

# Embracing Federalism Or: How I Learned to Stop Worrying and Love Fracking

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In the summer of 2010, a natural gas well in northwestern Pennsylvania erupted, spewing hydraulic fracturing (“fracking”) fluid<sup>1</sup> and natural gas for sixteen hours before finally being contained.<sup>2</sup> Although there were no injuries and no dangerous fire,<sup>3</sup> the well’s proximity to the headwaters of a tributary of the Susquehanna River prompted fears of surface water contamination, even as emergency response crews struggled to contain the fracking fluid escaping from the well.<sup>4</sup> Ultimately, a failed blowout preventer during a surge of pressure while drilling—an eerily similar situation to the devastating oil spill in the Gulf of Mexico during the spring of 2010<sup>5</sup>—proved to be the culprit.<sup>6</sup> Although no one was hurt, this event provided fodder for opponents of drilling in the Marcellus Shale.<sup>7</sup> For state regulators, the incident

confirmed the importance of having a suite of regulations in place aimed at hydraulic fracturing, including new well construction standards to prevent such incidents.<sup>8</sup> Likewise, these situations raised federalism concerns for many who questioned the future role of state regulations and argued federal agencies should have primacy in such a potentially dangerous arena.<sup>9</sup>

Beyond questions about the sufficiency of state regulatory regimes, the geographic diversity of these shale plays also raises federalism concerns. At the same time Pennsylvania was dealing with issues in the Marcellus Shale, halfway across the country, the fracking of natural gas wells in Texas’ Barnett Shale was blamed for the methane contamination of two private water wells.<sup>10</sup> Despite limitations on the U.S. Environmental Protection Agency’s (“EPA’s”) jurisdiction under the Safe Drinking Water Act (“SDWA”),<sup>11</sup> EPA issued an Emergency Administrative Order under SDWA §1431, which determined that the operator, Range Resources (“Range”), “caused or contributed” to methane contamination of water wells near Range’s operations.<sup>12</sup> This order presumed Range’s guilt and required the company to provide water to the affected landowners, install methane monitors in the affected homes, and conduct a thorough investigation into the cause of the methane contamination.<sup>13</sup> In addition,

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1. Fracking fluid is the generic term used for the mixture of water, sand, and chemicals that is injected into the wellbore in order to crack the rock in the shale formation. The mixture is approximately ninety-eight percent water, but massive volumes of water—potentially millions of gallons—can be used for each frack job. Both the concentrations and types of chemicals used in each frack job are specifically engineered for each hydraulic fracture. See OFFICE OF FOSSIL ENERGY, U.S. DEPT OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER ES-4 (2009) [hereinafter MODERN SHALE GAS DEVELOPMENT], available at [http://www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale\\_gas\\_primer\\_2009.pdf](http://www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale_gas_primer_2009.pdf).
2. Amy Worden, *Gas Spews From N.W. Pa. Well Rupture*, PHILA. INQUIRER (Apr. 8, 2011, 1:49 PM), [http://www.philly.com/philly/news/special\\_packages/inquirer/marcellus-shale/20100605\\_Gas\\_spews\\_from\\_N\\_W\\_Pa\\_well\\_rupture.html](http://www.philly.com/philly/news/special_packages/inquirer/marcellus-shale/20100605_Gas_spews_from_N_W_Pa_well_rupture.html).
3. *Id.*
4. *Id.*
5. See Russell Gold & Angel Gonzalez, *Report Rips Firms, Oversight*, WALL ST. J. (Sept. 15, 2011), <http://online.wsj.com/article/SB10001424053111904060604576570600492781420.html>.
6. See Worden, *supra* note 2.
7. See Lauren L. Head, *Chesapeake’s Marcellus Blowout Adds Fuel to Frac Fluid Concern*, PITTSBURGH BUS. TIMES (Apr. 25, 2011, 12:17 PM), <http://www.bizjournals.com/pittsburgh/blog/energy/2011/04/chesapeake-marcellus->

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[blowout-frac-fluid.html?page=all](http://www.bizjournals.com/pittsburgh/blog/energy/2011/04/chesapeake-marcellus-blowout-frac-fluid.html?page=all). The Marcellus Shale, which reaches from Pennsylvania to West Virginia, Ohio, and New York, is the most expansive shale play in the United States. Its size and potential reserves have made a major focus in the development of shale gas. See generally MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 21.

8. See Worden, *supra* note 2.
9. See, e.g., Nicholas Kusnetz, *PA Officials Issue Largest Fine Ever to Gas Driller*, PROPUBLICA (May 17, 2011, 4:19 PM), <http://www.propublica.org/article/pa-officials-issue-largest-fine-ever-to-gas-driller> (“The DEP has been under increasing pressure from critics and the federal governments to tighten its oversight of the gas industry.”); see also Nicholas Kusnetz, *Report for Obama Questions Effectiveness of Gas Drilling Regs*, PROPUBLICA (Aug. 12, 2011, 10:16 AM), <http://www.propublica.org/article/report-for-obama-questions-effectiveness-of-gas-drilling-regulations> (noting that current regulations may be insufficient to protect the environment and public health).
10. Terry W. Roberson, *The State of Texas v. The EPA: Regulation of Hydraulic Fracturing*, 48-APR HOUS. LAW. 24, 26 (2011).
11. EPA is limited when frack fluid does not contain diesel fuel. See *id.*
12. Roberson, *supra* note 10, at 26.
13. *Id.*

EPA eventually sought an injunction against Range requiring compliance with the agency's order and forcing Range to pay civil penalties.<sup>14</sup>

Range was unable to defend itself against EPA's order until a series of legal challenges commenced and time passed.<sup>15</sup> In a hearing before the Texas Railroad Commission ("RRC"),<sup>16</sup> the RRC found that Range was not liable after EPA admitted that, in light of evidence presented by Range, Range might not have contributed to the contamination.<sup>17</sup> As a result, the state regulatory agency handled the situation through established processes while EPA was duly chastened for its overreach.<sup>18</sup> Ultimately, EPA withdrew the administrative order and dropped the lawsuit against Range.<sup>19</sup> These stories, happening simultaneously in two very different parts of the nation, represent the central conflict involved with shale gas development and the use of fracking—is this issue too big and too important to be left up to the states?<sup>20</sup>

The two previous cases demonstrate complicated federalism questions that have only been magnified by the expansion of shale oil and gas development across the nation.<sup>21</sup> During the last five years, unconventional oil and gas production<sup>22</sup> from shale plays<sup>23</sup> has emerged as a legitimate "game-changer" for U.S. energy production.<sup>24</sup> Shale plays have emerged across all regions of the nation, and the rush to produce the oil and gas resources from these formations has put a strain on state regulatory agencies.<sup>25</sup> These growing pains, however, have done little to dampen enthusiasm for the future role of unconventional gas, as fossil fuels have reasserted themselves in the nation's energy picture.<sup>26</sup> In fact, even proponents of clean energy policies, such as the Center for American Progress, have hailed the glut of natural gas as a "clean" alternative to coal that can serve as a "bridge fuel" for the nation as it pursues more renewable energy resource-

es.<sup>27</sup> Fracking appears to be the key to unlocking a brave new world for the domestic energy future.<sup>28</sup> Fracking, however, has engendered an equal and opposite concern for environmental issues.<sup>29</sup>

This Note will argue that states are the most appropriate venue for the regulation of hydraulic fracturing and that states can ensure public health and environmental safety through the development of hydraulic fracturing-specific rules and effective regulations related to well construction—including well casing, cementing, and groundwater protection. State regulatory agencies should undertake the development of hydraulic fracturing-specific standards for well construction that comply with or exceed the criteria promoted by organizations such as the State Review of Oil and Natural Gas Environmental Regulations ("STRONGER")<sup>30</sup> for evaluating state regulatory frameworks.

Part I will consider the legal and regulatory framework at play with this issue, including relevant federal authority and regulations as well as the role of state regulations. Part II of this Note will attempt to cut through the vitriol related to hydraulic fracturing by narrowly defining hydraulic fracturing as an isolated stimulation technique and differentiating the various steps in the well completion process as a way to pinpoint the appropriate focus for environmental and public safety concerns. Part III will compare the statutes and regulations in place in four states that have experienced an increase in drilling activity due to hydraulic fracturing and will then analyze these regulations according to standards established by the multi-stakeholder organization STRONGER. Part IV will use the analysis of the various state statutes and model regulations as the basis for establishing a single set of fracking-related recommendations for states to adopt in order to ensure the sufficiency of their own regulatory program. Part V will consider the viability of possible alternatives to state primacy on the issue by examining the potential for federal regulation or the impact of a model federal regulation.

14. *Id.* at 27.

15. *Id.* at 26–27.

16. The RRC is the state regulatory agency tasked with oversight of the oil and gas industry. See *About The Oil & Gas Division*, R.R. COMM'N OF TEX., <http://www.rrc.state.tx.us/about/divisions/aboutog.php> (last updated Aug. 8, 2007).

17. Roberson, *supra* note 10, at 27.

18. *Id.* at 27–28.

19. Daniel Gilbert & Russell Gold, *EPA Backpedals on Fracking Contamination*, WALL ST. J. (Apr. 1, 2012, 1:47 PM), <http://online.wsj.com/article/SB10001424052702303404704577313741463447670.html>.

20. See *id.*

21. See, U.S. ENERGY INFO. ADMIN., REVIEW OF EMERGING RESOURCES: U.S. SHALE GAS AND SHALE OIL PLAYS 4 (2011), available at <http://www.eia.gov/analysis/studies/usshalegas/pdf/usshaleplays.pdf>.

22. The use of the term "unconventional" merely creates a distinction based on the kind of rock formation in which the resource is found. Unconventional oil or gas is found in low-permeability rock formations in which the resource is unable to flow freely into the wellbore. By contrast, conventional oil and gas production occurs in highly permeable formations in which the resource is able to flow without having to be stimulated through a process such as fracking. See MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 15.

23. This term refers to the geologic formations where oil or gas resources are found and developed. These formations may also be referred to as basins. See *id.* at 16.

24. U.S. ENERGY INFO. ADMIN., REVIEW OF EMERGING RESOURCES, *supra* note 21, at 4.

25. See *id.*

26. Nicholas Kusnetz, *Oil and Gas Drilling Surges Despite Increased Oversight*, PROPUBLICA (June 30, 2011, 12:15 PM), <http://www.propublica.org/article/oil-and-gas-drilling-surges-despite-increased-oversight>.

27. JOHN D. PODESTA & TIMOTHY E. WIRTH, CTR. FOR AM. PROGRESS, NATURAL GAS: A BRIDGE FUEL FOR THE 21ST CENTURY 3 (2009), available at <http://www.americanprogress.org/wp-content/uploads/issues/2009/08/pdf/natural-gasmemo.pdf>.

28. See Int'l Energy Agency, *Are We Entering a Golden Age of Gas?*, in WORLD ENERGY OUTLOOK 2011: SPECIAL REPORT 7–9 (2011), available at [http://www.worldenergyoutlook.org/media/weowebsite/2011/WEO2011\\_GoldenAgeof-GasReport.pdf](http://www.worldenergyoutlook.org/media/weowebsite/2011/WEO2011_GoldenAgeof-GasReport.pdf); see also PODESTA & WIRTH, *supra* note 27, at 3 (describing the importance of natural gas as "the cleanest burning" fossil fuel which makes it a clean alternative and a useful backstop for renewable energy sources).

29. The New York Times has put out a long-running series called "Drilling Down" that has covered, in-depth, the wide range of concerns coming from the environmental community. See generally *Drilling Down*, N. Y. TIMES, [http://www.nytimes.com/interactive/us/DRILLING\\_DOWN\\_SERIES.html](http://www.nytimes.com/interactive/us/DRILLING_DOWN_SERIES.html).

30. State Review of Oil and Natural Gas Environmental Regulations ("STRONGER") is a multi-stakeholder organization that brings together industry representatives, state regulators, and environmental stakeholders. The organization conducts reviews of state environmental regulations in accordance with guidelines developed through stakeholder collaboration, and it provides recommendations for potential improvements to the states. See *The Process*, STRONGER, <http://www.strongerinc.org/process> (last visited Dec. 18, 2012).

## I. Where the Law Stands Today

Although this Note primarily deals with the regulatory framework in Arkansas, Pennsylvania, Colorado, and Texas, one must first understand the interplay between state and federal regulation because the most common argument for changes in the law involves asserting federal jurisdiction over all hydraulic fracturing activity.<sup>31</sup>

### A. Federal Authority Over Hydraulic Fracturing

Federal regulators do not have the primary regulatory authority over hydraulic fracturing.<sup>32</sup> From 1997 until 2005, however, it appeared that they did.<sup>33</sup> In 1997, the U.S. Court of Appeals for the Eleventh Circuit ruled, in *Legal Environmental Assistance Foundation v. EPA* (“*Leaf*”), that fracking fluid constituted hazardous waste for the purposes of the SDWA’s Underground Injection Control Program (“UIC”).<sup>34</sup> Although states are responsible for administering the UIC program, this ruling empowered EPA, which sets the minimum requirements for UIC wells, to exercise authority over any drilling activity that could be considered fracking.<sup>35</sup> Because the *Leaf* ruling remanded for further consideration the issue of LEAF’s petition for the withdrawal of Alabama’s UIC program, EPA began a study to determine whether it should use this authority to regulate fracking.<sup>36</sup> These efforts became moot when Congress passed an amendment, sometimes known as the “Halliburton Loophole,” to the SDWA in the Energy Policy Act of 2005.<sup>37</sup> The amendment removed federal jurisdiction over “underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities.”<sup>38</sup> Now, with only a few exceptions—such as the one for diesel fuel—the regulatory authority over fracking rests solely with the states, a move seen by industry and state regulators as a boon for the increasingly important practice.<sup>39</sup> This has done little, however, to assuage the concerns of many environmental advocates and federal officials.<sup>40</sup>

31. See RACHEL L. AMANN ET AL., INTERSTATE OIL & GAS COMPACT COMM’N, SHALE GAS ASSESSMENT: A REGULATORY PERSPECTIVE 15-19 (2010), available at [http://www.netl.doe.gov/technologies/oil-gas/publications/ENVreports/NT42937\\_TopicalReport.pdf](http://www.netl.doe.gov/technologies/oil-gas/publications/ENVreports/NT42937_TopicalReport.pdf); Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115, 142-46 (2009).

32. *Id.* at 144-45.

33. *Id.*

34. *Legal Envtl. Assistance Found. v. EPA*, 118 F.3d 1467, 1477-78 (11th Cir. 1997) (rejecting an EPA policy that determined fracking fluid was not a hazardous waste for the purposes of the SDWA and remanding LEAF’s petition to EPA for further review).

35. Wiseman, *supra* note 31, at 142-44.

36. *Id.* at 144.

37. *Id.* at 144-45.

38. Energy Policy Act of 2005, § 322(1)(B)(ii), Pub. L. No. 109-58, 119 Stat. 594, 694 (2005).

39. Wiseman, *supra* note 31, at 146.

40. These concerns include potential water pollution, air pollution, community impacts, and ecosystem impacts. See Kusnetz, *supra* note 9; see also SEC’y OF ENERGY ADVISORY BD., U.S. DEP’T OF ENERGY, SHALE GAS PRODUCTION SUBCOMMITTEE NINETY-DAY REPORT 8-9 (2011) [hereinafter NINETY-DAY REPORT], available at [http://www.shalegas.energy.gov/resources/081811\\_90\\_day\\_report\\_final.pdf](http://www.shalegas.energy.gov/resources/081811_90_day_report_final.pdf) (identifying a range of continuing concerns raised during the SEAB’s investigation of fracking).

## B. Alternative Federal Regulatory Authority

Although EPA does not have direct regulatory authority over fracking, there are a number of other ways that federal regulations significantly impact oil and gas operations.<sup>41</sup> First, the Clean Water Act regulates the surface discharges of the flowback water associated with shale gas drilling in order to prevent the pollution of freshwater resources.<sup>42</sup> Flowback water is the name given to water used in fracking that returns to the surface after the frack job.<sup>43</sup> The SDWA is another federal law that controls the disposal of the flowback waters from fracking operations.<sup>44</sup> Although the Energy Policy Act of 2005 removed federal authority over hydraulic fracturing fluid “other than diesel fuel,” the SDWA continues to control the disposal of fracking fluid through its Class II disposal well program.<sup>45</sup> The UIC Class II program is instructive for this issue because it is a successful example of federalism at work in the field.<sup>46</sup> Although EPA establishes minimum requirements for the program, Congress created flexibility in the implementation of the program that avoids a “one-size-fits-all” approach by allowing states to take primacy in permitting for the wells by demonstrating the sufficiency of state regulations.<sup>47</sup>

Another area of federal regulation deals with air emissions from oil and gas production activities, including fracking, through the Clean Air Act.<sup>48</sup> Finally, because many areas of development are on federal lands, particularly in the Western United States,<sup>49</sup> the National Environmental Policy Act (“NEPA”) requires environmental impact studies before exploration and production activities may begin.<sup>50</sup> None of these avenues has proven sufficient, however, as a hook for federal jurisdiction over oil and gas operations that utilize the stimulation technique of fracking.

## C. How Fracking Is Being Regulated Today

Because of the limited federal authority over oil and gas activity discussed above, the primary regulatory role has been seized by the states.<sup>51</sup> A state-based system enables regulations that are more sensitive to the needs of particular states in terms of geology, climate, industry, and economics in a way that avoids a “one-size-fits” model of regulation.<sup>52</sup> The challenge for regulators in developing new regulations

41. MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 25.

42. *Id.* at 29-32.

43. *See id.*

44. *Id.* at 32. One of the reasons fracking fluid was removed from the SDWA was the fact that the UIC program’s Class II wells deal with injection of wastewater in disposal wells. With fracking, the vast majority of the fracking fluid returns to the surface as flowback or produced water. It is the handling of this flowback water that brings up the CWA and SDWA. *See id.* at 32-33.

45. *Id.* at 32-33.

46. *Id.* at 33.

47. So far, forty states have primacy for Class II injection wells. This is based on Safe Water Drinking Act (“SDWA”), § 1421(b)(3)(A), 42 U.S.C. § 300h(b)(3)(A) (2006). *See* MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 33.

48. *See* MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 35-36.

49. *Id.* at 39-40.

50. *Id.* at 25.

51. *Id.* at 25-26.

52. *Id.* at 25.

is to balance environmental concerns against the need to protect the oil and gas reservoir.<sup>53</sup> Likewise, individual state governments can determine what regulatory structure is most appropriate, such as whether to house regulation in one agency or department or to spread the function among a variety of offices.<sup>54</sup> Most importantly, states have much greater discretion in developing regulations and are capable of imposing more stringent standards that are more carefully targeted than those that could be imposed on the federal level.<sup>55</sup>

Every state with oil and gas exploration and production activity requires a permit before the drilling and operating of oil or gas wells.<sup>56</sup> For example, all twenty-seven states surveyed in a recent Ground Water Protection Council (“GWPC”) study of regulations had permitting requirements for locating, drilling, completing, and operating wells.<sup>57</sup> Moreover, state regulators are not alone in this process, as a number of collaborative efforts—such as the GWPC—provide review programs to ensure the sufficiency of state regulatory efforts.<sup>58</sup> One such program, known as STRONGER,<sup>59</sup> has established a set of guidelines with input from state, industry, and environmental stakeholders.<sup>60</sup> The proximity of state regulators to the resources, the environment, and those affected by oil and gas production reflect the important role that states have in the regulation of oil and gas production, including fracking.

## II. Limiting the Scope: Defining Hydraulic Fracturing

Due to the heated rhetoric that has come to surround almost any unconventional shale oil or gas activity, even industry-developed terms such as “fracking” have become pejorative shorthand for shale gas development in its entirety.<sup>61</sup> From a technical standpoint, however, fracking “is a well stimulation process used to maximize the extraction of underground

resources.”<sup>62</sup> Although hydraulic fracturing is central to any shale gas development activity,<sup>63</sup> in order to properly evaluate state regulations, this Note’s analysis will be limited to aspects of the well construction and completion process specifically implicated by hydraulic fracturing as a well stimulation technique—not all shale gas development.

### A. Shale Gas and Hydraulic Fracturing

Shale gas plays refer to geologic formations of dense shale rock that contain trapped pockets of natural gas or oil.<sup>64</sup> These formations are geologically distinct from the typical sandstone formations involved in oil and gas production because the low-permeability of the shale rock prohibits the migration of gas into large pools from which the resource can be extracted.<sup>65</sup> Only recently has the combination of technological advances, including hydraulic fracturing and horizontal drilling, made the extraction of oil and gas from these formations economically viable.<sup>66</sup> The impact of this new technology on the U.S. energy picture cannot be overstated: it has “enormous potential to provide economic and environmental benefits for the county.”<sup>67</sup>

Shale gas has reversed the decline of the U.S. natural gas industry, rescuing it from near extinction and setting the nation on a course for long-term self-sufficiency when it comes to its natural gas needs.<sup>68</sup> In addition, regionally diverse shale plays ranging from Texas to Ohio, and even North Dakota, have made this a national phenomenon.<sup>69</sup> This diversity brings not only opportunity, however; it also brings challenges because operators must deal with unique geological, ecological, and environmental challenges in each of these various shale plays.<sup>70</sup>

When attempting to extract oil or natural gas from a shale play, operators rely on a process known as hydraulic fracturing that has been used commercially since 1947.<sup>71</sup> The application of this stimulation technique to shale plays, however, has only recently been popularized, thanks to the efforts of industry pioneer George Mitchell—who, in the late 1990s, combined the technique with developments in horizontal drilling to make extraction from shale plays commercially viable for the first time.<sup>72</sup>

53. AMANN ET AL., *supra* note 31, at 9.

54. MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 26.

55. *See id.*

56. The steps in the permitting process are state specific, but in general, they include details regarding location, construction, operation, and reclamation. They also provide a way for agencies to ensure compliance with regulations and environmental safeguards. *See id.* at 26. FracFocus, a voluntary disclosure website created by the GWPC and IOGCC that provides a platform for disclosure of well-specific information, has created an interactive map that links directly to various state regulatory agencies and regulations. *See Regulations By State*, FRACFOCUS, <http://fracfocus.org/regulations-state> (last visited Dec. 18, 2012).

57. This study, conducted in 2009, considered regulations in all states with oil and gas production according to the most recently available data at the time which was for 2007. *See* GROUND WATER PROT. COUNCIL, STATE OIL AND GAS REGULATIONS DESIGNED TO PROTECT WATER RESOURCES 17 (2009) [hereinafter STATE OIL & GAS REGULATIONS], available at [http://www.gwpc.org/sites/default/files/state\\_oil\\_and\\_gas\\_regulations\\_designed\\_to\\_protect\\_water\\_resources\\_0.pdf](http://www.gwpc.org/sites/default/files/state_oil_and_gas_regulations_designed_to_protect_water_resources_0.pdf).

58. *See* MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 27.

59. *See supra* note 30.

60. *See* MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 27.

61. Use of the term “fracking” is by no means universal. In fact, many in the industry prefer to use “frac” or “fracing.” Noted industry historian Daniel Yergin recently published a major work on the contemporary oil and gas industry and used “fracing” throughout. *Oil, Gas Industry Opposes Use of Word “Fracking” for Method*, FUEL FIX (Jan. 27, 2012, 7:22 AM), <http://fuelfix.com/blog/2012/01/27/oil-gas-industry-opposes-use-of-word-fracking-for-method/>.

62. *Hydraulic Fracturing Background Information*, U.S. ENVTL. PROT. AGENCY, [http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells\\_hydrowhat.cfm](http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_hydrowhat.cfm) (last updated May 9, 2012).

63. *What Is Shale Gas and Why Is It Important?*, U.S. ENERGY INFO. ADMIN., ENERGY IN BRIEF, [www.eia.gov/energy\\_in\\_brief/about\\_shale\\_gas.cfm](http://www.eia.gov/energy_in_brief/about_shale_gas.cfm) (last updated Dec. 5, 2012).

64. *Id.*

65. *Id.*

66. *See* NINETY-DAY REPORT, *supra* note 40, at 8.

67. *See id.* at 5.

68. *See id.* at 6–7.

69. MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at ES-2.

70. *Id.*

71. AM. PETROLEUM INST., HYDRAULIC FRACTURING OPERATIONS—WELL CONSTRUCTION AND INTEGRITY GUIDELINES 15 (2009), available at <http://www.shalegas.energy.gov/resources/HF1.pdf>.

72. Roberson, *supra* note 10, at 25; *see also* U.S. ENERGY INFO. ADMIN., REVIEW OF EMERGING RESOURCES, *supra* note 21, at 4 (describing the success of Mitchell Energy in combining fracking and horizontal drilling techniques to make shale oil and gas extraction economically viable for the first time).

In terms of well stimulation techniques, fracking refers to the stage during the drilling process in which a water-based mixture, commonly called fracking fluid, is pumped into a wellbore<sup>73</sup> at such high pressure that a rock formation will physically crack, or fracture.<sup>74</sup> Once tiny fractures open in the rock, sand in the mixture—known as proppant—helps keep the crevices open while the natural gas or oil flows into the wellbore.<sup>75</sup> Fracking fluid refers generally to this solution, which is ninety-eight percent water and sand.<sup>76</sup> Although the vast majority of the mixture is water, a combination of chemicals gives the fluid the physical characteristics that create the specific conditions necessary to fracture that specific rock formation.<sup>77</sup> Even though the fundamentals are the same—cracking rock through a high-pressured injection in order to more easily extract hydrocarbons—each fracking project is as unique as the geologic characteristics of that well.<sup>78</sup>

One of the defining characteristics of fracking is the fact that there is nothing about the practice that is “one-size-fits-all.”<sup>79</sup> For example, rather than water-based fracking fluids, some fracking fluid is gel, acid, or even diesel fuel-based.<sup>80</sup> In addition, the chemical additives utilized vary significantly.<sup>81</sup> The makeup of these chemical additives has prompted questions about the potential for negative health impacts.<sup>82</sup> For example, diesel fuel—a potential base for fracking fluid—contains benzene, which has been linked to negative health effects.<sup>83</sup> Concerns with the potential for contamination when using diesel fuel prompted significant industry actors—including Halliburton Energy Services and Schlumberger Technology Corporation—to sign a memorandum of understanding with EPA that resulted in a concerted effort to discontinue the use of diesel fuel in fracking.<sup>84</sup> This episode underscores one of the primary concerns involved with fracking—the potential for contamination of ground water resources.<sup>85</sup>

Although the potential for groundwater contamination is a substantial concern, there are two significant factors ensuring the protection of water resources: (1) geologic fac-

tors make it a virtual impossibility for any residual fracking fluid to migrate into water resources through impenetrable rock formations separating freshwater resources and the production zone<sup>86</sup> and (2) proper well completion practices, including well casing and cementing, provide multiple barriers designed to prevent contamination.<sup>87</sup> Because this Note focuses on the actions of state regulators and operators that ensure public health and safety, consideration of geologic factors is beyond its scope.<sup>88</sup> Instead, the primary focus will be the substance and sufficiency of state regulations regarding well-construction standards. Fracking, as has been narrowly defined above, only becomes an issue in the absence or failure of adequate well construction. As a result, the focus of this Note turns from fracking in general to the specific stage of the exploration and production process when well stimulation occurs—the well completion process.

## B. Well Completion: Casing and Cementing

Although fracking has become the flashpoint for much of the criticism of shale gas development, the critical element from an environmental standpoint is actually what happens earlier in the completion process<sup>89</sup> when the well casing<sup>90</sup> and cement<sup>91</sup> are installed.<sup>92</sup> The integrity of the casing and cement are what ensures that neither fracking fluid, nor natural gas, migrates from the wellbore into ground water sources.<sup>93</sup> Steel pipe, or well casing,<sup>94</sup> installed after drilling the wellbore is the first line of defense between drilling operations in the well and the layers of earth immediately outside the well.<sup>95</sup> Once this casing is put in place, it is surrounded by a cement sheath that further insulates the well from the sur-

73. Wellbore is defined as “the drilled hole or borehole, including the open hole or uncased portion of the well.” *Oilfield Glossary*, SCHLUMBERGER, <http://www.glossary.oilfield.slb.com/Display.cfm?Term=wellbore> (last visited Dec. 18, 2012).

74. MODERN SHALE GAS DEVELOPMENT, *supra* note 1.

75. See AM. PETROLEUM INST., *supra* note 71, at 15.

76. See MODERN SHALE GAS DEVELOPMENT, *supra* note 1.

77. *Id.*

78. *Id.*

79. See Wiseman *supra* note 31, at 121.

80. STATE OIL & GAS REGULATIONS, *supra* note 57, at 22.

81. *Id.*

82. *Id.*

83. In addition to a number of potential health effects such as skin irritation and upper respiratory issues, benzene is a known human carcinogen. *Id.*; see also *Benzene*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/ttnatw01/hlthef/benzene.html#ref1> (last updated Feb. 3, 2012) (“Acute (short-term) inhalation exposure of humans to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic (long-term) inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia, in occupational settings.”).

84. STATE OIL & GAS REGULATIONS, *supra* note 57, at 22.

85. See AM. PETROLEUM INST., *supra* note 71, at 2.

86. STATE OIL & GAS REGULATIONS, *supra* note 57, at 23.

87. *Id.*

88. This Note further assumes the geologic factor is not an issue because of statements made by EPA Administrator Lisa Jackson who recently testified before Congress that she was unaware of any known instances of ground water contamination directly related to fracking. Although this remains a contentious point for many opponents of fracking, further analysis is beyond the scope of this Note. See Press Release, U.S. Senate Comm. on Env't. & Public Works, EPA Jackson “Not Aware of Any Proven Case Where the Fracking Process Itself Has Affected Water” (May 24, 2011), available at [http://epw.senate.gov/public/index.cfm?FuseAction=PressRoom.PressReleases&ContentRecord\\_id=23eb85dd-802a-23ad-43f9-da281b2cd287](http://epw.senate.gov/public/index.cfm?FuseAction=PressRoom.PressReleases&ContentRecord_id=23eb85dd-802a-23ad-43f9-da281b2cd287).

89. Well completion is “a generic term used to describe the events and equipment necessary to bring a wellbore into production once drilling operations have been concluded, including but not limited to the assembly of downhole tubulars and equipment required to enable safe and efficient production from an oil or gas well.” *Oilfield Glossary*, *supra* note 73.

90. Casing is defined as a “steel pipe cemented in place during the construction process to stabilize the wellbore. The casing forms a major structural component of the wellbore and serves several important functions: preventing the formation wall from caving into the wellbore, isolating the different formations . . . providing a means of maintaining control of formation fluids and pressure as the well is drilled.” *Oilfield Glossary*, *supra* note 73.

91. Cement is defined as “. . . precise blends of quality assured materials to achieve consistent and predictable performance. Cement sets as the water in the slurry reacts chemically with the active ingredients.” *Oilfield Glossary*, *supra* note 73.

92. See AM. PETROLEUM INST., *supra* note 71, at 2–3.

93. *Id.*

94. The drilling and completion process involves the installation of sequentially smaller sizes of casing that fit and are cemented in place within the previous casing string. See *id.* at 4–5.

95. *Id.* at 2.

rounding layers of earth.<sup>96</sup> By preventing both the horizontal migration of fluids in the wellbore and the vertical migration from downhole,<sup>97</sup> cement provides the greatest protection for ground water resources.<sup>98</sup> In order to ensure the integrity of the casing and cement, each well is specifically designed to handle the various downhole pressures and forces.<sup>99</sup> “It is the prime responsibility of operating companies, drilling contractors, and their drilling engineers and supervisors to design and review the design of the casing.”<sup>100</sup>

Despite the individualized nature of well design, there are two examples of uniformity that work to ensure the sufficiency of the operations.<sup>101</sup> First, industry organizations—such as the American Petroleum Institute (“API”)—regularly publish and work to continually update suggested best practices that provide important baselines, such as for well design.<sup>102</sup> Second, as of 2007, all twenty-seven oil and gas producing states had some level of regulation in place to ensure environmental safety through a permitting process for drilling, completing, and operating wells.<sup>103</sup> Although these regulations may vary by state, the common thread throughout is the state’s central role in acting to protect both important natural resources and the health of its citizens.<sup>104</sup> Because the well completion stage requires the interaction of state regulators, operators, and industry organizations, regulations intended to protect ground water resources will find their maximum leverage at this point.<sup>105</sup> Although the common refrain of concerned parties typically revolves around fracking,<sup>106</sup> the well completion process—specifically well cementing and casing—is much more central to the environmental safety of the well than an isolated event that occurs during a comparatively short window in a much larger production process.<sup>107</sup>

### C. Public Policy Concerns

Rapid developments in unconventional oil and gas production have prompted state and federal officials to consider legislation or regulation that will keep up with changes in the industry.<sup>108</sup> On the national stage, as many as twelve federal agencies have been engaged in studies or rulemakings involving potential regulation or oversight related to the practice of hydraulic fracturing.<sup>109</sup> Of these, three stand out as potentially the most significant.<sup>110</sup> First, EPA is in the opening stages of a congressionally-directed study of possible water impacts from hydraulic fracturing that will be completed in 2014.<sup>111</sup> In addition, at the urging of the president,<sup>112</sup> the Department of Energy (“DOE”) commissioned a study by the Secretary of Energy’s Advisory Board Shale Gas Subcommittee (“SEAB”) of safety and environmental performance in shale gas production.<sup>113</sup> The SEAB provided its first recommendations in August 2011,<sup>114</sup> and followed those recommendations with a final report in November 2011.<sup>115</sup> Finally, the Department of the Interior, through the Bureau of Land Management (“BLM”), is developing new rules for hydraulic fracturing on federal lands.<sup>116</sup> A draft of the rules leaked shortly after President Obama spoke favorably about the potential of natural gas production in his 2012 State of the Union address.<sup>117</sup> The agency released its proposed rule in May 2012<sup>118</sup> and extended the comment period to allow greater participation.<sup>119</sup> However, it withdrew the rule in January 2013 and will propose a new rule later in Spring

108. See STATE OIL & GAS REGULATIONS, *supra* note 57, at 15.

109. Tennille Tracy, *API: Gov’t Fracking Studies Threaten Nat Gas Production Pace*, RIGZONE (Mar. 1, 2012), [http://www.rigzone.com/news/article.asp?hpf=1&a\\_id=115684](http://www.rigzone.com/news/article.asp?hpf=1&a_id=115684).

110. See *Hydraulic Fracturing Background Information*, *supra* note 62; see also NINETY-DAY REPORT, *supra* note 40, at 5 (describing DOE’s creation of the SEAB shale gas subcommittee); see also Jennifer A. Dlouhy, *Regulators Prepare to Update Fracturing Rules*, HOUS. CHRON. (Oct. 31, 2011), <http://www.chron.com/business/article/Regulators-prepare-to-update-fracturing-rules-2245790.php> (describing efforts by the Dept. of Interior to develop rules for fracking on federal lands).

111. *Hydraulic Fracturing Background Information*, *supra* note 62.

112. NINETY-DAY REPORT, *supra* note 40, at 5.

113. *Id.*

114. *Id.* at 1.

115. SEC’Y OF ENERGY ADVISORY BD., U.S. DEP’T OF ENERGY, SHALE GAS PRODUCTION SUBCOMMITTEE SECOND NINETY-DAY REPORT 8 (2011), *available at* [http://www.shalegas.energy.gov/resources/111811\\_final\\_report.pdf](http://www.shalegas.energy.gov/resources/111811_final_report.pdf).

116. Dlouhy, *supra* note 110.

117. Timothy Gardner & Ayesha Rascoe, *U.S. to Require Disclosure of Fracking Fluids on Public Land*, REUTERS (Feb. 3, 2012, 5:59 PM), <http://www.reuters.com/article/2012/02/03/us-usa-fracking-interior-idUSTRE8121ZT20120203>; see also Katarzyna Klimasinska, *Draft Fracking Rule Has “Good Elements,” Environmentalist Says*, BLOOMBERG (Feb. 3, 2012), <http://www.bloomberg.com/news/print/2012-02-04/draft-fracking-rule-has-good-elements-environmentalist-says.html> (describing the reaction of some stakeholders to the initial draft proposal of the rule).

118. Press Release, Bureau of Land Mgmt., Interior Releases Draft Rule Requiring Public Disclosure of Chemicals Used in Hydraulic Fracturing on Public and Indian Lands (May 4, 2012), *available at* <http://www.doi.gov/news/pressreleases/Interior-Releases-Draft-Rule-Requiring-Public-Disclosure-of-Chemicals-Used-in-Hydraulic-Fracturing-on-Public-and-Indian-Lands.cfm#>.

119. News Release, Bureau of Land Mgmt., Bureau of Land Management Extends Public Comment Period for Proposed Hydraulic Fracturing Rule (June 26, 2012), *available at* [http://www.blm.gov/ut/st/en/info/newsroom/2012/june/bureau\\_of\\_land\\_management0.html](http://www.blm.gov/ut/st/en/info/newsroom/2012/june/bureau_of_land_management0.html).

96. The cement’s role is twofold: (1) to provide a barrier to ensure isolation from the surrounding geologic formations including groundwater and (2) to provide stability and support to the steel casing. *Id.* at 5–6.

97. “Downhole” simply refers to pressure and material within the wellbore. See, e.g., TEX. COMPTROLLER OF PUB. AUDIT DIV., OIL AND GAS WELL SERVICING MANUAL 23 (2010) *available at* [www.window.state.tx.us/taxinfo/audit/oilgas/Oil\\_and\\_Gas\\_Well\\_Servicing.pdf](http://www.window.state.tx.us/taxinfo/audit/oilgas/Oil_and_Gas_Well_Servicing.pdf) (defining “downhole” as “[p]ertaining to the wellbore”).

98. According to the Ground Water Protection Council (“GWPC”), cement not only prevents horizontal migration but also provides a hydraulic barrier that prevents vertical migration of what is in the well. STATE OIL & GAS REGULATIONS, *supra* note 57, at 21; AM. PETROLEUM INST., *supra* note 71, at 5–8.

99. AM. PETROLEUM INST., *supra* note 71, at 4–5.

100. *Id.* at 4.

101. See, e.g., *id.* at 2–20 (describing well construction and integrity guidelines developed by the American Petroleum Institute (“API”) as a tool appropriate for use in developing state-appropriate well construction practices).

102. STATE OIL & GAS REGULATIONS, *supra* note 57, at 17–18.

103. *Id.*

104. See *id.*

105. See e.g., MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 26–27 (describing the interaction of state regulatory agencies and other stakeholders); see also AMANN ET AL., *supra* note 31 at 17 (describing the importance of collaboration between state regulators and other stakeholders in public perception of fracking).

106. *Id.*

107. AMANN ET AL., *supra* note 31, at Appendix: Community and the Environment Fact Sheet.

2013.<sup>120</sup> Although these studies and activities indicate federal interest, each of these agencies' power is circumscribed by the limitations in the SDWA put in place by the Energy Policy Act of 2005.<sup>121</sup>

Meanwhile, on the state level, surveys by the Interstate Oil and Gas Compact Commission ("IOGCC") show that states have likewise been active in promulgating rules related to shale gas development.<sup>122</sup> In particular, states with oil and gas production have regulations in place governing the casing and cementing that ensure the integrity of the well.<sup>123</sup> These states rely on inspectors who ensure that activities, including hydraulic fracturing, are done safely and in complete compliance with state regulation.<sup>124</sup> This leads to an important issue: states have the regulations in place, but there are persistent concerns about the sufficiency of regulatory activity due to constrained resources.<sup>125</sup> With increases in drilling and production activity, states have sought to increase enforcement staffing levels in order to ensure adequate oversight.<sup>126</sup>

Going forward, there appear to be two alternatives regarding the future regulation of shale gas development.<sup>127</sup> First, the exemption in the Energy Policy Act of 2005, known as the "Halliburton Loophole," which precludes federal jurisdiction over hydraulic fracturing under the SDWA, could be rescinded.<sup>128</sup> This alternative has been attempted in the last two Congresses through legislation, known as the FRAC Act, proposed by Rep. Diana DeGette (D-Colo.).<sup>129</sup> The failure of this legislation to gain traction, however, highlights the necessity of a second alternative.<sup>130</sup>

Instead of rescinding EPA's exemption and rewriting federal law, a second alternative would be for states, which are currently regulating this activity, to collaborate in the exercise of their own jurisdiction to ensure the sufficiency of

their own oil and gas regulations when it comes to hydraulic fracturing.<sup>131</sup> By using industry benchmarks and standards related to hydraulic fracturing, such as those promoted by API<sup>132</sup> and STRONGER, states can ensure public health and environmental safety for their own lands, environment, and citizens.<sup>133</sup> In fact, the ability of states to be sensitive to the need to protect natural resources while retaining flexibility in their regulatory approach demonstrates the superiority of a state-centric approach to the regulation of fracking.

### III. How Are States Doing With Fracking Regulation?

Simply pointing to the number of state regulatory agencies and their respective programs is not enough.<sup>134</sup> Rather, the substance of these regulatory efforts must be evaluated to determine the sufficiency of the rules currently in place—in particular, how these regulations have adapted to the emergence of unconventional oil and gas production and new technologies such as fracking.<sup>135</sup> Having isolated fracking as a unique stimulation technique within the well completion and construction process, this Note will next consider the rules implicated during this process and what four states are doing in response to the challenges presented by the process. This Note will analyze state regulations in Arkansas, Colorado, Texas, and Pennsylvania,<sup>136</sup> comparing them to each other and to third-party evaluation criteria from the multi-stakeholder organization STRONGER.<sup>137</sup> These states were selected because of their recent regulatory activity related to fracking,<sup>138</sup> their history with the oil and gas industry,<sup>139</sup> and

120. See Ben Geman, *Obama Officials Delay "Fracking" Rules*, THE HILL (Jan. 18, 2013), <http://thehill.com/blogs/e2-wire/e2-wire/278107-interior-pumps-brakes-on-gas-fracking-rule-plans-revision>.

121. Public Health Services Act, 42 U.S.C. § 300h(d)(1) (2012); see also Energy Policy Act of 2005, § 321, Pub. L. No. 109-58, 119 Stat. 594, 694 (2005) (amending Safe Drinking Water Act § 1421, 42 U.S.C. § 300h (2006)).

122. AMANN ET AL., *supra* note 31, at Appendix: Shale Gas in the U.S Fact Sheet.

123. *Id.*

124. *Id.*

125. See Hannah Wiseman, *Regulatory Adaptation in Fracturing Appalachia*, 21 VILL. ENVTL. L.J. 229, 248 (2010) (detailing concerns with the sufficiency of state regulations as far back as 1988). A recent study released by Earthworks argues that state regulatory agencies are failing to maintain adequate oversight and are only inspecting a fraction of the wells in their respective states. See EARTHWORKS, *BREAKING ALL THE RULES: THE CRISIS IN OIL AND GAS REGULATORY ENFORCEMENT* 8 (2012), available at [www.earthworkSACTION.org/files/publications/FINAL-US-enforcement-sm.pdf](http://www.earthworkSACTION.org/files/publications/FINAL-US-enforcement-sm.pdf).

126. See STRONGER, PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW 19 (2010) [hereinafter PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW], available at <http://www.strongerinc.org/sites/all/themes/stronger02/downloads/PA%20HF%20Review%20Print%20Version.pdf>.

127. See Wiseman, *supra* note 31, at 142–46; see also AMANN ET AL., *supra* note 31, at 17–19 (providing recommendations for actions to be taken by stakeholders on the federal and state level).

128. Wiseman, *supra* note 31, at 144–45.

129. Rep. DeGette attempted this legislation for the first time during the 111th Cong. See Office of Dianne DeGette, *DeGette, Hinchey, and Polis Introduce FRAC Act to Ensure Safe Drinking* (Mar. 15, 2011), [http://degette.house.gov/index.php?option=com\\_content&view=article&id=1056:degette-hinchey-and-polis-introduce-frac-act-to-ensure-safe-drilling&catid=76:press-releases-&Itemid=227](http://degette.house.gov/index.php?option=com_content&view=article&id=1056:degette-hinchey-and-polis-introduce-frac-act-to-ensure-safe-drilling&catid=76:press-releases-&Itemid=227) (describing the Fracturing Responsibility and Awareness of Chemicals Act of 2011, H.R. 1084, 112th Cong. § 2(a) (2011)).

130. See discussion *infra* Part II.

131. AMANN ET AL., *supra* note 31, at 17.

132. API has been accredited as a standards setting organization by the American National Standards Institute ("ANSI"). API began establishing standards for oil and gas operations in 1924 and currently has more than 600 of them. API develops these standards "collaboratively by industry experts and others from government, academia and other interested stakeholders, including professional societies." Bill Bush, *ANSI Reaccredits API's Standards Program*, AMER. PETROLEUM INST., <http://www.api.org/news-and-media/news/newsitems/2011/oct-2011/ansi-reaccredits-apis-standards-program.aspx> (last visited Oct. 26, 2012).

133. See AMANN ET AL., *supra* note 31, at 17.

134. See, e.g., Letter from the STRONGER Board to Persons Interested in the Hydraulic Fracturing Guidelines (Feb. 8, 2010) [hereinafter STRONGER Letter] (on file with GW JEEL) (describing updates to STRONGER's guidelines intended to provide a rubric for analyzing the sufficiency of state regulations related to fracking).

135. See *id.*

136. See STATE OIL & GAS REGULATIONS, *supra* note 57, at 17–18. As mentioned above, twenty-seven states currently have some form of oil and gas production activity and concurrent regulatory efforts. Although analysis of this entire spectrum would be instructive, the selected states provide ample information for developing model legislation.

137. STRONGER provides a useful metric for this evaluation for three reasons: (1) STRONGER has published, applied and updated guidelines for oil and gas regulation including specific requirements for fracking; (2) STRONGER is a collaborative effort among state regulators, industry, and environmental concerns; and (3) the voluntary nature of state reviews and success in implementing updates to state regulations demonstrates how influential this organization and review process has been. See *The Process*, *supra* note 30; see also STRONGER Letter, *supra* note 134 (explaining the importance of developing additional guidelines for fracking).

138. See discussion *infra* Parts III.A.1–A.4.

139. See discussion *infra* Parts III.A.1–A.4.

because they have been subjected to analysis by trade and stakeholder associations.<sup>140</sup>

### A. Choosing States for Comparison

Arkansas has a long history of oil and gas production,<sup>141</sup> but the emergence of unconventional natural gas production in the Fayetteville Shale region has reinvigorated a declining industry in the state and renewed interest in the sector.<sup>142</sup> For example, a 2008 economic impact study conducted by the University of Arkansas and sponsored by industry organizations projected \$17.9 billion in new economic activity and as many as 4,600 new jobs created between 2008 and 2012.<sup>143</sup> This development, according to the estimate, will add \$1.8 billion in tax revenues from Fayetteville Shale activity.<sup>144</sup>

The industry's renewed importance to the state prompted some to question the need for a revamped regulatory structure capable of effectively monitoring operations in order to protect the environment.<sup>145</sup> Regulation in Arkansas is divided between two regulatory agencies.<sup>146</sup> The Arkansas Oil and Gas Commission ("AOGC") has authority over any person or activity related to the "exploration, production, and conservation of oil and gas."<sup>147</sup> In addition, the Arkansas Department of Environmental Quality is responsible for environmental regulation within the state.<sup>148</sup> Because this Note is primarily focused on the exploration and production side of oil and gas operations, the relevant regulations to consider are those promulgated by the AOGC.<sup>149</sup> In 2010, the AOGC proposed an amendment to Commission General Rule B-19 "Requirements for Well Completion Utilizing Fracture Stimulation."<sup>150</sup> In 2011, AOGC announced changes to General Rule B-15 that included specific casing requirements for wells in the Fayetteville Shale region.<sup>151</sup>

Colorado, which ranks among the nation's leaders in both oil and gas production, has taken the regulation of hydraulic fracturing seriously because almost all of its active wells have been fracked.<sup>152</sup> In addition, the state has experienced a significant amount of pressure to create stronger regulations for

the oil and gas industry due to its prominent role in the documentary *Gasland*.<sup>153</sup> In particular, the film's focus on homeowners who were able to light their tap water on fire due to high methane concentration placed significant pressure on both industry and regulators in the state to respond.<sup>154</sup> According to the Colorado Oil and Gas Conservation Commission ("COGCC"), the state has added or amended eight rules related to oil and gas operations.<sup>155</sup> Although almost all of these amended rules relate in some way to fracking operations, the following rules are most relevant to this Note's focus: Rule 317: "General Drilling Rules" (including enhanced casing and cementing requirements)<sup>156</sup> and Rule 341: "Bradenhead Monitoring During Well Stimulation Operations" (monitoring well pressure during hydraulic fracturing).<sup>157</sup> In 2011, the COGCC volunteered for a review by STRONGER.<sup>158</sup> These steps have given Colorado a reputation as one of the toughest oil and gas regulating states in the nation.<sup>159</sup>

In a situation very similar to that of Colorado, Pennsylvania has come under intense scrutiny for its handling of the emerging natural gas development in the Marcellus Shale.<sup>160</sup> Also like Colorado, reports of methane contamination of groundwater have raised concerns about the safety of operations.<sup>161</sup> Although many of these concerns involve the handling of wastewater after fracturing operations, the fact that nearly all wells drilled in Pennsylvania are fracked continues to raise concerns about what happens under the ground.<sup>162</sup> The state has been proactive in its approach to casing standards and has done so in a way that has been supported by industry.<sup>163</sup> In fact, industry cooperation has been important for the development of these new standards.<sup>164</sup> "[M]any, if not all, Marcellus [Shale] well operators met or exceeded current well casing and cementing regulations."<sup>165</sup> As the situation has continued to evolve,<sup>166</sup> industry has banded together with regulators to continually raise the bar for well construc-

available at <http://www.strongerinc.org/sites/all/themes/stronger02/downloads/Colorado%20HF%20Review%202011.pdf>.

153. See COLO. OIL & GAS CONSERVATION COMM'N, *GASLAND FACTS 4* (2010), available at <https://cogcc.state.co.us/library/GASLAND%20DOC.pdf>.

154. *Id.* at 1–4.

155. *Id.* at 4.

156. See COLO. OIL & GAS CONSERVATION COMM'N RULES & REGS., R. 317 (2012), available at [http://cogcc.state.co.us/RR\\_Docs\\_new/rules/300Series.pdf](http://cogcc.state.co.us/RR_Docs_new/rules/300Series.pdf).

157. See COLO. OIL & GAS CONSERVATION COMM'N RULES & REGS., R. 341 (2012), available at [http://cogcc.state.co.us/RR\\_Docs\\_new/rules/300Series.pdf](http://cogcc.state.co.us/RR_Docs_new/rules/300Series.pdf).

158. COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 2.

159. In fact, the governor of Colorado has publicly touted the toughness of Colorado's fracking regulations. See, e.g., *Colorado Governor Prefers State Regulation of Drilling*, CBS DENVER (Mar. 8, 2012, 2:53 PM), <http://denver.cbslocal.com/2012/03/08/colorado-governor-prefers-state-regulation-of-drilling/> ("Most governors are going to argue that it should be a state responsibility. We can create regulations that are less onerous but more effective than blanket regulations that come out of Washington.").

160. PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW, *supra* note 126, at 4–11.

161. *Id.* at 26.

162. See *id.* at 7–9.

163. Lynn Kerr McKay et al., *Science and the Reasonable Development of Marcellus Shale Natural Gas Resources in Pennsylvania and New York*, 32 ENERGY L.J. 125, 133 (2011).

164. *Id.*

165. *Id.* (citation omitted).

166. See *supra* p. 122.

140. See discussion *infra* Parts III.A.1–A.4.

141. See STRONGER, ARKANSAS HYDRAULIC FRACTURING STATE REVIEW 7 (2012) [hereinafter ARKANSAS HYDRAULIC FRACTURING STATE REVIEW], available at <http://www.strongerinc.org/sites/all/themes/stronger02/downloads/Arkansas%20HF%20Review%202012.pdf>.

142. See Adam J. Bailey, *The Fayetteville Shale Play and the Need to Rethink Environmental Regulation of Oil and Gas Development in Arkansas*, 63 ARK. L. REV. 815, 816–18 (2010).

143. UNIV. OF ARK., PROJECTING THE ECONOMIC IMPACT OF THE FAYETTEVILLE SHALE PLAY FOR 2008–2012, at iii (2009), available at [http://www.arkansasdc.com/media/1708/fayetteville%20shale%20economic%20impact%20study%20\(2008-2012\).pdf](http://www.arkansasdc.com/media/1708/fayetteville%20shale%20economic%20impact%20study%20(2008-2012).pdf).

144. See *id.* at iv.

145. Bailey, *supra* note 142, at 817–19.

146. *Id.* at 818–19.

147. *Id.* at 830.

148. *Id.* at 833.

149. See *supra* p. 127.

150. ARK. OIL & GAS COMM'N, NOTICE OF RULE CHANGE: REQUEST FOR PUBLIC COMMENT (2010), available at <http://www.aogc.state.ar.us/PDF/Notice%20B-19%20Notice.pdf>.

151. ARK. OIL & GAS COMM'N, NOTICE TO FAYETTEVILLE SHALE OPERATORS (2011).

152. See STRONGER, COLORADO HYDRAULIC FRACTURING STATE REVIEW 8 (2011) [hereinafter COLORADO HYDRAULIC FRACTURING STATE REVIEW],



tion standards in the state.<sup>167</sup> For example, the state promulgated new strengthened standards for well construction, cementing, and casing that took effect in February 2011.<sup>168</sup>

No survey of oil and gas regulation would be complete without consideration of the prevailing regulatory structure in the Lone Star State, particularly because it was home to the first significant commercial exploitation of fracking and horizontal drilling.<sup>169</sup> The Railroad Commission of Texas (“RRC”) regulates the oil and gas industry in Texas.<sup>170</sup> The RRC maintains responsibility for permitting oil and gas wells and monitoring activity from drilling through production.<sup>171</sup> It is particularly important to look at the developments in Texas because the state had a thoroughly developed regulatory structure for oil and gas operations prior to the shale revolution.<sup>172</sup> Currently, the state does not specifically regulate hydraulic fracturing activity through a unique set of rules specifically targeting fracking.<sup>173</sup> The closest the state has come to a frack-specific law was with the recently passed disclosure requirements<sup>174</sup> related to fracking fluid.<sup>175</sup> In addition, the RRC proposed amendments to §3.13 of Title 16 of the Texas Administrative Code in August 2012 that would strengthen the state’s regulatory regime in a number of ways including increased stringency for well casing and cementing.<sup>176</sup> The proposed rule would also create a new subsection that includes requirements for wells that will be fracked.<sup>177</sup> The comment period for the rule remains open at the time of this writing.<sup>178</sup> Regardless of the outcome, such a proposal by the RRC reflects the necessity for regulators in all oil and gas producing states to continuously seek improved regulations that keep up with advances in industry practice.

167. See McKay et al., *supra* note 163, at 133.

168. *Well Drilling, Operation and Plugging*, 41 Pa. Bull. 805 (Feb. 5, 2011) (to be codified at 25 PA. CODE. Ch. 78), available at <http://www.pabulletin.com/secure/data/vol41/41-6/239.html> (“The purpose of this final-form rulemaking is to improve drilling, casing, cement, testing, monitoring and plugging requirements for oil and gas wells to minimize gas migration and protect water supplies.”).

169. See U.S. ENERGY INFO. ADMIN., REVIEW OF EMERGING RESOURCES, *supra* note 21, at 4.

170. INTERSTATE OIL & GAS COMPACT COMM’N, *Texas State Progress: Shale Gas, GROUNDWORK*, <http://groundwork.ioGCC.org/content/texas-state-progress-shale-gas> [hereinafter *Texas State Progress*] (last visited Dec. 18, 2012) (noting that the RRC has been regulating oil and gas operations in the state for more than 100 years).

171. *Id.*

172. *Id.*

173. *Id.*

174. Disclosure has been a significant issue for a number of states during the last year. Because of the significant amount of regulatory and legislative action on this front, this Note does not attempt to engage the issue for fear it would swallow the more focused scope of well construction standards. As a result, disclosure, as a stand-alone issue related to fracking fluid, is beyond the scope of the Note.

175. Kate Galbraith, *Texas Fracking Disclosure to Start in February*, TEX. TRIB. (Dec. 13, 2011), <http://www.texastribune.org/texas-energy/energy/fracking-disclosure-rules-passed-texas-win-praise/>.

176. See Memorandum from Cristina Self, Attorney, Special Counsel Section of Office of Gen. Counsel, to Barry T. Smitherman, Chairman, R.R. Comm’n of Tex. 1 (Aug. 21, 2012), available at <http://www.rrc.state.tx.us/rules/prop-amend-3-13-Aug21-2012.PDF>.

177. See *id.*, at 4-5.

178. *Railroad Commission of Texas Proposed Rules*, R.R. COMM’N OF TEX., <http://www.rrc.state.tx.us/rules/proposed.php> (last updated Dec. 11, 2012).

## B. Criteria for Analysis From STRONGER Framework

As mentioned above, the non-profit, multi-stakeholder organization known as STRONGER has emerged as one of the most crucial players in the review process of state environmental regulations related to oil and gas production.<sup>179</sup> Beginning with its creation in 1999, STRONGER took responsibility for developing standards and conducting voluntary reviews of state regulatory frameworks.<sup>180</sup> As a result, a total of twenty-two states have undergone review by either STRONGER or an earlier incarnation under which the IOGCC conducted the same reviews.<sup>181</sup>

In 2010, STRONGER published an “Update on the Development of Hydraulic Fracturing Guidelines” to supplement its general guidelines for state regulatory programs by focusing on issues specifically created or exacerbated by fracking.<sup>182</sup> These guidelines cover the entire range of issues from wastewater management, regulator staffing levels, chemical disclosure, cement bond logs, and waste pit management.<sup>183</sup> For the purposes of this Note, the following four criteria are the most important to consider<sup>184</sup>: (1) casing standards; (2) cementing standards; (3) reporting requirements to state regulators; and (4) groundwater and surface water protection efforts.<sup>185</sup> Using these four criteria, the rules and statutes in Arkansas, Colorado, Pennsylvania, and Texas will be considered and compared in order to develop a set of recommendations.

## C. Comparing the States

The following section considers how states are currently regulating each of these criteria by comparing the various approaches utilized by each state’s regulators.

### I. Casing

The importance of updated casing requirements is represented by the various changes states have made following increases in oil and gas production, specifically when fracking is involved.<sup>186</sup> Casing requirements for oil and gas production in Arkansas are present in both the general AOGC rule and the fracking-specific rule.<sup>187</sup> In Rule B-15,

179. MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 27.

180. *Id.*; *Who We Are*, STRONGER, <http://www.strongerinc.org/who-we-are> (last visited Dec. 18, 2012).

181. *Past Reviews*, STRONGER, <http://www.strongerinc.org/past-reviews> (last visited Dec. 18, 2012); see also *The Process*, *supra* note 30 (“The state review process has undergone a number of changes since its inception. . . . The guidelines have periodically been updated and expanded in scope. Management of the process has shifted to a non-profit corporation named State Review of Oil and Natural Gas Environmental Regulations (STRONGER).”).

182. STRONGER Letter, *supra* note 134.

183. *Id.*

184. These criteria represent the critical elements for ensuring integrity during the well completion process discussed in Part II.B. Compare *id.* with discussion *supra* Part II.B.

185. *Id.*

186. See COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 5; PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW, *supra* note 126, at 8.

187. See ARK. OIL & GAS COMM’N GEN. RULES & REGS., R. B-15, B-19 (2012), available at <http://www.aogc.state.ar.us/onlineData/forms/rules%20and%20>

the AOGC specifies the depth to which surface casing must be placed based on the region of the state where the operations are conducted.<sup>188</sup> The fracking-specific regulations for the Fayetteville Shale region include requirements that the design for casing be able to “withstand the anticipated maximum pressures to which the casing will be subjected in the well.”<sup>189</sup> In addition, the initial drilling application must include the kind of well (vertical or horizontal), the estimated casing depths, and the “casing grade and minimum internal yield pressure” for the proposed casing.<sup>190</sup> Arkansas does not require specific pressure tests for the casing, but instead regulates the pressure for the frack based on the casing used in the well’s design.<sup>191</sup>

In Texas, the RRC’s general drilling rules set minimum requirements for the casing based on the pressure it must be able to withstand.<sup>192</sup> However, unlike Arkansas, Texas’ rule requires one of a variety of pressure tests, including hydrostatic, ultrasonic, radiation thickness gauging, or magnetic particle inspection.<sup>193</sup> In addition, the rule goes into great detail regarding the pressure test requirements, including time intervals for testing the pressure and acceptable ranges for pressure changes.<sup>194</sup> The specificity also extends to casing requirements, which it divides according to surface, production, and intermediate casing.<sup>195</sup>

In Colorado, the current state rule has a number of casing requirements<sup>196</sup> that include specific requirements for pressure tests, similar to those required in Texas.<sup>197</sup> STRONGER, however, recommended two changes related to casing.<sup>198</sup> First, they suggested minimum surface casing depths.<sup>199</sup> According to STRONGER, a minimum surface casing depth would ensure the protection of aquifers and require the well to be designed to meet pressure requirements.<sup>200</sup> Second, STRONGER suggested establishing maximum surface casing depths as a way of incorporating data from past instances when casing or cementing failed.<sup>201</sup>

Pennsylvania adopted significant revisions to the casing requirements in §78.84 of the state’s drilling regulations.<sup>202</sup> These new rules require standards for the cementing and cas-

ing plan to be established prior to operations.<sup>203</sup> Likewise, the operator must meet requirements related to the kind of casing, the depth for casing to be placed, and certain pressure tests.<sup>204</sup> The specificity of the rule even includes requirements for the certification of the individuals welding the casing.<sup>205</sup>

## 2. Cementing

As the sheath surrounding the casing, cement also plays a crucial role in the isolation of the wellbore and the protection of resources.<sup>206</sup> In Arkansas, cementing requirements are included in the general and fracking rule of the AOGC.<sup>207</sup> The cement procedure for surface casing specifies the method for cementing,<sup>208</sup> a minimum time for the cement to set up,<sup>209</sup> and depth requirements.<sup>210</sup> For example, the cementing for production casing must be a minimum of 250 feet above any producing interval and must be allowed to set for 24 hours before the plug is drilled.<sup>211</sup> Surface casing must be cemented to the surface and can require up to 1,500 feet of cement.<sup>212</sup> Likewise, when it comes to cement used for fracking operations, the AOGC requires “sufficient cement volume and integrity to prohibit movement of fracture fluids up-hole into the various casing.”<sup>213</sup> The cementing plan required for the permitting application must demonstrate the minimum compressive strength of the cement and the appropriate depth.<sup>214</sup> As with the casing, Arkansas does not require a specific level of pressure test but simply requires that the cement be designed to handle the anticipated level of pressure.<sup>215</sup>

Much like Arkansas’ rules, Colorado’s Rule 317 includes a number of cementing requirements with a substantial amount of specificity.<sup>216</sup> These include both pressure requirements specific to the pounds per square inch (“PSI”) and the amount of time the cement must be allowed to set for production, surface, and intermediate casing.<sup>217</sup> Likewise, the Pennsylvania drilling regulations include very specific requirements for the cement used in operations that include pressure and time requirements as well as compliance with third-party standards such as those promoted by API.<sup>218</sup> In

regulations.pdf.

188. *Id.* at B-15(b).

189. *Id.* at B-19(d)(1).

190. *Id.* at B-19(d)(1)(A)–(C).

191. The rule limits the pressure used in the frack to eighty percent “of the minimum internal yield pressure for such production casing.” *Id.* at B-19(d)(3).

192. 16 TEX. ADMIN. CODE § 3.13(b)(1)(A) (2012).

193. *Id.*

194. The code includes a cap for the pressure requirement 1,500 pounds per square inch. *Id.* at § 3.13(b)(1)(D).

195. *Id.* § 3.13(b)(2)–(4).

196. See COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 10; see also COLO. OIL & GAS CONSERVATION COMM’N, HYDRAULIC FRACTURING PRESENTATION 6 (2010), available at [http://cogcc.state.co.us/Announcements/Hot\\_Topics/Hydraulic\\_Fracturing/COGCC\\_FRACING\\_briefing\\_052011.pdf](http://cogcc.state.co.us/Announcements/Hot_Topics/Hydraulic_Fracturing/COGCC_FRACING_briefing_052011.pdf) (summarizing the various COGCC rules that implicate hydraulic fracturing).

197. COLO. CODE REGS. § 404-1:317(h)–(j) (2011).

198. COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 5–6.

199. *Id.*

200. *Id.*

201. *Id.* at 6.

202. See 25 PA. CODE § 78.84 (2011).

203. *Id.* at § 78.83(a).

204. *Id.* at § 78.84(a)–(d).

205. *Id.* at § 78.84(d)(3).

206. See COLO. OIL & GAS CONSERVATION COMM’N, *supra* note 196, at 16–17.

207. See ARK. OIL & GAS COMM’N GEN. RULES & REGS., R B-15, B-19 (2012), available at <http://www.aogc.state.ar.us/online/data/forms/rules%20and%20regulations.pdf> (outlining requirements for well completion utilizing fracture stimulation).

208. The rule requires cementing in accordance with the “pump and plug method.” *Id.* at B-15(b).

209. *Id.*

210. *Id.* at B-15(b)(1)–(5).

211. *Id.* at B-15(c).

212. *Id.* at B-15(b)(1).

213. *Id.* at B-19(d)(2).

214. *Id.* at B-19(d)(2).

215. See *id.* at B-19(e).

216. COLO. OIL & GAS CONSERVATION COMM’N RULES & REGS., R. 317 (2012), available at [http://cogcc.state.co.us/RR\\_Docs\\_new/rules/300Series.pdf](http://cogcc.state.co.us/RR_Docs_new/rules/300Series.pdf).

217. See *id.* at R. (h)–(i).

218. 25 PA. CODE § 78.85(b) (2011). This regulation also provides for the use of ASTM International C150 Type I, II, or III standards in place of the API version. *Id.* at § 78.85(a).

addition, the cement job must be recorded in a cement job log that must be available for review by regulators inspecting the operation.<sup>219</sup> Similarly, for Texas, the cementing requirements in the RRC rules include a great level of detail<sup>220</sup> including the method for cementing,<sup>221</sup> specific pressure tests, and references to outside standards from organizations such as API.<sup>222</sup>

### 3. Notification and Reporting Requirements

In Arkansas, the first level of notification under the AOGC rules deals with the initial permitting application, which requires the notification of “intent to perform Hydraulic Fracturing Treatment.”<sup>223</sup> If the initial drilling permit application does not include such a notice, however, the AOGC allows the operator to carry out fracturing activity, but only after the Permit Holder has notified AOGC.<sup>224</sup> Another notification requirement in Rule B-19 requires Permit Holders to notify the Director of AOGC within twenty-four hours if there is any reason for the Permit Holder to question the integrity of the casing and cementing done on the well.<sup>225</sup> After being notified, the Director or agency personnel may review the cement bond logs and require additional work to be conducted prior to the actual fracturing of the well.<sup>226</sup> Once the hydraulic fracturing operations are completed, the Permit Holder must disclose many of the details about the frack, including the chemicals used,<sup>227</sup> to the Director or designated AOGC personnel in accordance with the time period specified in Rule B-15.<sup>228</sup> Likewise, in Pennsylvania, notification requirements in the state’s newly promulgated rules include minimums for the amount of time before activities, such as cementing, that the operator can go before alerting the Department of Environmental Protection (“DEP”).<sup>229</sup>

Although the Arkansas rules clearly indicate that the permit holder must maintain documentation, such as a cement bond log, this is not a specified area of post-operation disclosure.<sup>230</sup> Rather, the records are to be kept and made available

at the Director’s discretion in the event there are problems with the well, which might be an unsatisfying end for proponents of notification and disclosure.<sup>231</sup> In contrast, Colorado requires operators to include a cement bond log for all production casing and intermediate casing (when they are run), along with certain other logs required to be disclosed in the Well Completion or Recompletion Report and Log.<sup>232</sup> The only recommendation for Colorado regulators by STRONGER dealing with completion reports involved changes to include greater specificity about fracturing fluid and proppant.<sup>233</sup> In addition, Pennsylvania operators are subject to specific recordkeeping and notification requirements for cementing and casing requirements under §78.<sup>234</sup> In Texas, once drilling and stimulation activity is completed on the well, operators are required to disclose data related to the frack.<sup>235</sup>

### 4. Groundwater Protection

With the development of shale gas plays through the use of fracking, groundwater contamination has become a significant area of concern because fracking adds a number of additional variables to the production process.<sup>236</sup> Although most of these water issues are beyond the scope of this Note, they are worth mentioning because they reinforce the sensitivity of state regulators to the issue. States have been concerned with groundwater protection for a long time.<sup>237</sup> The protection of groundwater is a common theme throughout the rules for oil and gas drilling in many states, including Arkansas.<sup>238</sup> First, the AOGC clearly spells out this goal when it says, “[a]ll fresh water sands shall be fully protected by the setting and cementing of surface casing to prevent the fresh water sands from becoming contaminated with oil, gas, or salt water.”<sup>239</sup> Moreover, the rules go on to provide the Director with sufficient discretionary authority to take measures deemed necessary “for the purpose of safety or for the protection of fresh water sands.”<sup>240</sup>

Much like in Arkansas, the use and abuse of water is a concern in Colorado, where the scarcity of the resource and the significant volumes of water used in fracking have given reason for alarm.<sup>241</sup> Like Arkansas, Colorado’s rules include a specific requirement to protect groundwater through casing.<sup>242</sup> In their review of Colorado’s rules, STRONGER made specific recommendations for amend-

219. *Id.* at § 78.85(f).

220. *See, e.g.*, 16 TEX. ADMIN. CODE § 3.13(b) (2012) (including casing and cementing requirements with specific time, pressure, depth, and other technical specifications for each step in the completion process).

221. The method is required to be a “pump and plug method. . . . to fill the annular space outside the casing from the shoe to the ground surface.” *Id.* at § 3.13(b)(2)(B).

222. *Id.* at § 3.13(b)(2)(F).

223. ARK. OIL AND GAS COMM’N GEN. RULES & REGS. B-19(c) (2012), available at <http://www.aogc.state.ar.us/online/data/forms/rules%20and%20regulations.pdf>.

224. *Id.*

225. *Id.* at B-19(f).

226. *Id.*

227. Arkansas requires the disclosure of chemical constituents and the associated Chemical Abstract Service number, but does provide an exemption for trade secrets. *See id.* at B-19(k)(8).

228. *Id.* at B-19(k).

229. *See* 25 PA. CODE § 78.85(e) (2011) (“The operator shall notify the Department a minimum of 1 day before cementing of the surface casing begins, unless the cementing operation begins within 72 hours of commencement of drilling.”).

230. *See* ARK. OIL AND GAS COMM’N GEN. RULES & REGS. B-19(k) (2012), available at <http://www.aogc.state.ar.us/online/data/forms/rules%20and%20regulations.pdf>.

231. *See id.* at B-19(f).

232. COLO. CODE REGS. § 404-1-317(o) (2011).

233. COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 6.

234. *See* 25 PA. CODE § 78.85(e)–(f).

235. *See Texas State Progress*, *supra* note 170.

236. *See* STATE OIL & GAS REGULATIONS, *supra* note 57, at 23.

237. *See id.* at 10.

238. *See* ARK. OIL & GAS COMM’N GEN. RULES & REGS. B-15(b)(2012), available at <http://www.aogc.state.ar.us/online/data/forms/rules%20and%20regulations.pdf>.

239. *Id.*

240. *Id.* at B-15(d).

241. *See* COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 7.

242. COLO. OIL & GAS CONSERVATION COMM’N RULES & REGS., R. 317(d) (2012), available at [http://cogcc.state.co.us/RR\\_Docs\\_new/rules/300Series.pdf](http://cogcc.state.co.us/RR_Docs_new/rules/300Series.pdf).

ing the state's plan for managing scarce water resources.<sup>243</sup> STRONGER recommended that the COGCC consider taking steps that would promote the reuse and recycling of the water used in fracking fluid to avoid potentially straining the state's water resources.<sup>244</sup>

As was seen with other states, including Arkansas and Colorado, the RRC drilling rules include specific requirements for the protection of "all usable-quality water strata."<sup>245</sup> Interestingly, the rule gives responsibility for defining water strata to the Texas Council of Environmental Quality, which is in charge of environmental protection in the state.<sup>246</sup>

Other states, such as Pennsylvania, have dealt with water issues by focusing on the regulation of the entire lifecycle of the water used in fracking.<sup>247</sup> The situation from the state's perspective is complicated because of two interstate compacts<sup>248</sup> that influence DEP's ability to permit water use.<sup>249</sup> Water issues are further exacerbated by the fact that Pennsylvania, unlike Arkansas and Texas, has fewer options for the handling of wastewater because of an extremely limited number of underground injection wells.<sup>250</sup> Operators in the Marcellus Shale have increasingly reused flowback water, but much of the wastewater must be transported to treatment facilities both inside and outside of the state.<sup>251</sup>

States protect water resources through casing and cementing regulations, such as Pennsylvania's drilling regulations that require casing and the setting of cement "approximately fifty feet below the deepest fresh groundwater or at least fifty feet into consolidated rock, whichever is deeper."<sup>252</sup> In addition, if more groundwater is encountered after the placement of the initial permanent casing, the operator must install an additional string of casing to "isolate and protect fresh groundwater."<sup>253</sup> These rules reflect that the state is serious about the protection of its groundwater resources.<sup>254</sup>

#### IV. Proposed Solutions

After considering the regulatory framework of these four states, there are a number of striking similarities.<sup>255</sup> Each state has a regulatory structure in place for cementing, casing, notification requirements, and protection of groundwater from underground contamination.<sup>256</sup> Despite these broad

similarities, each state has unique features that define the regulatory agency's approach to oversight.<sup>257</sup> This diversity underscores the decision made by STRONGER to make general guidelines rather than a specific, "one-size-fits-all" approach to be uniformly applied across all states or geologic formations.<sup>258</sup> Perhaps no state better represents this paradigm than Arkansas, which not only had field-specific regulations for development of oil and gas resources in established fields, but also included regional divisions that established casing and cementing depth requirements by county.<sup>259</sup>

Although the recognition of regional geologic and political differences is a necessary prerequisite to the regulation of fracking, simply invoking federalism as a justification for regulatory diversity is not sufficient to ensure the protection of the environment and oil and gas resources.<sup>260</sup> Rather, states must embrace their traditional role as the regulator of oil and gas industry. After all, local populations ultimately bear the impacts, for better or worse, of oil and gas exploration and production.<sup>261</sup> The proximity of state regulators to both those impacted and to the unique factors that exist on the ground demonstrates that states are in the best position to handle fracking.<sup>262</sup>

However, the appropriate solution will also build on collaborative efforts such as those by IOGCC,<sup>263</sup> GWPC,<sup>264</sup> and STRONGER<sup>265</sup> which allow states to coordinate their efforts and share their experiences. Because these existing organizations and programs already bring together a diverse set of stakeholders, participating states will be able to draw on a wide range of experiences and implement best practices.<sup>266</sup> Moreover, as evidenced by recent efforts to refine Pennsylvania's rules,<sup>267</sup> regulatory agencies must constantly be improving their approach in order to keep up with the technological advances redefining this industry.<sup>268</sup> For example, Pennsylvania was reviewed by STRONGER in 2004 but requested another look by 2010, a short turn around in regulatory time.<sup>269</sup> By recognizing this reality, states can

257. *See id.*

258. The description of a "one-size-fits-all" approach refers to a regulatory approach that attempts to set a broad uniform standard. As discussed throughout the note, the inherent diversity of oil and gas-bearing formations makes such an approach untenable. As an alternative, STRONGER's general guidelines provide a framework for regulators to use when considering the general challenges that will be faced. However, this approach leaves the final details up to the individual state regulators who are presumably more attuned to the particular local or regional issues. STRONGER Letter, *supra* note 134, at 1.

259. *See* ARK. OIL AND GAS COMM'N GEN. RULES & REGS., R. B-15 (2012), available at <http://www.aogc.state.ar.us/online/data/forms/rules%20and%20regulations.pdf>.

260. *See supra* Part III.A.1.

261. MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 25–26.

262. *See id.*

263. *See What We Do*, INTERSTATE OIL & GAS COMPACT COMM'N, <http://www.iogcc.state.ok.us/what-we-do> (last visited Dec. 18, 2012).

264. *See* STATE OIL & GAS REGULATIONS, *supra* note 57, at 6. The GWPC has developed a web-based information sharing portal known as the Risk Based Data Management System. *See About RBDMS.net*, GROUND WATER RESEARCH & EDUC. FOUND., <http://rbdmsonline.org/GWPC/About.aspx> (last visited Dec. 18, 2012).

265. *See* STRONGER Letter, *supra* note 134, at 1.

266. NINETY-DAY REPORT, *supra* note 40, at 14–15.

267. *See generally*, *Well Drilling, Operation and Plugging*, *supra* note 168.

268. *See supra* Part I.A.

269. PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW, *supra* note 126, at 2–3.

243. *See* COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 7.

244. *Id.*

245. 16 TEX. ADMIN. CODE § 3.13(b)(2)(A)(i) (2012).

246. *Id.*

247. *See* COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 4.

248. The Delaware River Basin Commission and the Susquehanna River Basin Commission have significant say over a large amount of the state's water resources. *Id.*

249. *Id.*

250. *Id.* at 21–22.

251. *Id.*

252. 25 PA. CODE § 78.83(c) (2011).

253. *Id.* at § 78.83(f).

254. *See Texas State Progress*, *supra* note 170.

255. *See* discussion *supra* Part III.C.

256. *See id.*

embrace STRONGER's exhortation to avoid "one-size-fits-all" approaches, while also using the following template to ensure they are maintaining, if not improving, the sufficiency of their regulatory efforts. This Note provides a template for states to use when calibrating a regulatory regime suited for its own particular needs and rooted in successful best practices currently in place in other states.

### A. State Regulatory Agencies Must Develop Hydraulic Fracturing-Specific Regulations

Of the states considered in this Note, only Texas has held out when it comes to developing regulations tailored to fracking.<sup>270</sup> The state tacitly acknowledged, however, the pervasive nature of fracking when the legislature passed a disclosure requirement for chemicals used in hydraulic fracturing in 2011.<sup>271</sup> Calling on agencies to develop hydraulic fracturing-specific regulations does not mean that there must be duplicative regulations that create a unique permitting process.<sup>272</sup> Rather, the state regulatory agency<sup>273</sup> should undertake a rulemaking to ensure the existing regulatory structure is sufficient for dealing with all areas related to fracking—casing, cementing, notification, etc.<sup>274</sup> In doing so, states will follow the example of Pennsylvania, where the casing standards were improved to protect against groundwater contamination issues.<sup>275</sup> To accomplish this endeavor, the dedicated state regulatory body should undertake a rulemaking to ensure that:

- (1) current cementing and casing standards meet or exceed the most recent API standards;<sup>276</sup>
- (2) the state has been divided according to geologic features into specific divisions with unique cementing and casing standards for each;<sup>277</sup> and
- (3) the regulatory body retains adequate flexibility to demand changes, as necessary, either through emergency orders from the agency or through a Director empowered to act in emergency situations.<sup>278</sup>

270. See *Texas State Progress* *supra* note 170.

271. See Galbraith, *supra* note 175.

272. See discussion *supra* Part III.C.

273. It is preferable for this to be done by rulemaking to hopefully engender a more collaborative and less politicized effort. If it is in a state such as New York where passions run high on this issue, however, it may be for the best to make it a legislative fix. All of the states reviewed in this Note made changes through the rulemaking process. See discussion *supra* Part III.C.

274. See *id.*; see also ARKANSAS HYDRAULIC FRACTURING STATE REVIEW, *supra* note 141 (demonstrating how a STRONGER review, such as this one performed for the Arkansas Oil and Gas Commission, can ensure the state's regulatory structure is sufficiently stringent in all areas related to fracking).

275. See *Well Drilling, Operation and Plugging*, *supra* note 168.

276. If the regulatory agency sees fit, the API cementing and casing standards can be replaced by an equivalent standard from another organization. Regardless of the source, the agency must put a standard in writing. The advantage of the suite of rules put forth by API is that they enable state regulators to focus their energy on judging the technical specifications and adjusting appropriately rather than forcing the wholesale creation of new, highly technical rules. See 25 PA. CODE § 78.85 (a)–(b) (2010).

277. See ARK. OIL AND GAS COMM'N GEN. RULES & REGS., R. B-15(b) (2012).

278. See, e.g., *id.* at B-15(d) ("The Director may grant exceptions to the above requirements if conditions exist that require more than these requirements for the purpose of safety or for the protection of fresh water sands and oil or gas

These changes would follow Arkansas' flexible system and provide state agencies the appropriate tools to respond to incidents that demand immediate attention.<sup>279</sup>

### B. Any Suite of Rules Must Call for the Development of Enhanced Notification Systems—Before, During, and After

Each of the states considered by this Note maintained some form of communication during the permitting process and after well completion.<sup>280</sup> In order for the relationship between regulators and industry to work best, there must be an ingrained system of communication, such as the system that Colorado has created.<sup>281</sup> This approach makes the contact systematic—not only on the front end, but throughout the process as notification and post-completion reports give regulators the rest of the story. For example, a twenty-four hour rule for the disclosure of pending cementing or fracking operations gives the field workers for state regulatory agencies advance notice to help determine the optimal time to visit operations to determine what is going on and whether it complies with state regulations.<sup>282</sup> In addition, states should develop thorough post-completion reports, similar to those used in Texas, to ensure that all necessary information is being disclosed to regulators.<sup>283</sup> This measure gives operators clear guidelines for notification that would allow operations to continue while simultaneously ensuring communication with state regulators.<sup>284</sup> This notification requirement, however, should not become de facto pre-approval.

In addition, the agency should conduct a study of the ratio of agency staff compared to the relative increase in the number of permit requests or other indicia of shale oil and gas production. If the state has experienced a significant increase in production, it is likely that the pace has outstripped the number of employee hours available on the agency side.<sup>285</sup> Ultimately, the agency should make appropriate recommendations to ensure that sufficient regulatory staff is available both for oversight of fracking operations and for visits to the well pad during other phases of the completion process, such as during cementing.<sup>286</sup> This can occur through budgetary requests or by reorganization of the agency structure.<sup>287</sup> For example, Pennsylvania increased its well permit fees in 2009 and has made oil and gas regulatory activities self-funded.<sup>288</sup>

bearing sands or may establish minimum surface casing requirements in future producing areas not covered by this rule.")

279. Cf. ARKANSAS HYDRAULIC FRACTURING STATE REVIEW, *supra* note 141, at 9.

280. See discussion *supra* Part III.C.3.

281. See e.g., COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 13–14 (requiring operators to provide notice to state regulators 24 hours before commencing drilling operations).

282. See COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 13.

283. See *Texas State Progress*, *supra* note 170.

284. See discussion *infra* Part IV.A.

285. See Abraham Lustgarten, *State Oil and Gas Regulators Are Spread Too Thin to Do Their Jobs*, PROPUBLICA (Dec. 30, 2009, 1:38 PM), <http://www.propublica.org/article/state-oil-and-gas-regulators-are-spread-too-thin-to-do-their-jobs-1230>.

286. See *id.*

287. Pennsylvania helped pay for increased staffing levels for the DEP through increased well permit fees. PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW, *supra* note 126, at 6.

288. *Id.*

As long as shale gas development is on the upswing, it seems such a funding mechanism would enable the agency's budget to grow roughly in proportion to the demand for oversight.<sup>289</sup> Because the number of boots on the ground corresponds directly to the ability of state regulators to conduct effective oversight,<sup>290</sup> state regulators must consider both their current and future budgetary demands.<sup>291</sup> This is one instance in which the fix might not be accomplished through a state agency rulemaking, but may require a legislative fix.<sup>292</sup>

### C. State Regulators Must Build In a Mechanism for Periodic Review of Regulations

As demonstrated by the useful recommendations from the Colorado and Pennsylvania STRONGER reports,<sup>293</sup> the use of a collaborative, multi-stakeholder organization can provide a valuable stamp of approval for state regulators by providing credible, external verification that new or existing regulations are in line with other states and are consistent with the practices supported by industry and environmental organizations.<sup>294</sup> Perhaps most importantly, this review process has received the support of industry organizations and state regulators.<sup>295</sup> Unfortunately, these reviews take time, meaning only so many can be done in a year.<sup>296</sup> As a result, states should not only embrace STRONGER by volunteering for review,<sup>297</sup> but they should likewise provide financial support to enable more reviews.<sup>298</sup> The SEAB reached precisely this conclusion when it recommended additional funding for multi-stakeholder organizations, particularly STRONGER.<sup>299</sup>

STRONGER has three primary benefits. First, STRONGER enables participating states to draw on the experiences gained from existing relationships among industry, other state regulators, and environmental groups.<sup>300</sup> Second, STRONGER's review process is constantly evolving and guidelines are revised to incorporate changes needed to keep regulations up to date, which means that states can be pushed to improve regulations during periodic reviews.<sup>301</sup> Finally, because STRONGER makes state reviews publicly

available, states undergoing review will not only disclose a significant amount of information about their current practices, but they will likely be challenged to fulfill the recommendations provided by STRONGER in order to retain or gain their reputation.<sup>302</sup> If the federal government is serious about ensuring the sufficiency of fracking regulations, there is probably not a smarter investment than STRONGER.<sup>303</sup> In fact, STRONGER's original roots were in an effort that included federal government support from EPA.<sup>304</sup>

Because of the limits faced by STRONGER due to the number of states seeking a limited range of spots for review,<sup>305</sup> state regulatory agencies should consider a rulemaking that would require a periodic internal study of state regulations related to fracking. Due to the amount of time and effort necessary to make significant changes to state regulations, such a study should be conducted only periodically—such as every four years. This rule should also trigger a review in the event (1) the legislature passes fracking-related legislation; (2) a significant environmental incident related to fracking or oil and gas operations—such as the blowouts seen in Pennsylvania—occurs;<sup>306</sup> or (3) there is a measurable increase in oil and gas production exceeding a percentage to be established by the state agency.<sup>307</sup>

## V. What Are Possible Alternatives to a State-Centric Approach?

Although there are a number of potential alternatives that may be considered when determining the appropriate source of regulation for fracking,<sup>308</sup> two prominent examples include: (1) amending federal legislation to remove the exemption for fracking in the SDWA; and (2) the development of a federal model statute through federal rules such as the one to be proposed by the Department of Interior.

### A. Federal Legislative Fix

The first possible alternative to a state-centric approach is a potential change to the SDWA that removes the current fracking exemption created by the Energy Policy Act of 2005, giving EPA complete jurisdiction to regulate fracking, presumably through the existing UIC program.<sup>309</sup> Under the current formulation of the SDWA §1421(d),<sup>310</sup> EPA can only

289. *See id.*

290. *See* ARKANSAS HYDRAULIC FRACTURING STATE REVIEW, *supra* note 141, at 11–12.

291. *Id.*

292. *Id.*

293. COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 5–7, 11; *see also* PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW, *supra* note 126, at 7–9 (providing six recommendations to Pennsylvania regulators about potential improvements to the state's regulatory structure).

294. *See* COLORADO HYDRAULIC FRACTURING STATE REVIEW, *supra* note 152, at 2, 5–7, 12, 17; *see also* PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW, *supra* note 126, at 3–5 (“During the review, the review team identified strengths of the Pennsylvania program, which also are noted in several of the report's findings.”).

295. NINETY-DAY REPORT, *supra* note 40, at 14.

296. *Cf. Past Reviews*, *supra* note 181.

297. NINETY-DAY REPORT, *supra* note 40, at 14.

298. NINETY-DAY REPORT, *supra* note 40, at 15.

299. *See id.*

300. *See The Process*, *supra* note 30 (“Review teams of state, industry and environmental stakeholders conduct state reviews.”).

301. *See id.* (“The guidelines have periodically been updated and expanded in scope.”).

302. *See id.*

303. In fact, this was the very argument that state regulators offered to the Secretary of Energy's Advisory Board Shale Gas Subcommittee during hearings in summer 2011. They emphasized the importance of the federal government in providing resources and bringing stakeholders together. *See* NINETY-DAY REPORT, *supra* note 40, at 14–15.

304. *The Process*, *supra* note 30.

305. *See* NINETY-DAY REPORT, *supra* note 40, at 14.

306. *See* Head, *supra* note 7.

307. *Cf. Lustgarten*, *supra* note 285, at 2. This should be measured at the discretion of the state agency, but this measure could be based on the number of barrels of oil produced or million cubic feet of natural gas. If easier, the state could base this change on the percentage increase in filings for permits related to oil and gas production in the state.

308. *See* discussion *supra* Part I.B.

309. *See* discussion *supra* Part I.A.

310. SDWA § 1421(d), 42 U.S.C. § 300h(d)(1) (2006).

regulate hydraulic fracturing activity that utilizes “diesel fuels.”<sup>311</sup> Presumably, without the “Halliburton Loophole,” EPA would be able to regulate all hydraulic fracturing activity under its UIC program.<sup>312</sup> As a result, operators would be required to undergo a permitting process analogous to those in place for injection wells under UIC.<sup>313</sup>

Although this is a potentially attractive option, it breaks down for three reasons. First, this does not seem feasible given the current political climate and unsuccessful attempts to move very similar legislation forward in the 112th Congress.<sup>314</sup> Second, constrained budgets on the federal level make it unlikely that EPA will be able to undertake the added expense of developing a program of this magnitude.<sup>315</sup> For the FY2013 budget, EPA was not beyond the “government wide effort to reduce spending and find cost savings” and was forced to make trade-offs between critical agency programs.<sup>316</sup> Finally, if this regulation were implemented in conjunction with the UIC program, the states would ultimately be responsible for implementing EPA’s regulations because this is a program reliant on federalism for its implementation.<sup>317</sup> As a result, allowing state regulators to implement the model template proposed by this Note seems to be not only the preferable means of regulation, but also the inevitable result.

## B. Development of a Federal Model Statute

Alternatively, the federal government could focus on exercising its regulatory authority over areas in which it has exclusive jurisdiction, such as oil and gas development on federal lands,<sup>318</sup> to promote a model statute to be adopted by the states. After President Obama endorsed natural gas as a vital component in the nation’s future energy mix in his 2012 State of the Union, the possibility of a federal model rule emerged.<sup>319</sup> Within days of the speech, a draft of a rule being promulgated by the Department of the Interior through the BLM was leaked.<sup>320</sup> According to the leaked draft, a potential BLM rule would include provisions requiring full disclosure of the composition of fracking fluid, the source of water used in fracking, the plan for the disposal of fracking waste water, and well construction standards.<sup>321</sup> In subsequent efforts to clarify the rule, BLM representatives indicated that

any rule would likely draw from available industry best practices, such as well construction standards.<sup>322</sup> In particular, BLM Director Robert Abbey said the bureau would borrow industry cementing standards because this stage is the “most critical part of the drilling operations.”<sup>323</sup> The proposed rule released by the BLM in early May 2012 included provisions that would require a permit approving any fracking in addition to the permit for drilling, the submission of information to demonstrate that water sources are protected, the submission of a disposal plan for the handling of flowback water, and mechanical integrity tests to ensure that the well can handle the pressures involved in fracking.<sup>324</sup> According to the rule, operators will still be required to comply with state oil and gas laws as well.<sup>325</sup>

This approach holds significant appeal for proponents of federal action because it marshals federal government action in a way that potentially incorporates all sides.<sup>326</sup> In particular, by pulling together industry best practices, state regulatory experience, and the concerns of environmental advocates, BLM has the potential to provide a broader perspective during the rulemaking process.<sup>327</sup> Nevertheless, because of delays in the development of BLM’s rule, it is almost impossible to speculate on the ultimate potential for this alternative.

Moreover, this plan has at least two problems. First, a model federal standard does not seem necessary until states have proven themselves incapable of appropriately regulating fracking.<sup>328</sup> Second, as this Note has argued, the significant variations in geology, ecology, water resources, and other aspects of oil and gas production weigh heavily against a “one-size-fits-all” approach.<sup>329</sup> As a result, a model federal regulation may, at best, provide a baseline to work with, but it will do little to solve the fundamental problems of the inherent challenges of oil and gas exploration and production on the state and local level.<sup>330</sup>

## VI. Conclusion

Hydraulic fracturing has become a lightning rod for controversy because it touches on so many sensitive energy and environmental issues.<sup>331</sup> The central role fracking plays in the emerging shale gas revolution, however, ensures the issue is not going away.<sup>332</sup> As a result, the ultimate resolution of this controversy will have a significant impact on the nation’s

311. *Regulation of Hydraulic Fracturing Under the Safe Drinking Water Act*, U.S. ENVTL. PROT. AGENCY, [http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells\\_hydroreg.cfm](http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_hydroreg.cfm) (last updated May 4, 2012).

312. *See id.*

313. *See discussion supra* Part I.B.

314. *See discussion supra* Part II.C.

315. *EPA Proposal Cuts Water Infrastructure Funds, Increases Air, Water Pollution Grants*, 29 ENV’T REP. (BNA) at A-6 (Feb. 14, 2012), available at <http://www.bna.com/epa-proposal-cuts-n12884907868/>.

316. *Id.*

317. *See discussion supra* Part I.B.

318. *See Klimasinska, Draft Fracking Rule, supra* note 117.

319. President Barack Obama, 2012 State of the Union Address (Jan. 24, 2012), *transcript available at* <http://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address>.

320. *See Klimasinska, Draft Fracking Rule, supra* note 117.

321. Bill Holland, *BLM Draft Rules for Fracking on U.S.-Owned Land Call for Full Disclosure*, PLATTS (Feb. 3, 2012, 3:32 PM), <http://www.platts.com/RSSFeedDetailedNews/RSSFeed/NaturalGas/6924885>.

322. Katarzyna Klimasinska, *Fracking Rule for Federal Land to Use Industry’s Cement Standard*, BLOOMBERG (Mar. 20, 2012, 1:21 PM), <http://www.bloomberg.com/news/2012-03-20/fracking-rule-for-federal-land-to-use-industry-s-cement-standard.html>.

323. *Id.*

324. Talia Buford, *Interior Department Floats New Fracking Rules*, POLITICO (May 6, 2012, 9:55 PM), <http://dyn.politico.com/printstory.cfm?uuid=7E30B17C-848B-457B-8823-F4A568E3D302>.

325. *Id.*

326. *Cf. discussion supra* Part II.C.

327. *See Klimasinska, Fracking Rule for Federal Land, supra* note 322.

328. *See discussion supra* Part IV.

329. *See MODERN SHALE GAS DEVELOPMENT, supra* note 1, at 25–26.

330. *Cf. MODERN SHALE GAS DEVELOPMENT, supra* note 1, at 26.

331. *See supra* pp. 121–22.

332. *See NINETY-DAY REPORT, supra* note 40, at 8.

immediate energy future.<sup>333</sup> The stakes are high, and something must be done.<sup>334</sup>

As this Note has suggested, states are in the best position to ensure that fracking is done in a safe way.<sup>335</sup> From a practical standpoint, it is much easier to enact changes through state agency rulemaking processes than a federal rulemaking or, even worse, attempting to pass legislation.<sup>336</sup> State regulation also seems to be appropriate for other reasons as well. Not only have states traditionally been responsible for this regulation, but local populations will also bear the burden or reap the rewards of this industry.<sup>337</sup> Accordingly, regulatory power over this industry should remain with the states,

which are in the best position to handle it.<sup>338</sup> The states, however, must live up to that promise.<sup>339</sup>

This Note has provided an outline for states to follow in seizing their potential and appropriately regulating the oil and gas industry and the use of hydraulic fracturing.<sup>340</sup> Long-term planning sounds somewhat comical in the face of such rapidly developing technology, but this is exactly what state agencies must do.<sup>341</sup> By facing the challenge directly and developing the mechanisms necessary to ensure the constant improvement of the regulatory scheme, states can protect their citizens and vital natural resources.<sup>342</sup>

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333. *See id.*

334. *See* discussion *supra* Part II.C.

335. *See* discussion *supra* Part IV.

336. *Cf.* discussion *supra* Part V.A.

337. *See* MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 25–26; *see also* AMANN ET AL., *supra* note 31, at 9 (describing the evolution of state regulation of oil and gas regulation from initial concerns about protecting the oil or gas bearing formations to more developed regimes that protect natural resources and the health and welfare of the local populations).

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338. *See* MODERN SHALE GAS DEVELOPMENT, *supra* note 1, at 26.

339. *See* STRONGER Letter, *supra* note 134.

340. *See* discussion *supra* Part IV.

341. *Cf.* ARKANSAS HYDRAULIC FRACTURING STATE REVIEW, *supra* note 141, at 4–6.

342. *See* discussion *supra* Part IV.