

HYDRAULIC FRACTURING IN MICHIGAN: REASSESSING STATE REGULATIONS IN LIGHT OF NEW DRILLING IN THE COLLINGWOOD AND UTICA SHALES

I. INTRODUCTION

Since the 1970s, natural gas has been a popular energy choice of electric utility generators and a variety of other large industries, such as the food processing and chemical industries, for its “clean-burning nature” and “economic availability.”¹ Today, natural gas energy provides about twenty-two percent of the United States’ total energy consumption and demand is still rising.² Indeed, since 2008, natural gas consumption has consistently surpassed its production.³ To meet this growing need, the natural gas industry has increasingly turned to the process of hydraulic fracturing,⁴ also called “hydrofracking,”⁵ or “fracking,”⁶ wherein a mixture of fluids is injected underground at extremely high pressures in order to force out large quantities of natural gas.⁷

The use of hydraulic fracturing has revolutionized the natural gas recovery process by allowing large quantities of gas to be extracted from “unconventional shale plays,” gas-producing rock formations that otherwise would not have released enough natural gas to be economically viable.⁸ However, use of the hydraulic fracturing process also has the potential to cause both environmental and public health harm through surface and groundwater depletion, land subsidence, and drinking water contamination.⁹ Federal attempts to minimize these risks through regulation have been ineffective. In fact, after years of debate, in 2005, Congress exempted hydraulic fracturing from regulation under the

1. *Modern Shale Gas Development in the United States: A Primer*, U.S. DEP’T OF ENERGY 3-4 (Apr. 2009), <http://fracfocus.org/node/93> [hereinafter *Modern Shale Gas*].

2. *Id.*

3. *Natural Gas Statistics*, U.S. ENERGY INFO. ADMIN., http://www.eia.doe.gov/energyexplained/index.cfm?page=natural_gas_home#tab2 (last updated June 8, 2011).

4. *Modern Shale Gas*, *supra* note 1, at 9.

5. Eartha Jane Melzer, *As Hydrofracking Begins in Michigan, New York Moves to Ban the Practice*, THE MICHIGAN MESSENGER (Aug. 5, 2010, 9:49 AM), <http://michiganmessenger.com/40600/as-hydrofracking-begins-in-michigan-new-york-moves-to-ban-the-practice>.

6. *Natural Gas Drilling & Water*, TIP OF THE MITT WATERSHED COUNCIL, <http://www.watershedcouncil.org/learn/hydraulic-fracturing/> (last visited Nov. 21, 2011).

7. *Modern Shale Gas*, *supra* note 1, at 56.

8. *Id.* at 9.

9. See *id.* at 61-70; *Land Subsidence*, U.S. GEOLOGICAL SURVEY (Apr. 30, 2010), <http://ga.water.usgs.gov/edu/earthgwlandsubside.html>.

Safe Drinking Water Act (SDWA)¹⁰ and so far, all attempts to subsequently repeal this exclusion have been unsuccessful.¹¹ Without any federal directive, hydraulic fracturing regulation has been left entirely to state governments.

In Michigan, state regulation of hydraulic fracturing has recently been substance for debate due to the discovery of substantial natural gas reserves in the Collingwood and Utica shale formations.¹² Because these shale formations are so much farther underground than the average gas producing shale in Michigan, the gas recovery process involves much deeper drilling, and also requires many millions more gallons of water to successfully fracture.¹³ This reality has stirred concerns about water depletion and drinking water contamination throughout the state, and has caused many to question the effectiveness of Michigan's existing oil and gas regulations in light of this new gas development.¹⁴ This Note will examine this concern, taking into account the new hydraulic fracturing rules issued by the Michigan Department of Environmental Quality ("DEQ") on May 25, 2011, and, where necessary, make suggestions for revision in or addition to the state's hydraulic fracturing regulations.

Part II provides a brief overview of the hydraulic fracturing process, including an explanation of the controversy surrounding the use of fracturing in natural gas recovery, and a discussion of the present state of federal hydraulic fracturing regulation. Part III focuses on hydraulic fracturing in Michigan and examines the May 25, 2011 order issued by the DEQ regarding regulation of the fracturing process in light of the new gas discovery in the Collingwood and Utica shales. Part III also discusses the possibility of direct legislative action in amending Michigan's oil and gas fee statutes. Finally, this Note recommends that Michigan continue to supplement its fracturing regulation in order to better protect the state's environmental integrity and the health of the public at large.

10. See 42 U.S.C. § 300h(b)(2)(A)-(B) (2006).

11. See H.R. 2766: *Fracturing Responsibility and Awareness of Chemicals Act of 2009*, GOVTRACK.US, <http://www.govtrack.us/congress/bill.xpd?bill=h111-2766> (last visited Nov. 21, 2011). See also H.R. 1084: *Fracturing Responsibility and Awareness of Chemicals Act of 2011*, GOVTRACK.US, <http://www.govtrack.us/congress/bill.xpd?bill=h112-1084> (last visited Nov. 21, 2011).

12. See Keith Schneider, *Michigan's New Natural Gas Rush: Energy and Water in Play*, CIRCLEOFBLUE.ORG (Jul. 27, 2010), <http://www.circleofblue.org/waternews/2010/world/michigan-new-natural-gas-rush-energy-and-water-in-play/>.

13. See *id.*

14. See *id.*

II. BACKGROUND

A. An Introduction to Natural Gas Geology and the Expansion of Hydraulic Fracturing

In order to fully understand just how vital the process of hydraulic fracturing has become to natural gas recovery, it is necessary to have some knowledge of natural gas geology and the evolution of the natural gas industry in the United States. Natural gas is a naturally occurring mixture of various hydrocarbon gases, composed predominately of methane and other gases.¹⁵ This gas mixture is found in porous rock formations, also called “reservoirs,” underneath the Earth’s surface.¹⁶ Rock formations with a high level of porosity or “permeability,” are classified as “conventional reservoirs,” and consist of rocks such as limestone and dolomite.¹⁷ Conversely, rock formations with a low level of permeability are classified as “unconventional” or “tight” reservoirs, and are usually composed of a type of sedimentary rock called shale.¹⁸ In conventional reservoirs, large amounts of gas can be recovered by drilling a vertical well down to the rock formation; the high permeability of the rock allows gas to easily escape through the well to the surface.¹⁹ However, in an unconventional reservoir, simply drilling a vertical well is not enough.²⁰ Due to the low permeability of the rock in an unconventional reservoir, only a minimal amount of natural gas is able to travel through the well to the surface—the gas is literally trapped in the tight rock formation, making it much harder to recover than gas in conventional reservoirs.²¹

Until recently, this difficulty confined natural gas recovery to conventional reservoirs, where drilling was technologically feasible and economically practicable.²² Today, conventional gas resources are becoming increasingly scarce and the gas industry is concentrating more and more on unconventional natural gas sources.²³ In order to obtain economically viable quantities of gas from these unconventional

15. *Modern Shale Gas*, *supra* note 1, at 6.

16. *Id.*

17. *Id.* at 15.

18. *Id.*

19. *Id.* at 13-15.

20. *See id.* at 13-14.

21. *See Modern Shale Gas*, *supra* note 1, at 13-14.

22. *See id.* at 7-9.

23. *See id.* at 8.

reservoirs, two new technological advances in natural gas drilling have been made: (1) horizontal drilling, and (2) hydraulic fracturing.²⁴

Horizontal drilling is a drilling technique in which the wellbore is turned from a vertical position to a horizontal position at the depth of the target rock formation.²⁵ This drilling method enhances the natural gas recovery of an unconventional well by increasing exposure of the well bore to the reservoir.²⁶ Hydraulic fracturing, a controversial technique and the focus of this Note, is another technological advancement in the drilling for natural gas. During the hydraulic fracturing process, a mixture of water, chemical additives, and a “proppant,” is injected at high pressure into the wellbore.²⁷ The pressure of this liquid mixture forces natural fractures in the reservoir to become wider and also creates new fractures.²⁸ The liquid also carries the proppant, usually sand, into the newly widened or created fractures.²⁹ This proppant literally serves to “prop,” or hold open the fractures produced by the fracturing process which permits a much greater quantity of natural gas to escape from the reservoir rock.³⁰ Later, when the fracturing process is over, the liquid mixture is pumped back out of the wellbore, allowing natural gas to flow back up through the well to the surface where it is collected.³¹

B. Benefits of the Hydraulic Fracturing Process

Clearly, hydraulic fracturing offers significant advantages to the natural gas industry by allowing drillers to tap into trapped natural gas reserves in unconventional reservoirs, but use of the fracturing process in natural gas recovery could also be hugely beneficial to individual states and even the United States as a whole. Encouraging the use of hydraulic fracturing in states with viable, natural gas-producing shale rock formations or “shale plays,” could be a huge economic boom for these states.³² A state permitting the fracturing of natural gas wells would

24. See *id.* at 8-9. Typically, a combination of horizontal drilling and hydraulic fracturing are used in unconventional reservoirs in order to achieve maximum gas production, but each technique can also be used independent of the other. See *id.* at 15.

25. *Natural Gas Drilling & Water*, *supra* note 6.

26. *Modern Shale Gas*, *supra* note 1, at 46-47.

27. Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115, 118 (2009).

28. See *id.*

29. *Id.*

30. *Id.*

31. *Natural Gas Drilling & Water*, *supra* note 6.

32. See Timothy Considine et al., *An Emerging Giant: Prospects and Economic Impacts of Developing the Marcellus Shale Natural Gas Play*, THE PA. STATE UNIV. 3

provide major gas companies with a significant incentive to move into that state and invest large sums of money in order to establish new drilling operations.³³ These new drilling operations in turn would create openings for many new jobs, stimulating the state's economy.³⁴

In addition to the benefits conferred on individual states, the United States, on a national level, could also reap considerable benefits from the use of hydraulic fracturing. As described above, hydraulic fracturing is really a "game changer" in terms of natural gas drilling in unconventional reservoirs, allowing much more gas that previously would have been unrecoverable to be harvested.³⁵ As hydraulic fracturing techniques become more refined and unconventional shale plays become even more economically practicable to develop, production and consumption of natural gas will only increase.³⁶ This increase in natural gas availability could lead to less dependence on the "dirtier" fossil fuels,³⁷ coal and oil, and thus, to a cleaner overall energy outlook for the United States.³⁸

C. The Potential Costs of Hydraulic Fracturing

Although the potential benefits of hydraulic fracturing are significant, the technique also has its drawbacks. Opponents of hydraulic fracturing argue that the environmental and public health risks associated with the process far outweigh any of its potential benefits.³⁹ Of greatest concern is the danger that hydraulic fracturing poses to valuable surface water and groundwater supplies.⁴⁰ Hydraulic fracturing could be a danger

(July 24, 2009)
<http://www.alleghenyconference.org/PDFs/PELMisc/PSUStudyMarcellusShale072409.pdf>.

33. *See id.*

34. *See id.*

35. Wes Deweese, *Fracturing Misconceptions: A History of Effective State Regulation, Groundwater Protection, and the Ill-Conceived FRAC Act*, 6 OKLA. J.L. & TECH. 49, *4-5 (2010).

36. *Modern Shale Gas*, *supra* note 1, at 9-10.

37. Natural gas is the cleanest burning fossil fuel. Coal and oil are considered to be "dirtier" fuels because in comparison to natural gas, they release significantly more air pollutants like nitrogen oxides, sulfur dioxide, and carbon monoxide. *See id.* at 5.

38. *See id.* at 5-6.

39. *See Natural Gas Drilling & Water*, *supra* note 6. *See also* Brian Creek, *What the Frack? Hydraulic Fracturing in Antrim Shale Will Impact Water Resources*, THE ROUND RIVER BLOG (Mar. 19, 2010), <http://theroundriver.com/2010/03/19/wtf-hydraulic-fracturing-in-antrim-shale-will-impact-water-resources/>.

40. *See Natural Gas Drilling & Water*, *supra* note 6.

to these water resources in two ways: (1) contamination, and (2) depletion.⁴¹

The threat of contamination focuses largely on the effects of hydraulic fracturing on groundwater resources. On average, a shale gas well must be drilled about 3,000 feet into the ground in order to reach the target formation.⁴² This means that on its way towards the target formation, the wellbore will pass through the water table, or "groundwater zone," where natural and valuable deposits of freshwater are stored in aquifers.⁴³ The worry here is that either (a) natural gas stimulated in the fracturing process will migrate upwards through the well and come into contact with groundwater, thus fouling the water resource, or (b) the chemical additives used in the fracturing process will likewise migrate upwards through the well into the groundwater, creating a serious public health risk.⁴⁴ The danger posed to the public health by the chemical additives used in the fracturing process is especially alarming because the exact chemical mixture introduced into the fracturing fluid is often considered a proprietary trade secret by the drilling companies.⁴⁵ Thus, the public knows only a fraction of the potentially dangerous, possibly carcinogenic, constituent chemicals used in the drilling process.⁴⁶

Additionally, there is further risk of groundwater contamination during the disposal of the used fracturing fluid,⁴⁷ also called "produced water."⁴⁸ The most common method of disposal for produced water is underground injection.⁴⁹ During this process, the produced water, which is usually not tested for human health and safety purposes or treated in any way,⁵⁰ is injected directly into "porous rock formations" deep

41. See *Modern Shale Gas*, *supra* note 1, at 61-70.

42. See *id.* at 54. In shallow shales (shale formations that are closer to the surface), risk of groundwater contamination is even higher because there is less natural barrier rock to buffer the "producing zone" where the fracturing is occurring from the groundwater zone. See *id.*

43. See *id.* at 51-52.

44. See *id.* at 61-70.

45. See Deweese, *supra* note 35, at 11.

46. See *id.*

47. Not all used fracturing fluid or "produced water," even makes it to the disposal stage. On average only 30-70% of the liquid mixture used in the hydraulic fracturing is recovered after the process is complete. *Modern Shale Gas*, *supra* note 1, at 66. The leftover fluid waste remains in the target rock formation. *Id.* The environmental consequences of this "stranded fluid are unknown." Wiseman, *supra* note 27, at 137.

48. See *Modern Shale Gas*, *supra* note 1, at 66-70.

49. See *id.* at 68.

50. Produced water is tested for naturally occurring radioactive material (NORM) which is often "brought to the surface in the natural gas production process." *Id.* at 70-71. Specifically, small amounts of radioactive material are usually found in the rock

underground.⁵¹ Though the produced water is separated from the groundwater zone by many feet of natural rock, there is still the possibility that this potentially hazardous mixture could migrate upwards in the future as the geologic structure of the Earth changes.⁵²

Besides the potential for groundwater contamination, the process of hydraulic fracturing also threatens to harm both surface and groundwater resources by depleting them past the point of viability. The fracturing process requires enormous volumes of fresh water.⁵³ In fact, “the drilling and fracturing of a horizontal shale gas well may typically require 2 to 4 million gallons of water.”⁵⁴ This water is either taken from surface water resources, like lakes and rivers, or is pumped from a nearby groundwater aquifer.⁵⁵ Such a large withdrawal from one surface water body, or one underground aquifer, has the potential for devastating environmental and other consequences. In surface waters, such a large withdrawal could lower the overall water level in that water body.⁵⁶ Lower water levels in turn “could affect fish and other aquatic life, fishing and other recreational activities, municipal water supplies, and other industries such as power plants.”⁵⁷ In groundwater aquifers, the repeated withdrawal of millions of gallons of water could quickly drain the resource.⁵⁸ As a result, municipal water authorities that pump groundwater to supply their residents and private well-owners may not be able to meet their water needs.⁵⁹ There is even the possibility that large water withdrawals for hydraulic fracturing could cause land subsidence.⁶⁰ Subsidence occurs when groundwater is pumped out of the ground faster than it is replenished through natural processes.⁶¹ The land above the emptied aquifer subsides, or collapses, because the water that once supported the ground is no longer there.⁶²

fragments and used fracturing fluids that are produced as a byproduct of the drilling process. *Id.* If NORM levels “exceed state regulatory levels or OSHA exposure dose risks, . . . [then] the material is taken to licensed facilities for proper disposal.” *Id.* at 71.

51. *Id.* at 68-69.

52. See *Natural Gas Drilling & Water*, *supra* note 6.

53. See *Modern Shale Gas*, *supra* note 1, at 64.

54. *Id.*

55. *Id.* at 65.

56. *Id.*

57. *Id.*

58. See *Groundwater Depletion*, U.S. GEOLOGICAL SURVEY (Mar. 29, 2010, 9:29 AM), <http://ga.water.usgs.gov/edu/gwdepletion.html>.

59. See *id.*

60. See *Land Subsidence*, *supra* note 9.

61. *Id.*

62. *Id.*

The natural gas industry and government have done little to investigate these threats to our nation's water. In fact, the science of hydraulic fracturing lags far behind the technological advances in the field. As of yet, no scientific report "has sufficiently investigated and compared the effects of fracing [i.e., hydraulic fracturing] in the many formations currently being tapped for . . . gas."⁶³ In other words, when it comes to hydraulic fracturing, we are going in blind with no sound way to predict the public health and environmental consequences of our actions.

D. Federal Regulation of Hydraulic Fracturing: The Safe Drinking Water Act Loophole

The Safe Drinking Water Act (SDWA) was passed by Congress in 1974 to ensure safe drinking water for the American public.⁶⁴ Part C of the Act focuses entirely on "protection of underground sources of drinking water."⁶⁵ Under Part C, the Administrator of the Environmental Protection Agency (EPA) is required to develop underground injection control (UIC) regulations for each state in which she deems a UIC program necessary to protect underground sources of drinking water from contamination by underground injection of wastes.⁶⁶ Primary enforcement responsibility of these regulations is then delegated to the states, each of which must develop and implement a UIC program that complies with the requirements of the existing regulations.⁶⁷ If a state fails to develop an approved UIC program, then the EPA Administrator may prescribe a program for that state.⁶⁸

Notably, gas drilling and hydraulic fracturing are excluded from regulation under the Act.⁶⁹ The decision to exclude fracturing from federal water protection law was the product of almost ten years of debate that began with the case *Legal Environmental Assistance Foundation v. United States Environmental Protection Agency*.⁷⁰ This case arose out of a petition made in 1994 by the Legal Environmental Assistance Foundation (LEAF) to the EPA, which asked the EPA to

63. Wiseman, *supra* note 27, at 141.

64. *Safe Drinking Water Act (SDWA)*, U.S. ENVTL. PROT. AGENCY, <http://water.epa.gov/lawsregs/rulesregs/sdwa/index.cfm> (last visited Nov. 21, 2011).

65. See 42 U.S.C. § 300h (2006).

66. 42 U.S.C. § 300h-1(a) (2006); 42 U.S.C. § 300h(d)(2) (2006).

67. 42 U.S.C. § 300h-1(b)(1)(A)(i) (2006).

68. 42 U.S.C. § 300h-1(c) (2006).

69. See 42 U.S.C. § 300h(b)(2)(A)-(B) (2006); 42 U.S.C. § 300h(d)(1)(A)-(B) (2006); 42 U.S.C. § 300h-1(c)(1)-(2) (2006); 42 U.S.C. § 300h-2(c)(1)(A)-(B) (2006).

70. Wiseman, *supra* note 27, at 142-46.

withdraw approval of Alabama's UIC program.⁷¹ At the time, Part C of the SDWA required that state UIC programs "prohibit unauthorized 'underground injection,' defined as 'the subsurface emplacement of fluids by well injection.'"⁷² In its petition to the EPA, LEAF argued that the Alabama UIC program did not meet this statutory requirement because it did not address "hydraulic fracturing activities associated with methane gas production," which LEAF argued constituted "underground injection" under the SDWA.⁷³ The EPA denied LEAF's petition and LEAF subsequently sought judicial review.⁷⁴ In the resultant case before the Eleventh Circuit, the EPA argued that hydraulic fracturing should not be regulated under the SDWA, and that the agency's interpretation of the statutory term "underground injection" was consistent with congressional intent and therefore permissible.⁷⁵ LEAF on the other hand, asserted that hydraulic fracturing must be regulated under Part C of the SDWA, and that the EPA's interpretation of the term "underground injection" was not valid because such an interpretation "render[ed] the regulations inconsistent with the [SDWA]."⁷⁶ The court agreed with LEAF and held that "hydraulic fracturing activities constitute[d] 'underground injection'" under Part C of the SDWA, and that the EPA's "contrary interpretation" was inconsistent with the SDWA and thus invalid.⁷⁷

After the resolution of the *LEAF* case, the EPA began a study to determine whether hydraulic fracturing should be regulated under the SDWA.⁷⁸ Predictably, oil and gas industry groups urged the EPA not to apply the SDWA to hydraulic fracturing, while environmental advocates supported increased federal oversight of the practice.⁷⁹ In a controversial report published in 2004, the EPA ultimately concluded that use of the hydraulic fracturing process did not pose a significant threat to underground sources of drinking water,⁸⁰ and based largely on these

71. *Legal Envtl. Assistance Found. v. United States Envtl. Prot. Agency (LEAF)*, 118 F.3d 1467, 1471 (11th Cir. 1997).

72. *Wiseman*, *supra* note 27, at 143.

73. *LEAF*, 118 F.3d at 1471.

74. *Id.* at 1471-72.

75. *Id.* at 1473-74. Specifically, the EPA argued that: "(1) the statutory definition of 'underground injection' [wa]s ambiguous, (2) Congress intended to exclude wells whose principal function is not the injection of fluids from the UIC regulatory scheme, and, therefore, (3) EPA's regulations [we]re a permissible interpretation of the statutory language." *Id.*

76. *Id.* at 1472.

77. *Id.* at 1478.

78. *Wiseman*, *supra* note 27 at 144-45.

79. *Id.*

80. *Hydraulic Fracturing Background Information*, U.S. ENVTL. PROT. AGENCY, http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_hydrowhat.cf

findings, Congress voted to formally exclude hydraulic fracturing from the SDWA in the Energy and Policy Act of 2005 (EPAAct).⁸¹ Specifically, the EPAAct amended the SDWA to exclude hydraulic fracturing from the definition of “underground injection” as provided in Section 300h by stating that, “underground injection” means *only* “the subsurface emplacement of fluids by well injection,” excluding “(i) the underground injection of natural gas for purposes of storage; and (ii) the underground injection of fluids or propping agents . . . pursuant to hydraulic fracturing operations”⁸²

E. The FRAC Act and the Future of Federal Hydraulic Fracturing Regulation

The unambiguous exception for hydraulic fracturing in the SDWA as created by the EPAAct went unchallenged for four years until 2009 when Democratic members of Congress, led by Representative Diana DeGette, introduced a bill called the “Fracturing Responsibility and Awareness of Chemicals Act of 2009,” or the “FRAC Act.”⁸³ The FRAC Act sought to remove the fracturing exemption in the SDWA by amending Section 300h(d)(1) and Section 300h(b) of the statute.⁸⁴ These amendments to the SDWA would require the EPA to regulate hydraulic fracturing by bringing the process within the definition of “underground injection,” and would also require any person using hydraulic fracturing to disclose

m (last updated Oct. 31, 2011). This study however, only examined the effects of hydraulic fracturing in coalbed methane reservoirs and did not inquire into the use of fracturing in shale formations. *Id.* Additionally, other groups have raised valid concerns about the neutrality and scientific soundness of this study, claiming that the EPA was improperly influenced by oil and gas industry lobbyists to “OK” the hydraulic fracturing process. See Ian Urbina, *Pressure Limits Efforts to Police Drilling for Gas*, N.Y. TIMES, Mar. 3, 2011, http://www.nytimes.com/2011/03/04/us/04gas.html?_r=1&ref=drillingdown.

81. *Hydraulic Fracturing Background Information*, *supra* note 80. Signed into law by Republican president George W. Bush, the EPAAct has been widely criticized by Democrats and environmentalists for the large and numerous subsidies it grants to the oil and nuclear industries. See Michael Grunwald & Juliet Eilperin, *Energy Bill Raises Fears About Pollution, Fraud*, WASH. POST (July 30, 2005), available at <http://www.washingtonpost.com/wp-dyn/content/article/2005/07/29/AR2005072901128.html>.

82. 42 U.S.C. § 300h(d)(1)(A)-(B) (2006).

83. Abraham Lustgarten, *FRAC Act—Congress Introduces Twin Bills to Control Drilling and Protect Drinking Water*, PROPUBLICA (June 9, 2009, 1:31 PM), <http://www.propublica.org/article/frac-act-congress-introduces-bills-to-control-drilling-609>.

84. Fracturing Responsibility and Awareness of Chemicals Act of 2009, H.R. 2766, 111th Cong. (2009).

the chemical constituents and proprietary chemical formulas used in the fracturing process to the general public.⁸⁵

Though the bill generated a good deal of public interest when it was introduced, it has yet to become ratified as law.⁸⁶ One day after its introduction in 2009, the bill was referred to the House Subcommittee on Energy and Environment, where it was seemingly ignored for over a year before being automatically cleared from the books when Congress began a new session on January 5, 2011.⁸⁷ The bill was then reintroduced as the “Fracturing Responsibility and Awareness of Chemicals Act of 2011” in

85. *Id.* The actual amendments provide:

(a) Hydraulic Fracturing- Section 1421(d)(1) of the Safe Drinking Water Act (42 U.S.C. 300h(d)(1)) is amended by striking subparagraph (B) and inserting:

‘(B) includes the underground injection of fluids or propping agents pursuant to hydraulic fracturing operations related to oil and gas production activities; but

‘(C) excludes the underground injection of natural gas for purposes of storage.’

(b) Disclosure- Section 1421(b) of the Safe Drinking Water Act (42 U.S.C. 300h(b)) is amended as follows:

(1) In subparagraph (C) of paragraph (1) insert before the semicolon ‘, including a requirement that any person using hydraulic fracturing disclose to the State (or the Administrator if the Administrator has primary enforcement responsibility in the State) the chemical constituents (but not the proprietary chemical formulas) used in the fracturing process.’

(2) Add the following new paragraph at the end thereof:

‘(4) The State (or Administrator) shall make the disclosure of chemical constituents referred to in subparagraph (C) of paragraph (1) available to the public, including a posting of the information on an appropriate Internet website. In addition, whenever the State or the Administrator, or a treating physician or nurse, determines that a medical emergency exists and the proprietary chemical formulas or specific chemical identity of a chemical used in hydraulic fracturing is necessary for emergency or first-aid treatment, the person using hydraulic fracturing shall immediately disclose the proprietary chemical formulas or the specific chemical identity of a trade secret chemical to the State, the Administrator, or that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The person using hydraulic fracturing may require a written statement of need and a confidentiality agreement as soon thereafter as circumstances permit.’

Id.

86. See H.R. 2766: *Fracturing Responsibility and Awareness of Chemicals Act of 2009*, *supra* note 11. See also H.R. 1084: *Fracturing Responsibility and Awareness of Chemicals Act of 2011*, *supra* note 11.

87. See H.R. 2766: *Fracturing Responsibility and Awareness of Chemicals Act of 2009*, *supra* note 11.

the new session of Congress on March 15, 2011, and has since been referred to the House Subcommittee on Environment and the Economy.⁸⁸

Considering the utter abandonment of the 2009 FRAC Act, the prospects for passage of the 2011 FRAC Act look bleak. Most likely, the FRAC Act, like the gaping exemption for fracturing in the SDWA, will become just another example of hydraulic fracturing regulatory failure on the part of the federal government and this controversial practice will continue to bypass federal oversight.⁸⁹

III. ANALYSIS

A. State Regulation of Hydraulic Fracturing: A Focus on Fracturing in Michigan

Due to the lack of federal regulation of hydraulic fracturing, administration of this controversial process has been left almost entirely to the states.⁹⁰ In Michigan, natural gas well regulation is controlled jointly by two administrative agencies: the DEQ and the Michigan Public Service Commission (MPSC).⁹¹ These agencies are authorized under Michigan law to promulgate and enforce rules that allow the agencies to effectively regulate natural gas drilling and production. For the DEQ, this authorization is found in Part 615 of the Michigan Natural Resources and

88. See *H.R. 1084: Fracturing Responsibility and Awareness of Chemicals Act of 2011*, *supra* note 11.

89. Even in the unlikely event that the FRAC Act becomes law, it will only be the first small step towards comprehensive fracturing regulation. Further legislative action will be required to regulate other risks associated with hydraulic fracturing that the FRAC Act does not address, namely, depletion of water resources and land subsidence. See *H.R. 2766: Fracturing Responsibility and Awareness of Chemicals Act of 2009*, *supra* note 11.

Though this sort of comprehensive federal fracturing legislation is unlikely in the current political and social climate, new scientific data may make such regulation more realistic in the future. In 2010, the EPA began development of a new study focused solely on hydraulic fracturing. *Hydraulic Fracturing*, U.S. ENVTL. PROT. AGENCY, <http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/index.cfm> (last updated Oct. 13, 2010). The study is planned to commence in 2011 with initial study results available in 2012. *Id.* Depending on the findings of this study, United States lawmakers may be persuaded to take a firmer regulatory approach towards hydraulic fracturing.

90. Wiseman, *supra* note 27, at 146.

91. *About Michigan's Natural Gas Industry: Exploration and Production*, MICH. PUB. SERV. COMM'N, <http://www.dleg.state.mi.us/mpsc/gas/about1.htm> (last updated Oct. 14, 2011) [hereinafter *About Michigan's Natural Gas Industry*].

Environmental Protection Act (NREPA).⁹² The MPSC is similarly authorized under Chapter 460 of the Michigan Compiled Laws.⁹³

Regulatory oversight of the natural gas recovery process begins when a well-owner files an application for a permit to drill with the DEQ.⁹⁴ Without this permit, no person may drill or operate a gas well in the state of Michigan.⁹⁵ If the permit is granted,⁹⁶ the well-owner may begin construction of the well, subject to DEQ regulations on spacing and location of wells, and drilling and well construction.⁹⁷

After construction of the well is complete, but before gas production can begin, two things must occur: (1) the DEQ must approve the well for production,⁹⁸ and (2) the well-owner must obtain a Standard Wellhead Connection Permit and Allowable Withdrawal Order from the MPSC.⁹⁹ In order to get production approval from the DEQ, the newly drilled well must undergo extensive testing to establish that it meets all regulatory requirements.¹⁰⁰ If the well passes these production tests the well-owner is then free to seek a Standard Wellhead Connection Permit¹⁰¹ and Allowable Withdrawal Order¹⁰² from the MPSC. In order to get this

92. MICH. COMP. LAWS ANN. §§ 324.61505-.61506 (West 2010).

93. MICH. COMP. LAWS ANN. § 460.6 (West 1999).

94. See MICH. ADMIN. CODE r. 324.201 (1999). The well-owner's permit application must include: (1) the exact well location as surveyed by a state licensed surveyor, (2) an "environmental impact assessment," (3) a "conformance bond" or "statement of financial responsibility," and (4) the permit application fee. *Id.* For wells that will utilize the hydraulic fracturing process, drilling applicants must provide further application information including (1) a detailed plat showing the proposed location and depth of the well and other wells in the area, (2) all plugging records of abandoned wells near the proposed fracturing well location, (3) a detailed schematic diagram of the proposed well, and (4) basic operating information related to the proposed well, such as "daily injection rates and pressures." *Id.* Additional application requirements also exist if a well-owner intends to horizontally or directionally drill a proposed well. *Id.*

95. *Id.*

96. The DEQ has 60 days in which to review and either grant or deny the permit application. *Id.* A permit will be denied to any person found to be in violation of: (1) NREPA, (2) the administrative rules governing drilling under Part 615, (3) any "permit conditions" established under Part 615, (4) any instructions promulgated by the supervisor of wells, (5) any order of the supervisor of wells, or (5) any order of the DEQ. MICH. ADMIN. CODE r. 324.205 (1999).

97. See MICH. ADMIN. CODE r. 324.301-.304, 324.401-.422 (1999).

98. MICH. ADMIN. CODE r. 324.601-.613 (1999).

99. MICH. ADMIN. CODE r. 460.864 (1999).

100. MICH. ADMIN. CODE r. 324.601-.613 (1999).

101. The Standard Wellhead Connection Permit allows the driller to connect the gas well to a pipeline so that the gas may be transported and sold. See MICH. ADMIN. CODE r. 460.864 (1999).

102. The Allowable Withdrawal Order establishes the maximum production limits of the gas well. *About Michigan's Natural Gas Industry*, *supra* note 91. Allowable production limits are usually set at 17.5% of the "calculated absolute open flow (the

permit and accompanying order, the well-owner must fill out a simple form application and submit this application to the MPSC at least "15 days before the first day of the month during which it is expected that [production of gas shall commence]." ¹⁰³ Unless the driller has made some mistake on the application form, the MPSC will grant the Standard Wellhead Permit and Allowable Withdrawal Order and the driller may finally begin gas production. ¹⁰⁴

Importantly, Michigan's regulation of hydraulic fracturing does not end when production begins. The DEQ maintains regulatory control over all gas wells for the production life of the well and beyond. ¹⁰⁵ In particular the DEQ regulates any "deepening, plugging, reworking, and abandonment of [gas] wells" ¹⁰⁶ and also has the authority to suspend well operations for regulatory violations, or even order a well to be plugged for continued violation. ¹⁰⁷ Like the DEQ, the MPSC retains jurisdictional control over gas wells after the start of production. ¹⁰⁸ In the case of the MPSC, regulatory authority over gas wells continues until production of gas at that well is abandoned. ¹⁰⁹

B. New Drilling in the Collingwood and Utica Shales and Its Effects on the Michigan Natural Gas Landscape

Though hydraulic fracturing has been a common practice in Michigan since the mid-1980s, ¹¹⁰ not much attention has been paid to the use of the fracturing process or to Michigan fracturing regulation until recently. ¹¹¹ However, in early 2010, Encana, a Canadian natural gas company, sparked what could be called a "natural gas rush" ¹¹² in the state of Michigan when one of its exploratory wells discovered significant natural gas reserves in the Collingwood Shale; a deep shale formation located about 9,500 feet underground. ¹¹³ The well, which has

amount that could flow or vent from an unrestricted well) as determined by a well flow test [conducted by the MPSC]." *Id.*

103. MICH. ADMIN. CODE r. 460.864 (1999).

104. *Id.*

105. *See About Michigan's Natural Gas Industry*, *supra* note 91.

106. *Id.*

107. MICH. ADMIN. CODE r. 324.1301 (1999).

108. MICH. ADMIN. CODE r. 460.855 (1999).

109. *Id.*

110. *Hydraulic Fracturing of Natural Gas Wells in Michigan*, DEP'T OF NATURAL RES. & ENV'T 1 (Aug. 13, 2010), http://www.michigan.gov/documents/deq/Hydrofrac-2010-08-13_331787_7.pdf.

111. *See Schneider*, *supra* note 12.

112. *Id.*

113. *Id.*

been named “Pioneer,” reportedly yielded about 2.5 million cubic feet of natural gas per day during the first thirty days of production, making it “the most prolific single source of natural gas in Michigan.”¹¹⁴ Recognizing a sound investment opportunity, the natural gas industry spent over 178 million dollars at a state mineral-rights auction in 2010, purchasing about 118,000 acres of land in twenty-two northern Michigan counties.¹¹⁵ A second auction in October 2010 garnered another 10 million dollars in sales of mineral rights.¹¹⁶ This overwhelming interest in recovering gas from the Collingwood and nearby Utica shales has brought the issue of hydraulic fracturing in Michigan into the spotlight as never before.¹¹⁷ All across the state, citizens and lawmakers have quickly become aware of the many risks associated with fracturing deep shale formations.¹¹⁸ Because the Collingwood and Utica shales are so much farther underground than the average shale formation, gas wells must be drilled deeper and much more water must be used in order to successfully fracture these deep wells.¹¹⁹ In fact, it took 5.5 million gallons of water¹²⁰ to fracture Encana’s Pioneer well.¹²¹ This daunting number has raised worries about the effects that more Collingwood and Utica gas wells could have on the state’s treasured and valuable water resources.¹²² Indeed, water depletion is a valid concern in Michigan, whose billion dollar tourism industry rests almost entirely on the draw of the state’s beautiful water bodies.¹²³ Though for some time the Michigan DEQ has claimed that the state’s oil and gas regulations are adequate to

114. *Id.*

115. Steve Kellman, “Typical” Michigan Oil and Gas Lease Auction Casts Doubt on Collingwood Shale Formation, CIRCLEOFBLUE.ORG (Nov. 9, 2010, 4:36 PM), <http://www.circleofblue.org/waternews/2010/world/%E2%80%9Ctypical%E2%80%9D-michigan-oil-and-gas-lease-auction-casts-doubt-on-collingwood-shale-formation/>.

116. *Id.*

117. See Schneider, *supra* note 12.

118. See *id.* See also *supra* footnotes 39-63 and accompanying text (detailing the potential dangers related to the hydraulic fracturing of deep shales).

119. See Schneider, *supra* note 12.

120. To put this number into perspective, 5.5 million gallons of water could fill just over eight Olympic sized swimming pools or satisfy the daily water needs of almost 80,000 people. See Lyssa Oberkreser, *How Big is an Olympic Swimming Pool?*, EHOW.COM, http://www.ehow.com/facts_5296452_big-olympic-swimming-pool.html (last visited Apr. 2, 2011); Am. Water Works Ass’n, *Water Use Statistics*, DRINKTAP.ORG, <http://www.drinktap.org/consumerdnn/Default.aspx?tabid=85> (last visited Nov. 21, 2011).

121. See Schneider, *supra* note 12.

122. See *id.*

123. See *MI Great Lakes Plan: Our Path to Protect, Restore and Sustain Michigan’s Natural Treasures*, MICHIGAN.GOV 1 (Jan. 2009), http://www.michigan.gov/documents/deq/MI-GLPlan-Brochure_262612_7.pdf.

protect the public health and local natural resources from these risks,¹²⁴ on May 25, 2011, the department issued an order announcing a series of new hydraulic fracturing regulations.¹²⁵ The new regulations, effective June 22, 2011, amend Michigan's current rules for reporting, well completion, and permitting requirements promulgated under Part 615 for "all oil and gas wells that utilize high volume hydraulic fracture completion technology."¹²⁶

1. Michigan's New Hydraulic Fracturing Regulations

a. Reporting Requirements

Under DEQ's new regulations, well-owners that conduct high volume hydraulic fracturing well completion operations must provide four additional items with the record of well completion operations:¹²⁷ (1) Material Safety Data Sheets (MSDSs) for each chemical additive used in the fracturing process and also the volume of each chemical additive used;¹²⁸ (2) records and charts showing fracturing volumes, rates and pressures;¹²⁹ (3) a record of annulus¹³⁰ pressures during fracturing operations;¹³¹ and (4) a record of "the total volume of flowback water (formation and/or treatment water) to date at the time of record submittal."¹³²

124. See Schneider, *supra* note 12.

125. Brad Wurfel, *Michigan Issues New Orders for Fracking*, MICH. DEP'T OF ENVTL. QUALITY, <http://www.michigan.gov/deq/0,1607,7-135--256844--,00.html> (last visited Mar. 2, 2012).

126. *High Volume Hydraulic Fracturing Well Completions*, MICH. DEP'T OF ENVTL. QUALITY 1 (May 2011), http://www.michigan.gov/documents/deq/SI_1-2011_353936_7.pdf [hereinafter *High Volume*]. "High volume hydraulic fracture completion technology" is defined by the DEQ as "a well completion operation that is intended to use a total of more than 100,000 gallons of hydraulic fracturing fluid." *Id.* A well completion operation is "work performed in an oil or gas well...after the well has been drilled...and the...casing...set, including perforating, artificial stimulation, and production testing." MICH. ADMIN. CODE r. 324.103(s) (1999).

127. *High Volume*, *supra* note 126, at 3.

128. *Id.*

129. *Id.*

130. The annulus, or annular space, is the space between two concentric objects "such as between the wellbore and casing or between casing and tubing, where fluid can flow." *Annulus Definition*, OILGASGLOSSARY.COM, <http://oilgassglossary.com/annulus.html> (last visited Nov. 21, 2011).

131. *High Volume*, *supra* note 126, at 3.

132. *Id.*

b. Well Completion Requirements

The Michigan DEQ also imposed three additional well completion requirements in its May 25, 2011 order.¹³³ First, if there are one or more freshwater wells within 1,320 feet of a proposed large volume withdrawal, then the well-owners must install a monitoring well between the water withdrawal well and the nearest fresh water well, record the water levels in the monitoring well on a weekly basis, and report the water levels on a weekly basis to the appropriate District Office of the Office of Geological Survey.¹³⁴ Second, freshwater pits¹³⁵ may not create a site hazard or remain on-site after well completion operations. “Depending upon site conditions,” some pits may be subject to further soil erosion protective measures and may require fencing.¹³⁶ Finally, during hydraulic fracturing operations, well-owners must “monitor and record the injection pressure at the surface and the annulus pressure between the injection string and the next string of casing unless the annulus is cemented to surface.”¹³⁷

c. Permitting Requirements

Finally, in order to receive a permit to drill¹³⁸ under the DEQ’s new regulations, a well-owner looking to make a large volume water withdrawal¹³⁹ for well completion operations must evaluate said withdrawal in order to assure that it will not “adversely affect surface waters or nearby freshwater wells.”¹⁴⁰ Specifically, a well-owner must: (1) assess the effects of the withdrawal using the Michigan Water

133. *Id.* at 2-3.

134. *Id.* at 3. The Office of Geological Survey is a unit of the DEQ. *Office of Geological Survey*, MICH. DEP’T OF ENVTL. QUALITY, http://www.michigan.gov/deq/0,1607,7-135-3306_57064-87386--,00.html (last visited Nov. 21, 2011).

135. These pits hold the massive quantities of water withdrawn for fracturing purposes before it is actually injected into the gas wells. *See Modern Shale Gas*, *supra* note 1, at 55.

136. *High Volume*, *supra* note 126, at 3.

137. *Id.*

138. Or, for existing wells, in order to receive permission to make large volume water withdrawal for well completion operations. *Id.* at 2.

139. A “large volume water withdrawal” means a water withdrawal “intended to produce a cumulative total of over 100,000 gallons of water per day when averaged over a consecutive 30-day period.” *Id.* at 1. *See also* MICH. COMP. LAWS ANN. § 324.32701 (West 1999).

140. *High Volume*, *supra* note 126, at 2.

Withdrawal Assessment Tool (MIWWAT or, the tool);¹⁴¹ (2) provide specific data regarding the withdrawal including proposed total volume of water needed for well completion operations, proposed number of water withdrawal wells, the type of aquifer from which the water will be collected, proposed well depth, and proposed pumping rate and frequency;¹⁴² and (3) provide a supplemental plat of the well site showing the proposed location of withdrawal wells, location of all freshwater wells "within 1,320 feet of water withdrawal location," and proposed freshwater pit location and dimensions.¹⁴³

2. *Assessing Michigan's New Hydraulic Fracturing Regulations*

a. *Reporting Requirements*

The DEQ's new hydraulic fracturing reporting requirements, particularly the rules requiring submission of MSDSs for each fracturing additive, and recordation and reporting of total volumes of flowback water, are a significant accomplishment for the Department in regards to protection of the public health from possible drinking water contamination caused by fracturing activities. Prior to the issuance of these new rules, the individual chemical constituents of hydraulic fracturing fluid were largely kept confidential from the public,¹⁴⁴ and well-owners needed only record and report the volumes of all fluids *injected into* their wells¹⁴⁵—no similar requirement existed for the volume of fluids *recovered from* each well after drilling and fracturing were complete. In combination, these two provisions posed a significant risk to the safety of Michigan's public health because when fracturing fluid is injected into a well, not all of it comes back out.¹⁴⁶ As a matter of fact, in some cases, a majority of the fluid is never recovered and remains in the target shale formation, creating increased potential for groundwater contamination by numerous unknown, and possibly carcinogenic, chemicals.¹⁴⁷ The DEQ's new reporting requirements will help to shed light on some of the consequences of the fracturing process, and will also aid the Department in determining if further action is

141. *Id.*

142. *Id.*

143. *Id.*

144. MICH. COMP. LAWS ANN. § 324.61506 (West 1999); MICH. ADMIN. CODE r. 324.416 (1999).

145. MICH. ADMIN. CODE r. 324.612, .806 (1999).

146. *Modern Shale Gas*, *supra* note 1, at 66-67.

147. *See id.*; Wiseman, *supra* note 27, at 137.

needed to protect Michigan's drinking water supplies from future contamination.

b. Well Completion Requirements

Michigan DEQ's new well completion requirements represent a step in the right direction for hydraulic fracturing regulation in the state, but could still be improved. Specifically, the DEQ should consider making some revisions to the new regulation mandating installation of a monitoring well between the fracturing withdrawal well and the nearest fresh water well. While the new rule requires that *water levels* in the monitoring well be recorded on a regular basis (presumably to ensure that hydraulic fracturing withdrawals are not draining underground water supplies), it makes no mention of monitoring the *water quality* in the well.¹⁴⁸ Considering that drinking water contamination from migrating fracturing fluids is arguably the most serious threat posed by hydraulic fracturing activities, this omission is significant. Ensuring an abundant groundwater supply means nothing to fresh water well users if that water is too toxic to drink. In the interests of the public health and under the authority granted to the department in Part 615 to prevent waste,¹⁴⁹ the DEQ should go one step further and develop a well completion regulation that protects not only the quantity, but also the quality of Michigan's fresh groundwater.

c. Permitting Requirements

The DEQ's new permitting requirements, which make unprecedented use of the MIWWAT¹⁵⁰ in evaluating hydraulic fracturing

148. See *High Volume*, *supra* note 126, at 3.

149. See MICH. COMP. LAWS ANN. § 324.61505 (West 1999).

150. The MIWWAT is a scientific, internet-based water withdrawal assessment tool. See MICH. COMP. LAWS ANN. § 324.32706a (West 1999). To use the MIWWAT, a water user wishing to make a large quantity withdrawal must access the internet and enter various data about the proposed withdrawal into the tool's designated fields. MICH. COMP. LAWS ANN. § 324.32706b (West 1999). After all required data has been entered, the tool will then calculate a particular classification for the withdrawal and assess its impact on the environment. *Id.* If the proposed withdrawal is likely to cause an "adverse resource impact" (impairment of a water body's ability to support its characteristic fish population), then it will probably not be permitted. MICH. COMP. LAWS ANN. § 324.32701 (West 1999); *High Volume*, *supra* note 126, at 2. The MIWWAT has been used to assess most large volume water withdrawals under the Michigan Water Withdrawal Act ("MWWA") for a number of years. See MICH. COMP. LAWS ANN. § 324.32706a (West 1999). However, because water withdrawals for oil and gas operations have been specifically exempted from regulation under the MWWA, this tool has never before been

water withdrawals, will be beneficial to the state in two ways: (1) the tool will significantly strengthen Michigan's environmental defenses against the potential harms caused by hydraulic fracturing through the application of its "adverse resource impact" standard, and (2) the tool's instant feedback on the environmental impacts of proposed gas projects will allow well-owners more time to implement mitigation measures.

Use of the MIWWAT in assessing fracturing water withdrawals will bolster protection of Michigan's water resources. Prior to the issuance of the DEQ's new hydraulic fracturing rules, Michigan's gas regulations under Part 615 only protected the state's water resources from "waste" that "unnecessar[ily] damage[d]" the environment.¹⁵¹ The problem with this standard is that in order for any environmental protection to kick in under Part 615, the harm must first be deemed "unnecessary." The MIWWAT however, protects water resources from any "adverse resource impact," which includes any impairment of the water body's ability to support characteristic fish populations.¹⁵² This is a much higher standard of protection that, unlike Part 615's very subjective "waste" standard, is based on a scientific and site-specific assessment of each affected water body.¹⁵³ By following this science-based approach, well-owners will have to be much more careful to ensure that their water withdrawals do not cause environmental harm.

Another major benefit of the MIWWAT as applied to hydraulic fracturing withdrawals is that it provides well-owners with instant feedback as to the environmental impacts of their proposed water withdrawals. As mentioned above, the tool is internet-based,¹⁵⁴ so unlike other environmental assessments required by the DEQ, there is no filling out and submitting paper forms. All a well-owner need do is enter some basic information about his proposed withdrawal into the tool, and the tool promptly calculates and displays the projected adverse resource impact of the withdrawal.¹⁵⁵ This immediate environmental assessment is advantageous in that it maximizes the amount of time a well-owner has to develop and implement measures to mitigate the projected

used to evaluate hydraulic fracturing withdrawals. MICH. COMP. LAWS ANN. § 324.32727 (West 1999). Importantly, though this new permitting requirement does subject hydraulic fracturing water withdrawals to review by the MIWWAT, it *does not* remove the exemption for oil and gas withdrawals from the MWWA. *High Volume*, *supra* note 126, at 2.

151. MICH. COMP. LAWS ANN. § 324.61501 (West 1999).

152. *See* MICH. COMP. LAWS ANN. § 324.32701 (West 1999).

153. *See* MICH. COMP. LAWS ANN. § 324.32706a (West 1999).

154. *Michigan's Water Withdrawal Assessment Tool*, MIWWAT.ORG, <http://www.miwwat.org/home.asp> (last visited Nov. 21, 2011).

155. *Id.*

environmental impacts of his withdrawal, or oversee responsible construction of his gas wells.

However, though the MIWWAT will likely have significant environmental protection benefits throughout the state, it should be noted that the standard will do nothing to preserve the public health against the threat of drinking water contamination associated with fracturing. Indeed, the tool does not once mention human health concerns.¹⁵⁶ Thus, in this respect, application of the MIWWAT to hydraulic fracturing water withdrawals will be entirely valueless.

In all, the recent DEQ order amending various rules promulgated under Part 615 makes good progress towards a more comprehensive regulatory system for hydraulic fracturing operations within the state. However, more could be done to protect the welfare of the Michigan public and the state's valuable environmental resources from the risks associated with the fracturing process.

3. Suggestion for Further Revision to Part 615

Instead of relying solely on the rule-making initiative of the DEQ, the Michigan legislature should take action directly to amend the state's oil and gas regulations. Specifically, the legislature should pass an amendment raising the mandatory permit, regulatory, and monitoring fees associated with natural gas wells under section 324.61524, section 324.61525, and section 324.61525a of Part 615.

As they stand, Michigan's permit, regulatory, and monitoring fees for natural gas wells seem almost ludicrously low, considering the size and vitality of the natural gas industry.¹⁵⁷ section 324.61524 requires the levy of a monitoring fee "not [to] exce[ed] 1%" of the "gross cash market value" of all gas produced in the state,¹⁵⁸ section 324.61525 calls for a \$300.00 permit fee per well,¹⁵⁹ and section 324.61525a imposes a \$20.00 annual regulatory fee per gas well.¹⁶⁰ Upon collection, these fees go into the state's oil and gas regulatory fund, which the DEQ uses for "monitoring, surveillance, enforcement and administration of [Part 615]."¹⁶¹ If these fees were increased, the DEQ would have more money to direct towards activities including inspection of wells and

156. See generally MICH. COMP. LAWS ANN. § 324.32706a (West 1999).

157. JACK W. PLUNKETT, PLUNKETT'S ENERGY INDUSTRY ALMANAC 2008: ENERGY INDUSTRY MARKET RESEARCH, STATISTICS, TRENDS & LEADING COMPANIES 124-26 (2007).

158. MICH. COMP. LAWS ANN. § 324.61524 (West 2010).

159. MICH. COMP. LAWS ANN. § 324.61525 (West 2010).

160. MICH. COMP. LAWS ANN. § 324.61525a (West 2010).

161. MICH. COMP. LAWS ANN. § 324.61525b (West 2010).

investigation of complaints. This increased DEQ oversight would in turn help to ensure that Michigan is protected from the contamination risks associated with the hydraulic fracturing process.

In amending the state's statutory oil and gas permitting fees, Michigan should look to the fee statutes of other states such as Pennsylvania and New York for guidance. In New York, when a permit is granted for the drilling of a natural gas well, the well-owner is assessed a \$100 flat fee and is also charged an additional fee, the amount of which varies depending on the depth of the well.¹⁶² The deeper the well, the higher the fee—for example, the additional fee for a well drilled to a depth of 4,501 to 5,000 feet is \$1,900, while the fee for a well drilled to a depth of 9,001 to 9,500 feet is \$3,610.¹⁶³ By charging higher fees to well-owners who want to drill deeper wells, the state of New York is clearly demonstrating its recognition of the heightened administrative costs of supervising deep gas wells, which pose much greater environmental and public health risks than wells of average depth. This kind of scaled fee system could be easily incorporated into Michigan's Part 615.

Similar to New York's fee statute, Pennsylvania's gas well permitting statute is also very flexible as to the amount assessed. In fact, the Pennsylvania legislature did not even mandate a baseline or required fee under the state's Oil and Gas Act.¹⁶⁴ Instead, fee setting is left entirely to the discretion of the Department of Environmental Resources, which may set any fee that "bears a reasonable relationship to the cost of administering [Pennsylvania's oil and gas laws]."¹⁶⁵ This fee statute, like the fee statute in New York, shows that Pennsylvania understands the need for a fee system that is responsive enough to provide for adequate enforcement and supervision of natural gas activities. The adaptive spirit of this statute should be considered in amending Part 615.

In sum, due to the new and more risky natural gas development in the Collingwood and Utica shales, it is crucial that the Michigan legislature revisit and amend the state's oil and gas regulations under Part 615 of the NREPA. An amendment raising the permitting, regulatory, and monitoring fees associated with the construction and operation of natural gas wells is a viable and expedient solution that, if adopted, would help ensure the safety of Michigan's environmental and public health.

162. N.Y. ENVTL. CONSERV. LAW § 23-1903 (McKinney 2011).

163. *Id.*

164. See 58 PA. STAT. ANN. § 601.201 (West 2010).

165. *Id.*

IV. CONCLUSION

Since federal regulation of hydrofracking has so far proved to be largely ineffective, Michigan should concentrate on strengthening its existing oil and gas regulations in order to protect the health of its citizens and the natural environment. Though Michigan DEQ's May 25, 2011 order revising many of the rules regulating hydraulic fracturing makes good progress towards a more comprehensive and responsive fracturing regulatory system for the state, more changes are still needed. Specifically, the DEQ should re-examine its newly issued well completion requirements and consider supplementing these rules to provide for water quality testing in addition to water quantity testing in hydraulic fracturing monitor wells. The Michigan legislature should also consider amending the provisions of Part 615 that set the permitting, regulatory, and monitoring fees for drillers. By increasing these fees, the DEQ would have more money to spend on enforcing the state's oil and gas regulations.

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