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# Pre-Drilling Groundwater Quality Testing and the Rebuttable Presumption of Liability

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## I. ABSTRACT

In order to protect groundwater supplies in the face of increasing domestic oil and gas development, state laws prompt oil and gas companies to perform pre-drilling groundwater quality testing, or "baseline testing." Baseline testing is required either through specific baseline testing standards, through a statutory presumption of liability, or both. This note assesses the use of the statutory presumption, which has been criticized as unwarranted in the context of oil and gas. However, those discussions narrowly frame the issue in terms of contamination risks from hydraulic fracturing, technically defined, as opposed to risks associated with the entire oil and gas extraction and production process. This note expands the discussion by looking at the rebuttable presumption in this broader light and adds to the discussion through an analysis of relevant legislative history and judicial opinion. It concludes that the statutory rebuttable presumption should be employed alongside prescriptive groundwater testing requirements.

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## II. INTRODUCTION

Domestic production of shale formations increased dramatically over the past decade.[1] Shale formations are commonly called "unconventional" formations because natural gas and oil is trapped in rock formations with very low permeability compared to "conventional" formations with high permeability and increased accessibility.[2] The ability to produce gas from these previously inaccessible unconventional gas formations is a result of rising natural gas prices, tax enhancements, and advances in hydraulic fracturing technology.[3] Hydraulic fracturing, specifically high volume "slick water"[4] hydraulic fracturing, is the process of creating fractures in underground rock formations by pumping in highly pressurized fluids, and is used to increase the flow of natural gas or oil through the well.[5]

Hydraulic fracturing is a single stage in the production of an oil or gas well.[6] However, the public and media often incorrectly use the term "hydraulic fracturing"[7] when referring to the entire oil and gas exploration and production process.[8] Although much of the expansion in natural gas development across the United States might not exist if not for hydraulic

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[1] U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2014 (2014), *available at* http://www.eia.gov/forecasts/aeo/executive_summary.cfm; *see, e.g.*, HALLIBURTON, U.S. SHALE GAS 1 (2008), http://www.halliburton.com/public/solutions/contents/shale/related_docs/H063771.pdf (indicating that "not until 1995 was the hydraulic fracturing technology available that successfully brought in the gas at commercial rates.").

[2] NAT'L ENERGY TECH. LAB., U.S. DEP'T OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: AN UPDATE (2013) [hereinafter SHALE GAS UPDATE], *available at* https://www.netl.doe.gov/File%20Library/Research/Oil-Gas/shale-gas-primer-update-2013.pdf.

[3] *Id.* at 11.

[4] "Slick water" fracturing is the type of hydraulic fracturing used in shale formations and is the type of fracturing that has attracted the most attention in media, environmental organizations, politicians, academics, et cetera. Hannah Wiseman, *Fracturing Regulation Applied*, 22 DUKE ENVTL. L. & POL'Y F. 361, 364 (2012); PA. DEP'T OF ENVTL. PROT., HYDRAULIC FRACTURING OVERVIEW (2010) [hereinafter HYDRAULIC FRACTURING OVERVIEW], *available at* http://files.dep.state.pa.us/OilGas/-BOGM/BOGMPortalFiles/MarcellusShale/DEP%20Fracing%20overview.pdf.

[5] NAT'L ENERGY TECH. LAB., U.S. DEP'T OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 44 (2009) [hereinafter SHALE GAS PRIMER], *available at* http://energy.gov/sites/prod/files/2013/03/f0/ShaleGasPrimer_Online_4-2009.pdf.

[6] Wiseman, *supra* note 4, at 362 ("In most cases, developing a shale well requires construction of a well pad . . . drilling and casing the well, often using horizontal drilling techniques . . . punching holes in small segments of the well far beneath the surface . . . and pumping a solution of water and chemicals down the well at high pressure."); *see also*, SHALE GAS UPDATE, *supra* note 2, at 47–51(describing shale gas development technology and the stages of production therein).

[7] The term "hydraulic fracturing," is synonymous with "fracing," "fracking," "hydrofracking," as well as other similar variations. While "fracking" is the most common shorthand used by the media and public, professionals working in industry and oil and gas law traditionally use "fracing." *See* Wiseman, *supra* note 4, at 361; Keith B. Hall, *Recent Developments in Hydraulic Fracturing Regulation and Litigation*, 29 J. Land Use & Envtl. L. 29 (2014), *available at* http://digitalcommons.law.lsu.edu-/faculty_scholarship/129.

[8] Keith B. Hall, *Hydraulic Fracturing and the Baseline Testing of Groundwater*, 48 U. RICH. L. REV. 857, 867 (2014).

fracturing technology,[9] it is important to recognize the distinction. Hydraulic fracturing is only a single phase of the multi-stage exploration and development process for an oil and gas well.[10]

Technically defined, it is not necessarily "hydraulic fracturing" that has had a major role in groundwater contamination, but rather the processes associated with the entire lifecycle of oil and gas exploration and development.[11] A prominent groundwater quality study found no evidence of the contamination of private drinking water wells near active drilling sites from formation brine (i.e., naturally occurring saltwater within shale formations) or fracturing fluids.[12] However, this is not to say that there are not significant impacts on groundwater and surface water as a result of oil and gas development. On the contrary, incidences of groundwater contamination associated with oil and gas development have been attributed to surface discharges of wastewater, faulty well construction leading to leaking well casings, well blow-outs caused by loss of well pressure, and fluid migration through improperly abandoned production wells.[13] A company's responsibility for activities during the entire oil and gas exploration and production lifecycle must be considered when evaluating and forming substantive laws that reduce environmental impacts.[14]

Over the past decade, numerous private landowners across the country have brought lawsuits against oil and gas companies in which landowners alleged that oil and gas activities contaminated their drinking water wells.[15]

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[9] Approximately ninety percent of all new gas wells undergo hydraulic fracturing. *See* Wiseman, *supra* note 4, at 364; *see also* Ben Casselman & Russell Gold, *Drilling Tactic Unleashes a Trove of Natural Gas—And a Backlash*, WALL ST. J., Jan. 21, 2010, at A1, *available at* http://www.uppermon.org/news/Other/ WSJ-Backlash-21Jan10.html.

[10] Hannah J. Wiseman, *Risk and Response in Fracturing Policy*, 84 U. COLO. L. REV. 729, 736 (2013) ("Yet injection represents only a small part of a multi-stage well development process, and this narrow focus [on hydraulic fracturing] is unproductive."). For a detailed explanation of the multiple steps in developing a hydraulically fractured well, see SHALE GAS PRIMER, *supra* note 5, at 5861.

[11] *Id.* at 736.

[12] Stephen G. Osborn et al., *Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic Fracturing*, 108 PROC. NAT'L ACAD. SCI. 8172, 8175 (2011).

[13] U.S. ENVTL. PROT. AGENCY, EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS, at ES6-ES9 (June 2004) *available at* http://www.epa.gov/OGWDW/uic/pdfs/cbmstudy_attach_uic_ch04_hyd_frac_fluids.pdf [hereinafter EPA 2004]; Claudio Brufatto et al., *From Mud to Cement-Building Gas Wells*, 15 OILFIELD REV. 62, 63–64 (2003) (describing risks from failure to isolate the hydrocarbon sources from the well bore during or after well production and the resulting possibility of methane migration).

[14] Wiseman, *supra* note 10, at 736 ("Investigating the more complete life cycle of a drilled and fractured well reveals certain risks that have received insufficient attention, such as potential surface or underground water contamination . . . .").

[15] *See e.g.*, Maring v. John Nalbone, Jr., No. K12009001499 (N.Y. Sup. Ct., Aug. 27, 2009); Fiorentino v. Cabot Oil & Gas Corp., No. 3:09-cv- 02284 (M.D. Pa., Nov. 19, 2009) (also known as Ely v. Cabot Oil & Corp., et al.); Tucker v. Southwestern Energy Co., 1:11-cv-44-DPM, No. 1:11-cv-45-DPM, 2012 BL 4399 (E.D. Ark. Feb. 17, 2012); Hallowich v. Range Res. Corp., No. 2010-3954 (Pa. Ct. Com. Pl. March 20, 2013); Roth v. Cabot Oil and Gas Corp., 287 F.R.D. 293 (M.D. Pa. October 15, 2012) (hereinafter Roth v. Cabot Oil and Gas Corp.); Berish v. Southwestern Energy Prod., 763 F. Supp. 2d 702 (M.D. Pa. 2011). For an annotated list of litigation involving oil and gas development and hydraulic fracturing of oil and gas wells in the United States, see BARCLAY R. NICHOLSON, ANALYSIS

However, the plaintiffs in these cases struggled to support their negligence claims because they lacked sufficient evidence showing that the defendant caused the contamination.[16] This evidentiary deficit largely exists because groundwater quality is not uniformly tested prior to the initiation of oil and gas activities on a property, which makes it difficult for plaintiffs to demonstrate that the contamination was present only after the drilling of a new oil and gas well.[17]

Determining the cause of groundwater contamination is complicated by the multitude of possible natural and human impacts.[18] In response, conducting pre-drilling groundwater testing, or "baseline testing," creates a "before and after" understanding of water quality to allow scientists to identify the extent and type of contaminants released.[19] This information can be used to either defend the oil and gas company in instances where it is not responsible for contaminating a groundwater supply, or to assist landowners in instances where the company is responsible.[20]

There are two main approaches that states employ to prompt oil and gas companies to perform groundwater quality testing prior to initiating drilling activities. The first approach is to require oil and gas companies to use specific, prescriptive baseline testing practices to monitor groundwater in certain circumstances.[21] Such laws vary among states, but essentially require oil and gas well operators to sample and report on specified characteristics of a defined number of groundwater wells within a specified radial distance of a proposed oil and gas well.[22] In contrast, the second and less common approach that states employ is a "statutory presumption" of liability. A statutory presumption is a legislatively required inference that

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OF LITIGATION INVOLVING SHALE & HYDRAULIC FRACTURING (2014) [hereinafter NORTON ROSE FULBRIGHT ANALYSIS].

[16] Hall, *supra* note 8, at 858; Jeffery C. King et al., *Factual Causation: The Missing Link in Hydraulic Fracture-Groundwater Contamination Litigation*, 22 DUKE ENVTL. L. & POL'Y F. 341, 342 (2012) (explaining that no landowner's alleged groundwater contamination claim has succeeded in part because of the lack of sufficient causation evidence to survive a motion for directed verdict); Hannah J. Wiseman, *Hydraulic Fracturing and Information Forcing*, 74 OHIO ST. L.J. FURTHERMORE 86, 88 (2013) ("[Baseline data on contamination] will also provide needed evidence for the courts, where damages caused by oil and gas drilling have been difficult to prove so far."); *see e.g.*, NORTON ROSE FULBRIGHT ANALYSIS, *supra* note 15 (showing no cases where a plaintiff succeeded in a groundwater contamination claim against an oil and gas company).

[17] Hall, *supra* note 8, at 858.

[18] Hall, *supra* note 8, at 857–58; Wiseman, *supra* note 16, at 86–88.

[19] Scientific analyses such as the use of isotopic monitoring help to measure substances such as methane that exists both naturally and as a result of oil and gas development. This can reduce uncertainty over whether increased methane concentrations were caused by oil and gas development or other methane-releasing sources. *See e.g.*, Osborn, *supra* note 12, at 8173, 8175.

[20] Wiseman, *supra* note 16, at 88.

[21] For a detailed explanation and comparison of state-by-state baseline testing requirements, see Hall *supra* note 8, at 918–28.

[22] *See id.*

the fact-finder must make when a certain undisputed fact exists .[23] In this context, the statute presumes that an oil and gas company caused any groundwater contamination found in a landowner's well within a specified timeframe and geographic distance from an oil and gas well.[24] The company can rebut the presumption of liability based on a specified list of defenses that states have available in their respective statutes.[25] This standard is therefore called a "rebuttable presumption."

To date, there is one published article that thoroughly evaluates the structure and merits of state baseline testing laws. In that article, Keith Hall concluded that the rebuttable presumption was not an appropriate standard because "hydraulic fracturing rarely causes contamination," referring to the narrow and technical definition of hydraulic fracturing.[26] In contrast to Hall's analysis, this note assesses whether the rebuttable presumption is an appropriate legal tool to prompt baseline testing in light of the risks associated with the entire oil and gas development process. This article posits that the lens Hall and others[27] used to draw such a conclusion was inappropriately focused on the narrow meaning of hydraulic fracturing to support the argument that stringent oil and gas regulations are unnecessary.

Instead, this article builds on Hall's analysis of state baseline testing requirements through a broader scope—one that incorporates all contaminating activities associated with a company's oil and gas extraction process—to assess whether the rebuttable presumption of liability is appropriate in the context of oil and gas law. In particular, this article analyzes private landowner lawsuits and legislative history to understand arguments for and against the rebuttable presumption as a means to prompt pre-drilling groundwater testing.

In Section III, this article provides background on pre-drilling groundwater quality testing, the legal framework, and relevant literature in the field. In Section IV, this article examines the strengths and weaknesses of the rebuttable presumption in terms of judicial opinions, legislative history, and landowner litigation alleging water contamination from oil and gas activity. Section IV ends by explaining why the rebuttable presumption is necessary for states with significant oil and gas activities. It argues that states should adopt the rebuttable presumption to protect landowners'

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[23] Butts v. Southwestern Energy Prod. Co., 2014 WL 3953155, at *5 (M.D. Pa. 2014) ("The Court found that § 3218(c) created a 'statutory presumption' of causation," citing Roth v. Cabot Oil and Gas Corp., No. 3:12-cv-00898 (M.D. Pa. May 14, 2012).

[24] *See* 58 PA. CONS. STAT. ANN., § 3218 (2013); 58 PA. CONS. STAT. ANN. § 3218(c) (2013); W. VA. CODE ANN. § 22-6A-18 (2013)*; see also* Hall, *supra* note 8, at 877 (the "statutory presumption" of liability that Hall describes is synonymous with the "evidentiary presumption" of liability); WILLIAM CRANCH ET AL., RESPONDING TO LANDOWNER COMPLAINTS OF WATER CONTAMINATION FROM OIL AND GAS ACTIVITIES: BEST PRACTICES 17 (2014) [hereinafter, HARVARD LAW BEST PRACTICES].

[25] 58 PA. CONS. STAT. ANN., § 3218(2013); W. VA. CODE ANN. § 22-6A-18 (West 2013).

[26] Hall, *supra* note 8, at 884.

[27] *See e.g.*, King et al., *supra* note 16, at 360 (discussing the causal connection between hydraulic fracturing and groundwater contamination in lawsuits against drilling companies).

groundwater supplies from the full range of risk-bearing activities for which oil and gas companies are responsible.

## III. BACKGROUND

### *A. Groundwater Quality Impacts from Oil and Gas Development*

As a result of the shale revolution in the United States, oil production rates have nearly doubled from five to nine million barrels per day over the past six years.[28] Shale development is termed "unconventional"[29] development because it employs new technologies such as horizontal drilling (where wells are drilled straight down and then laterally underground) and injects more water and chemicals[30] and water than conventional oil and gas development.[31] There are environmental risks posed by conventional and unconventional operations, although public concern over water contamination has largely focused on unconventional development using hydraulic fracturing.[32]

As hydraulic fracturing technologies have allowed more wells to be drilled in new formations, this expansion has led to an increased range of impacts to groundwater quality before, after, or irrespective of the hydraulic fracturing of a well.[33] Pollutants can reach groundwater through several key pathways: methane gas can leak from improperly constructed gas wells[34] or through natural conductive pathways into shallow aquifers,[35] drilling fluids

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[28] Joe Nocera, Op-Ed, *Shale and the Falling Price of Oil*, N.Y. TIMES, Dec. 22, 2014, http://www.nytimes.com/2014/12/23/opinion/joe-nocera-shale-and-the-falling-price-of-oil.html?_r=0.

[29] For a detailed description of the difference between conventional and unconventional formations, see SHALE GAS PRIMER, *supra* note 5, at 15; John A. Harper, *The Marcellus Shale—An Old "New" Gas Reservoir in Pennsylvania*, 38 PENN. GEOLOGY 2, 11 (2008).

[30] STAFF OF COMM. ON ENERGY AND COMMERCE, 112TH CONG., CHEMICALS USED IN HYDRAULIC FRACTURING 1 (2011).

[31] Wiseman, *supra* note 10, at 744.

[32] Jennifer S. Harkness et al., *Iodide, Bromide, and Ammonium in Hydraulic Fracturing and Oil and Gas Wastewaters: Environmental Implications*, ENVTL. SCI. & TECH. (2015) (finding no difference in concentrations of oil and gas wastewater origination from hydraulic fracturing and conventional oil and gas operations).

[33] Wiseman, *supra* note 4, at 364.

[34] Osborn, *supra* note 12, at 8175; Robert. B. Jackson et al., *Increased Stray Gas Abundance in a Subset of Drinking Water Wells near Marcellus Shale Gas Extraction*, 110 PROC. NAT'L ACAD. SCI. 11250 (2013) (finding that distance to gas wells was a significant factor for homeowners with drinking water contaminated by stray methane gas, and that improper well construction was the likely cause); Richard J. Davies et al., *Oil and Gas Wells and Their Integrity: Implications for Shale and Unconventional Resource Exploration*, 56 MARINE AND PETROLEUM GEOLOGY 239 (2014) (finding that 6.3% of Marcellus Shale wells inspected between 2005 and 2013 had been reported for well barrier or integrity failure violations); Anthony R. Ingraffea et al., *Assessment and Risk Analysis of Casing and Cement Impairment in Oil and Gas Wells in Pennsylvania, 2000-2012*, 111 PROC. NAT'L ACAD. SCI. 10955 (2013) (assessing more than 41,000 conventional and unconventional wells, and finding that structural integrity of casing and cement in oil and gas wells is a possible mechanism of methane migration).

[35] Avner Vengosh et al., *A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development and Hydraulic Fracturing in the United States*, 48 ENVTL. SCI. & TECH. 8334

or wastewater can spill on the surface of well pads or be improperly disposed in streams and rivers that contact low shallow aquifers,[36] and wastewater can leak from surface impoundments into low lying aquifers.[37] It is important to keep in mind the risks associated with the complete life cycle of a drilled and fractured well, because the potential for groundwater contamination does not come solely from the hydraulic fracturing process.[38]

In order to fully understand the type and extent of risks, groundwater quality data is needed before drilling and fracturing activities take place. Other contaminating activities have preceded current hydraulic fracturing production activities, and adequate baseline data helps scientists parse out the difference between new and previously existing contamination.[39]

### *B. Legal Framework of the Rebuttable Presumption for Oil and Gas Activities*

Although portions of the major environmental and public health laws apply to conventional and unconventional oil and gas development, the majority of these laws also contain exemptions or limitations in regulatory coverage.[40] In particular, the Energy Policy Act of 2005 amended the Safe Drinking Water Act, the federal statute that oversees groundwater protection, to exempt oil and gas development utilizing hydraulic fracturing[41] from its programs and regulatory actions.[42] As such, state agencies implement requirements governing many oil and gas development activities, and also implement and enforce federal requirements with the approval and oversight of the United States Environmental Protection

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(2014); Nathanial R. Warner et al., *Geochemical Evidence for Possible Natural Migration of Marcellus Formation Brine to Shallow Aquifers in Pennsylvania*, 109 Proc. NAT'L ACAD. SCI. 11961 (2012).

[36] Vengosh et al., *supra* note 35, at 8334 (discussing contamination of shallow groundwater from spills, leaks, and/or disposal of shale gas wastewater); Daniel J, Rozell & Sheldon J. Reaven, *Water Pollution Risk Associated with Natural Gas Extraction from the Marcellus Shale*, RISK ANALYSIS 1 (2011); Victor M. Heilweil et al., *A Stream-Based Methane Monitoring Approach for Evaluating Groundwater Impacts Associated with Unconventional Gas Development*, 51 GROUNDWATER 511 (2013) (describing a manner in which to study impacts on groundwater quality from a gaining stream, which is a stream that emerges above the ground but is part of a subsurface water table).

[37] Rozel & Reaven, *supra* note 36; Terry W. Roberson, *Environmental Concerns of Hydraulically Fracturing a Natural Gas Well*, 32 UTAH ENVTL. L. REV. 67 (2012).

[38] Wiseman, *supra* note 10, at 736 (calling for a reform of the debate in light of entire life cycle of a well).

[39] Wiseman, *supra* note 16, at 88; *see, e.g.*, Harper, *supra* note 29, at 2–3 (illustrating the differences between oil and new gas drilling in the Marcellus Shale region).

[40] *See* U.S. GOV'T ACCOUNTABILITY OFFICE, UNCONVENTIONAL OIL AND GAS DEVELOPMENT KEY ENVIRONMENTAL AND PUBLIC HEALTH REQUIREMENTS, GAO-12-874 (2012) for a discussion of the environmental and public health laws with exemptions or limitations in coverage for oil and gas activities.

[41] Specifically, underground injection of fluids "pursuant to hydraulic fracturing operations related to oil [or] gas . . . production activities" is exempt, unless diesel fuels are injected as part of the hydraulic fracturing fluids. 42 U.S.C. § 300h(d)); Prohibition of Unauthorized Injection, 40 C.F.R. § 144.11 (2011).

[42] Energy Policy Act of 2005, 42 U.S.C. § 15801-322 (2005).

Agency (EPA).[43] The resulting state legal frameworks create a patchwork of laws with varying scope and severity.

One strategy appearing across several state regulatory frameworks is a legal framework prompting pre-drilling groundwater testing.[44] This framework includes prescriptive statutory requirements or a presumption of liability, or both; the majority of states that address pre-drilling groundwater quality monitoring do so by directly requiring specific baseline testing practices,[45] whereas only Pennsylvania and West Virginia states use just a presumption of liability to prompt baseline testing.[46] Illinois and North Carolina also have presumptions of liability in place, adopted in addition to prescriptive baseline testing requirements.[47]

Statutes or jurisprudence can create a presumption of liability, but all are statutorily created in the context of oil and gas development.[48] These statutory presumptions incentivize pre-drilling testing of groundwater quality by presuming that the oil and gas developer or operator caused any groundwater contamination identified within certain period of time and within a certain radial distance of oil and gas operations. The statutory presumption of liability is a conclusion of fact that the factfinder must accept if the predicate fact—that there is contamination present—is proven and the presumption is not rebutted with factual evidence.[49] In other words, if contamination proven to exist in a specific groundwater supply, the factfinder must find that the oil and gas company is liable unless the company successfully rebuts the fact through one of the defenses listed in the relevant state statutes.[50]

In most civil cases, the burden of production and burden of persuasion, collectively called the burden of proof, is placed on the plaintiff.[51] However, the statutory presumption shifts the burden of proof to the defendant, the company against whom contamination is alleged.[52] The presumption shifts the burden of production by requiring the company to present rebuttal

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[43] *Id.* at 47.

[44] Hall, *supra* note 8, at 872.

[45] *See* Hall, *supra* note 8, at 918–28 (providing a summary of states that directly require baseline testing include Colorado, Ohio, Illinois, North Carolina, and Wyoming); *supra* note 24, at 15–16.

[46] 58 PA. CONS. STAT. § 3218 (2013); W. VA. CODE § 22-6A-18 (2013).

[47] 225 ILL. COMP. STAT. 732/1-83, 85 (2015).

[48] *See* Hall, *supra* note 8, at 879–81 (describing the presumptions in place in WV, PA, IL, and NC, all of which are created by statute); Keith B. Hall, *Evidentiary Presumptions*, 72 TUL. L. REV. 1321, 1325 (1998) (discussing the presumption rule adopted into Louisiana Code of Evidence, but is informative as to the mechanisms of evidentiary presumptions generally).

[49] Hall, *supra* note 8, at 877; Hall, *supra* note 48, at 1321.

[50] Available rebuttals are listed in the state laws and in include, for example, if the landowner refused to allow the company to perform pre-drilling testing, or if the pollution occurred after the presumptive timeframe or geographic scope. *See*, *e.g.*, 58 PA. CONS. STAT. § 3218 (2013); Hall, *supra* note 8, at 877.

[51] Hall, *supra* note 48, at 1324.

[52] Butts v. Southwestern Energy Prod. Co., 2014 WL 3953155, No. 3:12-cv-01330, at *7 (M.D. Pa. 2012) ("The statutory presumption in § 3218(c)(i) places responsibility on the well operator for pollution of a water supply under certain circumstances.").

evidence, and shifts the burden of persuasion by requiring evidence that sufficiently persuades the factfinder that the presumed fact (that the company caused the contamination) is not true.[53]

In Pennsylvania, the standard is different for conventional and unconventional operations.[54] For example, an operator of a conventional well is presumed responsible for pollution of a water supply found within 1,000 feet of a wellhead within six months after completion of drilling the well,[55] whereas the operator of an unconventional well is presumed responsible for contamination within 2,500 feet of the vertical portion[56] of a well bore within twelve months after completion, drilling, stimulation, or alteration activities.[57] Notably, the presumption for unconventional wells is more protective of the environment because it increases the length of time and distance for which a well operator could be found liable. The statute in Pennsylvania included a rebuttable presumption in the original version signed into law in 1984, but in 2012, the Pennsylvania House of Representatives passed House Bill 1950 to amend the statute and extend the presumption for unconventional wells.[58]

The only other state employing a rebuttable presumption as the sole means with which to prompt pre-drilling testing is West Virginia. The law in West Virginia presumes that "the drilling and the oil or gas well or either was the proximate cause of the contamination" identified within 1,500 feet of "the center of the well pad for a horizontal well" within six months of drilling or alteration activities.[59]

In contrast, both North Carolina and Illinois utilize a rebuttable presumption and prescriptive baseline testing requirements in unison. North Carolina requires that an oil and gas developer or operator is presumed responsible for contamination within one-half mile of a wellhead, but does not establish a timeframe within which the contamination must be discovered.[60] Similarly, Illinois requires that "any person" that has conducted "high volume horizontal hydraulic fracturing operations" is presumed liable for pollution found within 1,500 feet of the well site within

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[53] Hall, *supra* note 48, at 1323.

[54] An oil or gas well that is hydraulically fractured is typically an unconventional well. See SHALE GAS PRIMER, *supra* note 5 for a discussion of conventional versus unconventional formations.

[55] 58 PA. CONS. STAT. § 3218(c)(1); Note that hydraulic fracturing is a type of well completion. AM. PETROLEUM INST., HYDRAULIC FRACTURING OPERATIONS—WELL CONSTRUCTION AND INTEGRITY GUIDELINES 4 (2009) ("The last cycle of the well construction is well completion, which can include perforating and hydraulic fracturing or other stimulation techniques depending on the well type.").

[56] Hydraulically fractured wells often undergo horizontal drilling, as described in SHALE GAS PRIMER, *supra* note 6, at 45. However, it is the vertical portion that Pennsylvania uses as the central point of measurement for distance of contamination.

[57] 58 PA. CONS. STAT. § 3218(c)(2) (2013).

[58] Oil and Gas Act, 58 PA. CONS. STAT. § 601.208 (2012) (current version) (creating a rebuttable presumption of liability on the well operator for all oil and gas wells where the pollution was found within 1,000 feet of a well within six months of well drilling, completion, or alteration.)

[59] W. VA. CODE § 22-6A-18 (b)-(c) (2011).

[60] N.C. GEN. STAT. § 113–421(a) (2015).

thirty months after the completion of the high volume horizontal hydraulic fracturing operations.[61]

There are distinct variations between the statutory presumptions in each of these four states. For example, Illinois and West Virginia limit their statutory presumption to wells that have undergone horizontal drilling,[62] whereas the Pennsylvania and North Carolina laws include all oil and gas wells.[63] Another distinction is that the language in Illinois's statute defines the geographic limitation as starting from the well site, whereas North Carolina and Pennsylvania (for unconventional wells only) measure from the wellhead or wellbore.[64] West Virginia measures from the center of the well pad.[65] "Well site" or "well pad" are broad terms that arguably extend the statutory application to the boundaries of the entire area owned or operated by the oil and gas company.[66] On the other hand, the "wellhead" or "wellbore" is a precise location on the well pad where the production well is controlled at the surface of the earth from the vertical portion of a well.[67] A wellbore may fall in various locations across a well pad, and thus would affect the distance of presumed liability covered in the statute.[68]

Another variation between states is in the term used to refer to the oil and gas company, variations of which include "well operator," "person conducting high volume horizontal hydraulic fracturing," and "oil or gas developer." However, this variation is not of major consequence because the company that owns the well would likely retain liability for any contracted third parties. Nonetheless, the comparative difference between the statutes' distances, timeframes, and other aspects illustrate the patchwork of possible presumed liabilities that companies and landowners must understand prior to drilling.

An oil and gas company can rebut the presumption in each state by demonstrating one of the following: (1) that the contamination was beyond the specified distance or timeframe, (2) that it occurred as the result of something other than the company's activities, or (3) that it existed prior to

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[61] ILL. COMP. STAT. § 732/1-85 (2013).

[62] ILL. COMP. STAT. § 732/1-85(b) (2013) (including only high volume horizontal hydraulic fracturing operations); W. VA. CODE § 22-6A-18(b) (2011) (including all horizontal wells).

[63] 58 PA. CONS. STAT. § 3218(c)(1) (2013) (including oil or gas wells generally, and includes heightened restrictions for unconventional wells); N.C. GEN. STAT. § 113–421(a) (2015) (including oil and gas operations generally).

[64] ILL. COMP. STAT. § 732/1-85(b)(1) (2013) (" . . . within 1,5000 feet of the *well site*.") (emphasis added); N.C. GEN. STAT. § 113-421(a) (2015) ("within a one-half mile radius of a *wellhead*.") (emphasis added); 58 PA. CONS. STAT. § 3218(c)(2) (2013) (" . . . within 2,000 feet of . . . the vertical *well bore*.") (emphasis added).

[65] W. VA. CODE § 22-6A-18 (b) (2011).

[66] A "well pad" is the entire drilling site, usually constructed with a gravel or asphalt surface, depending on the duration of the drilling. SCHLUMBERGER OILFIELD GLOSSARY, PAD, *available at* http://glossary.oilfield.slb.com/en/Terms/p/pad.aspx (last visited April 3, 2015).

[67] The wellbore is the drilled hole. SCHLUMBERGER OILFIELD GLOSSARY, WELLBORE, *available at* http://glossary.oilfield.slb.com/en/Terms/p/pad.aspx (last visited April 3, 2015).

[68] SHALE GAS UPDATE, *supra* note 2, at 51–52.

the commencement of drilling activities as evidenced by a pre-drilling water well test.[69] North Carolina, Pennsylvania, and West Virginia law also include a fourth rebuttal for when a landowner refused to allow the oil and gas company access to conduct a pre-drilling test; however, Illinois does not include this rebuttal in the statute.[70] The burden of proof and standard for the rebuttal also varies state-by-state. Illinois requires operators to "affirmatively prove by clear and convincing evidence,"[71] North Carolina and West Virginia require operators to prove by "preponderance of the evidence,"[72] and Pennsylvania requires operators to "affirmatively prove" their defense.[73] Oil and gas companies and landowners must be familiar with these variations in order to protect their interests.

### *C. Existing Assessments of State Groundwater Monitoring Requirements*

There is a great deal of secondary source literature covering the environmental impacts from conventional and unconventional oil and gas development,[74] as well as the legal frameworks at the state and federal level.[75] However, the literature focusing specifically on groundwater testing requirements is less prevalent.

The first article on point, *Factual Causation: The Missing Link in Hydraulic Fracture-Groundwater Contamination Litigation,* published in 2012 by Jeffrey King, discussed the need for plaintiffs to establish a causal connection between hydraulic fracturing and groundwater contamination in lawsuits against drilling companies.[76] Although fixated on the impact of hydraulic fracturing—as opposed to all oil and gas development activities—the article discussed private landowner lawsuits filed against oil and gas companies and the failure of their claims due in part to the lack of evidence

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[69] 225 ILL. COMP. STAT. 732/1-85(c) (2015); N.C. GEN. STAT. § 113-421 (a1) (2015); 58 PA. CONS. STAT. §3218d (2015); W. VA. CODE ANN. § 22-6A-18(c) (2011).

[70] N.C. GEN. STAT. § 113-421 (a1)(2) (2015); 58 PA. CONS. STAT. §3218(d) (2015); W. VA. CODE ANN. § 22-6A-18(c) (2011).

[71] 225 ILL. COMP. STAT. 732/1-85(c) (2015).

[72] N.C. GEN. STAT. § 113-421 (a1) (2015); W. VA. CODE ANN. § 22-6A-18(c) (2011).

[73] 58 PA. CONS. STAT. §3218(d) (2015).

[74] *See, e.g.*, Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115 (2009); Roberson, *supra* note 37; MARY TIEMANN ET AL., CONG. RESEARCH SERV., R42333, MARCELLUS SHALE GAS: DEVELOPMENT POTENTIAL AND WATER MANAGEMENT ISSUES AND LAWS (2012); Wiseman, *supra* note 4; Wiseman, *supra* note 10; Ross H. Pifer, *What a Short, Strange Trip It's Been: Moving Forward After Five Years of Marcellus Shale Development*, 72 U. PITT. L. REV. 615 (2011).

[75] William J. Brady & James P. Crannell, *Hydraulic Fracturing Regulation in the United States: The Laissez-Faire Approach of the Federal Government and Varying State Regulations*, 14 VT. J. ENVTL. L. 39 (2012); Christopher S. Kulander, *Shale Oil and Gas State Regulatory Issues and Trends*, 63 CASE W. RES. L. REV. 1101 (2013); Angela C. Cupas, *The Not-So-Safe Safe Drinking Water Act: Why We Must Regulate Hydraulic Fracturing at the Federal Level*, 33 WM. & MARY ENVTL. L. & POL'Y REV. 605 (2009).

[76] King, *supra* note 16, at 341.

to demonstrate causality.[77] The article justified this conclusion based on the "safe use of fracture stimulation,"[78] and spent a significant portion of its discussion demonstrating that "there is no evidence that hydraulic fracturing contaminates groundwater."[79]

King did not analyze plaintiffs' contamination claims or the lack of supporting evidence in terms of the risks from entire oil and gas development process.[80] In contrast to that paper, Section IV of this article discusses landowner civil suits that allege groundwater contamination. The discussion explains that the lack of evidence indicating groundwater contamination does not result from a lack of risk in oil and gas development activities, but rather from insufficient data to establish the extent of such risks. Of course, even with pre-drilling baseline testing, determining the cause of contamination could still be difficult due to the other possible causes of contamination, limitations in groundwater sampling technologies, and cost limitations. That said, baseline data is necessary to move this issue in the right direction.

A second article pertinent in the discussion is by Hannah Wiseman, who is well published in the area of oil and gas law and environmental impacts.[81] In 2013, Wiseman published *Hydraulic Fracturing & Information Forcing*, where she called for improved baseline data on groundwater contamination to allow scientists to isolate the cause of contamination, provide needed evidence in the courts, and help agencies understand the risks and implement more protective regulations.[82] Wiseman also discussed the importance of understanding the difference between pre-existing groundwater contamination and contamination caused by recent development activities.[83] Wiseman discussed broad-scale surveys from the United States Geological Survey (USGS) that collected baseline groundwater data across multiple regions of the United States; but, these broad studies were largely not localized enough to be helpful for the individual landowner.[84] Wiseman also recognized that such efforts would not yield perfect information, because many substances released during oil and gas activities may not be tested across all studies due to limited time and costs.[85]

Finally, Wiseman discussed state level baseline testing requirements, and considered them insufficient due to the lack of uniformity state-by-state, thus yielding inconsistent assistance to landowners seeking recovery of

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[77] *Id.* at 344.
[78] *Id.*
[79] *Id.* at 350.
[80] *Id.* at 344.
[81] *See, e.g.*, Wiseman, *supra* note 4; Wiseman, *supra* note 10; Wiseman, *supra* note 16; Wiseman, *supra* note 74.
[82] Wiseman, *supra* note 16, at 88.
[83] *Id.* at 90–91.
[84] *Id.*
[85] *Id.* at 91.

damages.[86] In that discussion, Wiseman briefly explained the mechanics of the rebuttable presumption in Pennsylvania and West Virginia, although her only interpretation of the rebuttable presumption was that it "incentiviz[es] very careful baseline testing near the proposed oil or gas well site."[87] She also called state prescriptive baseline testing requirements "an important start," but stated that the laws are not comprehensive because of state-by-state variation in constituents tested and laboratory testing methodologies.[88]

Keith Hall also explored the difficulty of establishing the cause of groundwater contamination in his 2013 article, *Hydraulic Fracturing Contamination Claims: Problems of Proof*.[89] For example, Hall discussed the challenges in collecting groundwater samples, including the difficulty in isolating other types of human activities that can contribute to contamination, which is complicated in part because multiple entities over time could have "engaged in the types of activity that can cause contamination."[90] He highlighted the importance of "before and after" comparison of water quality, and described the mechanics of state level baseline testing requirements in Colorado, as well as the mechanics of the rebuttable presumption in Pennsylvania and West Virginia.[91] However, his discussion was narrowed to "whether hydraulic fracturing has caused contamination in specific circumstances."[92]

In that article, Hall's discussion of the rebuttable presumption and baseline testing was limited to restating the statute. He also stated that that the presumption in Pennsylvania may create an "irrebuttable" presumption for oil and gas companies that fail to use an independent laboratory but nonetheless have "irrefutable evidence" that something other than their activity caused the contamination.[93] This is because the section 3218(e) of the statute requires "any operator electing to preserve its defenses" to retain an independent certified laboratory to conduct baseline testing.[94] Hall argued that a situation could arise where an operator did not perform the required baseline testing using an independent laboratory yet there existed irrefutable evidence that something other than their activities caused the contamination.[95] It is possible that such a situation could arise, but a court

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[86] *Id.* at 91–93.
[87] *Id.* at 92.
[88] Wiseman, *supra* note 16, at 93.
[89] Keith B. Hall, *Hydraulic Fracturing Contamination Claims: Problems of Proof*, 74 OHIO ST. L.J. FURTHERMORE 71, 74 (2013).
[90] *Id.* at 75.
[91] *Id.* at 77–79.
[92] *Id.*
[93] *Id.* at 79 n.36.
[94] 58 PA. CONS. STAT. §3218(e) (2015)
[95] Hall, *supra* note 8, at 881 n.107.

could still take into consideration evidence showing another cause of contamination.[96]

Hall's 2013 article set the stage for his more detailed and inquisitive discussion of baseline testing requirements in his 2014 article, *Hydraulic Fracturing and the Baseline Testing of Groundwater*.[97] In that article, Hall dove into a deeper evaluation of baseline testing requirements and the rebuttable presumption standard. He explained the public confusion around what is and is not "hydraulic fracturing," acknowledging that the public and media typically misuses the term to encompass all oil and gas development activities. He described the challenges in determining the cause of groundwater contamination, and then summarized mechanics of the two main ways in which states prompt pre-drilling baseline testing: prescriptive baseline testing requirements,[98] and a statutory presumption of liability that can be rebutted with evidence from baseline testing.[99] However, similar to King[100] and Hall's 2013 article,[101] Hall's discussion was narrowed to whether "hydraulic fracturing," technically defined, causes groundwater contamination.[102] Similarly, and as described in detail in the discussion in Section IV.C., Hall used this narrow scope to conclude that the rebuttable presumption is not an appropriate standard. He justified this by stating, "there is no evidence that hydraulic fracturing causes groundwater contamination," but did not address whether risks from any other oil and gas activity should be evaluated when determining whether a state should adopt a rebuttable presumption.[103]

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[96] For example, the Defendant in *Butts v. Southwestern Energy Production Company* argued that it did not cause the contamination found in the Plaintiff's wells, and the court stated that it would have considered expert evidence showing that the Plaintiff's water was not contaminated by its drilling operations. Butts v. Southwestern Energy Prod. Co., 2014 WL 3953155, No. 3:12-cv-01330, at *6 (M.D. Pa. 2012). However, absent such evidence, the Plaintiffs' testimony supporting its claim, when considered alongside the statutory rebuttable presumption, was sufficient to survive summary judgment. *Id.* at *5–7. The opinion applies the Pennsylvania statutory presumption, which Hall stated, "arguably creates an *irrebuttable* presumption that applies in the event that the operator does not perform the required baseline testing." Hall, *supra* note 8, at 880 (emphasis added). However, the court in *Butts* does not base its decision on the statute's requirement that the operator electing to rebut the allegation must retain an independent certified laboratory. *See* 58 PA. CONS. STAT. §3218(e) (2015). Instead, the court simply stated that, "[a]bsent such evidence, the only evidence regarding causation of record is Plaintiff's testimony that their water 'turned black.'" Butts, 2014 WL 3953155, at *6. Thus, the decision was not determined by an "irrebuttable" presumption, but rather the courts' own evidentiary analysis.

[97] Hall, *supra* note 8.

[98] *Id.* at 872–76.

[99] *Id.* at 877–82.

[100] King, *supra* note 16.

[101] Hall, *supra* note 89.

[102] Hall, *supra* note 8, at 873 (For example, there is a section in Hall's 2014 paper titled, "Evidence Suggests Hydraulic Fracturing Rarely Causes Contamination, and a Presumption that Fracturing Has Caused Contamination Generally Will Not Be Accurate." In another example, Hall states that, "[i]f data acquired from baseline testing help confirm that hydraulic fracturing rarely causes contamination, that might help avoid the enactment of undue restrictions on hydraulic fracturing and ease unwarranted fears.").

[103] *Id.* at 888–89. However, see *infra* note 174, describing an in-person conversation between Hall and this author regarding the scope of Hall's legal analysis.

Thomas Merrill and David Schizer authored another article that touched on the rebuttable presumption for liability.[104] In their article, Merril and Schizer recognized the need for baseline testing given the uphill battle that plaintiffs face in proving that a company's activities were the but-for cause of the groundwater contamination.[105] The authors recommended that a rebuttable presumption of causation be used when there is no clear evidence showing the pathway of contamination.[106] The authors referred to the presumption in the context of "fracturing activities," but clearly intended to include to the full spectrum of risks associated with oil and gas activities.[107] As such, their article served as additional support for the use of a statutory rebuttable presumption in the context of all oil and gas activities.

Finally, there are two other sources that touch upon the rebuttable presumption of liability for oil and gas companies; but, both provide objective summaries of the relevant state statutes and do not offer analyses of the standards. "Water Schemes Across the Shale Plays: Marcellus/Utica," by R. Timothy Weston, explained topics in water rights, riparian regimes, and regulatory issues in treating and disposing of production wastewater,[108] and summarized the liability for impacts caused by gas well development in terms of common law liabilities and statutory and regulatory requirements.[109] In terms of common law liability, Weston mentioned that liability impacting water supplies rest substantially on common law tort doctrines –trespass, nuisance, negligence, etc.[110] Weston summarized the mechanics of rebuttable presumptions in Pennsylvania and West Virginia, and stated that the focus of the standard is on impacts to quality as opposed to quantity of neighboring groundwater supplies.[111]

Similarly, in 2014, the Environmental Policy Initiative and Emmett Environmental Law and Policy Clinic at Harvard Law School provided a "Best Practices" summary of baseline water testing requirements and presumptions of liability.[112] The paper summarized the mechanics of these legal frameworks, and stated that a statutory presumption is "crucial to encouraging responsible drilling practices."[113] It also recommended that the statutory time limits on the periods of presumed liability be "of sufficient length to allow any contamination or diminution to manifest in surrounding

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[104] 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, 235 (2013).

[105] *Id.* at 230.

[106] *Id.* at 235.

[107] *Id.*

[108] R. Timothy Weston, *Water Schemes Across the Shale Plays: Marcellus/Utica,* 2 ROCKY MTN. MIN. L. INST. 6A (2014).

[109] *Id.*

[110] *Id.* at 28.

[111] *Id.* at 29.

[112] HARVARD LAW BEST PRACTICES, *supra* note 24.

[113] *Id.* at 6.

water supplies."[114] The article expressed further support for employing the rebuttable presumption standard, stating that statutory presumptions of liability "play an essential role in the operation of an effective investigation and determination regime."[115]

As this Section shows, there is a heated debate in the literature over the appropriate strength of state requirements prompting baseline testing, particularly with respect to the rebuttable presumption. One side of the literature concluded that the rebuttable presumption was not warranted in oil and gas development because the risk is not present; however, the justification of their analysis was limited to the argument that hydraulic fracturing, technically defined, does not cause groundwater contamination.[116] In contrast, the other side of the debate favored the rebuttable presumption and recommended that it be adopted because it helps to resolve whether a company caused contamination and improves regulatory safeguards for public health and the environment.[117]

Indeed, prescriptive baseline testing requirements are an important start to ensuring protection of groundwater supplies. However, it is not clear whether they are sufficient without also incorporating a rebuttable presumption of liability. Answering this question requires an in-depth discussion that looks beyond the mechanics of various states' statutory presumptions and into case law, judicial opinions, and legislative history. This article takes that next step, and as such builds on Wiseman's call for better baseline testing.[118] Further, the main topic of this paper stems from Hall's discussion of whether the rebuttable presumption is a justifiable standard in the context of oil and gas regulation. This paper builds on Hall's 2014 article by relying on literature discussing the full range of risks from oil and gas development to reframe the scope of the analysis, and then incorporates the views of judicial opinions and lawmakers.

## IV. THE REBUTTABLE PRESUMPTION: AN APPROPRIATE STANDARD FOR OIL AND GAS DEVELOPMENT

### *A. Legislative History on Presumption of Liability for Oil and Gas Companies*

Legislative history discussing the rebuttable presumption provides a foundation and explanation for its application in the oil and gas context. The legislative history in states that have adopted the presumption—Pennsylvania, West Virginia, Illinois, and North Carolina—largely

[114] *Id.* at 7.
[115] *Id.* at 17.
[116] *See, e.g.*, Hall, *supra* note 8; King, *supra* note 16.
[117] Wiseman, *supra* note 16; HARVARD LAW BEST PRACTICES, *supra* note 24.
[118] Wiseman, *supra* note 16, at 88.

commends the standard. For example, the amendment to the original Pennsylvania Oil and Gas Act of 1984,[119] which evolved over a three-year period of consultation with members of both parties before it was passed in 2012,[120] set out to "improve the environmental standards for Marcellus Shale Well Drilling."[121] One such amendment expanded an unconventional well owner's presumed liability for impairing water quality from 1,000 feet to 2,500 feet of an oil or gas well, and extended the duration from 6 to 12 months.[122] In other words, this amendment expanded the distance and timeframe for which an oil and gas company may be found liable when operating an unconventional well. Several members of the committee overseeing the legislation expressed the view that the amendments, including the amended rebuttable presumption, "fall short of what is necessary to protect the public and the environment from the significant impact of deep-well drilling."[123] The bill "could have gone a little further when it comes to setbacks and protecting our water resources," but it was also the "first major overhaul" of the State's Oil and Gas Act in twenty-eight years. The law was in need of updated environmental protections.[124] The expanded rebuttable presumption was one such update, and although not perfect, reflected the state legislature's preference toward creating stronger environmental legislation by expanding the scope of the presumption.

The rebuttable presumption was first introduced in West Virginia legislature in the 1994 Act reorganizing the Division of Environmental Protection, at which point the law applied to any action for contamination of a water supply within 1,000 feet of the site of drilling for an oil or gas well.[125] A separate and stricter presumption was added for horizontal wells in December of 2011, when West Virginia legislature passed its Natural Gas Horizontal Well Control Act ("Horizontal Wells Act" or "Act"). This Act was passed in response to an executive order from Governor Earl Ray Tomblin, issued July 12, 2011, and directed the West Virginia Department of Environmental Protection (WVDEP) to issue emergency legislative rules

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[119] The original Pennsylvania Oil and Gas Act created a rebuttable presumption of liability on the well operator for all oil and gas wells where the pollution was found within 1,000 feet of a well within six months of well drilling, completion, or alteration. Oil and Gas Act, 58 PA. CONS. STAT. § 601.208 (2012).

[120] *Oil and Gas Act Amendment Report of Committee of Conference: Hearing on HB 1950*, 1984 Leg., 9th Sess. (2012) [hereinafter, HB 1950 Hearing] (statement of Sen. Joseph Scarnati) ("Our Caucus . . . has discussed Marcellus Shale over the past 36 months . . . Members from both sides of the aisle and both Chambers have sat down with me many times to raise their views and share their ideas.").

[121] *Id.*

[122] Press Release, PA Office of the Governor, Governor Corbit Signs Historic Marcellus Shale Law (Feb. 14, 2012) (on file with publication).

[123] HB 1950 Hearing, *supra* note 120 (statement of Sen. James Ferlo)("the improvements, notifications, setbacks, presumptions . . . all fall short . . . ."); *See also*, *Statement by Minority Leader, Frank Dermody,* PA H.R. Jour. 2012 Reg. Sess. No. 12 (2012) (expressing the need to continue to fight to protect the environment, because H.B 1950 was not sufficiently protective).

[124] HB 1950 Hearing (statement of Sen. John Yudichak).

[125] 1994 W. Va. Legis. Serv. 150.; W. VA. CODE § 22-6-35 (2014).

to address horizontal drilling and unconventional well development in the Marcellus Shale.[126] The WVDEP followed the executive order and in doing so adopted several provisions that the legislature had debated earlier that year.[127]

The West Virginia House and Senate formed a Joint Select Committee on the Marcellus Shale (Joint Committee), made up of five members, to study and propose the legislation.[128] In comments from the Joint Committee, the House Chairman spoke in favor of baseline testing, and stated, "[w]hile industry experts assure the Committee that the prospect of such a scenario is highly unlikely, there is frankly a lack of scientific data to confirm the existence or absence of such contamination."[129] Further, the Chairman stated that, "if no sufficient baseline testing is conducted, the owner of a water supply may conclude, rightly or wrongly, that a subsequently observed contamination of his or her water supply was attributed to the drilling or production activity."[130] This statement portrays the understanding that a rebuttable presumption is warranted in light of the possible harms to groundwater from drilling and production activities, and is based on an understanding of the importance of allocating liability accordingly.

In determining the geographic extent of the rebuttable presumption, the Chairman stated that a one-thousand foot presumption "may be sufficient for testing the integrity of a vertical well, but it is generally agreed that an expanded level of baseline testing is reasonable to confirm the integrity of a horizontal well."[131] The legislator noted that the vertical portion of the bore would represent the most likely conduit for contamination from drilling or stimulation activities because that is the portion of the well that passes through any overlying fresh water zones. Nonetheless, the Joint Committee agreed to expand the extent of statutory presumption for horizontal wells by five hundred feet, demonstrating a willingness to strengthen the presumption standard.[132] The Chairman also stated that the information collected in pre-drilling baseline testing would benefit the legislature by providing more definitive data if it decided to later revisit the issue.[133]

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[126] Exec. Order No. 4-11, W. Va. (2011), *available at* http://www.governor.wv.gov/-Documents/20110713150559476.pdf.

[127] Vison & Elkins LLP, *West Virginia*, FRACKING.VELAW.COM, (last updated March 2015), http://fracking.velaw.com/west-virginia-hydraulic-fracturing-profile/.

[128] Written Comments of Delegate Tim Manchin, House Chairman of the Joint Select Committee on Marcellus Shale to Senate Committee on Energy & Natural Resources, at 4 (W. Va. 2011), http://www.energy.senate.gov/public/index.cfm/files/serve?File_id=6bc4bf9f-5445-481c-b8c1-8a5d17ba9444.

[129] *Id.* at 9.

[130] *Id.*

[131] *Id.* at 10.

[132] *Id.* Although the Chairman states that the legislature agreed to 2,500 feet, the final distance passed in the bill was 1,500 feet, marking an initial willingness to include even broader protections.

[133] *Id.*

The State of Illinois Generally Assembly passed its Hydraulic Fracturing Regulatory Act in June of 2013.[134] Similar to the Pennsylvania Oil and Gas Act, this piece of legislature was enacted after "months if not years of bipartisan, bicameral negotiation."[135] State legislatures believed it would be seen as a "model for the nation that creates the strongest regulations."[136] After a push for a moratorium on hydraulic fracturing in Illinois did not gain enough support in the state legislature, the standards in this Act were designed to be "the most stringent, restrictive regulations possible," and were considered an alternative to the inadequate status quo.[137] The Act incorporated pre- and post-drilling groundwater testing, as well as testing "6 months, 18 months, and 30 months after the high volume horizontal hydraulic fracturing operations have been completed."[138] Representative Currie explained some of the specifics of the Act, including mechanisms for the water testing requirements and the rebuttable presumption, stating that, "if there's contamination, the onus is on the frackers to prove that they were not the reason for it."[139] The representative concluded, "[t]his is the most comprehensive, the most stringent set of fracking regulations in the country."[140]

The North Carolina legal structure came about in a different manner. Whereas Pennsylvania, West Virginia, and Illinois had always allowed hydraulic fracturing technologies and started from a place of less stringent regulation, horizontal drilling and hydraulic fracturing was illegal under the North Carolina Oil and Gas Conservation Act (OGCA), enacted in 1945.[141] In 2009, the North Carolina Geological Survey released a study of the potential shale reserves in the state, and soon after the state underwent a series of studies to evaluate whether it should revise its regulations to permit hydraulic fracturing and horizontal drilling.[142] The Governor vetoed the draft bill, entitled the "Clean Energy and Economic Security Act," but the state Senate and House overturned the veto and passed the bill legalizing hydraulic fracturing.[143] The Act set out to establish a "modern regulatory program for the management of oil and gas exploration and development," and to do so adopted rules for the regulation of pre-drilling testing.[144] In particular, the Act required that such rules, at minimum, provided for the

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[134] S.B. 1715, 98th Gen. Assemb., Reg. Sess. (Il. 2013).

[135] *Hydraulic Fracturing Regulatory Act: Hearing On S.B. 1715*, 98th Gen. Assemb., 67th Legis. at 137 (Il. 2013) (statement of Rep. Bradley).

[136] *Id.*

[137] *Id.* at 140 ("the status quo is absolutely unacceptable").

[138] 225 ILL. COMP. STAT. ANN. 99-20/c (West 2013).

[139] *Hearing on S.B. 1715*, *supra* note 135, at 156 (statement of Rep. Currie).

[140] *Id.*

[141] James L. Joyce, *North Carolina Oil and Gas Update*, 19 TEX. WESLEYAN L. REV. 413, 415 (2013).

[142] *Id.* at 416.

[143] *Id.* at 419.

[144] Clean Energy and Economic Security Act, No. 820, § 2(c), 2012 N.C. Sess. Laws 143 (2012).

"collection of baseline data, including groundwater, surface water, and air quality in areas where oil and gas exploration and development activities are proposed."[145] Although the bill did not address other important regulatory concerns,[146] the legislature in 2012 took affirmative steps to incorporate protective measures such as the rebuttable presumption.[147]

The legislative history in these four states demonstrates legislators' concerns regarding risks from oil and gas production, and highlights the value in adopting a presumption of liability in the oil and gas context. As the West Virginia House Chairman of the Joint Select Committee on Marcellus Shale stated, there is a lack of scientific data confirming whether groundwater contamination exists, and having a sufficient baseline helps to allocate liability.[148] The Chairman discussed the risk of a landowner concluding, rightly or wrongly, that the well operator caused contamination observed subsequent to drilling.[149] Requiring baseline testing alone could partly address this concern, but the legislature in Pennsylvania, as well as in West Virginia, North Carolina, and Illinois decided to go a step beyond and adopt a rebuttable presumption that would allocate liability whether or not baseline testing is completed. The presumption was included in Illinois law in its push for the most "stringent, restrictive regulations possible."[150] States that do not have such a standard arguably have fallen behind in best management practices, as further articulated in the best management practices review from Harvard Law School.[151]

Despite the benefit realized by the four states that have decided to adopt the presumption, no other state has chosen to adopt such regulations. Short of reviewing the legislative history on all state oil and gas law revisions for their rationale, common knowledge permits the conclusion that there are many political and economic obstacles to adopting a presumption of liability. The four states discussed here have overcome those obstacles in efforts to improve their oil and gas laws, but over states with unconventional fuel sources may choose not to do the same. However, the path blazed by these four states must be considered when other states revise their oil and gas laws, or in the eventual creation of a federal program.

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[145] *Id.*

[146] *See* Joyce, *supra* note 141, at 424 ("the Act leaves three major policy issues open for future study and for later resolution . . . public revenue, local government regulatory authority, and compulsory pooling.").

[147] N.C. GEN. STAT. § 113-421 (2015).

[148] Written Comments of Delegate Tim Manchin, *supra* note 128, at 4.

[149] *Id.*

[150] Hearing on S.B. 1715, supra note 135, at 139.

[151] HARVARD LAW BEST PRACTICES, *supra* note 24, at 17.

### *B. Case Law on Presumptions of Liability for Oil and Gas Companies*

Judicial opinions interpreting application of rebuttable presumption statutes in litigation involving oil and gas companies have interpreted the statutes favorably. For example, in 1987 the Commonwealth Court of Pennsylvania upheld the constitutionality of the statutory provision creating the rebuttable presumption that the well operator is responsible for pollution of any water supply within 1,000 feet of a gas or oil well.[152] The plaintiff in that case, the Pennsylvania Independent Petroleum Producers (PIPP) contended that, in a criminal enforcement proceeding, it would be impermissible to shift the burden to the well operator to prove beyond a reasonable doubt.[153] The defendant, the Commonwealth of Pennsylvania, countered that no criminal action existed in the proceeding at hand, but conceded that the presumption would not be appropriate in criminal prosecutions.[154] The court declined to declare the rebuttable presumption unconstitutional, because the alleged injury resulting from application of the presumption was "speculative and remote."[155] In 1989, the Supreme Court of Pennsylvania denied the plaintiff's petition for writ of certiorari.[156]

In *Roth v. Cabot Oil and Gas Corp*., the United States District Court for the Middle District of Pennsylvania reviewed a motion to dismiss the landowner-plaintiff's Complaint, which included negligence claims and alleged that an oil and gas company contaminated the landowner's groundwater supply. [157] In that case, a Magistrate Judge denied the company's request that Plaintiffs make a *prima facie* showing of exposure, injury, and causation before proceeding to discovery.[158] The court turned to the issue of causation, and cited the "statutory presumption" created by Section 3218 of Title 58 of the Pennsylvania Statutes and Consolidated Statutes. The court ran the facts of the case through the provisions of the presumption, stating that the plaintiffs had demonstrated that the water supply was within 1,000 feet of an oil or gas well and that the pollution occurred within six months after the drilling of the oil or gas well.[159] The court also stated that, notwithstanding the statutory presumption, the

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[152] Pa. Indep. Petroleum Producers v. Commonwealth, 529 A.2d 829.833 (Pa. Commw. Ct. 1987); Oil and Gas Act, 58 PA. CONS. STAT. § 601.208 (2012).

[153] *Id.* at 832.

[154] *Id.* at 832–33.

[155] *Id.* at 833.

[156] Pa. Indep. Petroleum Prod. v. Pa. Dep't of Envtl. Res., 109 Pa. Super. Ct. 1586 (1989).

[157] Roth v. Cabot Oil & Gas Corp., 919 F.Supp.2d 476, 482-84 (M.D. Pa. 2013).

[158] *See id.*, at 481 n.1. Such an order, called a *Lone Pine* order, was first adopted in the seminal case of Lore v. Lone Pine Corp., No. L-33606-85, 1986 WL 637507, at *1–2 (N.J. Super. Ct. Law Div. Nov. 18, 1986). Since then, *Lone Pine* orders have been issued in state and federal tribunals across the United States.

[159] *Roth*, 919 F.Supp.2d at 487; 58 PA. CONS. STAT. §3218 (2013). Note that this case concerns a conventional oil or gas well, which is why the less stringent provisions (1,000 feet and six months, as opposed to 2,500 feet and one year) of the presumption are used.

Plaintiff's allegations and "reasonable inferences drawn therefrom" were sufficient to withstand a motion to dismiss.[160] Thus, the court stated that the plaintiffs satisfied the statutory presumption, and that any further evidence to demonstrate causality was not necessary "at this preliminary stage."[161]

*Butts v. Southwestern Energy Production Co.* involves a landowner suit with facts akin to those alleged in *Roth*. In *Butts*, the defendant asserted that the plaintiffs "cannot sustain their burden of proving water contamination because they have no expert evidence regarding causation."[162] The plaintiffs in this case cited Pennsylvania Statute Section 3218, and relied on their firsthand observation that their "water turned black . . . right after" the defendant's drilling operations.[163] The defendants argued that Section 3218 only addressed whether a well operator must offer landowners replacement water and "does not set a standard for imposition of liability in private actions."[164] The District Court for the Middle District of Pennsylvania disagreed, cited their decision from a year earlier in *Roth,* and interpreted its prior decision to mean that "the plaintiffs lay, sensory observations of their water quality formed an independent and sufficient basis for establishing causation."[165] The court held that "the causal link here is actually more direct than in *Roth,* because of the immediacy in which the groundwater supply was affected."[166] Thus, the court used a similar interpretation of the rebuttable presumption in *Butts* as it did in *Roth*. In *Butts,* a lay observation sufficed to demonstrate that contamination appeared within the timeframe specified by state statute, whereas in *Roth* the court more formally applied the standards of Section 3218. This indicated that either approach was acceptable and lowered the bar for the evidence of contamination necessary to survive a motion for summary judgment.

The defendant in *Butts* asserted that, despite the statutory presumption in Title 58, expert testimony was needed to establish causality.[167] The court responded that the case the defendant cited to support this assertion was from outside the Third Circuit and was therefore distinguishable from the case at bar. [168] The court concluded that the statutory presumption "places responsibility on the well operator for pollution of a water supply under certain circumstances," and left it to the defendant to ascertain evidence sufficient to overcome this standard.[169] Without such evidence, the court

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[160] *Roth*, 919 F.Supp.2d at 487.
[161] *Id.*
[162] Butts v. Sw. Energy Prod. Co., No. 3:12 CV 1330, 2014 WL 3953155, at *5 (M.D. Pa. Aug. 12, 2014).
[163] *Id.* at *4.
[164] *Id.*
[165] *Id.* at *4–5.
[166] *Id.*
[167] *Id.*
[168] Butts, 2014 WL 3953155, at *5.
[169] *Id.* at *7.

held that "Plaintiffs have set forth sufficient facts to survive summary judgment with regard to their water contamination claim."[170]

Lastly, in *Fiorentino v. Cabot Oil and Gas Corporation*, another case similar to *Roth* and *Butts,* the same court rejected Defendant's Motion to Dismiss the Plaintiffs' negligence claim including alleged groundwater contamination, and later cited the rebuttable presumption in establishing causality in response to the Defendant's Motion for Summary Judgment.[171]

These court decisions illustrate the importance of the rebuttable presumption doctrine, which allowed plaintiffs to rely on lay testimony to establish causation in instances where their groundwater supply was contaminated and the oil and gas company had not come forth with data demonstrating that they were not the cause. Short of this doctrine, there would be limited processes with which the plaintiffs could establish the cause of the contamination when no pre-drilling testing occurred. Although no case alleging groundwater has reached final decision in state or federal court, the rebuttable presumption has been employed in pre-decision motions and memorandums, and has not received negative treatment in the courts.

### *C. Discussion*

There is no compelling reason to draw the line in determining the cause of groundwater contamination at hydraulic fracturing operations alone when an oil and gas company is responsible for additional activities throughout the entire life cycle of an oil and gas well. Therefore, when evaluating whether a state should adopt a rebuttable presumption, the state must consider risks from all oil and gas activities for which a well operator or owner may be responsible, and not just hydraulic fracturing. The judicial opinions in *Roth* and *Butts,* for example, did not focus on whether hydraulic fracturing caused groundwater contamination.[172] Instead, the court looked at whether it was reasonable to infer that any of the company's activities caused the contamination.[173] However, as discussed in the literature review in Section III.C., Keith Hall concluded in his 2014 University of Richmond Law Review article that state laws should require prescriptive baseline

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[170] *Id.*

[171] Fiorentino v. Cabot Oil & Gas Co., 750 F.Supp.2d 506, 511 (M.D. Pa. 2010); Plaintiffs' Memorandum of Law in Opposition to Defendants' Motions for Summary Judgment, Fiorentino v. Cabot Oil & Gas Co., 750 F.Supp.2d 506, 511 (M.D. Pa. 2010) (No. 3:09-cv-02284-JEJ).

[172] *See* Roth, *supra* note 157, at 36; Butts, *supra* note 162, at 38.

[173] *See e.g.*, Roth v. Cabot Oil & Gas Corp., 919 F.Supp.2d 476, 487 (M.D. Pa. 2013) ("The temporal and physical proximity of the Defendants' *actions* to the Plaintiff's harm . . . permit the reasonable inference that the Defendants were responsible for that harm.")(emphasis added).

testing, but not a rebuttable presumption, because evidence suggests "hydraulic fracturing rarely causes contamination of groundwater."[174]

Hall reached this conclusion by explaining that hydraulic fracturing fails to meet three common characteristics of rebuttable presumptions, albeit he does not cite which courts or literature make the characteristics "common."[175] Nonetheless, the stated characteristics include:

> (1) the evidence necessary to rebut a presumption is uniquely within the possession of one party, and (2) the presumed fact is almost always true when the predicate fact that triggers the presumption is true, or (3) it is essential to break an evidentiary deadlock, even if the result is arbitrary.[176]

The second factor is particularly relevant because Hall made the analysis in terms of whether hydraulic fracturing was physically responsible for the contamination instead of whether the oil and gas company was responsible.[177] The second factor means that when the predicate fact exists (e.g., that contamination of groundwater exists), the presumed fact must also be true (e.g., that hydraulic fracturing caused the contamination).[178] Hall entered into a lengthy discussion of scientific studies that found that the

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[174] Hall, *supra* note 8, at 884, 917. Instead of looking at risks from all oil and gas activities, Hall restricted his analysis to hydraulic fracturing, defined narrowly. However, the rationale for this restriction was not presented in his article. On October 28, 2015, this author met with Keith Hall to discuss his article during the American Bar Association, Section of Environment, Energy and Resources fall conference in Chicago, and continued correspondence by e-mail. In discussion, it was agreed that "hydraulic fracturing" refers to the technical definition of stimulating a well, and that the publically understood definition conflates well stimulation with the entire oil and gas production process. Given this understanding, Hall confirmed that he used the technical definition as the scope of his analysis of the rebuttable presumption. He believed this scope was appropriate, because one should look at the risks of the activity that can trigger the particular rebuttable presumption. Thus, when hydraulic fracturing triggers the presumption, he argued that it would be appropriate to only look at the risks from that process. For example, hydraulic fracturing triggers the presumption in Illinois's statute and a portion of Pennsylvania's statute. Ill. Comp. Stat. § 732/1-85(b)(1); 58 Pa. Cons. Stat. Ann., § 3218(c)(2). This is also true for West Virginia, Hall explained, because its presumption applies to horizontal wells, which generally are hydraulically fractured. In contrast, this note argues that the risks of all oil and gas activities should be evaluated in determining the appropriateness of a rebuttable presumption, irrespective of which activity triggers the presumption. Further, the presumptions in North Carolina's statute and a portion of Pennsylvania's statute are based on all oil and gas activities. N.C. Gen. Stat. § 113–421(a); 58 Pa. Cons. Stat. Ann., § 3218(c)(1). Thus, the trigger-based argument is too inconsistent and narrow to define the scope. Finally, the trigger is backward looking, and will not bind state legislatures' future evaluations of a rebuttable presumption when no such law is yet in place. E-mail from Keith Hall, Associate Professor of Law, Louisiana State University, Paul M. Herbert Law Center, to Maxine Segarnick, Law Student, University of Connecticut School of Law (Dec. 12, 2015, 03:56 EST) (on file with author).

[175] *Id.* at 883.

[176] *Id.*

[177] *Id.* at 884.

[178] *Id.*

hydraulic fracturing, technically defined, does not cause contamination, and also cites state and federal officials who have made such statements.[179]

However, the appropriate question to ask is not whether the cause is "almost always" hydraulic fracturing, but rather whether the cause is "almost always" *any* aspect of a company's oil and gas activities—be it drilling, well pressure control, well casing, wastewater handling, or surface disposal activities. This is because oil and gas companies, or their contracted third parties, are responsible for oil and gas exploration and production activities beyond hydraulic fracturing. Thus, *the risks from all activities for which an oil and gas company may be responsible* should be considered in determining whether to adopt the rebuttable presumption. The presumed fact in the second factor in Hall's analysis, therefore, should be that "oil and gas activities" caused the contamination, and not that hydraulic fracturing was the cause.

The consideration of all risks is especially important for hydraulically fractured wells, given the heightened risks to groundwater quality from increased chemicals and radioactive material in the produced water. When looking at the issue through this broader scope, it is probable that an oil and gas activity "almost always" is the cause of groundwater contamination found within the temporal and geographic scope of a rebuttable presumption statute. Thus, the second factor in Hall's analysis would result in the opposite conclusion than in his article—when the predict fact exists (e.g., that groundwater contamination exists), the presumed fact is in fact almost always true (e.g., that oil and gas activities caused the contamination found within the geographic and temporal scope of the statute). The presumption is therefore warranted when considering all risks from oil and gas activities.

Hall's conclusion was not appropriate in the oil and gas context for several additional reasons. First, if there is contamination present but the proximate cause cannot be proved due to missing or inadequate baseline data, the rebuttable presumption rightfully places the legal liability on the oil and gas company, given the difficulties plaintiffs face in such lawsuits.[180] Further, Hall argued that circumstances where the rebuttable presumption applies are rare compared to circumstances where such presumptions do not apply.[181] Even so, numerically, the circumstances in Pennsylvania law where rebuttable presumptions apply are similar in nature to oil and gas activities; for example, the state adopted presumptions of liability for pollution upon surface mining operators and owners,[182] as well as presumptions of liability relating to radioactive waste facilities,[183] release of

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[179] Hall, *supra* note 8, at 884–91.
[180] *See* Merril, *supra* note 104, at 236; Hall, *supra* note 8, at 867–72.
[181] Hall, *supra* note 8, at 881 ("The law's use of rebuttable presumptions is somewhat rate.")
[182] 58 PA. CONST. STAT. § 3218 (2013).
[183] 25 Pa. Code § 237.101 (1993).

hazardous substances,[184] and regulation of above ground and underground storage tank facilities.[185] As such, the state legislature in Pennsylvania determined that oil and gas activities are at least as dangerous as this list of industrial activities and warrant protection through a presumption of liability. Thus, the rebuttable presumption is not rare in instances of risk to the environment under Pennsylvania law. As Pennsylvania and West Virginia are the states with the second and third highest number of natural gas production wells, respectively,[186] the use of the rebuttable presumption in both states should be persuasive for other oil and gas-producing states. Finally, the state courts allowed plaintiffs to rely on the use of the rebuttable presumption to establish liability in the context of all oil and gas activities, and upheld its usage in the context of all oil and gas development.[187] Challenges to its constitutionality have failed,[188] and the standards have been amended in several states but only to be made stronger.[189] For the reasons listed above, the rebuttable presumption is appropriate in the oil and gas law context.

## V. CONCLUSION

Hall explained the distinction between hydraulic fracturing and the entire oil and gas development process: "Hydraulic fracturing is just one portion of the activities involved in drilling and completing oil and gas wells. But many media stories misuse the terms 'hydraulic fracturing' or 'fracking' to refer to virtually any part of the oil and gas exploration and production process."[190] However, he concluded that the rebuttable presumption was not a justifiable standard because hydraulic fracturing does not cause groundwater contamination. That statement cannot be used to conclude that more stringent regulations are unnecessary. In contrast, this article examined whether the rebuttable presumption is warranted in light of the entire oil and gas development process. To make that assessment, it looked at the usage of the presumption in case law and its support and criticism in legislative history. In case law, the Pennsylvania court system upheld the constitutionality of the presumption and determined that the statute created a statutory presumption that plaintiffs could use to establish causality when the oil and gas company failed to rebut the presumption. The courts endorsed its usage by applying the rebuttable presumption in cases of alleged

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[184] 35 PA. CONS. STAT. ANN. § 6020.1109 (1988).

[185] 35 PA. CONS. STAT. ANN § 6021.1311 (1989).

[186] Texas has the most natural gas production wells in the country, followed by Pennsylvania and then West Virginia. EIA ANN. REP. (2014).

[187] *See* discussion *supra* Part III.B at 35.

[188] *Id.*

[189] *See* discussion *supra* Part III.A.

[190] Hall, *supra* note 8, at 865.

groundwater contamination. Further, in the legislative history creating and amending the standards, state legislatures exhibited support for the standard as an effective means to protect public health and the environment.

The scope of this analysis is confined to state-level regulation of conventional and unconventional oil and gas development in the United States, and its impact on groundwater quality. It does not purport to address surface water impacts, nor the baseline testing requirements at the federal level. It does not address the use of a rebuttable presumption in other environmental scenarios. That said, it does assess the usage and importance of requiring a rebuttable presumption of liability in the context of oil and gas development.

Based on this analysis, it is recommended that all oil and gas producing states adopt a rebuttable presumption in addition to prescriptive baseline testing requirements. This structure would be similar to that in Illinois and North Carolina, both of which require prescriptive baseline testing and also adopt a rebuttable presumption of liability. In contrast, Hall recommended that the rebuttable presumption be used only as a sanction for companies that fail to perform baseline monitoring. However, employing the presumption as a sanction would be no different from employing it at the outset, and applying it at the outset would ensure uniform application of the standard. For example, if a plaintiff alleged groundwater contamination, but no baseline testing occurred and the presumption was only a sanction, then the company would be presumed liable. This would have the same result as applying the presumption at the outset when there was no baseline testing. Either way, the company is presumed liable. Although adopting the presumption as a sanction is preferable to not adopting a presumption, it must be required by statute at the outset in order to consistently prompt accurate testing. Employing the presumption in tangent with prescriptive standards provides a state the greatest amount of control over oil and gas activities, and affords all parties protection through reliance on a uniform testing framework.