University of Baltimore Journal of Land and Development

Volume 1
Issue 2 *Spring 2012*

Article 6

2012

Fracturing the Environment?: Exploring Potential Problems Posed by Horizontal Drilling Methods

Kathleen Kerner
University of Baltimore School of Law

RECENT DEVELOPMENT

FRACTURING THE ENVIRONMENT?: EXPLORING POTENTIAL PROBLEMS POSED BY HORIZONTAL DRILLING METHODS

Kathleen Kerner

I. INTRODUCTION

The ongoing energy crisis in the United States and the country's dependence on foreign oil has made developing alternative energy sources vital to the prosperity of future generations.[1] Recently, due to advancements in the energy field, companies have been exploring the potential of using domestic natural gas reserves as an alternative energy resource.[2] Domestic natural gas reserves were previously not considered a viable alternative energy resource due to the difficulty in accessing the vast amounts of natural gas found in "low permeability" geologic formations located deep underground.[3] However, new innovations in drilling technology have made harvesting the resource more economically feasible.[4] These natural gas reserves are being rapidly developed, using this new technique, by multiple energy companies in an effort to limit the nation's reliance on coal and oil.[5] While natural gas is not a unilateral solution to the energy crisis, scientists believe the use of natural gas is a major step forward in the effort to develop a more sustainable domestic energy source.[6]

---

1. John Deutch, *The Good News about Gas*, FOREIGN AFFAIRS, Feb. 2011, at 90-93.
2. *See* Deutch, *supra* note 1. "Beginning in 2008, the gas industry discovered that shale gas [an "unconventional" natural gas found all over the United States] was a large and economically feasible source of domestic supply." Deutch, *supra* noe 1 at 83-84.
3. Adam Orford, *Fractured: The Road to the New EPA "Fracking Study"*, 267 ENV. COUNS. (2010). "While easily accessible natural gas is still being discovered, the lion's share of new proven reserves result from applying innovative extraction technologies and techniques to recover previously known resources that were uneconomical using conventional production methods." *Id.*
4. Orford, *supra* note 3. Without these new advancements in drilling technology, natural gas would not be the viable energy source it is today. Orford, *supra* note 3.
5. *See* Joyce Nelson, *Fracking the World*, NEW INTERNATIONALIST, May 2011, at 24-25.
6. Deutch, *supra* note 1, at 92-93.

The practicability of natural gas as a viable energy resource depends on the methods used to remove the deposits from the earth.[7] The most efficient method, known as hydraulic fracturing, was first developed in the mid-twentieth century and continues to evolve today.[8] The original methods for hydraulic fracturing made it impossible to direct the drilling to specific areas of the geologic formations and instead forced the drilling at a vertical angle.[9] Most recently, a new version of hydraulic fracturing, called horizontal fracturing, has revolutionized the drilling process by improving the directional capabilities of the drill.[10] This new method has made extraction of natural gas more cost-efficient[11] and is being pursued aggressively in the United States without a complete study into short and long-term ecological repercussions.[12] Consequently, due to the necessity for developing new energy sources and the rapidly developing technology, there has been no comprehensive study of the potential environmental costs of using this new method.[13]

Hydraulic fracturing, or fracking, has provoked concerns about environmental safety because of the methods employed to extract this natural gas.[14] The main concerns involve the risks associated with the chemicals used in the fracking process as well as the methods of disposing of the chemical-filled water after the process is complete.[15] There is also fear that the fracking process and chemicals used will contribute to the pollution of both drinking water and groundwater.[16] Some of the shale layers, such as the Marcellus Shale located on the Appalachian basin, are located near massive watersheds that provide drinking water to millions of people.[17] These risks have increased in

7. *See* Nelson, *supra* note 5, at 25.
8. Holli Brown, *The Attack on Frack: New York's Moratorium on Hydraulic Fracturing and Where It Stands in the Threat of Takings*, 41 ENVTL. L. REP. 11146, 11146-47 (2011).
9. Orford, *supra* note 3.
10. Orford, *supra* note 3, at 5. Horizontal fracturing allows, "wells to be aligned within the semi-horizontal shale layer, perpendicular to the shale joints, maximizing each well's interface with the shale and increasing the number of intersected fractures." Orford, *supra* note 3. By increasing the number of fractures, there is more natural gas coming out. *See* Orford, *supra* note 3.
11. Orford, *supra* note 3.
12. *See* Orford, *supra* note 3.
13. *See generally Safety First, Fracking Second*, SCIENTIFIC AMERICAN, Nov. 2011, at 12 [hereinafter *Safety First*]. "A long list of technical questions remains unanswered about the ways the practice could contaminate drinking water, the extent to which it already has, and what the industry can do to reduce the risks. To fill this gap, the U.S. Environmental Protection Agency is now conducting comprehensive field research." *Supra*, at 12.
14. *See* Nelson, *supra* note 5, at 25.
15. Brown, *supra* note 8.
16. Brown, *supra* note 8.
17. Brown, *supra* note 8, at 11147.

recent years with the development and expanded use of new fracking methods.[18]

While the exploration of natural gas poses definite risks, the resource also has distinct advantages over other types of energy.[19] Natural gas is an abundant natural resource found in the United States, which has the potential to significantly reduce dependence on foreign oil.[20] Natural gas burns cleaner and is a potential replacement for coal in electric power generation, reducing concerns about climate change.[21] Finally, because the United States has significant natural reserves, it can be a potential bridge to allow for development of other alternative sources of energy.[22] Notwithstanding these advantages, natural gas should not be treated as a viable solution to the ongoing energy crisis at this time because the methods of retrieving natural gas may create significant environmental and health problems and thus merit additional study.

II. HISTORICAL DEVELOPMENT

The first fracking technique was developed in 1949 and has continued to change over the years.[23] Fracking was developed in an effort to harvest natural gas reserves from underground sources that are difficult to reach.[24] Fracking methods have advanced in recent years allowing for the excavation of "unconventional" natural gas sources[25] that contain sufficient natural gas reserves to provide energy to the entire country for decades.[26] Due to advances in fracking technology, unconventional natural gas deposits that were previously unreachable are now more accessible, and removal is more economically efficient.[27]

---

18. *See generally* Brown, *supra* note 8, at 11147.
19. Deutch, *supra* note 1, at 82-85.
20. Deutch, *supra* note 1, at 82-90.
21. Deutch, *supra* note 1, at 82-90.
22. Deutch, *supra* note 1, at 82-90. "In the long run, the world will need to transition from fossil fuels to carbon-free sources of energy, such as wind, solar, geothermal and nuclear energy. In this sense, shale gas is a way station en route to a new energy future – not a permanent solution to the problem." Deutch, *supra* note 1, at 82-90.
23. Brown, *supra* note 8, at 11147.
24. *See* Orford, *supra* note 3.
25. Orford, *supra* note 3. These "unconventional" sources of natural gas have existed for years and they include shale layers, sandstone, coalbeds and chalks. They are considered "low permeability," meaning they are extremely hard to fracture without special technology. *See* Orford, *supra* note 3.
26. *See* Chris Mooney, *The Truth About Fracking*, SCI. AM., Nov. 2011, at 81. "The U.S is estimated to have 827 trillion cubic feet of this 'unconventional' shale gas." *Id.* at 80-81.
27. Mooney, *supra* note 26.

The original method of fracking involves drilling wells into geological formations buried underground.[28] In order to harvest that natural gas, engineers developed the process called hydraulic fracking.[29] In hydraulic fracking, companies first have to inject more than a million gallons of water, sand, and chemicals into a vertical well at a very high pressure.[30] The water and chemical mixture is pumped into the geologic formations causing it to fracture and crack, releasing the natural gas.[31] The sand in the liquid mixture helps keep the fracture from closing and the natural gas travels up through the well.[32] The natural gas is then captured on the surface and trucked to a pipeline for delivery.[33] A significant portion of the chemical mixture that has been pumped down into the ground to cause the fracture, then comes back up through the well and is kept contained in open pits until it can be removed to a treatment plant, then it is either injected back into the earth through separate injection wells or recycled.[34] This original fracking method has evolved recently to promote more cost and time-effective procedures, and allows it access to greater deposits of natural gas.[35]

The new method, known as horizontal drilling, has the ability to turn the drill at a horizontal angle.[36] This allows operators to continue drilling at a level parallel to the surface.[37] The vertical well that was originally used can now maneuvered at a ninety-degree angle to allow water to pump both vertically and horizontally into the shale layers.[38] While horizontal fracturing requires a greater amount of the water-chemical mixture, it makes it possible to fracture multiple parts of the shale layer to reach a greater amount of natural gas.[39] Compared to a vertical well, horizontal fracking provides access to thousands of additional feet that would otherwise have been inaccessible.[40] Although

28. Mooney, *supra* note 26, at 84.
29. Mooney, *supra* note 26, at 84.
30. Brown, *supra* note 8, at 11146-47. The water/chemical mixture contains about 99 percent water and sand, and 1 percent chemicals. *Id.* at 11147.
31. Brown, *supra* note 8, at 11146-47.
32. Brown, *supra* note 8, at 11146-47.
33. John Manuel, *EPA Tackles Fracking*, ENVTL. HEALTH PERSP., May 2010, at A199.
34. Manuel, *supra* note 33. States are in charge of regulating the usage of these open pits. Some states require lining of the pits, and others do not. Manuel, *supra* note 33.
35. *See* Mooney, *supra* note 26, at 82.
36. *See* Mooney, *supra* note 26, at 82.
37. *See* Mooney, *supra* note 26, at 82.
38. *See* Mooney, *supra* note 26, at 82. The horizontal fracturing process can require between two and five million gallons of water to fracture one formation. Brown, *supra* note 8, at 11146-48.
39. Mooney, *supra* note 26, at 83-84.
40. *See* Orford, *supra* note 3. Vertical wells have not been notably productive on "low permeability rock" because it fractures the rock at adjacent, unconnected joints, limiting the amount of natural gas available to be released.

there are benefits to the retention of this resource, many individuals fear the environmental consequences of these methods.[41]

There are many environmental and health concerns that must be weighed against the possible benefits of natural gas as an energy resource.[42] First, there are concerns about the contamination of drinking water by methane and other chemicals as a result of leaky casings.[43] Second, there are concerns about groundwater pollution due to the improper disposal of the captured wastewater.[44] Consequently, the energy debate is centered on whether the precautions taken by drilling companies are enough to prevent contamination, whether there should be greater governmental regulation of drilling companies and the chemicals they use, and whether the risk of contamination outweighs the possible benefits of natural gas as a lower-carbon energy resource that helps reduce dependence on foreign oil.

III. ANALYSIS

There is an ongoing dispute over whether the potential environmental problems posed by fracking are outweighed by the benefits of natural gas as an energy source. Since the United States is under significant pressure to find cleaner, more renewable, domestic energy resources, the environmental costs of these fracking methods have not been fully evaluated.[45] It is essential to weigh both the potential advantages and disadvantages of fracking before a complete determination can be made.[46] However, the most recent studies on fracking suggest that the potential for disastrous disadvantages may outweigh the energy benefits.[47]

A. Benefits of Drilling for Natural Gas

Natural gas is a sought-after resource in the United States and all over the world.[48] It is estimated that trillions of cubic feet of natural gas in the Marcellus shale alone could supply the entire United States

---

Horizontal Fracturing fractures at a much more productive angle. Orford, *supra* note 3, at 4-5.

41. *See* Orford, *supra* note 3.
42. Manuel, *supra* note 33, at A199.
43. Manuel, *supra* note 33, at A199.
44. Manuel, *supra* note 33, at A199. Between 15 percent and 80 percent of the original water/chemical mixture will "flowback" through the well and contains harmful chemicals in addition to naturally occurring radioactive material from the shale layers. Brown, *supra* note 8, at 11147. The rest remains underground. Brown, *supra* note 8, at 11147.
45. *See* Madelon Finkel, *The Rush to Drill for Natural gas: A Public Health Cautionary Tale*, AM. J. PUB. HEALTH, May 2011 at 784-85. "Little Research has been done on the potential adverse health effects of fracking." *Id.* at 785.
46. Madelon, *supra* note 45.
47. *See generally* Madelon, *supra* note 45.
48. Deutch, *supra* note 1, at 82-85.

with energy for the next forty-five years.[49] Utilizing natural gas, as opposed to coal or nuclear power, will also make it easier to meet the federal air quality standards for certain contaminants such as smog and mercury.[50] Unlike coal and oil resources, natural gas burns more cleanly because it emits less carbon dioxide and is not obtained through strip-mining or mountaintop removal processes.[51] Natural gas has been passed over for many years because the technology to make drilling cost efficient was not available.[52] With the invention of horizontal drilling, inaccessible natural gas—gas that would be prohibitively expensive to extract—is now more accessible.[53] As a result, prices for natural gas decreased significantly and have become more competitive with other energy sources such as coal or oil.[54] Therefore, natural gas is seen as a cleaner domestic energy resource that is more cost-effective to extract than some of its counterparts.[55]

In addition, to the "green" aspect of natural gas, there is also a significant amount of the resource in the United States.[56] The United States could benefit greatly from an alternative resource that is available domestically because it limits reliance on foreign oil.[57] Also, the increase in accessibility to natural gas through these new fracking methods has severely decreased the price of this energy.[58] With the increased supply and decreased price of energy, the United States can benefit from these gas reserves not just through their use, but also through the sale of gas to foreign nations.[59] This could free the United States from some of its dependence on oil and make it a gas exporter.[60] While natural gas cannot fulfill all of the United State's energy needs, it could help lift the significant pressure to find alternate energy sources and allow the exploration of more long-term technologies.[61] However, the energy benefits must be balanced by the

49. Finkel, *supra* note 45, at 784.
50. Finkel, *supra* note 45, at 784.
51. Michael Burne, *Rogue Energy*, SIERRA, Mar./Apr. 2011, at 4. However, many communities positioned near these fracking operations find that the fracking does pose great threats upon the environment not much different than strip-mining, which include issues with air and water quality, heavy metal contamination, and wildlife habitat destruction. *Id.*
52. *See* Finkel, *supra* note 45, at 785. In the past, the thinness of the rock formation and the tightness of the shale made drilling very difficult and expensive. *See* Finkel, *supra* note 45, at 785.
53. *See* Finkel, *supra* note 45, at 785.
54. Deutch, *supra* note 1, at 82-85.
55. *See* Deutch, *supra* note 1, at 82-85.
56. Kathleen White, *The Fracas about Fracking*, NAT'L REV., June 20, 2011, at 38. From 2010 to 2011, the US energy information administration doubled its estimate of recoverable natural gas in the U.S. *Id.*
57. White, *supra* note 56.
58. Deutch, *supra* note 1, at 82-87.
59. Deutch, *supra* note 1, at 82-87.
60. Deutch, *supra* note 1, at 82-87.
61. *See* Deutch, *supra* note 1, at 88-90.

significant risks posed by the current system used for removing the natural gas.

B. Problems Associated with Drilling for Natural Gas

The main issue associated with using natural gas as an alternative energy resource concerns the way natural gas is removed from the earth.[62] Natural gas is a cleaner and more cost efficient form of energy than oil and coal once it has been harvested.[63] The real complaints directed toward the increased use of natural gas are environmental and health concerns provoked by the hydraulic fracturing technique, including the use and disposal of chemicals.[64] So far, twelve different states have reported environmental or health problems they associate with fracking.[65] These reports include contamination of drinking water with chemicals and contamination of surface water near the drilling site.[66] This concern is elevated due to the rapid speed with which companies are developing this new process.[67] From 2000 to 2008, the number of active drilling sites in New York almost doubled, and it is predicted that over the next 10 years another 80,000 wells will be drilled.[68] The rapid development in response to the growing need for domestic cleaner energy sources can account for the lack of comprehensive research on the environmental and health consequences of the new fracking methods.[69]

One consistent issue that has been raised by environmentalists is the release of information on the chemicals used in fracking.[70] Companies that participate in these excavations for natural gas are not legally required to list the chemical compounds used in the fracturing process.[71] Some recent studies have found that they contain toxic mud and fluid by-products that have the potential to be very harmful in the event of a spill or if the cleanup after the drilling is not done correctly.[72] Medical professionals and regulators also want the disclosure

62. *See* Nelson, *supra* note 5, at 25.
63. Manuel, *supra* note 33.
64. Manuel, *supra* note 33.
65. Brown, *supra* note 8, at 11147-48.
66. *See* Brown, *supra* note 8, 11147-48.
67. Finkel, *supra* note 45.
68. Finkel, *supra* note 45. "Industry estimates indicate that over the next 20 to 30 years an additional 300,000 nbew wells could be drilled." Finkel, *supra* note 45.
69. *See generally* Finkel, *supra* note 45. "There has been a rush to drill without sufficient health and environmental impact studies. . . [and] there has been relatively little research done on the potential negative health effects of fracking." Finkel, *supra* note 45.
70. Finkel, *supra* note 45. Orford, *supra* note 3.
71. Finkel, *supra* note 45, at 785.
72. Finkel, *supra* note 45, at 785. In August 2010, the EPA wrote letters to nine different drilling companies requesting information on fluids used in fracking. Finkel, *supra* note 45, at 785. They considered the information essen-

of chemicals so they know what to test for in the event of an emergency.[73] The full extent of these issues cannot be understood until companies are required to release the names of the chemicals used, and those chemicals can be tested.[74] The real risk with the release of these chemicals is posed to the groundwater of populations near the drill sites.[75]

Contamination of soil, air, and groundwater from the flowback is also a major concern.[76] The sludge from drilling is brought back to the surface during the drilling phase and must be disposed of safely because it has a serious risk of contaminating soil and air.[77] A 2011 EPA study found that "fracking wastewater contained radioactivity at unsafe levels that could not be diluted in rivers and other waterways and that was not being tested in most sewage treatment plants."[78] This wastewater potentially carries fracking chemicals and radioactive material.[79] To contain this wastewater, it is usually necessary to secure large ponds or tanks to protect the environment from the chemicals in the liquid.[80] However, storms sometimes cause the overflow of these ponds that may pollute surrounding land and groundwater.[81] An additional concern related to wastewater management is seismic activity that can occur when wastewater is disposed of through injection back into the earth.[82] Seismic activity is a known side effect of fracking, but the earthquakes are usually too light to detect.[83] Seismologists believe, however, that a bigger danger is posed by the injection of this wastewater back into the earth because it can reach the fault lines and cause more significant earthquakes.[84] Multiple states have recently reported substantial earthquakes, some as high as 5.1 magnitude.[85] Therefore, the systems for disposal of the millions of gallons of

---

tial to understanding the potential risks the methods pose. Finkel, *supra* note 45, at 785.

73. Orford, *supra* note 3.
74. *See* Finkel, *supra* note 45, at 784.
75. *Shale gas in Europe and America, Fracking Here, Fracking There,* ECONOMIST, Nov. 26, 2011, at 75-76.
76. Finkel, *supra* note 45, at 784-85.
77. Finkel, *supra* note 45, at 784.-85
78. Brown, *supra* note 8, at 11147.
79. Brown, *supra* note 8, at 11146-49.
80. Brown, *supra* note 8, at 11146-49.
81. Thomas Swartz, *Hydraulic Fracturing: Risks and Risk Management,* 26 NAT'L RES. & ENV'T 30, 30-31 (2011).
82. Pete Spotts, *How Fracking Caused an Ohio Earthquake,* CHRISTIAN SCI. MONITOR, Jan. 2, 2012, http://www.csmonitor.com/Science/2012/0102/How-fracking-might-have-led-to-an-Ohio-earthquake.
83. *Id.*
84. *See generally id.* "If pressurized fluids find their way into faults, the fluids can act like a hydraulic jack, separating locked sections enough to allow them to slip." *Id.*
85. Joyce Nelson, *Big "Fracking" Problem: Natural Gas Industry's "Fracking" Risks Causing Earthquakes,* CCPA MONITOR, Feb. 1, 2011, at 2.

wastewater must be regulated, and the risks must be managed and assessed before fracking can be a viable method for extraction.

Lack of governmental oversight is another disadvantage associated with fracking.[86] In 2005, Congress exempted fracking from regulation under the Safe Drinking Water Act in response to a 2004 report written by the EPA, claiming that fracturing was unlikely to cause contamination of drinking water.[87] This study has been condemned because it involved no direct monitoring of water wells but instead was based on literature and interviews with members of the industry and government officials.[88] The Department of Energy has recommended regulation, but there is no system of common standards that companies must maintain when participating in the fracking process.[89] States do regulate the fracking methods, but these regulations are often insufficient in preventing major problems associated with fracking.[90] For instance, these companies require massive amounts of water for the drilling process.[91] Currently, there is a permitting system in place, but there is no extensive state regulation or comprehensive underground water monitoring system, making it difficult to hold violators accountable.[92] Already, several Pennsylvania companies have been charged with drilling without permits, and it is widely suspected that many companies participate in this.[93] While some states do have regulations in place, there should be general standards that drill operators must abide by.[94] This failure by the state and federal government to

86. Finkel, *supra* note 45, at 784.
87. Manuel, *supra* note 33, at A199.
88. Manuel, *supra* note 33, at A199. The study was also condemned because it did not analyze the effects of fracking in substances other than coal beds. *See* Manuel, *supra* note 33. The EPA has since announced a more comprehensive study to be done by 2012. *See* Manuel, *supra* note 33.
89. *See* Richard Jansen, *DOE advisors call for tougher fracking laws*, THE CHEMICAL ENGINEER, Aug. 11, 2011, at 14. This may change with legislation currently introduced known as the FRAC act. Fracturing Responsibility and Awareness of Chemicals Act. S. 1215, 111th Cong. (2009). This would require companies to list the chemicals used among other changes allowing the EPA some regulation over fracking practices. Manuel, *supra* note 33, at A199.
90. *See* Finkel, *supra* note 45, at 784-85.
91. Finkel, *supra* note 45, at 784-85.
92. Finkel, *supra* note 45, at 784-85.
93. Finkel, *supra* note 45, at 784-85. Another example of the failure of the state to properly regulate drilling operations in Pennsylvania is where regulators hold well-operators liable for water quality only up to 2,500 feet from the drilling site when horizontal drilling can affect areas as far away as 5,000 feet. *Safety First*, *supra* note 13, at 12.
94. *See* Orford, *supra* note 3. Before the federal government or the state government should set standards, there needs to be a comprehensive report on the issues posed by fracking methods and how to manage the risks associated with those problems. The EPA study, which is set to be released in late 2012, should help clarify the standards needed to minimize risk when using hydraulic fracturing. *See* Orford, *supra* note 3.

provide adequate regulation must be fixed before widespread expansion of drilling occurs.

Another risk posed by fracking methods is the possible pollution of shallow aquifers by chemicals from fracking fluid or methane released during the fracking process.[95] This pollution does not generally come from the actual fracture of the shale rock but from leaks in vertical casings on the wells.[96] When the fracking fluid is pumped back up through the well, methane released from the shale rock can leak through casings along the well.[97] A study done by Duke University found that methane levels in drinking water wells within one kilometer of drilling sites were seventeen times higher than in wells further away.[98] The researchers also found that the chemical compositions of the methane contamination found in wells near the drilling site closely matched the type of gases extracted by the fracking process.[99] This exposure to methane and other by-products of fracking through drinking water has serious implications for the health of the surrounding areas.[100]

While leaks in the cement fixtures is the most likely reason for contamination of drinking water, new evidence suggests that horizontal fracturing has the potential to cause drinking water contamination on its own.[101] Many scientists previously dismissed the claim that the drilling process has polluted water wells or that there is a serious risk of polluting underground water reserves.[102] They dismissed the idea because shale layers are a mile or more deep into the ground and are separated from the relatively shallow aquifers from which the water is taken.[103] Most scientists claim that just one drill into the shale at the horizontal level will not cause the pollution of the aquifers, but agree that contamination is more likely if companies are drilling multiple wells and causing fractures within a very close range to ones previously drilled.[104] Since it is more cost efficient for companies to drill into multiple fractures near one another, this is the common practice.[105] This multiple fracking of the segments of the shale layer could potentially connect the shale layers to the surface.[106] If this happens, the

95. Swartz, *supra* note 81, at 31.
96. Swartz, *supra* note 81, at 31.
97. Swartz, *supra* note 81, at 30-32.
98. Swartz, *supra* note 81, at 30-32.
99. Swartz, *supra* note 81, at 30-32.
100. *See Fracking Here, Fracking There, supra* note 75, at 12.
101. Mooney, *supra* note 26, at 82-85.
102. Mooney, *supra* note 26, at 82-85.
103. Mooney, *supra* note 26, at 82-85. This is the reason it has taken so long to tap these natural gas sources. Mooney, *supra* note 26, at 82-85.
104. Mooney, *supra* note 26, at 82-85.
105. Mooney, *supra* note 26, at 82-85.
106. Swartz, *supra* note 80, at 30-32. This is especially a problem for states with operations that are drilling near old or abandoned drilling sites. Swartz, *supra* note 80, at 30-32.

gases and other sediment and contaminants that were pumped into the earth can reach surface wells and shallow aquifers where drinking water is stored.[107] Consequently, the new developments intended to make drilling more cost efficient could cause more severe environmental and health problems.[108] Recent evidence suggests that these environmental concerns are valid and should be explored fully before there is extensive drilling for natural gas.

IV. CONCLUSION

The potential environmental and health cost of mass-extraction of natural gas seems to outweigh the benefits of the energy resource. Evidence of drinking water and groundwater contamination resulting from fracking methods indicates that the risks posed are not outweighed by the prospect of an expanded domestic energy source.[109] It is true that natural gas, as a resource, is cleaner than both coal and oil.[110] However, the act of drilling for natural gas may pose bigger problems and should be thoroughly investigated before the expansion of fracking. If environmental fears about drinking water contamination are accurate, it could prove to be more detrimental to the health of Americans than the energy sources currently used.[111]

Overall, the rapid pace at which the shale rock is being fractured should cause significant concern, particularly because the long-term environmental issues are not currently known.[112] The lack of studies on the issue is alarming considering the rate with which the technology is developing and being used.[113] The EPA has announced a comprehensive study into the environmental effects of fracking that is estimated to conclude late in 2012. This study will hopefully predict the effects of the drilling process and establish guidelines to make fracking safer through greater state and federal oversight.[114] While this study will be helpful in recommending risk management strategies, the current state of fracking suggests that the dangers posed by the methods outweigh the benefits to retrieving the gas.

---

107. Swartz, *supra* note 80, at 30-32.
108. Swartz, *supra* note 80, at 30-32.
109. Manuel, *supra* note 33, at A199.
110. Finkel, *supra* note 45, at 785.
111. Finkel, *supra* note 45, at 785.
112. Finkel, *supra* note 45, at 785.
113. Manuel, *supra* note 33, at A199.
114. Manuel, *supra* note 33, at A199.