

HYDRAULIC FRACTURING REGULATION IN THE UNITED STATES: THE LAISSEZ-FAIRE APPROACH OF THE FEDERAL GOVERNMENT AND VARYING STATE REGULATIONS

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TABLE OF CONTENTS

An Introduction to Hydraulic Fracturing in the U.S.	40
I. Federal Regulation of Hydraulic Fracturing.....	43
A. The Safe Drinking Water Act.....	43
B. The Resource Conservation and Recovery Act	46
C. The Emergency Planning and Community Right-To-Know Act.....	47
D. The Clean Water Act	48
E. The Clean Air Act	50
F. The Comprehensive Environmental Response, Compensation, and Liability Act	51
G. The National Environmental Policy Act.....	52
II. State Regulation of Hydraulic Fracturing.....	53
A. Colorado	53
B. New York.....	56
C. Pennsylvania	59
D. Texas.....	60
E. Louisiana.....	61
F. Wyoming.....	63
G. North Dakota	64
III. Recent Developments in Hydraulic Fracturing Regulation	65
Conclusion	68

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AN INTRODUCTION TO HYDRAULIC FRACTURING IN THE U.S.

Hydraulic fracturing (or “fracking”) is a procedure used to increase the flow of oil or natural gas from a well drilled into a low permeability rock formation, like shale, that has been in use in the U.S. since the 1940s.¹ The procedure uses a mixture of water, proppants (e.g. sand or ceramic beads), and various chemicals, which are pumped into subsurface rock formations at high pressure.² The pressure creates fractures in the rock that extend outward from the well bore.³ The intent is to create a network of interconnected fractures, held open by the proppants, which allow oil and natural gas to flow from the pore spaces in the rock to the production well.⁴ This process, combined with horizontal drilling (to intersect natural vertical fractures in the shale), has turned otherwise unproductive shale formations into the largest oil and natural gas fields in the world.⁵ As of 2005, approximately ninety percent of all oil and natural gas wells drilled in the United States used hydraulic fracturing.⁶

Several major “shale plays,” as the oil and gas industry calls them, exist in the U.S.⁷ The Marcellus Shale of the Appalachian Basin, located within parts of eight eastern states (New York, Pennsylvania, Ohio, West Virginia, Maryland, Kentucky, Tennessee, and Virginia)⁸ takes up a land area of about 54,000 square miles—an area larger than the state of Florida.⁹ In 2008, original estimates of its natural gas capacity ranged from 168 trillion cubic feet to 500 trillion cubic feet.¹⁰ Recently, however, the U.S. Geological Survey (USGS) estimated that the Marcellus Shale contains eighty-four trillion cubic feet of undiscovered, technically recoverable

1. *Hydraulic Fracturing of Oil & Gas Wells Drilled in Shale*, GEOLOGY.COM, <http://geology.com/articles/hydraulic-fracturing> (last visited Sept. 26, 2012); *Hydraulic Fracturing 101*, EARTHWORKS, <http://www.earthworksaction.org/FracingDetails.cfm> (last visited Sept. 26, 2012).

2. *Hydraulic Fracturing of Oil & Gas Wells Drilled in Shale*, *supra* note 1; *Hydraulic Fracturing 101*, *supra* note 1.

3. *Hydraulic Fracturing 101*, *supra* note 1.

4. *Id.*; *Hydraulic Fracturing of Oil & Gas Wells Drilled in Shale*, *supra* note 1.

5. *Hydraulic Fracturing of Oil & Gas Wells Drilled in Shale*, *supra* note 1.

6. Env'tl. Working Group, FREE PASS FOR OIL AND GAS: ENVIRONMENTAL PROTECTIONS ROLLED BACK AS WESTERN DRILLING SURGES (March 26, 2009), <http://www.ewg.org/book/export/html/27154> (hereinafter FREE PASS FOR OIL AND GAS).

7. U.S. EIA, *Shale Gas and Oil Plays, Lower 48 States*, EIA.GOV http://www.eia.gov/oil_gas/rpd/shale_gas.pdf (last visited Sept. 26, 2012).

8. *Marcellus Shale-Appalachian Basin Natural Gas Play*, GEOLOGY.COM, <http://geology.com/articles/marcellus-shale.shtml> (last visited Oct. 26, 2011).

9. LISA SUMI, EARTHWORKS, SHALE GAS: FOCUS ON THE MARCELLUS SHALE 2 (2008), available at <http://www.earthworksaction.org/publications.cfm?pubID=354>.

10. *Id.* at 4.

natural gas, and 3.4 billion barrels of undiscovered, technically recoverable natural gas liquids.¹¹ This estimate contrasts sharply with the U.S. Department of Energy's (DOE) estimate of 410 trillion cubic feet of technically recoverable natural gas,¹² but still leaves the Marcellus as the largest reserve of shale gas in the U.S.¹³ The new findings by the USGS have, however, brought estimates of U.S. natural gas reserves under question and prompted the DOE to revise their previous figures on the Marcellus Shale.¹⁴

Aside from the Marcellus Shale, the largest U.S. shale gas formations being drilled today include the Barnett in Texas, the Fayetteville in Arkansas, and the Haynesville in Louisiana and eastern Texas.¹⁵ Significant commercial shale gas production also occurs in the Lewis Shale of northwestern Arizona and southwestern Colorado, the Antrim Shale in Michigan, and the New Albany Shale in southern Indiana and northern Kentucky.¹⁶

Significant U.S. shale oil formations include the Green River Formation in western Colorado, southeastern Utah, and southern Wyoming, and the Devonian-Mississippian black shales of the eastern U.S.¹⁷ The Green River Formation, which includes the Green River and Washakie Basins of Wyoming, the Uinta Basin of Utah, and the Piceance Basin of Colorado, contains the richest, most concentrated deposits of shale oil in the U.S.¹⁸ The largest shale oil formation in the U.S., however, is the Bakken

11. U.S. Geological Survey, *USGS Releases New Assessment of Gas Resources in the Marcellus Shale, Appalachian Basin*, USGS.GOV (Aug. 23, 2011), http://www.usgs.gov/newsroom/article.asp?ID=2893&from=rss_home.

12. Ian Urbina, *U.S. Geologists Sharply Cut Estimate of Shale Gas*, N.Y. TIMES, Aug. 24, 2011, http://www.nytimes.com/2011/08/25/us/25gas.html?_r=1&scp=1&sq=marcellus%20shale&st=cse.

13. See U.S. ENERGY INFO. ADMIN., U.S. DEPT. OF ENERGY, REVIEW OF EMERGING RESOURCES: U.S. SHALE GAS AND SHALE OIL PLAYS (2011), *available at* <http://www.eia.gov/analysis/studies/usshalegas> (comparing the revised 84 trillion cubic feet figure for the Marcellus shale to the figures listed for other shale formations in the U.S.).

14. Urbina, *supra* note 12.

15. *Technically Recoverable Shale Gas Resources Jump 134 Percent*, INSTITUTEFORENERGYRESEARCH.ORG (May 16, 2011), <http://www.instituteforenergyresearch.org/2011/05/16/technically-recoverable-shale-gas-resources-jump-134-percent>.

16. HALLIBURTON, U.S. SHALE GAS: AN UNCONVENTIONAL RESOURCE. UNCONVENTIONAL CHALLENGES, 1 (2008), *available at* http://www.halliburton.com/public/solutions/contents/Shale/related_docs/H063771.pdf.

17. John R. Dyni, *United States Oil-Shale Deposits*, GEOLOGY.COM (2005), <http://geology.com/usgs/oil-shale/united-states-oil-shale.shtml>.

18. OFFICE OF PETROLEUM RESERVES, U.S. DEPT. OF ENERGY, FACT SHEET: U.S. OIL SHALE RESOURCES (Jun. 18, 2007), *available at* http://www.fossil.energy.gov/programs/reserves/npr/Oil_Shale_Resource_Fact_Sheet.pdf.

formation in the Williston basin of eastern North Dakota and western Montana.¹⁹ The recently discovered Niobrara formation in the Denver Basin of southeastern Wyoming and northern Colorado has been getting a great deal of attention as well, as oil companies are rapidly leasing land in hopes of capitalizing on the Niobrara's oil-producing potential.²⁰

The utilization of hydraulic fracturing to exploit vast reserves of shale oil and gas in the U.S. raises significant concerns about its effect on human health and the environment. Specifically, there are concerns over four exposure pathways that could cause drinking water pollution. First, there is the concern that fracking chemicals²¹ might enter drinking water aquifers directly due to improper well construction or an over-aggressive "frack."²² Second, there is the potential for pollution from the vast amounts of produced water and flowback, which the industry sends to a publicly owned treatment works (POTW), discharges into surface waters, or injects back into the ground.²³ Third, surface drilling operations create the potential for spills and leaching of harmful waste products into the groundwater.²⁴ Fourth, the fracturing of underground rock formations could potentially cause oil and gas reservoirs to communicate with groundwater aquifers.²⁵ The first three exposure pathways are particularly important because the chemicals used in the hydraulic fracturing process include both chemicals known to be toxic to humans and wildlife and known carcinogens.²⁶

Other concerns relate to the emission of methane (a much more potent greenhouse gas than carbon dioxide) into the atmosphere from shale gas

19. *Bakken Formation Oil Assessment in North Dakota, Montana will be updated by U.S. Geological Survey*, U.S. DEPT. OF THE INTERIOR (May 19, 2011), <http://www.doi.gov/news/pressreleases/Bakken-Formation-Oil-Assessment-in-North-Dakota-Montana-will-be-updated-by-US-Geological-Survey.cfm>.

20. Mark Jaffe, *Oil Companies Rushing to Buy Leases Along Colorado's Front Range*, DENVER POST, Oct. 23, 2011, http://www.denverpost.com/search/ci_19169758.

21. U.S. DEPT. OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 61–63 (2009), available at http://www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale_gas_primer_2009.pdf.

22. *Id.* at 51–52, 58.

23. *Id.* at 66, 68–69.

24. *Id.* at 55–56.

25. *Id.* at 58.

26. *Hydraulic Fracturing 101*, *supra* note 1. For more information about the chemicals used in hydraulic fracturing, visit <http://fracfocus.org>. FracFocus is a national voluntary chemical disclosure website for the hydraulic fracturing industry. Some states are now requiring that well operators disclose chemical information for each individual well to FracFocus.

wells, intentional venting or flaring by workers, or from leaky pipes.²⁷ Although natural gas is marketed as the “green” alternative to burning dirty oil and coal for heat and electricity, some argue that the greenhouse gas footprint of methane released from shale gas production is greater than that of conventional natural gas, oil, or coal.²⁸

I. FEDERAL REGULATION OF HYDRAULIC FRACTURING

Despite Congress’ power to regulate hydraulic fracturing activities under the Commerce Clause of the U.S. Constitution, regulation of the technology—and of the oil and gas industry in general—is largely left to the states.²⁹ In fact, the oil and gas industry, including hydraulic fracturing, enjoys exemptions from several major federal environmental statutes, including: the Safe Drinking Water Act; the Resource Conservation and Recovery Act; the Emergency Planning and Community Right-To-Know Act; the Clean Water Act; the Clean Air Act; the Comprehensive Environmental Response, Compensation, and Liability Act; and the National Environmental Policy Act.³⁰ Many of the exemptions for the above-listed statutes stem from or were strengthened by the Energy Policy Act of 2005.³¹

A. The Safe Drinking Water Act

Congress enacted the Safe Drinking Water Act (SDWA) in 1974 to protect the quality of public drinking water in the U.S.³² The law regulates

27. Tom Zeller, Jr., *Studies Say Natural Gas Has Its Own Environmental Problems*, N.Y. TIMES, Apr. 11, 2011, http://www.nytimes.com/2011/04/12/business/energy-environment/12gas.html?_r=1.

28. See Robert W. Howarth et al., *Methane and the Greenhouse-Gas Footprint of Natural Gas from Shale Formations*, CLIMATE CHANGE LETTERS (Mar. 13, 2011), available at www.acsf.cornell.edu/2011Howarth-Methane (finding that the greenhouse-gas footprint of shale gas is greater than conventional gas or oil, and 20 percent greater of a 20-year period than coal).

29. David Holmes, *Fracking: The Music Video*, PROPUBLICA.ORG (May 12, 2011), <http://www.propublica.org/article/fracking-music-video>.

30. See RENEE L. KOSNIK, THE OIL AND GAS INDUSTRY’S EXCLUSION AND EXEMPTIONS TO MAJOR ENVIRONMENTAL STATUTES 2 (2007), available at <http://www.earthworksaction.org/pubs/PetroleumExemptions1c.pdf> (discussing oil and gas industry exemptions from major environmental statutes).

31. *Id.*

32. *Summary of the Safe Drinking Water Act*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/lawsregs/laws/sdwa.html> (last updated Aug. 23, 2012).

all waters, whether from above ground or underground sources, that are actually or potentially designed for human consumption.³³

Like most federal environmental laws in the U.S., the Environmental Protection Agency (EPA) is responsible for implementing the SDWA. Part C of the SDWA requires the EPA to establish minimum regulations for State Underground Injection Control (UIC) Programs.³⁴ These regulations must “contain minimum requirements for effective programs to prevent underground injection which endangers drinking water sources.”³⁵ It also mandates that State programs require a permit for any underground injection, mandates inspection, monitoring, recordkeeping and reporting requirements, and specifically disallows the promulgation of any rule, “which authorizes any underground injection which endangers drinking water sources.”³⁶ A state must meet these minimum requirements in order to obtain primary enforcement and regulatory responsibility for underground injection activities within the state.³⁷

Originally, the SDWA defined “underground injection” as “the subsurface emplacement of fluids by well injection,” without any exceptions.³⁸ Strangely, under this definition, the EPA considered hydraulic fracturing as exempt under the SDWA.³⁹ In 1997, however, the U.S. Court of Appeals for the 11th Circuit ruled that “hydraulic fracturing activities constitute ‘underground injection’ under Part C of the SDWA.”⁴⁰ Thus, the EPA and State UIC Programs were required to regulate hydraulic fracturing under the SDWA. In response, the EPA initiated a study of the potential for contamination of public water supplies from the hydraulic fracturing of coal seams for methane production,⁴¹ and concluded in 2004 that hydraulic fracturing “poses little or no threat to [underground sources of drinking water].”⁴² Environmental groups, federal legislators, and EPA employees

33. *Id.*

34. Safe Drinking Water Act, 42 U.S.C. § 300h(a) (2006).

35. *Id.* § 300h(b).

36. *Id.* § 300h(b).

37. *Id.* § 300h-1.

38. Safe Drinking Water Act of 1974, Pub. L. No. 93-523, § 1421(d)(1), 88 Stat. 1660, 1676 (1974).

39. FREE PASS FOR OIL AND GAS, *supra* note 6.

40. Legal Envtl. Assistance Found. v. U.S. Envtl. Prot. Agency, 118 F.3d 1467, 1478 (11th Cir. 1997).

41. *Inadequate Regulation of Hydraulic Fracturing*, EARTHWORKS, <http://www.earthworksaction.org/halliburton.cfm> (last visited Oct. 31, 2011).

42. ENVTL. PROT. AGENCY, EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS: EXECUTIVE

questioned the accuracy of the 2004 report,⁴³ with one veteran scientist alleging that EPA's findings were "unsupportable"⁴⁴ and that the report was "scientifically unsound."⁴⁵

Despite questions over the report's accuracy, Congress amended the SDWA in 2005 when it passed the Energy Policy Act.⁴⁶ The amendments added two exclusions to the definition of underground injection: "(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."⁴⁷ Thus, regardless of whether the underground injection of water, proppants, and otherwise toxic chemicals associated with hydraulic fracturing actually endangers drinking water sources, the practice is exempt under the SDWA so long as diesel fuel is not used.

Many in the U.S refer to this exemption as the "Halliburton loophole" because of former Vice President Dick Cheney's ties to Halliburton—the oil and gas giant that patented hydraulic fracturing in the 1940s, and of which Cheney served as CEO.⁴⁸ Since 2005, two bills have been proposed in Congress that would have ended the SDWA exemption for hydraulic fracturing. The first was in the House of Representatives in 2008, where Representatives DeGette, Salazar, and Hinchey introduced a bill aimed at protecting drinking water from oil and gas development.⁴⁹ The second came in 2009, when members of both houses of Congress introduced the Fracking Responsibility and Awareness of Chemicals Act (aptly named the "FRAC Act").⁵⁰ Neither bill made it through Congress.⁵¹

SUMMARY 1 (2004), available at http://water.epa.gov/ogwdw/uic/pdfs/cbmstudy_attach_uic_exec_summ.pdf.

43. KOSNIK, *supra* note 30, at 10.

44. *EPA Findings on Hydraulic Fracturing Deemed "Unsupportable,"* UNION OF CONCERNED SCIENTISTS (2010), http://www.ucsusa.org/scientific_integrity/abuses_of_science/oil-extraction.html.

45. *Inadequate Regulation of Hydraulic Fracturing*, *supra* note 41.

46. KOSNIK, *supra* note 30, at 8.

47. 42 U.S.C § 300h(d)(1)(B).

48. *Inadequate Regulation of Hydraulic Fracturing*, *supra* note 41.

49. *Id.*

50. *Id.*

51. Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, H.R. 2766, 111th Cong. (2009) (introduced on June 9, 2009 but not enacted); Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, S. 1215, 111th Cong. (2009) (introduced on June 9, 2009 but not enacted).

B. The Resource Conservation and Recovery Act

Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 is a comprehensive environmental statute that gives EPA the authority to regulate the generation, transportation, treatment, storage, and disposal of hazardous waste—commonly referred to as a “cradle-to-grave” regulatory scheme.⁵² Subtitle D provides a framework for regulating non-hazardous solid waste.⁵³

RCRA defines “hazardous waste” as:

[A] solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may—

(A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or

(B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or other managed.⁵⁴

RCRA required EPA to determine criteria for identifying and listing hazardous waste subject to regulation under Subtitle C.⁵⁵ Drilling fluids, produced waters, and other wastes associated with oil and natural gas exploration, development, or production (oil field wastes) were explicitly exempted from listing as hazardous waste until EPA conducted a Regulatory Determination as to whether such wastes warranted regulation under Subtitle C, but no sooner than October 21, 1982.⁵⁶

Before the EPA completed their Regulatory Determination, Congress enacted the Solid Waste Disposal Act (SWDA) in 1980.⁵⁷ The SWDA exempted oil-field wastes from Subtitle C unless EPA could prove that the

52. *Summary of the Resource Conservation and Recovery Act*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/lawsregs/laws/rcra.html> (last updated Aug. 11, 2011); KOSNIK, *supra* note 30, at 6.

53. KOSNIK, *supra* note 30, at 6.

54. Resource Conservation and Recovery Act, 42 U.S.C. § 6903(5) (2006).

55. *Id.* § 6921(a).

56. *Id.* § 6921(b)(2).

57. KOSNIK, *supra* note 30, at 6.

wastes posed a hazard to human health and the environment.⁵⁸ In 1988, the EPA completed their required Regulatory Determination of oil-field wastes and determined that regulation under Subtitle C was not necessary because existing state and federal regulations were adequate and the economic impact to the petroleum industry would be great.⁵⁹ The result of this determination is that EPA regulations now exclude oil-field wastes from the definition of hazardous wastes, meaning that these wastes are subject only to Subtitle D as a solid waste.⁶⁰

The implications of this classification are significant. Under Subtitle D, for example, solid wastes must be stored in a manner that does not constitute a fire, health, or safety hazard, and will not result in spillage.⁶¹ Generally, oil field wastes from hydraulic fracturing are stored on-site in tanks or surface pits.⁶² If regulated under Subtitle C, the surface pits (or “surface impoundments”) would be required to have a liner “designed, constructed, and installed to prevent any migration of wastes out of the impoundment to the adjacent subsurface soil or ground water or surface water at any time during the active life . . . of the impoundment.”⁶³ This is just one example of the less protective requirements of Subtitle D as compared to Subtitle C. The oil and gas industry is also subject to less stringent requirements for the transportation, treatment, and disposal of oil-field wastes under Subtitle D than they would be under Subtitle C.

C. The Emergency Planning and Community Right-To-Know Act

Enacted in 1986, the Emergency Planning and Community Right-To-Know Act (EPCRA) is the national legislation on community safety and is designed to help communities protect public health, safety, and the environment from chemical hazards.⁶⁴ Section 313 of EPCRA requires EPA and the states to collect data on releases and transfers of listed toxic chemicals that are manufactured, processed, or otherwise used above threshold quantities by certain industries.⁶⁵ This includes data related to point and fugitive on-site air releases, water releases, on- and off-site land

58. *Id.*

59. *Id.* at 6–7.

60. 40 C.F.R. § 261.4(b)(5) (2011).

61. 40 C.F.R. § 243.200-1(a) (2011).

62. *Hydraulic Fracturing 101*, *supra* note 1.

63. 40 C.F.R. § 264.221(a) (2011).

64. *Summary of the Emergency Planning and Community Right-to-Know Act*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/lawsregs/laws/epcra.html> (last updated Aug. 11, 2011).

65. Emergency Planning and Community Right-To-Know Act, 42 U.S.C. § 11023 (2006).

releases, underground injection, transfers to waste management facilities, and on-site waste treatment and management procedures.⁶⁶ The data are then made available to the public via EPA's Toxics Release Inventory.⁶⁷

Industrial facilities covered by the toxic chemical reporting requirements of EPCRA include those facilities with ten or more employees, with a Standard Industrial Classification (SIC) Code of 20 through 39, and that manufacture, process, or otherwise use a threshold quantity of listed toxic chemicals.⁶⁸ The Administrator of the EPA may elect to add or delete SICs from the list of those industries subject to the reporting requirements of EPCRA, but has yet to include the oil and gas industry—SIC Code 13.⁶⁹

D. The Clean Water Act

Originally enacted as the Federal Water Pollution Control Act, the Clean Water Act (CWA) provides the basic structure for regulating discharges of pollutants into “waters of the United States” and regulating quality standards for surface waters.⁷⁰ Under the CWA, it is unlawful to discharge any pollutant from a point source (a “discrete conveyance,” such as a ditch, pipe, tunnel, or conduit) into navigable waters without a permit.⁷¹

EPA administers the National Pollution Discharge Elimination System (NPDES) permit program to control discharges.⁷² In 1987, Congress amended the CWA to require EPA to develop a permitting program for stormwater runoff.⁷³ The amendments, however, exempted mining operations and “oil and gas exploration, production, processing, or treatment operations or transmission facilities” from the permitting requirement, provided the runoff consisted entirely of flows from

66. KOSNIK, *supra* note 30, at 17.

67. See *Toxics Release Inventory*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/tri> (last updated Oct. 27, 2011).

68. 42 U.S.C. § 11023(b)(1)(A).

69. *Id.* § 11023(b)(1)(B); *Chemicals and Public Disclosure*, FRAC FOCUS, <http://fracfocus.org/chemical-use/chemicals-public-disclosure> (last visited Sept. 25, 2012); NAICS Association, *Standard Industrial Code Divisions*, <http://www.naics.com/free-code-search/siclist.html?sictwo=13> (last visited Oct. 18, 2012).

70. *Summary of the Clean Water Act*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/lawsregs/laws/cwa.html> (last updated Aug. 11, 2011).

71. *Id.*; see also Federal Water Pollution Control Amendments of 1972, 33 U.S.C. §§ 1311(a), 1362(12), (14) (2006).

72. *Summary of the Clean Water Act*, *supra* note 70.

73. FREE PASS FOR OIL AND GAS, *supra* note 6.

conveyances, such as pipes or channels, which did not come in contact with on-site materials or waste products.⁷⁴

Interpreting this exemption, EPA asserted authority to require stormwater permits for discharges from oil and gas construction facilities on the theory that sediment from the construction site constituted a pollutant.⁷⁵ In 2005, however, Congress amended the CWA through the Energy Policy Act, by defining the term “oil and gas exploration, production, process, or treatment operations and transmission facilities” to include construction activities.⁷⁶ Thus, this amendment extended the stormwater permit exemption to all oil and gas field operation activities, which includes those activities associated with hydraulic fracturing.

Following the 2005 amendment, EPA issued a final rule exempting stormwater discharges of sediment from oil and gas construction facilities.⁷⁷ The Natural Resources Defense Council challenged this rule, and the Ninth Circuit Court of Appeals held that EPA’s promulgated rule was “arbitrary and capricious and constitutes an impermissible construction . . . of the CWA.”⁷⁸ The court vacated the rule and subsequently denied EPA’s request for a rehearing.⁷⁹

The result is that oil and gas construction facilities remain subject to the stormwater permitting requirements of the CWA and associated EPA regulations. Additionally, where applicable, the oil and gas industry is subject to the permitting requirements associated with discharging a pollutant into navigable waters. These requirements limit the concentration and quantity of a pollutant that can be discharged under the terms of a NPDES permit, and establish monitoring and recording requirements, among other permit conditions.⁸⁰

EPA also requires certain oil drilling facilities to prepare and implement Spill Prevention, Control, and Countermeasure (SPCC) plans to prevent the discharge of oil into navigable waters or adjoining shorelines.⁸¹ The regulations for the SPCC plans were promulgated under section 311(j)(1)(C) of the Clean Water Act in 1973 and were amended by the Oil

74. 33 U.S.C. § 1342(l)(2) (2006).

75. KOSNIK, *supra* note 30, at 10–11.

76. 33 U.S.C. § 1362(24).

77. *Regulation of Oil and Gas Construction Activities*, U.S. ENVTL. PROT. AGENCY, <http://cfpub.epa.gov/npdes/stormwater/oilgas.cfm> (last updated Mar. 9, 2009).

78. NRDC v. U.S. Env’tl. Prot. Agency, 526 F.3d 591, 608 (9th Cir. 2008).

79. *Regulation of Oil and Gas Construction Activities*, *supra* note 77.

80. See 40 C.F.R. 122.41–122.50.

81. *Spill Prevention, Control, and Countermeasure (SPCC) Rule*, EPA.GOV, <http://www.epa.gov/oem/content/spcc> (last updated Aug. 7, 2012).

Pollution Act of 1990.⁸² Facilities that must prepare and implement SPCC plans include those that are non-transportation related; have an aggregate aboveground storage capacity over 1,320 gallons or a buried storage capacity over 42,000 gallons; and have a reasonable expectation of discharging into or upon navigable waters or adjoining shorelines.⁸³ Furthermore, the SPCC plan must be prepared in accordance with good engineering practices, provide for inspections, tests, and recordkeeping procedures, and include training of personnel to prevent discharges.⁸⁴

E. The Clean Air Act

The Clean Air Act (CAA) is a comprehensive federal statute that regulates air emissions from stationary and mobile sources.⁸⁵ The CAA authorizes EPA to regulate hazardous air pollutant emissions and to protect public health and welfare by establishing National Ambient Air Quality Standards (NAAQS).⁸⁶ States are required to meet the NAAQS by developing State Implementation Plans (SIPs) to regulate industrial sources of air pollution in the state.⁸⁷

Section 112 of the CAA requires EPA to establish emission standards for Hazardous Air Pollutants (HAPs) from “major source” and “area source” categories that require the maximum degree of reduction in emissions that EPA determines to be achievable—commonly referred to as Maximum Achievable Control Technology (MACT).⁸⁸ Major sources are defined as “any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit . . . in the aggregate, ten tons per year or more of any hazardous air pollutant or twenty-five tons per year or more of any combination of hazardous air pollutants.”⁸⁹ An area source is “any stationary source of hazardous air pollution that is not a major source.”⁹⁰

82. *Laws and Regulations*, EPA.GOV, <http://www.epa.gov/oem/lawsregs.htm#oppr> (last updated Sept. 27, 2012).

83. 40 C.F.R. § 112.1.

84. *Id.* § 112.7.

85. *Summary of the Clean Air Act*, EPA.GOV, <http://www.epa.gov/lawsregs/laws/caa.html> (last updated Aug. 23, 2011).

86. *Id.*

87. *Id.*

88. *Id.*

89. 42 U.S.C. § 7412(a)(1).

90. *Id.* § 7412(a)(2).

The regulations applicable to the oil and gas industry under the CAA impose more stringent requirements on major sources of HAP emissions than on area sources.⁹¹ Additionally, major sources are required to obtain a Title V permit (as specified in subchapter V of the CAA and 40 CFR parts 70 and 71), while area sources are not.⁹² Under EPA regulations, however, HAP emissions from oil and gas exploration or production wells are exempt from the aggregation rule within the statutory definition of “major source.”⁹³ Since most oil and gas wells, on their own, do not emit the threshold limit of HAPs under the statutory definition, they are not required to obtain a Title V permit. This leaves HAP emissions from oil and gas wells essentially unregulated under the CAA.⁹⁴

F. The Comprehensive Environmental Response, Compensation, and Liability Act

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and amended the Act in 1986 with the Superfund Amendments and Reauthorization Act (SARA).⁹⁵ CERCLA establishes a federal “Superfund” to pay for the cleanup of abandoned or uncontrolled hazardous waste sites.⁹⁶ Additionally, the fund pays for the cleanup of accidents, spills, and other emergency releases of hazardous substances into the environment.⁹⁷ EPA has the power under CERCLA to hold potentially responsible parties (PRPs) financially liable for the costs of cleaning up a hazardous waste site or to direct private party cleanup when the responsible party is known.⁹⁸

CERCLA defines a hazardous substance as those substances designated or listed under various statutes, including hazardous wastes listed pursuant to RCRA, as amended by the SWDA, but excludes petroleum.⁹⁹ The petroleum exception includes crude oil, natural gas, natural gas liquids, liquefied natural gas, and mixtures of natural gas and synthetic gas.¹⁰⁰ This

91. Compare 40 C.F.R. § 63.764(c) (2011), with 40 C.F.R. § 63.764(d) (2011).

92. 40 C.F.R. § 63.764(f) (2012).

93. *Id.* § 63.761.

94. KOSNIK, *supra* note 30, at 13.

95. *Summary of the Comprehensive Environmental Response, Compensation, and Liability Act*, EPA.GOV, <http://www.epa.gov/lawsregs/laws/cercla.html> (last updated Aug 11, 2011).

96. *Id.*

97. *Id.*

98. *Id.*

99. Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601(14) (2006).

100. *Id.*

exclusion means that spills and releases of petroleum, crude oil, and natural gas, which contain chemicals otherwise covered under the definition of hazardous substance, are immune to federal regulation under CERCLA.¹⁰¹ Environmental groups argue that this exclusion gives oil companies little incentive to prevent and clean up spills.¹⁰²

G. The National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 established a framework for protecting the environment by requiring all branches of government to properly consider the environmental impacts of any major federal action that significantly affects the environment.¹⁰³ NEPA requires federal agencies to take a hard look at the environmental impacts of a proposed action and possible alternatives.¹⁰⁴ Federal agencies do this by preparing Environmental Assessments (EAs) to determine if the proposed action will result in significant environmental impacts. If the EA reveals a significant environmental impact, subsequent Environmental Impact Statements (EISs) must assess possible alternatives and require an opportunity for public involvement.¹⁰⁵

The Energy Policy Act of 2005 created a rebuttable presumption that certain oil and gas related activities authorized by the U.S. Department of the Interior in managing public lands, and the U.S. Department of Agriculture in managing National Forest System Lands, are subject to a “categorical exclusion” under NEPA.¹⁰⁶ The activities presumed to qualify for a categorical exclusion include activities conducted pursuant to the Mineral Leasing Act for the purpose of exploration or development of natural gas if the activity falls under one of five categories.¹⁰⁷ The excluded activities are presumed to have no significant environmental impact, unless the public can prove “extraordinary circumstances in which a normally excluded action may have a significant environmental effect.”¹⁰⁸ In effect, though, oil and gas activities are no longer subject to NEPA’s procedural requirements.

101. KOSNIK, *supra* note 30, at 5.

102. FREE PASS FOR OIL AND GAS, *supra* note 6.

103. *Summary of the National Environmental Policy Act*, EPA.GOV, <http://www.epa.gov/lawsregs/laws/nepa.html> (last updated Aug. 11, 2011).

104. KOSNIK, *supra* note 30, at 15.

105. *Id.*

106. 42 U.S.C. § 15942(a) (2006).

107. *Id.* § 15942(b).

108. 40 C.F.R. § 1508.4 (2006).

II. STATE REGULATION OF HYDRAULIC FRACTURING

Generally, the states are free to regulate hydraulic fracturing as they see fit, with the exception that state regulations must meet the minimum requirements of any applicable federal regulations. States have come up with regulatory schemes of varying complexity. Some states have specific rules related to hydraulic fracturing, while others regulate the process solely under their general oil and gas permitting requirements.

A. Colorado

The Oil and Gas Conservation Act (OGCA) is the primary statute governing oil and gas development in Colorado.¹⁰⁹ As part of the legislative declaration, the OGCA states that it is in the public interest to “[f]oster the responsible, balanced development, production, and utilization of the natural resources of oil and gas in the state of Colorado in a manner consistent with the protection of public health, safety, and welfare, including protection of the environment and wildlife resources.”¹¹⁰ The Act gives the Colorado Oil and Gas Conservation Commission (COGCC) the authority to regulate:

[o]il and gas operation so as to prevent and mitigate significant adverse environmental impacts on any air, water, soil, or biological resource resulting from oil and gas operations to the extent necessary to protect public health, safety, and welfare, including protection of the environment and wildlife resources, taking into consideration cost-effectiveness and technical feasibility.¹¹¹

Under regulations promulgated by the COGCC, an operator must apply for a permit to drill that indicates the proposed well location, the location of water wells, and the location of other water sources within 400 feet of the wellhead.¹¹² The Director of the COGCC may withhold approval if there is “reasonable cause to believe the proposed well or oil and gas location . . . presents an imminent threat to public health, safety and

109. Oil and Gas Conservation Act, COLO. REV. STAT. ANN. § 30-60-101-30-60-129 (West 2011).

110. *Id.* § 34-60-1021(1)(A)(I).

111. *Id.* § 34-60-106(2)(d).

112. 2 Colo. Code Regs. § 404-1:303(d)(3)(c) (2012).

welfare, including the environment, or a material threat to wildlife resources.”¹¹³

Operators wishing to perform “enhanced recovery operations,” must apply for additional authorization from COGCC and cannot commence construction until receiving said authorization.¹¹⁴ Where the injection of fluids for enhanced recovery operations is proposed, like fracking, the application must describe the proposed casing for the well, provide a statement of the type of fluid to be injected, provide a chemical analysis of the fluid to be injected, and describe the proposed “stimulation program.”¹¹⁵ Well casings must be designed to prevent migration of oil, gas, or water that “may result in the degradation of ground water.”¹¹⁶

Additionally, pits used during oil and gas exploration and production “shall be constructed and operated to protect public health, safety, and welfare and the environment . . . from significant adverse environmental, public health, or welfare impacts from [exploration and production] waste,” unless permitted by law.¹¹⁷ Operators must apply for an Earthen Pit Permit to construct and utilize all production pits.¹¹⁸ Pits constructed after April 1, 2009, with some exceptions, must be lined.¹¹⁹

Spills of exploration and production waste must be “controlled and contained immediately upon discovery to protect the environment, public health, safety, and welfare, and wildlife resources.”¹²⁰ Spills or releases of certain sizes must be reported to the COGCC within different time frames, but spills “of any size which impact or threaten to impact any waters of the state, residence or occupied structure, livestock, or public byway” must be reported within twenty-four hours.¹²¹ Most wastes from drilling operations may be injected back into the ground with a permit, or disposed of at a commercial solid waste facility.¹²²

In April of 2012, the revised Rules of the COGCC became effective.¹²³ The revised Rules were adopted in an effort “to increase the transparency of

113. *Id.* § 404-1:303(m).

114. *Id.* § 404-1:401(a).

115. *Id.* § 404-1:404(b)(4)(C)–(F).

116. *Id.* § 404-1:317(d).

117. *Id.* § 404-1:902(a).

118. *Id.* § 404-1:903(a).

119. *Id.* § 404-1:904.

120. *Id.* § 404-1:906(a).

121. *Id.* § 404-1:906(b).

122. *Id.* § 404-1:907.

123. OIL AND GAS CONSERVATION COMM’N, COLO. DEP’T OF NATURAL RES., REPORT OF THE COMMISSION 4 (2012), available at <http://www.sos.state.co.us/CCR/Upload/AGORrequest/AdoptedRules02011-00800.RTF>.

hydraulic fracturing operations in the State of Colorado and, at the same time, afford appropriate protections for vendor, service provider and operator trade secrets.”¹²⁴ Additionally, the new rules are intended to “increase the commission Staff’s ability to inspect and oversee hydraulic fracturing operations.”¹²⁵

The revised Rules require operators to complete a chemical disclosure, which becomes public record.¹²⁶ The disclosure is to include all chemicals intentionally added to the base fluid of a hydraulic fracking operation, with only one primary exception.¹²⁷ The primary exception is an operator’s ability to protect the disclosure of chemicals that fall under a trade secret.¹²⁸ For a chemical to be considered a trade secret, the specific identity or the concentration of the chemical must comply with 7-7-102(4) of the Colorado Uniform Trade Secrets Act.¹²⁹ While chemicals that fall under a trade secret are not disclosed to the public, an operator must still supply to the Commission information relevant to the chemical identifier.¹³⁰ Furthermore, under certain circumstances, a health professional can obtain chemical information for chemicals that are trade secrets, but must agree to non-disclosure.¹³¹

In addition to the disclosure requirements, the new rules also include additional notice procedures for hydraulic fracturing operations. First, operators must provide landowners located within 500 feet of a proposed well with a COGCC information sheet on hydraulic fracturing.¹³² Second, operators must provide the Commission written notice of intended hydraulic fracturing operations at least forty-eight hours before commencement.¹³³

Despite what seems to be a comprehensive set of regulatory control on the hydraulic fracturing industry¹³⁴, fracking operations in Colorado have

124. *Id.* at 14.

125. *Id.*

126. 2 Colo. Code Regs. § 404-1:205A(b)(2)(A).

127. *Id.*

128. *Id.*

129. *Id.* § 404-1:100.

130. OIL AND GAS CONSERVATION COMM’N, COLO., *supra* note 123 at 5.

131. 2 Colo. Code Regs. § 404-1:205A(b)(3)(B)(5).

132. *Id.* § 404-1:305e(1)A.

133. *Id.* § 404-1:316C.

134. In 1990, and again in 1994, the EPA and the Interstate Oil and Gas Compact Commission (“IOGCC”) issued guidelines for the regulation of oil and gas exploration and production wastes for use by member states. In 2000, 2005 and 2010, STRONGER (State Review of Oil and Natural Gas Environmental Regulations, Inc., an independent, non-profit, multi-stakeholder organization comprised of federal and state officials, and environmental and industry representatives) expanded,

led to a number of court cases over human exposure to harmful fracking chemicals. In *Evenson v. Antero Resources*, a class action lawsuit, Plaintiffs alleged acute health effects, like burning eyes and throats, from fracking operations in Mesa, Colorado.¹³⁵ In another case, *Strudley v. Antero Resources*, Plaintiffs alleged that fracking operations within a mile of their property contaminated their well.¹³⁶ The court in *Strudley* granted Defendant's motion to dismiss, holding that Plaintiffs did not meet their burden of establishing a prima facie case for exposure to chemicals alleged to have caused their injuries.¹³⁷ This holding came after the court issued a "Lone Pine Order."¹³⁸ A "Lone Pine Order" is a court order in mass toxic tort cases requiring plaintiffs to, at a minimum, show: (1) the identity of the chemical or substance that caused the injury; (2) the specific disease, illness, or injury caused by the substance; and (3) a causal link between exposure and the injury.¹³⁹ Some "Lone Pine Orders" also require a showing of the amount of the substance or chemical to which the plaintiffs were exposed, expert medical opinion to exclude other causes, and specific dates of exposure to the toxic substance.¹⁴⁰

B. New York

Currently, New York State does not allow hydraulic fracturing in its portion of the highly sought-after Marcellus Shale. In December 2010, then New York State Governor David Patterson issued an Executive Order banning the practice of "high-volume, horizontal hydraulic fracturing" in the Marcellus Shale region until the Department of Environmental Conservation (DEC) completed a review to certify that the practice was

updated and republished the IOGCC guidelines, which were approved and accepted by IOGCC. In April 2011, COGCC volunteered to have its hydraulic fracturing program reviewed by STRONGER. After a four-month review period from June through September 2011, the review team concluded that the Colorado program is well managed, professional, and generally in compliance with their previously issued 2010 guidelines. STRONGER, COLORADO HYDRAULIC FRACTURING STATE REVIEW 4 (Oct. 2011), available at <http://www.strongerinc.org/sites/all/themes/stronger02/downloads/Colorado%20HF%20Review%202011.pdf>.

135. *Evenson v. Antero Res. Corp.*, No. 2011-cv-05118 (Denver Co. Dist. Ct. July 20, 2011).

136. *Strudley v. Antero Res. Corp.*, No. 2011-cv-2218 at *1–2 (Denver Co. Dist. Ct. May 9, 2012).

137. *Id.* at 3.

138. *Id.* at 4–6.

139. *Lore v. Lone Pine Corp.*, No. L-03306-85, 1986 N.J. Super. LEXIS 1626, at *3–4 (N.J. Sup. Ct. Nov. 18, 1986).

140. *Id.* at *6–7.

safe.¹⁴¹ At the time of the Executive Order, DEC had already stopped issuing drilling permits in the Marcellus Shale until it completed its review of the practice.¹⁴² The Executive Order's "moratorium" remains in effect, as the DEC continues its review process.¹⁴³

In 2009, DEC issued a Draft Supplemental Generic Environmental Impact Statement (SGEIS) to provide a comprehensive review of issues unique to horizontal drilling and high-volume hydraulic fracturing.¹⁴⁴ After a great deal of public comment, DEC revised the Draft SGEIS and released a Revised Draft SGEIS in September 2011.¹⁴⁵ The Revised SGEIS recommends prohibiting high-volume hydraulic fracturing in the New York City and Syracuse watersheds, and on state-owned land including parks, forest areas, and wildlife management areas.¹⁴⁶ Under regulations that DEC will issue in accordance with these recommendations, hydraulic fracturing will only be allowed on privately-owned lands under "rigorous and effective controls."¹⁴⁷

DEC recently proposed regulations; the public comment period ended on December 12, 2011.¹⁴⁸ The proposed regulations would, among other things: prohibit the drilling of wells within 500 feet of a private water well or within 2,000 feet of a public drinking water supply well or reservoir for at least three years; require three well casings to prevent gas migration; impose strict stormwater control measures; and require full disclosure to DEC of all products utilized in the fracturing process.¹⁴⁹ Additionally, the proposed regulations would require a DEC-approved plan for disposing of flowback water, and would institute a process to monitor the disposal of waste streams from the drilling process.¹⁵⁰

141. Sasha Chavkin, *Executive Order Suspending Fracking Brings Little Change*, PROPUBLICA (Dec. 17, 2010), <http://www.propublica.org/article/executive-order-suspending-fracking-brings-little-change>.

142. *Id.*

143. Jay F. Marks, *Business Q&A with LeAnne Burnett*, NEWSOK.COM (Nov. 3, 2011), http://newsok.com/business-qa-with-leanne-burnett/article/3619398?custom_click=pod_headline_daily-qa.

144. *Marcellus Shale*, DEC.NY.GOV, <http://www.dec.ny.gov/energy/46288.html> (last visited Sept. 26, 2012).

145. *Id.*

146. *New Recommendations Issued in Hydraulic Fracturing Review*, DEC.NY.GOV (Jun. 30, 2011), <http://www.dec.ny.gov/press/75403.html>.

147. *Id.*

148. *High Volume Hydraulic Fracturing Proposed Regulations*, DEC.NY.GOV, <http://www.dec.ny.gov/regulations/77353.html> (last visited Sept. 25, 2012).

149. *New Recommendations Issued in Hydraulic Fracturing Review*, *supra* note 147.

150. *Id.*

Originally, it was expected that DEC would begin issuing hydraulic fracturing permits sometime in 2012, but the DEC Commissioner recently stated that the review process will likely take longer than originally expected.¹⁵¹ For New York, this means that permits for hydraulic fracturing are unlikely to be issued until at least 2013.¹⁵² Multiple towns across New York State, however, are taking the matter into their own hands by using zoning laws to ban hydraulic fracturing.¹⁵³ At least twelve towns in New York State have already banned hydraulic fracturing through zoning ordinances, and more plan to follow their lead.¹⁵⁴

Whether towns have the authority to do this was the issue in a lawsuit brought by Anschutz Exploration Corporation against the Town of Dryden, NY.¹⁵⁵ Anschutz argued that state conservation law gave the State of New York, not its towns, the sole authority to regulate the gas industry.¹⁵⁶ The Town argued that banning is not “regulation,” and that the home rule provision of the New York State Constitution gives towns the authority, through zoning, to decide where they want industry.¹⁵⁷ In February 2012, the New York Supreme Court ruled that Dryden’s zoning amendment banning oil and gas exploration within the Town, including fracking, was not preempted by the Oil, Gas and Solution Mining Law (OGSML).¹⁵⁸ The court held that the OGSML preempts all local laws or ordinances related to the regulation of oil and gas exploration, but does not preempt local zoning power to regulate land use in connection with oil and gas exploration.¹⁵⁹

In a similar decision that month, the New York Supreme Court ruled that the Town of Middlefield’s zoning ordinance banning oil and gas drilling was not preempted by the Environmental Conservation Law (ECL).¹⁶⁰ Here, the court held that the ECL preempted all local laws and ordinances relating to the regulation of oil and gas industries, but does not preempt local government jurisdiction over local roads, or the rights of

151. Karen Dewitt, *Gov. Cuomo Willing to Wait on Hydrofracking*, WRVO PUBLIC MEDIA (Oct. 31, 2011), <http://www.wrvo.org/post/gov-cuomo-willing-wait-hydrofracking>.

152. *Id.*

153. Maria Scarvalone, *In Upstate NY, Gas Drilling Debate Gets Local*, WNYC NEWS (Nov. 3, 2011), <http://www.wnyc.org/articles/wnyc-news/2011/nov/03/fracking>.

154. *Id.*

155. *Id.*

156. *Id.*

157. *Id.*

158. *Anschutz Exploration Corp. v. Town of Dryden*, 940 N.Y.S.2d 458 (Sup. Ct. 2012).

159. *Id.*

160. *Cooperstown Holstein Corp. v. Town of Middlefield*, 943 N.Y.S.2d 722 (Sup. Ct. 2012).

government under real property law.¹⁶¹ The court found that the State gets to control the method and manner of oil and gas exploration, but municipalities can control where such exploration takes place.¹⁶² Courts in at least one other state, however, have found that comprehensive oil and gas regulatory schemes do preempt local jurisdictions from banning hydraulic fracturing.¹⁶³ Where other states will fall on the issue of preemption is still to be determined.

C. Pennsylvania

The Pennsylvania Department of Environmental Protection (DEP) administers regulations applicable to oil and gas drilling in the State. No person is allowed to drill a well unless they obtain a permit from DEP.¹⁶⁴ DEP may deny a permit application if “the issuance of such permit would result in a violation of [the Pennsylvania Oil and Gas Act] or any other applicable environmental statute, rule, or regulation.”¹⁶⁵

A landowner who experiences a diminution in water quality as a result of drilling may request an investigation by DEP.¹⁶⁶ DEP must perform an investigation within ten days and make a determination within forty-five days.¹⁶⁷ If DEP finds that the drilling operations caused the diminution in water quality, then the well operator must “restore or replace the affected supply with an alternate source of water adequate in quantity or quality for the purposes served by the supply.”¹⁶⁸ If the pollution occurs within six months of drilling, DEP presumes that the well operator is responsible for water pollution within 1,000 feet of the well, unless the well operator provides an affirmative defense.¹⁶⁹ In order to prevent pollution or diminution of fresh groundwater, wells must have a permanent casing that runs through the fresh water strata.¹⁷⁰

When it comes to the disposal of drilling wastes, DEP regulations require the well operator to prepare a control and disposal plan for the

161. *Id.*

162. *Id.*

163. *Ne. Natural Energy, LLC v. City of Morgantown*, No. 11-C-411, 9 (W.Va. Cir. Ct. Aug 12, 2011), available at www.frackinginsider.com/Tucker_Marcellus_Order.pdf.

164. 25 PA. CODE § 78.11(a) (2011).

165. 58 PA. CONS. STAT. § 601.201(e)(1) (2011).

166. *Id.* § 601.208(b).

167. *Id.*

168. *Id.* §§ 601.208(a), (b).

169. *Id.* § 601.208(b).

170. *Id.* § 601.207(b).

disposal of wastes, including “stimulation fluids” (also known as fracking fluids).¹⁷¹ The plan must identify waste control and disposal methods consistent with the Pennsylvania Clean Streams Law and the Solid Waste Management Act.¹⁷² The well operator must control and dispose of wastes in a manner that prevents the pollution of waters of Pennsylvania.¹⁷³ Before disposal, well operators may store fracking fluid and certain other wastes from the drilling process in open pits, provided the pits are lined and designed to contain all pollution substances and wastes.¹⁷⁴

Specifically, DEP requires applications for drilling permits in the Marcellus Shale to include a mandatory water plan that will govern water withdrawal and disposal issues.¹⁷⁵ Additionally, DEP keeps a list of chemicals used in the fracking process and requires well operators to keep a list available of all chemicals used at each well site.¹⁷⁶

Perhaps in response to the New York court decisions on local zoning regulations discussed above, the Pennsylvania Legislature recently passed a pro-fracking bill prohibiting local jurisdictions from banning hydraulic fracturing activities within their boundaries.¹⁷⁷ Local jurisdictions are, however, allowed to impose an environmental impact fee on every fracked natural gas well.¹⁷⁸

D. Texas

The Oil and Gas Division of the Texas Railroad Commission (the Commission) is the main regulatory agency that administers regulations related to oil and gas drilling. Any operator wishing to drill an oil and gas well must apply for a permit to drill, deepen, reenter, or plug back.¹⁷⁹ All well casings should isolate and seal off all “usable-quality water zones” to

171. 25 PA. CODE § 78.55(a) (1987).

172. *Id.* § 78.55(b).

173. *Id.* § 78.54.

174. *Id.* § 78.56(a)(1).

175. PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, MARCELLUS SHALE: TOUGH REGULATIONS, GREATER ENFORCEMENT 1, (2011), *available at* <http://www.eLibrary.dep.state.pa.us/dsweb/Get/Document-84024/0130-FS-DEP4288.pdf>.

176. *Id.*

177. Gen. Assemb. H.B. 1950, 2012–13 (Pa. 2012).

178. *Id.*

179. 16 TEX. ADMIN. CODE § 3.5(a) (2011). “Plug back” is the process of placing cement or a mechanical plug in the bottom of a previously drilled well to prevent water accumulation and continued production, and also allows well operators to re-drill the same well at a shallower depth.

“prevent contamination or harm.”¹⁸⁰ Additionally, operators may not “cause or allow pollution of surface or subsurface water in the state.”¹⁸¹

Regulations related to drilling wastes provide for the use of pits, provided that the operator obtains a permit from the Commission.¹⁸² The Commission may only issue a permit if they determine that “the maintenance or use of such pit will not result in the . . . pollution of surface or sub-surface waters.”¹⁸³ Operators may dispose of certain low chloride fluids and other wastes without a permit by spreading them over the land on which they were generated, or by burial.¹⁸⁴ Otherwise, a permit is required for any other disposal method.¹⁸⁵ All oil and gas wastes may be injected underground into “nonproducing zones of oil, gas, or geothermal resources bearing formations,” provided that “the formations are separated from freshwater formation by impervious beds which will give adequate protection to such freshwater formations.”¹⁸⁶

In June 2011, Texas passed a law requiring the Commission to promulgate rules for the disclosure of chemicals used in hydraulic fracturing.¹⁸⁷ The Commission approved a proposed rule in August that would apply to hydraulic fracturing treatments on wells drilled after the effective date of the rule.¹⁸⁸ This proposed rule would require disclosure to the well operator of each chemical ingredient added to the hydraulic fracturing fluid.¹⁸⁹ The well operator would then be required to submit this information, as is currently proposed in Colorado, to the “FracFocus” website.¹⁹⁰

E. Louisiana

The Louisiana Department of Natural Resources (DNR) Office of Conservation is responsible for regulating the exploration and production of

180. *Id.* § 3.13(a).

181. *Id.* § 3.8(b).

182. *Id.* § 3.8(d)(2).

183. *Id.* § 3.8(d)(6).

184. *Id.* § 3.8(d)(3).

185. *Id.* § 3.8(d)(1).

186. *Id.* § 3.9(1), (2).

187. Kristi M. Tice & Gabrielle Sitomer, *United States: Railroad Commission of Texas Issues Proposed Hydraulic Fracturing Chemical Disclosure Rule* (Oct. 10, 2011), <http://www.mondaq.com/unitedstates/x/147544/Environmental+Law/Railroad+Commission+Of+Texas+Issues+Proposed+Hydraulic+Fracturing+Chemical+Disclosure+Rule>.

188. *Id.*

189. *Id.*

190. *Id.*

oil and gas. An operator of a hydraulic fracturing well must obtain a work permit before commencing well construction operations.¹⁹¹ The work permit application must include a plan for the construction and stimulation of the fracking well.¹⁹² Before drilling can begin, the operator also needs to obtain a permit to drill.¹⁹³ To protect fresh water sources, DNR requires well casings of varying depths dependent on the depth of the well itself.¹⁹⁴

Flowback from hydraulic fracturing activities must be stored in tanks or lined pits,¹⁹⁵ but are exempt from Louisiana Hazardous Waste Regulations.¹⁹⁶ Pits must be constructed above the 100-year floodplain, and temporary containment pits must be closed within six months of well completion.¹⁹⁷ Pits must be closed in a manner that protects the soil, surface water, ground water, and underground sources of drinking water.¹⁹⁸ Before closing a pit, the pit contents are tested for multiple parameters, including pH, heavy metals, and oil and grease content.¹⁹⁹

The well operator is responsible for the proper handling and transportation of exploration and production waste taken offsite for storage, treatment, or disposal.²⁰⁰ Offsite disposal must be at an approved commercial facility.²⁰¹ The operator may elect to dispose of such wastes at a DNR or Department of Environmental Quality (DEQ) permitted facility.²⁰² Waste received at a DEQ-permitted facility becomes the sole responsibility of DEQ.²⁰³ Furthermore, the DEQ regulations require well operators to develop and implement a Spill Prevention and Control Plan.²⁰⁴

Recently, the Louisiana DNR adopted a new rule requiring oil and gas well operators to disclose the composition and volume of the fracking fluids

191. STRONGER, INC., LOUISIANA HYDRAULIC FRACTURING STATE REVIEW 9–10 (Mar. 2011), available at http://dnr.louisiana.gov/assets/OC/haynesville_shale/071311_stronger_review.pdf.

192. *Id.* at 10.

193. LA. ADMIN. CODE tit. 43, § 103(C) (2011), available at <http://dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=62>.

194. *Id.* § 109(B).

195. *Id.* § 303(A).

196. *Id.* § 501.

197. STRONGER, INC., *supra* note 192, at 10.

198. LA. ADMIN. CODE tit 43, pt. XIX § 311(A).

199. *Id.* § 311(C).

200. *Id.* § 503(D).

201. *Id.*

202. *Id.* § 503(E).

203. *Id.*

204. STRONGER, INC., *supra* note 192, at 11.

they use after completing the well.²⁰⁵ The rule requires disclosure to the Office of Conservation or a public registry, such as “FracFocus.”²⁰⁶

F. Wyoming

The Wyoming Oil and Gas Conservation Commission (WOGCC) regulates oil and gas development in the state, handles the permitting process, and enforces Wyoming’s oil and gas statutes and regulations. Before drilling activity can commence, the well operator must apply for and obtain a permit to drill or deepen a well.²⁰⁷ The permit application must include a description of the casing and cementing programs, in addition to a completion and stimulation (hydraulic fracking) program, which includes the stimulation fluid and proposed chemical additives and their concentrations.²⁰⁸

For onsite storage of waste associated with the drilling process in pits, the operator must obtain a permit from the WOGCC²⁰⁹ and approval from the State Oil and Gas Supervisor.²¹⁰ Applications for pit construction shall be approved only if “the pit will not cause the contamination of surface or groundwater, and endanger human health or wildlife.”²¹¹ Under certain circumstances, such as when pits are proposed in areas with shallow groundwater or immediately adjacent to the Green or Colorado River drainage basin, the Supervisor shall require pits to be lined.²¹² Additionally, the operator must not “pollute streams, underground water, or unreasonably damage or occupy the surface of the leased premises or other lands,” and is not allowed to discharge any fluid contents of any pit without a permit issued by the Wyoming Department of Environmental Quality.²¹³ Drilling fluids may not be discharged into “live water or into drainages that lead to live waters of the state.”²¹⁴

205. Louisiana Department of Natural Resources, *New Hydraulic Fracturing Regulation Requires Work Permit, Disclosure of Fluids in Louisiana*, PENNENERGY.COM (Oct. 21, 2011), http://www.pennenergy.com/index/petroleum/display/5558175063/articles/pennenergy/petroleum/exploration/2011/10/new-hydraulic_fracturing.html.

206. *Id.*

207. WY. ADMIN. CODE. OIL. GEN. chp. 3 § 8 (2011).

208. *Id.*; see also *id.* § 45.

209. *Id.* ch. 4 § 1(a).

210. *Id.* § 1(h).

211. *Id.* § 1(a).

212. *Id.* § 1(w).

213. *Id.* § 1(ee).

214. *Id.*

G. North Dakota

In North Dakota, the State Legislature has declared that it is “in the public interest to foster, to encourage, and to promote the development, production, and utilization of natural resources of oil and gas in the state in such a manner as will prevent waste.”²¹⁵ To achieve this, the North Dakota legislature empowered the North Dakota Industrial Commission (NDIC) to be the primary governing body of oil and gas operations in the state, through the administrative code known as the Century Code.²¹⁶ NDIC has in turn delegated administration of North Dakota oil and gas rules to the Oil and Gas Division (NDOGD). NDOGD administers items such as well permitting, drilling and casing construction, flowback water collection and disposal, and use of chemicals associated with drilling.²¹⁷ In addition to NDIC and NDOGD, governing bodies relevant to oil and gas production include the North Dakota Water Commission, which is responsible for water appropriations, and the North Dakota Department of Health, which partakes in the safe cleanup of any discharge to the environment.²¹⁸

Hydraulic fracturing is an acceptable means of recovery in North Dakota. According to the North Dakota Century Code: “Notwithstanding any other provision of law, the legislative assembly designates hydraulic fracturing, a mechanical method of increasing the permeability of rock to increase the amount of oil and gas produced from the rock, an acceptable recovery process in this state.”²¹⁹

As in most states, the governing code provides several general requirements to address oil and gas production. These general requirements are applicable to all wells, including hydraulically fractured wells. Some relevant provisions include bonding,²²⁰ permitting,²²¹ well location,²²² site construction²²³ including waste disposal,²²⁴ strata sealing,²²⁵ and casing.²²⁶ In addition to the general requirements, North Dakota also has specific

215. N.D. CENT. CODE § 38-8-01 (2011).

216. *Id.* § 38-8-04.

217. *Id.*

218. N.D. CENT. CODE § 61-02-14 (West 2011); *id.* § 61-28-04.

219. N.D. CENT. CODE § 38-8-25.

220. N.D. CENT. CODE ANN. § 43-02-03-15 (West 2011).

221. *Id.* § 43-02-03-16.

222. *Id.* § 43-02-03-18.

223. *Id.* § 43-02-03-19.

224. *Id.*

225. *Id.*

226. *Id.*

hydraulic fracturing requirements that are addressed by the code.²²⁷ These hydraulic fracturing-specific provisions were recently altered by NDIC to address, among other items, new hydraulic fracturing requirements. NDIC approved the revisions on January 23, 2012 and subsequently went into effect April 1, 2012.²²⁸

A major driver for the hydraulic fracturing rule alterations was to “do away with open pits for production wastewater.”²²⁹ As such, one major change that went into effect is the prohibition, for all wells drilled below 5,000 feet, to use open pits to store liquids left over from the drilling process.²³⁰ In lieu of open pits, oil companies must now separate liquids from rock cuttings, and the liquids are to be hauled away or recycled. Another major change includes the mandatory disclosure of chemicals used for fracking, which must be reported within sixty days to the FracFocus website.²³¹

III. RECENT DEVELOPMENTS IN HYDRAULIC FRACTURING REGULATION

In April 2011, the Department of the Interior’s Bureau of Land Management (BLM) announced that they would be updating their Programmatic Environmental Impact Statement (EIS) for the Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the BLM in Colorado, Utah, and Wyoming.²³² In 2008, BLM amended land use plans in Colorado, Utah, and Wyoming to open up approximately two million acres of land to the possible development of oil shale.²³³ These amendments were supported by the preparation of a Programmatic EIS and Record of Decision (ROD), as required under the Energy Policy Act of 2005.²³⁴ BLM will now take a “fresh look” at the 2008 Programmatic EIS and ROD, to determine if it is appropriate for the two million acres to remain available for potential development of oil shale.²³⁵ This process is still ongoing.

227. *Id.* § 43-02-03-27.

228. Industrial Commission of North Dakota, *Industrial Commission Oks Rule Changes Governing Oil Industry* (Jan. 23, 2012), www.nd.gov/ndic/ic-press/dmr-oilrules.pdf.

229. *Id.*

230. *Id.* § 43-02-03-19.4

231. *Id.* § 43-02-03-27.1

232. Notice of Intent to Prepare EIS and Possible Plan Amendments for Resources on BLM Lands, 76 Fed. Reg. 21003, 21003 (Apr. 14, 2011).

233. *Id.*

234. *Id.*

235. *Id.*

On July 28, 2011, EPA announced a proposal to promulgate a New Source Performance Standard (NSPS) under the Clean Air Act (CAA) that would apply to oil and natural gas exploration and production operations.²³⁶ The NSPS would mandate the use of “reduced emissions completion” technology or pit flaring for all new hydraulically fractured natural gas wells.²³⁷ EPA is proposing the new NSPS in response to a consent decree between EPA and two environmental groups resulting from a lawsuit filed against EPA under the CAA.²³⁸ The consent decree required EPA to promulgate a final rule by February 28, 2012.²³⁹

On October 20, 2011, EPA announced that it would begin the process of developing standards for wastewater discharges produced by natural gas extraction from underground coalbed and shale formations.²⁴⁰ The announcement acknowledged that the federal government lacks a comprehensive set of regulations for the disposal of wastewater from natural gas extraction activities, and intends to develop a comprehensive set of regulations with the input of industry and public health groups.²⁴¹

On November 3, 2011, EPA announced final plans to perform a comprehensive study of water in hydraulic fracturing.²⁴² The study will look at the full cycle of water in fracking, from its acquisition before use to its ultimate treatment and disposal.²⁴³ EPA planned to release initial research findings in 2012 and a final report in 2014, but continuing political and administrative delays, requests for submission of further studies, and bureaucratic wrangling with the industry has hampered the release of any comprehensive federal assessment on hydraulic fracking to date.²⁴⁴ Sites to

236. *EPA Proposes New Rules to Regulate Air Emissions from Oil and Natural Gas Exploration, Production, Transmission, and Storage Facilities, Including Hydraulic Fracturing Operations*, VINSON & ELKINS, LLP (Jun. 19, 2011), <http://www.velaw.com/resources/EPAProposesNewRulesRegulateAirEmissionsOilNaturalGasHydraulicFracturingOperations.aspx> [hereinafter *EPA Proposes New Rules*].

237. *Id.*

238. *Id.*

239. *Id.*

240. *EPA Announces Schedule to Develop Natural Gas Wastewater Standards*, EPA.GOV (Oct. 20, 2011), <http://yosemite.epa.gov/opa/admpress.nsf/0/91E7FADB4B114C4A8525792F00542001>.

241. *Id.*

242. Nick Snow, *EPA Announces Final Hydraulic Fracturing Research Plan*, OIL & GAS J. (Nov. 4, 2011), <http://www.ogj.com/articles/2011/11/epa-announces-final-hydraulic-fracturing-research-plan.html>.

243. *Id.*

244. *Id.* Just as this article went to print EPA released an interim progress report on December 21, 2012 regarding its much-anticipated study of potential impacts to drinking water resources from hydraulic fracturing. EPA’s progress report describes eighteen research projects underway and provides updates through September 2012. The report, however, does not draw any conclusions about potential

be examined by EPA in the study include drilling sites in Colorado, Pennsylvania, Louisiana, North Dakota, and Texas.²⁴⁵ The study's findings will undoubtedly influence the course of future federal regulation of hydraulic fracturing.

In September 2012, the U.S. Government Accountability Office issued a report²⁴⁶ that detailed the results of an inquiry into federal and state regulation of hydraulic fracturing. The study recognized the key exemptions for hydraulic fracturing activities from major environmental statutes detailed in this article, and the somewhat more comprehensive regulatory framework within the six individual states analyzed.²⁴⁷

Additionally, the study identified challenges encountered by federal and state agencies in regulating oil and gas development from unconventional reservoirs.²⁴⁸ At the federal level, EPA reported that it is challenged by limited legal authority, the difficulty of conducting inspections, taking enforcement actions, and inadequate data on relevant matters, such as groundwater quality prior to drilling.²⁴⁹ More importantly, EPA's role in regulating exploration and production waste is significantly limited due to the exclusion of such wastes from RCRA's hazardous waste regulations.²⁵⁰

At the state level, the most significant recent development came in May 2012, when the Vermont General Assembly passed, and the governor signed, a new law that completely bans hydraulic fracturing within the State.²⁵¹ Additionally, the Ohio General Assembly passed a new law in late May 2012 "requiring natural gas drillers using hydraulic fracturing

impacts to drinking water resources, stating that those findings will be released at the conclusion of the final study in 2014. ENVTL. PROT. AGENCY, STUDY OF POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES: PROGRESS REPORT 1, 170 (2012), available at www.epa.gov/hfstudy/pdfs/hf-report20121214.pdf. Bridget DiCosmo, *GOP House Eyes 'Rifle Shot' Efforts to Revise Key Environmental Laws*, WESTLAW NEWSROOM, Nov. 26, 2012, available at 2012 WLNR 25110669; WESTLAW NEWSROOM, *EPA Seeks Data for Fracking, Drinking Water Study Amid Industry Concerns*, Nov. 26, 2012, available at 2012 WLNR 25110667.

245. Michael Rubinkam, *EPA to Probe Gas Drilling's Toll on Drinking Water*, ASSOCIATED PRESS (Nov. 4, 2011), <http://www.chron.com/news/article/EPA-to-probe-gas-drilling-s-toll-on-drinking-water-2250420.php>.

246. GAO, UNCONVENTIONAL OIL AND GAS DEVELOPMENT: KEY ENVIRONMENTAL AND PUBLIC HEALTH REQUIREMENTS (Sept. 2012), available at http://www.oilandgasbmps.org/workshops/COGCCgroundwater/GAO_health.pdf.

247. *Id.* The GAO analyzed the regulatory framework of Colorado, North Dakota, Ohio, Pennsylvania, Texas, and Wyoming. *Id.* at 3.

248. *Id.*

249. *Id.*

250. *Id.*

251. Associated Press, *Vermont Governor Signs Hydraulic Fracturing Ban*, THE COLUMBIA DAILY TRIBUNE, May 17, 2012, at A11.

technologies to disclose in detail the volume and types of chemicals and other fluids used in their operations.²⁵²

At the local level, on November 6th, the town of Longmont, Colorado, approximately thirty miles north of Denver, voted to amend its City Charter to ban hydraulic fracking within its borders.²⁵³ The purported ban may be short-lived, however. The State of Colorado has announced support of industry representatives' intention to bring an action to overturn the City's attempt at an end-run around state law that otherwise permits the practice.²⁵⁴ In a pair of cases decided on the same day twenty years ago, the Colorado Supreme Court ruled against municipalities attempting to ban fracking.²⁵⁵ The Court held that, inasmuch as gas pools do not conform to municipal boundaries, a zoning ordinance that banned drilling within a local government's borders would be preempted because it would conflict with the state's interest in fostering the efficient development and production of oil and gas reserves. However, the Court also held that Colorado's Oil and Gas Conservation Act, which does not contain an express supersedure clause, does not preclude local municipalities from *regulating* districts within which gas drilling may occur.²⁵⁶

CONCLUSION

The United States contains vast amounts of oil and natural gas in shale formations. For decades, the U.S. oil and gas industry has employed the process of hydraulic fracturing to exploit these natural resources. The process raises significant concerns about air and groundwater pollution, which has led to a polarizing, often heated public debate that continues to this day, and will likely continue for the foreseeable future.

Current U.S. federal regulation of hydraulic fracturing, and oil and gas industry extraction operations, largely consists of a string of ad hoc exemptions and little oversight. The bulk of the regulatory responsibility is given to the several states, and these regulations vary widely in their complexity and level of protection of human health and the environment.

252. PUBLIC UTILITIES REPORTS, INC., UPDATE ON HYDRAULIC FRACTURING 2 (2012).

253. Jack Healy, *With Ban on Drilling Practice, Town Lands in Thick of Dispute*, N.Y. TIMES (Nov. 25, 2012), http://www.nytimes.com/2012/11/26/us/with-ban-on-fracking-colorado-town-lands-in-thick-of-dispute.html?_r=0.

254. Scott Rochat, *Hickenlooper: State Won't Sue Longmont over Fracking Ban*, DENVORPOST.COM (Dec. 7, 2012, 1:44:14 PM MST).

255. Board of County Com'rs, La Plata County v. Bowen/Edwards Assocs., Inc., 830 P.2d 1045, 1059-61 (Colo. 1992); Voss v. Lundvall Bros., Inc., 830 P.2d 1061, 1068 (Colo. 1992).

256. Bowen/Edwards, 830 P.2d at 1059; Voss, 830 P.2d at 1066.

New Jersey and Vermont, for example, have recently banned hydraulic fracking.²⁵⁷

New research findings, proposed regulations, and allegations of groundwater contamination are released on an almost daily basis. With newly proposed federal regulations, studies being conducted by the states, the federal government, public interest NGOs, and mounting pressure from environmental groups, the state of hydraulic fracturing regulation in the U.S. is up in the air.

By comparison, moratoria and outright prohibitions have been imposed on hydraulic fracturing in Europe. In France, for example, Prime Minister Francois Fillon announced in March 2011 that "unconventional" oil shale exploration and extraction activities would not be authorized in the French territory.²⁵⁸ In October 2011, the French government canceled all three exploration permits on shale-gas fields after Total SA and U.S.-based Schuepbach Energy, LLC, which held the rights, maintained their intention to drill using hydraulic fracturing. In a joint statement, France's Minister of Energy, Eric Besson, and Minister of the Environment, Nathalie Kosciusko-Morizet, said that the three permits, which represent all of the country's potential shale-gas fields, had been canceled after the companies submitted a mandatory report about their drilling techniques in which they maintained plans to use hydraulic fracturing.²⁵⁹

Shale gas now accounts for one quarter of all U.S. gas production, and the Energy Information Administration (EIA) forecasts that this proportion will double by 2035.²⁶⁰ According to a study by IHS Cambridge Energy Research Associates, European production levels from unconventional gas sources, including shale, could range from sixty billion cubic meters (bcm), which is less than half of current shale gas production in North America, to 200 bcm by 2025.²⁶¹ With such overwhelming natural resources, which

257. 4076 PUR Util. Reg. News 5; Jim Malewitz, *In New Jersey, Christie Vetoes Anti-Fracking Bill*, PEW CTR. ON THE STATES (Sept. 24, 2012), <http://www.pewstates.org/projects/stateline/headlines/in-new-jersey-christie-vetoes-anti-fracking-bill-85899418995>.

258. Letter of March 11, 2011 from Prime Minister Francois Fillon to the Ministers of the Environment, Interior and the Economy (Commerce).

259. Geraldine Amiel, *France Cancels Shale-Gas Permits Over Fracking Impasse*, ONLINE.WSJ.COM (Oct. 4, 2011), <http://online.wsj.com/article/SB10001424052970204612504576608983814069012.html>.

260. *EPA Proposes New Rules*, *supra* note 237.

261. Reuters, *Hydraulic Fracturing to Revolutionize World Energy Markets*, VANCOUVER.SUN.COM (Oct. 31, 2011), <http://www.vancouversun.com/business/resources/Hydraulic+fracturing+revolutionize+world+energy+markets/5632987/story.html?id=5632987#ixzz1e6QZBGRI>.

could relieve EU gas energy dependence on Russia and Eastern Europe, Europe may soon follow the United States' lead in the development and regulation of these vast reserves.