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Hydraulic Fracturing and Cooperative Federalism

Gianna Cricco-Lizza*

I. Introduction

Energy independence and the importance of domestic sources of energy are pressing concerns in today's global political environment.¹ Shale gas production increasingly relies on hydraulic production as domestic natural gas resources are depleted.² Hydraulic fracturing is a process of increasing the volume of coal-bed methane gas extracted from sources with high density.³ Environmental organizations have raised serious concerns regarding states' diverse regulatory schemes and whether the federal government should provide uniform standards. The future role of the Environmental Protection Agency (EPA) is unclear.

This Comment argues that the model of cooperative federalism should be applied to the controversy surrounding the EPA's regulation of hydraulic fracturing. A dynamic of this nature, where the federal government agency produces a simple, final scientific answer to calm individual fears but leaves regulation to local governments, will provide

* J.D. Candidate, May 2012, Seton Hall University School of Law; B.A., 2008, Columbia University. I want to express deep gratitude to Professor Poirier for his excellent guidance and breadth of knowledge regarding all aspects of environmental law, to Brigitte Radigan for her supervision and valuable editing, and to my family and friends for their comments and assistance.

¹ INTERSTATE OIL AND GAS COMPACT COMMISSION ("IOGCC"), SUPPORTING HYDROCARBON EXPLORATION AND DEVELOPMENT IN THE COASTAL PLAIN OF ANWR AS PART OF THE NATIONAL ENERGY POLICY, Resolution 09.102 (2009) (U.S. imports 60% of the nation's needed oil, costing more than \$400 billion every year without considering costs of military protection of oil supply).

² IOGCC, SUPPORTING CONTINUED ENVIRONMENTALLY RESPONSIBLE DEVELOPMENT OF SHALE GAS IN THE UNITED STATES, Resolution 09.106 (2009) ("... [D]omestic production of natural gas is expected to increase as a share of US supply from 84 percent in 2007 to 97 percent in 2030," with shale gas formations gaining prominence as the fastest growing source within the same timeframe); ANDREW BRADFORD, MARCELLUS SHALE AND IMPLICATIONS FOR THE NORTHEAST 13 (BENITEK ENERGY, 2010) [hereinafter "BRADFORD, MARCELLUS SHALE IMPLICATIONS"] (Pennsylvania Active Rig Count—including directional, vertical, and horizontal wells—increased from forty in April 2009 to 115 in April 2010).

³ U.S. E.P.A., *Opportunity for Stakeholder Input on Conceptual Model of Potential Impacts to Drinking Water Resources from Hydraulic Fracturing 1* (2010), available at http://www.epa.gov/safewater/uic/pdfs/hydrofrac_landscapemodel.pdf [hereinafter "*Conceptual Model of Potential Impacts*"].

more comprehensive, protective, and accountable regulation of the industry, while preserving some balance of the competing interests. Part II discusses background information regarding the mechanical process of hydraulic fracturing. Part III focuses on the state solutions already implemented as well as on the issues arising in the states overlaying the Marcellus Shale. Part IV briefly identifies which federal statutes regulate parts of the hydraulic fracturing process and then discusses the gaps that the FRAC Act is intended to fill. Part V surveys science and policy related to the EPA's regulation of this area, in particular the precautionary principle and a previous study of hydraulic fracturing. Part VI presents the concept of cooperative federalism and an illustration of how a lack of designated authority has resulted in a catastrophic breakdown where federal and state powers overlap. Part VII analyzes how to apply cooperative federalism to the controversy surrounding the EPA's regulation of hydraulic fracturing. Finally, the conclusion summarizes the reasons why such a model should prevail in a situation where competing, highly valued interests must be balanced.

(a) Geology of the Marcellus Shale

For the past 60 years,⁴ commercial use of hydraulic fracturing has accessed unconventional⁵ sources of methane gas⁶ and stimulated production in subsiding wells.⁷

⁴ GROUND WATER PROTECTION COUNCIL & U.S. DEP'T OF ENERGY, STATE OIL AND NATURAL GAS REGULATIONS DESIGNED TO PROTECT WATER RESOURCES 21 (2009) [hereinafter "GWPC, NATURAL GAS REGULATIONS"] ("The first commercial application of hydraulic fracturing as a well treatment technology designed to stimulate the production of oil or gas likely occurred in either the Hugoton field of Kansas in 1946 or near Duncan Oklahoma in 1949.").

⁵ ". . . [U]nconventional, which for the non-specialist [U] means that it is challenging to lift this oil [or gas] out of the ground." David Cohen, *An Unconventional Play in the Bakken*, ENERGY BULLETIN (Apr. 16, 2008, 7:00 AM), <http://www.energybulletin.net/print/42850>.

⁶ STUART KEMP, HALLIBURTON ENERGY SERVICES, INC., COMMENTS OF HALLIBURTON ENERGY SERVICES, INC. ON DRAFT COMMITTEE REPORT OF THE ENVIRONMENTAL ENGINEERING COMMITTEE OF THE SCIENCE ADVISORY BOARD ON EPA'S RESEARCH SCOPING DOCUMENT FOR HYDRAULIC FRACTURING 7 (April 6, 2010) [hereinafter "HALLIBURTON, COMMENTS - APRIL"]; Pat. No. 2214064 (1940), Pat. No. 2482284 (1942), Pat. No. 2459268 (1942), Pat. No. 2327187 (1943).

Recent utilization of the procedure to access methane gas in shale plays⁸ in Texas⁹ has brought industry attention to the natural resources waiting four thousand feet under the earth's surface in the Marcellus Shale.¹⁰ This shale play stretches from New York to West Virginia.¹¹

The Marcellus Shale consists of Middle Devonian-age black, low-density, organically rich shale¹² with an average depth to its top ranging from a mile in southwestern Pennsylvania¹³ to 6,000 feet in southeastern New York and up to 1,000 feet in the middle of New York.¹⁴ With a thickness of 50 feet to 200 feet, the shale covers an area of 95,000 square miles.¹⁵ While the shale has a lower gas content than some other domestic plays,¹⁶ the estimated basin area is more than double the size of the next

⁷ HALLIBURTON COMMENTS – APRIL, *supra* note 6, at 7; JOSEPH H. FRANTZ, JR. & VALERIE JOCHEN, SCHLUMBERGER MARKETING COMMUNICATIONS, SHALE GAS WHITE PAPER 05-OF 299 4 (2005).

Early low-permeability horizontal wells were considered failures because they did not naturally produce at commercial rates. The explosive growth of horizontal wells in shales is due to improvements in completion technologies. Multistage stimulation treatments are now performed on these wells to place hydraulic fractures around the borehole. The ability to economically perforate, stimulate, and isolate multiple points along the lateral has made these wells commercial successes.

Id.

⁸ A shale play is a discovery of gas or oil within a geological formation that is of sufficient size to be worth subsequent exploration and development. Nolan Hart, *What Is a Shale Gas Play?*, THE EAGLE FORD SHALE BLOG (Mar. 3, 2010), <http://eaglefordshaleblog.com/2010/03/03/what-is-a-shale-gas-play/>.

⁹ J. DANIEL ARTHUR, P.E. ET AL., ALL CONSULTING, LLC, EVALUATING THE ENVIRONMENTAL IMPLICATIONS OF HYDRAULIC FRACTURING IN SHALE GAS RESERVES 2–3 (2008) [hereinafter “ARTHUR, IMPLICATIONS OF HF”]. Development of the Barnett Shale began in Fort Worth, Texas during the 1980s. *Id.*

¹⁰ *Id.* at 7; TIMOTHY CONSIDINE, ET AL., PENNSYLVANIA STATE UNIVERSITY, AN EMERGING GIANT: PROSPECTS AND ECONOMIC IMPACTS OF DEVELOPING THE MARCELLUS SHALE NATURAL GAS PLAY 6 (July 24, 2009) [hereinafter “CONSIDINE, PROSPECTS AND ECONOMIC IMPACTS”].

¹¹ CONSIDINE, PROSPECTS AND ECONOMIC, *supra* note 10, at 2.

¹² *Id.* at 4.

¹³ *Id.* at 6.

¹⁴ *Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas, and Solution Mining Regulatory Program*, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, 4-19 (September 30, 2009), <http://www.dec.ny.gov/energy/58440.html> [hereinafter “NYSDEC, DRAFT SGEIS”].

¹⁵ U.S. DEP’T. OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 21 (April 2009) [hereinafter “USDOE, MODERN SHALE GAS DEVELOPMENT”].

¹⁶ ARTHUR, IMPLICATIONS OF HF, *supra* note 9, at 5, ex. 3.

As recently as 2002 the United States Geological Survey in its “Assessment of Undiscovered Oil and Gas Resources of the Appalachian Basin Province,” calculated that the Marcellus Shale contained an estimated undiscovered resource of about 1.9 trillion cubic feet (TCF) of gas. Just five years later, Engelder (2009) estimates 2,445 trillion

greatest¹⁷ in New Albany (43,500 square miles),¹⁸ and almost 10 times the sizes of the other five: Barnett (5,000),¹⁹ Fayetteville (9,000),²⁰ Haynesville (9,000),²¹ Woodford (11,000),²² and Antrim (12,000).²³ In summary, the Marcellus Shale represents a conveniently placed, extensive source of natural gas.

(b) Political and Economic Background to Marcellus Shale Development

Development of the Marcellus Shale presents the opportunity to create jobs,²⁴ develop domestic natural resource reliance,²⁵ and smoothly affect the transition from fossil fuels to greener sources of energy.²⁶ Natural gas extraction is important due to the potential to use natural gas as a “bridge fuel”²⁷ that will encourage the transition from

cubic feet of reserves in place with recoverable reserves amounting to 489 trillion cubic feet.

CONSIDINE, PROSPECTS AND ECONOMIC, *supra* note 10, at 4.

¹⁷ ARTHUR, IMPLICATIONS OF HF, *supra* note 9, at 5, ex. 3. The Marcellus Shale extends for 95,000 square miles, while the next largest shale is merely 43,500 sq. mi.. *Id.*

¹⁸ *Id.* The New Albany Shale is under Illinois and Indiana and the northwestern border of Kentucky, holding an estimate of 19.2 Tcf (trillion cubic feet) in estimated gas reserves. *Id.*

¹⁹ *Id.* The Barnett Shale is beneath Texas, holding between 25 and 252 Tcf. *Id.*

²⁰ *Id.* The Fayetteville Shale is under Arkansas, holding 42 Tcf. *Id.*

²¹ ARTHUR, IMPLICATIONS OF HF, *supra* note 9, at 5, ex. 3. The Haynesville/Bossier Shale is under Texas and Louisiana and holds approximately 264 Tcf. *Id.*

²² *Id.* The Woodford Shale is in both Texas and Oklahoma, holding 11 Tcf. *Id.*

²³ *Id.* Antrim, beneath Michigan, holds between 35 and 76 Tcf. *Id.*

²⁴ CONSIDINE, PROSPECTS AND ECONOMIC IMPACTS, *supra* note 10, at 17–18. The study estimates that total spending by Marcellus Shale producers was \$3.09 billion in 2008, \$66 million on payroll alone. *Id.*

²⁵ *Id.* at 10, 32–33.

²⁶ James M. Tour, Carter Kittrell, & Vicki L. Colvin, *Green Carbon as a Bridge to Renewable Energy*, 9 NATURE MATERIALS 871, 871 (October 22, 2010) (“... the typical value of greenhouse gas emission for natural gas is about *half that of coal*, or half as much CO₂ per kilowatt hour. Moreover, there is enough recoverable natural gas in shale deposits (shale gas) to meet the world’s energy needs for the next 60 years.”) (emphasis added) (internal citations omitted); IOGCC, SUPPORTING CONTINUED ENVIRONMENTALLY RESPONSIBLE DEVELOPMENT OF SHALE GAS IN THE UNITED STATES, Resolution 09.106 (2009). “Domestic production of natural gas is expected to increase as a share of U.S. supply from 84 percent in 2007 to 97 percent in 2030” and natural gas currently comprises 23% of the United States’ energy supply. *Id.*

²⁷ See Tour et al., *Green Carbon as a Bridge*, *supra* note 25. The article identifies the three elements most abundant on Earth with “the capacity to store and produce enough energy to power our civilization”: carbon, non-fissile uranium-238, and hydrogen. *Id.* at 872. Because the current infrastructure is geared to carbon, however, the authors suggest that a green carbon movement towards a hydrogen-based future would best serve long-term national energy needs. *Id.* at 874.

traditional sources of energy to more renewable, greener sources.²⁸ Shale gas is projected to amount to 50% of the U.S. natural gas supply by 2035, up from 20% today, and up from 1% in 2000.²⁹

Market forces impacting natural gas production in the Marcellus Shale operate at local, state, national, and global levels.³⁰ Additionally, coal-fired electric power presents powerful competition in the market, with natural gas only recently gaining an edge through lower capital costs and strategic environmental considerations.³¹ Widespread use of hydraulic fracturing has led to a uniform surge in interest in shales across the United States.³² The Marcellus Shale is uniquely situated as compared to other sources of natural gas due to its proximity to the major cities on the eastern seaboard.³³ Between Pennsylvania and the five states surrounding, the “current natural gas consumption is 9.2 BCF per day.”³⁴

Additionally, this particular market relies on a similar level of electric power derived from coal combustion, which gives a potential market of at least 18 BCF of

²⁸ *Id.*; IOGCC, URGING THE U.S. GOV'T TO RECOGNIZE THE IMPORTANCE OF OIL AND GAS RESEARCH AND TO ADEQUATELY FUND OIL AND GAS RESEARCH INITIATIVES, Resolution 09.101 (2009) (proposing that repeal of the Energy Policy Act of 2005 would result in a substantial reduction of funding necessary to ensure that “American consumers have clean, reliable, and affordable supplies of oil and natural gas”).

²⁹ INFORMATION HANDLING SERVICES CAMBRIDGE ENERGY RESEARCH ASSOCIATES (IHS CERA), FUELING NORTH AMERICA'S ENERGY FUTURE: THE UNCONVENTIONAL NATURAL GAS REVOLUTION AND THE CARBON AGENDA ES-1 (2010), http://www2.cera.com/docs/Executive_Summary.pdf [hereinafter “IHS CERA, REPORT”].

³⁰ CONSIDINE, PROSPECTS AND ECONOMIC IMPACTS, *supra* note 10, at 7, fig. 2. The natural gas prices are still recovering from the summer of 2008. *Id.*

³¹ *Id.* at 7-10.

³² USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 25.

³³ *Id.* at 25; *Marcellus Shale - Appalachian Basin Natural Gas Play*, GEOLOGY.COM (Oct. 30, 2009), <http://geology.com/articles/marcellus-shale.shtml>.

³⁴ TIMOTHY CONSIDINE, THE ECONOMIC IMPACTS OF THE MARCELLUS SHALE: IMPLICATIONS FOR NEW YORK, PENNSYLVANIA, & WEST VIRGINIA iv, 9 (2010) [hereinafter CONSIDINE, ECONOMIC IMPACTS: IMPLICATIONS]. “. . . [A]bundant supplies of natural gas would enable electricity producers to cost effectively reduce greenhouse gas emissions because natural gas has considerably less carbon content than coal and oil.” *Id.*

natural gas per day.³⁵ The shale's development implicates large sums of money both in the present and the near future. In 2008, development in Pennsylvania alone generated \$2.3 billion in total value added, as well as 29,000 jobs and \$240 million in state and local taxes.³⁶ The pace of development in the shale is rapidly transforming from the testing and evaluation stage into full commercial production.³⁷

There are groups opposed to development. Some citizens who have previously leased land to oil companies for drilling and other citizens with land that could be leased have also weighed in on the issue. A few share fearful, bitter stories of blighted, depleted water after the companies hydro-fracked³⁸ the coalbed methane (CBM) wells.³⁹ Some say the wells were unobtrusive, lucrative ways to use rights that were purchased when the homeowners bought the land.⁴⁰ Others point to neighboring states and either desire to

³⁵ CONSIDINE, PROSPECTS AND ECONOMIC IMPACTS, *supra* note 10, at 11. "There is also a considerable amount of coal-fired electric power generation in this region. In the unlikely event that all of this capacity was converted to natural gas, an additional 9 BCF per day of natural gas would be required. So within a 200-mile radius of the Marcellus, there is an existing and potential market of over 18 BCF per day." *Id.*

³⁶ *Id.* at ii.

³⁷ *Id.* (resulting in such a dramatic increase in economic output that values estimated for 2009 were doubled, while state and local taxes were predicted to increase to \$400 million and total job creation of 48,000).

³⁸ Hydraulic fracturing is also known as "hydrofracking," "fracking," "frac'ing," and many other informal terms.

³⁹ David Hill, *Farmers Want Land Restored*, TRF TIMES & NORTHERN WATCH (Oct. 26, 2010), http://www.trftimes.com/news/index.php?option=com_content&view=article&id=8605:farmers-want-land-restored&catid=13:front; Katie Benner & Shelley DuBois, *Odorless, Colorless: the Quiet Rise of American Big Gas*, FORTUNE, Oct. 1, 2010, available at http://money.cnn.com/2010/09/29/news/companies/fracking_natural_gas_industry.fortune/index.htm.

⁴⁰ Siobhan Hughes, *New York Congressman's Lead Slips as Gas-Drilling Fight Heats Up*, WALL STREET JOURNAL, Oct. 21, 2010, available at <http://online.wsj.com/article/BT-CO-20101021-720593.html>.

follow the same lucrative paths⁴¹ or avoid suffering through the lessons the citizens and leaders of other states learned.⁴²

There are several public environmental concerns associated with the process of hydraulic fracturing. The first issue is anecdotal evidence of changes in water quality (so-called introduction issues) and quantity (so-called reduction issues) following the commencement of fracking operations in communities.⁴³ Another source of concern stems from personal stories of contaminated well water, dead farm animals, and impaired human health.⁴⁴ Environmental activists have pointed to citizens' experiences that are redolent with misinformation concerning regulation and unsubstantiated incidents of contamination of water.⁴⁵ This fear stems from lack of public knowledge concerning the components of the fracking fluid.⁴⁶

On June 9, 2009, U.S. Senators Casey (D-PA) and Schumer (D-NY) and Representatives DeGette (D-CO), Hinchey (D-NY), and Polis (D-CO) introduced companion bills dubbed the Fracturing Responsibility and Awareness of Chemicals Act

⁴¹ Andrew Maykuth, *Strong Positions on Either Side of "Fracking" at EPA Hearing*, PHILLY.COM (Sept. 14, 2010),

http://www.philly.com/pm_21408/contentdetail.htm;jsessionid=C524ABCFF7B48B577402A777253B65DO?contentguid=00fGFvCY. ". . . land owners such as Chris Ostrowsky expressed exasperation that Pennsylvanians a few miles away in Susquehanna County were striking it rich while New Yorkers were in limbo. . . . 'It's real frustrating to see what's going on across the border, how the economy is booming in Pennsylvania,' Ostrowsky said." *Id.*

⁴² Abrahm Lustgarten, *Reporter's Notebook: Hydraulic Fracturing*, YOUTUBE (Jan. 21, 2009), <http://www.youtube.com/watch?v=yy556ACxJ2I>.

⁴³ EPA, *Conceptual Model of Potential Impacts*, *supra* note 3, at 1–2 (potential contamination of underground sources of drinking water ("USDWs") or surface water through hydraulic fracturing processes and affecting quantity through the large volume of water used—each well could potentially use between two to five million gallons of water in drilling and hydrofracking the well).

⁴⁴ Don Hopey, *I,200 Hear Marcellus Shale Debate EPA Hearing in Canonsburg One of Four Nationwide*, PITTSBURGH POST-GAZETTE, July 23, 2010, at A-1 ("They attributed the problems to water contamination caused by the deep gas drilling operations that are increasing quickly through much of the state.").

⁴⁵ Tom Zeller, Jr., *EPA to Study Chemicals Used to Tap Natural Gas*, N.Y. TIMES, Sept. 9, 2010, at B3.

⁴⁶ Hopey, *I,200 Hear Marcellus Shale Debate*, *supra* note 43.

(“FRAC Act”).⁴⁷ The bills called for the EPA to obtain jurisdiction over hydraulic fracturing under the Safe Drinking Water Act (SDWA)⁴⁸ and for companies engaging in hydraulic fracturing to provide certain disclosures regarding the chemicals used in the process.⁴⁹ In 2010, the 111th Congress asked the EPA to produce a study determining the risks to groundwater associated with hydraulic fracturing, with anticipated results available in 2014.⁵⁰

Industry officials have welcomed the EPA’s decision to study the complex relationship between hydraulic fracturing and drinking water to learn more about possible impacts such activities may have on such a vital natural resource.⁵¹ The industry leaders, however, have cautioned that the study should remain focused and present a final conclusive answer that will quickly permit the stakeholders to determine whether the EPA should be involved in regulation of hydraulic fracturing.⁵² A fear persists among

⁴⁷ Fracturing Responsibility and Awareness of Chemicals Act, S. 1215, H.R. 2766, 111th Cong. (1st Sess. 2009); Abraham Lustgarten, *FRAC Act – Congress Introduces Twin Bills to Control Drilling and Protect Drinking Water*, PROPUBLICA (June 9, 2009), <http://www.propublica.org/article/frac-act-congress-introduces-bills-to-control-drilling-609>.

⁴⁸ Safe Drinking Water Act of 1974, 42 U.S.C. §§ 300f et seq. (2010).

⁴⁹ Fracturing Responsibility and Awareness of Chemicals Act, S. 1215, 111th Cong. § 2 (1st Sess. 2009); Fracturing Responsibility and Awareness of Chemicals Act of 2009, H.R. 2766, 111th Cong. § 2 (1st Sess. 2009).

⁵⁰ Zeller, *EPA to Study Chemicals*, *supra* note 44; Jim Efstathiou, *New Yorkers Spar over U.S. EPA Study of Natural-Gas Fracturing*, BLOOMBERG, Sept. 14, 2010, *available at* <http://www.bloomberg.com/news/2010-09-13/new-york-gas-drilling-conflict-aired-over-u-s-fracturing-study.html>. “The EPA’s new study ‘needs to be carried out with the utmost care to identify the full range of risks,’ said Kate Sinding, senior attorney with the New York-based Natural Resources Defense Council, an environmental organization. ‘It is no exaggeration to say all eyes, both in the United States and around the world, are on EPA.’” *Id.*

⁵¹ STUART KEMP, HALLIBURTON ENERGY SERVICES, INC., COMMENTS OF HALLIBURTON ENERGY SERVICES, INC. ON DRAFT COMMITTEE REPORT OF THE ENVIRONMENTAL ENGINEERING COMMITTEE OF THE SCIENCE ADVISORY BOARD ON EPA’S RESEARCH SCOPING DOCUMENT FOR HYDRAULIC FRACTURING 2 (June 9, 2010) [hereinafter “HALLIBURTON, COMMENTS – JUNE”]; EPA, SCOPING MATERIALS FOR INITIAL DESIGN OF EPA RESEARCH STUDY ON POTENTIAL RELATIONSHIPS BETWEEN HYDRAULIC FRACTURING AND DRINKING WATER RESOURCES 7–9 (March 2010).

⁵² HALLIBURTON, COMMENTS – JUNE, *supra* note 50, at 2; IOGCC, SUPPORTING CONTINUED ENVIRONMENTALLY RESPONSIBLE DEVELOPMENT, *supra* note 2.

industry insiders⁵³ and consumers⁵⁴ that federal intrusion into the current states' regulatory schemes will drive up prices and produce adverse incentives for the gas industry to invest in production of this natural resource.⁵⁵

The bills introduced in the Senate and House of Representatives seek to address these concerns through two mechanisms: first, through amendment of the SDWA to remove the explicit exemption⁵⁶ of hydraulic fracturing from the EPA's jurisdiction⁵⁷ and second, by requiring companies using hydraulic fracturing to make public and emergency disclosures of the additives injected into the wells in the mix used to fracture the coal beds.⁵⁸ The bills are still pending in Congress.⁵⁹

II: The Mechanical Process of Hydraulic Fracturing

⁵³ IOGCC, SUPPORTING CONTINUED ENVIRONMENTALLY RESPONSIBLE DEVELOPMENT OF SHALE GAS IN THE UNITED STATES, Resolution 09.011 (2009). "Hydraulic fracturing plays a major role in the development of virtually all unconventional oil and gas resources and, thus, should not be limited in the absence of any evidence that such fracturing has damaged the environment . . . Regulation of hydraulic fracturing as underground injection under the SDWA would impose significant administrative costs on the state and substantially increase the cost of drilling oil and gas wells with no resulting environmental benefits." Attached to Resolution 09.011 were the resolutions passed by Alaska (S.J.R. 14), Alabama (H.J.R. 254), Louisiana (H.C.R. 38), Mississippi (S.C. 636), North Dakota (S.C.R. 4020), Oklahoma (H.C.R. 1012), Utah (S.J.R. 17), Texas (H.C.R. 67), and Wyoming (S.J. 0005).

⁵⁴ Maykuth, *Strong Positions*, *supra* note 40. "Broome County Executive Barbara Fiala declared fracking "safe" and expressed frustration with the slow pace of development in New York. 'All we ask is that this study be focused and not take forever to complete,' she said [at the EPA shareholder meeting in Binghamton, N.Y. in September 2010]." *Id.*

⁵⁵ IOGCC, Resolution 09.011 *supra* note 52.

⁵⁶ FRAC Act aims to lift the Environmental Policy Act of 2005 Exemption of Hydraulic Fracturing from the Safe Drinking Water Act. 42 U.S.C. § 300h as amended August 8, 2005, P.L. 109-58. The exemption was enacted following extensive lobbying by the oil and gas industry for Congress to provide clarification about whether the EPA was required to regulate hydraulic fracturing under state UIC programs. *See* Section V. (b) *infra*; *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. LAW REV. 115, 167 (2009). The author provides a comprehensive discussion of this history in Section V. Regulatory Problems and the Need for Reform. *Id.*

⁵⁷ Fracturing Responsibility and Awareness of Chemicals Act, S. 1215, 111th Cong. § 2 (2009); Fracturing Responsibility and Awareness of Chemicals Act of 2009, H.R. 2766, 111th Cong. § 2 (2009).

⁵⁸ *Id.*

⁵⁹ Lustgarten, *FRAC Act*, *supra* note 47 ("The House bill was introduced by Diana DeGette, D-Colo., Maurice Hinchey, D-N.Y., and Jared Polis, D-Colo., and will now be debated inside the House Energy and Commerce Committee. According to DeGette, the bill may proceed alone, or she could attach it to a larger piece of legislation."); Hughes, *New York Congressman's Lead Slips*, *supra* note 39. Hinchey faces a tight election as his constituents appreciate the economic consequences of the moratorium imposed by New York Department of Environmental Conservation following his push for a study of hydraulic fracturing by the EPA. *Id.*

Hydraulic fracturing,⁶⁰ combined with the recent advent of horizontal drilling,⁶¹ has resulted in unprecedented potential to access sources of methane gas that were previously too difficult to extract⁶² in terms of profit on investment.⁶³ The mechanical process of hydraulic fracturing uses fluid pressure to fracture the material surrounding the drill shaft.⁶⁴ Operators inject fluids into vertical or horizontal wells at high pressure to generate fractures or exacerbate existing fractures in the formation.⁶⁵ The fluids are largely made up of water with a small proportion of additives, which increase fluidity or prevent contamination, and sand or some other proppant, which keeps the fractures open and permits the gas to flow back up to the surface freely.⁶⁶

The process of hydraulic fracturing begins with the construction of the well pad, from which all operations will be conducted.⁶⁷ Construction can take up to a month,⁶⁸

⁶⁰ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 13 (“Large scale hydraulic fracturing, a process first developed in Texas in the 1950s, was first used in the Barnett in 1986; likewise, the first Barnett horizontal well was drilled in 1992.”) (citing J. Hayden & D. Pursell, PICKERING ENERGY PARTNERS INC., *The Barnett Shale—Visitor’s Guide to the Hottest Gas Play in the US* (2005)).

⁶¹ J. Harper, *The Marcellus Shale—An Old “New” Gas Reservoir in Pennsylvania*, 38 PA. GEOLOGY 2, 3 (2008). Horizontal drilling consists of drilling vertically until the drill bit is at a specific height from the desired horizontal resource, (the “kickoff point”), at which point the drill is directed in an arc ending within the layer of material. The drill then moves forward, now drilling parallel from the surface. USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 52, ex. 30.

⁶² USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 13 (“The combination of sequenced hydraulic fracture treatments and horizontal well completions has been crucial in facilitating expansion of shale gas development. Prior to the successful application of these two technologies in the Barnett Shale, shale gas resources in many basins had been overlooked because production was not viewed as economically feasible.”) (citing Harper, *The Marcellus Shale*, *supra* note 60).

⁶³ *Id.* at 14 (“The combination of reduced economics and low permeability of gas shale formations historically caused operators to bypass these formations and focus on other resources.”) (citing M. Airhart, *The Barnett Shale Gas Boom: Igniting a Hunt for Unconventional Natural Gas Resources*, GEOLOGY.COM <http://geology.com/research/barnett-shale-gas.shtml>. Accessed: September 2008.).

⁶⁴ EPA, *Conceptual Model of Potential Impacts*, *supra* note 3, at 1.

⁶⁵ *Id.*

⁶⁶ *Id.*; NYSDEC, DRAFT SGEIS, *supra* note 13, at 5-90 (“On September 30, 2009, the Department released the Draft SGEIS for additional public review and comment. The comment period on the Draft SGEIS ended on December 31, 2009 and the Department is now evaluating the many comments received. The Final SGEIS, to be prepared after consideration of comments received on the draft, will set additional parameters for SEQRA review. The Department will then process and, as appropriate, issue well permits for gas well development using high-volume hydraulic fracturing in accordance with both the [Generic Environmental Impact Statement] and the SGEIS.” (from <http://www.dec.ny.gov/energy/47554.html>)).

⁶⁷ NYSDEC, DRAFT SGEIS, *supra* note 13, at 5-123, tbl. 5.15.

following which the vertical well shaft is drilled with a smaller rig.⁶⁹ A larger rig is brought onsite for the horizontal drilling, which also takes up to two weeks per well, though more than one well may be drilled simultaneously.⁷⁰ To prepare the well for fracturing, it is lined with casing that serves to prevent fluids from escaping into the environment except where the operator directs them.⁷¹ “Current well construction requirements consist of installing multiple layers of protective steel casing and cement that are specifically designed and installed to protect fresh water aquifers and to ensure that the producing zone is isolated from overlying formations.”⁷² The layered system of casings sealed with cement is tested at several steps during the process to ensure that “the casing used has sufficient strength, and that the cement has properly bonded to the casing.”⁷³ Preparation for the hydraulic fracture takes somewhere between one to two months, depending on when the necessary equipment arrives.⁷⁴ Trucks with temporary tanks to store the water, and trucks carrying the frac fluid, water, sand, and other equipment, including computerized monitoring instruments, must all be coordinated.⁷⁵ The process of fracturing the well requires two to five days, “including approximately 40 to 100 hours of actual pumping.”⁷⁶ Fluid return will occur over the next two to eight

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 51–52.

⁷² *Id.*

⁷³ *Id.* at 52.

⁷⁴ NYSDEC, DRAFT GSEIS, *supra* note 13, at 5-123, tbl. 5.15.

⁷⁵ *Id.*

⁷⁶ *Id.*

weeks,⁷⁷ with the volume of flowback fluid accounting for 30% to 70% of the original fracture fluid.⁷⁸

These activities are subject to extensive state and federal regulation, as is discussed below,⁷⁹ as well as industry best practices, which have been analyzed elsewhere.⁸⁰

III: State Control

Comprehensive state and local laws manage the process of producing oil and gas from exploration to delivery.⁸¹ Individual assessments of “geology, hydrology, climate, topography, industry characteristics, development history, state legal structures, population density, and local economics” are appropriate and often form the basis for current regulatory schemes.⁸² For instance, the method of dealing with wastewater generated at wells employing hydraulic fracturing in Texas is simple: the water is injected deep underground into natural depositories.⁸³ This specific solution is uniquely suited to the geological formation of Texas, but would be utterly impracticable for a state

⁷⁷ *Id.*; USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 66 (citing J. Satterfield, M. Mantell, D. Kathol, F. Hiebert, K. Patterson, and R. Lee. CHESAPEAKE ENERGY CORP., *Managing Water Resource’s Challenges in Select Natural Gas Shale Plays*, Presented at the GWPC Annual Meeting (2008)).

⁷⁸ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 66 (citing “Personal communication with numerous operators and service companies in a variety of shale gas plays.”).

⁷⁹ For an overview of state statutes governing the disposal of produced fluid, *see infra* Part III. For federal statutes currently addressing disposal of flowback fluid, *see infra* Part IV.

⁸⁰ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 66.

⁸¹ *Id.* at 25.

⁸² *Id.*

⁸³ MICHELE RODGERS ET AL., PENNSYLVANIA STATE COLLEGE OF AGRICULTURAL SCIENCES, MARCELLUS SHALE: WHAT LOCAL GOVERNMENT OFFICIALS NEED TO KNOW 4, 7–8 (2008), *available at* <http://downloads.cas.psu.edu/naturalgas/pdf/MarcellusShaleWhatLocalGovernmentOfficialsneedtoknow.pdf>.

like Pennsylvania, where the underlying geological formations would not be conducive to such disposal methods.⁸⁴

(a) State Regulations in Place

State regulatory agencies for oil and gas provide guidance for protection of the environment and workers onsite, with regulations addressing everything from permit requirements to the required depth of protective casing and time needed for the cement to dry before drilling continues.⁸⁵ The state regulatory approach has been described as a “cradle-to-grave” method that covers everything from “the drilling and fracture of the well, production operations, management and disposal of wastes, [to] abandonment and plugging of the well.”⁸⁶

Permits are required before drilling can commence and the application for such permits must include information regarding the well’s location, construction, operation, and reclamation.⁸⁷ Some states compel operators to post a financial security or show financial resources sufficient to accomplish compliance with all applicable regulations.⁸⁸ States have also produced voluntary reviews of applicable statutes to ensure that

⁸⁴ 42 U.S.C.S. § 300h (b)(3)(A) (2010) (“The regulations of the Administrator under this section shall permit or provide for consideration of varying geologic, hydrological, or historical conditions in different States and in different areas within a State.”); RODGERS, MARCELLUS SHALE, *supra* note 82, at 4, 7-8.

⁸⁵ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 52-53; Burns Ind. Code Ann. § 14-37-7-5 (2010) (production string of casing requirement); K.R.S. § 353.100 (2010) (casings requirement); MCLS prec § 319.51 (2010) (supervisor of wells to provide regulations relating to casing among other well activities); 58 P.S. § 601.503 (2010) (department to have authority to “issue such orders” necessary to enforce provisions of oil and gas act); 6 N.Y.C.R.R. Part 554 (2010) (regarding the drilling, casing, and completion programs’ purpose in preventing pollution); T.A.C. 16.1.3.8 (2010) (Texas Railroad Commission’s prohibition against pollution of either surface or subsurface water).

⁸⁶ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 26.

⁸⁷ *Id.*; *see e.g.*, N.D. Admin. Code 43-02-03-16 (2009) (“No drilling activity shall commence until such application is approved and a permit to drill is issued by the director.”).

⁸⁸ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 26; W. VA. Code § 22-21-6 (2010); 225 I.L.C.S. 715/5 (2010); Mont. Code Anno., § 82-1-104 (2010); Fla. Stat. § 377.2425 (2010); MCLS § 324.61506 (p) (2010); NY CLS ECL § 23-0305 (2010); 58 P.S. § 601.503 (2010); ORC Ann. 1509.07 (2010); Idaho Code § 42-238 (2010); *but see* Keith G. Baurle, *Reaping the Whirlwind: Federal Oil and Gas Development on Private Lands in the Rocky Mountain West*, 83 DENV. U.L. REV. 1083, 1085 n. 12 (2006) (criticizing the adequacy of such bonds to protect landowners potentially harmed).

regulatory programs are up to date and successful. All of the states overlying the Marcellus Shale formation are members of the Interstate Oil and Gas Compact Commission [IOGCC].⁸⁹ Other third parties also produce reviews for the public's education.⁹⁰ For instance, the Ground Water Protection Council (GWPC) produces reviews of state Underground Injection Control (UIC) programs.⁹¹ GWPC also compiles a list of state agencies that promulgate regulations impacting groundwater and provides links to the agencies' websites.⁹² "In addition to the GWPC UIC review, state oil and gas environmental programs other than UIC programs can periodically be reviewed against a set of guidelines developed by an independent body of state, industry, and environmental stakeholders, known as STRONGER⁹³ (State Review of Oil and Natural Gas Environmental Regulation, Inc.)."⁹⁴

New York State has been particularly proactive in identifying potential threats to water resources and the New York State, Department of Environmental Conservation-Division of Mineral Resources produced a comprehensive draft supplemental generic environmental impact statement (Draft SGEIS) in 2009. As part of this effort, New York

⁸⁹ See IOGCC, *Member States*, <http://www.iogcc.state.ok.us/member-states> (last visited Nov. 5, 2010); *Map of Marcellus Shale*, <http://www.marcellusshales.com/marcellusshalemap.html> (last visited Nov. 5, 2010) (depiction of the contours of the Marcellus Shale superimposed on the states overlying the formation). The IOGCC is a government agency that spans multiple states and "works to ensure our nation's oil and natural gas resources are conserved and maximized while protecting health, safety and the environment." IOGCC, *About Us*, <http://www.iogcc.state.ok.us/about-us>.

⁹⁰ See, e.g., *Independent Review Completed of Pennsylvania Department of Environmental Protection Program Regulating Hydraulic Fracturing of Oil & Gas Wells*, BUSINESS WIRE, Sept. 24, 2010, <http://www.businesswire.com/news/home/20100923006018/en/Independent-Review-Completed-Pennsylvania-Department-Environmental-Protection>.

⁹¹ *Underground Injection Control*, GWPC, <http://www.gwpc.org/uic/uic.htm>.

⁹² *State Information*, GWPC, http://www.gwpc.org/state_resources/state_resources.htm click on "State Agencies List" for the Excel spreadsheet.

⁹³ *List of State Reviews*, STRONGER, Inc., <http://www.strongerinc.org/reviews/reviews.asp>.

⁹⁴ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 26.

asked ICF International⁹⁵ to evaluate the following factors identified as potentially having a likelihood of groundwater contamination from high-volume hydraulic fracturing:⁹⁶

- wellbore failure,⁹⁷
- subsurface pathways,
- waste transport,
- centralized flowback water surface impoundments,⁹⁸
- fluid discharges,
- treatment facilities,
- disposal wells,
- solids disposal,
- naturally occurring radioactive material disposition,⁹⁹
- cuttings volume,¹⁰⁰
- cuttings and liner associated with mud drilling,

⁹⁵ ICF International, *Environmental Policy & Economics*, (last visited Nov. 5, 2010) <http://www.icfi.com/markets/environment/environment-policy-economics.aspx>. ICF characterizes itself as a global professional services firm with more than 40 years experience in “[conducting] policy and economic analyses to support clients in developing and implementing environmental protection programs in such areas as solid and hazardous waste management, air quality, climate change, and sustainability.” *Id.* New York State Energy Research & Development Authority contracted with consulting groups for the research needed to produce the SGEIS to ICF International, along with Alpha Environmental, Inc., URS Corporation and NTC Consultants. NYSDEC, DRAFT GSEIS, *supra* note 13, at 6-37 – 6-38.

⁹⁶ NYSDEC, DRAFT GSEIS, *supra* note 13, at 6-37 – 6-38.

⁹⁷ *Id.* at 6-37. “[T]he probability of fracture fluids reaching an underground source of drinking water (USDW) from properly constructed wells due to subsequent failures in the casing or casing cement due to corrosion is estimated at less than 2×10^{-8} (fewer than 1 in 50 million wells).” *Id.*

⁹⁸ *Id.* at 5-113. “Operators may propose to store flowback water prior to or after dilution in the onsite lined pits or tanks . . . , or in centralized facilities consisting of tanks or one or more engineered impoundments.” *Id.*

⁹⁹ *Id.* at 6-40. “Marcellus shale is known to contain NORM concentrations at higher levels than surrounding rock formations,” requiring employers to perform testing and provide appropriate worker protection. *Id.* at 6-129 – 6-130. However, as this impacts water supplies, New York has found that, “[b]ased on the analytical results from field-screening and gamma ray spectroscopy performed on samples of Marcellus shale, NORM levels in cuttings are not likely to pose a problem.” *Id.* at 6-40.

¹⁰⁰ Cuttings volume consists of “[t]he very fine-grained rock fragments removed by the drilling process are returned to the surface in the drilling fluid and managed either within a closed-loop tank system or a lined on-site reserve pit.” NYSDEC, DRAFT GSEIS, *supra* note 13, at 5-29.

- potential impacts to subsurface New York City water supply infrastructure,
- degradation of New York City’s drinking water supply,
- floodplains,
- primary and principle aquifers,
- freshwater wetlands, ecosystems and wildlife, and
- air quality.

The consulting group determined that the regulations implemented in New York are “sufficient to prevent fracturing fluid from flowing upward along the wellbore and contacting water-bearing strata adjacent to the borehole.”¹⁰¹ To reach this conclusion, ICF studied subsurface migration of fracturing fluids into USDWs. Typical conditions for hydraulic fracturing produce wells with similar characteristics: aquifer maximum depth is less than 1000 feet, the fracture zone is greater than 2000 feet, the average hydraulic conductivity of intervening strata remains less than 1E-5 cm/sec, and the average porosity of intervening strata is over 10%.¹⁰² ICF found that even in circumstances most favorable to flow, the current practices of hydraulic fracturing generate pressures and volumes that are insufficient “to cause migration of fluids from the fracture zone to the overlying aquifer in the short time that fracturing pressures would be applied.”¹⁰³

For twenty-seven distinct events in the lifecycle of a horizontal well, the Draft SGEIS identified at least one regulatory jurisdiction associated with that part of the

¹⁰¹ *Id.* at 5-148.

¹⁰² NYSDEC, DRAFT GSEIS, *supra* note 13, at 5-148.

¹⁰³ *Id.*

process.¹⁰⁴ The regulatory jurisdictions include local government and health agencies, New York City agencies, New York State agencies, and federal agencies.¹⁰⁵

In Pennsylvania, oil and gas well developers must adhere to the Oil and Gas Act when they decide to drill in the state.¹⁰⁶ The main requirement is that drillers procure a permit prior to beginning any drilling, which includes paying fees keyed to the length of the wellbore and including a water management plan in the permit application.¹⁰⁷ Other regulations address prerequisites before receiving the permit, including surveys, stipulation of angles and directions of non-vertical wells, and provision of notice to surface owners.¹⁰⁸ Pennsylvania's Department of Environmental Protection plays an active, protective, and productive role in regulation of oil and gas development and production,¹⁰⁹ including oversight of permit and inspection programs.¹¹⁰

(b) Issues Facing State Regulators

Once an agency is tasked with the specific role of regulating a part of the process, lack of evidence leaves the agency hobbled. "Regulatory officials from 15 states have recently testified that groundwater contamination from the hydraulic fracturing procedure

¹⁰⁴ *Id.* at 8-8, Tbl. 8.1.

¹⁰⁵ *Id.* Local government agencies included: New York City Department of Environmental Protection; New York State provided oversight through Department of Environmental Conservation Divisions & Offices (Division of Mineral Resources, Division of Environmental Permits, Division of Water, Division of Solid and Hazardous Materials, Division of Fish, Wildlife and Marine Resources, Division of Air Resources), Department of Health, Department of Transportation, Public Service Commission, Office of Parks, and Recreation & Historic Restoration; and federal agency involvement was identified as the EPA, United States Department of Transportation, and US Army Corps of Engineers. *Id.*

¹⁰⁶ 58 Pa. Stat. Ann. § 601.101 (1996); see Laura C. Reeder, *Creating a Legal Framework for Regulation of Natural Gas Extraction from the Marcellus Shale Formation*, 34 WM. & MARY ENVTL. L. & POL'Y REV. 999, 1016 (2008) (Section IV provides a comprehensive overview of the Pennsylvania regulation of drilling at both state and local levels).

¹⁰⁷ Pa. Department of Environmental Protection, *Marcellus Shale Well Permit Application Fees Fact Sheet*, (Apr. 2009), available at <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-74269/5500-FS-DEP4239.pdf>; Reeder, *Creating a Legal Framework*, supra note 105 at 999, n. 141-142 (citing Oil and Gas Act, 58 Pa. Stat. Ann. §§ 601.101-601.201).

¹⁰⁸ 58 Pa. Stat. Ann. § 601.201.

¹⁰⁹ See Pa. Dep't. of Env'tl. Protection, Bureau of Oil and Gas Mgmt., <http://www.dep.state.pa.us/dep/deputate/minres/oilgas/oilgas.htm> (last visited Nov. 5, 2010).

¹¹⁰ See *Independent Review Completed of Pennsylvania Program*, supra note 89.

is not known to have occurred despite the procedure's widespread use in many wells over several decades.”¹¹¹ Issues arising in the producing states have largely related to insufficient casing or negligent operation of wells, in violation of existing regulations.¹¹² In June 2010, the blowout of a well drilled into the Marcellus Shale in Clearfield County, Pennsylvania, brought responders from the state, as well as industry experts drawn from Texas and the federal government.¹¹³ Another blowout in the town of Killdeer resulted in a spill of more than 2000 barrels of oil and frack fluid.¹¹⁴ The Killdeer spill was the first well blowout since the Department of Mineral Resources began requiring pressure testing and pressure release valves during high-pressure hydraulic fracturing procedures in 2008.¹¹⁵ The Department of Mineral Resources has demonstrated a responsive and conservationist attitude of the state's regulatory agency.¹¹⁶ The Mineral Resources Director traced the impetus behind the department's decision to impose regulation in 2008 to the previous blowouts seen in the state.¹¹⁷ However, environmental organizations have complained that the current regulation lags behind industry innovation.¹¹⁸

IV: Federal Statutes Regulate Parts of the Hydraulic Fracturing Process

¹¹¹ NYSDEC, DRAFT GSEIS, *supra* note 13, at 6-37.

¹¹² PENN. STATE DEP'T. OF ENV'T'L PROTECT., *Hydraulic Fracturing Overview*, http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/marcellus/Reports/DEP%20Fracing%20overview.pdf.

¹¹³ *Gas Well Blowout Under Control in Clearfield County*, WJACTV.COM, June 4, 2010, <http://www.wjactv.com/print/23792353/detail.html>.

¹¹⁴ Lauren Donovan, *Killdeer oil spill being cleaned up, officials investigate*, BISMARCK TRIBUNE, Sept. 2, 2010, http://www.bismarcktribune.com/news/state-and-regional/article_af6a8bd2-b712-11df-b4ff-001cc4c03286.html.

¹¹⁵ *Id.*

¹¹⁶ *Id.*

¹¹⁷ *Id.*

¹¹⁸ Mark Guarino, *More Regulation Needed to Prevent Oil Spills, Commission Finds*, CHRISTIAN SCIENCE MONITOR (Jan. 11, 2011), available at <http://www.alaskadispatch.com/dispatches/news/8243-more-regulation-needed-to-prevent-oil-spills-commission-finds>. “The technology, laws and regulations, and practices for containing, responding to, and cleaning up the spills lag behind the real risk associated with [oil and gas production] . . . government must close the existing gap and industry must support rather than resist that effort,” the report states.” *Id.*

The use of complex chemicals in hydraulic fracturing is subject to scrutiny under numerous federal environmental statutes.¹¹⁹ All of the laws, regulations, and permitting procedures that bind conventional oil and gas exploration and production also attach to activities aimed at producing unconventional sources of natural gas.¹²⁰ This Comment, however, examines only the potential results of the act pending in Congress to amend the SDWA. Under the SDWA as currently amended, Congress provided the EPA with a lever to use against states' inaction in protecting drinking water sources—a means to halt any “race to the bottom.”¹²¹ The typical justifications given for placing environmental regulation under federal control “reflect commonly understood collective action problems, including negative environmental externalities, resource pooling, the ‘race to the bottom,’

¹¹⁹ E.g., the U.S. Army Corps of Engineers oversees any wetlands permitting necessary. Clean Water Act of 1972, 33 U.S.C. §1344 (2010); *see also*, Steven G. Davison, *General Permits Under Section 404 of the Clean Water Act*, 26 PACE ENVTL. L. REV. 35 (2009). The U.S. Department of Transportation oversees transportation of fracturing fluids as hazardous chemicals. 49 U.S.C. § 5103 (2010). The EPA retains primary jurisdiction over injection well disposal under the SDWA. § 1421 (2010). Additionally, “the Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the ‘cradle-to-grave.’ This includes the generation, transportation, treatment, storage, and disposal of hazardous waste.” 42 U.S.C. § 6901 et seq. (1976); EPA, *Summary of the Resource Conservation and Recovery Act*, June 28, 2006, <http://www.epa.gov/lawsregs/laws/rcra.html>. *See also Gas Well Blowout Under Control*, supra note 112. In a recent blowout of a well drilled into the Marcellus Shale in Clearfield County, Pa., responders came from the state level, as well as industry experts drawn from Texas and the federal government. *Id.*

¹²⁰ USDOE, MODERN SHALE GAS DEVELOPMENT, supra note 14, at 25.

¹²¹ Robert L. Glicksman & Richard E. Levy, *A Collective Action Perspective on Ceiling Preemption by Federal Environmental Regulation: The Case of Global Climate Change*, 102 NW. U. L. REV. 579, 597 (2008).

Another rationale for federal environmental regulation is the so-called “race to the bottom.” A race to the bottom assumes that competition for business and industry will create a prisoner’s dilemma in which states are driven to relax their environmental standards in order to gain the economic benefits and tax revenues that the business or industry brings. Individual states have the incentives to lower standards to compete for industry whether or not other states do the same, even though the states as a collective would be better off not doing so. Some environmental law scholars have argued either that the race to the bottom is not an empirical reality or that interjurisdictional competition is a good thing because it tends to produce socially efficient outcomes. Other academics have responded that the race to the bottom has been and remains a factor that provides obstacles to effective state environmental regulation.

Id. at 597-598.

uniform standards, and the ‘NIMBY’ (Not In My BackYard) phenomenon.”¹²² These concerns about pollution are particularly relevant in the context of protecting drinking water,¹²³ which consists of both surface and groundwater.¹²⁴ The resource of water is vulnerable to conflicts arising out of non-uniform protection due to its migratory characteristics.¹²⁵ Migratory resources spread pollution when states provide insufficiently protective regulation.¹²⁶ The difficulty in providing that uniform protection is, in part, due to the fact that, between more protective and less protective states,

. . . courts are apt to discount or disregard empirical evidence relating to a statute’s population health impact while accepting almost at face value claims relating to the burdens a statute imposes on commerce. Thus not only do the federal courts now frequently ignore public health claims in particular cases, they also sometimes reject, ostensibly as beyond their competence, the empirical and epidemiological evidence that public health can provide in support or refutation of particular public health statutes.¹²⁷

As part of the SDWA program, the EPA requires states to develop regulations that at least meet the minimum standards established by the Agency for the SDWA before the states can obtain federal authorization to run their own UIC program.¹²⁸ But, because the SDWA does not explicitly define the term “underground injection” to include the process of hydraulic fracturing, the interpretation of that phrase belongs in the hands of the

¹²² *Id.* at 593-594.

¹²³ EPA, THE WATER CYCLE: GROUND WATER DISCHARGE, <http://ga.water.usgs.gov/edu/watercyclegwdischarge.html>.

¹²⁴ P. JAYA RAMA REDDY, A TEXTBOOK OF HYDROLOGY 289 (Laxmi Publications) (2005) (“A groundwater basin is filled and the excess water is discharged by several ways until a quasi-equilibrium is reached.”)

¹²⁵ Marc K. Landy, *Local Government and Environmental Policy*, DILEMMAS OF SCALE IN AMERICA’S FEDERAL DEMOCRACY 227, 228–29 (Woodrow Wilson Center Press) (1999) (“Air and water move; they do not respect state lines.”). In particular, Landy observed that increased agricultural and industrial output occurring post-World War II resulted in such significant pollution that economic damage following the detrimental effect on the environment would indeed spill over state boundaries. *Id.*

¹²⁶ Wendy E. Parment, *Population Health and Federalism: Whose Job Is It?*, POPULATIONS, PUBLIC HEALTH AND THE LAW 78, 100–01 (Georgetown University Press) (2009).

¹²⁷ *Id.* at 97.

¹²⁸ 42 U.S.C.S. § 300h (a)(1), (b)(1) (2010).

agency implementing the statute: the EPA.¹²⁹ Under SDWA § 300g-1, the EPA must establish a maximum acceptable level for specified contaminants and create a “national drinking water regulation . . . if the Administrator determines that . . .” the following three permissive characteristics are present: (1) the contaminant may have an adverse effect on human health; (2) the likelihood of permeating public water systems at a rate and quantity that gives rise to health concerns has become a “substantial likelihood”; and (3) “in the sole judgment of the Administrator, regulation of” the contaminant will present the opportunity to reduce risk to human health.¹³⁰

Additionally, to ensure that the contaminant is properly categorized, the Administrator must base this determination on “best available, peer-reviewed science” that examines seven factors describing the “quantifiable and non-quantifiable health risk reduction benefits for which there is a factual basis to conclude” that such benefits to identified populations would likely follow.¹³¹ In light of *Chevron U.S.A., Inc. v. Natural Resources Defense Council*, “considerable weight should be accorded to an executive department’s construction of a statutory scheme it is entrusted to administer, and the

¹²⁹ Legal Envtl. Assistance Found., Inc. v. U.S. E.P.A., 276 F.3d 1253, 1258 (2001) (requiring the EPA to determine whether Alabama’s revised UIC program provided an adequate permitting process for hydraulic fracturing). Using the two-part *Chevron* test, the court determined that the intent of Congress was not clear in whether hydraulic fracturing fell within the purview of “underground injection,” and thus the Agency was entitled to controlling weight for its interpretation of the phrase unless such interpretation was inconsistent with the clear terms of the statute, despite the existence of other possible interpretations. *Id.* at 1264.

¹³⁰ 42 U.S.C. § 300g-1 (b)(1)(A)(i)-(iii) (2010).

¹³¹ 42 U.S.C. § 300g-1 (b)(C)(i)(I)-(VII) (2010). The statute lists the seven factors to be considered: (1) that reductions in health risks will occur as a result of compliance with the proposed treatment; (2) that the proposed treatment will target the contaminants causing the damage; (3) that costs resulting from the regulation are justified; (4) that the “incremental costs” resulting from compliance with the regulation have been considered; (5) that the contaminant’s effect(s) on the general public as well as on children, the elderly, and pregnancies were considered; (6) that the Administrator considered any increased health risks stemming from compliance; and (7) any other “relevant factors,” with discretion vested solely in the administrative agency. *Id.*

principle of deference to administrative interpretations.”¹³² This dynamic is particularly illustrated in the SDWA, in which Congress directed the EPA to apply its scientific and environmental expertise to evaluate best practices and promulgate appropriate regulatory schemes beyond the scope of the legislature’s expertise or time to manage.¹³³

V: Science, Policy, and Regulation

(a) The EPA’s Application of the Precautionary Principle

The precautionary principle requires that “when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.”¹³⁴ This precept is one that remains deeply entrenched in the environmental management field,¹³⁵ and particularly in the American conception of regulation.¹³⁶ As a general concept, prevention rather than cure is generally preferred; it is easier not to drop a fragile vase than it would be to clean up the myriad shards it would become once it hit the ground. On the other hand, where two mutually exclusive options present both advantages and

¹³² *Chevron U.S.A., Inc. v. Nat’l. Res. Def. Council*, 467 U.S. 837, 844 (1984) (internal citations omitted). Judicial deference is consistent with a co-equal branch of government’s review of matters explicitly delegated to administrative agencies when Congress relinquishes its discretionary power. *INS v. Chadha*, 462 U.S. 919 (1983) (holding that Congress may not delegate authority to an executive branch agency while maintaining in the statute a clause granting to itself a legislative veto over actions of the executive branch because that is inconsistent with the bicameralism principle and Presentment Clause of the United States Constitution).

¹³³ 42 U.S.C. § 300g.

¹³⁴ Joel A. Tickner, *Introduction*, in *PRECAUTION, ENVIRONMENTAL SCIENCE, AND PREVENTATIVE PUBLIC POLICY* xiii-xiv (Island Press) (2003) (quoting the “1998 Wingspread Statement on the Precautionary Principle”). The four central components of the principle, as identified in the statement, were: “(1) taking preventive action in the face of uncertainty, (2) shifting burdens onto proponents of potentially harmful actions, (3) exploring a wide range of alternatives to possibly harmful actions, and (4) increasing public participation in decision-making.” *Id.*

¹³⁵ Michael Faure & Goran Skogh, *Principles of environmental policy*, in *THE ECONOMIC ANALYSIS OF ENVIRONMENTAL POLICY AND LAW* 19, 21–26 (Edward Elgar Publishing) (2003) [hereinafter “Faure, *Principles of environmental policy*”].

¹³⁶ *See, e.g.*, *Pollution Prevention Act*, 42 U.S.C. 13101; *see also* Cass R. Sunstein, *Reducing Risks Rationally*, *RISK AND REASON: SAFETY LAW, AND THE ENVIRONMENT* 99 (Cambridge University Press) (2002). Consider “the phaseout of lead in gasolines, the use of solar power, and the substitution of electric cars for cars powered by gasoline.” *Id.* at 100–01.

dangers, it is extraordinarily difficult to pick one as the objectively better choice. Similarly, contemporary environmental risks engender complexity of scale, context, and uncertainty that make application of the precautionary principle difficult to employ.¹³⁷ The application of the precautionary principle could have a sizeable impact on the scope and recommendations of the study currently being produced by the EPA.

(b) Politics and Public Involvement in EPA Scientific Practices

The EPA is seeking to involve all interested stakeholders in the articulation of the scope and methodology of its study on hydraulic fracturing's effects on groundwater.¹³⁸ This is consistent with both the current EPA's practices in community involvement and accountability. "[I]n the context of complex environmental and health risks, it is much more useful to think of science and policy as dynamically informing each other"¹³⁹ Science is the basis on which to ground policy determinations, and public policy should prioritize which environmental issues to research first.¹⁴⁰ Whether the EPA will regulate the use of hydraulic fracturing will undoubtedly be influenced by the results of the study of the practice's effects on groundwater, but the study would lose integrity if it were structured around that knowledge so as to affect a particular outcome.

Ideally, if policy-setting behind environmental regulation was merely an empirical choice, it would be easy, (through the weight of scientific evidence and the significance of intelligent recommendations), to articulate a new program and implement the

¹³⁷ Tickner, *The Role of Environmental Science in Precautionary Decision Making*, in PRECAUTION, ENVIRONMENTAL SCIENCE, AND PREVENTATIVE PUBLIC POLICY *supra* note 133, at 3, 4.

¹³⁸ *EPA Seeks Gas-Drilling Facts*, WALL STREET JOURNAL, Sept. 10, 2010, at B2. The EPA requested and received disclosure of chemicals used in hydraulic fracturing by the nine biggest natural gas companies and contractors. *Id.* The EPA also scheduled several public meetings for stakeholder participation. *Id.*

¹³⁹ Tickner, *Introduction*, *supra* note 133, at xiii.

¹⁴⁰ *Id.*

procedures as they logically need to change.¹⁴¹ “However, the policy process is more complex than superficial change can accommodate. In addition to context programs and administrative activity, the formulation and implementation process relies on something deeper and more fundamental: a core moral or normative belief.”¹⁴² Policy sets preferences in funding, priority, and objectives: the message communicated by the preferences is a moral statement.¹⁴³ That belief must be consistent across the law’s reformulations, despite regular revisions and opportunity for competing moral standards to devise alternate methods of operation.¹⁴⁴

Hydraulic fracturing produces virulent and intractable responses in its advocates and opponents alike. Such responses in the public make it difficult to establish a uniform policy. For instance, at a public stakeholders’ meeting the EPA held in Pennsylvania, the EPA requested input regarding the design of the study proposed to be concluded in 2012, according to Regional Administrator Judith Enck, “not about the merits of hydraulic fracturing.”¹⁴⁵ And nonetheless, “[n]early all [the impassioned speakers present] urged the EPA to base its study on science, rather than emotion or political pressure—as long as it was the science that supported their position.”¹⁴⁶

The public has a limited scientific and historical context from which it can promote rational views on the preferred balance of economic and public health

¹⁴¹ JOHN MARTIN GILLROY & JOE BOWERSOX, *THE MORAL AUSTERITY OF ENVIRONMENTAL DECISION MAKING: SUSTAINABILITY, DEMOCRACY, AND NORMATIVE ARGUMENT IN POLICY AND LAW* 5 (Duke University Press 2002).

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.* (paraphrasing Giandomenico Majone, *EVIDENCE, ARGUMENT AND PERSUASION IN THE POLICY PROCESS* 146–49 (Yale University Press 1989)).

¹⁴⁵ Maykuth, *Strong positions*, *supra* note 40.

¹⁴⁶ *Id.*

interests.¹⁴⁷ “. . . [I]n recent years, environmental groups and community activists, pointing to inconclusive but sometimes compelling anecdotes of possible water contamination, have complained that the drilling practice is far too loosely regulated. Those complaints increased after the BP oil spill in the Gulf of Mexico.”¹⁴⁸ Notably, the causes of the BP oil spill are but tenuously connected¹⁴⁹ to possible future EPA regulation of hydraulic fracturing.¹⁵⁰ This combination of inflammatory discourse and lack of specialized public knowledge leads to over-promotion of regulation without meaningful, critical analysis of the outcomes likely to result from such regulation.

(c) Previous EPA Study on Hydraulic Fracturing Impacts on Drinking Water

The EPA has previously produced a study on hydraulic fracturing that has come under attack for being too influenced by the private sector’s interests.¹⁵¹ In 2004, the EPA produced “a report evaluating the impacts of hydraulic fracturing on USDWs.”¹⁵² During the first phase of the study, the EPA identified three specific means through which contaminants could migrate from the location where hydraulic fracturing was being used to USDWs: either direct injection into the USDW, creation of a hydrological

¹⁴⁷ Zeller, *EPA to Study Chemicals*, *supra* note 44.

¹⁴⁸ *Id.*

¹⁴⁹ Christian Garcia, *Halliburton Comments on National Commission Cement Testing*, BUSINESS WIRE, Oct. 29, 2010, available at <http://www.marketwatch.com/story/halliburton-comments-on-national-commission-cement-testing-2010-10-28> (“Well logs and rig personnel confirm that the well was not flowing after the cement job. BP and/or others, following the misinterpreted negative results conducted after the cement job proceeded to displace mud in the production casing and riser with lighter sea water, allowing the well to flow. Given these numerous intervening causes, Halliburton does not believe that the foam cement design used on the Macondo well was the cause of the incident.”).

¹⁵⁰ Ian Urbina, *BP Spill Report Hints at Legal Defense*, N.Y. TIMES, Sept. 8, 2010, available at <http://www.nytimes.com/2010/09/09/us/09spill.html>.

¹⁵¹ See Wiseman, *Untested Waters*, *supra* note 55 at 167. Section V details the accusation levied against the EPA’s lack of objectivity in producing the study, in particular the decision to stop the study before instituting a more comprehensive examination of hydraulic fracturing. *Id.* The EPA is not only subject to the overbearing interests of the private sector; it also faces considerable pressure from the political party in power during the course of any particular decision. *Id.*

¹⁵² EPA, EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS (2004).

connection between the coalbed and a USDW, or injection into a fracture already in “hydraulic communication with a USDW.”¹⁵³ The EPA also studied reports of drinking water well contamination, finding no confirmatory evidence linking the hydraulic fracturing process to the contamination.¹⁵⁴ The first phase of the study looked at existing literature, interviewed industry and government officials, and solicited comments from concerned citizen and environmental groups.¹⁵⁵

Based on these preliminary assessments in light of the tightly focused question, the EPA concluded that there was “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.”¹⁵⁶ Additionally, the EPA concluded that chemicals, even if injected directly through USDWs, are unlikely to have more than minimal effect: “groundwater production, combined with the mitigating effects of dilution and dispersion, adsorption, and potentially biodegradation, minimize the possibility that chemicals included in the fracturing fluids would adversely affect USDWs.”¹⁵⁷ Finally, citing the expansive horizontal and vertical distances between most USDWs and methane coal beds, the EPA determined that the material barrier between the two would prevent breach and contamination.¹⁵⁸

In light of the results of the first phase, the EPA declined to produce a time-consuming, expensive study of hydraulic fracturing beyond the scope of the initial

¹⁵³ *Id.* at ES-1.

¹⁵⁴ *Id.*

¹⁵⁵ *Id.* at ES-8. The EPA looked at water quality incident reports that may have been associated with CBM hydraulic fracturing. They examined over 200 peer-reviewed publications, spoke with about 50 employees of industry leaders and officials at state/local government agencies, and contacted more than 500 local or county agencies in potentially affected areas, receiving no complaints from these officials. *Id.* at 7-1. The Agency also contacted and took comments from about 40 concerned citizens and environmental groups. *Id.*

¹⁵⁶ *Id.* at 7-2.

¹⁵⁷ EPA, EVALUATION OF IMPACTS, *supra* note 151, at 7-3.

¹⁵⁸ *Id.*

question asked, which it had already answered.¹⁵⁹ Based on the study's conclusions, Congress passed the Energy Policy Act of 2005¹⁶⁰ to amend the SDWA,¹⁶¹ removing hydraulic fracturing from its jurisdiction and ending any ambiguity previously perceived in the statute.¹⁶² The FRAC Act currently pending in Congress seeks to change this exception and require the EPA to regulate hydraulic fracturing.¹⁶³ To properly balance the interests of the oil and gas industry against those of local businesses, citizens, and state and local governments, the federal government should approach this new avenue for regulation with eagerness to cooperate with existing state statutory schema and a respect for the competing and complementary interests of all parties.

VI: Cooperative Federalism

Cooperative federalism attempts to balance power between federal and state or local government without sacrificing consistency in favor of localized solutions.¹⁶⁴ Within this collaborative dynamic, the federal government remains the dominant authority.¹⁶⁵ For environmental policy, a marked preference for cooperative federalism permeates the statutes enacted over the past thirty years.¹⁶⁶

¹⁵⁹ *Id.* at 7-5.

¹⁶⁰ Energy Policy Act of 2005, H.R. 6, 109th Cong. (Jan. 4, 2005).

¹⁶¹ 42 U.S.C. § 300h (d) (2010).

¹⁶² Federal Energy Bar Association, *Committee Report: Legislative Committee*, 27 ENERGY L. J. 349, 353 (2006).

¹⁶³ See Lustgarten, *Frac Act*, *supra* note 46.

¹⁶⁴ Robert L. Fischman, *Cooperative Federalism and Natural Resources Law*, N.Y.U. ENVTL. L. J. 179, 184 (2005). “[C]ooperative federalism . . . requires a greater degree of coordination between the two levels of government. Since the New Deal, cooperative federalism typically appears as congressional or administrative efforts to induce (but not coerce or commandeer) states to participate in a coordinated federal program.” *Id.*

¹⁶⁵ *Id.* at 183. “The adjectival root, ‘federal,’ aptly implies the strong national government created in the U.S. Constitution to repair the relatively weak central government created by the Articles of Confederation. Therefore, most scholarly approaches to federalism emphasize the national government as the dominant partner.” *Id.*

¹⁶⁶ See Robert L. Glicksman, *From Cooperative to Inoperative Federalism: the Perverse Mutation of Environmental Law and Policy*, 41 WAKE FOREST L. REV. 719, 737-47 (2005). Section II (B)(2)(b) provides a comprehensive description of federal statutes employing the use of cooperative federalism ideals in structure and implementation.

The allocation of decision-making authority between levels of government, industry, and consumers is a fundamental source of tension in America.¹⁶⁷ Individual involvement and interest in decision-making drops precipitously when the benefits connected to the decision are diffused across a large population.¹⁶⁸ This response occurs because the perceived benefit of promoting a self-beneficial outcome is outweighed by the perceived cost of influencing that outcome.¹⁶⁹ “Centralized regimes relying upon mandatory prescriptions that constrain discretion on the part of individuals are often accompanied by processes of psychological detachment, social disengagement, and loss of initiative on the part of those who seek to minimize their individual costs of entrapment.”¹⁷⁰ Consequently, in a centralized control regime, the power to direct regulation remains in the hands of a few – either federal officials tasked with decision or those private individuals or corporations with sufficient economic incentive to play. Yet centralized control over environmental issues through federal regulation has been touted

¹⁶⁷ See Bruce Ledewitz, *The Present and Future of Federalism*, 43 DUQ. L. REV. 645 (2005). Section I describes the relationship between federalism and the Constitution and the rest of the article examines the importance of political checks provided through federalism concepts. *Id.*

¹⁶⁸ Some federalism incarnations draw heavily from the economic model of competition among the states and local government propounded by Tiebout in 1956. Tiebout theorized that the mobility of states’ citizenry, when combined with diverse governmental models, would result in the efficient allocation of resources to the public. Charles Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416, 418 (1956). This method of governance reduces the problem of pluralism where fiscal and decisional irresponsibility of representatives abounds because of the “concentration of benefits in a few hands while the concomitant costs are diffused among the population as a whole.” LANDY, *Local Government and Environmental Policy*, *supra* note 124, at 227, 231. Where a population is large enough that each individual is only required to contribute inconsequential amounts to achieve a single result, citizen involvement in decision-making drops precipitously. *Id.* at 227, 232.

¹⁶⁹ People with “skills and resources . . . better suited to the national scene have come to exert enormous leverage in Washington.” LANDY, *Local Government and Environmental Policy*, *supra* note 124, at 227, 231.

¹⁷⁰ VINCENT OSTROM, Garcia, *the Eclipse of Federalism, and the Central-Government Trap*, in THE MEANING OF AMERICAN FEDERALISM: CONSTITUTING A SELF-GOVERNING SOCIETY 99, 124 (ICS Press) (1991).

as the apex of sufficiently protective regulation for non-localized issues in an efficient manner.¹⁷¹

Legislation to address potential environmental effects on groundwater from hydraulic fracturing represents significant investment of money for research, broad participation by stakeholders, and some compromise between two important national interests, energy and protection of natural resources.¹⁷² “. . . [S]ince some states may be unwilling to enact statutes, particularly costly legislation, only national legislation sufficiently addresses these issues.”¹⁷³ While states can, and have,¹⁷⁴ regulated hydraulic fracturing that occurs within the state’s boundaries, suspicion adheres that such regulation does not adequately protect migratory resources: “. . . proponents of a purely federal approach reason that environmental concerns involve issues, such as air and water, not confined to any one state.”¹⁷⁵ Thus, one state’s efforts to attract industry through looser regulation could have effects on another state’s water or air supply, through downstream effects.¹⁷⁶

Despite these concerns, state and local authorities take on great responsibility for implementing broad policy goals, particularly in the realm of environmental protection. Environmental statutes are largely administered through some form of cooperative

¹⁷¹ Krista Yee, *A Period of Consequences: Global Warming Legislation, Cooperative Federalism, and the Fight Between the EPA and the State of California*, 32 ENVIRONS ENVTL. L. & POL’Y J. 183, 186 (2008). “Since environmental problems have far reaching effects on national – in fact, global – concerns, some argue only national legislation can adequately address these issue.” *Id.*

¹⁷² See Part I (b), *supra*.

¹⁷³ Yee, *A Period of Consequences*, *supra* note 170, at 183, 186. “Since environmental problems have far reaching effects on national – in fact, global – concerns, some argue only national legislation can adequately address these issue.” *Id.* at 183.

¹⁷⁴ See Part II, *supra*.

¹⁷⁵ Yee, *A Period of Consequences*, *supra* note 170, at 183, 186.

¹⁷⁶ Ledewitz, *The Present and Future of Federalism*, *supra* note 166, at 649-50 (“Scientifically speaking, there is no such thing, for example, as intrastate water. All water has moved across state borders in the past and, of course, will do so again in the future.”).

federalism requiring both federal and state participation.¹⁷⁷ This method of governance conforms to the ultimate goal of federalism:

All federal systems have reference to multiple units of government, each of which has an autonomous existence. . . . Using power to check power amid opposite and rival interests (to combine phrases from Montesquieu and Madison) implies that such a system of government will have equilibrating tendencies. . . . Government in a democratic society, then, is not simply a matter of command and control but of providing multiple structures that have reference to diverse methods of problem solving.¹⁷⁸

There are other benefits inherent in the concept of states as experimental laboratories—allowing states the discretion to deviate from a federally-established norm encourages innovation and such exploration of alternatives can expose policymaking errors.¹⁷⁹ Additionally, cooperative federalism prevents some of the inefficiencies and policy failures that plague the command-and-control, centralized regulatory schema. These include inefficiencies associated with having a wide range of programs that cover interwoven aspects of a single problem; the difficulty in implementing “regulatory programs involv[ing] complex tradeoffs among competing social goals;” and the over-involvement of any single interest group in setting policy throughout the regulatory process.¹⁸⁰

¹⁷⁷ See Glicksman, *From Cooperative to Inoperative Federalism*, *supra* note 165, at 737-47. Section II (B)(2)(b) provides a comprehensive description of federal statutes employing the use of cooperative federalism ideals in structure and implementation.

¹⁷⁸ OSTROM, *THE MEANING OF AMERICAN FEDERALISM*, *supra* note 169, at 7, 16, 17.

¹⁷⁹ Henry Butler & Jonathan Macey, *Externalities and the Matching Principle: The Case for Reallocating Federal Authority*, 14 *YALE L. & POL’Y REV.* 23, 25 (1996). “. . . [D]ecentralization allows other people to visit on legislators and regulators the content of their preferences and the rigors of the marketplace.” *Id.* at 35 (quoting Peter H. Aranson, *Pollution Control: the Case for Competition*, in *INSTEAD OF REGULATION: ALTERNATIVES TO FEDERAL REGULATORY AGENCIES* 383-84 (Robert W. Poole, Jr., ed., 1982)). See also Adam B. Cox, *Symposium on New Directions in Federalism: Expressivism in Federalism: A New Defense of the Anti-Commandeering Rule?*, 33 *LOY. L.A. L. REV.* 1309 (2000). Some of the commonly proffered values of federalism include “the promotion of diversity, prevention of tyranny, and the enhancement of democracy,” as well as “the improvement of economic efficiency through competition among the states, the acceleration of progress through experimentation by the states, and perhaps the protection of certain values of community.” *Id.* at 1321.

¹⁸⁰ Cass Sunstein, *Administrative Substance*, 41 *DUKE L. J.* 607, 627 (1991).

Dr. Michael Greve has long criticized cooperative federalism for producing insurmountable information costs, concealing accountability of elected representatives, and voiding individual choice and state competition.¹⁸¹ From the perspective of the individual, these concerns represent substantial impediments to participation in policy-setting. “Citizenship is a mix of opportunity and obligation. . . . [A] voice in collective decisions [requires] . . . a share in the sacrifices those decisions impose. Centralizing policy and politics not only minimizes one’s voice in public affairs, it reduces one’s responsibilities.”¹⁸² When cooperative federalism fails to protect true diversity of regulatory options, it devolves into a multi-tiered game of bureaucratic blame-shifting, where each level of government failed to provide the necessary checks and balances against the others. As particularly illustrated in the story of the Deepwater Horizon blowout,¹⁸³ efforts by one level of government alone are often insufficient to meet the complex needs of diverse populations seeking legal solutions to multi-issue problems.

Oil and seafood are mainstays of Louisiana’s economy.¹⁸⁴ The explosion and subsequent spill of an estimated 4.4 millions of gallons of oil¹⁸⁵ have led to several consequences, such as damage to the Louisiana wetlands,¹⁸⁶ injury to the fishing

¹⁸¹ MICHAEL S. GREVE, *REAL FEDERALISM: WHY IT MATTERS, HOW IT COULD HAPPEN* 57 (AEI Press, 1999).

¹⁸² LANDY, *Local Government and Environmental Policy*, *supra* note 124, at 227, 231.

¹⁸³ *Oil Spill Gulf of Mexico 2010*, TIMES-PICAYUNE, <http://www.nola.com/news/gulf-oil-spill/> (last visited Jan. 18, 2011). On April 20, off-shore oil rig Deepwater Horizon had two days of work left to complete before it was to put a temporary cap on the oil well it had drilled and then turn over the well to a production platform for pumping to produce the well thousands of feet below the surface of the ocean. But as the rig disconnected, a blowout occurred and the rig exploded, catching fire and eventually sinking to the bottom of the ocean. *How the Gulf of Mexico Oil Spill Happened: a Graphic Presentation*, (May 7, 2010), TIMES-PICAYUNE, http://media.nola.com/news_impact/other/oil-cause-050710.pdf.

¹⁸⁴ Chris Kirkham, *Oil and fish worlds are entwined in the same net*, TIMES-PICAYUNE, May 9, 2010, at A1.

¹⁸⁵ David Hammer, *History of Louisiana and Offshore Oil*, TIMES-PICAYUNE, Jul. 18, 2010, at A1.

¹⁸⁶ Mark Schleifstein, *Splitting the bill is tricky, BP’s expenses will continue for years*, TIMES-PICAYUNE, May 23, 2010, at A12; David Batker et al., *Gaining Ground: Wetlands, Hurricanes, and the Economy: The Value of Restoring the Mississippi River Delta*, 40 E.L.R. 11106, 11107 (2010).

industry,¹⁸⁷ and a temporary moratorium placed on offshore drilling in the Gulf.¹⁸⁸ Various commentators have traced the causes of the explosion to industry-wide bad practice,¹⁸⁹ specific operators' poor decision-making,¹⁹⁰ and the failure of government regulation.¹⁹¹ In particular, the government agencies that bore the responsibility for regulating the industry were found to have either engaged in unethical collusion with industry insiders or only laxly enforced the regulations that would have prevented the spill.¹⁹²

Federalism is predicated on competition between government actors to ensure the best provision of public services.¹⁹³ Some measure of modified cooperative federalism may cure the ills engendered by sharing responsibility.¹⁹⁴ Modifications do not need to be enunciated in the federal statute itself. Instead, letting the states develop multiple

¹⁸⁷ Bruce Alpert, *The feds declare fisheries disaster in La., Miss., Ala.*, TIMES-PICAYUNE, May 25, 2010, at A4.

¹⁸⁸ See Hammer, *History of Louisiana and Offshore Oil*, *supra* note 184.

¹⁸⁹ Dana Milbank, *Tusk-tusk, oil execs*, WASHINGTON POST, June 16, 2010, at A2.

¹⁹⁰ David Hammer, *Five key human errors, colossal mechanical failure led to fatal Gulf oil rig blowout*, TIMES-PICAYUNE, (Sept. 5, 2010, 6:00 AM), http://www.nola.com/news/gulf-oil-spill/index.ssf/2010/09/5_key_human_errors_colossal_me.html.

¹⁹¹ Steven Mufson, *Since '64, a steady stream of oil spills has tainted gulf*, WASHINGTON POST, Jul. 24, 2010, at A1. Federal records clearly point to a consistently poor industry and regulator record with 517,847 barrels having been dumped in the Gulf. *Id.* See also Jen DeGregorio, *Oil projects often sail past state regulators; Wetlands permits seldom denied*, TIMES-PICAYUNE, May 30, 2010, at A1. Many federal agencies, such as Mineral Management Services and the Department of Natural Resources, face dual obligations as both collectors of rents and regulators of the industries they manage. *Id.*

¹⁹² WILLIAM R. FREUDENBURG & ROBERT GRAMLING, *BLOWOUT IN THE GULF: THE BP OIL SPILL DISASTER AND THE FUTURE OF ENERGY IN AMERICA* 51-61 (MIT Press) (2011). The history of the relationship between the oil industry and the federal regulators includes such sordid episodes as sex and drugs passing between the two as well as a long, consistent history of favoring production of economic benefits over regulation of environmental impacts. *Id.* The oil industry outpaced the agency in growth until: "The number of accidents, spills and deaths regularly occurring in the region has far surpassed the agency's ability to investigate them." Marc Kaufman et al., *MMS investigations of oil-rig accidents have history of inconsistency*, WASHINGTON POST, (Jul. 18, 2010), available at <http://www.washingtonpost.com/wp-dyn/content/article/2010/07/17/AR2010071702807.html>.

¹⁹³ See generally GREVE, *REAL FEDERALISM: WHY IT MATTERS, HOW IT COULD HAPPEN*, *supra* note 180.

¹⁹⁴ Michael S. Greve, *Against Cooperative Federalism*, 70 MISS. L. J. 557, 598 (2000) ("Any form of cooperative federalism will reduce the range of policy variation among the states and deprive citizens of the benefits of diversity and choice; produce taxation that is hidden and therefore in excess of the voters' actual preferences; reduce political transparency; obscure political responsibility; and facilitate political blame-shifting.").

variations will be even more beneficial. Federal statutes can permit some states to enact more stringent regulations, others to provide tax exemptions to conforming businesses, and give others funds to invest in supporting infrastructure that can ameliorate greater burdens on individuals or business who must comply with the environmentally protective regulation.¹⁹⁵ This solution calls for a flexible, national minimum standard that leaves room for state variation.¹⁹⁶

VII. Analysis

State and local officials are necessarily more familiar with the terrain, processes, and current practices of the industry due to their history of regulating hydraulic fracturing and the state regulators' closer relationships with the geographical areas. Accordingly, state or local officials are better suited to effectively attend to regulatory activities governing hydraulic fracturing. Moreover, permitting states to produce regulatory frameworks that further local goals will promote adaptive and particularized regulation, as opposed to a federal one-size-fits-all solution.¹⁹⁷ The federal decision to devolve primary control over the federal programs (such as the UIC program) to the states has had

¹⁹⁵ See, e.g., Patricia Salkin, *Cooperative Federalism and Climate Change: New Meaning to "Think Globally—Act Locally,"* 40 ENVTL. L. REP. NEWS & ANALYSIS 10562 (2010). The author provides examples for recommendations to federal and state governments "to ensure that local governments have the tools, resources, authority, and support needed" to address the root causes of greenhouse gases and implement national policies for dealing with them. *Id.* at 10570-10571.

¹⁹⁶ Philip J. Weiser, *Federal Common Law, Cooperative Federalism, and the Enforcement of the Telecom Act*, 76 N.Y.U. L. REV. 1692, 1692–93 (2001). Weiser argues that lack of unified vision for the singular roles of federal regulatory agencies, state government, and federal judges has resulted in a failure to properly implement the cooperative federalism ideals set out in recent federal statutes. *Id.*

Cooperative federalism regulatory programs, which combine federal and state authority in creative ways, strike many courts and commentators as a messy and chaotic means of generating federal law. Compounding the hostility to such regimes, some argue that globalization and technological change leave little or no role for states in implementing complex regulatory regimes and thus endorse a 'preemptive federalism' that relies primarily or exclusively on federal courts or administrative agencies to develop unitary and pinpointed federal policies.

Id. at 1693.

¹⁹⁷ USDOE, MODERN SHALE GAS DEVELOPMENT, *supra* note 14, at 2566.

its critics, despite these benefits.¹⁹⁸ The critics point out that, in practice, devolution can sometimes result in an “economic inefficiency of reinventing scientific and technical knowledge at the state level [that] more than counterbalances the supposed advantages of moving the standard-setting aspects of such decision-making closer to the people.”¹⁹⁹ The criticism is accurate—needless repetition of complex science is an expensive method of encouraging participation of all interested citizens.

To stay abreast of the dynamic expansion of the energy industry, both complex science and nuanced approaches to regulation are needed. Energy-producing companies are driven by profit and innovation, and they change technological marvels more quickly than regulators can produce scientific evidence of harm. Regulatory schemes should represent both accurate science and citizens’ preferences for environmental protection and development of industry. In formulating these regulations, the precautionary principle can provide guidance with the complex decision-making process if broader, normative decisions are made by elected representatives.²⁰⁰

While the precautionary principle can remind us of our moral duty to prevent harm in general, it cannot prescribe what kind of sacrifice we should be prepared to make in each and every case. Thus the precautionary principle has the semantic status of a general norm rather than of a step-by-step rule of operation.²⁰¹ When regulatory decisions require policy-setting, a focused use of the precautionary principle will produce regulations that protect industry as well as the environment.

¹⁹⁸ Rena I. Steinzor, *Devolution and the Public Health*, 24 HARV. ENVTL. L. REV. 351, 374 (2000), *contra* Shelia R. Foster, *Meeting the Environmental Justice Challenge: Evolving Norms in Environmental Decisionmaking*, 30 ENVTL. L. REP. 10,992, 11,005 (2000); Sheila R. Foster, *Environmental Justice in an Era of Devolved Collaboration*, 26 HARV. ENVTL. L. REV. 459 (2002) (addressing the means necessary to decentralize environmental decision-making without overpowering the voices of vulnerable communities).

¹⁹⁹ Steinzor, *Devolution and the Public Health*, *supra* note 197, at 374.

²⁰⁰ The precautionary principle encourages avoidance of potentially risky activities where all risks have yet to be identified. This is difficult to follow where one population bears the risks that bring profit to a proponent of the activity. *See* Faure, *Principles of environmental policy*, *supra* note 134, at 19–26.

²⁰¹ *Id.* at 22.

Normative values are behind decisions that evaluate the extent to which the environment should be protected in a way that prejudices industry. This is a function best suited to the legislative branch rather than shoehorned into the restricted authority delegated to an administrative agency.²⁰² The decisions about how to shape the landscape of the energy industry should be made by consumers with direct knowledge of the associated hardships or by their elected representatives, but not by appointed agency administrators, who cannot be held directly accountable for the wide-reaching consequences of their decisions.

The federal government faces a recent, large-scale example of federal agencies' failures to properly regulate the oil industry. The balance of power between state and federal government must be calculated to protect the environment and interests of citizens and business, not to spread liability and avoid accountability. The natural gas industry does not need more paperwork to fill out that will be processed by overworked federal employees and then never passed on to state officials. Instead, the industry needs a clear set of authorities that force it to answer for any negligent practices or failed innovations.

The protection of groundwater must not be subordinated to the development of natural gas. But neither should the resources lying beneath the surface of the affected states be put into indefinite stasis. The best option should be more creative than a hastily-concocted moratorium that merely panders to an elected official's political base's fears. Instead, if the EPA needs more time to study the actual effects that the chemicals used in hydraulic fracturing have on groundwater, it should institute a staggered system of permitted activity that allows the industry to frack wells in low risk geographical areas, but does not allow hydrofracking in areas where the chemicals would present greater

²⁰² Matthias Kaiser, *Ethics, Science, and Precaution: A View from Norway*, in PRECAUTION, ENVIRONMENTAL SCIENCE, AND PREVENTATIVE PUBLIC POLICY, *supra* note 133, at 21, 22.

risks. This model of regulation would allow the EPA to produce a sufficiently comprehensive investigation of the inherent risks of hydraulic fracturing without too damaging an effect on the industry.

VIII. Conclusion

This note drew from the mechanical process of hydraulic fracturing and current state regulations to provide historical context for the EPA's forthcoming study. There are already federal statutes that regulate parts of the hydraulic fracturing process as well as gaps in the regulatory scheme, which the FRAC Act is intended to fill. Science and politics are dynamic forces shaping the format of the study. Recent federal failures in federal agency accountability and capability, as seen in the BP blowout, demonstrate the danger when a lack designated authority results in catastrophic breakdowns where federal and state powers overlap.

Under the SDWA, the EPA possesses the authority to set national policy goals for individual states to implement UIC programs.²⁰³ Practical application of cooperative federalism in this context would require the EPA to take over with a federal solution only when states had shown they were incapable of adequately maintaining a regulatory program. The balance of competing interests—the need for sources of energy and the need to protect our water resources—calls for a respectful solution so as to not smother an industry that provides necessary resources for our consumption,²⁰⁴ but an answer that also protects our most vital resource. A partnership can develop between state and federal governments where the federal government provides uniform science and a

²⁰³ See Part IV, *supra*.

²⁰⁴ IHS Global Insight study found that federal regulation would reduce gas production by 4.4 Tcf, or 22 percent, and reduce oil production by 400,000 b/d, or 8 percent, by 2014. *Measuring the Economic and Energy Proposals to Regulate Hydraulic Fracturing*, IHS Global Insight (2009), <http://www.ihsglobalinsight.com/SDA/SDADetail17095.htm>.

minimum standard to calm individual concerns but leaves room for more stringent or specific regulation to local government sources. This cooperation will provide the most comprehensive, protective, and accountable regulation of the natural gas industry, while preserving a balance between the interests.