

WHAT'S THE FRACKING PROBLEM?: HYDRAULIC FRACTURING, SILICA SAND, AND ISSUES OF REGULATION

ABSTRACT

Hydraulic fracturing, or fracking, is a topic of great controversy within the United States. While proponents of fracking point to the great economic benefits the industry provides, as well as its potential to free us from dependence on Middle Eastern energy, others worry that the process is fraught with significant environmental and health risks. This Note discusses the history of fracking in the United States, the economic benefits and environmental concerns, and how the use of silica sand in the fracking process has fueled a new debate in the Midwest. Additionally, it addresses how to best protect the public and the nation at large from the potential harmful effects of fracking while not abandoning the process altogether.

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I. INTRODUCTION

Hydraulic fracturing, or fracking, has recently become a topic of great debate and controversy within the United States, despite the fact that the

process has been used in oil and natural gas operations for several decades.¹ While fracking provides a great economic benefit to Americans and gives the country access to “ethical oil” within its own borders,² the current controversy exists because many believe the process is fraught with environmental and health risks.³ Finding a balance between these competing economic and environmental interests is imperative if America intends to continue large-scale fracking operations.

Though the fracking debate centers mostly within the states of Pennsylvania, New York, and North Dakota—states with large oil and natural gas reserves—it reaches other states as well.⁴ Large deposits of silica sand, which frackers use to break up rock layers during the fracking process, are located in Iowa, Minnesota, and Wisconsin.⁵ Extraction of this silica sand is providing jobs for residents of those states and great economic benefits for those who own the land on which the silica sand sits, just as those who live on the Marcellus Shale in Pennsylvania can reap great economic benefits by allowing fracking on their land.⁶ However, the economic benefits of silica sand mining also come with environmental and health risks.⁷

Parts II and III of this Note address what led to the fracking boom in the United States, how fracking can lead to great economic benefits for the country by providing jobs, and how it can contribute to energy independence by giving the country access to oil and natural gas within its borders. Part IV addresses the controversy surrounding the environmental effects and health

1. See *A Historic Perspective*, FRACFOCUS, <http://fracfocus.org/hydraulic-fracturing-how-it-works/history-hydraulic-fracturing> (last visited Mar. 10, 2015) (noting that fracking has been used in the United States since the late 1940s).

2. Jivaji Moré, *Come Shale Away: Navigating the “Business Friendliness” of Regulatory Environments in the Marcellus Shale and Albertan Oil Sands*, 33 NW. J. INT’L L. & BUS. 393, 396 (2013).

3. See, e.g., Doyle Rice, *Is Fracking Polluting the Air?*, USA TODAY (Dec. 17, 2014), <http://www.usatoday.com/story/news/nation/2014/12/16/fracking-air-pollution-health-hrhc/20451639/>.

4. See Matt Kelso, *Over 1.1 Million Active Oil and Gas Wells in the US*, FRACKTRACKER ALLIANCE (Mar. 4, 2014), <http://www.fracktracker.org/2014/03/1-million-wells/>.

5. Maria Gallucci, *US Oil & Gas Fracking Boom Could Drive Silica Sand Mining Operations In 12 More States, Environmental Groups Say*, INT’L BUS. TIMES (Sept. 25, 2014), <http://www.ibtimes.com/us-oil-gas-fracking-boom-could-drive-silica-sand-mining-operations-12-more-states-1695246>.

6. *Id.*

7. *Id.*

risks of the fracking process, especially its effects on groundwater and other pollution hazards. Part V brings to light the controversy surrounding silica sand mining in the Midwest. Finally, Part VI addresses the regulation of fracking on the federal, state, and local levels. There is a need for increased regulation, but the question of where that regulation should come from is a controversial one. This Note specifically addresses the current role of the Environmental Protection Agency (EPA) in regulating fracking, as well as the regulatory roles of state and local governments, and discusses how best to protect against the potential harmful effects of hydraulic fracturing while not abandoning the process altogether.

II. HYDRAULIC FRACTURING: AN OVERVIEW

A. *The History and Process of Fracking*

Hydraulic fracturing has been used in the United States for more than 60 years.⁸ During the 1940s, it was utilized as a method of extracting greater production from already existing wells; today, it is most commonly used in the completion of gas wells, especially those involving tight shale reservoirs or other unconventional production sites.⁹ The process has been used on more than 1 million gas and oil wells, and today it is used on as many as 35,000 wells each year.¹⁰ Without fracking, as much as 80 percent of oil and gas production from shale formations would be impossible.¹¹

Contrary to the public's perception of hydraulic fracturing as a form of drilling,¹² the process does not involve drilling at all.¹³ Fracking is the process of using hydraulic pressure to pump thousands of gallons of water, along with sand and chemical additives, into an already existing oil or gas well to create cracks in the rock and increase the flow of gas.¹⁴ The fracking process

8. See *A Historic Perspective*, *supra* note 1.

9. *Id.*

10. *Id.*

11. *Id.*

12. See, e.g., Briana Mordick, *New Drilling Rules Reflect Old Problems (Op-Ed)*, LIVESCIENCE (Aug. 29, 2013), <http://www.livescience.com/39318-new-drilling-rules-reflect-old-problems.html>.

13. See *Hydraulic Fracturing: The Process*, FRACFOCUS, <http://www.fracfocus.org/hydraulic-fracturing-how-it-works/hydraulic-fracturing-process> (last visited Mar. 10, 2015) ("Contrary to many media reports, hydraulic fracturing is not a 'drilling process.'").

14. See *id.* ("Put simply, hydraulic fracturing is the use of fluid and material to create or restore small fractures in a formation in order to stimulate production from

begins *after* a well has been drilled down to the reservoir rock. As a preliminary step, steel pipe casings are inserted into the existing well, and cement is poured around the outside of the steel pipe.¹⁵ This protects the structure of the well and “ensure[s] that neither the fluid that will eventually be pumped through the well, nor the oil or gas that will eventually be collected, enters the water supply.”¹⁶ A particular combination of water, sand, and additive chemicals is then “pumped deep into the well at pressures sufficient to create or restore the small fractures in the reservoir rock.”¹⁷

The particular blend of water, sand, and chemical additives is especially important for the fracking process. The sand acts as a “proppant” that props the cracks in the shale open, allowing the gas and oil to flow through them.¹⁸ Water and sand constitute 98 to 99.5 percent of the fracking fluid, while the remainder is made up of chemical additives.¹⁹ The wide range of chemical additives used serve a variety of purposes but are generally used to ensure the fracking sand stays in place and to prevent bacteria from degrading the gas and oil.²⁰ Each chemical additive “serves a specific, engineered purpose,” such as reducing friction, preventing microorganism growth, removing mud damage, and preventing corrosion of metal pipes.²¹

Fracking plays an important role in current oil and gas production in the United States. It is the most common technique for mining natural gas in underground shale formations and is used in approximately “nine out of 10 natural gas wells in the United States.”²² If the fracking process is abandoned, many wells will no longer be operable.

new and existing oil and gas wells.”).

15. *Id.*

16. *Id.*

17. *Id.* (“This creates paths that increase the rate at which fluids can be produced from the reservoir formations, in some cases by many hundreds of percent.”).

18. See Hobart King, *What Is Frac Sand?*, GEOLOGY.COM, <http://geology.com/articles/frac-sand/> (last visited Mar. 26, 2015) (“When the pumps are turned off, the fractures deflate but do not close completely—because they are propped open by billions of grains of frac sand. This only occurs if enough sand grains to resist the force of the closing fractures have been delivered into the rock.”).

19. *Hydraulic Fracturing: The Process*, *supra* note 13.

20. *Chemical Use in Hydraulic Fracturing*, FRACFOCUS, <http://fracfocus.org/water-protection/drilling-usage> (last visited Feb. 28, 2015).

21. *Id.*

22. *What is Hydraulic Fracturing?*, PROPUBLICA, <http://www.propublica.org/special/hydraulic-fracturing-national> (last visited Mar. 10, 2015).

Experts believe 60 to 80 percent of all wells drilled in the United States in the next ten years will require hydraulic fracturing to remain operating. Fracturing allows for extended production in older oil and natural gas fields. It also allows for the recovery of oil and natural gas from formations that geologists once believed were impossible to produce, such as tight shale formations . . . Hydraulic fracturing is also used to extend the life of older wells in mature oil and gas fields.²³

The fracking process is indispensable if America intends to continue its high-volume oil and natural gas mining.

B. *Why Do We Frack?*

The United States has long been dependent on the Middle East for its energy supply.²⁴ The country is now seeking alternative sources of energy in order to gain a level of energy independence.²⁵ The natural gas mining that currently exists in 31 states is a direct result of America's pursuit of energy independence.²⁶ Fracking proponents, commentators, and even President Barack Obama have begun calling Pennsylvania the "Saudi Arabia of natural gas," because the state's shale resources have the potential to give America energy independence.²⁷

23. *Hydraulic Fracturing: The Process*, *supra* note 13.

24. See generally Loren Thompson, *What Happens When America No Longer Needs Middle East Oil?*, FORBES (Dec. 3, 2012), <http://www.forbes.com/sites/lorenthompson/2012/12/03/what-happens-when-america-no-longer-needs-middle-east-oil/>.

25. See Daniel Yergin, *Congratulations, America. You're (Almost) Energy Independent. Now What?*, POLITICO MAGAZINE (Nov. 2013), <http://www.politico.com/magazine/story/2013/11/congratulations-america-youre-almost-energy-independent-now-what-98985.html> ("It's not likely that the United States will actually become energy independent in the foreseeable future, but it will certainly become energy a-lot-less-dependent.").

26. See Kelso, *supra* note 4.

27. Javier E. David, *Marcellus Turns Pennsylvania into 'Saudi Arabia' of Natgas*, CNBC (May 8, 2013), <http://www.cnbc.com/id/100720973> ("Pennsylvania—currently famous for Philadelphia cheese steaks, Hershey's chocolate and ketchup—is in the midst of a transformation that may yet put the state on the map for another American staple: natural gas."); President Barack Obama, Remarks by the President on American-Made Energy (Jan. 26, 2012), *available at* <http://www.whitehouse.gov/the-press-office/2012/01/26/remarks-president-american-made-energy> ("Some of you may not have been following this, but because of new technologies, because we can now access natural gas that we couldn't access before in an economic way, we've got a supply of natural gas under our feet that can last America nearly a hundred years. . . . We, it turns out, are the Saudi Arabia of natural gas.").

Such energy independence will allow America to rethink its approach to the Middle East:

The United States has always purchased its oil from countries with which we have, at best, a complicated relationship.

....

Such relationships could change. The United States will soon be the world's largest oil producer, thanks to innovative new extraction technologies that have revitalized previously dormant wells and also led to a shale gas and oil boom that has galvanized into action a series of once sleepy communities across the upper Great Plains, Texas and beyond. Given such resources, we no longer have to fund our enemies.²⁸

America's increasing energy independence has already produced great economic benefits. The energy boom sustained an estimated 2.1 million jobs in 2012, and that number is expected to rise to 3.3 million by 2020.²⁹ It also contributed \$74 billion to federal and state revenues in 2012, as well as "an increase of \$1,200 in average household disposable income" due to lower energy costs.³⁰ Further, by substantially reducing the need for imported oil, the increase in domestic oil and natural gas production has reduced America's annual trade deficit by about \$85 billion.³¹ With such remarkable political and economic benefits stemming from fracking, it is not surprising that the process has become so widely used.

C. *The Scale of Fracking in the United States*

Fracking has become a huge part of the natural gas industry in the United States. Currently, "[t]hirty-three states are home to major shale plays."³² The most well-known states for natural gas extraction are Pennsylvania, New York, West Virginia, and Ohio, which sit on top of the

28. Ross Gerber, *Beating Our Enemies by Energy Independence*, FORBES (Aug. 27, 2014), <http://www.forbes.com/sites/greatspeculations/2014/08/27/beating-our-enemies-by-energy-independence/>.

29. See Yergin, *supra* note 25.

30. *Id.* Similarly, lower energy costs are "making the United States a much more competitive place for industry." *Id.*

31. See *id.*

32. Rebecca W. Watson & Nora R. Pincus, *Hydraulic Fracturing and Water Supply Protection—Federal Regulatory Developments*, 49 ROCKY MTN. MIN. L. FOUND. J. 235, 235 (2012).

Marcellus Shale.³³ Of these states, Pennsylvania has been home to the most fracking thus far.³⁴

The Marcellus Shale is an underground formation of shale located about “4,000 feet to 10,000 feet beneath the Earth’s surface.”³⁵ It is estimated to contain “up to 489 trillion cubic feet of natural gas.”³⁶ Some reports have estimated that 140 trillion cubic feet of natural gas is recoverable using fracking, while others suggest that there might be as much as 330 trillion cubic feet of recoverable natural gas.³⁷

Fracking has also given the United States access to domestic oil within shale rock, most notably in the Bakken Shale in North Dakota. The Bakken Shale is a 25,000-square mile rock formation known to have embedded oil.³⁸ It is estimated to have at least 11 billion barrels of recoverable oil but may have as much as 30 billion barrels.³⁹ In 2010, 113 million barrels of crude oil were produced in North Dakota.⁴⁰ The United States is expected to produce 11.1 million barrels of oil per day by 2020, which would surpass Saudi Arabia’s projected production by about 500,000 barrels per day.⁴¹

33. See Moré, *supra* note 2, at 399.

34. Elizabeth McGowan, *Fracking’s Environmental Footprint to Transform Pennsylvania Landscape*, REUTERS (Apr. 25, 2011), <http://www.reuters.com/article/2011/04/25/idUS308837987220110425> (“Geologists hail Pennsylvania as a natural gas mother lode because nearly two-thirds of the state’s 28 million acres rests atop a yawning sheath of sedimentary rock formed around 400 million years ago during what scientists label the Devonian Period. What’s called the Marcellus Shale . . . measures about 150,000 square miles and stretches from the lower tier of New York State south through parts of Pennsylvania, Maryland, Ohio, West Virginia and a sliver of Virginia.”).

35. *Id.*

36. DIANA FURCHTGOTT-ROTH & ANDREW GRAY, *THE ECONOMIC EFFECTS OF HYDROFRACTURING ON LOCAL ECONOMIES: A COMPARISON OF NEW YORK AND PENNSYLVANIA 1* (May 2013), available at http://www.manhattan-institute.org/html/gpr_01.htm#.VP9826Mo6bg (citing NEW YORK STATE DEP’T OF ENVTL. CONSERVATION, *Marcellus Shale* (Sept. 7, 2011), <http://www.dec.ny.gov/energy/46288.html>).

37. See Moré, *supra* note 2, at 399.

38. Eric Konigsberg, *Kuwait on the Prairie: Can North Dakota Solve the Energy Problem?*, NEW YORKER (Apr. 25, 2011), <http://www.newyorker.com/magazine/2011/04/25/kuwait-on-the-prairie> (“The formation is mostly beneath the surface of North Dakota, but it extends into Montana and Canada.”).

39. See *id.*

40. See *id.*

41. Lananh Nguyen, *U.S. Oil Output to Overtake Saudi Arabia’s by 2020*, BLOOMBERG BUS. (Nov. 12, 2012), <http://www.bloomberg.com/news/articles/2012-11-12/u-s-to-overtake-saudi-arabia-s-oil-production-by-2020-iea-says>.

As fracking has become increasingly widespread in recent years, many consider America to be in the midst of an energy revolution.⁴² This explosion of energy resources will likely increase in coming years.

III. ECONOMIC AND NATIONAL SECURITY BENEFITS OF FRACKING

American shale oil and gas production has fueled great economic growth throughout the country, specifically in those states with high-volume fracking. This positive economic impact is most clearly seen in job creation in fracking communities.⁴³ In 2009, more than 44,000 jobs were created from the local shale gas extraction industry in Pennsylvania “through direct employment and the indirect and induced effects of the industry’s equipment purchases and land royalties.”⁴⁴ In that year, fracking added \$3.87 billion in total value to Pennsylvania’s economy.⁴⁵ The impact in Pennsylvania exemplifies the potential economic growth that fracking can provide:

Between 2007 and 2011, per-capita income rose by 19 percent in Pennsylvania counties with more than 200 wells, by 14 percent in counties with between 20 and 200 wells, and by 12 percent in counties with fewer than 20 wells. In counties without any hydrofracking wells, income went up by only 8 percent. It is important to note, too, that counties with the lowest per-capita incomes experienced the most rapid growth.⁴⁶

In the country as a whole, the shale gas industry “has already created half a million jobs” and is expected to create an additional 870,000 jobs by 2015.⁴⁷

42. See Moré, *supra* note 2, at 395–96.

43. See FURCHTGOTT-ROTH & GRAY, *supra* note 36, at 1–2.

44. *Id.* at 2.

45. See *id.*; Ken Silverstein, *Pennsylvania and New York Are a Thousand Miles Apart on Shale Gas Fracking*, ENERGYBIZ (Aug. 19, 2013), <http://www.energybiz.com/article/13/08/pennsylvania-and-new-york-are-thousand-miles-apart-shale-gas-fracking> (“Pennsylvania is set to become the nation’s second leading natural gas producer this year. In 2011, it was seventh. The papers in Pittsburgh are reporting that the shale gas sector now employs 46,644 people in its metropolitan area.”); see also *The Downside of New York’s Fracking Ban: Local Businesses “Falling Apart,”* GUARDIAN (Dec. 21, 2014), <http://www.theguardian.com/us-news/2014/dec/21/new-york-fracking-ban-local-businesses-falling-apart> (“New Yorkers have watched other states that sit atop the Marcellus Shale—Ohio, West Virginia and neighbouring Pennsylvania—ride the fracking boom and reap profits from one of the world’s largest natural gas deposits.”).

46. FURCHTGOTT-ROTH & GRAY, *supra* note 36, at 2.

47. Moré, *supra* note 2, at 397.

The shale gas and oil industry is also making lucky landowners “millionaires overnight” if their land happens to be located on the valuable shale rock.⁴⁸ In North Dakota, landowners with oil on their land “generally earn a bonus royalty of \$3,000 per acre plus a 20% stake in any oil that is produced,”⁴⁹ which means that a “moderately productive plot of two square miles could bring the owners—typically, groups of relatives and speculators—a million dollars up front, and five hundred thousand dollars a year for two decades.”⁵⁰

Fracking also benefits the nation as a whole by giving Americans access to oil and natural gas within the country’s borders. Americans currently consume about 20 trillion cubic feet of gas annually.⁵¹ Geologists estimate that given the United States’ current rate of consumption, the Marcellus Shale alone could “supply the entire United States for years to come.”⁵² Indeed, President Obama stated in his 2012 State of the Union Address, “We have a supply of natural gas that can last America nearly 100 years.”⁵³

Overall, the effects of shale gas on America’s natural gas and oil industries are astounding:

The result is a massive new domestic supply of natural gas and oil. In 2000, shale supplied negligible amounts of oil and only 2% of domestically produced natural gas in the U.S. As recently as 2007, we were preparing to become a major importer of natural gas. Yet since 2008, domestic natural gas production has increased by 25%. Today, 37% of our gas comes from shale; tight sands and shale together account for 50%, with 80% expected by 2035. Pennsylvania has the second largest natural gas field in the world, and there are sizable deposits in Arkansas, Louisiana, New York, Ohio, Oklahoma, North Dakota,

48. See, e.g., John M. Smith, *The Prodigal Son Returns: Oil and Gas Drillers Return to Pennsylvania with a Vengeance: Are Municipalities Prepared?*, 49 DUQ. L. REV. 1, 4 (2011) (discussing how the shale gas industry has made some landowners “millionaires overnight” through the sale of valuable mineral rights).

49. Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98 MINN. L. REV. 145, 158 (2013).

50. *Id.* (quoting Konigsberg, *supra* note 38) (internal quotation marks omitted).

51. See Smith, *supra* note 48, at 5.

52. *Id.*

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

Texas, and West Virginia. While natural gas generated 20% of the nation's electricity in 2006, the percentage has increased to 31% in just six years. Of the additional capacity to generate electricity that will be added in the next 25 years, 60% is expected to come from natural gas.⁵⁴

Any analysis of the fracking controversy needs to take into account the positive economic and policy effects of the industry; specifically, the fact that fracking is liberating America from its dependence on Middle Eastern oil and also greatly helping the American economy and the economy of states like Pennsylvania and North Dakota.

IV. THE ENVIRONMENTAL AND HEALTH RISKS OF FRACKING

Unfortunately, the fracking industry faces harsh criticism from environmental groups, local residents, and health officials regarding the fracking process and its effects.⁵⁵ Numerous reports have described the harms and annoyances it causes, including earthquakes,⁵⁶ wide-ranging environmental impacts,⁵⁷ risks to endangered animals,⁵⁸ toxic air pollution,⁵⁹ and nuisances to local residents arising from industrial activities⁶⁰ and

54. Merrill & Schizer, *supra* note 49, at 154–55 (footnotes omitted).

55. See, e.g., Mike Soraghan, *Baffled About Fracking? You're Not Alone*, N.Y. TIMES (May 13, 2011), <http://www.nytimes.com/gwire/2011/05/13/13greenwire-baffled-about-fracking-youre-not-alone-44383.html>.

56. See Colin Schultz, *Researchers Find Fracking Might Cause Earthquakes After All*, SMITHSONIAN.COM (Nov. 7, 2012), <http://blogs.smithsonianmag.com/smartnews/2012/11/researchers-find-fracking-might-cause-earthquakes-after-all/>.

57. See McGowan, *supra* note 34 (“[N]atural gas companies have thus far leased about 7 million acres of public and private property—about one-quarter of [Pennsylvania’s] entire land mass. That high volume prompted the Pennsylvania chapter of The Nature Conservancy to delve into what impact such an intense fracking footprint will have on the flora and fauna the nonprofit organization is dedicated to protecting.”).

58. See Kalyani Robbins, *Awakening the Slumbering Giant: How Horizontal Drilling Technology Brought the Endangered Species Act to Bear on Hydraulic Fracturing*, 63 CASE W. RES. L. REV. 1143, 1144 (2013) (“[A]s it turns out the wildlife problem, and not the contamination of the human water supply, may well be the most ominous for the [fracking] industry.”).

59. See Rice, *supra* note 3 (reporting on the release of a study purportedly showing that “Americans who live near oil and gas drilling wells are exposed to fracking-related air pollution in the form of chemicals such as benzene and formaldehyde”).

60. See Smith, *supra* note 48, at 9 (“Like any other industrial activity, [fracking] operations generate light, noise, dust, fumes, traffic, and drastic changes to the land, all of which affect the daily lives of the people living in [local] communities.”); see also Kevin Begos, *Issues with Fracking Could Be Eased If Industry Was More Honest, Some Say*, HUFFPOSTGREEN (July 28, 2013), <http://www.huffingtonpost.com/2013/07/28/issues->

population influx.⁶¹

However, most of the controversy surrounding fracking stems from the chemicals used in the fracking process. Because these chemicals are “shot underground at high force and in high volumes,” many environmentalists and journalists worry about the risk the chemicals will spread through the surrounding land and into local drinking water reserves.⁶² These concerns are more than mere speculation. Contamination has already been reported in several states.⁶³ The impact of these chemicals is exemplified by a detailed ProPublica report:

In an extensive report on the environmental impact of the shale gas industry, public interest news group ProPublica identified leaking condensate tanks (tanks used to hold liquid hydrocarbons detached from extracted natural gas) and massive, open-air frac ponds as possible sources of air and groundwater contamination. ProPublica also reported that people living close to fracking operations have experienced respiratory infections, headaches, nausea, rashes, and “[m]ore rarely,” miscarriages, tumors, cancer, and benzene poisoning. Nevertheless, ProPublica noted that researchers have not been able to “draw good solid conclusions about whether [fracking] is a public health risk as a whole.”⁶⁴

with-fracking_n_3668512.html. (“Another drilling critic who battled Colorado’s Encana Oil & Gas for 10 years over its work around his property said he was angered not only by noise and pollution but also by industry attitudes. ‘Those people moved into our valley like a conquering army,’ said Thomas Thompson, who complained that the heavy equipment that accompanied drilling in Rifle, Colo., created endless dust storms that caused health problems for him and his wife.”).

61. See Wallace McKelvey, *Fracking Brought Spikes in Crime, Road Deaths, and STDs to Pa.: Report*, PENN LIVE (Dec. 17, 2014), http://www.pennlive.com/midstate/index.ssf/2014/12/fracking_brought_spikes_in_vio.html (“Communities with the highest intensity of natural gas drilling have seen increased rate of crime, motor vehicle fatalities and even sexually transmitted diseases. While the influx of energy workers hasn’t significantly increased population figures, it coincided with a surge in rental prices across the Marcellus Shale region.”).

62. Ford J.H. Turrell, *Frack Off! Is Municipal Zoning a Significant Threat to Hydraulic Fracturing in Michigan?*, 58 WAYNE L. REV. 279, 281 (2012) (citing Abraham Lustgarten, *Years After Evidence of Fracking Contamination, EPA to Supply Drinking Water to Homes in Pa. Town*, PROPUBLICA (Jan. 20, 2012), <http://www.propublica.org/article/years-after-evidence-of-fracking-contamination-epa-to-supply-drinking-water>).

63. See Lustgarten, *supra* note 62.

64. Moré, *supra* note 2, at 402 (alterations in original) (footnotes omitted) (quoting Abraham Lustgarten & Nicholas Kusnetz, *Science Lags as Health Problems Emerge Near*

The health and environmental risks of fracking were also portrayed in the 2010 documentary *Gasland*.⁶⁵ The film focuses on the environmental impact of fracking in communities across the country.⁶⁶ The film's director, Josh Fox, speaks with residents in communities where fracking is taking place and hears disturbing stories about how fracking chemicals leak into the groundwater, resulting in well contamination and health problems.⁶⁷ In the most well-known scene of the film, Mr. Fox visits the home of a couple who reported that the methane content of their water had risen so drastically since local fracking began that they were able to ignite the water from their kitchen faucet.⁶⁸ They hold a lighter to the water and a fantastic flame explodes from the faucet, nearly catching the man's sleeve on fire.⁶⁹ This documentary has fueled the growing concern surrounding groundwater pollution resulting from fracking.⁷⁰

There are at least four ways that fracking can potentially contaminate ground water:

[F]irst, during or after the fracturing itself, fracturing fluid might migrate from the shale seam into water wells and aquifers; second, natural gas released or disturbed by fracturing might seep into water wells and aquifers; third, vibrations from drilling or fracturing might disturb contaminants lying at the bottom of a water well, mixing them into the well water; fourth, used fracturing fluid, or waste products generated by the production of oil and gas, might be disposed of in ways that pollute water wells and aquifers.⁷¹

There are numerous media reports of groundwater pollution resulting from fracking.⁷² Additionally, some argue that the only reason there are not more

Gas Fields, PROPUBLICA (Sept. 16, 2011), <http://www.propublica.org/article/science-lags-as-health-problems-emerge-near-gas-fields> (internal quotation marks omitted).

65. See *GASLAND* (HBO 2010).

66. See *id.*

67. See *id.*

68. *Id.* at 23:04–24:16; see also HBO DOCUMENTARY FILMS: *GASLAND TRAILER* (HBO 2010), available at <http://youtu.be/BtpSgqUZ3oA>.

69. *GASLAND*, *supra* note 65, at 23:04–24:16.

70. See, e.g., *Sparks Fly Over "Gasland" Drilling Documentary*, NPR (Feb. 24, 2011), <http://www.npr.org/2011/02/24/134031183/Gasland-Takes-On-Natural-Gas-Drilling-Industry>.

71. Merrill & Schizer, *supra* note 49, at 180–81.

72. See, e.g., Mark Fischetti, *Groundwater Contamination May End the Gas-Fracking Boom*, SCIENTIFIC AM. (Aug. 20, 2013), <http://www.scientificamerican.com/>

reports of groundwater pollution is that oil and natural gas companies settle lawsuits with a gag order forbidding the plaintiffs from discussing any facts of the case or speaking to the media about the extent of the groundwater contamination.⁷³

Because of the controversy surrounding groundwater contamination and “[i]n response to public concerns and anticipated growth in the oil and gas industries, the US Congress urged the US Environmental Protection Agency (EPA) to examine the relationship between hydraulic fracturing and drinking water resources.”⁷⁴ Thus, in 2010, the EPA began conducting a study regarding fracking’s impact on drinking water resources.⁷⁵ The study is expected to be completed in 2015.⁷⁶ While a progress report was released in 2012, it did not contain any “conclusions about potential impacts to drinking water” and instead only described the “18 research projects underway” that fall within “five different types of research activities: analysis of existing data, scenario evaluations, laboratory studies, toxicity assessments, and case studies.”⁷⁷ Until the full report is released in 2015, the public will be given no information regarding what the EPA has discovered about fracking’s impacts on ground water.⁷⁸

In December 2014, the state of New York released a report regarding the potential dangers of fracking.⁷⁹ The report explained the potential

article.cfm?id=groundwater-contamination-may-end-the-gas-fracking-boom; Joseph Stromberg, *Radioactive Wastewater from Fracking Is Found in a Pennsylvania Stream*, SMITHSONIAN.COM (Oct. 2, 2013), <http://blogs.smithsonianmag.com/science/2013/10/radioactive-wastewater-from-fracking-is-found-in-a-pennsylvania-stream/>.

73. See Don Hopey, *Pittsburgh-Area Shale Settlement “Gag” Questioned*, PITTSBURGH POST-GAZETTE (Aug. 1, 2013), <http://www.post-gazette.com/washington/2013/07/31/Pittsburgh-area-shale-settlement-gag-questioned/stories/201307310199> (“The hearing transcript, which provides details of the \$750,000 settlement paid to the family, shows the [plaintiffs] agreed to the terms of the settlement to remove their children from what they considered an unhealthy environment. They also raised questions about the lifetime ‘gag order’ that required the entire family to never discuss Marcellus Shale or fracking.”).

74. EPA, STUDY OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES: PROGRESS REPORT 5 (2012), (citing 155 CONG. REC. 11,900 (2009)), available at <http://www2.epa.gov/hfstudy/potential-impacts-hydraulic-fracturing-drinking-water-resources-progress-report-december>.

75. See *id.* at 5–6.

76. See *id.* at 6.

77. *Id.* at 1.

78. See *id.* at 170–71.

79. See N.Y. STATE DEP’T OF HEALTH, A PUBLIC HEALTH REVIEW OF HIGH VOLUME HYDRAULIC FRACTURING FOR SHALE GAS DEVELOPMENT (2014), available at

environmental and health concerns, such as climate change, surface water contamination, earthquakes, and boom-town economic effects like increased traffic, noise, odor complaints, and stress.⁸⁰ However, the report also emphasized the significant information gaps that must be filled, which require further study of the risks of fracking to reduce scientific uncertainties regarding fracking's actual effects.⁸¹

V. SILICA SAND MINING FOR HYDRAULIC FRACTURING

A. Silica Sand Use for Fracking

Silica sand is an important component of the fracking fluid that is pumped into wells because it serves as a propping agent—it props open the fractures in the shale to maintain the continued flow of natural gas.⁸² Silica sand is preferred above other kinds of sand because it is an especially strong proppant material:

Branded “Northern White,” this pedigree of sand boasts 99 percent quartz and a compressive strength between 6,000 and 14,000 pounds per square inch. This makes the grains ideally round and durable to prop open underground shale formations fissured by horizontal drilling and hydraulic fracturing, or fracking.⁸³

A single well can require 10,000 tons of silica sand during the fracking process.⁸⁴ With such a huge amount of sand needed, the industry is now looking for additional sources for this important resource, which has led them to the Midwest.⁸⁵

<https://s3.amazonaws.com/s3.documentcloud.org/documents/1382539/new-york-department-of-health-report-on-fracking.pdf>.

80. *Id.* at 4.

81. *Id.* at 8.

82. *See Chemical Use in Hydraulic Fracturing*, *supra* note 20.

83. Sally Younger, *Sand Rush: Fracking Boom Spurs Rush on Wisconsin Silica*, NAT'L GEOGRAPHIC (July 3, 2013), <http://news.nationalgeographic.com/news/energy/2013/07/130703-wisconsin-fracking-sand-rush/>.

84. *See id.*

85. *See* Alison Sider & Kristin Jones, *In Fracking, Sand Is the New Gold: Energy Boom Fuels Demand for Key Ingredient Used in Drilling Wells; 100 Sand Mines in Wisconsin*, WALL ST. J. (Dec. 2, 2013), <http://online.wsj.com/news/articles/SB10001424052702304868404579194250973656942> (“In Wisconsin, the source of white sand perfectly suited for hydraulic fracturing, state officials now estimate more than 100 sand mines, loading, and processing facilities have received permits, up from just five sand mines and five processing plants operating in 2010.”).

B. *The Health Risks Inherent in Silica Sand Mining*

Mining silica sand comes with significant health risks, specifically silicosis.⁸⁶

Silicosis is a chronic lung disease caused by breathing in tiny bits of silica dust. . . . People who work in jobs where they can be breathing in these tiny silica bits—like sandblasting, mining, construction and many others—are at risk for silicosis. When people breathe silica dust, they inhale tiny particles of silica that has crystallized. This silica dust can cause fluid buildup and scar tissue in the lungs that cuts down your ability to breathe.⁸⁷

Prolonged exposure to silica sand can also cause “lung cancer, pulmonary tuberculosis . . . autoimmune disorders, chronic renal disease, and other adverse health effects.”⁸⁸ These health risks have become a topic of significant contention in Wisconsin, Minnesota, and Iowa, the states known to have the largest amounts of silica sand.⁸⁹ There is great concern that silica sand mining will subject the residents of these states to increased silicosis diagnoses, and therefore residents are very wary of the Midwest silica sand mining boom.⁹⁰

86. See *Understanding Silicosis*, AM. LUNG ASS'N, <http://www.lung.org/lung-diseases/silicosis/understanding-silicosis.html> (last visited Mar. 10, 2015).

87. *Id.*

88. IOWA DEP'T OF PUB. HEALTH, SILICOSIS: REPORT TO THE IDPH DIVISION OF ENVIRONMENTAL HEALTH 1 (2012), available at http://www.idph.state.ia.us/idph_universalhelp/MainContent.aspx?TOCId=%7B732967A1-F20E-43D1-9DA7-278D8E5D0850%7D; see generally OSHA, OCCUPATIONAL EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA—REVIEW OF HEALTH EFFECTS LITERATURE AND PRELIMINARY QUANTITATIVE RISK ASSESSMENT 16–75 (2010), available at https://www.osha.gov/silica/Combined_Background.pdf.

89. See, e.g., Christopher Helman, *Why Sand is the Latest Front in the War on Fracking (Yes, Sand)*, FORBES (Aug. 22, 2013) <http://www.forbes.com/sites/christopherhelman/2013/08/22/a-new-target-for-fracking-opponents-sand-mines/> (“Towns like Winona, Minn., are now facing calls for the monitoring of silica dust and diesel fumes emitted by the sand mines.”).

90. See IOWA DEP'T OF PUB. HEALTH, *supra* note 88 (“Sand mining, hauling, and use in some hydraulic fracturing (fracking) operations have been identified as potential silica health hazard risks.”). For an in-depth discussion of silicosis litigation, see generally Melissa Shapiro, *Is Silica the Next Asbestos? An Analysis of Silica Litigation and the Sudden Resurgence of Silica Lawsuit Filings*, 32 PEPP. L. REV. 983 (2005).

C. How Midwest Communities Are Reacting to Silica Sand Mining

Until recently, the fracking debate has seemed a distant concern for most Iowans, but that debate has arrived at their doorstep. “[O]ne of the nation’s largest deposits of silica sand” is located in Iowa.⁹¹ Indeed, silica sand mining has already begun in parts of northeast Iowa along the Mississippi River.⁹² Fracking has become part of public conversation and a political talking point in Iowa.⁹³ Governor Terry Branstad recently stated that because of the need for silica sand, fracking is an area of potential growth for Iowa.⁹⁴ According to Governor Branstad, fracking makes Iowa more attractive to the manufacturing industry, especially when coupled with Iowa’s recent reduction of commercial and industrial property taxes.⁹⁵ As this conversation continues, Iowans must become informed on this issue and its inherent risks, as well as its economic benefits.⁹⁶

Residents of the communities in Wisconsin, Minnesota, and Iowa that are most affected by silica sand mining have mixed feelings about the new industry.⁹⁷ The tension stems from the competing economic, environmental,

91. *Iowa’s Frack Sand Mining Controversy*, IOWA ENERGY CTR. (Aug. 26, 2013), <http://www.iowaenergycenter.org/2013/08/iowas-frack-sand-mining-controversy/>.

92. See Kathleen Masterson, *Iowa Grain Company Digs into Silica Sand*, HARVEST PUB. MEDIA (June 8, 2011), <http://harvestpublicmedia.org/article/592/iowa-grain-company-digs-silica-sand/5>.

93. See, e.g., Brad Johnson, *Rick Perry Wants to Frack Iowa*, CLIMATE PROGRESS (Aug. 16, 2011), <http://thinkprogress.org/climate/2011/08/16/296821/rick-perry-loves-fracking/> (reporting that Governor Rick Perry, at a campaign stop in Iowa, “expressed concern that Iowans would miss out on the natural gas boom” if fracking or silica sand mining were overregulated on the federal or state level).

94. See Jason Noble, *Iowa Gov. Branstad Highlights Manufacturing in Iowa; Talks of Potential Benefits of Fracking*, DES MOINES REG. (Sept. 30, 2013), <http://blogs.desmoinesregister.com/dmr/index.php/2013/09/30/iowa-gov-branstad-highlights-manufacturing-in-iowa-talks-of-potential-benefits-of-fracking/article>.

95. See *id.*

96. See Jason Noble, *Think Tank Warns Iowa: Go Slow, Act Locally on Silica Sand Mining*, DES MOINES REG. (Jan. 30, 2014), <http://www.desmoinesregister.com/story/news/2014/01/30/think-tank-warns-iowa-go-slow-act-locally-on-silica-sand-mining/5058193/>.

97. See David Pope, *We’re All Fracked!*, N. IOWAN (May 3, 2013), http://issuu.com/northern-iowan/docs/ni_5-3-13 (“Most worrying, however, is the likely effect this frac sand mining could have on Iowa’s underground water reserves.”); Quentin Wagenfield, *Fracking—Blessing or Curse?*, GAZETTE (Mar. 28, 2014), <http://thegazette.com/2013/09/14/fracking-blessing-or-curse/> (“Environmentalists and residents near fracking sites believe that fracking pollutes the air and water, kills animals and causes cancer and other illnesses.”); Katie Wiedemann, *Lawsuit Filed over Crawford County Sand Mine*,

and health concerns—the same concerns that are at issue in Pennsylvania, New York, and North Dakota regarding fracking:

Fresh investment and fresher salaries are winning the hearts of some locals, while others decry the out-of-town license plates and gobbling machinery. Many landowners have been grateful for the opportunity to unload unproductive acreage. Others, fearful of the dust that's being kicked up, shutter the kitchen windows when winds change. Gatherings held in school gyms debate the potential impacts on both property taxes and small-town tranquility.⁹⁸

Generally, there are limited regulations regarding silica sand mining in these areas.⁹⁹ Opponents of silica sand mining insist the practice should cease until further studies are done or increased regulations are put in place.¹⁰⁰ Proponents, on the other hand, point to the great economic benefits silica sand mining can bring to communities.¹⁰¹

KCRG.COM (last updated Apr. 3, 2014), <http://www.kcrg.com/news/local/Lawsuit-Filed-Over-Crawford-County-Sand-Mine-220743651.html> (“A proposed fracking sand mine operation in Crawford County, Wis., has led to a heated debate.”).

98. Younger, *supra* note 83.

99. See, e.g., *Industrial Sand Mining*, DNR, <http://dnr.wi.gov/topic/mines/sand.html> (explaining Wisconsin's regulations for silica sand mining, which include “getting necessary air and water permits and following state reclamation laws,” as well as following hazardous waste regulations and any applicable requirements of the Safe Drinking Water Act).

100. See, e.g., Orlan Love, *Iowa Policy Project Study Urges Local Control on Frac Sand Mining: Clayton County Home to Only Operating Frac Sand Mine in State*, GAZETTE (Jan. 30, 2014), <http://thegazette.com/2014/01/30/iowa-policy-project-study-urges-local-control-on-frac-sand-mining/> (noting that local ordinances up for discussion “could include provisions for hydrologic mapping to determine groundwater flow patterns, local well monitoring to determine a baseline level for well quality and quantity and setbacks for both sinkholes and trout streams”); Jon Overton, *Winneshiek County Residents Push Against Rapid Sand Mining Growth*, IOWA PEACE NETWORK (Mar. 2, 2013), <http://iowapeacenetwork.blogspot.com/2013/03/winneshiek-county-residents-push.html> (“[O]rganizers want the Winneshiek County Board of Supervisors to place an 18-month moratorium on sand mining. Winneshiek County Protectors officials also want the county supervisors to implement a zoning ordinance to limit and regulate silica sand mining.”).

101. See, e.g., Dar Danielson, *Sand Used for Fracking Creates Environmental Discussion in Northeast Iowa*, RADIOIOWA (Mar. 5, 2013), <http://www.radioiowa.com/2013/03/05/sand-used-for-fracking-creates-environmental-discussion-in-northeast-iowa/> (“Mining companies and industry groups are cagey about talking about the value of sand for hydraulic fracturing, but a Wall Street Journal article last year put the price around \$50 a ton. [Winneshiek County Supervisor Dennis] Karlsbroten says when you're talking

In Iowa, regulation of silica sand mining has occurred primarily at a local level,¹⁰² unlike Wisconsin and Minnesota, where state governments have been more involved.¹⁰³ In addition, Iowa counties differ in their approach to silica sand regulation. There are three primary Iowa counties that contain silica sand: Allamakee, Winneshiek, and Clayton.¹⁰⁴ In February 2013, the Allamakee County Board issued an 18-month moratorium on silica sand mining to allow the Planning and Zoning Commission time to study the effects of silica sand mining.¹⁰⁵ The moratorium expired July 1, 2014, when the county enacted an ordinance severely restricting silica sand mining in the county.¹⁰⁶ Winneshiek County has issued a moratorium on silica sand mining that is still in effect and is working on issuing a more permanent ordinance of its own.¹⁰⁷ On the other hand, Clayton County allows silica sand mining

about an entire hill—even a small share of that profit could change your life.”).

102. See Amber Rouse, *Iowa Counties Stick to Home to Win Fight Over Frac Sand Mining*, IOWAWATCH.ORG, (Aug. 31, 2014), <http://iowawatch.org/2014/08/31/iowa-counties-stick-to-home-in-fights-over-frac-sand-mining/> (reporting that Iowa counties dealing with fracking sand mining issues have “focused on dealing with the matter locally, instead of with state intervention”).

103. For a comprehensive explanation of silica sand mining regulation in Wisconsin and Minnesota, see William Miley, *Assessing the Silica (Frac) Sand Mining Environmental Regulatory Frameworks in Minnesota and Wisconsin: Who Has a Better Plan for Digging, the Gophers or Badgers?*, 35 HAMLINE J. PUB. L. & POL’Y 330 (2014).

104. See Rouse, *supra* note 102.

105. See Orlan Love, *Allamakee Supervisors Approve Frac Sand Mining Moratorium*, GAZETTE (Mar. 28, 2013), <http://thegazette.com/2013/02/04/allamakee-supervisors-approve-frac-sand-mining-moratorium/> (“No frac sand will be mined in Allamakee County for at least 18 months following action Monday by the county supervisors. By unanimous vote, the supervisors approved a temporary moratorium to allow time for the Planning and Zoning Commission to study the potential ill effects of frac sand mining and to make corresponding amendments to the county’s zoning ordinance and comprehensive plan.”).

106. See Rouse, *supra* note 102 (“Allamakee County’s ordinance states a mining operation can exist but cannot use chemicals to wash or process silica sand, or apply any chemical or toxic substance in excavating silica sand. Sand mines cannot be located within 1,000 feet of any spring, cave, sinkhole or other feature of the karst topography prevalent in the county; nor can they be located within any portion of a Bluffland Protection District that the county’s zoning law defines, or within one mile of any stream, river, recreational trail or scenic byway. Mining operations are prohibited from using a process called hydraulic dredging or any similar method. The use of previously mined, processed and contaminated sand also is prohibited. The ordinance so thoroughly defines the county’s dominant features that it virtually keeps large operations out.”).

107. See *id.*; see also *Suitability of Winneshiek County Sand for Fracking Will Be Discussed During Monday’s Supervisor Meeting at Noon*, DECORAH NEWSPAPERS (Feb. 6, 2015), <http://decorahnewspapers.com/Content/News/Local-News/Article/Suitability->

and has experienced only minor problems and complaints.¹⁰⁸

There is great concern in the region regarding what silica sand mining will do to the environment and how it will affect the natural resources of the area.¹⁰⁹ Before issuing its moratorium, Allamakee County residents attended eight public forums to voice concerns about a decline in tourism, potential contamination of a local aquifer, increase in truck traffic, silica dust in the air, and a general lack of research on the safety of fracking.¹¹⁰ Local researchers have stated that silica sand mining “could cause a reduction in both the quantity and quality of water in northeast Iowa.”¹¹¹ Because of similar concerns, similar moratoriums have been issued in counties in both Wisconsin and Minnesota.¹¹²

Additionally, the University of Iowa recently took the initiative to study any effects that silica sand mining may have on the air quality of the surrounding communities.¹¹³ The major health concern frequently mentioned with regard to silica sand is silicosis, and activists want to be sure adequate measures are taken to prevent mine workers and local residents

of-Winneshiek-County-sand-for-fracking-will-be-discussed-during-Monday-s-supervisor-meeting-at-noon/2/10/36803.

108. See Rouse, *supra* note 102 (reporting that complaints about an accumulation of sand near the shoreline of the Mississippi River, gases from a mine vent being “blasted over the river,” and sand trucks “shaking buildings and tossing dust through the town’s business district” were the only real objections to the ongoing fracking sand mining operation’s activities).

109. See Steve Horn & Trisha Marczak, *Iowa: Fracking Industry’s Next Frac-Sand Target*, ECOWATCH (Apr. 30, 2013), <http://ecowatch.com/2013/iowa-fracking-industrys-frac-sand-target/>.

110. Rouse, *supra* note 102.

111. See Love, *supra* note 100 (“In a terrain characterized by porous subsoil limestone, industry uses of water or mining beneath the water table could affect the flow of groundwater, wells and streams, elevating the temperature of cold water trout streams that make the region a big draw for anglers.”).

112. Orlan Love, *Northeast Iowa Residents Speak Out Against Frac Sand Mining Proposal*, GAZETTE (Apr. 1, 2014), <http://thegazette.com/2012/10/24/northeast-iowa-residents-speak-out-against-frac-sand-mining-proposal/> (“In Wisconsin, the nation’s leading frac sand state, more than 80 mines and processing facilities are either operating or under construction, with an additional 20 in the proposal stage. As many as two dozen temporary moratoriums on new mines have been enacted by local government units. In Minnesota, six silica sand mines are currently up and running, and moratoriums have been enacted by five counties and five cities.”).

113. See Sarah McCammon, *Air Quality Concerns from Frack Sand to Be Studied by UI Team*, IOWA PUB. RADIO (Nov. 28, 2013), <http://iowapublicradio.org/post/air-quality-concerns-frack-sand-be-studied-ui-team-0>.

from developing this condition.¹¹⁴

There have been instances where pollution stemming from silica sand mining was policed by state and local regulatory agencies. For example, Wisconsin recently fined Minnesota fracking sand outfits \$80,000 when sediment was discharged into local wetlands, a creek, and a river.¹¹⁵ Just as fracking faces criticism due to environmental and health risks, silica sand mining for fracking is also fraught with controversy and is in need of further study, as well as potentially increased regulation.

VI. REGULATION OF FRACKING

A. Federal Regulation of Fracking

At this time, little to no fracking regulation comes from the federal level. This is surprising and disconcerting to many who believe that federal regulation, specifically from the EPA, is the ideal way to ensure that the fracking industry is mindful of, and held accountable for, the health risks and environmental hazards inherent to fracking.¹¹⁶ However, fracking is specifically exempted from the EPA regulations promulgated under the Safe Drinking Water Act (SDWA).¹¹⁷ Thus, the EPA has no authority under the

114. See Abigail Meier, *Allamakee County Activists Call Hydraulic Fracturing "Hot Spot for Silicosis"*, DAILY IOWAN (Dec. 11, 2013), <http://www.dailyiowan.com/2013/12/11/Metro/36014.html> ("According to the U.S. Department of Labor's website, these mining sites can protect workers by monitoring the air they are exposed to, control dust exposures, and provide respiratory protection to workers.").

115. See Steven Verburg, *Wisconsin Hits Minnesota Frac Sand Outfits with \$80,000 Penalty*, WIS. STATE J. (Jan. 7, 2014), http://host.madison.com/wsj/news/local/environment/wisconsin-hits-minnesota-frac-sand-outfits-with-penalty/article_afc2d8b3-94e6-50b8-9779-61127d2f100e.html ("A frac sand mining operation must pay \$80,000 for discharging sediment into Burnett County wetlands, a creek and the St. Croix River, which is part of the National Wild and Scenic Rivers System."); see also Alison Dirr, *Frac Sand Mining Company Faces \$200,000 in Water, Air Penalties*, CAP TIMES (Dec. 18, 2013), http://host.madison.com/news/local/environment/frac-sand-mining-company-faces-in-water-air-penalties/article_9c968b3c-67f4-11e3-bca3-001a4bcf887a.html ("Frac sand mining company Preferred Sands of Wisconsin has been ordered to pay \$200,000 for stormwater and air permit violations at its facility near Blair, a Trempealeau County city.").

116. See, e.g., Angela C. Cupas, *The Not-So-Safe Drinking Water Act: Why We Must Regulate Hydraulic Fracturing at the Federal Level*, 33 WM. & MARY ENVTL. L. POL'Y REV. 605, 627–32 (2009).

117. 42 U.S.C. § 300h(d)(1)(B)(ii) (2012) (exempting hydraulic fracturing from regulation under the Safe Drinking Water Act).

SDWA to penalize fracking companies for water pollution resulting from the fracking process.¹¹⁸

Many are critical of this exemption, which specifically excludes “the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations relating to oil, gas, or geothermal production activities,” from the definition of “underground injection” activities that the EPA can regulate.¹¹⁹ Some critics call this the “Halliburton Loophole,”¹²⁰ because fracking was invented by the multinational oil company Halliburton in 1947,¹²¹ and was pushed through Congress by Vice President Dick Cheney, a former chief executive of Halliburton.¹²² Therefore, some argue that the EPA should have been able to regulate fracking but for inappropriate interference of corporate interests.¹²³

Many analysts contend that fracking regulation would be most effective if it came from the EPA rather than from scattershot state attempts at regulation.¹²⁴ This would create a level of continuity and predictability for

118. See Moré, *supra* note 2, at 410 (“Those in the business of extracting unconventional fossil fuels . . . currently have little to fear from SDWA’s penalties. . . . [F]racking as it pertains to shale gas is essentially exempted from the SDWA.”).

119. 42 U.S.C. § 300h(d)(1)(B)(ii); see also *Regulation of Hydraulic Fracturing Under the Safe Water Drinking Act*, EPA, http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_hydroreg.cfm (last visited Mar. 10, 2015).

120. See THOMAS E. KURTH ET AL., AMERICAN LAW AND JURISPRUDENCE ON FRACING—2012, 167 (2012) (citing Editorial, *The Halliburton Loophole*, N.Y. TIMES, Nov. 3, 2009, at A28), available at https://web.archive.org/web/20131019172715/http://www.haynesboone.com/files/Uploads/Documents/Attorney%20Publications/CURRENT_RMMLF%20Fracing%202012%20Paper_Formatted.pdf.

121. See *Hydraulic Fracturing 101*, HALLIBURTON, http://www.halliburton.com/public/projects/pubsdata/Hydraulic_Fracturing/fracturing_101.html (last visited Mar. 4, 2015).

122. See Editorial, *The Halliburton Loophole*, *supra* note 120.

123. See David Allen Hines, *The “Halliburton Loophole”: Exemption of Hydraulic Fracturing Fluids from Regulation Under the Federal Safe Drinking Water Act*, INST. FOR ENERGY AND ENVTL. RES. FOR N. PA. (Mar. 8, 2012), <http://energy.wilkes.edu/PDFFiles/Laws%20and%20Regulations/Halliburton%20Loophole%20Essay%20Final.pdf>.

124. See Akiah C. Highsmith, *Is It Tomorrow, or Just the End of Time? Why You Shouldn’t Be Worried About Fracking and the EPA Should Keep It That Way*, 7 APPALACHIAN NAT. RESOURCES L.J. 157, 170 (2013) (“The EPA should regulate hydraulic fracturing in the United States because it is in the best position to do so. The EPA is in a better position than individual states both financially and geographically. Additionally, the EPA is the federal agency responsible for protecting human health and the environment.”); see also Shawna Bligh & Chris Wendelbo, *Hydraulic Fracturing: Drilling into the Issue*, GPSOLO, Sept./Oct. 2013, at 72, 72 (“Acting in the void of

the American fracking industry at large, and it would ensure that the residents of every state are equally protected from any harmful fracking effects.¹²⁵

For those urging federal regulation, the outlook is not entirely negative; the EPA announced in April 2012 that it intends to begin regulating fracking using the Clean Air Act.¹²⁶ These regulations will be in place by 2015 and are intended “to reduce harmful air pollution from the oil and natural gas industry while allowing continued, responsible growth in U.S. oil and natural gas production.”¹²⁷ “Among other things, oil and gas wells must now have equipment able to capture escaping volatile organic compound emissions.”¹²⁸ “This is the first federal air standard for natural gas wells that are hydraulically fractured.”¹²⁹

B. Legislative Response to Fracking

Some members of Congress have pushed for fracking regulation, but it has had little to no effect. For example, the Fracturing Responsibility and

substantive federal law, the states have taken the lead enacting legislation addressing the myriad issues associated with fracking. The result is an emerging patchwork of disparate laws and regulations.”).

125. Akiah Highsmith presents a strong argument for federal regulation of fracking:

Through EPA regulation on the federal level, uniformity of regulations, laws, precedents, and enforcement could be accomplished. That benefits everyone involved. The industry benefits from uniformity because it removes a lot of uncertainty as to what the laws or regulations that must be conformed with are. Uncertainty is also a bane to investment in the business world. States benefit from uniformity because it allows the states to use their resources for unique state issues and gives state courts more guidance. The public also benefits because federal regulation supplies protection for the public as a whole, regardless of which state or territory the individual calls home. Individuals living near state borders would also be safe from unfavorable precedent in a neighboring state adversely affecting those individuals’ rights.

Highsmith, *supra* note 124, at 172.

126. See *Oil and Natural Gas Air Pollution Standards: Regulatory Actions*, EPA, <http://www.epa.gov/airquality/oilandgas/actions.html> (last visited Mar. 10, 2015) (“The final rules include the first federal air standards for natural gas wells that are hydraulically fractured, along with requirements for several other sources of pollution in the oil and gas industry that currently are not regulated at the federal level.”) (citing 77 Fed. Reg. 49,490 (Aug. 16, 2012) (to be codified at 40 CFR pts. 60, 63)).

127. *Id.*

128. Moré, *supra* note 2, at 433.

129. See Bligh & Wendelbo, *supra* note 124; see also Moré, *supra* note 2, at 433 n.289.

Awareness of Chemicals Act (FRAC Act) was introduced in the House of Representative and the Senate in 2009.¹³⁰ The FRAC Act was intended to repeal the exemption for fracking in the SDWA by amending the term “underground injection” to include the underground injection of fluids used for fracking.¹³¹ It would also have required that natural gas drilling companies disclose the chemicals used in fracking.¹³² However, the FRAC Act did not pass.¹³³ It was reintroduced during the 113th Congress, but no action was taken.¹³⁴

At least two other fracking-related bills are currently pending before Congress: S. 1234 and H.R. 2513.¹³⁵ These bills would “specify that a state has sole authority to regulate fracking on federal lands within state boundaries.”¹³⁶ However, as a result of ongoing political discord, it is unlikely that Congress will have a positive impact on fracking regulation.

C. State and Local Regulation of Fracking

The bulk of fracking regulation has come from the state level, and states have used varied approaches.¹³⁷ This is best represented by Pennsylvania and New York, two states with a substantial portion of their land on the Marcellus Shale.¹³⁸ Pennsylvania has generally been very

130. See Fracturing Responsibility and Awareness of Chemicals Act of 2009, H.R. 2766, 111th Cong. (2009); Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, S. 1215, 111th Cong. (2009).

131. See H.R. 2766 § 2(a); S. 1215 § 2(a).

132. See H.R. 2766 § 2(b); S. 1215 § 2(b).

133. See H.R. 2766 (111th): *Fracturing Responsibility and Awareness of Chemicals Act of 2009*, GOVTRACK.US, <http://www.govtrack.us/congress/bills/111/hr2766> (last visited Mar. 4, 2015); S. 1215 (111th): *Fracturing Responsibility and Awareness of Chemicals (FRAC) Act*, GOVTRACK.US, <https://www.govtrack.us/congress/bills/111/s1215> (last visited Mar. 4, 2015).

134. See Fracturing Responsibility and Awareness of Chemicals Act of 2013, H.R. 1921, 113th Cong. (2013); Fracturing Responsibility and Awareness of Chemicals Act, S. 1135, 113th Cong. (2013).

135. See Fracturing Regulations are Effective in State Hands Act, H.R. 4322, 113th Cong. (2013); Fracturing Regulations are Effective in State Hands Act, S. 1234, 113th Cong. (2013).

136. Bligh & Wendelbo, *supra* note 124; see H.R. 4322 § 4(a); S. 1234 § 4(a).

137. See KURTH, *supra* note 120, at 187.

138. Silverstein, *supra* note 45 (“Pennsylvania and New York State may border each other but they are a thousand miles apart in terms of their philosophies about hydraulic fracturing. Pennsylvania has been plowing ahead and has become one the nation’s leading natural gas producers while New York is still debating whether to ease its ban

fracking-friendly, while New York is currently enforcing a fracking ban.¹³⁹ Additionally, a New York appellate court case held that local New York regulation can take precedence over more permissive state regulation.¹⁴⁰ This is significant because a large number of New York towns have banned fracking, meaning that even if New York lifts its ban, many towns would still prohibit fracking.¹⁴¹

Other states have enacted strong regulations regarding fracking, even though fracking is not currently taking place in the state and the state is not known to sit on any oil or gas producing formations.¹⁴² Additionally, a number of states have enacted regulations requiring mandatory disclosure of the chemicals used in fracking fluids, including North Dakota, Colorado, Montana, Wyoming, Idaho, New York, Texas, West Virginia, and Arkansas.¹⁴³

Just as some critics are adamant about federal entities being better suited for handling fracking regulation, others assert that regulation should

on fracking.”).

139. See *id.*; see also Fred Krupp, *New York Has Outlawed Fracking. More Bans Will Follow If Energy Companies Don't Take Action: The Oil and Gas Industry Needs to Start Cooperating with Regulators*, WASH. POST (Dec. 22, 2014), <http://www.washingtonpost.com/posteverything/wp/2014/12/22/new-york-has-outlawed-fracking-it-wont-be-the-last/>.

140. See generally *Wallach v. Town of Dryden (In re Wallach)*, Nos. 130 & 131 (N.Y. June 30, 2014), available at <https://www.nycourts.gov/ctapps/Decisions/2014/Jun14/130-131opn14-Decision.pdf>.

141. Silverstein, *supra* note 45 (“[A]bout 150 local towns there have either outright banned fracking or they have temporarily halted the drilling procedure. So, if New York would eventually come back and lift its ban, those communities with prohibitions could continue their policies.”); see also Turrell, *supra* note 62, at 280 (“[M]unicipalities have attempted to draw on their home rule and zoning authorities in order to zone out gas operators. These local efforts met stiff resistance from states asserting that regulating gas mining is a state function and not a local function.” (citing Powers, *Home Rule Meets State Regulation: Reflections on High-Volume Hydraulic Fracturing for Natural Gas*, ABA: STATE & LOCAL NEWS (2012), available at http://www.americanbar.org/publications/state_local_law_news/2011_12/winter_2012/home_rule_state_regulation.html)).

142. See Bligh & Wendelbo, *supra* note 124, at 73 (“For example, Indiana has enacted temporary rules requiring all producers who utilize fracking to provide detailed information on the types and volumes of fluids and additives used in the well treatment. In May 2012 the Vermont legislature passed (and the governor signed into law) H. 464, banning all fracking activities within the state. Neither of these two states has commercially developable oil and gas reserves.” (citation omitted)).

143. Evan J. House, *Fractured Fairytales: The Failed Social License for Unconventional Oil and Gas Development*, 13 WYO. L. REV. 5, 64 (2013).

be left to the states.¹⁴⁴ This reasoning stems from the fact that fracking activity varies from state to state; additionally, each state has its own industry standards and history (or lack thereof) of drilling.¹⁴⁵ States with experience regulating similar industries are likely well-suited to regulate fracking as well.¹⁴⁶ Pennsylvania, for example, has a long history of coal mining and is thus more accustomed to regulating natural resource development than states with no history of mining or drilling.¹⁴⁷

State regulation also has the benefit of being much more flexible than federal regulation, which conforms to the idea of the states as laboratories of democracy.¹⁴⁸ States are better able to experiment with regulation, see what is effective and what is not, and adjust as needed; federal regulation, on the other hand, is much more restricted by political hurdles and less likely to result in a solution that is maximally effective for each state.¹⁴⁹

144. See Merrill & Schizer, *supra* note 49, at 151 (“To ensure that the regulatory regime is both dynamic and tailored to local conditions, we recommend keeping the regulatory center of gravity in the states, instead of fashioning a new federal regime.”).

145. Matt Willie, Comment, *Hydraulic Fracturing and “Spotty” Regulation: Why the Federal Government Should Let States Control Unconventional Onshore Drilling*, 2011 BYU L. REV. 1743, 1746 (“While environmental concerns over hydrofracking should not be ignored, in many cases they have been overstated. More importantly, the characteristics of reserves (and therefore specific hydraulic fracturing techniques) vary from state to state, making the success of any regulatory system highly dependent on regulators’ knowledge of local and regional industry realities.”).

146. See David, *supra* note 27 (“[O]bservers say Pennsylvania’s lengthy experience with resource development makes it fertile ground for production.”).

147. See *id.* (“The state ‘has a history of natural resource development: coal mining in particular,’ said Susan Christopherson, professor of urban planning at Cornell University and the author of a study examining the unfolding regulatory and legislative framework of Marcellus production. ‘A place that has experience with this, like Texas, is more likely to support [fracking].’”).

148. See Jessica Bulman-Pozen, *Partisan Federalism*, 127 HARV. L. REV. 1077, 1126 & 1128 (2014) (discussing how states serve as laboratories for a variety of issues, “[f]rom fracking to in-state tuition for undocumented immigrants; from charter schools to tax rates; from public sector unions to takings for economic development,” and that “what makes the states laboratories is the hope that a successful experiment will spread nationwide or that a dangerous one will not”).

149. See Merrill & Schizer, *supra* note 49, at 151–52 (“Because state regulators observe each other, successful regulatory initiatives are likely to disseminate from one state to another. A federal regime, in contrast, would have to be developed from scratch after lengthy and contested rulemaking proceedings. It might impose uniform rules that do not always fit local conditions, and that could be harder to change once in place.”).

D. *Tension Between State, Local, and Federal Regulation of Fracking*

Because the federal government is unsure about whether it should begin to regulate fracking, state legislatures are equally unsure about their role as regulators. While many environmental advocates assert that a federal regulatory scheme is necessary, those in the oil and gas industry argue that state regulation is preferable.¹⁵⁰ States and counties have already begun regulating fracking, and large-scale investments have been made in reliance on those regulatory decisions; if the EPA changes its position and decides to begin regulating fracking, it will disrupt current industry expectations. However, advocates for federal fracking regulation assert that “a uniform federal system of oversight is necessary to provide the public with access to information and ensure that the oil and gas industry is engaging in uniform practices.”¹⁵¹

VII. CONCLUSION

Considering the controversy surrounding fracking and silica sand mining, it is clear that the most important problem to address is the lack of information. While gas and oil companies assert that fracking is not harmful, or at least no more harmful than any other drilling activity, environmental advocates and media reporters continue to release captivating and horrifying stories regarding the negative impacts of fracking on local communities.¹⁵² Without adequate information from all involved in the fracking industry, “the public lacks a sufficient basis for evaluating fracking and horizontal drilling operations, and is left with only its intuition and the information put forth by third parties.”¹⁵³ It is therefore vital that oil and gas companies

150. See Watson & Pincus, *supra* note 32, at 236–37 (comparing the debate surrounding fracking regulation to the debate surrounding surface coal mining regulation 30 years ago, where environmentalists called for “a strong federal regulatory scheme” and industry insiders argued that “regulation of such activities is better left to the states”).

151. *Id.* at 237.

152. See, e.g., Lance Simmens, *Known Unknowns*, HUFFINGTON POST (Mar. 22, 2013), http://www.huffingtonpost.com/lance-simmens/fracking-research_b_2920617.html (“Experiences with fracking in other parts of the country, namely Pennsylvania, Arkansas, New Mexico and Colorado have generated enormous controversy due to citizens’ complaints that the byproducts of fracking, such as water and air contamination and environmental health impacts upon both animals and humans, raise serious questions as to the ability of public policies to adequately regulate these activities while protecting human life.”).

153. House, *supra* note 143, at 54 (footnote omitted).

voluntarily release information regarding their fracking activities and the components of their fracking fluids. It is also imperative that researchers study the negative environmental and health effects of fracking and silica sand mining before the practices are allowed to continue indefinitely. Continuing to simply report that it is unclear whether fracking is resulting in environmental or health hazards is inadequate. These studies can come from the federal level, the state level, or both, so long as they shed light on the current and potential impacts of these industries' practices. Likewise, studies must be conducted on the risks of large scale silica sand mining before Iowa embraces the industry, despite its great potential economic benefits.

General Electric (GE) has recently invested billions of dollars in the fracking industry, stating that "the continued use of fracking depends on the 'industry getting its act together to do it in an environmentally sustainable way.'"¹⁵⁴ GE says it is developing technology that could help to treat the water used in the fracking process, using "an energy-efficient process that could cut the cost of water treatment in half . . . [and] also decrease the chances of toxic waste spills."¹⁵⁵ Similar initiatives from other energy companies will be necessary if the fracking industry expects to be accepted by the public. Until that time, despite the many economic and political benefits fracking provides, it will continue to meet great resistance from Americans who are increasingly wary of the potential risks to their health, water, and local environment.

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154. See Kevin Bullis, *One Way to Solve Fracking's Dirty Problem*, MIT TECH. REV. (Sept. 24, 2013), <http://www.technologyreview.com/news/519416/one-way-to-solve-frackings-dirty-problem/> ("GE has demonstrated technology aimed at addressing one of the biggest challenges with fracking: water pollution."); see also Kevin Begos, *GE to Invest Billions of Dollars in Fracking*, HUFFINGTON POST (May 27, 2013), http://www.huffingtonpost.com/2013/05/27/ge-fracking-oklahoma-lab_n_3342480.html.

155. Bullis, *supra* note 154; see also *Clean That Up—Environmental Technology: A Combination of Two Desalination Techniques Provides a New Way to Purify the Water Used in Fracking*, ECONOMIST, Nov. 30, 2013, <http://www.economist.com/news/technology-quarterly/21590757-environmental-technology-combination-two-desalination-techniques-provides> ("[R]ecent trials of [GE's water treatment] system at a gas-fracking plant in Texas have been encouraging.").

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