazines/media-center/reports/archive/2011/no-more-drilling-in-the-dark.aspx](http://www.nwf.org/news-and-magazines/media-center/reports/archive/2011/no-more-drilling-in-the-dark.aspx).
- 2 Global Reporting Initiative, Sustainability Reporting Guidelines & Oil and Gas Sector Supplement, Indicator Protocols Set Environment, page 45, [www.globalreporting.org/resource/library/OGSS-G3.1-Complete.pdf](http://www.globalreporting.org/resource/library/OGSS-G3.1-Complete.pdf).
- 3 Personal communication from Richard Liroff, Executive Director of the Investor Environmental Health Network, to Amy Mall, December 19, 2013.
- 4 Mall, A., "Spreading Like Wildfire: Oil and gas leases mean that fracking could occur on tens of millions of acres of U.S. lands," NRDC February 2013, [www.nrdc.org/land/drilling/files/fracking-land-leases-FS.pdf](http://www.nrdc.org/land/drilling/files/fracking-land-leases-FS.pdf).
- 5 Mall, A., "Drilling Down; Protecting Western Communities from the Health and Environmental Effects of Oil and Gas Production," NRDC, 2007, [www.nrdc.org/land/use/down/down.pdf](http://www.nrdc.org/land/use/down/down.pdf).
- 6 The only state that doesn't provide well location data is Maryland, which has less than ten producing wells. Texas charges a fee for the data.
- 7 DePasquale, E., "Department of Environmental Protection's Performance in Monitoring Potential Impacts To Water Quality From Shale Gas Development, 2009–2012," Pennsylvania Department of the Auditor General, July 21, 2014, [www.auditorgen.state.pa.us/Media/Default/Reports/speDEP072114.pdf](http://www.auditorgen.state.pa.us/Media/Default/Reports/speDEP072114.pdf).
- 8 Wirfs-Brock, J., "Groundwater, Noise, Odors Top Colorado Oil & Gas Complaints," Inside Energy, July 1, 2014, <http://insideenergy.org/2014/07/01/groundwater-noise-odors-top-colorado-oil-gas-complaints/>; Colaneri, K., "How Are Energy Boom States Dealing With Drilling-Related Health Complaints?," State Impact Pennsylvania, July 8, 2014, <http://stateimpact.npr.org/pennsylvania/2014/07/08/how-oil-and-gas-states-handle-drilling-related-health-complaints/>.
- 9 In Pennsylvania, public health nurses said that they were prohibited from responding directly to public health concerns. Colaneri, K., "Pa. confirms drilling 'buzzword' list; says it's meant to guide, not silence employees," State Impact Pennsylvania, July 2, 2014, <http://stateimpact.npr.org/pennsylvania/2014/07/02/pa-health-department-policies-on-drilling-meant-to-guide-not-silence-employees/>.
- 10 Wirfs-Brock, J., and Colaneri, K., "How are energy boom states dealing with drilling-related health complaints?," State Impact Pennsylvania, July 8, 2014.
- 11 Griswold, M., "Spills from hydraulic fracturing continue to rise—it's time to protect clean water," NRDC Switchboard, May 13, 2014, [http://switchboard.nrdc.org/blogs/mgriswold/spills\\_from\\_hydraulic\\_fracturing.html](http://switchboard.nrdc.org/blogs/mgriswold/spills_from_hydraulic_fracturing.html).
- 12 Earthworks, "Breaking All the Rules: The crisis in oil & gas regulatory enforcement," September 2012, p. 11, [www.earthworksaction.org/files/publications/FINAL-US-enforcement-sm.pdf](http://www.earthworksaction.org/files/publications/FINAL-US-enforcement-sm.pdf).
- 13 Osnos, E., "Chemical Valley: The coal industry, the politicians, and the big spill," *The New Yorker*, April 7, 2014, [www.newyorker.com/magazine/2014/04/07/chemical-valley](http://www.newyorker.com/magazine/2014/04/07/chemical-valley).
- 14 Letter from Pennsylvania Secretary of Environmental Protection E. Christopher Abruzzo to Pennsylvania Auditor General Eugene A. DePasquale, June 27, 2014, [www.auditorgen.state.pa.us/Media/Default/Reports/speDEP072114.pdf](http://www.auditorgen.state.pa.us/Media/Default/Reports/speDEP072114.pdf).
- 15 Pennsylvania Department of Environmental Protection, List of Water Supply Determination Letters, December 15, 2014, [http://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/OilGasReports/Determination\\_Letters/Regional\\_Determination\\_Letters.pdf](http://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/OilGasReports/Determination_Letters/Regional_Determination_Letters.pdf).
- 16 Colaneri, K., "DEP publishes details on 248 cases of water damage from gas development," State Impact Pennsylvania, August 29, 2014, <http://stateimpact.npr.org/pennsylvania/2014/08/29/dep-publishes-details-on-248-cases-of-water-damage-from-gas-development/>.
- 17 Legere, L., "Sunday Times review of DEP drilling records reveals water damage, murky testing methods," *The Scranton Times-Tribune*, May 19, 2013, <http://thetimes-tribune.com/news/sunday-times-review-of-dep-drilling-records-reveals-water-damage-murky-testing-methods-1.1491547>.
- 18 Colorado Oil and Gas Conservation Commission Staff Directory, <http://cogcc.state.co.us/>.
- 19 Lustgarten, A., "Update: State Oil and Gas Regulators Still Spread Thin," ProPublica, February 4, 2013, [www.propublica.org/article/update-state-oil-and-gas-regulators-still-spread-thin](http://www.propublica.org/article/update-state-oil-and-gas-regulators-still-spread-thin).
- 20 Hamill, S., "Drillers did not report half of spills that led to fines," *Pittsburgh Post-Gazette*, August 3, 2014, <http://www.post-gazette.com/news/state/2014/08/03/Drillers-did-not-report-half-of-spills-that-led-to-fines/stories/201408020142>.
- 21 Webb, D., "Leaking well, company draw state's notice," *Grand Junction Sentinel*, January 7, 2014, [www.gjsentinel.com/news/articles/leaking-well-company-draw-states-notice](http://www.gjsentinel.com/news/articles/leaking-well-company-draw-states-notice).
- 22 Colorado Oil and Gas Conservation Commission, 2012 Report to the Water Quality Control Commission and Water Quality Control Division of the Colorado Department of Public Health and Environment, January 2012, [http://cogcc.state.co.us/Library/WQCC\\_WQCD\\_AnnualReports/WQCC11\\_12RPT.pdf](http://cogcc.state.co.us/Library/WQCC_WQCD_AnnualReports/WQCC11_12RPT.pdf).
- 23 Lukawski, M., et al., "Cost analysis of oil, gas, and geothermal well drilling," *Journal of Petroleum Science and Engineering*, April 4, 2014.
- 24 Kemp, J., "Bakken revolution is only half-complete," *Reuters*, November 21, 2012, <http://www.reuters.com/article/2012/11/21/column-kemp-oil-bakken-idUSL5E8MLJ6V20121121>.
- 25 Arnett, Diane Kerner, "DEP orders U.S. Energy to stop drilling in Pennsylvania," *Bradford Era*, July 10, 2009, [http://www.bradfordera.com/news/article\\_f9c67c58-3b2c-5a2e-80a3-74e1fe23b977.html](http://www.bradfordera.com/news/article_f9c67c58-3b2c-5a2e-80a3-74e1fe23b977.html).
- 26 Railroad Commission of Texas, Complete List, All operators barred by Natural Resources Code 91.114 due to outstanding orders, <http://www.rrc.state.tx.us/oil-gas/compliance-enforcement/enforcement-activities/91114-operators-complete-list/>.
- 27 Personal communication from Lisa Sumi, extractive industries research consultant, to Amy Mall, September 24, 2014.
- 28 Democratic Staff of the House Natural Resources Committee, "Drilling Dysfunction: How the Failure to Oversee Drilling on Public Lands Endangers Health and the Environment," February 8, 2012, <http://democrats.naturalresources.house.gov/reports/drilling-dysfunction-how-failure-oversee-drilling-public-lands-endangers-health-and-o>.
- 29 U.S. Environmental Protection Agency, Enforcement and Compliance History Online (ECHO). Available at: <http://echo.epa.gov/>.
- 30 United States Department of Labor, Occupational Safety and Health Administration, OSHA Enforcement Inspections Database, [www.osha.gov/pls/imis/industry.html](http://www.osha.gov/pls/imis/industry.html).
- 31 U.S. Bureau of Labor Statistics, Fatal occupational injuries in the private sector mining, quarrying, and oil and gas extraction industry, 2003–2012. See: <http://www.bls.gov/iif/oshwc/foi/cfch0011.pdf>, page 17.
- 32 Mall, A., "Spreading Like Wildfire."
- 33 A recent FracTracker Alliance (FTA) analysis found that there were 214 spills at unconventional oil and gas sites in Pennsylvania between January 1 and October 14, 2014. FTA determined that on average there was a spill three out of every four days: [www.fracktracker.org/map/us/pennsylvania/](http://www.fracktracker.org/map/us/pennsylvania/).
- 34 Colorado is the only state in the three we looked at that has a separate spill database.
- 35 In Colorado, the Oil and Gas Conservation Commission provides a written Notice of Alleged Violation when there is reasonable cause to believe a violation has occurred. There is a separate regulatory procedure to impose a penalty.
- 36 Colorado Oil and Gas Information System (COGIS), <http://cogcc.state.co.us/>, Accessed December 18, 2014.

- 37 Ibid.
- 38 Colorado Oil and Gas Conservation Commission press release, "Colorado Oil and Gas Conservation Commission Recognizes Outstanding Operators for 2010," August 3, 2011, [www.anadarko.com/SiteCollection/Documents/PDF/Awards/COGCC\\_Award\\_Aug2011.pdf](http://www.anadarko.com/SiteCollection/Documents/PDF/Awards/COGCC_Award_Aug2011.pdf).
- 39 Handy, R.M., "Crude oil spills into Poudre near Windsor," *The Coloradoan*, June 20, 2014, [www.coloradoan.com/story/news/local/2014/06/20/crude-oil-spills-poudre-near-windsor/11161379/](http://www.coloradoan.com/story/news/local/2014/06/20/crude-oil-spills-poudre-near-windsor/11161379/).
- 40 Colorado Oil and Gas Conservation Commission, Order No. 1V-411, Docket No. 1305-OV-09, Amended.
- 41 Colorado Oil and Gas Conservation Commission, Notice of Alleged Violation, January 20, 2010, Norcross Well A1, API #050451518100.
- 42 Legere, L., "DEP fines Chesapeake more than \$1 million for fire, contamination incidents," *Scranton Times-Tribune*, May 18, 2011, <http://thetimes-tribune.com/news/gas-drilling/dep-fines-chesapeake-more-than-1-million-for-fire-contamination-incidents-1.1148039>; Pennsylvania Department of Environmental Protection Press Release, "DEP Fines Chesapeake Energy More Than \$1 Million," May 17, 2011, [www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=17405&typeid=1](http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=17405&typeid=1).
- 43 Earthworks, "Pennsylvania Oil & Gas Enforcement: Violations," [www.earthworkSACTION.org/issues/detail/pennsylvania\\_oil\\_gas\\_enforcement\\_violations](http://www.earthworkSACTION.org/issues/detail/pennsylvania_oil_gas_enforcement_violations).
- 44 Marcellus Drilling News, "Penn Virginia Sells Appalachian Drilling, Closes Office," <http://marcellusdrilling.com/2012/07/penn-virginia-sells-appalachian-drilling-closes-office/>.
- 45 Pennsylvania Department of Environmental Protection, Environment Facility Application Compliance Tracking System, file for James Cady 1 well, Tioga County, Pennsylvania, [www.ahs.dep.pa.gov/eFACTSWeb/searchResults\\_singleFacility.aspx?FacilityID=723418](http://www.ahs.dep.pa.gov/eFACTSWeb/searchResults_singleFacility.aspx?FacilityID=723418).
- 46 Pennsylvania Department of Environmental Protection, Environment Facility Application Compliance Tracking System, file for Risser A 2H well, Potter County, Pennsylvania, [www.ahs.dep.pa.gov/eFACTSWeb/searchResults\\_singleFacility.aspx?FacilityID=734950](http://www.ahs.dep.pa.gov/eFACTSWeb/searchResults_singleFacility.aspx?FacilityID=734950).
- 47 Pennsylvania Department of Environmental Protection, Office of Oil and Gas Management Compliance Report – Operator Penn Virginia Oil & Gas Corp – Inspections from 1/1/2009 to 12/31/2014. July 11, 2014. [www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Oil\\_Gas/OG\\_Compliance](http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Oil_Gas/OG_Compliance).
- 48 West Virginia Department of Environmental Protection spill database, spill date: March 14, 2009, [https://apps.dep.wv.gov/oog/svsearch\\_new.cfm](https://apps.dep.wv.gov/oog/svsearch_new.cfm).
- 49 Knezevich, A., "Farmer: Gas driller has invaded property," *The Charleston Gazette*, July 23, 2011, 2011, [http://www.wvsoro.org/news/2011/07\\_23.html](http://www.wvsoro.org/news/2011/07_23.html).
- 50 Associated Press, "Explosion kills EQT worker in rural West Virginia," *Pittsburgh Post-Gazette*, February 15, 2013, [www.post-gazette.com/local/region/2013/02/15/Explosion-kills-EQT-worker-in-rural-West-Virginia/stories/201302150373](http://www.post-gazette.com/local/region/2013/02/15/Explosion-kills-EQT-worker-in-rural-West-Virginia/stories/201302150373); Brakken, J., "Men allegedly burned in explosion sue EQT Production," *The West Virginia Record*, September 5, 2013, <http://wvrecord.com/news/262306-men-allegedly-burned-in-explosion-sue-eqt-production>.
- 51 West Virginia Oil and Gas Spills Database, June 24, 2009, EXCO Elkview Facility, [https://apps.dep.wv.gov/oog/spills\\_new.cfm](https://apps.dep.wv.gov/oog/spills_new.cfm).
- 52 West Virginia DEP press release, "DEP halts drilling operation," March 28, 2011, <http://www.dep.wv.gov/news/Pages/DEPHaltsdrillingoperation.aspx>.
- 53 Knezevich, A., "Farmer: Gas driller has invaded property."
- 54 Soraghan, M., "Spills up 17 percent in U.S. in 2013," *EnergyWire*, May 12, 2014, [www.eenews.net/energywire/stories/1059999364](http://www.eenews.net/energywire/stories/1059999364).
- 55 BLM Case #COC62161, Event #RJB1001.
- 56 Epstein, H., Wald, J., and Smillie, J., "Undermined Promise: Reclamation and Enforcement of the Surface Mining Control and Reclamation Act," Natural Resources Defense Council and Western Organization of Resource Councils, 2007, [www.worc.org/Undermined-Promise-Report/](http://www.worc.org/Undermined-Promise-Report/).
- 57 Squillace, M. *The Strip Mining Handbook*, 1990, pre-publication draft of second edition, 2009, <https://sites.google.com/site/stripmininghandbook/>.
- 58 Malone, S. et al, "Data inconsistencies from states with unconventional oil and gas activity," *Journal of Environmental Science and Health, Part A*, accepted manuscript, February, 2015.
- 59 In a "split estate," the property right to use the surface of the land (the "surface estate") and the property right to develop the "minerals" (e.g. oil and gas) beneath the surface (the "mineral estate") have been severed, and are owned by separate people. Because the mineral estate is usually considered "dominant" under state law, the owner of that estate is generally able to conduct industrial oil and gas activities on the surface property without the surface owner's permission. Because split estates date back to the early 20th century, many surface estate holders, some of whom live on land that has been family-owned for generations, are now being forced to accept oil and gas activities against their will.
- 60 Mall, A., "Drilling Down."
- 61 For example, the Washington, D.C. Metropolitan Police Department's DC Police Alert sends emergency cell phone and email alerts to announce crimes in a specified neighborhood, <http://mpdc.dc.gov/service/dc-police-alert>.
- 62 30 U.S.C. § 226 (g).
- 63 Our analysis focused on violations associated with active producing wells, but due to the nature of the states' data structure, some statistics may inadvertently include inactive wells or transmission operations managed by the same companies or their affiliates.