

DEFINING AND CLOSING THE HYDRAULIC FRACTURING GOVERNANCE GAP

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I. Introduction

How many articles over the past half-decade have begun by describing the dramatic growth and impacts of fracking? A lot—over 1,000, to be precise.² We therefore leave that description to others. The purpose of this Article, instead, is to catalogue the full public governance structure around hydraulic fracturing, to identify expressed community concerns around fracking that are uniquely local in nature, and to provide guidance to local governments on how to manage these local impacts.

Beyond questions about broad issues of climate change and America’s energy mix, much of the debate around hydraulic fracturing has centered on tensions between local communities, state governments, and industry.³ These tensions can arise because local communities object to fracking, and local governments respond by banning the practice. Conversely, conflicts may arise when local communities express concerns but local governments are unprepared to act in line with their citizens’ interests.⁴

As recent examples in Texas and Colorado have shown, if local governments ban fracking, they risk pushback from state governments and this pushback can result in express preemption of local authority.⁵ Preemption occurs when there is conflict between state and local laws or actions, as described in more detail in Section IV.⁶ If states support hydraulic fracturing but local governments institute local bans, states will often respond by undermining the local action. Where a conflict already exists between state law and the local ban, states will institute legal actions to undo the local ban. In spring 2016, a state supreme court decision in Colorado, for example, addressed this exact issue.⁷ If state law does not already prevent bans, states can legislate, post hoc, to unravel the ban. In 2015, this precise scenario occurred in Texas.⁸ In either case, an outright local ban on fracking may

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² A December 2016 Westlaw search for “fracking” in law reviews and journals returns 1,109 results since January 2010.

³ See, e.g., *All Four Colorado Oil, Gas Ballot Measures Withdrawn as Promised*, DENV. POST, Aug. 5, 2014, <http://www.denverpost.com/2014/08/05/all-four-colorado-oil-gas-ballot-measures-withdrawn-as-promised/>; Molly Hennessy-Fiske, *In Denton, Texas, Voters Approve ‘Unprecedented’ Fracking Ban*, L.A. TIMES, Nov. 7, 2014, <http://www.latimes.com/nation/la-na-texas-fracking-20141108-story.html>; *Texas Governor Prohibits Cities and Towns from Banning Fracking*, REUTERS, May 18, 2015, http://www.huffingtonpost.com/2015/05/18/texas-fracking-ban_n_7310072.html.

⁴ E.g., Interview by Allison Sloto John Smith, Partner, Smith Butz, LLC (Jan. 25, 2016) (noting that local officials in several Pennsylvania towns are struggling with the proper methods for addressing fracking because of their concern about technical and legal questions).

⁵ See *supra* note 3.

⁶ See PATRICIA E. SALKIN, 1 AM. LAW ZONING § 6:28 (West, 5th ed. 2016).

⁷ See, e.g., Jacy Marmaduke, *High court strikes down Fort Collins’ halt to fracking*, COLORADOAN, May 4, 2016, <http://www.coloradoan.com/story/news/2016/05/02/colorado-supreme-court-rules-against-fort-collins-fracking-moratorium/83798238/>.

⁸ See *Texas Governor Prohibits Cities and Towns from Banning Fracking*, *supra* note 3.

be self-defeating, because it could ultimately result in less local control over the negative (and positive) impacts of hydraulic fracturing.

There are, of course, different perspectives on the impacts of fracking and related activities, and the appropriate nature of regulation,⁹ but there is scientific understanding about the types of impacts that hydraulic fracturing may cause.¹⁰ The process of hydraulic fracturing itself can impact

water availability, spills of chemicals at the surface, and induced seismicity that very rarely can be felt. Issues associated with the more complete process of oil and gas drilling and production . . . include all of the above as well as groundwater quality degradation, reduced air quality, noise, night sky light pollution, impacts of sand mining for use in hydraulic fracturing process, landscape changes such as forest fragmentation, surface water quality degradation from waste fluid disposal, and induced seismicity from the injection of waste fluids deep into disposal wells.¹¹

As discussed further in Section V, there are also community and economic impacts—both positive and negative—from hydraulic fracturing and its attendant activities. While the severity of these issues vary, the breadth and diversity creates a need for some degree of safeguards.

Given the potential impacts of hydraulic fracturing, and the potentially self-defeating nature of local fracking bans, local governments should address the impacts of fracking through more traditional local governance mechanisms that do not pose as great a risk to local authority. Ultimately, fracking is a land use not entirely different from other industrial land uses with which local governments have long histories of governing through zoning and planning tools as well as non-regulatory techniques. The recent election of Donald Trump and Republican control in Congress suggests that oil and gas exploration will continue to be an issue attracting attention at all levels of governance.¹²

On this premise, this Article seeks to make the case for the importance of, and authority for, local leadership on fracking governance. Sections II and III give an overview of the federal and state laws that address fracking and identify gaps in both regimes. In Section IV, we describe the traditional scope of local land use authority. In Section V, we present a list of the most salient local impacts of hydraulic fracturing, including a description of the methods we employed to catalogue these local impacts. Finally, in Section VI, we make explicit how local governments might use that authority to address fracking by presenting a series of case studies that demonstrate different local governance mechanisms.

II. Federal Hydraulic Fracturing Governance

The current federal hydraulic fracturing regulatory system is both fragmented and incomplete. This section identifies aspects of fracking that are covered by federal regulations and highlights many of the gaps and shortcomings in that coverage. Major federal environmental legislation—the Clean Air

⁹ See, e.g., Michael Burger, *Fracking and Federalism Choice*, 161 U. PA. L. REV. ONLINE 150, 158 (2013).

¹⁰ See, e.g., *Hydraulic Fracturing (“Fracking”) FAQs - What environmental issues are associated with hydraulic fracturing?* U.S. GEOLOGICAL SERVICE (Jun. 15, 2016), <https://www2.usgs.gov/faq/categories/10132/3821>.

¹¹ *Id.*

¹² See, e.g., Gaurav Sharma, *Making America ‘Crude’ Again: U.S. Oil and Gas Industry Feel the Trump Effect*, FORBES (Jan. 27, 2017 4:36 P.M.), <http://www.forbes.com/sites/gauravsharma/2017/01/27/making-america-crude-again-us-oil-and-gas-industry-feels-the-trump-effect/#436b14632213>.

Act (CAA), the Clean Water Act (CWA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Endangered Species Act (ESA), the National Environmental Policy Act (NEPA), the Resource Conservation and Recovery Act (RCRA), the Safe Drinking Water Act (SDWA), and Toxic Substance Control Act (TSCA)—all nominally cover aspects of the fracking lifecycle. However, these statutes essentially all contain exemptions, limitations, or nuances that limit their effectiveness in protecting the environment from negative impacts of fracking.

Overall, the federal government has not enacted a comprehensive fracking regulatory regime, instead leaving the majority of regulation to “a patchwork of state policies.”¹³ There are few federal approvals required as part of a fracking operation; for example, there is no requirement to seek federal licensing approvals before beginning fracking activity.¹⁴ Yet federal regulations may apply “if the fracking operation risks harm to an endangered species, will result in a discharge to surface waters or a pretreatment facility” or involves the transport of hazardous chemicals.¹⁵ Moreover, federal regulations may also apply when the operation includes methane or hazardous air pollutant emissions. Still, fracking operations may avoid regulation under some of these regulatory frameworks because of explicit exemptions.¹⁶

As a result, if a fracking operation and its ancillary activities do not fall into one of these federal regulatory systems, then no federal approval is needed under any environmental law.¹⁷ For example, if a fracking project does not trigger requirements to obtain federal approvals under any of the federal environmental laws, there will not be a corresponding requirement to undertake an environmental review under NEPA, or obtain a state permitting certification under the CWA.¹⁸

The following parts will provide an overview of the major federal environmental laws and analyze the degree to which these statutes address hydraulic fracturing.

A. Clean Air Act

The Clean Air Act seeks to decrease air pollution, but until recently, the CAA and accompanying administrative regulations did not address fracking directly. In 2012, the Environmental Protection Agency (EPA) instituted a new rule integrating fracking into the ambit of CAA regulation. That rule encompassed several aspects of fracking. First, EPA set “New Source Performance Standards (NSPS) for industrial categories that cause, or significantly contribute to, air pollution that may endanger public health or welfare.”¹⁹ The NSPS rules regulate volatile organic compound (VOC) emissions from gas wells, storage tanks, and other equipment, as well as “leaking components at onshore natural gas processing plants.”²⁰ Among other things, oil and gas wells must now have

¹³ Emily C. Powers, *Fracking and Federalism: Support for an Adaptive Approach That Avoids the Tragedy of the Regulatory Commons*, 19 *J.L. & POL’Y* 913, 940–41 (2011).

¹⁴ See David B. Spence, *Federalism, Regulatory Lags, and the Political Economy of Energy Production*, 161 *U. PA. L. REV.* 431, 477 (2013).

¹⁵ *Id.* at 477–78.

¹⁶ *Id.* at 478.

¹⁷ *Id.*

¹⁸ *Id.*

¹⁹ Overview of Final Amendments to Air Regulations for the Oil and Natural Gas Industry, U.S. EPA (Apr. 17, 2012), https://www.epa.gov/sites/production/files/2016-09/documents/natural_gas_transmission_fact_sheet_2012.pdf;

²⁰ Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 77 *Fed. Reg.* 49,490, 49,492 (Aug. 16, 2012) (to be codified at 40 *C.F.R.* pt. 60, 63).

equipment (“green completions”) able to capture escaping volatile organic compound emission.²¹ EPA also promulgated “green completion” rules regulating the release of hazardous air pollutants.²² The final rule took effect on October 15, 2012.²³

More recent action demonstrates EPA’s intent to expand air pollution regulation. In November 2015, EPA issued a request for additional data and information on hazardous air pollutants that was not available in 2012.²⁴ In May 2016, EPA finalized climate-change-related updates to its 2012 green completion rule to reduce greenhouse gas emissions.²⁵ The updates add methane to the pollutants covered by the 2012 rule, as well as requirements for detecting and repairing leaks, and requirements to limit emissions from pneumatic pumps used at well sites.²⁶ The agency explains that all of these actions will reduce methane emissions and reduce air pollution, help combat climate change, and provide more guidance about Clean Air Act permitting requirements for the oil and natural gas industry.²⁷

The cumulative impact of these rules has been to mandate many onshore natural gas fracking operations take action under the Clean Air Act to address VOCs and methane emissions.²⁸

B. Clean Water Act

The Clean Water Act is the primary federal regulatory tool to manage surface water pollution.²⁹ Passed in 1972, the CWA set “effluent limitations and standards governing the discharge of pollutants into waters of the United States.”³⁰ The CWA ensures that these standards are met by requiring that point sources that discharge into waters of the United States—including both private facilities and publicly owned treatment works—obtain a permit pursuant to the National Pollutant Discharge Elimination System (NPDES).³¹ Either EPA, or states and Indian tribes that have adopted an EPA-approved water program, may issue these permits.³² Most of the states in the

²¹ *Id.*

²² Overview of Final Amendments to Air Regulations for the Oil and Natural Gas Industry, *supra* note 19; *see also* Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, *supra* note 20. “Hazardous air pollutants” include 187 pollutants classified by EPA as those “known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.” *What Are Hazardous Air Pollutants?*, U.S. EPA, <https://www.epa.gov/haps/what-are-hazardous-air-pollutants>.

²³ Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, *supra* note 20, at 49,490.

²⁴ *Regulatory Actions*, U.S. EPA, <https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry/actions-and-notices-about-oil-and-natural-gas-regactions> (last updated Sep. 29, 2016).

²⁵ Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources, 81 Fed. Reg. 35824 (Jun. 3, 2016) (to be codified at 40 C.F.R. pt. 60).

²⁶ *Id.* at 35,844 and 35,846.

²⁷ EPA Releases First-Ever Standards to Cut Methane Emissions from the Oil and Gas Sector, U.S. EPA (May 12, 2016), <https://www.epa.gov/newsreleases/epa-releases-first-ever-standards-cut-methane-emissions-oil-and-gas-sector>.

²⁸ *Id.* *See also supra* note 24.

²⁹ Kevin J. Garber, Steven Baicker-McKee & Jean M. Mosites, *Water Sourcing and Wastewater Disposal: Two of the Least Worrisome Aspects of Marcellus Shale Development in Pennsylvania*, 13 DUQ. BUS. L.J. 169, 183 (2011).

³⁰ Jason Obold, *Leading by Example: The Fracturing Responsibility and Awareness of Chemicals Act of 2011 as a Catalyst for International Drilling Reform*, 23 COLO. J. INT’L ENVTL. L. & POL’Y 473, 485-86 (2012) (citation omitted). These limits are generally either technology-based or water quality-based. Garber et al., *supra* note 29.

³¹ 33 U.S.C. § 1311(a) (2012) (proscribing discharge unless provided otherwise); 33 U.S.C. § 1342 (2012) (rules governing permits for discharge); *see also* Obold, *supra* note 30, at 486.

³² 40 C.F.R. §§ 123.1–.64 (2012); *see also* Obold, *supra* note 30, at 486.

United States operate under EPA-approved programs.³³

NPDES permits implement EPA standards by setting “effluent limitations,” which “impose restrictions on the quantity or concentration of pollutants that may be discharged.”³⁴ These limitations are set to a floor which is based on available control technology: either the “best available technology” for toxic or non-conventional pollutants³⁵ or the “best conventional technology” for a limited number of “conventional” pollutants (including “pH, biological oxygen demand, total suspended solids, fecal coliform, and grease”³⁶).³⁷ Sources whose construction began after EPA promulgated national standards, called “new sources,” must comply with “new source performance standards” for all pollutants representing “best available demonstrated control technology” at the time of construction.³⁸

Theoretically, there are two ways in which EPA could regulate water. First, the agency could regulate the direct discharge of wastewater from fracking sites. Second, EPA could regulate sub-surface injection of produced wastewater. The CWA does only the former: it regulates the direct surface discharge of wastewater from fracking, but does not regulate the underground activities.

The Clean Water Act provides EPA with the authority to regulate the direct discharge of wastewater.³⁹ However, there are no categorical standards for the disposal of wastewater discharged from natural gas activities.⁴⁰ As a result, shale gas wastewater is generally transported to publicly owned treatment works, or private centralized waste treatment facilities⁴¹—which may not always be properly equipped to treat hydraulic fracturing wastewater.

EPA has established a national effluent limitation for oil and gas extraction point source categories, and the applicable regulation states that “there shall be no [on-site direct] discharge of wastewater pollutants into navigable waters from any source associated with production, field exploration, drilling, well completion, or well treatment.”⁴² However, there is an exception for “wastewater that is of good enough quality for use in agricultural and wildlife propagation.”⁴³ For fracking specifically, EPA has interpreted its national effluent limitation for oil and gas extraction to apply to wastewater emitted from fracking in shale formations as well as sandstone gas facilities. However, EPA has concluded that fracking in coalbeds to produce coalbed methane is *not* subject to these same requirements.⁴⁴

³³ Jeffrey M. Gaba, *Flowback: Federal Regulation of Wastewater from Hydraulic Fracturing*, 39 COLUM. J. ENVTL. L. 251, 283 (2014); *see also* NPDES State Program Information, U.S. EPA, <https://www.epa.gov/npdes/npdes-state-program-information> (last updated Feb. 19, 2016) (outlining EPA process of delegating permitting authority).

³⁴ 40 C.F.R. § 435.30–.34 (2014); *see also* Gaba, *supra* note 33, at 283.

³⁵ 33 U.S.C. § 1311(b)(2)(A) (2012).

³⁶ Gaba, *supra* note 33, at 284 n.158.

³⁷ 33 U.S.C. § 1311(b)(2)(E) (2012); 33 U.S.C. §§ 1314(a)(4), –(b)(4)(A) (2012).

³⁸ 33 U.S.C. §§ 1316(a), (b)(1)(B) (2012).

³⁹ 40 C.F.R. §§ 435.30, –.32 (2016).

⁴⁰ *Natural Gas Extraction – Hydraulic Fracturing*, U.S. EPA, <https://www.epa.gov/hydraulicfracturing> (last accessed Jan. 2, 2017) (noting that there are “different management methods employed by industry” and describing the ways that EPA is working with industry to consider different policy frameworks for different disposal techniques.).

⁴¹ *Id.*

⁴² 40 C.F.R. § 435.32 (2016).

⁴³ *Natural Gas Extraction – Hydraulic Fracturing*, *supra* note 40.

⁴⁴ *Unconventional Extraction in the Oil and Gas Industry*, U.S. EPA, <http://water.epa.gov/scitech/wastetech/guide/oilandgas/unconv.cfm> (last updated Aug. 7, 2014).

As to the underground injection of discharged wastewater, the Clean Water Act has not been a successful tool for restricting the underground emission of fracking wastewater because only the actual surface discharge of fracking wastewater is subject to regulation.⁴⁵ Although one could argue that a subsurface discharge could trigger CWA if it had a link to surface pollution—for example, groundwater flowing into surface water—EPA has not enforced underground operations under the CWA.⁴⁶ Further, although some commentators argue that the CWA should not regulate groundwater,⁴⁷ the majority of hydraulic fracturing’s risk to water is underground through injection.⁴⁸ Underground injection can occur at two parts of the fracking process: first, there is injection of fracking fluid to stimulate the well.⁴⁹ Second, there is often underground injection at the end of the process to dispose of produced wastewater back into the well.⁵⁰ Further, some of the most salient concerns about fracking stem from the injection of chemicals underground as part of the extraction process and into the wells themselves.⁵¹ Thus, because the Clean Water Act does not regulate underground releases of polluted water, the Act is limited in its ability to regulate fracking.

In some respects, fracking regulations under the CWA have been eroded since 1987. In that year, Congress passed Clean Water Act amendments to exempt oil and gas exploration, production, and processing operations from permitting requirements.⁵² Then, in 2005, Congress further exempted onshore oil and gas facilities from stormwater permitting requirements under the Clean Water Act.⁵³ Although this exemption only applies to stormwater that does not come in contact with any waste on-site, it still demonstrates intent to chip away at the Clean Water Act’s power.⁵⁴

However, there has been some strengthening of fracking regulations in the aftermath of the 2009 ruling in *NRDC v. EPA*. In that case, environmental groups challenged EPA’s rule that exempted oil and gas construction stormwater from the Clean Water Act. The Ninth Circuit Court of Appeals agreed with the environmental challengers, finding that the language of the Clean Water Act did not allow for a stormwater exemption and vacating the rule.⁵⁵ The Ninth Circuit thus vacated EPA’s rule that had exempted stormwater runoff from the CWA.⁵⁶ As a result of that decision, oil and gas construction activities discharging stormwater, even when contaminated only by sediment, must

⁴⁵ Obold, *supra* note 30, at 486.

⁴⁶ Compare Obold, *supra* note 30, at 486 (“The CWA has been successful at regulating the surface activities of hydraulic fracturing operations, but has not been and should not be the vehicle for policing underground operations.”)

⁴⁷ *Id.*

⁴⁸ John Craven, Note, *Fracking Secrets: The Limitations of Trade Secret Protection in Hydraulic Fracturing*, 16 VAND. J. ENT. & TECH. L. 395, 408 (2014).

⁴⁹ *Id.*

⁵⁰ Inessa Abayev, *Hydraulic Fracturing Wastewater: Making the Case for Treating the Environmentally Condemned*, 24 FORDHAM ENVTL. L. REV. 275, 300 (2013).

⁵¹ *Id.*

⁵² 42 U.S.C. § 300h(d)(1)(B)(ii) (2012) (excluding from the SDWA definition of underground injection “the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities”). See Sandra Zellmer, *Treading Water While Congress Ignores the Nation’s Environment*, 88 NOTRE DAME L. REV. 2323, 2359–60 (2013).

⁵³ 33 U.S.C. § 1362(24) (2012) (“The term ‘oil and gas exploration, production, processing, or treatment operations or transmission facilities’ means all field activities or operations . . . including activities necessary to prepare a site for drilling and for the movement and placement of drilling equipment, whether or not such field activities or operations may be considered to be construction activities.”). See Zellmer, *supra* note 52, at 2359–60.

⁵⁴ See Adam Kron, *EPA’s Role in Implementing and Maintaining the Oil and Gas Industry’s Environmental Exemptions: A Study in Three Statutes*, 16 VT. J. ENVTL. L. 586, 596–97 (2015).

⁵⁵ *Id.* at 607.

⁵⁶ *Id.* at 608.

obtain an NPDES permit, as long as the well pad and access road are one acre or larger in size.⁵⁷ However, wastewater discharges containing other contaminants remain subject to the Clean Water Act's permitting requirements.⁵⁸

More recently in June 2016, EPA finalized a rule to set standards for wastewater discharges produced by natural gas extraction and destined for publically owned wastewater treatment plants.⁵⁹ The agency also announced that it would discontinue rulemaking for coalbed methane extraction.⁶⁰ Further limiting its regulation over fracking, EPA issued its Preliminary 2016 Effluent Guidelines Program Plan in June 2016.⁶¹ This plan concluded that “no additional industries warrant[ed] new or revised effluent guidelines” and so EPA is neither crafting new effluent guidelines nor revising any existing effluent guidelines.⁶²

Thus, while there have been several efforts in the last ten years to erode the Clean Water Act's power and authority, the Ninth Circuit's decision in *NRDC v. EPA* has helped provide more authority for EPA to regulate broader types of contamination in wastewater. However, there is still an opportunity for EPA to more comprehensively protect waters of the United States by utilizing CWA authority to regulate sub-surface wastewater disposal that has a connection to surface waters.⁶³

C. Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”) was created in 1980 to authorize cleanup of contaminated properties and provide a cost recovery action for litigants.⁶⁴ Any of the following elements may establish a cost recovery action under CERCLA: (1) the defendant is a “responsible party;” (2) hazardous substances are disposed of at a “facility;” (3)

⁵⁷ 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, 200 (2013); see also Michael Lauffer, *Impact of Natural Resources Defense Council v. U.S. EPA* (9th Cir. 2008) 526 F.3d 591 on the Regulation of Storm Water Discharges of Sediment from Oil and Gas Construction Activities, STATE WATER RES. CONTROL BOARD 1 (Feb. 18, 2009), http://www.swrcb.ca.gov/water_issues/programs/stormwater/docs/public_oil_gas_memo021809.pdf; Amendments to the National Pollutant Discharge Elimination System (NPDES) Regulations for Storm Water Discharges Associated With Oil and Gas Exploration, Production, Processing, or Treatment Operations or Transmission Facilities, Fed. Reg. 33628, 33,639 (June 12, 2006) (allowing an exemption for “small construction activities”).

⁵⁸ See 40 C.F.R. § 435.32 (2014).

⁵⁹ Effluent Limitations Guidelines and Standards for the Oil and Gas Extraction Point Source Category, 81 Fed. Reg. 41,845 (Jun. 28, 2016) (to be codified at 40 C.F.R. pt. 435).

⁶⁰ *Id.* at 41,848.

⁶¹ EPA, Preliminary 2016 Effluent Guidelines Program Plan (2016), https://www.epa.gov/sites/production/files/2016-06/documents/prelim-2016-eg-plan_june-2016.pdf.

⁶² *Id.* at 1-1.

⁶³ One additional potential tool to regulate fracking through the Clean Water Act may be through the portion of the Act that “authorizes permit writers to develop specific technology-based limitations on pollutants in fracking wastewater based on “best professional judgment” (BPJ).” Gaba, *supra* note 30, at 303-04. These limitations allow the permit writer to exercise judgment in establishing permit limits appropriate to the facility. *Id.* There are two circumstances in which permit writers may set best professional judgment limitations on pollutants: First, BPJ may be invoked if there are no promulgated national standards applicable to the permittee. Second, BPJ may be used if pollutants are not specifically regulated under the national standards, which “could form the basis for imposing additional technology-based limits on the discharge of fracking wastewater from private CTW [centralized wastewater treatment] facilities.” *Id.*

⁶⁴ Sean H. Joyner, *Superfund to the Rescue? Seeking Potential CERCLA Response Authority and Cost Recovery Liability for Releases of Hazardous Substances Resulting from Hydraulic Fracturing*, 28 J. CONTEMP. HEALTH L. & POL'Y, 111, 129 (2011).

there is a “release” or threatened release of hazardous substances into the environment;⁶⁵ or (4) the release causes the incurrence of “response costs.”⁶⁶ A CERCLA response action is thus available where hazardous substances resulting from a federally permitted release⁶⁷ have contaminated the surface water, soil, or groundwater.⁶⁸

Under CERCLA, the definition of “hazardous substance” includes hazardous chemicals or substances included in the Toxic Substances Control Act, with the exception of petroleum.⁶⁹ This exception also includes crude oil, or “any fraction thereof.”⁷⁰ In *Wiltshire Westwood Assoc. v. Atlantic Richfield Corp.*, the Ninth Circuit Court of Appeals reasoned that constituent parts of gasoline must also be excluded, or the exclusion would be meaningless.⁷¹ These constituents have been interpreted to include any distillation of petroleum, including diesel fuel and the compounds (such as benzene, toluene, ethylbenzene, and xylene) constituting diesel.⁷²

The petroleum exemption also applies to “natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel.”⁷³ Adam Kron reasons that given the statute’s language, it may be possible to argue that the exclusion does not cover releases at modern natural gas wells.⁷⁴ This is because “the natural gas provision of the exclusion does not include the ‘any fraction thereof’ language in the petroleum provision, and it includes the modifier ‘usable for fuel.’”⁷⁵ Kron argues that since natural gas cannot be used for fuel until after a series of processing steps to remove several “toxic constituents,” “a release of unprocessed natural gas or a release of the constituents removed by processing is not exempt and still should trigger CERCLA’s liability and notification provisions.”⁷⁶

CERCLA allows “[a]ny injection of fluids or other materials authorized under applicable State law for the purpose of stimulating or treating wells for the production of crude oil, natural gas, or water, for the purpose of . . . recovery of crude oil or natural gas.”⁷⁷ As a result, the underground injection of fluids for fracking is a federally permitted release under CERCLA section 101(10)(I), as long as the release is permitted at the state level.⁷⁸ Thus, fracking injection is exempt from CERCLA liability.⁷⁹

⁶⁵ Under CERCLA, a “release” is “any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment.” 42 U.S.C. § 9601(22) (2012).

⁶⁶ *United States v. Alcan Aluminum Corp.*, 964 F.2d 252, 258–59 (3d Cir. 1992).

⁶⁷ A federally permitted release, as defined by 42 U.S.C. § 9601(10) (2012), is a discharge or emission that is allowed under a particular environmental statute given that statute’s permitted allowances or discharge limits.

⁶⁸ *Alcan*, 964 F.2d at 261.

⁶⁹ 42 U.S.C. § 9601(14) (2012).

⁷⁰ *Id.*

⁷¹ 881 F.2d 801, 805 (9th Cir. 1989).

⁷² Joyner, *supra* note 64, at 130.

⁷³ 42 U.S.C. § 9601(14).

⁷⁴ Kron, *supra* note 54, at 596.

⁷⁵ *Id.*

⁷⁶ *Id.*

⁷⁷ 42 U.S.C. § 9601(10)(I)

⁷⁷ 42 U.S.C. § 9601(10).

⁷⁸ 42 U.S.C. § 9601(10).

⁷⁹ Joyner, *supra* note 64, at 133–34. (Add a parenthetical explanation re: author’s stance that exemption should not apply.)

However, there remains a debate over the limits of fracking fluid exemptions from cleanup liability.⁸⁰ Scholars note that EPA has used CERCLA section 104(e) to investigate water that may be contaminated with fracking fluids.⁸¹ Further, though petroleum and gas are excluded, courts have held that liability attaches to an entire site if multiple hazardous substances, such as diesel, are inextricably mixed together such that petroleum cannot be separated from the other chemicals.⁸²

To conclude, although the injection of fracking fluids into wells is generally exempt under the statute,⁸³ there is some ambiguity about whether EPA has the authority to investigate water contaminated with fracking fluid. However, spills are likely not as big of a concern for local governments given their infrequency.⁸⁴

D. Endangered Species Act

Fracking operations must comply with the Endangered Species Act (“ESA”).⁸⁵ If a species is listed under the ESA, all federal agencies are prohibited from authorizing, funding or carrying out actions (including issuing permits) that “result in the destruction or adverse modification of [critical] habitat.”⁸⁶ In 2012, a United States Geological Survey (“USGS”) report documented that shale gas and coalbed methane natural gas extraction practices between 2004 and 2010 in two Pennsylvania counties “create[d] potentially serious patterns of disturbance on the landscape.”⁸⁷ This finding is particularly germane to the ESA because increases in habitat disturbances, such as habitat fragmentation, can have negative impacts on the populations of ESA-listed flora and fauna.⁸⁸

The Endangered Species Act applies to private and public property, and proscribes both direct and indirect harms to listed species.⁸⁹ As a result, the Act has a broad reach that can lead to extensive liability. Thus, the ESA can effectively limit local impacts of hydraulic fracturing—but a species must be listed to receive such protection.⁹⁰

E. National Environmental Policy Act

While the National Environmental Policy Act nominally applies to fracking, in practice fracking operations are rarely subject to NEPA review for the reasons stated below. Established in 1969, Congress envisioned NEPA as a regulatory program that would require government agencies to consider environmental concerns by identifying the environmental impacts of federal programs and

⁸⁰ Craven, *supra* note 50, at 410.

⁸¹ *Id.*

⁸² Joyner, *supra* note 64, at 133–34.

⁸³ 42 U.S.C. § 9601(10).

⁸⁴ EPA estimates that the number of spills related to hydraulic fracturing is less than one hundred per year. See U.S. EPA, Review of State and Industry Spill Data 9 (May 2015), https://www.epa.gov/sites/production/files/2015-05/documents/hf_spills_report_final_5-12-15_508_km_sb.pdf (cataloguing 456 spills due to fracking over six years).

⁸⁵ See 16 U.S.C. § 1536(a)(2) (2012).

⁸⁶ *Id.*

⁸⁷ E.T. SLONECKER ET AL., U.S. GEOLOGICAL SURVEY, LANDSCAPE CONSEQUENCES OF NATURAL GAS EXTRACTION IN BRADFORD AND WASHINGTON COUNTIES, PENNSYLVANIA, 2004–2010 1 (2012), <http://pubs.usgs.gov/of/2012/1154/of2012-1154.pdf>. See also 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, 1154 (2013).

⁸⁸ See Robbins, *supra* note 89, at 1154.

⁸⁹ Robbins, *supra* note **Error! Bookmark not defined.**, at 1151.

⁹⁰ See, e.g., 16 U.S.C. § 1536(a)(2) (2012) (delineating protections for species that have already been listed as endangered).

projects in an environmental impact statement (“EIS”).⁹¹ This intent was at least thwarted in part by the Energy Policy Act of 2005, which created a “rebuttable presumption” that oil and gas operations fall under a “categorical exception to the normal procedural requirements.”⁹² To rebut this presumption, a citizen bringing a suit must meet the high standard of “extraordinary circumstances warranting a full NEPA review.”⁹³ Further, even if a particular project were subject to NEPA review, the operation would have to include federal actors or support in order to trigger NEPA, and would have to be sufficiently “extraordinary” to rebut the statutory exemption. Accordingly, only in rare circumstances does NEPA apply to fracking operations. Ultimately, while NEPA review could provide substantial information on certain fracking activities, it provides more in the way of transparency and review than in creating actual fracking safeguards.

F. Resource Conservation and Recovery Act

RCRA regulates the lifecycle of hazardous waste from “cradle to grave” through a series of stringent standards and procedures.⁹⁴ When RCRA passed in 1976, control over oil and gas production and waste was included, Congress granted a temporary exemption to “exploration and production” oil and gas wastes in 1980.⁹⁵ At that time, Congress directed EPA to study whether these wastes should be regulated under RCRA.⁹⁶ EPA’s study found that the regulation of oil and gas wastes was unwarranted due to relatively low risks and the costs that would be imposed on oil and gas producers.⁹⁷ EPA also asserted that state and other federal regulation of oil and gas wastes was generally adequate.⁹⁸ Since then, identifying the contents of “waste generated from oil and gas operations is not subject to federal hazardous waste regulation” Under Subtitle C of RCRA.⁹⁹

However, EPA has recognized that some oil and gas exploration and production wastes were hazardous, and that some state regulations were lacking. Instead of regulating the wastes itself, EPA provided funding to the Interstate Oil and Gas Compact Commission (IOGCC) to review state regulations.¹⁰⁰ In 2009, IOGCC hosted two congressional briefings on Capitol Hill attesting to the adequacy of the states’ fracking regulation writ large.¹⁰¹ These briefings did not result in any changes to the oil and gas exemption under RCRA.¹⁰² Thus, the Resource Conservation and Recovery Act continues to exempt waste generated from oil and gas operations.

⁹¹ Craven, *supra* note 50, at 410.

⁹² *Id.* See also 42 U.S.C. § 15942 (2012).

⁹³ Craven, *supra* note 50, at 410–11.

⁹⁴ *Id.* at 409–10.

⁹⁵ James R. Cox, *Revisiting RCRA’s Oilfield Waste Exemption as to Certain Hazardous Oilfield Exploration and Production Wastes*, 14 VILL. ENVTL. L.J. 1, 3 (2003).

⁹⁶ *Id.*

⁹⁷ *Id.* at 5–6.

⁹⁸ *Id.*

⁹⁹ Craven, *supra* note 50, at 409. EPA exempted oil and gas from oversight in 1980, after a study concluded that oil and gas exploration and production wastes did not warrant regulation under RCRA. This conclusion was not based on the idea that the wastes did not contain hazardous constituents, but that “existing state and federal programs adequately addressed management of these wastes and that classifying oil and gas wastes as hazardous would result in increased administrative burdens.” Gaba, *supra* note 33, at 272–73. In 1988, EPA acknowledged that the exemption was “unwarranted.” Cameron Jefferies, *Unconventional Bridges over Troubled Water – Lessons to Be Learned from the Canadian Oil Sands as the United States Moves to Develop the Natural Gas of the Marcellus Shale Play*, 33 ENERGY L.J. 75, 99 (2012).

¹⁰⁰ Hannah L. Wiseman, *Regulatory Adaptation in Fractured Appalachia*, 21 VILL. ENVTL. L.J. 229, 248 (2010).

¹⁰¹ INTERSTATE OIL & GAS COMPACT COMM’N, *IOGCC in Action: Resolution 09-011 (2009)*, <https://iogcc.publishpath.com/Websites/iogcc/Images/State-Resolutions-HF.pdf>.

¹⁰² *Summary of the Resource Conservation and Recovery Act*, U.S. EPA, <http://www.epa.gov/laws-regulations/summary-resource-conservation-and-recovery-act> (last updated Dec. 1, 2016).

G. Safe Drinking Water Act

The Safe Drinking Water Act seeks to protect public health by regulating the nation’s drinking supply¹⁰³ through ‘national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water.’”¹⁰⁴

The Safe Drinking Water Act, passed in 1974, requires the EPA to create a national maximum contaminate level when a particular contaminate “may have an adverse effect on the health of persons”¹⁰⁵ and “there is a substantial likelihood that [it] will occur in public water systems.”¹⁰⁶ However, it is in the “*sole judgment of the Administrator* [whether] regulation of such contaminant presents a meaningful opportunity for health risk reduction.”¹⁰⁷ Such discretion suggests that there is flexibility for the types of contaminants covered by the SDWA, but also a great deal of discretion endowed to the Administrator.

In lieu of federal agencies implementing their regulations, states may also apply to the EPA for “primacy,” defined by EPA as “the authority to implement the EPA’s standards within an individual jurisdiction.”¹⁰⁸ If a state elects this option, it must submit an Underground Injection Control (UIC) proposal to EPA meeting EPA’s minimum requirements.¹⁰⁹ The UIC program regulates both the initial injection of fracking fluid and post-fracking injection of wastewater. EPA retains the right to take regulatory power back from a state if it determines that the state UIC program violates the SDWA.¹¹⁰ As of 2015, EPA has delegated the authority to administer UIC programs to thirty-nine states.¹¹¹

Despite state programs’ prevalence, a 2014 Government Accountability Office report found significant deficiencies in EPA’s oversight of states’ regulatory schemes. First, the Government Accountability Office found that EPA was not “consistently conducting annual on-site reviews of state programs, as is required by EPA’s own guidance.”¹¹² Second, GAO found that EPA was not adequately updating its regulations to track state program requirements.¹¹³

Fundamentally, fracking may impact drinking water in two primary ways. The first is when fracking fluid is injected to stimulate the well, and the second is when flowback wastewater is disposed in underground injection wells. The SDWA regulates neither.

First, the SDWA does not regulate the injection of materials into wells. Between 2000 and 2005, the EPA conducted a study into coalbed methane and found that the “injection of certain extraction

¹⁰³ Obold, *supra* note 30, at 482.

¹⁰⁴ Abayev, *supra* note 50 at 297 (quoting U.S. EPA, *Understanding the Safe Drinking Water Act* (June 2004), <https://www.epa.gov/sites/production/files/2015-04/documents/epa816f04030.pdf>).

¹⁰⁵ 42 U.S.C. § 300g-1 (2012).

¹⁰⁶ *Id.*

¹⁰⁷ *Id.* (emphasis added); see also 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, 606 (2009).

¹⁰⁸ U.S. EPA, *Understanding the Safe Drinking Water Act* (June 2004), <https://www.epa.gov/sites/production/files/2015-04/documents/epa816f04030.pdf>.

¹⁰⁹ Obold, *supra* note 30, at 482.

¹¹⁰ 42 U.S.C. § 300h-1 (2012).

¹¹¹ Kron, *supra* note 54, at 618.

¹¹² *Id.*

¹¹³ *Id.*

materials into such wells posed ‘little or no threat to underground sources of drinking water.’”¹¹⁴ In the wake of EPA’s study, Congress passed the Energy Policy Act of 2005, which excluded most fluids used in the initial fracking injection from regulation under the Act.¹¹⁵ These amendments effectively “exempt[] fracking companies from compliance with UIC programs because their fracking fluids no longer require a permit.”¹¹⁶

The only aspect of fracking regulated under the Safe Drinking Water Act is when diesel fuel is used as a fluid to initially inject water into a recovery well.¹¹⁷ In that instance, EPA *does* have authority to regulate the underground injection of diesel fuel through the Underground Injection Control program.¹¹⁸ This means that “[a]ny service company that performs hydraulic fracturing using diesel fuel must receive prior authorization through the applicable UIC program.”¹¹⁹

Second, the SDWA does not cover wastewater. The SDWA and the CWA establish minimal federal standards for management of wastewater. In Part C of the SDWA, underground drinking water sources are addressed, and the Act requires EPA to “establish and publish regulations that set minimum requirements and restrictions for underground injections nationwide.”¹²⁰ These include standards “for inspection, monitoring, recordkeeping, and reporting requirements.”¹²¹ Yet because Part C of SDWA was specifically amended to exempt any “underground injection of” most fluids “related to oil production,¹²² fracking wastewater is not regulated by SDWA either. However, EPA maintains authority over its Underground Injection Control Class II wells, which “accept injection of oil and gas wastewater . . . so long as fracking for oil and gas production is not involved.”¹²³

In 2009, Congress directed EPA to commission a new study to determine the comprehensive effects of fracking on the environment, including effects on drinking water.¹²⁴ As of December 2015, EPA

¹¹⁴ Cupas, *supra* note 107, at 608–09. “The formal battle over whether the Safe Drinking Water Act must regulate hydraulic fracturing began in 1997, when the Legal Environmental Assistance Foundation, Inc. filed a petition asking the EPA to withdraw its approval of Alabama’s underground injection program.” *Id.* at 606. “[T]he EPA’s draft study noted that over ten chemicals associated with hydraulic fracturing required SDWA regulation, nine of which exceeded the regulatory standard, however, in the final draft of the study, the EPA either completely removed or favorably altered calculations regarding most of these chemicals.” *Id.* at 614.

¹¹⁵ Energy Policy Act of 2005, Pub. L. No. 109-58, § 322, 119 Stat. 594, 694 (2005); *see also* Abrahm Lustgarten, *Former Bush EPA Official Says Fracking Exemption Went Too Far; Congress Should Revisit*, PROPUBLICA, (Mar. 9, 2011), <http://www.propublica.org/article/former-bush-epa-official-says-fracking-exemption-went-too-far> (describing the motivation behind the exemption).

¹¹⁶ Craven, *supra* note 50, at 407; *see also* Spence, *supra* note 14, at 449–50.

¹¹⁷ L. Poe Leggette et al., *Federal Regulation of Hydraulic Fracturing: A Conversational Introduction*, 33 ENERGY & MIN. L. INST. § 22.13, sec. 5 (2012); *see also* *Class II Oil and Gas Related Injection Wells*, U.S. EPA, <https://www.epa.gov/uic/class-ii-oil-and-gas-related-injection-wells>.

¹¹⁸ *Natural Gas Extraction – Hydraulic Fracturing*, U.S. EPA, <https://www.epa.gov/hydraulicfracturing>; *see also* Leggette, *supra* note 117, at sec. 5.

¹¹⁹ Leggette, *supra* note 117, at §22.13, sec. 5. Diesel fuel, however, “is not a major component of modern fracking fluids.” Kendall Gurule, *Diesel Fuel Fracking*, STATE IMPACT (Aug. 3, 2013), <http://frackwire.com/diesel-fuel-fracking>.

¹²⁰ Obold, *supra* note 30, at 482. *See also* 42 U.S.C. §§ 300h-300h-8 (2012).

¹²¹ Craven, *supra* note 50, at 407–08 (quoting Rebecca Jo Reser & David T. Ritter, *State and Federal Legislation and Regulation of Hydraulic Fracturing*, in 57 ADVOCATE: ST. BAR LITIG. SEC. REP. 31, 31 (2011)).

¹²² Energy Policy Act of 2005, Pub. L. No. 109-58, § 322, 119 Stat. 594, 694 (2005).

¹²³ Kron, *supra* note 54, at 617.

¹²⁴ Obold, *supra* note 30, at 487.

has not yet completed that study.¹²⁵

A final source of regulatory authority in the SDWA rests with EPA's emergency powers: Under section 1431 of the SDWA, EPA has "the power to issue emergency orders if a contaminant in an underground source of drinking water may present an imminent and substantial endangerment to the health of persons."¹²⁶ However, because this provision applies only if there is substantial endangerment of human health, the SDWA would not protect drinking water supplies before there are negative human-health effects.¹²⁷

H. Toxic Substances Control Act and Emergency Planning and Community Right-to-Know Act

The Toxic Substances Control Act gives EPA the authority to require private companies to report the types and amounts of chemicals in their products.¹²⁸ These reporting requirements apply to companies that manufacture and/or import a chemical substance listed on the TSCA Inventory and are not otherwise exempt.¹²⁹ In 2014, EPA proposed a new rule mandating that companies report their usage of inorganic chemical substances, often used in fracking.¹³⁰ The Advanced Notice of Proposed Rulemaking closed in September 2014, and the final rule is not expected until June 2017.¹³¹

Moreover, EPA recently lowered the chemical volume that must be included in reported records in one calendar year, from 100,000 pounds to 25,000.¹³² Some chemicals used in natural gas extraction are still exempt from reporting, including petroleum process streams and liquefied petroleum gas.¹³³

EPA also agreed to propose rules under sections 8(a) and 8(d) of the Act that would require regulated parties to disclose information on "chemical substances and mixtures used in hydraulic fracturing."¹³⁴ These rules would also create new transparency and access to information by requiring manufacturers, processors, commercial distributors, and other regulated entities to disclose health and safety research addressing the regulated substances.¹³⁵ As a result, some observers expect that "the burden of compliance would more likely fall on service companies, as opposed to oil and gas well operators."¹³⁶ This would create a new degree of transparency, but would not control on-the-ground operations.

Under the Emergency Planning and Community Right-to-Know Act (EPCRA), operators must maintain material safety data sheets for certain chemicals that are stored at the drilling site above

¹²⁵ See *Office of Research and Development, Study of Potential Impacts of Hydraulic Fracturing on Drinking Water Resources: Progress Report*, U.S. EPA (2012), <https://www.epa.gov/hfstudy/study-potential-impacts-hydraulic-fracturing-drinking-water-resources-progress-report-0>.

¹²⁶ Craven, *supra* note 50, at 407–08 (quoting 42 U.S.C. § 300i(a) (2012)).

¹²⁷ *Id.* at 408.

¹²⁸ Leggette et al., *supra* note 117, at sec. 4. See also *Hydraulic Fracturing Chemicals and Mixtures*, U.S. EPA (2015) <http://yosemite.epa.gov/opei/rulegate.nsf/byRIN/2070-AJ93>.

¹²⁹ Leggette et al., *supra* note 117, at § 22.13, sec. 4.

¹³⁰ See *Hydraulic Fracturing Chemicals and Mixtures*, 79 Fed. Reg. 28,664, 28,665 (May 19, 2014) (proposed rule).

¹³¹ *Id.*

¹³² *Id.*

¹³³ *Id.*

¹³⁴ See *id.* at 664.

¹³⁵ Leggette et al., *supra* note 117, sec. 4.

¹³⁶ *Id.*

threshold quantities.¹³⁷ However, oil and gas operators are not required to prepare annual toxic chemical release forms, because the oil and gas industry is not one of the listed industries under the Act.¹³⁸ Further, although the EPCRA requires that operators provide the data sheets to local emergency planning committees upon request, it also allows operators to claim that certain chemical compositions are “trade secrets” and are thus exempt from disclosure.¹³⁹

On March 20, 2015, the Secretary of the Interior released final standards¹⁴⁰ that would “improve safety and help protect groundwater by updating requirements for well-bore integrity, wastewater disposal and public disclosure of chemicals.”¹⁴¹ These standards would also purportedly include measures to target where oil and gas leasing occurs, and protect “special” areas where no drilling should be permitted.¹⁴² Specifically, key provisions of the rule include improved protection of groundwater supplies by requiring a certification of

well integrity and strong cement barriers between the wellbore and water zones through which the wellbore passes; [i]ncreased transparency by requiring companies to publicly disclose chemicals used in hydraulic fracturing to the Bureau of Land Management . . . within 30 days of completing fracturing operations; [h]igher standards for interim storage of recovered waste fluids from hydraulic fracturing to mitigate risks to air, water, and wildlife; [and] [m]easures to lower the risk of cross-well contamination with chemicals and fluids used in the fracturing operation by [increasing requirements for disclosure to the Bureau].¹⁴³

The rule, initially scheduled to come into effect in June 2015, applied only to land managed by the Bureau of Land Management. As a result, it was limited to development on public and tribal lands. Yet this rule represented a significant step forward in federal regulation of hydraulic fracturing. Then-Secretary of the Interior Sally Jewell noted that “[c]urrent federal well-drilling regulations are more than 30 years old and they simply have not kept pace with the technical complexities of today’s hydraulic fracturing operations.”¹⁴⁴

However, in June of 2016, a federal judge struck down the BLM rule.¹⁴⁵ Judge Scott Skavdahl found that BLM lacked the authority to regulate energy extraction on public lands because Congress did not delegate such authority to regulate fracking to the Department of the Interior.¹⁴⁶ In looking at the text of the 2005 Energy Policy Act, Judge Skavdahl concluded that Congress had “explicitly

¹³⁷ 42 U.S.C. § 11021 (West, 2016).

¹³⁸ Wiseman, *supra* note 100, at 250 n.125.

¹³⁹ 42 U.S.C. § 11042 (West 2016).

¹⁴⁰ Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands, 80 Fed. Reg. 16,128 (Mar. 26, 2015) (to be codified at 43 C.F.R. pt. 3160).

¹⁴¹ Press Release, Bureau of Land Mgmt., Dept. of Interior, Interior Department Releases Final Rule to Support Safe, Responsible Hydraulic Fracturing on Public and Tribal Lands (Mar. 20, 2015), https://www.blm.gov/wo/st/en/info/newsroom/2015/march/nr_03_20_2015.html.

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *Wyoming v. Dep’t. of Interior*, No. 2:15-CV-041-SWS, 2016 WL 3509415 (D. Wyo. June 21, 2016).

¹⁴⁶ *Id.* at *12.

removed the only source of specific federal agency over fracking.”¹⁴⁷ The case has been appealed to the Tenth Circuit Court of Appeals, but no opinion has been published as of October 2016.¹⁴⁸

H. Gaps in Federal Regulations

The significant gap in federal fracking governance appears to be an unprincipled, relatively arbitrary one.¹⁴⁹ In some ways, this is expected, as “the regulation of oil and natural gas exploration and production in the United States has always been primarily a state matter.”¹⁵⁰ Because economic motives drove the earliest government interventions into oil and gas production,¹⁵¹ the federal regime did not emerge from a comprehensive endeavor to protect the environment from oil and gas activities. The gaps that have emerged in the federal regulation regime stem from the loopholes enacted throughout the past twenty-five years. These include the exemptions for oil and gas exploration from CERCLA, RCRA, and the SWDA. Such exemptions appear to have largely been political calculations,¹⁵² and not the result of a reasoned policy decisions to leave matters of primarily local concern to state and local governments.

The loopholes in federal fracking regulation might beg the question of whether the federal government is the most appropriate regulator. Some scholars argue that the federal government is not the appropriate level of government to regulate fracking.¹⁵³ These scholars have noted that not enough is currently known about the technology itself to institute a comprehensive federal regime.¹⁵⁴ Moreover, perhaps states are the best level of government to make these decisions about their oil and gas regulations, given the many intrastate effects of the technology¹⁵⁵ and tradition of local oil and gas regulation. Other arguments for state regulation include “the ability to tailor decisions to local environmental conditions; regulatory and policy innovation; adaptive management or other experimentalist or ‘new governance’ regimes; and interjurisdictional competition that can lead to economically efficient regulation.”¹⁵⁶

Others, however, have argued that the federal government is actually the better actor to regulate fracking given the widespread economic, environmental, and energy-system impacts.¹⁵⁷ With the rapid expansion of fracking across the United States, there is a large risk of interstate pollution.¹⁵⁸ Federal regulation might also be favored in order to address

¹⁴⁷ *Id.* at *11-*12.

¹⁴⁸ *E.g.*, Jennifer A. Dlouhy, *Obama to Fight Court Ruling That Struck Down Fracking Rules*, BLOOMBERG (June 22, 2016), <http://www.bloomberg.com/news/articles/2016-06-22/federal-judge-strikes-down-obama-s-effort-to-regulate-fracking>.

¹⁴⁹ *See* Shalanda Helen Baker, *Is Fracking the Next Financial Crisis? A Development Lens for Understanding Systemic Risk and Governance*, 7 TEMP. L. REV. 229, 268–69 (2015).

¹⁵⁰ Spence, *supra* note 14, at 447.

¹⁵¹ *Id.*

¹⁵² *See, e.g.* Kron, *supra* note 54, at 613–614 (describing the “Halliburton loophole” in the SWDA and the purported role that Vice President Cheney played in brokering the deal).

¹⁵³ *See, e.g.*, David Spence, *Is It Time for Federal Regulation of Shale Gas Production?*, ENERGY MGMT. & INNOVATION CTR., <https://www.mcombs.utexas.edu/~media/Files/MSB/Centers/EMIC/Briefs/Energy-Brief-Is-It-Time-for-Federal-Regulation-of-Shale-Gas-Production.pdf>.

¹⁵⁴ *Id.*

¹⁵⁵ Burger, *supra* note 9, at 153 (noting that “most individual contamination events occur entirely within a single state or locality” but arguing that federal regulation is nonetheless preferable).

¹⁵⁶ *Id.*, at 158–59.

¹⁵⁷ *See, e.g., id.*

¹⁵⁸ *Id.* at 161.

the interrelated problems of interstate externalities, the “race to the bottom,” and NIMBYism (not in my backyard); the economic efficiencies gained through federal uniformity; the benefits of pooling resources in order to gather technical and scientific expertise; creating durable rules, and providing for enforcement; the potential for greater diversity of interest-group participation; and the mobilization around national moral imperatives.¹⁵⁹

In any event, local governance is rarely a part of this two-sided debate.

III. State Regulations

The gap in federal regulations is not unique to that level of governance. Fracking affects every layer of regulation, from local to national, and yet there is no comprehensive regulatory framework at any level.¹⁶⁰ At the state level, categorizing fracking regulations is difficult because of the many steps and processes involved in fracking,¹⁶¹ and the variety of policies that exist in different states. Because fracking is a complex process involving a range of stakeholders, effects, and procedures, most states’ regulations addressing fracking are fragmented across state statutes and codes.¹⁶² Each state has its own regulations and statutory provisions, and no comprehensive database has yet identified individual states’ statutes and regulations that apply to each stage of the process.¹⁶³ Even if an organization were to attempt to catalogue these requirements, state regulations are often being revised as science regarding fracking develops and public opinion shifts.¹⁶⁴

Currently, twenty-seven states have laws in place to address hydraulic fracturing and related activities.¹⁶⁵ These laws employ a broad range of regulatory techniques to manage fracking.¹⁶⁶ For example, the state of New York announced a ban on hydraulic fracturing in December 2014, after a state Department of Health report concluded that more research into the technology was necessary to determine whether fracking is safe.¹⁶⁷ In 2013, California passed Senate Bill 4, which allowed fracking subject to a number of requirements including permitting, reporting information about fluids used, and providing permit copies to all neighboring property owners and tenants.¹⁶⁸ Some states, such as Maryland, have decided to propose regulations regarding fracking, but with strict control over the process.¹⁶⁹ Still other states, such as Montana, have allowed fracking with stringent, albeit less comprehensive regulation.¹⁷⁰

¹⁵⁹ *Id.* at 158.

¹⁶⁰ Baker, *supra* note 149, at 268.

¹⁶¹ Hannah J. Wiseman, *Regulatory Islands*, 89 *N.Y.U. L. REV.* 1661, 1696–97 (2014).

¹⁶² *Id.*

¹⁶³ *Id.* at 1697. However, Professor Wiseman notes that “some are getting close,” including the Interstate Oil and Gas Compact Commission. *Id.*

¹⁶⁴ *Id.* at 1698–99.

¹⁶⁵ Blake Lara, *Hydraulic Fracturing: Evaluating Fracking Regulations*, 4 *U. BALT. J. LAND & DEV.* 177, 181 (2015).

¹⁶⁶ See Alexandra Dapolito Dunn & Chandos Cullen, *Engines of Environmental Innovation: Reflections on the Role of States in the U.S. Regulatory System*, 32 *PACE ENVTL. L. REV.* 435, 460–64 (2015).

¹⁶⁷ See *id.* at 463.

¹⁶⁸ *Id.* at 462–63.

¹⁶⁹ *Id.*

¹⁷⁰ See NATHAN RICHARDSON ET AL., RES. FOR THE FUTURE, THE STATE OF STATE SHALE GAS REGULATION 13–16 (2013), http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-Rpt-StateofStateRegs_Report.pdf (comparing the categories and quantity of regulation in different states).

Such disparate fracking regulations across states may entice fracking operators to “race to the bottom.”¹⁷¹ Shalanda Helen Baker, for example, believes that this pattern is already occurring: She cites states with more lax regulations, like West Virginia and Pennsylvania, as experiencing the environmental and social effects of fracking in ways that states that have banned fracking, like Vermont and New York, have not.¹⁷²

Recognizing that there is a significant federal gap and a wide variety of regulations across the twenty-seven states that have regulated fracking, we have singled out four states whose approaches to regulating fracking differs significantly. Pennsylvania, North Dakota, Colorado, and Texas all currently allow hydraulic fracturing, and have seen large increases in the amount of fracking occurring within their borders over the past ten years. Investigating these states’ policies demonstrates the array of options available for states to regulate land use within their borders. We believe that these four case studies illuminate the wide variety of activity currently occurring in the fracking space. As discussed further in Section VI, local governments in these states are also exemplifying a third dimension in the fracking debate: local governance.

A. Colorado

1. Overview

Colorado has an extensive history of oil and gas development. The state’s drilling has historically occurred on the Western Slope of the state, and more recently in the densely populated Front Range area including Denver and Boulder.¹⁷³ Colorado state law gives primary regulatory authority over oil and gas development to the state, though local governments also have some explicit authority.¹⁷⁴ Colorado’s principal oil and gas law is the 1951 Oil and Gas Conservation Act (COGCA).¹⁷⁵ The COGCA seeks to balance oil and gas development in a manner that is “consistent with protection of public health, safety, and welfare, including protection of the environment and wildlife resources.”¹⁷⁶ It grants authority to the Colorado Oil and Gas Conservation Commission (COGCC) to make and enforce regulations as “reasonably required to implement such power and authority;” otherwise, the statute has very few other specific guidelines for the Commission.¹⁷⁷ However, the Commission’s implementing regulations are specific and cover a large number of subjects. The governor appoints seven of these commissioners and two are executive directors of state agencies,¹⁷⁸ and the Commission’s mission is to “provide for the responsible development of the oil and gas resources within the state,” covering topics like operator registration, permits, notice to the public and landowners, and enforcement.¹⁷⁹ The Commission also runs and maintains an online database cataloging the state’s rules.¹⁸⁰

¹⁷¹ Baker, *supra* note 149, at 271.

¹⁷² *Id.*

¹⁷³ Oil and Gas Development in Colorado – 10.639, COLO. STATE UNIV., <http://extension.colostate.edu/topic-areas/family-home-consumer/oil-and-gas-development-in-colorado-10-639/> (last accessed Jan. 2, 2017).

¹⁷⁴ *Id.*

¹⁷⁵ John Jennings, *Current Topics in Colorado’s Regulatory Landscape*, 92 DENV. U. L. REV. O. 183, 185–87 (2015).

¹⁷⁶ COLO. REV. STAT. ANN. § 34-60-102(1)(a)(I) (West 2016).

¹⁷⁷ *See id.* § 34-60-105(1).

¹⁷⁸ *Id.*

¹⁷⁹ Jennings, *supra* note 175, at 185–87

¹⁸⁰ *Id.*

Under the COGCA, local jurisdictions have authority to regulate local affairs, including land use.¹⁸¹ Colorado has a strong tradition of home rule, and as a result, local governments are authorized to address even those aspects of oil and gas development that the Commission’s regulations cover, provided that “the local government regulations can be harmonized with state regulations and do not ‘materially impede’ or ‘destroy’ the state regulation.”¹⁸² Thus, the state’s interest in uniform policies across its jurisdiction and local governments’ interest in flexibility and autonomy are sometimes at odds.¹⁸³ Colorado’s state courts have held that state laws will only preempt local efforts if the local law causes an “operational conflict” with state law.¹⁸⁴ Further, two Colorado Supreme Court cases have held that local governments can regulate oil and gas operations, but “cannot completely prohibit state-sanctioned oil and gas development within their jurisdictions.”¹⁸⁵

Litigation has erupted in Colorado as a result of localities enacting bans or other restrictions on fracking.¹⁸⁶ In May 2016, the Colorado Supreme Court struck down local government fracking bans, affirming a lower court’s ruling that state law preempted a local fracking prohibition.¹⁸⁷ In addition to litigation, both industry-backed and industry-opposed groups proposed ballot initiatives to amend the state constitution in 2014.¹⁸⁸ Further, as the result of a politically-engineered compromise, the groups backing all four ballot measures withdrew their petitions before the general election in 2014.¹⁸⁹

2. *Permitting & Reporting Requirements*

Permitting and reporting requirements in Colorado are regulated by the 1965 Ground Water Management Act, which requires “every well intending to divert tributary, nontributary, designated, or Denver Basin groundwater first secure a permit.”¹⁹⁰ These subcategories each require slightly different permit processes.¹⁹¹ For example, in areas of Colorado facing water shortages, additional water saving action (an “augmentation plan”) is required.¹⁹² These permits are usually distributed by the state engineer, and may differ slightly depending on the type of groundwater to be removed.¹⁹³

In 2011, the Colorado Legislature passed a law requiring “operators to keep a chemical inventory on-site at each well and make that information available to emergency responders and local governments within twenty-four hours in the event of a spill.”¹⁹⁴ The law also requires that operators

¹⁸¹ *See id.*

¹⁸² Joel Minor, *Local Government Fracking Regulations: A Colorado Case Study*, 33 STAN. ENVTL. L.J. 61, 104 (2014).

¹⁸³ *See* Jennings, *supra* note 175, at 185–87.

¹⁸⁴ *Id.*

¹⁸⁵ *Id.*; *see also* Bd. of Cty. Comm’rs of La Plata Cty. v. Bowen/Edwards Assocs, Inc., 830 P. 2d 1045 (Colo. 1992); Voss v. Lundvall Bros., Inc., 830 P.2d 1061 (Colo. 1992).

¹⁸⁶ Jennings, *supra* note 175, at 186.

¹⁸⁷ Michael Wines, *Colorado Court Strikes Down Local Bans on Fracking*, N.Y. TIMES (May 2, 2016), <http://www.nytimes.com/2016/05/03/us/colorado-court-strikes-down-local-bans-on-fracking.html>.

¹⁸⁸ *All Four Colorado Oil, Gas Ballot Measures Withdrawn as Promised*, *supra* note 3.

¹⁸⁹ *Id.*

¹⁹⁰ Yong Eoh, *Yes, No, Maybe So: Uncertainty in Texas Groundwater Withdrawal for Hydraulic Fracturing*, 52 HOUS. L. REV. 1227, 1244 (2015).

¹⁹¹ *Id.* at 1245

¹⁹² *Id.* at 1244-45.

¹⁹³ *Id.*

¹⁹⁴ Francis Gradijan, *State Regulations, Litigation, and Hydraulic Fracturing*, 7 ENVTL. & ENERGY L. & POL’Y J. 47, 68-69 (2012).

report the amount and type of chemical added to their fracturing mixtures.¹⁹⁵ Drilling operators are encouraged, but not required, to create a Comprehensive Drilling Plan intended to identify foreseeable oil and gas activities in a defined geographic area.¹⁹⁶ All operators must file detailed and truthful reports at times specified by the state regulations, and conduct tests to determine the presence of waste or pollution.¹⁹⁷

Other aspects of hydraulic fracturing governed by the Colorado Oil & Gas Conservation Commission health and safety requirements (600 Series) include fire prevention, and setback and mitigation requirements for various types of buildings.¹⁹⁸ The 1200 Series establishes a comprehensive wildlife protection system.¹⁹⁹

3. *Casing & Cementing Standards*

The state's "300 Series" of regulations regulates drilling, development, production, and abandonment of wells.²⁰⁰ Rule 326 governs the mechanical integrity of wells. It specifies that there shall be a "test to determine if there is a significant leak in the well's casing, tubing, or mechanical isolation device."²⁰¹ The Commission's regulations also cover well spacing requirements.²⁰²

4. *Air*

Regulation 805 specifies that oil and gas facilities "shall be operated in such a manner that odors and dust do not constitute a nuisance or hazard to public welfare."²⁰³ Operators must control fugitive dust caused by their operations.²⁰⁴ The regulation controls emissions from production equipment, such as crude oil, and from well completions.²⁰⁵

5. *Water: Surface, Ground, and Wastewater*

Colorado regulates groundwater, but no other type of water contamination: In 2012, the Colorado Oil and Gas Commission promulgated a final rule that will apply to oil and gas wells permitted on or after May 1, 2013.²⁰⁶ That rule requires initial baseline samples of groundwater underlying the wells and subsequent monitoring from several locations on a proposed oil and gas well.²⁰⁷

Well construction for oil and gas purposes is generally not allowed in any of the designated basins, and the operator must formally apply to change the water right.²⁰⁸ For operators entering into

¹⁹⁵ *Id.*

¹⁹⁶ See 2 COLO. CODE REGS. § 404-1:216 (West 2016).

¹⁹⁷ *Id.* § 404-1:206 (West 2016).

¹⁹⁸ See *id.* §§ 404-1.606A, 1.609, 1.604.

¹⁹⁹ *Id.* §§ 404-1:1201–05 (requiring operators to identify impacted wildlife and creating area-specific restrictions).

²⁰⁰ *Id.* §§ 300–41.

²⁰¹ COLO. OIL & GAS CONSERVATION COMM'N, RULE 326: MECHANICAL INTEGRITY GUIDANCE 1 (2015), <http://cogcc.state.co.us/documents/reg/OpGuidance/Rule%20326%20Mechanical%20Integrity%20-%205-15-15.pdf>.

²⁰² Minor, *supra* note 1821, at 103.

²⁰³ 2 COLO. CODE REGS. § 404-1:805(a) (West 2016).

²⁰⁴ 2 COLO. CODE REGS. § 404-1:805(c) (West 2016).

²⁰⁵ 2 COLO. CODE REGS. § 404-1:805 (West 2016).

²⁰⁶ 2 COLO. CODE REGS. § 404-1:609 (West 2016).

²⁰⁷ 2 COLO. CODE REGS. § 404-1:609(b) (West 2016).

²⁰⁸ *Id.*

agreements with landowners to divert non-tributary groundwater from the aquifer underlying the landowner's land, no more than one percent of the amount of groundwater estimated to be in the aquifer may be withdrawn annually.²⁰⁹

Operators seeking to withdraw groundwater outside of designated groundwater basins must usually secure a court-approved augmentation plan.²¹⁰ According to Yong Eoh, “[t]his is because most wells exist in parts where surface streams are over-appropriated, and because these wells usually have junior water rights.”²¹¹

6. *Recent Updates*

A 2011 study by STRONGER,²¹² an independent nonprofit that helps states develop hydraulic fracturing regulations, suggested several improvements to Colorado's regulatory framework.²¹³ First, the group proposed that the COGCC set minimum and maximum surface casing depths to demonstrate that those depths protect fresh groundwater.²¹⁴ Second, STRONGER recommended that the state COGCC and Colorado's Division of Water Resources “jointly evaluate available sources of water for use in hydraulic fracturing.”²¹⁵

In 2014, Colorado approved regulations crafted by the state's most productive oil and gas producers in conjunction with the Environmental Defense Fund.²¹⁶ The regulations seek to “fix persistent leaks from tanks and pipes” by “require[ing] companies to install equipment to minimize leakage of toxic gases and to control or capture 95% of emissions.”²¹⁷ They also represent any state's first attempt to regulate methane emissions caused by fracking.²¹⁸

In February 2015, a task force of twenty-one governor-appointed members²¹⁹ unanimously recommended a series of action items “to harmonize state and local regulatory structures” respecting the oil and gas industry.²²⁰ This report also recommended that the Oil and Gas Commission focus on drafting rules that would enhance local governments' involvement in the drill permitting process.²²¹

B. North Dakota

²⁰⁹ *Id.*

²¹⁰ Eoh, *supra* note 190, at 1246.

²¹¹ *Id.*

²¹² Who We Are, STATE REVIEW OF OIL AND NATURAL GAS ENVIRONMENTAL REGULATIONS (STRONGER) (2016) <http://www.strongerinc.org/about-us/who-we-are/>.

²¹³ STRONGER, INC., COLORADO HYDRAULIC FRACTURING STATE REVIEW 5 (2011), http://cewc.colostate.edu/wp-content/uploads/2012/02/Colorado_HF_Review_2011.pdf.

²¹⁴ *Id.* at 5–6.

²¹⁵ *Id.* at 7.

²¹⁶ Jennifer Oldham, *Colorado First State to Clamp Down on Fracking Methane Pollution*, BLOOMBERG NEWS (Feb. 23, 2014), www.bloomberg.com/news/articles/2014-02-24/colorado-first-state-to-clamp-down-on-fracking-methane-pollution.

²¹⁷ *Id.*

²¹⁸ *Id.*

²¹⁹ These members included six representatives from the oil and gas industry, agricultural industry, or homebuilding industry; six members from local government and conservation communities; and seven members from a variety of other interests. KEYSTONE CTR. COLO. OIL AND GAS TASK FORCE FINAL REPORT 4 (2015), <http://www.cred.org/wp-content/uploads/2015/04/OilGasTaskForceFinalReport.pdf>.

²²⁰ *Id.* at 3.

²²¹ *Id.* at 5–8.

1. *Overview*

In the last ten years, North Dakota has emerged as the third-largest oil producing state in the United States.²²² Fracking in North Dakota is governed by the oil and gas regulations in the North Dakota Century and Administrative Codes (NDAC)²²³ and enforced by the North Dakota Industrial Commission's Department of Mineral Resources.²²⁴ These regulations cover several aspects of the hydraulic fracturing process, including permitting requirements and rules regarding the disposition of fracturing fluids, disclosure, and record keeping.²²⁵ The North Dakota Department of Health (Environmental Health Section) administers provisions of the NDAC that protect the state's air, land, and water resources. The North Dakota Department of Trust Lands regulates oil and gas lease agreements, bonus payments and royalties, rights-of-way applications and procedures, surface damage agreements, and seismic surveys.²²⁶

2. *Permitting & Reporting Requirements*

In North Dakota, no entity or person may begin any operations for drilling a well without first obtaining a permit from the North Dakota Industrial Commission.²²⁷ Moreover, unless the Commission provides a waiver, it will not issue a permit for an oil or gas well to be located within 500 feet of a permanently occupied dwelling.²²⁸ If the Commission issues a permit within 1,000 feet of an occupied dwelling, it reserves the right to impose additional conditions on the permit operator.²²⁹

Within thirty days of ceasing operations, any open pit must be reclaimed.²³⁰ North Dakota law requires that within sixty days of performing hydraulic fracturing, the owner, operator, or service company must "post on the [F]rac[F]ocus chemical disclosure registry all elements made viewable by the [F]rac[F]ocus website."²³¹ However, there are no express exceptions to reporting requirements for trade secrets or otherwise confidential information.²³²

3. *Casing & Cementing Standards*

North Dakota regulations specify that all wells drilled for oil or natural gas must be "properly cemented at sufficient depths to adequately protect and isolate all formations containing water, oil or gas or any combination of these; protect the pipe . . . ; and isolate the uppermost sand of the Dakota group."²³³ These regulations require operators to pressure test casing strings after cementing, and before beginning other operations, like injecting fracking fluid, in the well. In addition, operators are

²²² *Shale and Fracking Tracker: North Dakota*, VINSON & ELKINS, <http://www.velaw.com/Shale---Fracking-Tracker/US-State-Resources/North-Dakota/>.

²²³ *Id.*

²²⁴ *Id.*

²²⁵ *Id.*

²²⁶ *Id.*

²²⁷ N.D. CENT. CODE § 38-08-05 (West 2016).

²²⁸ *Id.*

²²⁹ *Id.*

²³⁰ *Id.*

²³¹ N.D. ADMIN. CODE § 43-02-03-27.1 (2016).

²³² *See id.*

²³³ N.D. ADMIN. CODE § 43-02-03-21 (2016).

required to keep a log describing the presence and quality of bonding of cement before completing any well, and must file these reports within thirty days of completing the work.²³⁴ Further, North Dakota requires the application of an appropriate cement evaluation tool to test well bore and casing integrity before conducting hydraulic fracturing activity.²³⁵

Any exploration and production waste must be disposed of in a particular manner. This means that such waste must be stored in lined pits removed within seventy-two hours after operations have ceased, and disposed of at an authorized facility.²³⁶ Lastly, the North Dakota Industrial Commission may grant exceptions to these rules, “after due notice and hearing, when such exceptions will result in the prevention of waste and operate in a manner to protect correlative rights.”²³⁷

4. *Air*

North Dakota regulations do not establish any particular requirements for air pollution or emissions, but they do specify that “[t]he commission may require surface air monitoring to detect movement of sequestered carbon dioxide that could endanger an underground source of drinking water.”²³⁸ Sequestered carbon dioxide might leak into underground drinking water if, for example, it escapes the drilled holes of improperly constructed injection wells.²³⁹ Carbon dioxide might also leach into the drinking water supply if plugged wells are not adequately sealed, if there are faults or fractures in the surrounding rock formations, or from “lateral and upward movement into hydraulically connected USDWs [underground sources of drinking water].”²⁴⁰ Should carbon dioxide build up in any of these confined spaces, it could increase the pressure on the water source, potentially causing seismic events.²⁴¹

5. *Water: Surface, Ground, and Wastewater*

Much of North Dakota’s fracking regulation regarding water relates to carbon dioxide sequestration. Before issuing a permit, the Oil and Gas Commission must find that the drilling operation’s storage facility for carbon dioxide will not adversely affect surface waters or any freshwater source.²⁴² North Dakota regulations specify that drilling pits shall be diked to prevent surface water from running into the pit,²⁴³ and treatment facilities shall be constructed and operated “so as not to endanger surface or subsurface water supplies.”²⁴⁴

For groundwater, all applications for permits to drill must provide leak detection and monitoring plans for all wells and surface facilities, and this plan must identify potential degradation of groundwater resources, with a particular emphasis on underground sources of drinking water.²⁴⁵

²³⁴ N.D. ADMIN. CODE §§ 43-02-03-21, -03-31 (2016).

²³⁵ N.D. ADMIN. CODE § 43-02-03-27.1 (2016).

²³⁶ N.D. ADMIN. CODE § 43-02-03-19.3 (2016).

²³⁷ N.D. ADMIN. CODE § 43-02-03-02 (2016).

²³⁸ N.D. ADMIN. CODE § 43-05-01-11.4(1)(h) (2016).

²³⁹ *Carbon Dioxide Capture and Sequestration*, U.S. EPA (Oct. 25, 2016), <http://www3.epa.gov/climatechange/ccs/safety.html>.

²⁴⁰ *Id.*

²⁴¹ *Id.*

²⁴² N.D. CENT. CODE § 38-22-08 (7) (2016).

²⁴³ N.D. ADMIN. CODE § 43-02-03-19.4 (2016).

²⁴⁴ N.D. ADMIN. CODE § 43-02-03-51.3 (2016).

²⁴⁵ N.D. ADMIN. CODE § 43-05-01-05 (2016).

Further, the operator must prepare a testing and monitoring plan to ensure that any sequestration project does not endanger underground sources of drinking water.²⁴⁶ This plan must include periodic monitoring of ground water quality and geochemical changes.²⁴⁷ North Dakota has no additional requirements for wastewater disposal.²⁴⁸

6. *Recent Updates*

North Dakota has recently challenged the Bureau of Land Management's proposed rules for fracking on Bureau-managed land, arguing that federal law lets states regulate oil and gas operations, and thus these regulations impermissibly override North Dakota's authority.²⁴⁹ Several other states, including Colorado, Wyoming, and Utah, have joined the suit. As described above in Section II, Judge Skavdahl in Wyoming issued an injunction in September 2015 halting the implementation of these regulations.²⁵⁰

C. Pennsylvania

1. *Overview*

Fracking has been used as a method of gas extraction in Pennsylvania since the 1950s, but the practice has grown exponentially since the late 2000s.²⁵¹ In response to this increased practice, Pennsylvania significantly updated its Oil and Gas Act in 2012 and in 2016.²⁵² This Act explicitly preempts local control over fracking.²⁵³ The Coal and Gas Resource Coordination Act, the Oil and Gas Conservation Law, and the state's environmental protection laws also regulate fracking.²⁵⁴ Other environmental protection laws include the Clean Streams Law, the Dam Safety and Encroachments Act, the Solid Waste Management Act, the Water Resources Planning Act, and the Community Right to Know Act.²⁵⁵

The Pennsylvania Department of Environmental Protection (DEP) enacts and enforces fracking regulations in Pennsylvania. David Spence argues that, consistent with his theory of "mission-orientation,"²⁵⁶ the delegation of fracking regulation to the DEP demonstrates a commitment to

²⁴⁶ N.D. ADMIN. CODE § 43-05-01-11.4 (2016).

²⁴⁷ *Id.* § 43-05-01-11.4(1)(d).

²⁴⁸ See N.D. CENT. CODE §§ 38-01 to -22 (2016).

²⁴⁹ Katherine Lynn, *North Dakota Seeks to Join Suit Against Federal Fracking Rule*, GRAND FORKS HERALD (Mar. 31, 2015), <http://www.grandforksherald.com/news/business/3711856-north-dakota-seeks-join-suit-against-federal-fracking-rule>.

²⁵⁰ Davenport, *supra* note 145.

²⁵¹ *Pennsylvania Follow-Up State Review*, STRONGER, INC. 10 (Sept. 2010), <http://www.strongerinc.org/wp-content/uploads/2015/04/PA-HF-Review-Print-Version.pdf>.

²⁵² Final Regulations for Oil and Gas Surface Activities, PA. DEP'T OF ENVTL. CONSERVATION, <http://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2016/February%203/Fact%20Sheet%20for%20Final%20Ch%2078%20Regulation.pdf> (last accessed Jan. 2, 2017); Marie Cusick, *DEP finalizes new oil and gas drilling*, STATEIMPACT (Jan. 6, 2016), <https://stateimpact.npr.org/pennsylvania/2016/01/06/dep-finalizes-new-oil-and-gas-drilling-regulations/>

²⁵³ See *Huntley, Inc. v. Borough of Oakmont*, 964 A.2d 855 (Pa. Sup. Ct. 2009).

²⁵⁴ *Laws, Regulations and Guidelines*, PA. DEP'T OF ENVTL. PROT. (2015), <http://www.dep.pa.gov/Business/Energy/OilandGasPrograms/OilandGasMgmt/Pages/Laws,-Regulations-and-Guidelines.aspx>.

²⁵⁵ *Id.*

²⁵⁶ This theory suspects that people attracted to work for an agency will exhibit policy preferences consistent with its statutory mission. Spence, *supra* note 14, at 458.

minimizing the environmental impacts of fracking.²⁵⁷ Perhaps in line with this hypothesis, the Pennsylvania DEP has more than doubled its drilling oversight staff since 2008. However, some commentators argue that Pennsylvania regulators are still understaffed.²⁵⁸

2. *Permitting & Reporting Requirements*

Drilling a well in Pennsylvania requires a license.²⁵⁹ Revenue from drill permit application fees funds the DEP staff, as well as the DEP oil and gas program more broadly.²⁶⁰ Pennsylvania is not involved in regulating lease agreements between mineral property owners and producers, and the DEP does not audit payments, read or calibrate meters, or tanks, or otherwise involve itself in disputes over lease issues.²⁶¹ Instead, authority over leasing state land for fracking operations lies with the Commonwealth's Department of Conservation and Natural Resources.²⁶² For non-state lands, there is no agency oversight of the private contracts between landowners and lease-seekers.²⁶³

The Pennsylvania Oil and Gas Act requires operators to notify the DEP at least twenty-four hours before they begin drilling a well, but there is no specific requirement that the operator notify the DEP before beginning the fracking process by injecting fluid into the pre-drilled well.²⁶⁴ The operator must then file a report within thirty days after completing drilling, and that report must include information about the well, such as the type of propping agent that will be used, average injection rate, rock pressure and well service company name.²⁶⁵ Pennsylvania's chemical disclosure rules require that drilling companies disclose to the Pennsylvania DEP the names of chemicals (excluding trade secrets) that are used at a drilling site within six days of the conclusion of fracking.²⁶⁶ Recently-enacted regulatory changes require prospective drillers to identify public resources like schools and playgrounds that would be affected by drilling.²⁶⁷

3. *Casing & Cementing Standards*

Pennsylvania's standards for casing and cementing are expressed as performance standards—for example, casing must be “of sufficient cemented length and strength to attach proper well control equipment and prevent blowouts, explosions, fires and casing failures.”²⁶⁸ Such casing standards

²⁵⁷ *Id.*

²⁵⁸ Katie Colaneri, *Well inspectors lured by higher pay to industry jobs*, STATEIMPACT (Oct. 7, 2013 1:47 PM), <https://stateimpact.npr.org/pennsylvania/2013/10/07/well-inspectors-lured-by-higher-pay-to-industry-jobs/>.

²⁵⁹ Eoh, *supra* note 190, at 1240. This requirement exempts farmers, drilling for “farming purposes,” as well as landowners drilling on their own property, or lessees drilling on leased property. 32 PA CONS. STAT. § 645.4 (2016).

²⁶⁰ Eoh, *supra* note 190, at 1240.

²⁶¹ *Id.*

²⁶² See Laura Legere, *Pennsylvania Legislature Wins in Court on Fracking Royalties*, PITTSBURGH POST-GAZETTE (Jan. 7, 2015 1:05 PM EST) <http://powersource.post-gazette.com/powersource/policy-powersource/2015/01/07/Court-Pennsylvania-DCNR-not-governor-has-authority-to-OK-natural-gas-leases-on-state-lands/stories/201501070160>; see also *Oil and Gas Lease for Forest State Lands*, PA. DEPT. OF CONSERVATION AND NAT. RES., http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_008504.pdf.

²⁶³ *Pennsylvania—Leasing Tips for Natural Gas Drilling*, THE NETWORK FOR PUB. HEALTH L. 2, https://www.networkforphl.org/_asset/6djmnl/Pennsylvania-Leasing-Tips-FINAL.pdf.

²⁶⁴ *Pennsylvania Follow-Up State Review*, *supra* note 251, at 18.

²⁶⁵ *Id.*

²⁶⁶ 58 PA. CONS. STAT. § 3222.1(b) (2016); Gradijan, *supra* note 194, at 74-75 (2012); Spence, *supra* note 14, at 456.

²⁶⁷ Cusick, *supra* note 252.

²⁶⁸ Spence, *supra* note 14, at 455 (quoting 25 PA. CODE §78.71(a) (2011)).

were updated in 2012.²⁶⁹ “General provisions for well construction and operation require the operator to ‘construct and operate the well in a manner that will ensure the integrity of the well’ and protect “health, safety, environment, and property.”²⁷⁰ These plans must describe the casing that the operation is using, the proposed depths to which they will set casing, the proposed placement of centralizers, as well as detailed information about the type of cement they will use.²⁷¹

4. *Water: Surface, Ground, and Wastewater*

Pennsylvania manages fracking wastewater in four ways: it is (1) reused to fracture additional wells; (2) treated and discharged to surface water; (3) injected into underground disposal wells; or (4) transported to out-of-state facilities.²⁷²

For groundwater, the 2012 Oil and Gas Act dictates that water withdrawals used for oil and gas drilling may not adversely affect the quality or quantity of water in the watershed.²⁷³ This Act requires operators to restore or replace a water supply with an alternative source of water of similar quantity and quality.²⁷⁴ Additionally, both the DEP and the Oil and Gas Act require operators to submit water management plans to identify where and how much water will be withdrawn during fracking operations.²⁷⁵ Where water contamination occurs, there is a legal presumption that the oil and gas well operator is responsible for the pollution if the contamination occurs within six months of drilling and is within 1,000 feet of the well.²⁷⁶

There are few other specific requirements for protecting surface or wastewater.²⁷⁷ Both the landowner and operator must undertake baseline water quality tests before operation.²⁷⁸ However, some regions facing water scarcity must develop water plans that identify existing and future uses of water available in these areas.²⁷⁹

5. *Air*

The General Permit for Air Pollution Control in Natural Gas Compression and/or Processing Facilities (GP-5) regulates air emissions in Pennsylvania.²⁸⁰ This general permit authorizes the construction, modification, and operation of natural gas or gas processing facilities. It is only

²⁶⁹ *Id.*

²⁷⁰ 25 PA. CODE § 78.73(a) (2016). *See also* Timothy James Furdyna, *Strengthening State Regulation of Casing and Cementing in High Volume Hydraulically Fractured Natural Gas Wells*, 9 *APPALACHIAN NAT. RES. L.J.* 1, 25 (2015).

²⁷¹ *Pennsylvania Follow-Up State Review*, *supra* note 245, at 10–11; *see also* Furdyna, *supra* note 270, at 25–26.

²⁷² *Pennsylvania Follow-Up State Review*, *supra* note 251, at 10. The Pennsylvania DEP is not authorized to administer its own Underground Injection Control (UIC) program due to the EPA’s federal primacy. *Id.* at 11.

²⁷³ *Pennsylvania Follow-Up State Review*, *supra* note 251, at 60–62.

²⁷⁴ Eoh, *supra* note 190, at 1240.

²⁷⁵ *Id.*

²⁷⁶ *Pennsylvania Follow-Up State Review*, *supra* note 251, at 10.

²⁷⁷ *Pennsylvania Follow-Up Fracturing State Review*, *supra* note 251, at 38.

²⁷⁸ *Id.*

²⁷⁹ Eoh, *supra* note 190, at 1240.

²⁸⁰ *Pennsylvania Follow-Up State Review*, *supra* note 251, at 113; *see also* GP-05, *Natural Gas Compression Facilities*, PA. DEP’T OF ENVTL. PROT., <http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-9747>.

applicable to non-major facilities (as defined by the Clean Air Act);²⁸¹ major facilities need separate plan approval from the DEP before construction.²⁸²

6. *Recent Updates*

The nonprofit STRONGER recommended in 2013 that Pennsylvania’s Department of Environmental Protection improve its data standardization for tracking violations and enforcement actions to facilitate accurate internal performance and transparency to the public.²⁸³ The team also recommended that the DEP complete a study for unconventional gas development to determine whether its program appropriately assesses wastes to detect radiation.²⁸⁴ Further, the organization recommended that DEP consider developing a process by which it determines surface casing depths to protect fresh groundwater, as its methodology has heretofore been inconsistent.²⁸⁵ STRONGER also suggested the state consider developing guidance for pre-drilling water sampling.²⁸⁶ DEP released its most recent annual report in 2013, and that report does not suggest that Pennsylvania has ever adopted its suggestions.²⁸⁷

Recent legislative activity suggests that fracking will continue in Pennsylvania under regulation in the near future. Disagreeing with New York State’s fracking ban in December 2014, Pennsylvania Governor Tom Wolf said he believes fracking can be done safely: “I want to do what I think we can do here in Pennsylvania and that is have this industry, but do it right from an environmental point of view, from a health point of view.”²⁸⁸ However, Governor Wolf also stated that he would support a moratorium on fracking in the Delaware River basin in the eastern part of the state, and on new leasing in state parks and forests. On January 29, 2015, he signed a moratorium on drilling in Pennsylvania’s state parks and national forests, comprising over two million acres of land.²⁸⁹

Later, in April 2015, Governor Wolf heard comments from the public on proposed fracking regulations that would increase the mandatory setbacks of oil and gas drilling operations to at least one mile from schools.²⁹⁰ “These regulations would also ban temporary fracking waste storage pits at well sites and increase requirements for ponds used as way stations for drilling waste.”²⁹¹ These

²⁸¹ “Major” is as defined in Title V of the Clean Air Act: “[A]ny source that emits or has the potential to emit 100 tons per year or more of any criteria air pollutant.” 35 PA. CONS. STAT. ANN. § 4006.6(b) (West 2016); *Vocabulary Catalog*, U.S. EPA (Feb. 21, 2013),

http://ofmpub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&vocabName=Air%20Permitting%20Terms&uid=1810064&taxonomyName=Air%20Permitting%20Terms.

²⁸² *General Permit for Natural Gas Compression and/or Processing Facilities (GP-5)*, PA. DEP’T OF ENVTL. PROT. (Dec. 2014), <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-103720/2700-FS-DEP4403.pdf>.

²⁸³ *Pennsylvania Follow-Up State Review*, *supra* note 251, at 11.

²⁸⁴ *Id.* at 12.

²⁸⁵ *Id.*

²⁸⁶ *Id.* at 12–13.

²⁸⁷ *See generally 2013 Oil and Gas Annual Report*, PA. DEP’T OF ENVTL. PROT.,

<http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-100389/2013%20Oil%20and%20Gas%20Annual%20Report%20with%20cover.pdf>.

²⁸⁸ Katie Colaneri, *Wolf: New York’s Fracking Ban is “Unfortunate”*, STATEIMPACT PA. (Dec. 18, 2014 5:09 PM), <http://stateimpact.npr.org/pennsylvania/2014/12/18/wolf-new-yorks-fracking-ban-is-unfortunate/>.

²⁸⁹ *Gov. Wolf Signs Moratorium on Fracking on State Lands*, CBS LOCAL (Jan. 29, 2015 12:07 PM),

<http://pittsburgh.cbslocal.com/2015/01/29/wolf-bans-new-gas-drilling-leases-on-public-land-as-promised/>.

²⁹⁰ *State Hears Comments on New Fracking Regulations*, THE ALLEGHENY FRONT (Apr. 29, 2015),

<http://www.allegHENYfront.org/story/state-hears-comments-new-fracking-regulations>.

²⁹¹ *Id.*

rules were finalized in October 2016, and require “additional measures if fracking is taking place near public resources, and requires drillers to restore water supply that is degraded or damaged through fracking.”²⁹²

In all, Pennsylvania has a fairly comprehensive set of fracking regulations covering the major categories of environmental risks. Under the leadership of Governor Wolf, the state appears to be taking a more protective approach to fracking that reflects some of the concerns that states like New York have recognized. However, as averred by STRONGER, there are some key areas in which Pennsylvania might strengthen its regulations, particularly with respect to pre-drilling water sampling and establishing a methodology to determine surface casing depths.

D. Texas

1. *Overview*

Texas’s approach to fracking is highly decentralized, and local jurisdictions have significant leeway in defining how oil and gas development occurs in the state.²⁹³ The Texas Railroad Commission administers the bulk of statewide regulatory authority, but the Texas Commission on Environmental Quality is responsible for administering air quality regulations, waste disposal, and other pollution-related aspects of gas production.²⁹⁴ However, Texas has cut the Commission on Environmental Quality’s budget by about a third since 2008, implicating the organization’s ability to effectively enforce air pollution.²⁹⁵

David Spence believes that in delegating power to the Railroad Commission, Texas has demonstrated its emphasis on natural gas development without a corresponding emphasis on environmental values.²⁹⁶ In further support of this argument, a 2012 University of Texas Energy Poll showed that Texans are more likely to support fracking and believe it requires less regulation compared to Pennsylvanians or New Yorkers.²⁹⁷

2. *Permitting & Reporting Requirements*

For oil and gas drilling, the Railroad Commission of Texas requires permits for the following: new wellbores; working over an existing wellbore to complete in a different reservoir; re-entry of a plugged well; reclassification of a well from injection/disposal to an oil/gas producing well; and transferring of the well location.²⁹⁸

²⁹² David DeKok, *Pennsylvania Adopts New Fracking Regulations*, REUTERS (Oct. 7, 2016), <http://www.reuters.com/article/us-usa-pennsylvania-fracking-idUSKCN1272B3>.

²⁹³ See Ryan Hackney, Note, *Don’t Mess With Houston, Texas: The Clean Air Act and State/Local Preemption*, 88 *TEX. L. REV.* 639, 658 (noting that cities in Texas have a “great deal of discretion in managing their affairs, and their ordinances will only be deemed invalid where the legislature has limited their authority with unmistakable clarity.”).

²⁹⁴ *Id.*; Spence, *supra* note 14, at 458.

²⁹⁵ Lisa Song, Jim Morris & David Hasemyer, *Fracking Boom Spews Toxic Air Emissions on Texas Residents*, *INSIDE CLIMATE NEWS* (Feb. 18, 2014), <http://insideclimatenews.org/news/20140218/fracking-boom-spews-toxic-air-emissions-texas-residents>.

²⁹⁶ See Spence, *supra* note 14, at 458.

²⁹⁷ *Id.* at 459.

²⁹⁸ *Drilling Permits Online Filing User’s Guide*, ch. 2, R.R. COMM’N OF TEX., <http://www.rrc.state.tx.us/media/20067/dpmanual.pdf>.

Regarding water wells specifically, Texas groundwater conservation districts have broad authority under the Texas Water Code to determine how and when a permit will be required to be utilized in the district.²⁹⁹ However, groundwater conservation districts are required to develop a permit program for drilling, equipping, operating, or completing wells, except for wells that are statutorily exempt.³⁰⁰ Drilling a well solely to support a rig actively engaged in oil and gas exploration is exempted from this permitting requirement.³⁰¹ Thus, many groundwater conservation districts have failed to issue permits for wells drilled for fracking. Nevertheless, some districts have conversely construed this exemption as inapplicable to water wells used for fracking.³⁰² These districts have argued that the exemption does not apply because the statute only exempts “drilling,” not “drilling and operating,” as Texas’s statute regulating well drilling for livestock use does.³⁰³

In 2012, the Railroad Commission of Texas implemented the Hydraulic Fracturing Disclosure Rule.³⁰⁴ This rule requires Texas oil and gas operators to disclose the chemical ingredients and water volumes used in hydraulic fracturing treatments on the website FracFocus.³⁰⁵ However, this rule does not apply to components considered “trade secrets,” to chemicals that are not disclosed to the operators themselves by manufacturers, or chemicals present in trace amounts.³⁰⁶

3. *Casing & Cementing Standards*

Compared to Pennsylvania’s emphasis on performance standards, Texas’s substantive regulations focus on the attainment of specific technical goals.³⁰⁷ Administrative Code Rule section 3.13 provides specification for well casing, cementing, drilling, well control, and completion requirements.³⁰⁸ The Railroad Commission regulations include well construction requirements and surface gauges used to measure contamination and protect groundwater.³⁰⁹ Operators must comply with “general proper wellhead practices for casing and well-waste disposal.”³¹⁰ However, these rules apply only to wells that will be “spudded” on or after January 1, 2014.³¹¹

4. *Air*

Although the Texas Commission on Environmental Quality regulates air quality, there are no regulations specifically related to air quality and fracking in Texas. A 2014 study revealed that there

²⁹⁹ See Trey Nesloney, *Fracking Dry: Issues in Obtaining Water for Hydraulic Fracturing Operations in Texas*, 45 TEX. ENVTL. L.J. 197, 207–08 (2015).

³⁰⁰ *Id.*

³⁰¹ *Id.*

³⁰² *Id.*

³⁰³ *Id.*

³⁰⁴ 16 TEX. ADMIN. CODE § 3.29 (2016).

³⁰⁵ *Oil & Gas FAQs*, R.R. COMM’N OF TEX., <http://www.rrc.state.tx.us/about-us/resource-center/faqs/oil-gas-faqs/faq-hydraulic-fracturing/>.

³⁰⁶ Gradijan, *supra* note 194, at 78.

³⁰⁷ See Spence, *supra* note 14, at 458.

³⁰⁸ 16 TEX. ADMIN. CODE § 3.13 (2016).

³⁰⁹ *Oil & Gas FAQs*, *supra* note 305.

³¹⁰ *Id.*; see also 16 TEX. ADMIN. CODE § 3.13 (2015) (describing general well casing requirements); 16 TEX. ADMIN. CODE § 3.14 (2015) (describing casing requirements for plugging a well); 16 TEX. ADMIN. CODE § 3.95 (2015) (describing casing requirements for “underground storage of liquid or liquefied hydrocarbons in salt formations”); see generally 16 TEX. ADMIN. CODE §§ 3.01–3.107 (2015).

³¹¹ 16 TEX. ADMIN. CODE § 3.13(a) (2015).

were “[o]nly five permanent air monitors . . . in [a] 20,000-square-mile region,” and that the monitors were all located “far from the . . . drilling areas where emissions are highest.”³¹² Further, the Texas Commission on Environmental Quality investigates only a small percentage of emissions complaints filed.³¹³

5. *Water: Surface, Ground, and Wastewater*

Water use in Texas is regulated by the Texas Commission on Environmental Quality, which regulates the use of surface water, and local groundwater conservation districts, with authority over the use of groundwater in their regions.³¹⁴

To protect groundwater, the Railroad Commission states that all wells drilled in Texas must have the surface casing “in the well . . . set below the depth of usable quality water.”³¹⁵ The Commission’s rules also “include strict well construction requirements that [specify that] several layers of steel casings . . . [shall be utilized] to protect groundwater.”³¹⁶ The rules also require that the production casing be “permanently cemented in place.”³¹⁷

6. *Recent Updates*

While Texas’s approach to regulating fracking provides a great deal of freedom to municipalities,³¹⁸ local jurisdictions can go beyond the baselines state-level standards if they choose. For example, in November 2014, the town of Denton passed the first fracking ban in the state.³¹⁹ In response to this, the Texas legislature passed a law stating that localities may not ban fracking in May 2015.³²⁰ This law represents a major departure from Texas’s long-held tradition of local home rule and giving municipalities the “broad authority to manage the local impacts of industries.”³²¹ The state’s assumption of historically local power may signal that localities’ efforts to ban a technology actually backfire when they attempt to contravene a state-supported technology.³²² Tensions between localities seeking to govern themselves and the State of Texas will likely continue to build over this issue.

E. Gaps in State Regulation

The four states surveyed here have made promising steps in regulating fracking—particularly in terms of requiring disclosure of chemicals used in fracking operations and specifying construction and maintenance techniques for casing and well pipes. However, there are still many opportunities for states to create a comprehensive and responsibly-managed fracking scheme. Specifically, there

³¹² Song et al., *supra* note 295.

³¹³ *See id.*

³¹⁴ *Oil & Gas FAQs*, *supra* note 305.

³¹⁵ *Id.*

³¹⁶ *Id.*

³¹⁷ *Id.*

³¹⁸ *See* Hackney, *supra* note 293, at 658.

³¹⁹ Hennessey-Fiske, *supra* note 3.

³²⁰ *Texas Governor Prohibits Cities and Towns from Banning Fracking*, *supra* note 3.

³²¹ Josh Galperin, *Fracking News: Texas Bans Bans*, YALE CTR. FOR ENVTL. L. & POL’Y (May 29, 2015), <http://envirocenter.yale.edu/news/fracking-news-texas-bans-bans>.

³²² *Id.*

are gaps in terms of water and air regulation, as evidenced by Texas’s large number of air quality complaints and low enforcement rate.

Further, even in states like Colorado that have a detailed and specific list of fracking regulations—and in fact, Colorado seems to also be a leader in governing traditionally local issues such as dust and other nuisances—there are still gaps around many of the local impacts described in Section V below. In addition to some of the larger gaps noted above, such as insufficient air and water regulation, less tangible aspects of fracking have also been left unaddressed. For example, no state studied here has addressed how hydraulic fracturing may affect communities’ social or economic welfare, such as impacts on property values or fracking’s effects on tax revenue.

Likewise, although the social tensions and financial risks arising from fracking operations—including increased prices of the housing stock, commodity prices, crime, and substance abuse—have been documented in the academic literature,³²³ the case studies in Section VI show that the regulation of many of these non-environmental impacts have not yet been widely implemented on the ground. The majority of these gaps are areas of regulation with almost entirely local effects, and most are non-environmental in nature. For example, there do not appear to be any ordinances addressing the environmental impacts from increased sand mining and processing, or the adverse effects on farming and farmland preservation. There are also no regulations targeting the effects of increased fracking on the local housing market due to increased scarcity and cost, or hedging against adverse effects on property values. We also did not find any governance systems that address or capitalize on charitable contributions, local employment, the effect of increased tax revenue, or revenue from leasing and royalties. Given the wide variety and extent of impacts that address the environmental effects of fracking—from regulating groundwater depletion to noise pollution—this lack of regulation addressing non-environmental aspects of fracking provides an opportunity for local governments to act.

IV. Local Land Use Authority

The importance of local governance in hydraulic fracturing is now receiving much-needed attention.³²⁴ And the timing is right, as 2016 was the hundredth anniversary of America’s first zoning ordinance.³²⁵ Prior to assessing how local governments should regulate hydrofracking and its impacts, however, it is critical to understand what the sources of local power are, and from where they originate.

Most state constitutions vest in their legislatures all of the legislative authority for the state, which allows states to “enact laws to regulate, prohibit, or require certain conduct, provided that such laws have some reasonable relation to the public health, safety, morals, or welfare.”³²⁶ This is commonly

³²³ Baker, *supra* note 149, at 266–67.

³²⁴ See, e.g., John R. Nolon & Steven E. Gavin, *Hydrofracking: State Preemption, Local Power, and Cooperative Governance*, 63 *CASE W. RES. L. REV.* 995 (2013); Scott Martin, Note, *What the Frack?! How Local Zoning Laws Keep Dangerous Mining Techniques Off Our Property*, 21 *J. ENVTL. & SUSTAINABILITY L.* 209 (2015); Minor, *supra* note 182; Jesse J. Richardson, Jr., *Local Regulation of Hydraulic Fracturing*, 117 *W. VA. L. REV.* 593 (2014).

³²⁵ CITY OF N.Y. BD. OF ESTIMATE & APPORTIONMENT, BUILDING ZONE RESOLUTION (1916), <http://biotech.law.lsu.edu/cphl/history/laws/1916NYCcode.htm>.

³²⁶ 1 AM. LAW ZONING § 2:2 (West 2016). See, e.g., N.Y. CONST. ART. 3 § 1.

known as the “police power,” under which zoning regulations are enacted and enforced.³²⁷ Generally, state legislatures have chosen to delegate these land use powers to local governments.³²⁸

Zoning as a form of regulatory power first began in the early twentieth century. Before that time, governments had made very little use of the police power to regulate land development and uses.³²⁹ In the beginning, zoning was considered a “radical departure” from traditional private property concepts, because it was “perceived as prohibiting a citizen from devoting his property to a purpose useful and entirely harmless, in the ordinary sense, in certain districts within a community.”³³⁰ Yet courts upheld the exercise of such powers to promote orderly segregation of industrial, commercial, and residential uses in bustling, growing communities.³³¹ In prohibiting uses from certain districts, localities (and the courts which upheld their ordinances) relied on nuisance and “general welfare” rationales.³³² Zoning codes, in their earliest stages, sought to regulate the kinds of nuisance and harms that could only be addressed prior by use of restrictive covenants, building codes, or injunctions.³³³ Prohibiting certain uses or preferring “higher uses” for a district effectively acted as injunctions against the nuisances of non-preferred uses.³³⁴ Meanwhile, policymakers generally thought that zoning contributed to the people’s “general welfare” by assuring orderly development and increased public services.³³⁵

The first zoning ordinance in the United States was the 1916 Zoning Resolution of the City of New York, which the New York Court of Appeals upheld as constitutional.³³⁶ That resolution and court decision subsequently sparked a widespread adoption of state zoning enabling statutes and implementation of zoning codes.³³⁷ The Advisory Committee on City Planning and Zoning, part of the U.S. Department of Commerce, published a Model Standard State Zoning Enabling Act in 1922, which served as a model that many state legislatures followed in delegating zoning powers to their local governments.³³⁸ The Committee also published a companion guide in 1928, known as A Standard City Planning Enabling Act.³³⁹ In 1926, the United States Supreme Court definitively affirmed the ability of localities to zone when the Court upheld the zoning ordinance of the Village of Euclid, Ohio.³⁴⁰ Further, by 1931, every state had authorized zoning and “over 1,000 municipalities had adopted zoning codes.”³⁴¹

³²⁷ 1 AM. LAW ZONING § 2:2 (West 2016).

³²⁸ *Id.*

³²⁹ 1 AM. LAW ZONING § 7:1 (West 2016).

³³⁰ *Id.*

³³¹ *Id.*

³³² Rathkopf’s *The Law of Zoning & Planning* § 1:2 (West 2016) [hereinafter Rathkopf].

³³³ Rathkopf § 1:2 (West 2016); *see, e.g.*, *Hadachek v. Sebastian*, 239 U.S. 394 (1915).

³³⁴ *Portage Twp. v. Full Salvation Union*, 29 N.W.2d 297, 302 (Mich. 1947); Rathkopf § 1:2 (West 2016).

³³⁵ Rathkopf § 1:2 (West 2016); *see, e.g.*, *Village of Euclid, Ohio v. Ambler Realty Co.*, 272 U.S. 365, 387–89 (1926).

³³⁶ *Building Zone Resolution*, *supra* note 325.

³³⁷ *Lincoln Trust Co. v. Williams Bldg. Corp.*, 229 N.Y. 313 (1920); Rathkopf § 1:2 (West 2016).

³³⁸ Rathkopf § 1:2 (West 2016); ADVISORY COMM. ON ZONING, U.S. DEP’T OF COMMERCE, A STANDARD STATE ZONING ENABLING ACT UNDER WHICH MUNICIPALITIES MAY ADOPT ZONING REGULATIONS (rev. ed. 1926), [https://planning-org-uploaded-](https://planning-org-uploaded-media.s3.amazonaws.com/legacy_resources/growingsmart/pdf/SZEnablingAct1926.pdf)

[media.s3.amazonaws.com/legacy_resources/growingsmart/pdf/SZEnablingAct1926.pdf](https://planning-org-uploaded-media.s3.amazonaws.com/legacy_resources/growingsmart/pdf/SZEnablingAct1926.pdf).

³³⁹ ADVISORY COMM. ON CITY PLANNING AND ZONING, U.S. DEP’T OF COMMERCE, A STANDARD CITY PLANNING ENABLING ACT (rev. ed. 1928), <https://www.planning.org/growingsmart/pdf/CPEnabling%20Act1928.pdf>.

³⁴⁰ *Village of Euclid*, 272 U.S. 365 (1926); 1 AM. LAW ZONING § 7:1 (West 2016).

³⁴¹ Rathkopf § 1:2 (West 2016).

Today, it is well established that municipal governments have been delegated legitimate zoning powers to assure orderly development and regulate for the health, safety, and welfare of their residents.³⁴² The following sections provide an overview of the most common types of delegated powers and the source of those powers.

A. Home Rule Powers

Municipal home-rule powers are one means by which local governments may regulate the impacts of hydraulic fracturing. Municipal home-rule powers include grants of authority stemming from either state constitutions, or enabling legislation that allow localities to zone and regulate land uses. Local home-rule systems are complex and are not easily sorted into distinct categories,³⁴³ but this Part provides an overview of the most common systems.

The two broadest home-rule categories are constitutional home-rule powers and home-rule powers granted from legislative acts; however, localities do not easily fall into one category or the other.³⁴⁴ Constitutional home-rule states grant municipalities power directly from the constitution, while localities in legislative home-rule states draw their power from legislative acts.³⁴⁵ In some states, municipalities possess a combination of constitutional and legislative home-rule powers, or are only permitted to exercise certain constitutional home rule powers after adopting a municipal charter.³⁴⁶ In each of the above cases, municipal power must be exercised in a manner consistent with the general law of the state, and may be constrained by limits set by the general law of the state, the local charter, or both.³⁴⁷

In New York, for example, it is the state enabling legislation—the Municipal Home Rule Law—that grants localities their zoning power; courts have refused to hold that local governments can draw the power to zone directly and solely from the state constitution.³⁴⁸ In Pennsylvania, the Municipalities Planning Code delegates to localities the authority for zoning, planning, enacting subdivision and land use controls, and creating planned developments.³⁴⁹ Moreover, a constitutional provision in Texas gives home-rule powers to cities with a population larger than 5,000, allowing them to regulate for the health, safety, and welfare of their citizens, while the state legislature delegates authority to municipalities with populations below 5,000.³⁵⁰

Colorado, on the other hand, illustrates how complex the delegation of authority to local governments can become. There are five different types of local governments in Colorado: home-rule municipalities (via a constitutional provision authorizing localities to grant themselves home-

³⁴² See Michael Lewyn, *New Urbanist Zoning for Dummies*, 58 *ALA. L. REV.* 257, 263 (2006) (citing Jerry Frug, *The Geography of Community*, 48 *STAN. L. REV.* 1047, 1091 (1996) (remarking that Euclidean zoning has become nearly universal in use throughout the United States)).

³⁴³ 1 *AM. LAW ZONING* § 2:7 (West 2016).

³⁴⁴ *Id.*

³⁴⁵ *Id.*; Rathkopf § 1:11 (West 2016).

³⁴⁶ 1 *AM. LAW ZONING* § 2:7 (West 2016).

³⁴⁷ 1 *AM. LAW ZONING* §§ 2:7–8 (West 2015); Rathkopf § 1:11 (West 2016).

³⁴⁸ N.Y. CONST. art. IX; 1 *AM. LAW ZONING* § 2:6 (West 2016); N.Y. MUN. HOME RULE L. § 10 (McKinney 2011).

³⁴⁹ 53 PA. STAT. § 10101 (PA. MUN. PLANNING CODE) (West 2015); 22A SUMM. PA. JUR. 2D MUN. AND LOC. L. § 14:47 (2d ed.) (West 2016).

³⁵⁰ VERNON'S ANN. TEX. CONST. art. 11, § 5 (West 2016); TEX. PRAC. SERIES MUN. LAW & PRACTICE § 1.005(5) (West 2016). See *infra* Section VI(B)(iii) for more detail on Texas' delegation of authority to municipalities.

rule powers by charter),³⁵¹ statutory municipalities (which have only those powers explicitly granted to them by Titles 29 and 31 of Colorado’s Revised Statutes, including zoning),³⁵² home-rule counties, statutory counties, and special districts.³⁵³

B. Police Powers

Zoning regulations that restrict development and use of land stem from municipal police powers, which enable localities to regulate for the general health, safety, and welfare of their residents.³⁵⁴ Granted by enabling legislation or state constitution (depending on the legislatures’ delegation of power), police powers address the regulation of uses that go beyond merely dictating in which districts they may take place.³⁵⁵ The police power is the basis for a wide variety of land use regulations, including, but not limited to, historic landmark district restrictions, environmental controls, architectural and aesthetic regulations, affordable housing mandates, and more.³⁵⁶ A zoning ordinance enacted pursuant to a municipality’s police power will only be held valid if it furthers an objective that is expressly or impliedly authorized by the state enabling statute.³⁵⁷

Some localities are currently using their police powers to regulate fracking, as will be discussed in more depth in Section VI. For example, Arlington, Texas has implemented a gas well permitting system that ensures wells will be sited in areas that minimize impacts on the community and may impose additional conditions such as proper landscaping screening and the enforcement of basic safety standards.³⁵⁸ Though an updated ordinance has been crafted in Peters Township, Pennsylvania, it will retain many features of the current regulations, which include provisions limiting noise, odor, and dust disturbances, a requirement for pre- and post-fracking water testing, and an emphasis on roadway safety and maintenance.³⁵⁹

C. Preemption

³⁵¹ Colorado’s constitution allows municipalities to approve charters granting themselves home rule powers. COLO. CONST. ART. XX, § 6.

It enumerates many broad powers, including eminent domain, taxation, and election holding. But home rule powers are broader than those listed in the Constitution. Section 6 also grants home rule municipalities “all other powers necessary, requisite or proper for the government and administration of its local and municipal matters,” and states that the enumeration of powers should not be construed to deny them “any right or power essential or proper to the full exercise of [self-government] right[s].”

Section 6 provides that state law is superseded by ordinances passed pursuant to home rule charters.

Minor, *supra* note 182, at 89–90 (citing COLO. CONST. art. XX, § 6).

³⁵² COLO. REV. STAT. ANN. §31-15-401 (West 2016).

³⁵³ Robert M. Linz, *Researching Colorado Local Government Law*, 38(8) COLO. LAW. 101 (2009); Minor, *supra* note 182, at 90.

³⁵⁴ *Lawton v. Steele*, 152 U.S. 133, 136 (1894); Rathkopf § 1:8; *see also* *City of Albany v. Anthony*, 262 A.D. 401, 403 (N.Y. App. Div. 1941) (distinguishing between zoning ordinance and nonzoning police power ordinances, zoning ordinances are traditionally aimed at directly controlling where a use takes place as opposed to how it takes place).

³⁵⁵ Rathkopf § 1:8 (West 2016).

³⁵⁶ Rathkopf § 1:8 (West 2016).

³⁵⁷ 1 AM. LAW ZONING § 7:1 (West 2016).

³⁵⁸ ARLINGTON, TEX., ORDINANCE 11-068 (Dec. 6, 2011), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/07/GasDrilling-Chapter-Arlington.pdf>. Despite these best efforts, however, Arlington was recently the site of a well blowout that spilled over 42,000 gallons of fracking fluid into residential neighborhoods. Brett Shipp, *Arlington Officials Report on Fracking Fluid Blowout*, WFAA, <http://www.wfaa.com/story/news/local/tarrant-county/2015/06/16/arlington-officials-report-on-fracking-fluid-blowout/28844657/>.

³⁵⁹ PETERS TOWNSHIP, PA., ORDINANCE 737 (Aug. 8, 2011), http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/06/Minera_Extraction_Ord_final_version_737_8-2-11.pdf.

1. *Legal Nature*

Municipalities may only exercise the authority granted to them by a state statute or constitution, and may not exceed the limitations inherent to this delegatory scheme. Otherwise, the ordinance is in direct conflict with the constitution or statute that delegates the power.³⁶⁰ Additionally, a number of states explicitly specify that “municipal legislation is valid only to the extent that it does not conflict with the general law of the state” (which includes the constitution as well as the general statutes of the state).³⁶¹ Express preemption exists when the state legislature, in specific and unambiguous terms, preempts local action in order to further the interests of the state.³⁶² For example, a state may expressly limit local authorities’ power to regulate the location of airports.³⁶³ Implied preemption, on the other hand, occurs when a state regulation does not explicitly prohibit localities from regulating in a certain arena, but the local law appears to conflict with the state interests at hand.³⁶⁴ In this case, it is up to the judiciary to determine whether there is either an irreconcilable conflict created by the local law with state regulation, or whether the state law “occup[ies] the field” to the extent that local regulation is automatically preempted.³⁶⁵ When a conflict is found between a state law and a local ordinance, the local ordinance must always give way to the state regulation.³⁶⁶ For example, a locality is permitted to zone business classes—liquor stores, for instance—into specific areas, but cannot totally prohibit the sale of liquor within its jurisdiction when the state has licensed liquor sales. This is because a complete prohibition contradicts the implied interests of the state.³⁶⁷

Many states have enacted comprehensive oil and gas legislation that regulates *how* the process of fracking is carried out, which preempt localities from adding additionally restrictive or contrary regulations.³⁶⁸ This is a particularly contentious issue in the context of fracking, as local regulations that severely restrict or prohibit drilling can frustrate state economic objectives. For example, elements of the drilling process that are preempted from local control might include the placement of boreholes and well casing regulations.³⁶⁹ However, several states have upheld localities’ use of zoning power to determine *where* fracking can take place. This can be accomplished by restricting drilling activities to certain drilling districts (e.g. the industrial district),³⁷⁰ or by use of the police power to implement a permitting scheme or passing ordinances regulating nuisance effects such as road wear, noise, odor, and dust.³⁷¹

³⁶⁰ 1 AM. LAW ZONING § 6:28, Westlaw (2016).

³⁶¹ *Id.*

³⁶² John R. Nolon & Jessica A. Bacher, *Mitigating the Adverse Impacts of Hydraulic Fracturing: A Role for Local Zoning*, 37 ZONING & PLAN. L. REP. 1, 20 (2014).

³⁶³ *See, e.g.*, In re Petition of Detroit, 14 N.W.2d 140, 142 (Mich. 1944).

³⁶⁴ Nolon & Bacher, *supra* note 362, at 20.

³⁶⁵ *Id.*

³⁶⁶ 1 AM. LAW ZONING § 6:28, Westlaw (2016).

³⁶⁷ *See id.*; *see also, e.g.*, Town of Fenton v. Tedino, 356 N.Y.S.2d 397 (N.Y. Sup. Ct. 1974); Twp. of Spring v. Majestic Copper Corp., 256 A.2d 859 (Pa. 1969).

³⁶⁸ *See, e.g.*, 34 COLO. REV. STAT. ANN. §§ 34-60-102-130 (West 2016); 58 PA. CON. STAT. ANN. §§ 3201–3274 (West 2016); 38 N.D. CENT. CODE. §§ 38-01-22 (West 2016); TEX. NAT. RES. CODE ANN. art. 3 §§81–123 (West 2016).

³⁶⁹ *See, e.g.*, COLO. REV. STAT. ANN. §§ 34-61-102, 34-61-105 (West 2016).

³⁷⁰ *See, e.g.*, Huntley & Huntley, Inc. v. Borough Council, 964 A.2d 855, 861–62 (Pa. 2009); Range Res.-Appalachia, LLC v. Salem Twp., 964 A.2d 869, 872 (Pa. 2009).

³⁷¹ *See, e.g.*, PETERS TOWNSHIP, PA., CODE Ch. 27 (ZONING) § 713 (2016) (discussed in more detail *infra* Section VI).

In Pennsylvania, local governments are expressly preempted from mandating the thickness of well casings, or the type of equipment that drillers use.³⁷² Yet despite these state-level limitations, the Supreme Court of Pennsylvania has upheld that Pennsylvania localities do have the legal authority to regulate *where* fracking may take place within their jurisdiction.³⁷³ In Colorado, the state's Supreme Court has determined that localities, such as Longmont and Fort Collins, do not possess the authority to constitutionally ban fracking within their borders; such action is preempted by the state oil and gas law, as bans arguably run counter to the state's interests in exploiting natural gas deposits.³⁷⁴

2. *Politics and the Local Governance of Fracking*

Preemption has become one of the central battlegrounds in the fracking debate. State governments, for example, may seek to increase oil and gas exploration, while local governments may remain sensitive to residents' concerns regarding the lifestyle, environmental, health, and economic risks of fracking. When states endeavor to overturn local regulations related to fracking, a key question is whether the local fracking rules are really different from other, well-established local regulations, or whether they are simply addressing an issue that is currently a political minefield.

D. Non-Regulatory Governmental Approaches

In addition to traditional regulatory techniques, non-regulatory approaches can also be effective tools to address the impacts of hydraulic fracturing, whether used alone or in conjunction with regulatory measures. One of the most common non-regulatory approaches is crafting a community benefits agreement (CBA)—a site-specific, legally enforceable agreement between local government, the community, and a developer.³⁷⁵ A CBA lays out the project's benefits to the community, and ensures the community's support of the project.³⁷⁶ Allowing the community and the developer to engage in a more collaborative negotiation process than what is afforded under the usual land use application process, the developer minimizes risk while community members enjoy an increased degree of input to ensure the project is tailored to meet the unique needs of their locale.³⁷⁷ Over the past two decades, CBAs have gained a higher profile in the land use processes in several states, such as New York and California, where they are employed to address a wide range of environmental and social justice concerns.³⁷⁸ Though the scenarios involved in drilling are not analogous to a CBA's usual applications (for example, to a single development site such as a stadium project), modifications to the process could be made in order to enhance negotiations between community members, local government, and industry.³⁷⁹

³⁷² See *Huntley*, 964 A.2d at 861; *Range Resources-Appalachia*, 964 A.2d at 875.

³⁷³ See *Huntley*, 964 A.2d at 864–65; *Range Resources-Appalachia*, 964 A.2d at 872–73.

³⁷⁴ *City of Longmont v. Colo. Oil & Gas Ass'n*, 369 P.3d 573 (Colo. 2016).

³⁷⁵ Julian Gross et al., *COMMUNITY BENEFITS AGREEMENTS: MAKING DEVELOPMENT PROJECTS ACCOUNTABLE 9* (2005); *Policy & Tools: Community Benefits Agreements and Policies*, P'SHIP FOR WORKING FAMILIES, <http://www.forworkingfamilies.org/resources/policy-tools-community-benefits-agreements-and-policies>.

³⁷⁶ Gross, *supra* note 375, at 9.

³⁷⁷ *Id.*

³⁷⁸ Patricia E. Salkin & Amy Levine, *Understanding Community Benefits Agreements: Equitable Development, Social Justice and Other Considerations for Developers, Municipalities and Community Organizations*, 26 U.C.L.A. J. ENVT'L. POL'Y 291 (2008); *The NYC Bar Association Reports on CBAs In NYC's Land Use Practice*, 16 CITY L. 49 (May/June 2010).

³⁷⁹ See William Yukstas, Note, *Managing Fractions: The Role of Local Government In Regulating Unconventional Natural Gas Resources – Recommendations For New York*, 11 CARDOZO PUB. L. POL'Y & ETHICS J. 563, 595-603 (2013).

Another non-regulatory approach is executing a memorandum of understanding (MOU), also known as a “letter of intent.”³⁸⁰ An MOU effectively memorializes in writing the signing parties’ intentions to enter into a formal contract, but does not legally bind the parties to adhering to the terms of the MOU.³⁸¹ In terms of its applicability to hydraulic fracturing, local governments may use an MOU to air concerns and negotiate with industry without the pressure of adopting or adhering to formal regulatory measures.³⁸² Finally, keeping open clear, direct, and honest lines of communication can greatly enhance the relationship between local government officials and industry operators, which greatly aids a locality’s mission to effectively address impacts of concern.³⁸³

Given the scope and history of local land use and environmental authority, governing fracking *qua* fracking is not the best tactic for controlling its impacts. Rather, local governments should govern fracking as they do other local industries because, while fracking does present local concerns and impacts that are distinct from other industries, at its core, fracking is merely another industry. Thus, by addressing fracking through those impacts that cause the most concern to local communities, it is easier to highlight the ways in which local governments can address those concerns using their familiar local powers. The following Section describes the ways in which these local powers overlap with the identified impacts of fracking.

V. Identifying the Local Impacts of Hydraulic Fracturing

The federal and state governance systems do address a range of impacts from hydraulic fracturing, but a gap remains at the local level. Communities must cope with a set of impacts that are uniquely local in nature that federal and state regulations do not address, but local governments can for the most part manage these impacts by using traditional local governance tools. The authors of this Article, along with colleagues at Yale University and Pace University School of Law, undertook a project from 2013-2015 to catalogue and analyze the local impacts of hydraulic fracturing. In this article, we provide our list of local fracking impacts as an illustration of major local concerns. The next Part describes the methods we used to catalogue local impacts, followed by a table illustrating those impacts. A complete list is available as an online appendix at www.bit.ly/frackingdatabase.

A. Methods

1. *Project Origins*

This project began in 2013 in a joint effort between the Yale Center for Environmental Law & Policy (YCELP), Yale Climate & Energy Institute, and Pace Law School’s Land Use Law Center. Our overarching goals have been to understand how local governments can fill fracking regulatory gaps at the federal and state levels, and to empower local government decision-making on a range of challenges that shale oil and gas development pose. We hypothesized that outright fracking bans risk state preemption and uncontrolled drilling risks negative environmental and community impacts. Thus, our work has sought to support municipal leaders in developing balanced and effective regulatory and non-regulatory practices to address the effects of fracking. These practices would ideally mitigate land use and environmental damage, while preserving economic, social, and

³⁸⁰ *Memorandum of Understanding*, BLACK’S LAW DICTIONARY (10th ed. 2014).

³⁸¹ *Id.*

³⁸² See Erie, CO Case Study, *infra* Section VI.

³⁸³ See Arlington, TX Case Study, *infra* Section VI.

community benefits. We believe that, equipped with the proper tools, local authorities can effectively govern most aspects of fracking.

2. *Meeting with Stakeholders*

Our process has involved two stages. First, we focused on research, analysis, and stakeholder outreach to identify local impacts from fracking. Second, we investigated local government strategies to manage those impacts. Initially, we endeavored to synthesize fracking's local effects and incorporate local communities' concerns. These concerns include those founded on environmental impacts as well as social and economic impacts. Some impacts are clear and well documented, while others are speculative or largely unfounded. Nevertheless, we believe that only with an understanding of community concerns can local leaders address the tangible and intangible impacts of a significant new industry such as fracking.

To begin this process, the group identified a variety of local fracking impacts based on data previously collected by the non-profit organization Food and Water Watch.³⁸⁴ The Food and Water Watch data aggregated local resolutions, ordinances, and other legislative actions to ban hydraulic fracturing. Our team then accessed these legislative actions and, by reviewing the legislative findings of each, extracted details on the issues about which local governments were expressing concern.

These local actions ultimately included impacts that were well documented in the scientific literature as well as impacts that were less well researched, speculative, or unfounded but still deeply worrisome to community members. Our list does not seek to distinguish among these categories of impacts. Instead, we seek to provide sufficient information for local leaders to make informed decisions about how to manage hydraulic fracturing in their jurisdictions based on the concerns of their constituents. At the same time, we provide access to scientific literature, news reports, and other assessments of the science to help inform decision-making with subjective and objective information.

After consolidating these initial impacts, we sought to verify and understand firsthand the challenges that local governments might face. To do this, we held an expert panel and roundtable workshop in December 2013 at the Pace Land Use Law Center's annual conference.³⁸⁵ This session involved key participants from local governments, advocacy groups, academia, and industry. At this meeting, the team presented the preliminary impacts list, and incorporated additional impacts based on feedback from meeting participants. This session showed us that the impacts highlighted in local bans presented a one-sided perspective. As a result, we widened the project's focus to include beneficial aspects of shale development, relying heavily on the work of Daniel Raimi and Richard Newell at Duke University.³⁸⁶

³⁸⁴ Mary Grant, *Local Resolutions Against Fracking*, FOOD AND WATER WATCH (Nov. 17, 2016), <http://www.foodandwaterwatch.org/insight/local-resolutions-against-fracking>.

³⁸⁵ *December 2013 Workshop and Panel*, PACE LAND USE LAW CTR. (Dec. 6, 2013), https://mediaspace.pace.edu/media/Hydro-Fracking+LULC+12-05-13/1_p21ysyb7/31792771.

³⁸⁶ Richard G. Newell & Daniel Raimi, *Shale Public Finance: Local Government Fiscal Impacts of Oil and Gas Development*, DUKE U. ENERGY INITIATIVE (2015), <http://energy.duke.edu/shalepublicfinance>.

Building on the momentum from the December 2013 conference, we facilitated a second discussion at the Yale Law School in March 2014.³⁸⁷ This latter session focused on local strategies and best practices for governing unconventional oil and gas development. The discussion also centered on issues of state preemption of local authority, and included examples of local land use efforts in various states addressing the impacts of fracking.³⁸⁸ With input from current or former local government officials in Pennsylvania, Texas, and New Mexico, the workshop demonstrated that local governments have a strong capacity to address the impacts of hydraulic fracturing, and vary widely in both approaches and strategies.³⁸⁹

3. *Building the Impacts List*

Throughout 2014, we expanded the impact list to include two additional types of resources beyond positive and negative community impacts. First, we explored the peer-reviewed and gray literature, as well as news media to collate information on each of the impacts that our research identified. Second, we scoured local hydraulic fracturing regulations from across the country in order to find templates, models, and examples of the types of strategies local governments use to address impacts of local concern.

The goal of including resources and regulatory strategies in the impact list was ultimately to create an online database where local officials could find thorough and varied fracking research to support their own decision-making and leadership.

To do this, we gathered resources on each of the impacts the research team reviewed. We collected the available literature and consulted with experts to identify potential resources that explain, document, contextualize, or substantiate the impact. Some potential impacts, such as groundwater pollution from stray gas or fracking chemicals, have been subject to scientific study and subsequently documented in peer-reviewed literature.³⁹⁰ Other impacts, like the increase in demand for local government services and a reduction in local government workforce retention, are not as well documented.³⁹¹ Where possible, the framework provides links to authoritative, peer-reviewed journal articles with an objective perspective on the impact. Where peer-reviewed resources were not available, the framework provides either non-peer reviewed studies or news reports with useful coverage of the impact. Containing more than 150 resources and links documenting and contextualizing potential local impacts, the framework represents a significant step towards equipping local governments with foundational knowledge to manage shale development.

³⁸⁷ See *Workshop Materials and Further Resources: March 2014 Workshop*, LAND USE COLLABORATIVE, <http://sites.environment.yale.edu/collaborative/2015/08/11/hydraulic-fracturing/>.

³⁸⁸ *Id.*

³⁸⁹ *Id.*

³⁹⁰ See Local Impacts, *infra* Section V.B. For example, the harms of groundwater pollution from stray gas or fracking chemicals has been documented in the journal *Environmental Earth Sciences*, among others. See Birgit C. Gordalla, Ulrich Ewers & Fritz H. Frimmel, *Hydraulic Fracturing: A Toxicological Threat for Groundwater and Drinking-Water?*, 70 *ENVTL. EARTH SCI.* 3875 (2013).

³⁹¹ See Local Impacts, *infra* Section V.B. Though many local municipalities have identified an increased demand for local government services as an impact of fracking, no peer-reviewed journal has addressed this challenge. See Impacts List, *Community and Government: Provision of Local Government Services*. The same is true of the “Community and Government: Workforce Retention” impact, among others. *Id.*

To understand how the environmental, financial, and social consequences of fracking are incorporated into local law and policy, we then collected town resolutions and ordinances to augment those provided by Food and Water Watch. We surveyed a wide range of local ordinances and policy measures to procure a variety of regulatory and non-regulatory governance options for local authorities to consider. Then, we paired these local legal and policy strategies to corresponding impacts. While the measures and impacts in the framework are not exhaustive, the database provides a substantial resource and reference point for local governments seeking to secure local economic advantages, while safeguarding against potential negative effects from shale gas development.

At present, the impacts framework, summarized in Section V.B, and available in its entirety online in an interactive online format (see Appendix 1) or a static document (see Appendix 2), contains nearly forty unconventional oil and gas local impacts across the environmental, socio-economic, and public health spectrum that correspond with local measures that address these challenges. As stated above, while the catalogue of impacts is not an exclusive list of challenges a community may face, nor a complete picture of the potential benefits, the compiled list demonstrates the range of challenges a locality may face depending on local context. We seek to provide a balanced resource for governments seeking precedents of how other localities are addressing fracking, and suggest how governments might incorporate concerns of the scientific community, environmental advocates, industry, and local community members into municipal policy.

B. The Local Impacts of Hydraulic Fracturing

As noted above, we have compiled nearly forty oil and gas impacts of fracking across multiple areas of concern. The following list sets forth the impacts that we have surveyed, with more information located in the footnotes. For the online interactive database of these impacts, please see Appendix 1. See Appendix 2 for a static database saved as a PDF.

LOCAL IMPACTS
Agriculture: Farming and Farmland Preservation ³⁹²
Agriculture: Farmland Preservation ³⁹³
Community and Government: Civic Discourse, Community Character, and Crime ³⁹⁴

³⁹² See ARLINGTON, TEX., ORDINANCE 11-068, § 7.01B (DEC. 6, 2011), <http://www.arlington-tx.gov/cityattorney/wp-content/uploads/sites/15/2014/05/GasDrilling-Chapter.pdf> (creating setback requirements); MCKENZIE CTY., N.D., ZONING ORDINANCE, art. I.2 (2015), (2016), http://county.mckenziecounty.net/usrfiles/Zoning_Ordinance_9-20-2016.pdf; PETERS TOWNSHIP, PA., ZONING ORDINANCE § 714 (establishing compressor stations locations); MCKENZIE CTY. COMPREHENSIVE PLAN 1-1 (2016), http://planmckenzie.com/wp-content/uploads/2016/06/McKenzieCountyComprehensivePlan_FINAL-1.pdf (creating a town-wide comprehensive plan and establishing economic development strategies).

³⁹³ See Jon Hurdle, *Fracking Under a Historic Farm*, N.Y. TIMES (Mar. 1, 2013 1:42 PM), <http://green.blogs.nytimes.com/2013/03/01/fracking-to-unfold-under-a-historic-farm/>; Teri Weaver, *NY Farmers Reject Anti-Hydrofracking Position at Farm Bureau Meeting*, SYRACUSE.COM (Dec. 4, 2013), http://www.syracuse.com/news/index.ssf/2013/12/ny_farmers_reject_anti-hydrofracking_position_at_farm_bureau_meeting.html.

³⁹⁴ See CECIL TOWNSHIP, PA., ORDINANCE 2-2010 § 3 (Mar. 22, 2010), http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/07/Cecil_Township_2-2010_General.pdf (addressing resident notifications); MCKENZIE CTY., N.D., ZONING ORDINANCE, art. II.6, IV.8, *supra* note 392 (termination of non-conforming uses and addressing temporary workforce housing, respectively); MCKENZIE CTY. COMPREHENSIVE PLAN, *supra* note 392, at 16 (creating a statement of housing strategies).

Community and Government: Provision of Local Government Services ³⁹⁵
Community and Government: Workforce Retention ³⁹⁶
Economy: Charitable Contributions ³⁹⁷
Economy: Local Economic Development ³⁹⁸
Economy: Local Employment ³⁹⁹
Economy: Property Values ⁴⁰⁰
Economy: Revenue from Fee-for-Service Payments ⁴⁰¹
Economy: Revenue from Intergovernmental Transfers ⁴⁰²

³⁹⁵ See ARLINGTON, TEX., ORDINANCE 11-068, *supra* note 392, §§ 5.03 and 6.01B (requiring burden of proof to fall on the operator and requiring periodic reports); JEFFERSON HILLS, PA., DRAFT ORDINANCE 814 § 4 (July 12, 2010), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/10/Jefferson-Hills-PA.pdf> (requiring use of a security guard); MCKENZIE CTY., N.D., ZONING ORDINANCE, *supra* note 392, art. IV.8 (providing standards for temporary workforce housing); MIDLOTHIAN, TEX., ORDINANCE 2010-12, art. XIII (June 8, 2010), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/10/Midlothian-TX.pdf> (establishing fire prevention measures); NOTTINGHAM TOWNSHIP, PA., DRAFT ORDINANCE 8-16-2010 (Aug. 16, 2010), *passim*, http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/10/Nottingham_Township_No_91.pdf (ensuring pedestrian safety); PETERS TOWNSHIP, PA., ORDINANCE 737, §§ 713(K), (L), (M), (Q), (V), (W), (Y), (Z) (Aug. 8, 2011), http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/06/Minera_Extraction_Ord_final_version_737_8-2-11.pdf (addressing spill cleanup, site security, and accident preparedness); SOUTH FRANKLIN TOWNSHIP, PA., ORDINANCE 1-2012, § 3(Q) (Feb. 7, 2012), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/06/South-Franklin-Twnship-Ord.pdf> (ensuring reimbursement for operator compliance); and MCKENZIE CTY. COMPREHENSIVE PLAN, *supra* note 392, at 6–8 (requiring a statement of government strategies).

³⁹⁶ See Katie Walters, *Watford City's First-Ever Affordable Housing for Public-Service Employees Dedicated*, ROUNDUPWEB.COM (Aug. 14, 2013), <http://www.roundupweb.com/story/2013/08/14/news/watford-citys-first-ever-affordable-housing-for-public-service-employees-dedicated/3160.html>.

³⁹⁷ See Timothy Kelsey et al., *Economic Impacts of Marcellus Shale in Bradford County: Employment and Income in 2010*, MARCELLUS SHALE ED. AND TRAINING CTR. (Jan. 2012), http://www.marcellus.psu.edu/resources/PDFs/EI_Bradford.pdf; Raimi & Newell, *supra* note 384, at *Shale Public Finance: Local Government Revenue and Costs Associated with Oil and Gas Development*.

³⁹⁸ See, e.g., Andrew Rumbach, *Natural Gas Drilling in the Marcellus Shale*, CATSKILL CITIZENS, [http://catskillcitizens.org/learnmore/MarcellusTourismFinal\[1\].pdf](http://catskillcitizens.org/learnmore/MarcellusTourismFinal[1].pdf) (describing the effect of fracking on tourism).

³⁹⁹ See, e.g., *Pennsylvania Statewide Marcellus Shale Workforce Needs Assessment*, MARCELLUS SHALE ED. AND TRAINING CTR. (June 2011), http://www.shaletc.org/docs/PennsylvaniaStatewideWorkforceAssessmentv1_Final.pdf (noting the increased need for local workforce); Raimi & Newell, *supra* note 384, at *Revenues, Costs, and Net Fiscal Impacts for Local Governments Associated with Oil and Gas Development* (assessing the potential for an increase in the local tax base).

⁴⁰⁰ See ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 7.01.B (setting bonding and setback requirements, landscaping requirements, and fencing requirements, among other restrictions); MCKENZIE CTY. COMPREHENSIVE PLAN (2013), *supra* note 392, *passim* (requiring a statement of land use strategies; building restrictions; and setback restrictions, among other requirements).

⁴⁰¹ See ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 5.02 (describing a provision where an operator pays annual administrative fees for each permit); and BEDFORD, TEX., ORDINANCE, *passim*, https://www.municode.com/library/tx/bedford/codes/code_of_ordinances?nodeId=PTIICOOR_CH79GADRPR (stating which fees must be paid prior to drilling/construction).

⁴⁰² See, e.g., Raimi & Newell, *supra* note 384, at *Revenues, Costs, and Net Fiscal Impacts for Local Governments Associated with Oil and Gas Development* (describing that states collect taxes and fees associated with fracking operations in localities).

Economy: Revenue from Leasing and Royalties ⁴⁰³
Economy: Tax Revenue ⁴⁰⁴
General Concerns ⁴⁰⁵
Health and Safety: Health Concerns for Workers ⁴⁰⁶
Health and Safety: Local Health and Emergency Services ⁴⁰⁷
Housing: Increased Scarcity and Cost ⁴⁰⁸
Infrastructure: Improved Roads ⁴⁰⁹

⁴⁰³ See, e.g., *Energy Boomtowns and Natural Gas: Implications for Marcellus Shale Local Governments and Rural Communities*, NERC RD RURAL DEV., Paper No. 43 (Jan. 2009), <https://www.google.com/search?q=Energy+Boomtowns+and+Natural+Gas%3A+Implications+for+Marcellus+Shale+Local+Governments+and+Rural+Communities&oq=Energy+Boomtowns+and+Natural+Gas%3A+Implications+for+Marcellus+Shale+Local+Governments+and+Rural+Communities&aqs=chrome..69i57.317j0j4&sourceid=chrome&ie=UTF-8> (documenting increased local government revenue in Wyoming); Raimi & Newell, *supra* note 384, at *Revenues, Costs, and Net Fiscal Impacts for Local Governments Associated with Oil and Gas Development* (noting that oil and gas operators on public land pay royalties to the government for use of the land).

⁴⁰⁴ See, e.g., *Fact Sheet: Economics of High-Volume Hydraulic Fracturing in New York State*, N.Y. STATE DEP'T OF ENVTL. CONSERVATION (Sept. 2, 2011), <http://www.empireenergyforum.com/uploads/econimpact092011.pdf>; *State Tax Implications of Marcellus Shale: What the Pennsylvania Data Say in 2010*, PENN STATE COLLEGE OF AG. SCI. COOPERATIVE EXTENSION (2010), <http://extension.psu.edu/publications/ua468> (describing the increasing local tax revenue accompanying fracking in Pennsylvania).

⁴⁰⁵ See ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 6.01 (bonding and insurance requirements); PETERS TWP., PA. ORDINANCE NO. 737, *supra* note 359, *passim* (public safety and permit compliance).

⁴⁰⁶ See ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 5.02 (requiring emergency response plan, hazardous materials management, liability insurance, blowout prevention, fire prevention, and storage tank regulations); CECIL TWP., PA., ORDINANCE NO. 2-2010, *supra* note 394, at § 3 (requiring a first responders plan, and a preparedness, prevention, and contingency plans).

⁴⁰⁷ See, e.g., BURLERSON, TEX., ORDINANCE NO. B-790-09, *passim* (2009), https://www.municode.com/library/tx/burleson/ordinances/code_of_ordinances?nodeId=434664 (describing the authority of the city manager's power); CECIL TWP., PA., ORDINANCE NO. 2010-02, *supra* note 394, at § 3 (requiring a first responders' plan); CROSS CREEK TWP., PA. ORDINANCE at 4, <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/07/Cross-Creek-PA-oil-and-gas-zoning-amendment-new-draft-2.pdf> (requiring a Preparedness, Prevention, and Contingency Plan to the first responders and zoning officer); MCKENZIE CTY., N.D. ORDINANCE, *supra* note 392, at art. IV.11 (providing temporary workforce housing).

⁴⁰⁸ See *Watford City's First Ever Affordable Housing for Public Service Employees*, *supra* note 396 (describing the provision of subsidized housing).

⁴⁰⁹ See CRANBERRY TWP., PA. ORDINANCE NO. 2010-08 § 3 (2010), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/07/Cranberry-TWP-ordinance.pdf> (requiring the permit applicant to enter into an agreement with the township before, during, and after natural gas development).

Infrastructure: Road Conditions and Safety ⁴¹⁰
Land Use: Future Growth and Development ⁴¹¹
Land Use: Local Habitat and Species ⁴¹²
Land Use: Recreational Space ⁴¹³
Pollution: Air ⁴¹⁴

⁴¹⁰ See, e.g., See ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 7.01 (requiring that private roads must be approved before usage); BUFFALO TWP., PA. ORDINANCE § III, <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/10/Bufalo-NY.pdf> (operator must agree to deal with all necessary road degradation); CECIL TWP., PA., ORDINANCE NO. 2010-02, *supra* note 394, at § 3 (operator must ensure safeguards to ensure road conditions and pedestrian safety); CROSS CREEK TWP., PA. ORDINANCE, *supra* note 407, at 4 (requiring an impervious parking surface); ERIE, COLO., ORDINANCE NO. 12-74, p. 5 (2012), http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/06/74-MOU-EnCana_201403141454073868.pdf (describing the location of water supply and providing a traffic management plan); JACKSON TWP., PA. ORDINANCE § 4 (2006), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/11/Jackson-PA-Methane-Gas-Ordinance-141.pdf> (stipulating access road requirements); JEFFERSON HILLS, PA. ORDINANCE NO. 814, *supra* note 395, at § 4 (requiring highway occupancy permits and submission of a road restoration plan); MT. PLEASANT, PA., CODE § 200-103.1 (2013), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/11/Mt-Pleasant-Oil-and-gas-.pdf> (providing of inspection of proposed truck routes); MURRYSVILLE, PA., CODE § 220-31, <https://drive.google.com/file/d/0B8qLI4PcACUWktxWFIYdnVVeEE/view?usp=sharing> (requiring an operator to perform an inspection of proposed truck routes); PETERS TWP., PA. ORDINANCE NO. 737, *supra* note 392, at § 713 (requiring a truck road use plan, road maintenance agreement, specified off-site loading area, requirement to fix property damage); *McKenzie Cty. Approach Permit*, MCKENZIE CTY., N.D., May 12, 2014, http://county.mckenziecounty.net/usrfiles/Approach_Permit_051012_Fill.pdf (holding permit operator liable for damages and requiring all oil and gas development in an agricultural or industrial zone); MCKENZIE CTY. COMPREHENSIVE PLAN (2013), *supra* note 392, at 13 (requiring a route for preferred heavy traffic network).

⁴¹¹ See, e.g., ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 6.01 (requiring an operator to hold a bond); BURLERSON, TEX., ORDINANCE, *supra* note 407, at § 14-353 (noting the city manager's power).

⁴¹² See, e.g., AZTEC, N.M., CITY CODE § 15-12 (2007), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/08/Aztec-NM-chapter15-oilgas.pdf> (requiring a wildlife mitigation plan); CECIL TWP., PA. ORDINANCE NO. 2010-02, *supra* note 394, at § 3 (a ban on burning brush, trees, or stumps); ERIE, COLO., ORDINANCE NO. 12-74, *supra* note 410, at 1 (requiring a best management practices); FT. WORTH, TEX., ORDINANCE NO. 18449-02-2009, *passim* (2009), <https://drive.google.com/file/d/0B8qLI4PcACUd3h4QnplZXJ0YVvk/view?usp=sharing> (landscaping requirement); JEFFERSON HILLS, PA., ORDINANCE NO. 814, *supra* note 395, at § 1 (requiring of overlay districts); MT. LAKE PARK, MD., ORDINANCE NO. 2011-01 art. 4 (2011), <https://drive.google.com/file/d/0B8qLI4PcACUWnpGUFGRG0J6RFE/view?usp=sharing> (noting rights of natural communities to exist); MT. PLEASANT, PA., CODE § 200-103.1, *supra* note 410, at § 125-10 (setback requirements); MURRYSVILLE, PA. CODE § 220-31, *supra* note 410, at § 220-31 (requiring an environmental impact analysis); PETERS TWP., PA., ORDINANCE NO. 737, *supra* note 359, at § 713 (requiring an environmental survey); RIO ARRIBA CTY., N.M. ORDINANCE NO. 2009-01 § 8.2 (2009), <https://drive.google.com/file/d/0B8qLI4PcACUREctdXBHTmxsMlk/view?usp=sharing> (requiring environmental report).

⁴¹³ See, e.g., ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 5.02 (requiring a state restoration plan and conditional use permit within the zone); JEFFERSON HILLS, PA. ORDINANCE NO. 814, *supra* note 395, at § 1 (requiring overlay districts); MIDLOTHIAN, TEX., ORDINANCE NO. 2010-02, *supra* note 395, at art. IV (noting location criteria and specific use permits); MT. PLEASANT, PA., CODE § 200-103.1, *supra* note 410, at § 125-12 (setback requirements); NOTTINGHAM TWP., PA. ORDINANCE NO. 8-16-2010, *supra* note 395, at § 1 (describing specific zoning districts); PETERS TWP., PA., ORDINANCE NO. 737, *supra* note 359, at § 303 (permitted use zones); MCKENZIE CTY. COMPREHENSIVE PLAN (2013), *supra* note 392, at 15 (stating recreation and tourism strategies).

⁴¹⁴ See, e.g., ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 358, at § 7.01 (flaring prohibitions, emissions restrictions); ERIE, COLO., ORDINANCE NO. 12-74, *supra* note 410, at 1 (describing best management practices for the water supply); MIDLOTHIAN, TEX., ORDINANCE NO. 2010-02, *supra* note 410, at art. VIII (muffling exhaust standards and gas emissions); PETERS TWP., PA. ORDINANCE NO. 737, *supra* note 359, at § 713 (controlling dust and odor); MURRYSVILLE, PA. CODE § 220-31, *supra* note 410, at § 220-31 (requiring an environmental impact analysis).

Pollution: Groundwater ⁴¹⁵
Pollution: Noise ⁴¹⁶
Pollution: Surface Water ⁴¹⁷
Pollution: Visual ⁴¹⁸
Soil and Geology: Earthquakes and Ground Vibration ⁴¹⁹
Soil and Geology: Erosion and Sedimentation ⁴²⁰
Soil and Geology: Increased Sand Mining and Processing ⁴²¹
Soil and Geology: Soil Compaction ⁴²²
Water Resources: Strain on Water Infrastructure and Public Utilities ⁴²³

⁴¹⁵ See ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 7.01 (insurance requirements; wastewater pond regulations; saltwater well prohibitions and disposal lines regulations).

⁴¹⁶ See, e.g., ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 7.01 (noise monitoring and control); BUFFALO TWP., COLO. ORDINANCE, *supra* note 410, at § 1 (hiring an outside consultant); CECIL TWP., PA. ORDINANCE NO. 2010-02, *supra* note 394, at § 3 (requiring a seventy-two ambient noise level evaluation); ERIE, COLO. ORDINANCE NO. 12-74, *supra* note 413, at 1 (noting best management practices); JEFFERSON HILLS, PA., ORDINANCE NO. 814, *supra* note 394, at § 4 (noise curfew and limit); MURRYSVILLE, PA., CODE, *supra* note 410, at § 220-31 (noise management plan); N. STRABANE TWP., P.A., ORDINANCE NO. 5-2-10 § 3 (2010), <https://drive.google.com/file/d/0B8qLlI4PcACUZEVaZEpuY095Ykk/view?usp=sharing> (requiring engine mufflers); PETERS TWP., PA., ORDINANCE NO. 737, *supra* note 359, at § 713 (noise control).

⁴¹⁷ See, e.g., ARLINGTON, TEX. ORDINANCE NO. 11-067, *supra* note 392, at § 7.01.B (describing pond design and landscaping features; storage tank regulations; saltwater disposal lines); AZTEC, N.M. CITY CODE, *supra* note 412, at § [15-12] (storage tank regulations); BUFFALO TWP., COLO. ORDINANCE, *supra* note 410, at § III (describing disposal site requirements, environmental impact analysis, water withdrawal plan); ERIE, COLO. ORDINANCE NO. 12-74, *supra* note 413, at 1 (responsible products program and best management practices); MIDLOTHIAN, TEX. ORDINANCE NO. 2010-02, *supra* note 395, at art. XIII (specifying discharge regulations); MT. PLEASANT, PA. CODE § 200-103.1, *supra* note 410, at § 171-10 (noting a liability coverage requirement); OTERO CTY., N.M. ORDINANCE NO. 02-05 (2005), <https://drive.google.com/file/d/0B8qLlI4PcACUQUc0MU5HTUtiTGM/view?usp=sharing> (describing oil cleanup and disposal, accident report and spills); PETERS TWP., PA. ORDINANCE NO. 737, *supra* note 359, at § 713 (requiring water testing); S. FAYETTE TWP., PA., ORDINANCE § 240 (2010), <http://ecode360.com/11616851> (pond management); MCKENZIE CTY. COMPREHENSIVE PLAN (2013), *supra* note 392, at 8 (natural resources management plan).

⁴¹⁸ See ARLINGTON, TEX., ORDINANCE NO. 11-067, *supra* note 392, at § 7.01 (describing minimal interference initiatives; visual blight reduction; setbacks; landscaping; gates requirements); BEDFORD, TEX., ORDINANCE, *supra* note 394, at art. V (seismic survey regulations); CECIL TWP., PA., ORDINANCE NO. 2010-02, *supra* note 394, at § 3 (minimal interference initiatives); ERIE, COLO., ORDINANCE NO. 12-74, *supra* note 410, at 1 (best management practices); MCKENZIE CTY., N.D., ORDINANCE, *supra* note 392, at art. IV (detailing road approach permit; conditional use permits; performance standards; zoning ordinances); MIDLOTHIAN, TEX. ORDINANCE NO. 2010-02, *supra* note 395, at art. V (landscaping requirements) S. FAYETTE TWP., PA. ORDINANCE (2010), *supra* note 417, at § 240 (facility design).

⁴¹⁹ See, e.g., ARLINGTON, TEX. ORDINANCE NO. 11-067, *supra* note 392, at § 7.01 (noting vibration control); BEDFORD, TEX. ORDINANCE, *supra* note 401, at art. V (seismic survey regulations); MURRYSVILLE, PA., CODE, *supra* note 410, at § 220-31 (geophysical exploration plan); PETERS TWP., PA. ORDINANCE NO. 737 *supra* note 359, at § 713 (vibration and landslide control).

⁴²⁰ See, e.g., MCKENZIE CTY., N.D. ORDINANCE, *supra* note 392, at art. IV (soil testing); MURRYSVILLE, PA., CODE, *supra* note 410, at § 220-31 (erosion prevention and soil reclamation).

⁴²¹ See MCKENZIE CTY., N.D. ORDINANCE, *supra* note 392, at art. IV.9 (specifying a bond requirements for excavation and reclamation).

⁴²² See, e.g., ARLINGTON, TEX. ORDINANCE NO. 11-067, *supra* note 392, at § 5.01 (describing a site restoration plan); FT. WORTH, TEX. ORDINANCE NO. 18449-02-2009, *supra* note 412 (describing a reclamation plan); MCKENZIE CTY., N.D. ORDINANCE, *supra* note 392, at art. IV (requiring a runoff management plan).

⁴²³ See, e.g., BUFFALO TWP., PA. ORDINANCE, *supra* note 410, at § III (describing water withdrawal plan); BURLESON, TEX. ORDINANCE NO. B-790-09, *supra* note 407, at § 14-355 (water needs questionnaire); FT. WORTH, TEX. ORDINANCE NO. 18449-02-2009, *supra* note 412, at § 15-42 (requiring a fresh water fracture pond permit).

VI. Overlap Between Local Concerns & Local Authority

Our ongoing research has sought to identify both the positive and negative impacts of fracking. These impacts are local in nature, and their regulation falls under the umbrella of traditional local zoning authority.⁴²⁴

Positive impacts are generally economic in nature; drilling operations have been touted for creating jobs and providing desperately needed income for hardscrabble farmers who choose to lease their land.⁴²⁵ Fracking can also improve conditions in poor, rural municipalities that would otherwise not be able to afford to carry out functions such as fixing their roads or buying new firefighting equipment.⁴²⁶ Further, local governments can potentially advance these functions as conditions of permitting fracking, or industry may provide for them via charitable donations to the localities in which they operate.⁴²⁷ Such economic improvements may lead to increased population and property values, which in turn increase tax revenues.⁴²⁸

On the other hand, localities are concerned that fracking may also negatively impact the environment, health and safety, and sense of character of a community. Environmental concerns include water⁴²⁹ and air pollution,⁴³⁰ water depletion (especially in drought-prone areas in the West),⁴³¹ nuisance effects (such as dust, odor, and noise),⁴³² habitat fragmentation,⁴³³ and increased erosion.⁴³⁴ Excessive truck traffic can quickly wear down local roads.⁴³⁵ These, as well as concerns

⁴²⁴ See Methodology, *supra* Section V.A.

⁴²⁵ Raimi & Newell, *supra* note 384, at *Revenues, Costs, and Net Fiscal Impacts for Local Governments Associated with Oil and Gas Development*.

⁴²⁶ PETERS TWP., PA., CODE §§ 27-151, 27-155, 27-137.

⁴²⁷ See Timothy Kelsey et al., *Economic Impacts of Marcellus Shale in Bradford Cty.: Employment and Income in 2010*, MARCELLUS SHALE ED. AND TRAINING CTR. (Jan. 2012), http://www.marcellus.psu.edu/resources/PDFs/EI_BradfOrdinancepdf; Raimi & Newell, *supra* note 386, at *Revenues, Costs, and Net Fiscal Impacts for Local Governments Associated with Oil and Gas Development*.

⁴²⁸ See *Economic Assessment Report for the Supplemental Generic Environmental Impact Statement on New York State's Oil, Gas, and Solution Mining Regulatory Program*, N.Y.S. DEPT. OF ENVTL. CONSERVATION. (2011), http://www.dec.ny.gov/docs/materials_minerals_pdf/rdsgseicon0811.pdf; Raimi & Newell, *supra* note 386.

⁴²⁹ JACKSON TWP., PA. ORDINANCE NO. 141, *supra* note 410, at § 4(E); SOUTH FAYETTE TWP., PA., ORDINANCE NO. 1 at art. 15, § 95(A)(54)(f) (2015), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/10/South-Fayette-PA.pdf>.

⁴³⁰ CECIL TWP., PA. ORDINANCE NO. 2-2010, *supra* note 394 at 4 (2010); MIDLOTHIAN, TEX. ORDINANCE NO. 2010-12, *supra* note 395, at art. 13(A)(17); TOWN OF UPPER BURRELL, PA., CODE § 350-107(L)(7) (2011), <http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/10/Burrell-PA.pdf>.

⁴³¹ Michael Dillon, *Water Scarcity and Hydraulic Fracturing in Pennsylvania: Examining Pennsylvania Water Law and Water Shortage Issues Presented by Natural Gas Operations in the Marcellus Shale*, TEMPLE L. REV. 201 (2012); *Hydraulic Fracturing & Water Stress: Water Demand by the Numbers*, CERES (Feb. 2014), <https://www.ceres.org/resources/reports/hydraulic-fracturing-water-stress-water-demand-by-the-numbers>; Bobby Magill, *Water Shortages in Northern Colorado Top Environmental Concerns in Coming Decades*, COLORADOAN (July 2013), <http://www.savethepoudre.org/news-articles/climate-change-fracking-water-shortages-in-n-colorado-coloradoan-2013-07-29.pdf>.

⁴³² TOWN OF N. STRABANE, PA., ORDINANCE *supra* note 416, at § 3 (amending §§ 1301.35(I), (N), minimizing noise and light pollution); CITY OF AZTEC, N.M. CODE, *supra* note 395, at § 15-30 (minimizing odor).

⁴³³ Erik Kiviat, *Risks to Biodiversity from Hydraulic Fracturing for Natural Gas in the Marcellus and Utica Shales*, ANNALS OF THE N.Y. ACAD. OF SCI. 1286 (2013), <http://catskillcitizens.org/learnmore/Kiviat2013Riskstobiodiversity.pdf>; David M. Marsh & Nicole G. Beckman, *Effects of Forest Roads on the Abundance and Activity of Terrestrial Salamanders*, ECOLOGICAL APPLICATIONS 14 (2004); A. Racicot, *A Framework to Predict the Impacts of Shale Gas Infrastructures on the Forest Fragmentation of an Agroforest Region*, 53 ENVTL. MGMT. 1023-33 (2014).

⁴³⁴ Matthew McBroom, Todd Thomas & Yanli Zhang, *Soil Erosion and Surface Water Quality Impacts of Natural Gas Development in East Texas, USA*, in THE EFFECTS OF INDUCED HYDRAULIC FRACTURING ON THE ENVIRONMENT:

about accidents (such as spills), may actually negatively impact property values.⁴³⁶ Finally, the rapid population increase accompanying drilling activity – associated with waste disposal, schools, courts, jails, and emergency response services – may completely overwhelm a small locality.⁴³⁷

A. What Local Governments Can Do

Local governments may draw from their traditional zoning and police powers to regulate unwanted impacts of fracking, in the same manner as they have historically regulated industrial uses and activities within their communities. Local governments may use zoning power to restrict drilling activities to certain zones (e.g. the heavy industrial zone),⁴³⁸ or an overlay zone where drilling is permitted to occur (albeit with heightened restrictions above those that exist for the underlying zone).⁴³⁹ Local jurisdictions may make drilling a conditional use within a zone, requiring industry to seek a special permit in order to establish an operation.⁴⁴⁰ Local governments may even ban fracking completely within a municipality's borders, so long as state law does not preempt doing so.⁴⁴¹ Municipalities may also use their police power to pass local ordinances mitigating unwanted nuisances, such as noise, dust, odors, and safety concerns.⁴⁴² For example, a noise ordinance can limit the maximum decibel level of fracking operations and the hours of the day in which they are permitted to occur.⁴⁴³

Some local governments are even adopting novel non-regulatory strategies, such as memoranda of understanding⁴⁴⁴ and road maintenance agreements.⁴⁴⁵ These techniques, the efficacy of which have been debated,⁴⁴⁶ serve at the very least to foster better communication and relations between the local government and industry, and can result in industry being more sensitive to the concerns of the locality in which it is drilling.⁴⁴⁷

COMMERCIAL DEMANDS VS. WATER, WILDLIFE, AND HUMAN ECOSYSTEMS (ed. Matthew McBroom 2013); Mary Beth Adams, et al., *Effects of Natural Gas Development on Forest Ecosystems*, PROCEEDINGS OF THE 17TH HARDWOOD FOREST CONFERENCE (2011), <http://www.nrs.fs.fed.us/pubs/gtr/gtr-p-78papers/23adamsp78.pdf>.

⁴³⁵ NOTTINGHAM TWP., PA., ORDINANCE NO. 8-16-2010, *supra* note 395, § 3; TOWN OF UPPER BURRELL, PA. CODE, *supra* note 430, at § 250-107 (K)(1).

⁴³⁶ NOTTINGHAM TWP., PA., ORDINANCE NO. 8-16-2010, *supra* note 395, § 3; Jason Notte, *Fracking Leaves Property Values Tapped Out*, MSN MONEY (Aug. 2013), <http://www.damascuscitizensforsustainability.org/2013/08/fracking-leaves-property-values-tapped-out/>.

⁴³⁷ See, e.g. McKenzie Cty., N.D. Case Study, *infra* Section VI.

⁴³⁸ See text accompanying *infra* note 493.

⁴³⁹ Overlay zones are a generally accepted zoning mechanism that allow for a special zone, with its own unique regulations, to lie overtop the existing zoning. See, e.g., *Galveston Historical Foundation v. Zoning Bd. of Adjustment of Galveston*, 17 S.W.3d 414 (Tex. 2000) (overlay zone used to impose special restrictions on signs); *Main Street Development Group v. Tincum Twp. Bd. of Supervisors*, 19 A.3d 21, 27-28 (Pa. 2011) (“the MPC does not define overlay districts, but they have become common tools of land use in Pennsylvania”).

⁴⁴⁰ See, e.g., TOWN OF N. STRABANE, PA. ORDINANCE, *supra* note 416, at § 3.

⁴⁴¹ See e.g., TOWN OF DRYDEN, N.Y. ORDINANCE (2011), *supra* note 430; *Wallach v. Town of Dryden*, 16 N.E.3d 1188 (N.Y. 2014).

⁴⁴² See, e.g., *supra* note 432 (discussing noise, light, odor nuisances).

⁴⁴³ See, e.g., UPPER BURRELL TWP., PA. CODE, *supra* note 433, at § 350-107(L) (requiring the erection of a sound barrier wall around all drilling operations).

⁴⁴⁴ See, e.g., Erie, Colo. Case Study *infra* Section VI.

⁴⁴⁵ See, e.g., Peters Twp., Pa. Case Study *infra* Section VI.

⁴⁴⁶ See *infra* Section VI(D) on non-regulatory techniques.

⁴⁴⁷ See, e.g., *infra* Section V(B)(1) on Erie, CO.

The following localities: Erie, Colorado; McKenzie County, North Dakota; Peters Township, Pennsylvania; and Arlington, Texas are compelling case studies that demonstrate these strategies in practice. Looking closely at the specific nature of each government's strategy will show that fracking, and the tools for governing it, are essentially the same in nature as any other land use, despite difficult political circumstances and complicated technical and environmental issues. These case studies also show that jurisdictions in different political, legal, economic, social, and geologically technical contexts can develop techniques that manage the most pressing impacts of hydraulic fracturing. The following studies borrow from more detailed case studies, which can be accessed from the link in Appendix 3.

B. What Local Governments Are Doing: Case Studies

1. *Erie, Colorado: A Novel Non-Regulatory Approach*

In Colorado, there are four classes of localities, as determined by the state legislature:⁴⁴⁸ cities, towns, territorial charter cities, and home rule municipalities.⁴⁴⁹ Home-rule municipalities are those that have adopted a home-rule charter pursuant to Article XX of the Colorado Constitution, which grants home-rule power to those localities.⁴⁵⁰ Cities have a population of over 2,000, while towns have a population of 2,000 or less.⁴⁵¹ Territorial charter cities are those that incorporated prior to 1877 and never re-organized under the more modern statutes; only one such city remains in the state.⁴⁵² Only home-rule municipalities possess home-rule powers; the others may exercise only the powers granted to them legislatively under Colorado Revised Statutes, section 31-15-101-(2).⁴⁵³

In home-rule municipalities, all state laws continue to apply until superseded by the charters or local laws of the locality. Where a local law is challenged under the doctrine of preemption, Colorado courts will determine whether the issue the local law is seeking to regulate is of local, state, or "mixed" local and state concern.⁴⁵⁴ If the matter is purely local, the home-rule municipality's ordinance will supersede the state law.⁴⁵⁵ On the other hand, if the matter is found to be of state concern, state law will supersede the local regulation.⁴⁵⁶ If the matter is of mixed state and local concern, then both the state and local governments can adopt laws regulating it,⁴⁵⁷ but in the case of

⁴⁴⁸ COLO. CONST. art. XIV, § 13.

⁴⁴⁹ 1C COLO. PRAC., METHODS OF PRACTICE § 54:1 (West 2016); COLO. REV. STAT. § 31-3-201 (West 2016).

⁴⁵⁰ 1C COLO. PRAC., METHODS OF PRACTICE § 54:1 (West 2016).

⁴⁵¹ *Id.* "A town may have a population of above 2,000 if it has not reorganized as a city pursuant to sections 31-1-204, 31-1-205. COLO. REV. STAT. § 31-1-101(13) (West 2016).

⁴⁵² 1C COLO. PRAC., METHODS OF PRACTICE § 54:1 (West 2016). Georgetown, Colorado is the only remaining territorial charter town in the state. It is mostly governed by its territorial charter, which may only be amended by the state legislature. COLO. REV. STAT. § 31-1-202 (West 2016).

⁴⁵³ REV. STAT. § 31-15-101(2) (West 2016); 1C COLO. PRAC., METHODS OF PRACTICE § 54:2 (West 2016); COLO.; *see also* City of Sheridan v. City of Englewood, 609 P.2d 108 (Colo. 1980); Svaldi v. City of Lakewood, 536 P.2d 331 (Colo. App. 1975); City of Aurora v. Bogue, 489 P.2d 1295 (Colo. 1971).

⁴⁵⁴ 1C COLO. PRAC., METHODS OF PRACTICE § 54:2 (West 2016). Courts decide on an ad hoc basis what constitutes a local and municipal matter under article XX of Colorado's constitution. *Id.*

⁴⁵⁵ Vela v. People, 484 P.2d 1204 (Colo. 1971); 1C COLO. PRAC., METHODS OF PRACTICE § 54:2 (West 2016).

⁴⁵⁶ City of Commerce City v. Colorado, 40 P.3d 1273 (Colo. 2002).

⁴⁵⁷ John E. Hayes & Kristy M. Hartl, *Home Rule in Colorado: Evolution Or Devolution*, 33 COLO. LAWYER 61 (2004).

"'Conflict' exists in the event a local regulation seeks to 'authorize what the state legislation forbids, or forbids what the state legislation authorizes.'" *Id.*, *citing* Denver & Rio Grande W. R.R. Co. v. City and Cty. Of Denver, 673 P.2d 354 (Colo. 1983).

a conflict, state law will supersede the local law.⁴⁵⁸ Determining whether a matter is of local, state, or mixed concern is an issue for the courts, who must balance fact and policy in making their determination.⁴⁵⁹ The courts admit that often these categories can even merge, and thus each determination is made on an ad hoc basis using a multi-factor test.⁴⁶⁰ This makes for a rather litigious area of the law, and provides the backdrop for the raging fracking debate that has been ongoing for years within the state. In May 2016, the Colorado Supreme Court finally resolved the fiercely contested issue of whether local governments have the right to enact drilling moratoriums; the court established that such moratoriums conflict with - and are therefore preempted by - state oil and gas law.⁴⁶¹

The town of Erie, Colorado, is located in the northern part of the state, nestled in the Front Range of the Rocky Mountains. It currently has 21,500 residents and expects its population to double by 2025. Erie's median age is thirty-six and its median household income is \$107,246.⁴⁶² The debate over hydraulic fracturing in Erie, Colorado began in the summer of 2012 over a drill pad sited near Red Hawk Elementary School; Erie residents were concerned by the proximity of the well pad to the school and residential homes, as well as the noise that emanated from the site.⁴⁶³ Though the site complies with all state setback and operation requirements, the rig generated significant local resistance against future drilling sites. The impacts of greatest concern to Colorado residents include water consumption and pollution; waste; air pollution; leaking wells and faulty containment equipment (a particular problem in recent large flooding events); and insufficient siting and setback requirements.⁴⁶⁴

In an attempt to address residents' concerns, Erie town administrators decided to take a non-regulatory approach and entered into negotiations with Encana and Anadarko, the two major companies running drilling operations in northern Colorado.⁴⁶⁵ This approach is in stark contrast to other Colorado towns, such as Longmont, whose residents instead voted to outright ban fracking from its borders, but lost the fierce legal battle to establish its right to impose a moratorium.⁴⁶⁶ The resulting Memorandum of Agreements (MOA) between Erie, Encana and Anadarko requires

⁴⁵⁸ Hayes & Hartl, *supra* note 457; *City of Commerce City*, 40 P.3d 1273.

⁴⁵⁹ Hayes & Hartl, *supra* note 457. "There is no litmus-like indicator for resolving whether a matter is of local, statewide, or mixed concern." *Town of Telluride v. Lot Thirty-Four Venture, LLC*, 3 P.3d 30, 37 (Colo. 2000), *citing* *National Adver. Co v. Dept. of Highways*, 751 P.2d 632, 635 (Colo. 1988); *see also* *City and Ct. of Denver v. Qwest Corp.*, 18 P.2d 748 (Colo. 2001).

⁴⁶⁰ *City & Cty. of Denver v. State*, 788 P.2d 764, 767-68 (Colo. 1990); *City of Commerce City v. State*, 40 P.3d 1273 (Colo. 2002).

⁴⁶¹ *City of Longmont v. Colo. Oil & Gas Ass'n*, *supra* note 374. *See also* Cathy Proctor, *Colorado Supreme Court rules on local fracking bans*, DENVER BUSINESS J. (May 3, 2016, 8:30am MDT). Some holdouts are still not in compliance with the court's ruling; for example, Boulder County, Co. voted in December 2016 to extend its drilling moratorium through May 1, 2017, and the state Attorney General is now threatening to bring suit against the county to force compliance. Caitlin Hendee, *Colorado attorney general threatens Boulder County with legal action over oil and gas moratorium*, DENVER BUSINESS J. (Jan. 27, 2017, 4:27pm EST), <http://www.bizjournals.com/denver/news/2017/01/26/colorado-attorney-general-threatens-boulder-county.html>.

⁴⁶² *Quick Facts*, TOWN OF ERIE, COLO. <https://www.erieco.gov/240/Quick-Facts>; *Town of Erie 2015 Community Profile*, TOWN OF ERIE, COLO., <https://www.erieco.gov/DocumentCenter/Home/View/43>.

⁴⁶³ Interview with Fred Diehl, Assistant to the Town Adm'r, Erie, Colo. by Avana Andrade, Researcher, Yale Ctr. for Envtl. Law & Pol'y (Dec. 2, 2014).

⁴⁶⁴ *Id.*

⁴⁶⁵ TOWN OF ERIE, COLO., RES. NO. 12-74 (Aug. 28, 2012), http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/06/74-MOU-EnCana_201403141454073868.pdf.

⁴⁶⁶ *See supra* note 461.

companies to use best practice techniques such as a wider setback than the state requires; vapor recovery units; a noise, light, and dust mitigation plan; and steel-rimmed berms around tanks at the well site.⁴⁶⁷ When additional issues surfaced after drilling commenced (such as noise and vibration problems), Erie's Town Board continued to engage with the drilling companies and seek more mitigation measures instead of banning the operations.⁴⁶⁸ Due to the collaborative approach taken by town administrators and industry representatives – and especially in light of the Colorado Supreme Court's decision that local moratoriums are preempted by state law - Erie's MOU offers a potentially constructive pathway forward for other small towns confronted with the natural gas industry. At minimum, the unique effort of crafting a MOU has created a better relationship between the Town and industry, in which the town retains a significant amount of negotiating power.

3. *McKenzie County, North Dakota: A Rural Hybrid Approach*

In North Dakota, authority is statutorily granted to all municipalities to regulate a wide variety of industries and uses, including passing ordinances (though the power to zone is not a power explicitly granted).⁴⁶⁹ All municipalities hold the same powers of townships.⁴⁷⁰ In order for a proposed municipal corporation to become a city, it must have a territory of under four square miles in area.⁴⁷¹ Cities of under 500 inhabitants may incorporate “under the council or modern council forms of government,” while cities of 500 or more inhabitants may incorporate under either the council, modern council, or commission forms of government.⁴⁷²

Home-rule authority is statutorily granted to cities through the enabling clause found in North Dakota Century Code section 40-05.1-01: “Any city may frame, adopt, amend, or repeal home rule charters. . . .”⁴⁷³ The powers of home-rule cities are laid out in Code section 40-05.1-06, and notably include both the authority to “provide for the adoption, amendment, and repeal of ordinances, resolutions, and regulations to carry out its governmental and proprietary powers and to provide for public health, safety, morals, and welfare,”⁴⁷⁴ and to “provide for zoning, planning, and subdivision of public or private property.”⁴⁷⁵

In a similar vein, counties in North Dakota are statutorily established entities⁴⁷⁶ that are also granted the power (if they choose to exercise it) to become home-rule entities.⁴⁷⁷ Their authority, much like cities, includes the ability to pass, amend, and repeal ordinances⁴⁷⁸ as well as engage in planning and zoning for the health and welfare of their citizens.⁴⁷⁹

⁴⁶⁷ TOWN OF ERIE, COLO., ORDINANCE NO. 21-2015 (2015), <http://www.erieco.gov/DocumentCenter/View/7078>.

⁴⁶⁸ Mark Jaffe, *Erie Rejects Fracking Freeze*, DENV. POST (Jan. 27, 2015 10:15 PM MST), http://www.denverpost.com/business/ci_27408174/erie-rejects-fracking-freeze.

⁴⁶⁹ N.D. CENT. CODE § 40-05-01 (2016).

⁴⁷⁰ *Id.* at § 40-05-10.

⁴⁷¹ *Id.* at § 40-02-01.

⁴⁷² *Id.*

⁴⁷³ *Id.* at § 40-05.1-01.

⁴⁷⁴ *Id.* at § 40-05.1-06(7).

⁴⁷⁵ *Id.* at § 40-05.1-06(11).

⁴⁷⁶ N.D. CENT. CODE tit. 11 (Counties) (West 2016).

⁴⁷⁷ *Id.* at § 11-09.1-01.

⁴⁷⁸ *Id.* at § 11-09.1-05(5).

⁴⁷⁹ *Id.* at § 11-09.1-05(7).

With a pre-boom population of 6,360 people, McKenzie County has been rapidly growing, recently landing the title of fastest growing non-metropolitan county in the country.⁴⁸⁰ An accurate population counts is difficult, as the numbers are changing so rapidly. The official United States Census Bureau estimate for the 2014 county population is 10,996, but Watford City's population more than quintupled from 2010 to 2013 to reach 8,000.⁴⁸¹ This phenomenal growth rate is one of the impacts that the county has been most focused on mitigating. The county seeks to preserve its agrarian, "wholesome" community character, despite this "instant sprawl." This "instant sprawl" describes the "man camps," or miles of temporary housing units constructed for drill site workers that have popped up within a twenty-mile radius of Watson City in the few years since the shale boom has taken off.⁴⁸² County officials have utilized a hybrid approach to address these growth concerns; the traditional zoning process was used to develop a Comprehensive Plan and Zoning Ordinance, while non-regulatory collaborations between the county, surrounding counties, and other stakeholders have assessed and planned for infrastructure and service needs.

The Comprehensive Plan expresses the community's vision for future development and features key priorities for guiding policy-making. The county used the Comprehensive Plan to articulate an overarching goal of preserving the "integrity of the rural communities" while "reaping the benefits of development," focusing on broad categories of concern: economic development, provision of government services, stewardship of resources, land use, and adequate transportation, recreation, and housing.⁴⁸³

The Zoning Ordinance creates zoning districts with district-specific restrictions on development, though it allows all nonconforming uses at the time of adoption to continue.⁴⁸⁴ It focuses on allowed and conditional uses in the county and includes general restrictions such as requiring approved on-site sewage systems and road access for subdivisions.⁴⁸⁵ Importantly, temporary workforce housing is considered a conditional use and is subject to significant regulation.⁴⁸⁶ In contrast to the other localities featured as case studies in this Article, the McKenzie County Ordinance places minimal restrictions on oil and gas development, avoiding regulations like sound restrictions that might be more common in more urbanized areas.⁴⁸⁷ Yet an extensive portion of the ordinance is devoted to addressing wind energy siting, extensive permitting requirements, public hearings, setbacks, and post-leasing restoration of property—a contrast that mostly results from state authority over oil and gas regulation but also reflects local priorities.⁴⁸⁸

⁴⁸⁰ Stephanie Norman, *County Is No. 1 in Nation for Population Growth*, MCKENZIE CTY. FARMER (Apr. 15, 2014), <http://www.watfordcitynd.com/?id=10&nid=2665>.

⁴⁸¹ *State & Cty. QuickFacts, McKenzie Cty., North Dakota*, U.S. CENSUS BUREAU, <http://www.census.gov/quickfacts/table/PST045215/00>; Raimi & Newell, *supra* note 386, at *Back to the Bakken*.

⁴⁸² Interview with Gene Veder, Exec. Dir. of the McKenzie Cty. Job Dev. Auth. and Tourism Bd., by Christopher Halfnight, Researcher, Yale Ctr. for Envtl. Law & Pol'y (Dec. 1, 2014).

⁴⁸³ *See, e.g.,* Kate Ruggles, *Cty. Zone Plan Approved*, MCKENZIE CTY. FARMER (Mar. 27, 2013), <http://www.watfordcitynd.com/?id=10&nid=2118>; *McKenzie Cty. Comprehensive Plan*, MCKENZIE CTY. (2016), http://planmckenzie.com/wp-content/uploads/2016/06/McKenzieCountyComprehensivePlan_FINAL-1.pdf (last accessed Dec. 25, 2016).

⁴⁸⁴ *McKenzie Cty. Comprehensive Plan*, MCKENZIE CTY. (2016), http://planmckenzie.com/wp-content/uploads/2016/06/McKenzieCountyComprehensivePlan_FINAL-1.pdf (last accessed Dec. 25, 2016).

⁴⁸⁵ *Id.*

⁴⁸⁶ *Id.*

⁴⁸⁷ *Id.*

⁴⁸⁸ *Id.*

The county's non-regulatory strategies to address the increasing strains on local government infrastructure and services from the rapid population boom have primarily focused on assessing and prioritizing infrastructure and service needs, and then creating infrastructure and expanding staff to meet those needs. The county joined with 18 other counties and entities to form Vision West ND, a consortium of local interests seeking to improve the regional economy, and released an Economic Development Strategic Plan, which included topics such as business retention, health care, environmental restoration, and traffic management.⁴⁸⁹

Although the oil boom in McKenzie County has dramatically slowed over the past two years due to a sharp drop in oil prices,⁴⁹⁰ the current presidential administration's focus on encouraging domestic energy production may spur another uptick in fracking.⁴⁹¹ Though the future for McKenzie County is uncertain, their planning and zoning efforts (emphasizing controlled growth), diversification of the economy, and preservation of community character will serve them well going forward, and remain a prime example for local governments striving to achieve a balanced and adaptive approach to the region's development.

3. *Peters Township, Pennsylvania: A Regulatory Approach*

Pennsylvania municipalities have general authority to regulate for the wellbeing of their communities.⁴⁹² However, the Pennsylvania Oil and Gas Law explicitly preempts certain local control over fracking; effectively, the law prevents localities from regulating how fracking occurs.⁴⁹³ For example, local governments cannot mandate the thickness of well casings, or the type of equipment that drillers use.⁴⁹⁴ Despite these state-level limitations, Pennsylvania localities do have the legal authority to regulate where fracking may take place.⁴⁹⁵

In 2012, the state government tried to limit this local authority over fracking when it passed Act 13.⁴⁹⁶ Peters Township was among a group of townships and individuals that challenged the law, arguing that its restrictions on local power were unconstitutional.⁴⁹⁷ The resulting 2013 Pennsylvania Supreme Court decision in *Robinson Township v. Commonwealth* overturned section 3304 of Act 13 and

⁴⁸⁹ *McKenzie Cty. Economic Development Strategic Plan*, VISION WEST ND (June 2013), http://www.visionwestnd.com/pdf/strategic_plans/McKenzie%20County%20Final.pdf.

⁴⁹⁰ Ernest Scheyder, *In North Dakota's oil patch, a humbling comedown*, REUTERS (May 18, 2016, 2:00pm GMT), <http://www.reuters.com/investigates/special-report/usa-northdakota-bust/>.

⁴⁹¹ An America First Energy Plan, THE WHITE HOUSE, <https://www.whitehouse.gov/america-first-energy> (last accessed Jan. 30, 2017) ("The Trump Administration is committed to energy policies that lower costs for hardworking Americans and maximize the use of American resources, freeing us from dependence on foreign oil."); see also Gaurav Sharma, *Making America 'Crude' Again*, *supra* note 12.

⁴⁹² The Pennsylvania Municipalities Planning Code is the enabling legislation that empowers local governments to enact, amend, and repeal zoning ordinances in order to regulate for the health, safety, and welfare of their citizens. Pennsylvania Municipalities Planning Code Act of 1968, PA. P.L. 805, NO. 247 (2003), <https://www.dep.state.pa.us/hosting/growing smarter/MPCCode%5B1%5D.pdf>.

⁴⁹³ See *Huntley, Inc. v. Borough of Oakmont*, 964 A.2d 855 (Pa. Sup. Ct. 2009); see also *Range Resources-Appalachia, LLC v. Salem Twp.*, 964 A.2d 869 (Pa. Sup. Ct. 2009); see also *supra* Section III.A.

⁴⁹⁴ *Id.*

⁴⁹⁵ *Id.*

⁴⁹⁶ Act No. 13 of Feb. 14, 2012, P.L. 87 (codified at 58 PA. CONS. STAT. §§ 2301–3504).

⁴⁹⁷ Jason Cato, *Peters Residents Opposed to Fracking Turn out for Public Hearing*, TRIBLIVE NEWS (Jan. 19, 2015 9:57 PM ET), <http://triblive.com/news/adminpage/7595230-74/drilling-peters-ordinanceaxzz3PIXdY9Ut>.

affirmed local authority to regulate the location of fracking operations, with certain limitations.⁴⁹⁸ The Pennsylvania Supreme Court affirmed the Commonwealth Court’s holding that section 3304 violates “substantive due process . . . because it allows incompatible uses in zoning districts and does not protect the interests of neighboring property owners from harm, alters the character of the neighborhood, and makes irrational classifications.”⁴⁹⁹ Further, the court held that section violates article 1, section 27 (the environmental rights provision) of the Pennsylvania Constitution (article 1, section 27) because “a new regulatory regime permitting industrial uses as a matter of right in every type of pre-existing zoning district [including residential] is incapable of conserving or maintaining the constitutionally-protected aspects of the public environment and of a certain quality of life.”⁵⁰⁰

Peters Township, located in Western Pennsylvania, is heavily residential and relatively wealthy (especially compared to its neighboring townships), with a population of 21,827 and median household income of \$103,107.⁵⁰¹ While the majority of wealthy community members would like to see Peters Township ban hydrofracking, as they harbor strong concerns about negative environmental, road, and property value impacts—the Pennsylvania Municipalities Planning Code does not appear to permit local governments to completely ban a legitimate use.⁵⁰² Thus, the township has used the traditional zoning process to regulate the location of drill sites, compressor stations, and processing stations, as well as mitigate impacts including visual blight, noise and odor pollution, truck traffic and wear on local roads, and potential safety hazards.

The township, while regulating under the mandates of the now-overturned provision of Act 13, originally crafted a Mineral Extraction Ordinance, which regarded drilling as a “conditional use” that the Township’s Planning Commission must approve prior to extraction.⁵⁰³ The ordinance modified the township’s existing zoning code by creating a “Mineral Extraction Overlay Zone,” which the township can float over the existing zoning to permit drilling in areas over 40 acres that are accessible via an existing road.⁵⁰⁴ All types of drilling activity and stations are considered industrial uses under the zoning code. The regulations require setbacks; notification,⁵⁰⁵ signage, and fencing requirements;⁵⁰⁶ drilling noise decibel limits;⁵⁰⁷ minimization of visual blight,⁵⁰⁸ lighting,⁵⁰⁹ and

⁴⁹⁸ *Robinson Twp. v. Commonwealth*, 83 A.3d 901 (Pa. 2013). The decision effectively reaffirmed the holdings in *Huntley and Range Resources*, which Act 13 had directly contravened.

⁴⁹⁹ *Robinson Twp. v. Commonwealth*, 52 A.3d 463, 485 (Pa. Super. Ct. 2012), *aff’d*, *Robinson Twp. v. Commonwealth*, 83 A.3d 901 (Pa. 2013).

⁵⁰⁰ *Robinson Twp.*, 83 A.3d at 979.

⁵⁰¹ *Peters Twp., Washington Cty., Penn. Quickfacts*, U.S. CENSUS BUREAU, <http://www.census.gov/quickfacts/table/PST045213/4212559608> (last accessed Dec. 24, 2016).

⁵⁰² PA. MUNICIPALITIES PLANNING CODE, §§ 603(b), (i) (2016), <http://mpc.landuselawinpa.com/MPCCode.pdf>.

⁵⁰³ PETERS TWP., PA., LOCAL ORDINANCE NO. 737 (2011), *supra* note 392, at § 3.

⁵⁰⁴ PETERS TWP., PA., ZONING CODE §§ 303, 504 (2016).

⁵⁰⁵ *Id.* at § 713(S).

⁵⁰⁶ *Id.* at § 713(M).

⁵⁰⁷ *Id.* at § 713(P). Noise regulations are robust; after establishing a pre-drilling noise level baseline, the drilling cannot exceed this ambient noise level by more than ten decibels from the hours of 7:00am-9:00pm, and not by more than five decibels between 9:00pm-7:00am. *Id.* at § 713(P)(a). To accommodate the “fluctuations” in drilling activities, the township also created a “sliding scale which provides adjustments in the permitted level of noise generated during operations to create flexibility in the regulations and prevent repeated violations.” *Id.* at § 713(P)(b). Finally, the Township reserves the right to require operators to use devices such as sound walls, acoustical blankets, and mufflers, to ensure compliance with the permitted noise levels. *Id.* at § 713(P).

⁵⁰⁸ *Id.* at §§ 713(I), (U). For example, the ordinance requires that the operator paint machinery “earth tones” and requires fencing and/or landscape buffering to minimize the visual impact of fracking at the streetscape. *Id.* at §§ 713(Q), (I), (U).

dust/vibrations/odor;⁵¹⁰ road maintenance and repair requirements;⁵¹¹ and pre- and post- drilling water testing,⁵¹² all with the intent of mitigating to the fullest extent possible the negative impacts of drilling on both community members and the environment.

To ensure compliance with the 2013 *Robinson Township* decision, the township reviewed and amended its ordinance in January 2015.⁵¹³ The township eliminated its mineral extraction overlay district, and instead now permits fracking to occur in its Light Industrial District. The ordinance retains all of its provisions relating to environmental, health, and safety concerns, and these specific requirements for drilling are valuable best practices that other localities may consider in order to regulate some of the impacts of fracking.⁵¹⁴

The above case studies illustrate different paths forward that localities across the country have taken in their quest to control the local impacts of hydrofracking that most greatly impact their residents. Both traditional regulatory practices—such as zoning and ordinances—as well as non-regulatory approaches, like memoranda of understanding and open channels of communication, have been effective in addressing impacts from environmental, health, and safety concerns, to sprawl containment and economic development. Localities across the United States likewise facing the effects of hydraulic fracturing on their own communities can inform their own processes by drawing inspiration from the best practices highlighted in these case studies.

4. *Arlington, Texas: An Urban Hybrid Approach*

Texas first enacted laws permitting the incorporation of cities in the 1850s.⁵¹⁵ In the early 1900s, the Home Rule Enabling Act was created and modified, permitting cities to designate zones and districts wherein they could regulate size, height, bulk, and use of structures in furtherance of the public welfare.⁵¹⁶ In 1927, the basis of Texas's modern Local Government Code was laid with the passage of the Zoning Act, a comprehensive piece of legislation outlining the mechanisms by which local governments could exercise their authority.⁵¹⁷ Today, the authority for Texas localities' authority to zone is found in Chapter 211 of the Local Government Code.⁵¹⁸

There are three types of Texan municipalities; general-law, municipal home-rule, and those chartered by special legislation.⁵¹⁹ Each locality's governmental structure and powers are dependent on its

⁵⁰⁹ *Id.* at § 713(N). Lighting may not shine on adjacent public or private property, and must point downward to illuminate only the drilling site. *Id.*

⁵¹⁰ PETERS TWP., PA., ZONING CODE, *supra* note 504, at § 713(O).

⁵¹¹ *Id.* at § 713(I).

⁵¹² *Id.* at § 713(F).

⁵¹³ See Peters Township Plan. Comm'n Jan. 15, 2015 Meeting Minutes, http://www.peterstownship.com/vertical/sites/%7B3BE5B086-2A15-4083-A63D-16B3DD03C8DD%7D/uploads/Planning_Minutes_2015-01-15.pdf (approving amendment to mineral extraction ordinance).

⁵¹⁴ PETERS TWP., PA., ORDINANCE NO. 804, <http://www.ecode360.com/documents/PE3557/source/LF926970.pdf>.

⁵¹⁵ Tex. Session Laws—Acts 1858, ch. 61, § 40 (allowing the incorporation of Type B cities); Session Laws—Acts 1875, ch. 100, § 62 (granting authority to incorporate Type A cities); TEX. PRAC. SERIES MUN. LAW & PRACTICE § 21.01 (West 2016).

⁵¹⁶ Session Laws—Acts 1921, ch. 87; TEX. PRAC. SERIES MUN. LAW & PRACTICE § 21.01 (West 2016).

⁵¹⁷ Session Laws—Acts 1927, ch. 283, § 1; TEX. PRAC. SERIES MUN. LAW & PRACTICE § 21.01 (West 2016).

⁵¹⁸ TEX. PRAC. SERIES MUN. LAW & PRACTICE § 21.01 (West 2016); TEX. LOCAL GOV'T CODE § 211.001 (West 2016).

⁵¹⁹ TEX. PRAC. SERIES MUN. LAW & PRACTICE § 3.03 (West 2016). These are recognized in Texas Local Government Code §§ 5.001 (Type A); 5.002 (Type B); 5.003 (Type C); 5.004 (home rule); 5.005 (special-law).

classification; thus, a general-law city is bound by the general laws of the state, a home-rule city is guided by its charter, and a special-law city regulates pursuant to the special legislative act that created it.⁵²⁰ There are three sub-types of general-law municipality: Types A, B, and C.⁵²¹ Each has its own distinct requirements for incorporation, such as population and territory size requirements.⁵²² Cities with a population of over 5,000 may vote to adopt their own charter and become home-rule cities.⁵²³

Arlington, Texas is a home-rule city⁵²⁴ of 375,000 people, with a median household income of \$50,655, and is located inside of the nation's fastest-growing metroplex.⁵²⁵ While local officials at first thought fracking was a temporary phenomenon, it quickly became clear that fracking would become a permanent industry.⁵²⁶ Local citizens and the city are specifically concerned with avoiding state preemption (a constantly-looming issue in Texas); mitigating noise pollution;⁵²⁷ and ensuring the safe operation of heavy industry in a dense urban setting, such as through underground pipe management.⁵²⁸

The city has utilized a hybrid approach of engaging in the traditional zoning practice of passing a comprehensive ordinance—which requires multiple layers of approval for fracking to occur and contains clear guidelines for underground pipe laying, roads, and water use—as well as the non-regulatory approach of developing close working relationships through constant, symmetrical communication between enforcement staff and operators. The city has also instituted a call system to coordinate calls from operators and residents.⁵²⁹

Arlington's ordinance requires drillers to obtain a special use permit (SUP);⁵³⁰ approval of the permit is a multi-step process with includes a neighborhood meeting, a gas well permit application, and a public City Council meeting.⁵³¹ The system reduces the administrative burden by allowing for entire

⁵²⁰ TEX. LOCAL GOV'T CODE §§ 1.005(1)-1.005(5) (West 2016); TEX. PRAC. SERIES MUN. LAW & PRACTICE § 3.03 (West 2016).

⁵²¹ See TEX. LOCAL GOV'T CODE § 6.001 (Authority to Incorporate as a Type A Municipality) (West 2016); TEX. LOCAL GOV'T CODE § 7.001 (West 2016) (Authority to Incorporate as a Type A Municipality); TEX. LOCAL GOV'T CODE § 8.001 (West 2015) (Authority to Incorporate as a Type A Municipality); TEX. LOCAL GOV'T CODE § 9.001 (West 2016) (Adoption or Amendment of Home-Rule Charter).

⁵²² See TEX. LOCAL GOV'T CODE § 6.001 (Authority to Incorporate as a Type A Municipality) (West 2016); TEX. LOCAL GOV'T CODE § 7.001 (West 2016) (Authority to Incorporate as a Type B Municipality); TEX. LOCAL GOV'T CODE § 8.001 (West 2015) (Authority to Incorporate as a Type C Municipality); TEX. LOCAL GOV'T CODE § 9.001 (West 2016) (Adoption or Amendment of Home-Rule Charter).

⁵²³ TEX. LOCAL GOV'T CODE. ART. 11, § 5 (West 2016). TEX. PRAC. SERIES MUN. LAW & PRACTICE § 1.005(5) (West 2016).

⁵²⁴ CITY OF ARLINGTON, TEX. CITY CHARTER, <http://www.arlington-tx.gov/government/city-charter/> (last accessed Dec. 24, 2016).

⁵²⁵ *Arlington, Tex. QuickFacts*, U.S. CENSUS BUREAU, <http://www.census.gov/quickfacts/table/PST045215/4804000> (last accessed Dec. 25, 2016).

⁵²⁶ Interview with James Parajon, Deputy City Manager for Econ. Dev. and Capital Inv., by Becky Gallagher, Yale Ctr. for Law & Pol'y (May 19, 2014).

⁵²⁷ ARLINGTON, TEX., ORDINANCE NO. 11-068, *supra* note 392, at § 7.01 (F).

⁵²⁸ *Id.* at § 7.01 (J).

⁵²⁹ Interview with Collin Gregory, Gas Well Coordinator, City of Arlington, Tex., by Becky Gallagher, Researcher, Yale Ctr. for Envtl. Law & Pol'y (Nov. 18, 2014).

⁵³⁰ *Application for Gas Drilling and Prod.*, <http://www.arlington-tx.gov/cdp-gaswells/wp-content/uploads/sites/44/2014/12/Gas-Drilling-Production-Application.pdf> (last accessed Dec. 25, 2016).

⁵³¹ *Gas Well Permitting Process*, CITY OF ARLINGTON, CMTY. DEV. AND PLANNING, <http://www.arlington-tx.gov/cdp-gaswells/applications-and-permits/permitting-process/> (last accessed Dec. 25, 2016).

“drill zones,” which contain multiple well sites, to go through the approval process. Before a zone is approved, it must comply with setback restrictions, be approved at a public meeting, and be fully licensed.⁵³² If the drill zone is approved, then all of the well sites within it are automatically approved.⁵³³ Once approved, the site is subject to frontage and setback requirements, ambient noise mitigation measures, water use and pollution regulations, road use restrictions and charges for damages.⁵³⁴ Further, drillers must submit an underground pipe plan.⁵³⁵

Arlington’s non-regulatory approach includes putting in place a three-person full-time fracking team, which does on-site inspections, processes and reviews documentation, and responds to complaints and calls from drillers and neighbors on a daily basis.⁵³⁶ An assistant director oversees the drilling program, and city administrative staff also supports the team.⁵³⁷ These dedicated staff and resources are intended to help the city maintain close working relationships with operators and ensure that drilling is safely conducted in a manner compliant with the city’s ordinance.

The city hopes its hybrid approach—a comprehensive ordinance combined with funding the resources necessary for enforcement staff to cultivate close but professional relationships with both industry and neighbors—will allow it to retain its authority over local drilling.⁵³⁸ Whether or not state authority ultimately preempts the ordinance, the carefully worded provisions and dedication of the city to fund the execution of its regulations are certainly best practices for other local governments to emulate.

VII. Conclusion

Though many descriptive articles have been written about the growth of fracking in the United States, this Article has sought to demonstrate that local governments can regulate fracking in a manner that does not pose a risk to their local authority. Because of significant gaps in the state and federal regulatory apparatus that seem likely to continue with the Trump Administration, opportunity exists for local governments to craft regulatory and non-regulatory structures that meet the community’s needs. Indeed, as our case studies and local impacts list have shown, local governments *are* acting to balance environmental, social, and economic risks of fracking with the benefits that this technology can bring. However, because of the legal relationship between state and local governments, local communities must beware of the risk of preemption if localities enact outright fracking bans. We believe that with more comprehensive information about the impacts of fracking, as well as regulatory and non-regulatory tools that local governments can employ, municipalities will be better able to enact policies that withstand legal scrutiny and reflect local interests.

⁵³² *Id.*

⁵³³ Interview with Collin Gregory, *supra* note 529.

⁵³⁴ ARLINGTON, TEX., ORDINANCE NO. 11-068, *supra* note 392, at § 7.01 (J).

⁵³⁵ *Id.*

⁵³⁶ Interview with Collin Gregory, *supra* note 529. The town even maintains a website for each drill site with updated information. See CITY OF ARLINGTON, CMTY. DEV. AND PLANNING, GAS WELL OPERATORS, <http://www.arlington-tx.gov/cdp-gaswells/operators/> (last accessed Aug. 12, 2015).

⁵³⁷ Interview with James Parajon, *supra* note 526. See also *Staff Information*, CITY OF ARLINGTON, CMTY. DEV. AND PLANNING, <http://www.arlington-tx.gov/cdp-gaswells/staff/> (last accessed Feb. 15, 2016).

⁵³⁸ See CITY OF ARLINGTON, TEX., 2015 PROPOSED BUDGET & BUS. PLAN 179, <http://www.arlington-tx.gov/budget/wp-content/uploads/sites/19/2014/08/FY-2015-Proposed-Budget-Book-Final.pdf> (last accessed Dec. 24, 2016) (budgeting for over \$900,000 from gas well inspection fees).

APPENDIX 1

A full impacts list is available at the following address:

www.bit.ly/frackingdatabase

or by visiting

landuse.yale.edu

APPENDIX 2

A static version of the impacts list database is available as a PDF file at the following address:

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/02/PUBLIC-Impact-List.pdf>

APPENDIX 3

A full investigation into the four case studies—Erie, Colorado; McKenzie, North Dakota; Peters Township, Pennsylvania; and Arlington, Texas—is available at the following address:

landuse.yale.edu

or directly, by visiting the following links:

Erie, Colorado

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/01/Erie-CO-Collaborative-Case-Study.pdf>

McKenzie County, North Dakota

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/01/McKenzie-Co-ND-Collaborative-Case-Study.pdf>

Peters Township, Pennsylvania

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/01/Peters-Twp-PA-Collaborative-Case-Study.pdf>

Arlington, Texas

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/01/Arlington-TX-Collaborative-Case-Study.pdf>