

ARTICLE

STATE REGULATIONS, LITIGATION, AND HYDRAULIC FRACTURING

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I. INTRODUCTION

Hydraulic fracturing is a process by which oil and gas operators can increase recovery of resources from otherwise unproductive, tight hydrocarbon bearing formations.¹ After a well is drilled, it is encased in concrete and steel casing to prevent resource seepage into nearby rock formations.² Holes, called perforations, are made in the casing over an interval in which hydrocarbons may be located.³ Hydraulic fracturing fluids, which are made of water and chemicals, are pumped under pressure through holes that are perforated in the casing until fractures are opened or enlarged in the shale formation's rocks.⁴ A 'propping agent', such as sand or ceramic beads, is pumped into the fractures to keep fractures from closing as the pumping pressure is released.⁵ The fracturing fluids are then returned back to the surface. If the hydraulic fracturing is successful, natural gas then flows from rock fractures into the well.⁶

Hydraulic fracturing has met opposition, and litigation has arisen concerning the practice's possible environmental impacts.⁷ These concerns led to an EPA study of the practice's environmental impacts.⁸ The EPA's current study examines potential risks to surface and underground sources of drinking water.⁹ An interim report will be delivered in 2012, and a final report will be released in 2014.¹⁰

The EPA Act of 2005 exempts hydraulic fracturing from federal regulation under the Safe Drinking Water Act.¹¹ In the

1. Vladimir Grechka, Prajnajyoti Mazumdar, & Serge A. Shapiro, Predicting Permeability and Gas Production of Hydraulically Fractured Tight Sands from Microseismic Data, 75 GEOPHYSICS B1 (Jan.-Feb. 2010); see also Ian Urbina, Hazardous Chemicals Injected into Gas Wells, Report Says, N.Y. TIMES, Apr. 17, 2011, A16, available at http://www.nytimes.com/2011/04/17/science/earth/17gas.html?_r=1&ref=health.

2. ENVT'L PROT. AGENCY, HYDRAULIC FRACTURING RESEARCH STUDY 1 (2010), available at <http://www.epa.gov/tribal/pdf/hydraulic-fracturing-fact-sheet.pdf>.

3. See Grechka, *supra* note 1, at B1.

4. HYDRAULIC FRACTURING RESEARCH STUDY, *supra* note 2, at 2; see also Randy Lee Loftis, *How fast will natural gas drilling come to Dallas?*, DALLAS MORN. NEWS, 4A, available at <http://www.dallasnews.com/sharedcontent/dws/news/localnews/stories/082210dnmetdallasdrilling.2afe907.html>.

5. HYDRAULIC FRACTURING RESEARCH STUDY, *supra* note 2, at 1.

6. *Id.*

7. See e.g. Range Res. Appalachia, v. Salem Twp., 964 A.2d 869 (2009) (discussing whether the government needs to act affirmatively to prevent contamination if there is a chance of contamination).

8. ENVT'L PROT. AGENCY, DRAFT PLAN TO STUDY THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES, (2011), vii [hereinafter DRAFT PLAN]; HYDRAULIC FRACTURING RESEARCH STUDY, *supra* note 2, at 2.

9. DRAFT PLAN, *supra* note 8, at viii.

10. *Id.*

11. 42 U.S.C. § 300h(d) (2005).

absence of federal regulations, specific legislation and regulations are promulgated by states;¹² however, oil and gas operations do need to conform to general federal environmental regulations that govern resource extraction.¹³

Hydraulic fracturing is a popular topic in the news because the practice increasingly involves drilling in areas that are relatively close to urban locations.¹⁴ As the number of hydraulic fracturing operations increase, opportunities for legal challenges to the practice also increase.¹⁵

Generally, state regulation has successfully placed limits on the practice, while litigation has failed to abolish fracking. When the EPA's study is completed in 2014, the federal government may supersede state regulations. Many states where fracking is practiced already implement federal regulations through state Underground Injection Control ("UIC") programs.¹⁶

This article introduces the historical and the current regulatory structure for hydraulic fracturing, focusing on how the EPA's 2011–2014 investigation of fracking differs from a 2004 EPA study. Issues involving hydraulic fracturing-related litigation are discussed. Then several states' and model codes' hydraulic fracturing regulations are examined and categorized as disclosure-based, operational-based, economic-based, and regulatory-based. The article concludes with thoughts regarding the future of regulation.

12. See *infra* Part III below (detailing state by state utilization of regulations and legislation).

13. See *e.g.*, 42 U.S.C. §§ 7401, 7411, 7412, 7416 (Clean Air Act) (being designations and delineations of state authority in the Clean Air Act).

14. See *e.g.*, JAMES BENÉ ET AL., NORTHERN TRINITY/WOODBINE GAM ASSESSMENT OF GROUNDWATER USE IN THE NORTHERN TRINITY AQUIFER DUE TO URBAN GROWTH AND BARNETT SHALE DEVELOPMENT 1 (Jan. 2007), available at www.twdb.state.tx.us/RWPG/rpgm_rpts/0604830613_BarnetShale.pdf [hereinafter GAM ASSESSMENT] (demonstrating the impact of urban drilling); see also 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, 126 (2009), [hereinafter Wiseman] (describing increased drilling in urban and suburban areas).

15. See *e.g.*, OHIO DEP'T NAT. RES., REPORT ON THE INVESTIGATION OF THE NATURAL GAS INVASION OF AQUIFERS IN BAINBRIDGE TOWNSHIP OF GEAUGA COUNTY, OHIO 4 (Sept. 1, 2008), available at http://s3.amazonaws.com/propublica/assets/natural_gas/ohio_methane_report_080901.pdf [hereinafter OHIO STUDY]; Geofrey Thyne, REVIEW OF PHASE II HYDROGEOLOGIC STUDY: PREPARED FOR GARFIELD COUNTY 23 (Dec. 2008), available at <http://www.garfield-county.com/Index.aspx?page=1149>.

16. See *Legal Envtl. Assistance Found., Inc. v. U.S. EPA*, 118 F.3d 1467, 1469 (11th Cir. 1997) [hereinafter LEAF] (discussing UIC Programs).

II. REGULATORY STRUCTURE FOR AND HISTORY OF HYDRAULIC FRACTURING

Prior to 1997, hydraulic fracturing was not considered a type of underground injection for purposes of the Safe Drinking Water Act (SDWA);¹⁷ therefore, the process was exempt from federal regulation under the SDWA.¹⁸ Specific regulation of hydraulic fracturing operations is primarily conducted via state regulations.¹⁹

Regulation was proposed for hydraulic fracturing in the wake of a 1997 case in the 11th Circuit, *LEAF v. United States EPA*,²⁰ which stated that because hydraulic fracturing of coalbeds to produce methane gas is a form of underground injection, Alabama's EPA-approved underground injection control (UIC) program must regulate the practice.²¹

The controversy resulting from *LEAF* led to a 2004 federal government study to determine if the process of hydraulic fracturing needed to be placed under SDWA regulation.²² A 2004 EPA study concluded there was only a limited threat to underground sources of drinking water (USDWs);²³ therefore, the 2005 Energy Policy Act exempted Hydraulic Fracturing operations, except those involving diesel-based fluids, from SDWA regulation.²⁴

The EPA in 2010 began planning a study to see if hydraulic fracturing presents threats to underground sources of drinking water and whether the practice should be federally regulated under the Safe Drinking Water Act.²⁵ The study will conclude in 2014 with an interim report released in 2012.²⁶ As the study proceeds, it has piecemeal released studies of alleged cases of contamination. On December 8, 2011, a draft report was

17. Robert E. Beck, *Current Water Issues in Oil and Gas Development and Production: Will Water Control What Energy We Have?*, 49 WASHBURN L.J. 423, 435 (2010).

18. 42 U.S.C. §§ 300h, 300j-26 (2005).

19. Wiseman, *supra* note 14, at 156 (describing how most hydraulic fracturing processes are currently controlled by state regulations).

20. *LEAF*, 118 F.3d at 1470.

21. *Id.* at 1478.

22. NAT'L ASS'N OF REGULATORY UTIL. COMM'RS, HYDRAULIC FRACTURING: REGULATORY AND POLICY CONSIDERATIONS 5-6 (Feb. 2010), available at <http://www.narucmeetings.org/Presentations/Steve%20Heare%20EPA.pdf>.

23. ENVTL. PROT. AGENCY, EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS 7-2 (June 2004), available at http://www.epa.gov/ogwdw/uic/pdfs/cbmstudy_attach_uic_ch07_conclusions.pdf [hereinafter EPA Conclusions].

24. 42 U.S.C. § 300h(d).

25. DRAFT PLAN, *supra* note 8, at viii.

26. *Id.*

released that discussed potential groundwater contamination near Pavilion, Wyoming.²⁷

In the absence of EPA-guidance, some states implemented standards regarding hydraulic fracturing.²⁸ Regulatory and advisory bodies also proposed regulations to improve safety.²⁹ Regulations generally focus on improving the process' safety through encouraging disclosure of chemicals, establishment of setbacks, imposition of more stringent casing strength standards, and notification requirements.

A. EPA's 2011–2014 Study

The EPA's 2011–2014 study began in part due to the urging of Congressman and hydraulic-fracturing opponent Maurice Hinchey (D-NY), who in October 2009 helped pass a provision in Congress that formally urged the EPA to conduct the study.³⁰ The new EPA study was initiated in response to arguments that the 2004 EPA study had too narrow a focus.³¹

The 2011–2014 study examines, in general, the potential adverse impact that hydraulic fracturing may have on drinking

27. ENVTL. PROT. AGENCY, DRAFT INVESTIGATION OF GROUND WATER CONTAMINATION NEAR PAVILION, WYOMING (Dec. 8, 2011) [hereinafter PAVILION].

28. *See e.g., infra* Part III (discussing states' regulations).

29. *See e.g., infra* Part IV (discussing model regulations).

30. *See* Press Release, Congressman Maurice Hinchey, Hinchey Addresses EPA Binghamton Public Hearing on Hydraulic Fracturing Study (Sept. 13, 2010), http://www.house.gov/apps/list/press/ny22_hinchey/morenews/09132010epahearing.html (last visited Sept. 20, 2010) (claiming that the 2004 study was flawed in that it only addressed risks to USDW in coalbed methane hydraulic fracturing projects rather than risks involved in all hydraulic fracturing plays, and risks to surface water and flowback and produced waters. Additionally, Hinchey argued that "according to in depth reviews by independent experts and an EPA whistleblower, this conclusion [that there are minimal risks to drinking water as a result of fracking in coalbed methane areas] was actually contradicted by some of the study's own findings and the study's final outcome was heavily influenced by non scientific political appointees in the prior administration.").

31. *See* Letter from Weston Wilson to Senators Allard, Campbell & DeGette, (Oct 4, 2004), <http://latimes.image2.trb.com/lanews/media/acrobat/2004-10/14647025.pdf> (last visited Sept. 20, 2010) [Whistleblower Letter] (being a letter by Weston Wilson, a member of the EPA who was "not involved in either the preparation or review of EPA's report on the hydraulic fracturing of coal bed methane reservoirs" but who criticized some technical and political aspects of the study. The aspects he criticized include political complaints, such that "five of the seven members of this panel appear to have conflicts-of-interest and may benefit from EPA's decision not to conduct further investigation or impose regulatory conditions." Wilson's letter also includes substantive complaints, e.g. "EPA has conducted limited research.").

water.³² The draft study design was released in early 2011 after a series of town meetings in 2010.³³ The study will examine (1) the process of water acquisition, (2) chemical mixing, (3) well injection, (4) the effects of flowback and produced water, and (5) wastewater treatment and waste disposal.³⁴ Those points will be evaluated for both surface water and ground water impacts,³⁵ and the studies will consider existing data, as well as prospective and retrospective case studies.³⁶

Commentators have specifically asked the EPA to consider the depletion of drinking water supplies and potential methane migration, especially in coalbed methane (CBM) plays.³⁷

B. EPA's 2004 Study

The 2004 EPA study of hydraulic fracturing in CBM plays was limited to evaluate the potential for hydraulic fracturing to affect the quality of USDWs via the following:

- (1) Direct injection of fracturing fluids into a[n] USDW in which the coal is located, or injection of fracturing fluids into a coal seam that is already in hydraulic communication with a[n] USDW (e.g., through a natural fracture system);
- or (2) Creation of a hydraulic connection between the coalbed formation and an adjacent USDW.³⁸

The 2004 study's analysis was even further limited.

[The 2004 study analyzed] CBM wells and [did] not include other hydraulic fracturing practices (e.g. those for

32. ENVTL. PROT. AGENCY, HYDRAULIC FRACTURING RESEARCH STUDY 1 (2010), available at <http://www.epa.gov/tribal/pdf/hydraulic-fracturing-fact-sheet.pdf> ("The likelihood of those risks causing drinking water contamination will be evaluated during the EPA hydraulic fracturing study. Contaminants of concern to drinking water include fracturing fluid chemicals and degradation products and naturally occurring materials in the geologic formation (e.g. metals, radionuclides) that are mobilized and brought to the surface during the hydraulic fracturing process.").

33. See DRAFT PLAN, *supra* note 8, at vii.

34. See *id.* at ix, 18.

35. ENVTL. PROT. AGENCY, OPPORTUNITY FOR STAKEHOLDER INPUT ON EPA'S HYDRAULIC FRACTURING RESEARCH STUDY: STUDY DESIGN 2 (July 14, 2010), available at http://www.epa.gov/safewater/uic/pdfs/hydrofrac_landscapemodel.pdf.

36. See DRAFT PLAN, *supra* note 8, at 26.

37. CYNTHIA DOUGHERTY, ENVTL. PROT. AGENCY, HYDRAULIC FRACTURING: APPLICABILITY OF THE SAFE DRINKING WATER ACT AND CLEAN WATER ACT, SCIENCE ADVISORY BOARD DISCUSSION 11 (Apr. 7, 2010), [http://yosemite.epa.gov/sab/sabproduct.nsf/5DEE6115FCA43661852576FD006B8460/\\$File/EPA+Presentation+Materials+4-6-10+for+EEC+Apr+7-8+2010+Meeting.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/5DEE6115FCA43661852576FD006B8460/$File/EPA+Presentation+Materials+4-6-10+for+EEC+Apr+7-8+2010+Meeting.pdf) (last visited Sept. 20, 2010).

38. EPA CONCLUSIONS, *supra* note 23, at 7-1.

petroleum-based oil and gas production) because: (1) CBM wells tend to be shallower and closer to USDWs than conventional oil and gas production wells; and (2) the EPA ha[d] [at the time] not heard concerns from citizens regarding any other type of hydraulic fracturing . . . The study also does not address potential impacts of non-injection related CBM production activities, such as impacts from groundwater removal or production water discharge.³⁹

The EPA saw “no conclusive evidence that water quality degradation in USDWs is a direct result of injection of hydraulic fracturing fluids into CBM wells and subsequent underground movement of these fluids.”⁴⁰

The 2004 study was criticized by some commentators for being too narrow in its focus since it merely considered fracturing itself rather than other factors involved in wastewater disposal.⁴¹ “[The EPA’s] report alludes to other steps in the fracking process unrelated to injection that can also contaminate underground drinking water, and it fails to fully analyze these steps . . . and does not include an in-depth study of fracking’s non-injection-related effects on drinking water.”⁴²

The study’s investigations were also restricted to the effect on underground sources of drinking water (USDWs) of hydraulic fracturing to produce.⁴³ The EPA’s findings on hydraulic fracturing, CBM and the impact of CBM hydraulic fracturing on drinking water were that there was only a minimal threat to water supplies and there was no need for regulation at the time the study was conducted.⁴⁴

The EPA’s June 2004 report focused on only CBM sources of effects on USDWs because CBM gas reservoirs are typically closer to the surface than are other hydraulically fractured plays, which means that drilling into CBM gas reservoirs would be more likely to impact USDWs than would drilling into other,

39. ENVTL. PROT. AGENCY, EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS ES-7 (June 2004), *available at* http://www.epa.gov/ogwdw/uic/pdfs/cbmstudy_attach_uic_exec_summ.pdf [hereinafter EPA Summary].

40. EPA CONCLUSIONS, *supra* note 23, at 7-2.

41. Wiseman, *supra* note 14, at 135; *see also* Press Release, Congressman Maurice Hinchey, *supra* note 30; Earthworks, Our Drinking Water at Risk: What the EPA and the Oil and Gas Industry Don’t Want Us to Know About Hydraulic Fracturing viii (Apr. 2005).

42. Wiseman, *supra* note 14, at 135.

43. EPA SUMMARY, *supra* note 39, at ES-1.

44. *Id.*

deeper reservoirs.⁴⁵ Still, the EPA's study was criticized because it did not consider non-CBM-based hydraulic fracturing.⁴⁶ The 2004 study also only used existing data and the report was more of a literature review than a creation of independent science.⁴⁷ Some commentators criticized the EPA's report of "cherry picking" only favorable scientific reports to support non-regulation of hydraulic fracturing.⁴⁸

Other commentators, like Robert Howarth, a professor at Cornell University, have broader concerns about the 2004 study. Howarth called attention to the need for study of the multimedia effects of hydraulic fracturing. In addition to water pollution, natural gas extraction could lead to greater greenhouse gas emissions than coal if it is not properly regulated.⁴⁹ His opinions, which are at odds with EPA's modeling, could nevertheless lead to more studies and regulation.⁵⁰ The EPA's draft study plan recognizes the multimedia impacts, and it notes that the topics are proper for future study.⁵¹

Ongoing scientific studies may influence the EPA's study in ways that are difficult to predict. A December 8, 2011 draft study of possible contamination near Pavilion, Wyoming drew attention from the news for concluding that hydraulic fracturing may have led to ground water contamination, but the study also cited problems in the area's wells casing as a potential culprit for contamination.⁵² A study by Duke University professors,

45. Dougherty, *supra* note 37, at 10.

46. See H.R. Rep. 109-215, pt. 1, at 1 (2005) (Conf. Rep.), available at <http://archives.energycommerce.house.gov/legviews/109lvhr1640-oilgas.shtml> (criticizing EPA's narrow focus).

47. Wiseman, *supra* note 14, at 178.

48. See Angela C. Cupas, Note, *The Not-So-Safe Drinking Water Act: Why We Must Regulate Hydraulic Fracturing at the Federal Level*, 33 WM. & MARY ENVTL. L. & POL'Y REV. 605, 613-614 (2009) (describing how "EPA conveniently refrained from including reports from nationally-renowned scientific laboratories, such as the Argonne National Laboratory, which reported on the toxic nature of multiple hydraulic fracturing chemicals. In its report, the Argonne National Laboratory concluded that several chemicals frequently used in the extraction process "can be lethal at levels as low as 0.1 parts per million," a statistic never cited in the EPA's UIC program study.").

49. Tom Zeller, Jr., *Studies Say Natural Gas Has Its Own Problems*, N.Y. TIMES, Apr. 12, 2011, B1, available at http://www.nytimes.com/2011/04/12/business/energy-environment/12gas.html?_r=1; Robert W. Howarth et al., *Methane and the greenhouse-gas footprint of natural gas from shale formations*, 106 CLIMATIC CHANGE 667, April 12, 2011, available at <http://www.springerlink.com/content/e384226wr4160653/>; Abraham Lustgarten, *More Reasons to Question Whether Gas is Cleaner than Coal*, PROPUBLICA, Apr. 12, 2011, <http://www.propublica.org/article/more-reasons-to-question-whether-gas-is-cleaner-than-coal> (last visited May 15, 2011).

50. Zeller, *supra* note 49, at B1.

51. See DRAFT PLAN, *supra* note 8.

52. See PAVILION, *supra* note 27 (discussing casing "lack of cement and sporadic bonding outside casing in production constitutes a major potential gas migration pathway to the depth of deep monitoring and domestic wells.").

published in May 2011, concluded that although methane could seep out of some fractured wells,⁵³ hydraulic fracturing chemicals were not discovered in leaks from the studied wells.⁵⁴ It is unclear what effect this study may have on the EPA's ongoing study, especially since the Duke study lacked baseline data to compare the amount of methane in the water before and after nearby hydraulic fracturing.⁵⁵ It is likely, however, that aquifer monitoring requirements will be imposed on producers, if only to establish baseline levels of methane and other pollutants. Even before the Duke study was released, states imposed some monitoring requirements.⁵⁶

C. Federal Diesel Fuel Regulation

Diesel fuel injection into rock formations for the purpose of hydraulic fracturing is covered under the SDWA.⁵⁷ However, regulations related to diesel fuel injection were not promulgated until after 2005.⁵⁸ In 2010, the EPA placed a notice on its website that required “[a]ny service company that performs hydraulic fracturing using diesel fuel must receive prior authorization from the UIC [Underground Injection Control] program.”⁵⁹

An industry group filed a complaint in response to the posting.⁶⁰ The complaint charged the EPA with having conducted rulemaking outside the required procedures of notice and comment.⁶¹ If EPA wins the challenge, it will not change how the

53. Stephen G. Osborn et. al., *Methane Contamination of Drinking Water Accompanying Gas-well Drilling and Hydraulic Fracturing*, PROCEEDINGS OF NATIONAL ACADEMIES OF SCIENCE, Apr. 14, 2011, available at <http://www.nicholas.duke.edu/cgc/pnas2011.pdf>.

54. *Id.*; see also Abraham Lustgarten, *Scientific Study Links Flammable Drinking Water to Fracking*, PROPUBLICA, at 1 (May 9, 2011), <http://www.propublica.org/article/scientific-study-links-flammable-drinking-water-to-fracking> (last visited May 15, 2011).

55. Abraham Lustgarten, *Gas Drilling Companies Hold Data Needed by Researchers to Assess Risk to Water Quality*, PROPUBLICA, May 17, 2011, <http://www.propublica.org/article/gas-drilling-companies-have-the-water-quality-methane-risk-data> (last visited May 18, 2011).

56. See *infra* Part III (discussing Pennsylvania's initial monitoring requirements).

57. 42 U.S.C. § 300h(d).

58. Keith B. Hall, Regulation of Hydraulic Fracturing Under the Safe Drinking Water Act, 31 WESTLAW J. ENVTL. 18, 24 (2011).

59. Env'tl. Prot. Agency, Regulation of Hydraulic Fracturing Under the Safe Drinking Water Act, http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_hydroreg.cfm (last visited May 11, 2011).

60. Hall, *supra* note 58, at 24; see also Motion to Dismiss, *Indep. Petroleum Ass'n of America v. U.S. EPA*, Case No. 10-1233 (D.C. Cir. Oct. 29, 2010); Amena H. Saiyid, *EPA in Settlement Talks With Oil, Gas Groups Over Permits for Diesel in Fracking*, BNA DAILY ENVTL. REPORT (Nov. 15, 2011), <http://www.bna.com/epa-settlement-talks-n12884904349/> (last visited Dec. 10, 2011).

61. Hall, *supra* note 58, at 24.

EPA regulates other aspects of hydraulic fracturing because diesel fuels are omitted from the SDWA exemption that covers other hydraulic fracture injection fluids.⁶² If the EPA loses the challenge, then the agency likely will only see action delayed until a proper rulemaking process has been conducted for regulation and reporting of diesel fluid injection.

D. The Future

Congress has moved ahead even though the EPA's study is not yet concluded. Recent Congresses have drafted, but have not passed, laws that would increase regulations on hydraulic fracturing. The Fracturing Responsibility and Awareness of Chemicals ("FRAC") Act was proposed in the 111th Congress in 2009, but it did not become law.⁶³ The bill would require oil and gas companies to disclose chemicals, but not the proprietary formulas, used in hydraulic fracturing operations and it would have placed all fracking operations under the SDWA.⁶⁴ The bill, re-introduced in the 112th Congress in May 2011, also required a list of fracking chemicals be made available on a website.⁶⁵

It is unclear if the FRAC Act or a similar disclosure-oriented bill will pass before EPA delivers its interim report in 2012. In 2012, the EPA will report based on the progress of case studies,⁶⁶ an initial database search and ranking of the toxicity of chemicals used in fracking,⁶⁷ and EPA will analyze existing data,⁶⁸ which will give some guidance to Congress.

Until the EPA delivers its 2012 interim report, the void left by absence of federal guidance on hydraulic fracturing regulations will continue to be filled by states' regulations,⁶⁹ like those in Wyoming, Pennsylvania, and Alabama, and by litigation, but litigation has not been very successful in affecting hydraulic fracturing development.⁷⁰

62. 42 U.S.C. § 300h(d)(1) (defining "underground injection" as the "means the subsurface emplacement of fluids by well injection," excluding "underground injection of natural gas for purposes of storage" and "underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities...").

63. Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, S. 1215 § 2, 111th Cong. (2009).

64. *Id.*

65. Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, S. 587 § 2, 112th Cong. (2011).

66. DRAFT PLAN, *supra* note 8, at 46.

67. *Id.* at 49.

68. *Id.* at 70.

69. *See infra* § 2 (litigation), § 3 (state regulations).

70. *Id.*

III. LAWSUITS AND HYDRAULIC FRACTURING.

Since the pivotal LEAF cases in 1997 and 2001,⁷¹ several lawsuits have related to the practice of hydraulic fracturing. Although one principally voiced complaint regarding hydraulic fracturing is the potential by which the practice can contribute to groundwater pollution,⁷² no lawsuit has successfully created a legal link between the specific process of hydraulic fracturing and pollutant liability.

Successful litigation regarding hydraulic fracturing will probably focus on operators' violations of governmental regulations that are designed to protect against risk or trespass. Cases that look to other areas of law, like trespass, have ended with the fracturing opponent's defeat. Cases that challenged a municipality's anti-fracturing regulations, like *Range Resources v. Salem Township*, also ended in defeat of the hydraulic fracturing opponents.⁷³ Cases that involve individuals who complain of specific instances of pollution have tended to end in settlement. The types of cases that individuals raise have been gravitating to focus on complaints regarding air pollution and other aspects of the oil extraction process rather than on fluid migration. If the cases succeed, it will likely be because pollution can be connected to substandard or weak casing, a surface spill, an air quality regulation violation, or an operational mistake was made. Litigation will, in that sense, focus on regulatory matters rather than on the creation of new torts or new risks unique to the hydraulic fracturing process.

One developing case deals with potential violations of existing regulations. In early 2011, three members of Congress filed a complaint with the EPA, arguing that diesel fuel is being injected into the ground by companies as part of their operations.⁷⁴ The complaint could lead the EPA to pursue enforcement actions against specific companies. Diesel fuel injection has been prohibited in hydraulic fracturing activities

71. LEAF, *supra* note 16; *Legal Envtl. Assistance Found. v. U.S. EPA*, 276 F.3d 1253 (11th Cir. 2001), *cert. denied*, 123 S. Ct. 475 (2002) (challenging Alabama's rules for hydraulic fracturing).

72. Wiseman, *supra* note 14, at 183.

73. *Range Res. Appalachia, v. Salem Twp.*, 964 A.2d 877 (2009).

74. Press Release, House Comm. on Energy & Commerce, Waxman, Markey, and DeGette Investigation Finds Continued Use of Diesel in Hydraulic Fracturing Fluids (Jan. 31, 2011), *available at* <http://democrats.energycommerce.house.gov/index.php?q=news/waxman-markey-and-degette-investigation-finds-continued-use-of-diesel-in-hydraulic-fracturing-f>.

since the 2005 EPA Act.⁷⁵ Representatives Henry A. Waxman, Edward J. Markey, and Diana DeGette allege that “oil and gas service companies have injected over 32 million gallons of diesel fuel or hydraulic fracturing fluids containing diesel fuel in wells in 19 states between 2005 and 2009.”⁷⁶

Coastal v. Garza established that in Texas, mere drainage from a neighbor’s property through the use of hydraulic fracturing is not a trespass.⁷⁷ The drainage is permitted under the rule of capture.⁷⁸ At least one commentator believes that *Coastal* left open the question of whether fracking could be regulated by the state if the fluids physically damaged a neighbor’s property.⁷⁹ It is clear, however, that an injunction could be sought if fracking damaged someone’s property other than by causing mere drainage.⁸⁰ No case with facts of physical damage caused by fracking trespass has yet progressed through Texas courts.⁸¹

One Pennsylvania township attempted in 2011 to pass zoning regulations that would specifically apply to hydraulically fractured sites.⁸² That township was not allowed to establish its own regulations under the theory that a township cannot pass zoning regulations related to oil and gas management if the state already has regulations that oversee setbacks and wellhead

75. 42 U.S.C. § 300(h) (“(1) UNDERGROUND INJECTION.—The term ‘underground injection’— (A) means the subsurface emplacement of fluids by well injection; and (B) excludes— (i) the underground injection of natural gas for purposes of storage; and (ii) the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities.”).

76. Press Release, House Comm. on Energy & Commerce, *supra* note 74.

77. *Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1, 42 (Tex. 2008).

78. *Id.* at 12-13.

79. Beck, *supra* note 17, at 439; *see also Coastal*, 268 S.W.3d at 42 (“the rule of capture cannot be used to shield misconduct that is illegal, malicious, reckless, or intended to harm another without commercial justification”).

80. Thomas E. Kurth et al., *Law Applicable to Hydraulic Fracturing in the Shale States*, OIL, GAS & ENERGY RES. L.J. (June, 2010), 18.

81. *Id.* at 19.

82. Range Res., 964 A.2d at 877.

surface activities.⁸³ Some individuals have confronted companies based on claims that hydraulic fracturing led to health issues—several of these cases have settled.⁸⁴ The *Fiorentino* case against Cabot Oil in Pennsylvania proceeded on a claim of potential contamination of wells due to improper hydraulic fracturing activities, but the case also had issues related to breach of contract in an agreement to return groundwater to its “pre-drilling” condition.⁸⁵ The part of the case involving the DEP settled for \$4.1 million dollars in December 2010, approximately one month after the *Fiorentino* case survived summary judgment,⁸⁶ but the claims for breach of contract appear to remain in litigation.

83. *Id.*; see also 58 PA. STAT. § 601.602 (2011) [the regulation has since been superseded by 58 PA. STAT. § 3302 (2012), which has similar language] (“Except with respect to ordinances adopted pursuant to the act of July 31, 1968 (P.L. 805, No. 247), known as the Pennsylvania Municipalities Planning Code, and the act of October 4, 1978 (P.L. 851, No. 166), known as the Flood Plain Management Act, all local ordinances and enactments purporting to regulate oil and gas well operations regulated by this act are hereby superseded. No ordinances or enactments adopted pursuant to the aforementioned acts shall contain provisions which impose conditions, requirements or limitations on the same features of oil and gas well operations regulated by this act or that accomplish the same purposes as set forth in this act. The Commonwealth, by this enactment, hereby preempts and supersedes the regulation of oil and gas wells as herein defined.”); *c.f.* *Huntley & Huntley, Inc. v. Borough Council*, 964 A.2d 855 (Pa. 2009) (holding that municipal regulation is permitted when a sitting ordinance is focused on community development); *Penneco Oil Co. v. County of Fayette*, 4 A.3d 722 (Pa. Commw. Ct. 2010) (demonstrating the same point); *Commonwealth v. Whiteford*, 884 A.2d 364 (Pa. Commw. Ct. 2005) (demonstrating that, to circumvent municipal regulations, a plaintiff must show that a municipality took actions in conflict with the permit to operate a gas well and interfered with the Pennsylvania Department of Environmental Protection’s exclusive jurisdiction).

84. See Mike Soraghan, *Baffled about Fracking? You’re Not Alone*, N.Y. TIMES, May 13, 2011, available at <http://www.nytimes.com/gwire/2011/05/13/13greenwire-baffled-about-fracking-youre-not-alone-44383.html> (discussing how an individual claimed that development of a rare tumor was due to fracking fluids. Even though “state regulators concluded that hydraulic fracturing was not to blame for the problems with . . . [the] water well [and t]hey suggested that if [] had been exposed to 2-BE it may have come from household cleaning fluids, such as Windex, rather than her groundwater.” Still, the individual “accepted a reported multimillion-dollar settlement from EnCana, which also bought her family’s property.”).

85. See *Fiorentino v. Cabot Oil & Gas Corp.*, 750 F. Supp.2d 506, 510-11, 516 (Pa. M.D., 2010) (surviving a summary judgment. “Plaintiffs allege that Defendants improperly conducted hydrofracturing and other natural gas production activities that allowed the release of methane, natural gas, and other toxins onto Plaintiffs’ land and into their groundwater. In support of the eight counts alleged in the Second Amended Complaint, Plaintiffs maintain that they have experienced property damage and physical illness, that they live in constant fear of future illness, and that they suffer severe emotional distress. Thus, Plaintiffs request an injunction prohibiting future natural gas operations, and seek compensatory and punitive damages, the cost of future health monitoring, attorneys’ fees and costs, and any other appropriate relief.”).

86. Press Release, Pa. Dep’t Env’tl. Prot., *Dimock Residents to Share \$4.1 Million, Receive Gas Mitigation Systems Under DEP-Negotiated Settlement with Cabot Oil and Gas*, (Dec. 16, 2010), available at <http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=15595&ypeid=1>.

No contamination cases based on the unique processes of hydraulic fracturing have led to a jury judgment, but the *Berish* case presents a possibility that a jury may soon decide whether hydraulic fracturing activities may lead to contamination.⁸⁷ In *Berish*, another Pennsylvania case that survived summary judgment,⁸⁸ Plaintiffs allege that “[a]s a result of . . . insufficient casing, pollutants and other industrial waste, including the fracking fluid and other hazardous chemicals such as barium and strontium, were discharged into the ground and contaminated the water supply used by the Plaintiffs.⁸⁹ This contamination has not only exposed Plaintiffs to hazardous materials and created the possibility of causing present and future health problems, but it has also lowered the value of Plaintiffs' properties.”⁹⁰ However, even if the *Berish* jury finds contamination, the contamination may be found to have come from poor casing—a problem common with other types of drilling—rather than from chemical migration from the place of injection.

The *Parr* case in Texas, filed on March 8, 2011, saw plaintiffs raise concerns regarding air pollution and flaring in addition to concerns regarding the migration of fracturing fluids.⁹¹ Air pollution is a concern with hydraulic fracturing efforts, since a well pad may see many trucks and a large amount of activity during the perforation of a frack job, but those concerns can be controlled by state regulation and enforcement of

87. *Berish v. Sw. Energy Prod. Co. & Sw. Energy Co.*, 763 F. Supp. 2d 702 (Pa. M.D. 2011); see also Press Release, Parker Waichman Alonso LLP, Lawsuit Filed In Pennsylvania Over Hydraulic Fracturing, Sept. 15, 2010, <http://www.lexisnexis.com/community/litigationresourcecenter/blogs/newlawsuitfilings/archive/2010/09/15/lawsuit-filed-in-pennsylvania-over-hydraulic-fracturing.aspx> (last visited Oct. 1, 2010) (Southwestern Energy had filed a response and a motion to dismiss on October 12, 2010, alleging that none of its drilling fluids contained barium, manganese, and strontium); Press Release, Sw. Energy Co., No Factual Basis to Contamination Lawsuit Against Southwestern Energy Production Company (Oct. 12, 2010) available at www.swn.com/investors/Press_Releases/2010/2010-10-12.pdf (“The complaint alleges that SEPCO's hydraulic fracturing activities contaminated nearby water wells with barium, manganese and strontium. However, neither the drilling fluids nor the fracturing fluids utilized by SEPCO contained any of these substances. Barium is one of the most common elements in the earth's crust and occurs naturally in many water supplies, which has been noted by both federal and state agencies. An August 2007 report by the U.S. Department of Health and Human Services specifically identified Pennsylvania as a state with many communities that ‘have drinking water where barium content is up to 10 times higher than the Environmental Protection Agency's recommended maximum concentration level.’ Further, water samples from the area taken prior to the commencement of SEPCO's drilling operations indicated barium readings in excess of federal and state limits.”).

88. *Berish*, 763 F. Supp. 2d at 706.

89. *Id.* at 704.

90. *Id.*

91. *Parr v. Aruba Petroleum, Inc.*, No. 11-01650-E (County Court at Law No. 5 of Dallas Cnty., Tex., filed Mar. 8, 2011).

existing air quality regulations rather than by special litigation. In April 2012, the EPA issued new drilling-related air quality regulations.⁹²

A case in New York, filed in March 2011, alleges methane, ethane, propane, and butane contamination as a result of poor drilling practices.⁹³ A case in Colorado raises similar issues.⁹⁴ Similarly, a Texas case, *Harris v. Devon*, alleges groundwater contamination due to hydraulic fracturing activities.⁹⁵ “Testing results performed on the well ground water showed water contamination with high levels of metals: aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, nickel, potassium, sodium, strontium, titanium, vanadium, and zinc, some of which upon information and belief, are contained in a commercial compound called ‘bentonite’ used in drilling mud.”⁹⁶ Other cases have been filed in Arkansas,⁹⁷ Colorado,⁹⁸ and Pennsylvania.⁹⁹

Some lawsuits attack hydraulic fracturing under the theory that government agencies must act if agencies conclude there is potential for contamination. A lawsuit based on this theory failed in New Mexico in 2006.¹⁰⁰ The judge reasoned that: “[I]t is not an abuse of discretion to acknowledge the possibility of contamination, but to conclude that the possibility of such contamination is small if existing governmental regulations are enforced correctly.”¹⁰¹

92. See Regulatory Actions, U.S. Env’t Prot. Agency (2012), <http://www.epa.gov/airquality/oilandgas/actions.html> (last visited April 18, 2012) (listing documents related to the Final Air Rules for the Oil and Natural Gas Industries. As of April 18, 2012, information regarding the rule’s codification in the Federal Register was not available); see also Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews Final Rule, 40 C.F.R. Part 63, <http://www.epa.gov/airquality/oilandgas/pdfs/20120417finalrule.pdf> (last visited April 18, 2012).

93. *Baker v. Anschutz Exploration Corp.*, No. 2011-1168, ¶ 170 (Chemung Co. State Supreme Court, NY filed Mar. 9, 2011), http://www.frackinginsider.com/Napoli_Complaint.pdf.

94. *Strudley v. Antero Res. Corp.*, No. 2011-2218 (Colo. Dist. Ct., Denver Cnty. filed Mar. 24, 2011).

95. *Harris v. Devon Energy Prod. Co., L.P.*, No. 3:10-cv-02554-L, 5 (N.D. Tex. filed Dec. 15, 2010), <http://www.wturley.com/2010-12-14-Harris-PL-Orig-Complaint-1.pdf>.

96. *Id.* at 4.

97. *Tucker v. Sw. Energy Co.*, No. 1:11-cv-044-DPM (E.D. Ark. May 17, 2011); *Ginardi v. Frontier Gas Serv., LLC*, No. 11-cv-0420 BRW (E.D. Ark. May 17, 2011).

98. *Evenson v. Antero Res. Corp.*, No. 2011-cv-5118 (Denver Co. Dist. Ct., July 20, 2011).

99. *Dillon v. Antero Res.*, No. 2:11-cv-01038 (W.D. Pa. Aug. 11, 2011); *Becka v. Antero Res.*, No. 2:11-cv-01040 (W.D. Pa. Aug. 12, 2011).

100. *New Mexico ex rel. Richardson v. Bureau of Land Mgmt.*, 459 F. Supp. 2d 1102 (D.N.M. 2006).

101. *Id.* at 1114.

The EPA has also attempted to institute enforcement actions that have led to court cases, but one of their more high profile cases ended before penalties were imposed.¹⁰² On December 7, 2010 the EPA issued an emergency administrative order concluding as a matter of law that Range Resource's activities in Texas contributed to water contamination.¹⁰³ The Texas Railroad Commission found Range Resource's activities did not contribute to water well contamination because gas that was detected in the wells was more similar to gas that occurred in a shallower gas field that began about 200 to 400 feet below the surface, whereas the Barnett Shale field is over 5,000 feet below the surface and the Range gas wells lacked any leaks. The "hydraulic fracturing of gas wells in the area could not result in communication between the Barnett Shale gas field and shallow aquifers from which water wells in the area produce."¹⁰⁴ Although the EPA filed a case in federal court,¹⁰⁵ it was dropped in April 2012.¹⁰⁶

As hydraulic fracturing development increases in urban areas, challenges related to the process will increase. The above

102. Paula Dittrick, *EPA drops Texas water contamination case against Range*, OIL & GAS J. (Apr. 3, 2012), available at <http://www.ogj.com/articles/2012/04/epa-drops-texas-water-contamination-case-against-range.html?cmpid=EnlDailyApril42012>; see also *United States v. Range Prod. Co.*, 2011 WL 200016 (N.D. Tex., filed Jan. 18, 2011); see also *United States v. Range Prod. Co.*, Civil Action No. 3: 11-CV-116-F, 19 (Jun. 20, 2011) (order denying without prejudice defendants' motion to dismiss and staying case).

103. Emergency Administrative Order, Docket No. SDWA-06-2010-1208; see also Holly A. Vandrovec, *The Fight Over Fracking: Recent Hydraulic Fracturing Litigation in Texas*, 74 TEX. BAR J. 390 (May 2011).

104. R.R. Comm'n Tex., Revised Examiners' Report and Proposal for Decision, Oil and Gas Docket No. 7B-0268629, Mar. 11, 2011, available at <http://www.rrc.state.tx.us/meetings/ogpfd/RangePFD-03-11-11.pdf>; Press Release, R.R. Comm'n Tex., Railroad Commissioners Find Range Resources' Natural Gas Not Source in Parker County Water Wells (Mar. 22, 2011), available at <http://www.rrc.state.tx.us/pressreleases/2011/032211.php>.

105. *United States v. Range Prod. Co.*, 2011 WL 200016 (N.D. Tex., filed Jan. 18, 2011). The Judge issued a stay pending the Fifth Circuit's resolution of the whether the Emergency Order was arbitrary or capricious. *United States v. Range Prod. Co.*, Civil Action No. 3: 11-CV-116-F, 19 (Jun. 20, 2011) (order denying without prejudice defendants' motion to dismiss and staying case). The Judge argued that "the Court is struggling with the concept that the EPA can enforce the Emergency Order and obtain civil penalties from Range without ever having to prove to this Court, or another neutral arbiter, that Range actually caused the contamination of the [wells], or without ever giving Range the opportunity to contest the EPA's conclusions." *Id.* at 18; see also *Range Res. Corp. v. U.S. EPA*, Case No. 11-60040 (5th Cir. filed May 9, 2011); see also *Envtl. Prot. Agency, Range Resources Imminent and Substantial Endangerment Order*, Parker County, TX, <http://www.epa.gov/region6/region-6/tx/tx005.html> (last visited Jan. 19, 2012) (being EPA's online center for filings related to the case); see also *Sackett v. U.S. EPA*, 132 Sup. Ct. R. 1367 (2012) (being a 9-0 Supreme Court case that came out very close in time to when the EPA dropped its case against Range Resources. The Sackett case gave petitioners the right to seek pre-enforcement review of certain Administrative Compliance Orders).

106. See Dittrick, *supra* note 102.

cases demonstrate litigation will likely focus on regulatory compliance rather than on the development of new torts or on risks that are unique to the hydraulic fracturing process. Casing may break or chemicals may be spilled by any oil and gas operator; therefore, the legal precautions that a hydraulic fracturing operator must consider are in large part similar to the concerns that a traditional oil and gas operator must confront.

IV. STATE REGULATION OF HYDRAULIC FRACTURING

State-driven hydraulic fracturing regulations mostly fall under the categories of disclosure-based regulations, economic-based regulations, operational regulations, or regulatory restrictions. The categories are fluid; for example, some disclosure regulations also have economic consequences.

Disclosure regulations include required disclosure of chemicals (as they do in Colorado, Texas, and Wyoming), and increased disclosure of operational activities to nearby landowners (Alabama and Pennsylvania).

Economic regulations include imposing larger permitting fees on hydraulically fractured wells (Pennsylvania), more detailed filing and review processes (Alabama), and a legal presumption of pollution based on the distance a well is from a source of drinking water (Pennsylvania).

Operational regulations include increased set-backs from water sources (Louisiana and Pennsylvania), requirements that casing be set at deeper levels and with thicker cement (New York), requirements on well depth (New York), and requirements that forbid drilling in certain types of geological strata or formations (Louisiana).

Regulatory restrictions include legal presumptions of pollution (Pennsylvania) and municipalities' attempts to regulate or forbid hydraulic fracturing in a direct way (Pennsylvania, New Mexico, West Virginia) or in an indirect way through imposition of studies and hearings (New York). Some cities in Pennsylvania and New Mexico have attempted to regulate or forbid hydraulic fracturing, but similar actions were prohibited in West Virginia. It is unlikely that Pennsylvania cities' outright blanket bans on the practice will be upheld, especially given some language that is in Pennsylvania's new drilling regulations.

Much as with other types of law, there is a fractured variety of regulations among the states, but after the 2011–2014 study is complete, the EPA may regulate fracturing under the Safe Drinking Water Act, which could lead to more standardized state regulation. Given the big money involved in shale plays,

federal regulation and guidelines may instead focus on disclosure and operational requirements like monitoring, recordkeeping, and self-reporting.¹⁰⁷ Even if fracking is regulated under the Underground Injection Control (UIC) Program, at least one commentator believes that the economic impact of the regulation will be “coupled with streamlined permitting by way of rule.”¹⁰⁸

Below is a survey of several states’ regulations, starting with Wyoming, the first state that required disclosure of the chemicals that are used in hydraulic fracturing.¹⁰⁹

A. Wyoming

Wyoming’s hydraulic fracturing rules took effect on September 15, 2010. Its rules are disclosure-based. Operators must disclose fracturing fluids, comply with casing and cementing requirements, and they must comply with notification requirements to nearby landowners.¹¹⁰ The rules are available at the Wyoming Oil and Gas Conservation Commission website.¹¹¹

Operators must disclose component chemicals used in fracking fluids on a well-by-well basis and “for each stage of the well stimulation program.”¹¹² According to the Wyoming Oil and Gas Conservation Commission Supervisor, “[w]e’ll see exactly what they pumped into the well . . . Further, they have to report what comes out of the well after they’ve completed the [well stimulations.]”¹¹³ The “Wyoming Oil and Gas Conservation Commission doesn’t plan to make special efforts to compile and present the information to the public [; however,] . . . [t]he documentation is listed on a well-by-well basis [along with other

107. Paul Bohannon, Andrews Kurth LLP, *Developing Frac Issues – Newly Proposed Completion Rules for Wyoming & Pennsylvania*, Mar. 29, 2010, <http://www.andrewskurth.com/pressroom-publications-702.html> (last visited Oct. 10, 2010).

108. *Id.*

109. Glenn Hess, *Wyoming Requires Chemical Disclosure*, 88 CHEMICAL & ENGINEERING NEWS 25, June 21, 2010, available at <http://pubs.acs.org/cen/environment/88/8825govc2.html>. Wyoming was followed by Arkansas, Pennsylvania, and Michigan. More recently, Texas and Colorado have required disclosure of chemical constituents.

110. Operational Rules, Drilling Rules, Wyoming Oil & Gas Conservation Comm’n, Doc. 7928, Ch. 3, § 45 (Aug. 17, 2010), available at <http://soswy.state.wy.us/Rules/RULES/7928.pdf> [hereinafter Operational Rules].

111. *Id.*

112. *Id.* § 45(d); see also Dustin Bleizeffer, *Wyoming rule change means public can see drilling documents*, BILLINGS GAZETTE, Aug. 29, 2010, available at http://billingsgazette.com/news/state-and-regional/wyoming/article_28f616fe-b3e1-11df-85a1-001cc4c002e0.html.

113. *Id.*; see also Operational Rules, *supra* note 110, § 1(a).

information that is required by general oil and gas permitting] on the commission's website."¹¹⁴

Disclosure of particular chemical mixtures is protected by Wyoming trade secret rules. "Confidentiality protection shall be provided consistent with § 16-4-203(d)(v) of the Wyoming Public Records Act for the following records: 'trade secrets, privileged information and confidential commercial, financial, geological or geophysical data furnished by or obtained from any person.'"¹¹⁵

An operator seeking to hydraulically fracture a formation also must comply with general oil and gas requirements:

[T]he [owner/operator] O/O must now provide notice of intent to frac on an Application for Permit to Drill,¹¹⁶ and detail: (i) permitted water supply wells within ¼ mile of the drilling or spacing unit, whichever is less;¹¹⁷ (ii) upper hole geology and hydrology from surface to casing surface set point and specify methods to avoid invasion and maintain well and hole control;¹¹⁸ (iii) casing and cementing shall be in a manner not to cause oil, gas, or fresh water source loss, with specific information required;¹¹⁹ (iv) cement additives and bond logs requirements;¹²⁰ (v) "daily" drilling information to assure proper containment of frac stimulation treatment in the productive interval;¹²¹ (vi) details on downhole problems;¹²² (vii) information on base fracture fluid source, chemical additives and concentrations, additive type (biocide, acid, breaker, brine, etc.);¹²³ (viii) use of BTEX and other petroleum distillates are prohibited except in the hydrocarbon bearing zones, without permission;¹²⁴ and (ix) information regarding waste materials.^{125,126}

Notice of application to drill a horizontal well must also be "given by certified mail to all Owners within one-half (1/2) mile of any point on the entire length of the horizontal wellbore, from the surface location through the terminus of the lateral."¹²⁷

114. Bleizeffer, *supra* note 112; *see also* Operational Rules, *supra* note 110, at § 21.

115. Operational Rules, *supra* note 110, § 45(f).

116. *Id.* § 1(a), 8.

117. *Id.* § 8(c).

118. *Id.* § 8(c).

119. *Id.* 3, § 8(c), 45(a)

120. *Id.* § 8(d).

121. Operational Rules, *supra* note 110, § 8(c), § 45(i)

122. *Id.* § 8(c); § 45(i)

123. *Id.* § 8(c), 45(d), (g).

124. *Id.* § 45(g).

125. *Id.* § 45(j).

126. Bohannon, *supra* note 107.

127. Operational Rules, *supra* note 110, § 8(f).

Wyoming's regulations are already used as a base model for hydraulic fracturing regulations elsewhere, like in Idaho.¹²⁸

B. Alabama

Alabama has special disclosure and economic requirements related to hydraulic fracturing in coalbeds.¹²⁹ Each coalbed may only be hydraulically fractured after the applicant submits a fee (\$175),¹³⁰ a wellbore schematic for approval by the Supervisor, and inventories of fresh water supply wells within a quarter mile radius of the CBM well need to be made and provided.¹³¹ Operators must also submit technical information to the Supervisor before approval can be given. This technical information includes the specifications of the casing and cementing program.

[This includes] pressure tests and the depth interval(s) and name(s) of coal beds to be fractured; geophysical and cement bond logs; . . . [F]urther, the operator shall affirm to the Supervisor, in writing, that the well construction and pressure tests results, geophysical and cement bond logs, and (if applicable) inventory of fresh water supply wells have been evaluated and that the results . . . indicate that the proposed hydraulic fracturing operations can be conducted without adverse impact on any . . . fresh water resources.¹³²

Furthermore, the operator needs to provide estimates of the maximum length and orientation of the fractures to be propagated and the operator needs to describe the type of fluids and materials that are to be utilized.¹³³

Some operational requirements include limits on the fracturing of coal beds at certain depths. Hydraulic fracturing of coal beds is prohibited between 0 to 399 feet.¹³⁴

Alabama also specifically forbids the use of certain fluids to frac, specifically diesel fuel.¹³⁵

128. George Prentice, *Oil and Gas Commission Approves Temporary Fracking Rules*, BOISE WEEKLY, Apr. 19, 2011, available at <http://www.boiseweekly.com/CityDesk/archives/2011/04/19/oil-and-gas-commission-approves-temporary-fracking-rules>.

129. Safety & Env'tl. Rule, ALA. ADMIN. CODE R. 400-3-8-.03(2) (2010); see also Wiseman, *supra* note 14, at 36.

130. ALA. ADMIN. CODE R § 400-3-8-.03(2) (2010).

131. *Id.* § 400-3-8-.03(3), (4).

132. *Id.*

133. *Id.* § 400-3-8-.03(5).

134. *Id.* § 400-3-8-.03(6).

Finally, Alabama imposes a record-keeping requirement that operators maintain all records until the well has been plugged for permanent abandonment, but they must retain the records at least for three years following completion of fracturing.¹³⁶

C. Arkansas

Arkansas' regulations are similar to Wyoming's regulations in that they require disclosure of chemicals used in the hydraulic fracturing process. Arkansas' other regulations are standard protective measures that also apply to oil and gas operations.¹³⁷ However, fracturing operations have more stringent controls on use of water than do normal oil and gas operations. Specifically, fracturing flowback fluids may not be stored in clay pits and they must be "disposed at an appropriately permitted facility."¹³⁸

Arkansas' Rule B-19 deals with disclosure of fracturing chemicals. The rule was proposed in September 2010 before the Arkansas Oil and Gas Commission, was heard in December 2010, and went into effect in January 2011.¹³⁹

Rule B-19 includes specifications for new wells' casing strength, depth, and cementing.¹⁴⁰ The proposal also imposes more stringent reporting requirements related to annulus pressure recordings and post-frack-job retrieved data.¹⁴¹ Following completion of the hydraulic fracturing treatment, the permit holder must report information concerning the maximum pump pressure, the types and volumes of the fluid and proppants, the fracture height, a name and list of additives, their concentrations, and other information.¹⁴²

The rule did not require full disclosure of fracturing chemicals, however. When the "specific identity of any such Chemical Constituent and associated CAS number is entitled to

135. *Id.* § 400-3-8-.03(7).

136. *Id.* § 400-3-8-.03(9).

137. *See* Kurth, *supra* note 80, at 20-22 (describing Arkansas' regulations).

138. *Id.* at 22.

139. ARKANSAS OIL & GAS COMM'N, RULE 19-B(K) REQUIREMENTS FOR WELL COMPLETION UTILIZING FRACTURE STIMULATION (Dec. 7, 2010), [hereinafter ARKANSAS RULE], <http://www.aogc.state.ar.us/notices/B-19%20-Approved%2012-7-10%20for%20web%20only.pdf> (last visited Feb. 20, 2012).

140. ARKANSAS RULE, *supra* note 139, at 2.

141. *Id.* ("The Permit Holder must provide written notice to the Director, or his designee, of (i) any change in surface casing annulus pressure that would indicate movement of fluids into the annulus, or (ii) a pressure that exceeds the rated minimum internal yield pressure on any casing string in communication with the Hydraulic Fracturing Treatment.")

142. *Id.*

be withheld as a trade secret,” the Chemical Family of the Chemical Constituent is all that needs to be provided.¹⁴³ The 19-B(k)(8) exemption does not apply when a healthcare professional needs disclosure to provide treatment.¹⁴⁴

A proposed amendment to 19-B would further clarify the 19-B(k)(9) disclosure requirement of § 15-72-220 in the Arkansas Code by establishing that “[t]he trade secrets exemption for disclosure of the chemicals shall follow the federal standards set out in the Emergency Planning and Community Right to Know Act and its implementing regulations in 40 C.F.R. Pt. 350.”¹⁴⁵ The amendment would require greater disclosure of the sources of water that will be used to hydraulically fracture wells, and it would also define more terms like “drilling fluid,” “drilling mud,” and “hydraulic fracturing fluid” in § 15-72-201 of the Arkansas Code at.¹⁴⁶

D. Colorado

Colorado implemented discretionary chemical disclosure rules in spring 2009, but those rules were supplanted by more rigorous rules adopted in December 2011 that go into effect in April 2012.¹⁴⁷ “The Colorado rule requires operators to keep a chemical inventory on-site at each well and make that information available to emergency responders and local governments within 24 hours in the event of a spill.”¹⁴⁸ Companies in 2009 could voluntarily disclose chemicals on a website, *FracFocus*, which is a project of the Groundwater Protection Council (GPC) and the Interstate Oil and Gas Compact Commission (IOGCC).¹⁴⁹ Companies were not required to make chemical constituents of their hydraulic fracturing fluids public unless the Colorado Oil and Gas Conservation Commission

143. Letter from Halliburton Energy Services to Arkansas Oil and Gas Commission (Apr. 25, 2011), available at http://aogc2.state.ar.us/B-19/1062_Form37.pdf; see also ARKANSAS RULE, *supra* note 139.

144. ARKANSAS RULE, *supra* note 139.

145. Interim Study Proposal 2011-043, H.B. 1396, 88th Gen. Assemb. (Ark. 2011), available at <http://www.arkleg.state.ar.us/assembly/Interim%20Study%20Proposal%20and%20Resolution/ISP-2011-043.PDF>.

146. *Id.* § 15-72-201.

147. 2 COL. CODE. REGS. § 404-1:205A (2011).

148. David O. Williams, *Critics claim Colorado gas drillers playing both sides of 'fracking' debate*, COLORADO INDEP. (July 22, 2010), available at <http://coloradoindependent.com/57895/critics-claim-colorado-gas-drillers-playing-both-sides-of-%E2%80%98fracking%E2%80%99-debate>; see also 2 COL. CODE. REGS. § 404-1:205A.

149. FracFocus Chemical Disclosure Registry, <http://fracfocus.org> (last visited Feb. 20, 2012); see also About Us, FracFocus Chemical Disclosure Registry, <http://fracfocus.org/welcome> (last visited Feb. 20, 2012).

was undergoing an investigation.¹⁵⁰ Now, companies must disclose the contents and composition of each chemical that has been added to their fracturing fluids, whether or not the chemicals are hazardous.¹⁵¹

E. Louisiana

Louisiana has regulated hydraulic fracturing based on location and individual permits rather than by a broad-based regulation. Louisiana is also developing chemical disclosure rules.¹⁵² Although Louisiana has specific rules for reuse of production waste in hydraulic fracturing operations, most fracturing-applicable regulations are the same as general regulations for oil and gas operations.¹⁵³ Urban drilling rules for the Haynesville Shale went into effect in August 2009.¹⁵⁴ The rules “include requirements on fencing, noise, dust, work hours, and water use.”¹⁵⁵

The urban drilling rules apply “only to wells which are drilled to or completed in the Haynesville Zone, and which are within seven hundred fifty (750) feet of a residence, religious institution, public building or public park in an urban area, pursuant to a drilling permit issued after the effective date of this Order.”¹⁵⁶ “The new regulations place specific limits on operating hours, noise pollution, and gas venting related to fracking.”¹⁵⁷

[The setback will be 500 feet from any] residence, religious institution, public building or public park located in an urban area. The distance shall be calculated from the

150. Bruce Finley, *Colorado regulators, trade groups encourage energy firms to disclose fracking chemicals on website*, DENVER POST, Apr. 24, 2011, available at http://www.denverpost.com/news/ci_17916592; see also 2 COL. CODE. REGS. § 404-1:205A.

151. 2 COL. CODE. REGS. § 404-1:205A (2011).

152. LOUISIANA DIV. NAT. RESOURCES, HYDRAULIC FRACTURE STIMULATION OPERATIONS HEARING (Aug 30, 2011), available at <http://dnr.louisiana.gov/index.cfm?md=calendar&tmp=detail&eid=110> (proposing to amend LA. ANN. CODE 43, Part XIX Subpart 1 Statewide Order No. 29-B Ch 1).

153. LA. ADMIN. CODE 43, Part XIX § 433 (2010) (describing rules related to fracking operations); see Kurth, *supra* note 80, (describing Louisiana’s general regulations).

154. Press Release, Louisiana Dept. of Natural Res., New Haynesville Shale Zone urban drilling rules set, (June 25, 2009), <http://dnr.louisiana.gov/index.cfm?md=newsroom&tmp=detail&aid=381> (last visited Mar 8, 2012) [hereinafter Haynesville Rules].

155. Ann Davis Vaughan, Energy Investment & Merchant Banking, Frac Attack: Risks, Hype, and Financial Reality of Hydraulic Fracturing in the Shale Plays 52 (July 8, 2010), available at <http://www.tudorpickering.com/pdfs/TPH.Fracturing.Report.7-8-10.pdf>; see also Haynesville Rules, *supra* note 154.

156. STATE OF LOUISIANA: OFFICE OF CONSERVATION, ORDER NO. U-HS 3 (June 22, 2009), available at <http://dnr.louisiana.gov/cons/orders/U-HS.pdf>.

157. Kurth, *supra* note 80, at 23.

wellbore, in a straight line. . . to the closest exterior point of the building . . . [But] if the owner of the building is a party to an oil, gas and mineral lease covering the property on which the building is located [or they are a successor in interest] . . . , then the setback distance . . . shall be two hundred (200) feet unless otherwise provided in the oil, gas and mineral lease. [If an operator obtains written consent of all owners who fall within a 500 feet radius around the well, then the] setback distance from such well shall be two hundred (200) feet.¹⁵⁸

Louisiana Act 955 authorizes the Secretary of the Department of Natural Resources to enter into cooperative endeavor agreements to withdraw running surface water of the state.¹⁵⁹ “In a cooperative endeavor agreement, the secretary reviews applications for water withdrawal and, if an application is approved, collects the ‘fair market value’ for the water withdrawn.”¹⁶⁰ Riparian rights holders do not need to have their water withdrawals reviewed by the State. The law is based on the concept that the State cannot donate water to operators who use the water to frack;¹⁶¹ instead, the State must charge for water withdrawals. Regulations like Louisiana Act 955 demonstrate that some ‘free rides’ that operators once received are gradually being eroded; therefore, operators may be less able to recoup costs when natural gas prices decline.

F. New Mexico

Fracking in New Mexico is particularly affected by county and municipal regulations that affect when drilling may occur. Santa Fe County’s oil and gas ordinance limits fracking activities to 8:00 a.m. and 5:00 p.m. and forbids the activities from exceeding eighty decibels at 300 feet from the source.¹⁶²

158. *Id.*

159. Laura Springer, *Waterproofing the New Fracking Regulation: The Necessity of Defining Riparian Rights in Louisiana’s Water Law*, 72 LA. L. REV. 225 (2011); *see also* LA. DEP’T OF NAT. RES., ACT 955—SURFACE WATER RESOURCES MANAGEMENT (Sept. 2010), *available at* <http://dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=92> (select “Overview Presentation, Sept. 2010”).

160. *Id.*

161. Springer, *supra* note 159; *see also* Office of the Sec’y, La. Dep’t of Nat. Res., Act 955—Surface Water Resources Management, *supra* note 159, at 2.

162. *See* Kurth, *supra* note 80, at 28 (citing Santa Fe Co., N.M., Santa Fe Co. Oil & Gas Amendment to the Santa Fe. Co. Land Dev. Code, Ordinance No. 2008-19 (Dec. 9, 2008), § 11.25.2, .3).

Some New Mexican cities have regulations that are more disclosure-based, such as the city of Lovington. Lovington's fracking ordinance deals more with recording requirements. Each month, an operator of a secondary recovery injection well must record the injection pressure, injection rate, and the cumulative volume of the fluid injected.¹⁶³

One lesson of New Mexico's local regulations appears to be that where the federal government will not guide, and where the state will not regulate certain activities, the individual communities will provide a fractured patchwork of laws to govern the process.

G. New York

New York has engaged in a multi-year contemplation of "how to permit [hydraulically fractured] wells and is reviewing voluminous new comments before it issues a final assessment" in a supplemental generic environmental impact statement (SGEIS).¹⁶⁴ Its regulations may become the most comprehensive and restrictive of all states' regulations regarding the process of hydraulic fracturing.¹⁶⁵ New York's State Department of Environmental Conservation (DEC) created a draft generic environmental impact statement in 2009¹⁶⁶ that evaluated the practice, and in July 2011 the DEC released an over-1000 page document that collected results of geologic surveys, studies of New York's drilling practices, comparisons to other states' and organizations' best practices for managing hydraulic fracturing, and it made recommendations for how operators should conduct hydraulic fracturing in New York.¹⁶⁷

163. See Kurth, *supra* note 80, at 28 (citing LOVINGTON MUNICIPAL CODE § 8.30.440(c) (2009)).

164. Press Release, New York Dept. of Env't Conservation, New Recommendations Issued in Hydraulic Fracturing Review, (June 30, 2011), <http://www.dec.ny.gov/press/75403.html> (last visited Feb. 20, 2012).

165. *Id.*

166. N.Y. DEP'T ENVTL. CONSERVATION, DRAFT SUPPLEMENTAL GENERIC ENVTL. IMPACT STATEMENT ON THE OIL, GAS, AND SOLUTION MINING PROGRAM (Sept. 30, 2009), available at <http://www.dec.ny.gov/energy/58440.html> [hereinafter DRAFT SGEIS].

167. See generally N.Y. DEP'T ENVTL. CONSERVATION, PRELIMINARY REVISED SUPPLEMENTAL GENERIC ENVTL. IMPACT STATEMENT (July 1, 2011).

New York's study advised the adoption of operational regulations, like set-backs from water sources,¹⁶⁸ and it will require increased chemical disclosure.¹⁶⁹ Unlike in Texas, which permits protection of chemical constituents as trade secrets,¹⁷⁰ New York "considers MSDSs, [which list chemical constituents] to be public information ineligible for exception from disclosure as trade secrets."¹⁷¹

From late 2010 until the New York DEC released its findings in July 2011, the New York DEC did not approve drilling permits. The DEC received cover for their *de facto* moratorium through former New York Governor Patterson's executive order that forbade approval of hydraulic fracturing permits until July 1, 2011, after a preliminary revised draft supplemental generic environmental impact statement could be completed.¹⁷² Patterson's order passed on the same day he vetoed a New York Senate bill that would have prohibited issuance of new drilling permits in the Marcellus Shale until May 15, 2011—an official moratorium on hydraulic fracturing. Patterson's executive order apparently affects fewer non-hydraulic fracturing-related drilling permits than the Senate bill would have affected.¹⁷³

168. Some proposed New York setbacks are large. "[T]he Department recommends that regulations be adopted to prohibit high-volume hydraulic fracturing in both the New York City and Skaneateles Lake watersheds, as well as in a 4,000 foot buffer area surrounding these watersheds," N.Y. DEPT. ENV'T'L CONSERVATION, PRELIMINARY REVISED SUPPLEMENTAL GENERIC ENVTL. IMPACT STATEMENT, *supra* note 167, at § 7.1.5; "site disturbance associated with such operations be prohibited within 2,000 feet of any public (municipal or otherwise) water supply well, reservoirs, natural lake or man-made impoundments (except engineered impoundments constructed for fresh water storage associated with fracturing operations), and river or stream intake" *Id.* § 7.1.12.2; the extensive proposed setbacks have caused consternation for companies, destroying the worth of some investments. *See e.g.* Edward McAllister, *Insight: N.Y. gas drillers' victory soured by tough new rules*, REUTERS, Oct. 11, 2011, available at <http://www.reuters.com/article/2011/10/21/us-newyork-shale-idustre79k4yt20111021> ("Royal Dutch Shell, which has leased about 90,000 acres for drilling in New York, reckons that 40 percent of that land could be off limits under the proposed laws, a company source told Reuters after Shell completed modeling of its acreage in the state.").

169. N.Y. DEPT. ENV'T'L CONSERVATION, PRELIMINARY REVISED SUPPLEMENTAL GENERIC ENVTL. IMPACT STATEMENT, *supra* note 167, at § 8.1.2.2.

170. TEX. NAT. RES. CODE § 91.851(3) (Vernon 2011).

171. N.Y. DEPT. ENV'T'L CONSERVATION, PRELIMINARY REVISED SUPPLEMENTAL GENERIC ENVTL. IMPACT STATEMENT, *supra* note 167, at § 8.1.2.2.

172. David Patterson, Executive Order No. 41: Requiring Further Environmental Review, Dec. 13, 2010, available at

<http://www.governor.ny.gov/archive/paterson/executiveorders/EO41.html>; *see also* Tom Zeller, Jr., *New York Governor Vetoes Fracking Bill*, N.Y. TIMES, Dec. 11, 2010, available at <http://green.blogs.nytimes.com/2010/12/11/new-york-governor-vetoes-fracking-bill/>.

173. New York S.B. 8129-2010 (Aug. 6, 2010); *see also* Jim Efstathiou, Jr., *New York Senate Approves Halt to Shale Gas Drilling Over Water Safety*, BLOOMBERG, Aug. 4, 2010, available at <http://www.bloomberg.com/news/2010-08-04/new-york-s-senate-approves-drilling-moratorium-on-natural-gas-from-shale.html>.

The preliminary revised draft SGEIS was completed and issued on July 8, 2011 and it modified the 2009 draft SGEIS' recommendations.¹⁷⁴ A revised draft SGEIS was issued in September 2011.¹⁷⁵ The SGEIS would impose a number of operational restrictions. Well pad locations would be prohibited in the New York and Syracuse watersheds and in all 100-year floodplains.¹⁷⁶ Nor could any well pad be located within 4,000 feet of the New York and Syracuse watersheds.¹⁷⁷ Well pads would also be banned within 500 feet of all primary aquifers and well pads would be banned within 500 feet of private drinking water or domestic use springs, unless waived by the property owner.¹⁷⁸

The *de facto* DEC-imposed moratorium will likely continue in New York until a final SGEIS is issued. The DEC's sixty-day comment period began on September 7th, but it was extended to end on January 11th.¹⁷⁹ Despite New York Governor Cuomo's stated support for lifting the *de facto* moratorium,¹⁸⁰ the DEC's period for receiving and responding to comments was extended.¹⁸¹ Fracturing opponents in other states may apply New York's system of continual small delays as a model tactic to discourage fracturing.

H. Pennsylvania

Pennsylvania's hydraulic fracturing regulations include disclosure, operational, and economic requirements. The state also specifically mentions fracking in its regulations and best management practices that are aimed to control the environmental effects of oil and gas drilling and it has instituted

174. Press Release, N.Y. Dep't of Env'tl. Conservation, New Recommendations Issued in Hydraulic Fracturing Review, June 30, 2011 <http://www.dec.ny.gov/press/75403.html> (last visited Sept. 1, 2011); *see also* Press Release, DEC Report on Recommendations for Permitting of Hydraulic Fracturing Now Online, July 8, 2011 <http://www.dec.ny.gov/press/75579.html> (last visited April 15, 2012).

175. N.Y. DEP'T ENVT'L CONSERVATION, REVISED DRAFT SUPPLEMENTAL GENERIC ENVT'L IMPACT STATEMENT (September 2011) *available at* <http://www.dec.ny.gov/energy/75370.html>.

176. *Id.* at § 3.2.4.

177. *Id.*

178. *Id.*

179. N.Y. Dep't Env'tl Conservation, News Briefs (Dec. 2011), <http://www.dec.ny.gov/environmentdec/78288.html> (last visited Dec. 15, 2011).

180. Danny Hakm & Nicholas Confessore, *Cuomo Will Seek to Lift Ban on Hydraulic Fracturing*, N.Y. TIMES, June 30, 2011, *available at* <http://www.nytimes.com/2011/07/01/nyregion/cuomo-will-seek-to-lift-drilling-ban.html?pagewanted=all>.

181. Press Release, N.Y. Dep't Env'tl Conservation, New Recommendations Issued in Hydraulic Fracturing Review, June 30, 2011 <http://www.dec.ny.gov/press/75403.html> (last visited Sept. 1, 2011).

regulatory restrictions on the process,¹⁸² like its water protection regulations.¹⁸³ As this article was going to press, Pennsylvania passed House Bill 1950, which codified regulations related to unconventional resource-specific severance taxes and other hydraulic-fracturing-related regulations.¹⁸⁴

Pennsylvania's economic regulations have resulted in increased well permit fees, which allowed the state to hire thirty-seven oil and gas staff in 2009 and completely funded Pennsylvania's Bureau of Oil and Gas Management.¹⁸⁵ Under even the old regulations, applications for drilling in the Marcellus Shale cost more than applications for drilling in other formations in part because the applications also require submission of a water management plan.¹⁸⁶ "The permit review evaluates the water intake information associated with the fracturing process, in addition to the management, treatment and discharge of the wastewater."¹⁸⁷ The operator must list the names of all people who own property within 1,000 feet of the proposed well location, or, in the case of an unconventional well, within 3,000 feet from the vertical well bore,¹⁸⁸ but the operator is not required to list the names of all property owners along the hydraulically fractured pipe.¹⁸⁹ Under the new regulations, ". . . the governing body of a county under subsection (a) may adopt an ordinance to impose an unconventional gas well fee. The governing body of a county must notify the commission and give public notice of its intent to adopt the ordinance."¹⁹⁰ Pennsylvania also established legislation that would fund programs to conduct testing of baseline water quality.¹⁹¹

Pennsylvania has chemical disclosure requirements. Drilling companies must disclose to the Department of

182. STRONGER, PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW (Sept. 2010).

183. *Id.* at 1.

184. H.B. 1950, 2011-12 Gen. Assemb. (Pa. 2012), http://www.legis.state.pa.us/cfdocs/billinfo/bill_history.cfm?year=2011&sind=0&body=H&type=B&bn=1950 (last visited April 14, 2012).

185. STRONGER, PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW 6 (Sept. 2010).

186. *Id.* at 1.

187. PA. DEP'T ENV'T'L PROT., MARCELLUS SHALE WELL PERMIT APPLICATION FEES (Apr. 2009), *available at* <http://www.eLibrary.dep.state.pa.us/dsweb/Get/Document-84138/5500-FS-DEP4239.pdf>. The cost of well permitting fees are also available from this hyperlink location. The permit fees are based on total wellbore length in feet. *Id.*

188. 58 PA. STAT. § 3211 (2012).

189. PA. DEP'T ENV'T'L PROT., INSTRUCTIONS FOR COMPLETING AN APPLICATION FOR A PERMIT TO DRILL OR ALTER AN OIL OR GAS WELL, (Feb. 2011), *available at* <http://www.eLibrary.dep.state.pa.us/dsweb/Get/Document-83435/01%205500-PM-OG0001%20Instructions.pdf>.

190. 58 PA. STAT. § 2302 (2012).

191. 58 PA. STAT. § 2315(a.1)(v) (2012).

Environmental Protection (DEP) the names of chemicals that are used at a drilling site.¹⁹² Additionally, new regulations detail requirements for disclosure of drilling chemicals to certain people, with exceptions for the preservation of trade secrets.¹⁹³ In the event of a medical emergency, an operator must provide the concentration of each constituent chemical and the formula for each chemical compound to medical emergency personnel or local emergency personnel.¹⁹⁴

Pennsylvania has implemented regulatory requirements to calm citizen concerns related to potential contamination of water supplies as a result of hydraulic fracturing operations. A landowner or purveyor of water who experiences problems with water quality or quantity after drilling may request the DEP to conduct an investigation. The investigation must take place within ten days,¹⁹⁵ and the DEP must determine within forty-five days whether drilling caused the pollution.

The DEP also presumes that well operators are responsible for water pollution that occurs within six months after drilling or completion of a well that is within 1,000 feet of a water well, unless the well operator provides an affirmative defense.¹⁹⁶ In the case of unconventional wells, the presumption of pollution is extended to 2,500 feet of a water well when activities such as completion, drilling, stimulation, or alteration have occurred at the well site.¹⁹⁷ Affirmative defenses to claims of pollution are:

- (i) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration survey;
 - (ii) the landowner or water purveyor refused to allow the operator access to conduct a predrilling or prealteration survey;
 - (iii) the water supply is not within 1,000 feet of the well;
 - (iv) the pollution occurred more than six months after completion of drilling or alteration activities; and
 - (v) the pollution occurred as the result of a cause other than the drilling or alteration activity;
- or (2) in the case of an unconventional well: (i) the pollution existed prior to the drilling, stimulation or alteration activity as

192. 25 PA. CODE § 78.55 (2011).

193. 58 PA. STAT. § 3222.1 (2012).

194. *Id.*

195. *See* 25 PA. CODE § 78.51 (2011).

196. *See* 58 PA. STAT. § 3218 (2012) (being the new regulation); *see also* Wiseman, *supra* note 15, at 34 (describing Pennsylvania statutes related to hydraulic fracturing); PA. DEP'T ENVTL. PROT., GUIDE TO DEP PERMITS & OTHER AUTHORIZATIONS 99 (2007), available at <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-47493/383-2100-108.pdf> (discussing older regulations).

197. 58 PA. STAT. § 3218 (2012).

determined by a predrilling or prealteration survey; (ii) the landowner or water purveyor refused to allow the operator access to conduct a predrilling or prealteration survey; (iii) the water supply is not within 2,500 feet of the unconventional vertical well bore; (iv) the pollution occurred more than 12 months after completion of drilling or alteration activities; or (v) the pollution occurred as the result of a cause other than the drilling or alteration activity.¹⁹⁸

If water has been contaminated, the driller must replace the water.¹⁹⁹

Pennsylvania has pursued enforcement actions against operators who have conducted improper well casing and cementing that leads to contamination. In May 2011, Chesapeake Energy entered a consent decree to pay \$900,000 for contaminating 16 families' drinking water supplies.²⁰⁰

Some Pennsylvania cities,²⁰¹ most notably Pittsburgh, have voted to ban hydraulic fracturing. Pittsburgh's city council plans to hold a referendum to incorporate the ban into its home rule charter, which would make the ban more difficult for future councils to overturn.²⁰² It is unclear whether these city bans will be upheld in court, given that state agencies oversee well permitting.²⁰³ Other townships, fearing court challenges to fracturing bans, address the issue with municipal ordinances.²⁰⁴ Pennsylvania's recently passed drilling regulations address

198. 58 PA. STAT. § 3218(d) (2012).

199. *Id.*, at § 3218(a) (“[A] well operator who affects a public or private water supply by pollution or diminution shall restore or replace the affected supply with an alternate source of water adequate in quantity or quality for the purposes served by the supply.”).

200. Press Release, Pa. Dep't of Env'tl. Prot., DEP Fines Chesapeake Energy More than \$1 Million, (May 17, 2011), <http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=17405&typ eid=1> (last visited May 18, 2011).

201. Among the cities are Wilkinsburg, West Homestead and Baldwin Borough. Annie Tubbs, *Wilksburg passes natural gas drilling ban*, PITTSBURGH POST-GAZETTE, July 21, 2011, available at <http://www.post-gazette.com/pg/11202/1162012-100.stm>. Other cities have created *de facto* bans on the practice. Andrea Iglar, *Showdown over drilling seen in South Fayette case*, PITTSBURGH POST-GAZETTE, Oct. 20, 2011, available at <http://www.post-gazette.com/pg/11293/1183362-57.stm>.

202. Joe Smydo, *Onorato says 'legal issues' could block natural-gas referendum*, PITTSBURGH POST-GAZETTE, Aug. 4, 2011, available at <http://www.post-gazette.com/pg/11216/1165099-503.stm>.

203. *Id.*; see also CBS NEWS, *Pittsburgh Bans Natural Gas Drilling*, Nov. 16, 2010, <http://www.cbsnews.com/stories/2010/11/16/national/main7060953.shtml> (last visited May 15, 2011); see also Range Res. Appalachia, LLC v. Salem Tp., 964 A.2d 869 (2009).

204. “The August ordinance limits drilling to parcels 40 acres or larger, restricts access to certain roads, and requires buffers between wells and various structures, including homes.” PHILADELPHIA INQUIRER, *Pittsburgh Suburb: No to Drill Ban* (Nov. 10, 2011), http://articles.philly.com/2011-11-10/news/30382603_1_anti-drilling-group-township-officials-pittsburgh-suburb (last visited Dec. 8, 2011).

restrictive bans on hydraulic fracturing by providing that “all local ordinances regulating oil and gas operations shall allow for the reasonable development of oil and gas resources.”²⁰⁵ Reasonable development includes, not imposing “conditions, requirements or limitations on the construction of oil and gas operations that are more stringent than conditions, requirements or limitations imposed on construction activities for other industrial uses within the geographic boundaries of the local government” and the setting of a maximum period of 120 days for application review.²⁰⁶

Other operational regulations have developed as the legislative drafting process has continued. Originally, wells could be drilled within 200 feet, measured horizontally, from any existing building or existing water well only with the written consent of the building or well owner.²⁰⁷ A previous hydraulic-fracturing-related bill that did not pass the 2009–2010 session, House Bill 2213, would have increased that requirement to 1,000 feet.²⁰⁸ The recently passed bill restricts drilling within 500 feet of a water well or a building.²⁰⁹ No conventional well may be drilled within 100 feet of a stream, spring, or body of water.²¹⁰ The restriction increases to 300 feet with an unconventional well.²¹¹ Under previous regulations, landowners and water purveyors within 1,000 feet would be notified of the drilling of a conventional well. House Bill 2213 would have required notification of landowners and water purveyors within 2,500 feet of the well.²¹² The newly codified regulations require notification to landowners and water purveyors who are located within 3,000 feet of the well.²¹³

Pennsylvania also enforces regulations against specific companies to the extent where not only fines are levied, but bans are given.²¹⁴ Cabot Oil was banned from drilling in a nine square mile area because of complaints about its practices.²¹⁵ In another

205. 58 PA. STAT. § 3304 (2012).

206. *Id.*

207. H.B. 2213, 2009-10 Gen. Assemb. § 205(A) (Pa. 2010),

http://www.legis.state.pa.us/cfdocs/billinfo/bill_history.cfm?year=2009&ind=0&body=H&type=B&bn=2213 (last visited May 11, 2011) (the bill made it to the appropriations committee in October 2010, but it passed no further).

208. *Id.*

209. 58 PA. STAT. § 3215 (2012).

210. *Id.*

211. *Id.*

212. *See* H.B. 2213, *supra* note 206, at § 201(B).

213. 58 PA. STAT. § 3211 (2012).

214. CBS NEWS, *supra* note 202.

215. Laura Legere, *Gas company slapped with drilling ban and fine*, SCRANTON TIMES-TRIBUNE, Apr. 16, 2010, available at <http://thetimes-tribune.com/news/gas-company-slapped-with-drilling-ban-and-fine-1.731625#axzz1N1ZYlay4>.

settlement, Cabot Oil paid Pennsylvania's DEP "\$500,000 to offset the state's expense of investigating the stray gas migration cases that have plagued Dimock residents."²¹⁶ Until a court could find Cabot Oil as being in full compliance with the terms of the settlement, it would not be permitted to drill in the nine square mile area.²¹⁷

Operational regulations on wastewater disposal have also been affected by attempts to prevent water contamination. In April 2011, Pennsylvania's Department of Environmental Protection asked natural gas drilling operators "to stop delivering wastewater from shale gas extraction to fifteen facilities . . . [that] accept the wastewater."²¹⁸

I. Texas

Texas House Bill 3328 passed in May 2011.²¹⁹ The bill requires operators to disclose and report hydraulic fracturing chemicals and the amount of water used in hydraulic fracturing operations.²²⁰ House Bill 3328, as codified in § 91.851 of the Texas Natural Resources Code on September 1, 2011, protects operators who do not disclose chemicals if the discovered

216. Press Release, Pa. Dep't Env'tl. Prot., Dimock Residents to Share \$4.1 Million, Receive Gas Mitigation Systems Under DEP-Negotiated Settlement With Cabot Oil and Gas (Dec. 16, 2010), *available at* <http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=15595&typ eid=1>.

217. Laura Legere, *DEP drops Dimock waterline plans; Cabot agrees to pay \$4.1M to residents*, SCRANTON TIMES-TRIBUNE, Dec. 16, 2010, *available at* <http://thetimes-tribune.com/news/gas-drilling/dep-drops-dimock-waterline-plans-cabot-agrees-to-pay-4-1m-to-residents-1.1077910#axzz1WvSp9XQf>. In November, Cabot "won permission from state environmental regulators last month to stop paying for water for the residents." Michael Rubinkam, *Driller to stop water to families in Dimock*, ASSOCIATED PRESS, Dec. 1, 2011, *available at* <http://my.news.yahoo.com/driller-stop-water-families-dimock-pa-153025340.html>. The EPA stepped in and delivered water to Dimock in January, alleging that more testing was needed. Andrew Maykuth, *EPA to deliver water in Dimock*, PHILADELPHIA INQUIRER, Jan. 20, 2012, *available at* http://articles.philly.com/2012-01-20/business/30647511_1_water-wells-drinking-water-contaminants; Press Release, U.S. Env'tl Prot. Agency, EPA to Begin Sampling Water at Some Residences in Dimock, Pa. (Jan. 1, 2012), *available at* <http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/8eb78248ce13d9dc8525798a0070f991!opendocument>; EPA in Pennsylvania, U.S. Env'tl Prot. Agency, <http://www.epa.gov/aboutepa/states/pa.html> (last visited April 10, 2012) (being a repository for information about Pennsylvania news releases and sampling information related to Dimock).

218. Christie Campbell, *DEP asks drillers to halt dumping*, OBSERVER-REPORTER, Apr. 20, 2011, *available at* <http://www.observer-reporter.com/or/localnews/04-20-11-DEP-calls-on-treatment-plants>.

219. *See generally* H.B. 3328, 82d Reg. Sess. § 1 (Tx. 2011), <http://www.capitol.state.tx.us/BillLookup/History.aspx?LegSess=82R&Bill=HB3328> (last visited May 15, 2011).

220. *See generally Id.*

chemicals are not “purposefully added.”²²¹ The Railroad Commission of Texas adopted a hydraulic fracturing chemical disclosure rule in December 2011. The rule is effective on wells that are issued an initial drilling permit after February 1, 2012.²²² Texas’ regulations also do not require operators to disclose chemicals that are not disclosed to them by manufacturers, or chemicals that are present in trace amounts.²²³

Texas’ regulations allow an operator to withhold fluid data from disclosure if it is considered a “trade secret.”²²⁴ Standing to challenge the designation is limited to persons who are the landowner “on whose property” the well is located, that person’s adjacent neighbor, or a department or agency of the state.²²⁵ There are also provisions requiring information to be revealed to health care officials, similar to Arkansas’ disclosure provisions.²²⁶

Texas does not have any other particular requirements for disclosure or special casing requirements for hydraulic fracturing operations.²²⁷ Operators still must comply with general proper wellhead practices for casing and well-waste disposal.²²⁸

J. West Virginia

Whereas it is unclear in Pennsylvania whether cities like Pittsburgh can declare a moratorium on hydraulic fracturing,²²⁹ a state judge in West Virginia made it clear that in West Virginia a moratorium by any governmental entity lesser than the state is not permitted because the State has the primary interest in oil

221. TEX. NAT. RES. CODE ANN. § 91.851(1)(E) (West 2011).

222. Press Release, R.R. Comm’n of Tex., Railroad Commissioners Adopt One of the Nation’s Most Comprehensive Hydraulic Fracturing Chemical Disclosure Requirements (Dec. 13, 2011), <http://www.rrc.state.tx.us/pressreleases/2011/121311.php>; H.B. 3328 § 2.

223. 16 TEX. ADMIN. CODE § 3.29(d) (2011) (effective Feb. 29, 2012); *but see* 16 TEX. ADMIN. CODE § 3.29(c)(2)(A) (2011) (detailing the disclosures that are required).

224. *Id.* § 91.851(3).

225. *Id.* § 91.851(5); 16 TEX. ADMIN. CODE § 3.29(f) (2011), *available at* <http://www.rrc.state.tx.us/rules/prop-new-3-29-frac-disclosure-Aug29.pdf>.

226. *See* § 91.851(6).

227. *See* 16 TEX. ADMIN. CODE § 3.13 (2010) (describing general casing requirements); *see generally* TEX. NAT. RES. CODE § 91.011 (2010).

228. *See* 16 TEX. ADMIN. CODE § 3.14 (2011) (describing casing requirements for plugging a well); *see also* 16 TEX. ADMIN. CODE § 3.95 (2011) (describing casing requirements for Underground Storage of Liquid or Liquefied Hydrocarbons in Salt Formations); *see also* 16 TEX. ADMIN. CODE § 3.13 (2011) (describing general well casing requirements).

229. *See* Smydo, *supra* note 201; *see also* CBS NEWS, *supra* note 202; *see also* Range Res., 964 A.2d 869, at 877.

and gas law.²³⁰ Companies that meet blanket opposition at local levels in some states can look to state law for assistance. The city of Morgantown's municipal ban on hydraulic fracturing was struck down in an Order signed on August 12, 2011.²³¹

V. MODEL REGULATIONS AND GUIDELINES

Several groups, such as STRONGER and the Groundwater Protection Council, have created systems of "best practices" that provide guidance for companies and states that practice hydraulic fracturing. These organizations' best practices guidelines have no legal impact—they are a form of "self regulation" and are mainly recommendations to state regulatory bodies to include provisions that address certain concerns.

A. STRONGER Guidelines

STRONGER, the State Review of Oil and Natural Gas Environmental Regulations, is an independent stakeholder governing body that helps states formulate their regulations. STRONGER was incorporated as a non-profit corporation in June 1999. "Its Board of Directors consists of three state regulators, three environmental/public interest representatives and three industry representatives."²³² Its chair at the time of the report, Robert J. Sandilos, worked at Chevron Global Upstream.²³³ "The EPA, DOE, and Department of the Interior participate as non-voting Board members. The IOGCC also participates through its State Review Committee . . . [The IOGCC provides] three state regulators to serve on the Board . . ."²³⁴

230. Northeast Natural Energy LLC v. City of Morgantown, No. 11-C-411, 9 (W.V. Monogalia Cnty. Cir. Ct. 2011), *available at* http://www.frackinginsider.com/Tucker_Marcellus_Order.pdf ("the State's interest in oil and gas development and production throughout the State as set forth in, W. VA. CODE § 22-6 et seq. (1994), provides for the exclusive control of this area of law to be within the hands of the WVDEP. These regulations do not provide any exception or latitude to permit the City of Morgantown to impose a complete ban on fracking or to regulate oil and gas development and production").

231. *Id.*

232. MICHAEL NICKOLAUS, WILLIAM BRYSON, & PAUL JEHN, STATE OIL AND NATURAL GAS REGULATIONS DESIGNED TO PROTECT WATER RES., at 34 (2009), *available at* <http://www.gwpc.org/e-library/documents/general/State%20Oil%20and%20Gas%20Regulations%20Designed%20to%20Protect%20Water%20Resources.pdf>.

233. See Letter from The STRONGER Board, State Review of Oil & Natural Gas Envtl. Regulations, to Persons Interested in the Hydraulic Fracturing Guidelines, at 10 (Feb. 8, 2010), *available at* <http://www.strongerinc.org/documents/HF%20Guideline%20Web%20posting.pdf>. [hereinafter STRONGER Guidelines].

234. Nickolaus, Bryson, & Jehn, *supra* note 232, at 33.

“The current subject areas of the Guidelines include General/Administrative, Technical, Abandoned Sites, Naturally Occurring Radioactive Materials (NORM), and Stormwater Management.”²³⁵

On February 8, 2010, STRONGER released proposed hydraulic fracturing guidelines. Their guidelines and commentary on the guidelines are set out in full on their website.²³⁶ STRONGER has conducted studies of states like Pennsylvania,²³⁷ Oklahoma,²³⁸ and Ohio,²³⁹ and it published reports on areas in which the states can improve their regulatory practices.

STRONGER’s guidelines focus on environmental concerns that most well-operators already need to concern themselves with, rather than on concerns that are specific to hydraulic fracturing.²⁴⁰ The presence of potentially toxic hydraulic fracturing fluids, however, makes it imperative for well operators to be specifically careful regarding the handling of flowback and waste waters.²⁴¹

The STRONGER guidelines encourage state programs to include standards for protection of the well from seepage, the identification of risks to water sources, and notification to state regulatory agencies prior to and after completion of hydraulic fracturing operations.²⁴²

The first standards discuss the importance of operational concerns, like proper casing and cementing.²⁴³ Then, the standards describe how a state program should also address monitoring concerns that could lead to regulatory requirements. STRONGER’s guidelines address the unique geology of areas where drilling will take place by encouraging operators and regulatory agencies to identify “potential conduits for fluid migration.”²⁴⁴

235. *Id.*

236. STRONGER Guidelines, *supra* note 233, at 3-4.

237. *See generally* STRONGER, Pennsylvania Hydraulic Fracturing State Review (2010), *available at* http://www.shalegas.energy.gov/resources/071311_stronger_pa_hf_review.pdf.

238. *See generally* STRONGER, Oklahoma Hydraulic Fracturing State Review (2011), *available at*

<http://www.strongerinc.org/documents/Final%20Report%20of%20OK%20HF%20Review%201-19-2011.pdf>.

239. *See generally* STRONGER, Ohio Hydraulic Fracturing State Review (2011), *available at* http://www.dnr.state.oh.us/Portals/11/oil/pdf/stronger_review11.pdf [hereinafter STRONGER Ohio Review].

240. *See e.g.* STRONGER Guidelines, *supra* note 233, at 3-4.

241. *Id.* at 8-9.

242. *See e.g. Id.* at 3-4; *see also* STRONGER Ohio Review, *supra* note 239.

243. *See* STRONGER Guidelines, *supra* note 233, at X.2.1.

244. *Id.*

STRONGER appears prepared to support case-by-case restrictions on fracturing in places where fissures could permit methane migration. The STRONGER approach and focus on an area's geology is a mid-point between a ban on fracking and a lack of regulation. If geological surveys and/or environmental impact statements are required, the practice of hydraulic fracturing may be slowed—similar to the regulatory-driven holdup in New York while its state DEC determines if fracturing in certain areas may present a risk to state water supplies.²⁴⁵

The guidelines then focus on disclosure concerns, like the necessity of communication and notification. State regulatory agencies should “require appropriate notification prior to, and reporting after completion of, hydraulic fracturing operations. Notification should be sufficient to allow for the presence of field staff to monitor activities. Reporting should include identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded.”²⁴⁶

B. Groundwater Protection Council Recommendations

The Groundwater Protection Council (GWPC), a non-profit organization of state groundwater regulatory agencies, provided “suggested actions” for regulating well sites and simultaneously protecting water sources.²⁴⁷

The GWPC's 2009 guidelines present detailed recommendations related to operational concerns like casing and cement, temporary abandonment of wells, plugging, tanks, pits, spill remediation, and surface discharges.²⁴⁸

The GWPC also recommends regulatory actions, like a study of the impact of hydraulic fracturing on sources of drinking water. The GWPC further recommends that additional testing should be done on wells that are going to be hydraulically fractured, especially when a well is near a USDW,²⁴⁹ and that state and federal regulators should be wary about relying on anecdotal evidence of contamination. “The studies should focus on evaluating both the theoretical and empirical relationship of hydraulic fracturing to ground water protection.”²⁵⁰

Although the GWPC recommends the institution of more precautionary measures, it suggests that waste regulation

245. See DRAFT SGEIS, *supra* note 166.

246. STRONGER Guidelines, *supra* note 233, at X.2.2.

247. See Dep't of Energy, State Oil and Natural Gas Regulations Designed to Protect Water Res., *supra* note 232, at 7.

248. *Id.* at 37-39.

249. *Id.* at 40.

250. *Id.* at 39.

remain managed primarily at the state level.²⁵¹ The GWPC indicates that the state review process managed by STRONGER, increased environmental protection for water resources, and it demonstrated that “state regulation is a very effective means of managing E&P waste.”²⁵²

VI. CONCLUSIONS

Federal government regulation of hydraulic fracturing would be a baseline, much as the Clean Water Act and the Clean Air Act are baselines for regulation.²⁵³ States could likely create more stringent regulations. If the EPA’s ongoing study does not establish cohesive hydraulic fracturing regulations, then the number and variety of state-based regulatory solutions will likely increase.

The lack of any definitive conclusions regarding hydraulic fracturing’s effects on the environment has led to at least two competing views about the practice.²⁵⁴

One view is that hydraulic fracturing requires few new regulations and it can be regulated under usual oil and gas regulations. The view stresses there has not yet been any study that establishes water supply contamination due to the act of fracking. Although studies have found contamination due to surface spills or casing troubles near the well-head, the studies have not discovered underground migration of chemicals. Although the December 2011 Pavilion field study in Wyoming indicates that fracturing chemicals may have migrated to wells, the study also notes that leaks may have originated from insufficient surface casing.²⁵⁵ Fracturing at Pavilion was conducted relatively close to the surface where rocks are in permeable layers. Most fracturing in shale plays occurs underneath impermeable rock layers. Insufficient surface casing and the depth at which fracturing is permitted can be controlled

251. *Id.*

252. *Id.*

253. *See generally* 33 U.S.C. § 1370 (2011) (describing how states can regulate “more stringently” under the Clean Water Act if they desire); *see also* 42 U.S.C. § 7416 (2011) (describing likewise for the Clean Air Act).

254. *See* Osborn et al., *supra* note 53, at 1; *see also* Abrahm Lustgarten, *About Us*, PROPUBLICA, http://www.propublica.org/site/author/Abrahm_Lustgarten (last visited May 15, 2011) (being one viewpoint that is very concerned about hydraulic fracturing. This page lists Mr. Lustgarten’s series of articles, some of which have been picked up by national newspapers, which raise concerns about the practice).

255. *See* PAVILION, *supra* note 27 (discussing casing and permeable layers: “lack of cement and sporadic bonding outside casing in production constitutes a major potential gas migration pathway to the depth of deep monitoring and domestic wells.”).

by enforcement and operational regulations rather than by moratoria, economic regulations, or through increased disclosure.

Another view is that operators should act in an overabundance of caution and apply the “precautionary principle” of “do no harm” until all potential dangers of the practice are known.²⁵⁶ In the absence of a pre-hydraulic fracturing study of nearby aquifers, it is difficult to predict how methane will migrate and how to legally prove human-causation of the migration.²⁵⁷ Regulations informed by this view of hydraulic fracturing may impose regulatory *de facto* or *de jure* moratoria, they may focus on disclosure-based regulations such as requiring disclosure of the types of chemicals that are used, they may impose water quality monitoring obligations, and they may require baseline studies of water quality.

If the EPA determines that a scientific study, like the Duke study,²⁵⁸ demonstrates a probable link between hydraulic fracturing and public health hazards, producers will need to adapt to federal regulations for monitoring water supplies, specifications for casing strength and depth, and setbacks from urban areas or water supplies. It will become more expensive to conduct hydraulic fracturing due to the cost of compliance with new regulations. However, it does not appear that hydraulic fracturing will be prohibited by a national ban or by most attempted municipal bans.²⁵⁹ More monitoring requirements will likely be imposed on producers, including the determination of baseline levels of methane and other pollutants.²⁶⁰ As this article was going to press in April 2012, the EPA imposed new air

256. See Madelon L. Finkel, & Adam Law, *The Rush to Drill for Natural Gas: A Public Health Cautionary Tale*, 101 AM. J. PUBLIC HEALTH 784, 785 (May 2011); see also Medical Society of the State of New York Position Statement # 90.992 (Dec. 9, 2010), Medical Society of the State of New York (Dec. 9, 2010); see also Sheila Bushkin-Bedient, Geoffrey E. Moore, and The Preventive Medicine and Family Health Committee of the Medical Society of the State of New York, *Update on Hydraulic Fracturing*, 68 Medical Society of the State of New York News of New York 6 (Apr. 2012), available at http://www.mssny.org/mssnycfm/mssnyeditor/File/2012/In_the_News/NONY/April/MSSNYApril2012web.pdf.

257. See Osborn et al., *supra* note 53, at 4-5.

258. *Id.* at 5.

259. See, e.g., CBS NEWS, *supra* note 202 (being a municipal ban).

260. See Lustgarten, *Gas Drilling Companies Hold Data Needed by Researchers to Assess Risk to Water Quality*, *supra* note 56, at 2 (demonstrating that studies can be attacked if they lack baseline data); see also H.B. 2213, *supra* note 206, at 12 (demonstrating Pennsylvania’s attempts to create regulations that can establish baseline data).

quality standards, which will affect operations by imposing more stringent pollution reduction requirements.²⁶¹

State-based regulation of hydraulic fracturing has taken many different paths. New York's regulatory delays and increased requirements for environmental studies act as a curb on rapid development of hydraulically fractured wells.²⁶² Pennsylvania focuses on disclosure and operational regulations. Texas and Wyoming took an early lead with disclosure-based regulations related to the composition of chemicals used in operations. West Virginia's state primacy over development precludes municipalities from enacting moratoria. West Virginia's experience demonstrates that people who seek to affect hydraulic fracturing in some locations must act at the state or federal level rather than through local ordinances.²⁶³ Regulation, rather than litigation, appears to lead to most reform in hydraulic fracturing activities.²⁶⁴ Successful litigation will likely focus on enforcement and the interpretation of regulations. Ultimately, the absence of significant hazards posed by the process of hydraulic fracturing means that fracking will provide an increasing percentage of America's oil and gas production.²⁶⁵

261. See Regulatory Actions, U.S. Env't Prot. Agency (2012), <http://www.epa.gov/airquality/oilandgas/actions.html> (last visited Apr. 18, 2012) (listing documents related to the Final Air Rules for the Oil and Natural Gas Industries. As of April 18, 2012, information regarding the rule's codification in the Federal Register was not available); see also Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews Final Rule, 40 C.F.R. Part 63, <http://www.epa.gov/airquality/oilandgas/pdfs/20120417finalrule.pdf> (last visited Apr. 18, 2012).

262. See e.g. Patterson, *supra*, note 172.

263. *But see* discussion on New Mexico regulations, *supra* § III(f), demonstrating that time and place regulations may be acceptable in certain areas.

264. See *supra* § II (discussing some of the lawsuits).

265. See IHS CAMBRIDGE ENERGY RESEARCH ASSOCIATES, FUELING NORTH AMERICA'S FUTURE: THE UNCONVENTIONAL NATURAL GAS REVOLUTION AND THE CARBON AGENDA, ES-4(2010), available at http://www2.cera.com/docs/Executive_Summary.pdf; see also Clifford Krauss, *Shale Boom in Texas Could Increase U.S. Oil Output*, N.Y. Times, May 27, 2011, at A1, available at <http://www.nytimes.com/2011/05/28/business/energy-environment/28shale.html?pagewanted=all> (discussing how "shale and other 'tight rock' fields that now produce about half a million barrels of oil a day will produce up to three million barrels daily by 2020").