

2013

The Political Landscape of Hydraulic Fracturing: Methods of Community Response in Central Arkansas

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Recommended Citation

Solis, Alyssa M., "The Political Landscape of Hydraulic Fracturing: Methods of Community Response in Central Arkansas" (2013).
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The Political Landscape of Hydraulic Fracturing: Methods of Community Response in Central Arkansas

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A Thesis Submitted in Partial Fulfillment

of the Requirements for the Degree of

Bachelor of Arts

Political Studies Field Group

Environmental Analysis Field Group

Pitzer College

Spring 2013

Acknowledgements

Immense gratitude to Professors Brinda Sarathy and Rachel Van Sickle-Ward for asking me really, really hard questions and helping me figure out what this is all about.

Immeasurable thanks to the community members who spoke candidly with me about their struggles and for the amazing work they continue to do.

Thanks especially to Tom Kimmons, who asked me how exactly this work would help the people in his community, a question that I continue to wrestle with.

Thank you to Jim Marchant and Katie Tewell of Pitzer College's Office of Student Affairs for generously funding transportation to and from my research site.

Thanks to my mom for being my research assistant during my fieldwork and helping me navigate Central Arkansas

This work is dedicated to my grandfather.

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Introduction

Until the 1990s, most policymakers and energy specialists assumed that the supply of natural gas would dwindle into irrelevance in the mid- 21st century.¹ No expert could have anticipated the boom in supply of natural gas at the turn of the century, a direct result of the refinement of an extraction method out of Texas known as hydraulic fracturing. Suddenly the buzz surrounding natural gas became a speculative roar. In the past decade, fracking has radically altered the energy portfolio of the United States and the priorities and national narratives about alternatives to our petroleum-based economy. The natural gas industry promotes this image of natural gas as a clean-burning alternative, a campaign that has thus far been met with eager support from Congress. But behind the media buzz, what are the real consequences of our shift towards this unconventional extraction method?

The first chapter of this work will investigate the political landscape of fracking on a federal level by assessing several key legislative exemptions that were granted to the industry by an industry-friendly Bush administration, but have gone unquestioned by the Obama administration. The atmosphere of post-9/11 United States is ripe with economic stagnation and wariness of our economic relationship with the Middle East, a region personified by its otherness and its oil. Natural gas offers more than just a cleaner-burning fuel to satisfy the demands of environmentalists to shift away from the proven harms of coal and oil combustion: it promises energy independence and job creation here at home in the United States. These promises have afforded the natural gas industry a

¹ Wiseman, Hannah. Trade Secrets, Disclosure, and Dissent in a Fracturing Energy Revolution. *Columbia Law Review*: Vol 111. Pages 1-13. 27 Jan 2011. Accessed on 30 Mar 2013. Page 3.

range of free passes from the U.S Congress for the sake of encouraging the industry to develop without the troublesome burdens of regulatory oversight. What this paper is concerned with is whether these exemptions have created an atmosphere of recklessness, of charging into the dark without being fully conscious of potential dangers, leaving irreparable damage in its wake reminiscent of our country's experiences with DDT and leaded gasoline. These fears of irreparable harm to communities have recently garnered the wrath of public scrutiny. Critical to this shift in public dialogue was the release of the documentary *Gasland*, produced by Josh Fox, which chronicles his experience with gas companies offering attractive royalty payments in exchange for drilling on his family's land in Pennsylvania, and communities all over the Western United States.² Additionally, a series of Propublica articles published in 2009 highlight the environmental degradation of communities in Pennsylvania and Ohio; the water contamination and methane explosions were recognized by their respective state governments as directly caused by faulty fracking practices.³ However, many questions related to fracking remain inconclusive or unanswered. The second chapter of this work will wade through the available literature concerning the environmental impacts of various aspects of fracking operations and the normative recommendations made by experts in the field.

With the federal government silenced in these regulatory matters, this leaves regulation largely at the discretion of state agencies. The Environmental Protection Agency (EPA) plans to release a comprehensive study in 2014 that will document the

² Fox Josh. *Gasland*. DVD. Directed by Josh Fox. New Video Group, 2010.

³ Lustgarten, Abrahm. Officials in Three States Pin Water Woes on Gas Drilling. Propublica. 26 Apr 2009. Accessed on 1 Apr 2013.

effects of fracking in areas of Colorado, North Dakota, Pennsylvania, and Texas⁴. These case studies will fill a huge gap in the literature on the unique implications of fracking on different communities. This thesis, too, employs a community-specific lens in looking at the politics of fracking: specifically, I will focus on communities in Central Arkansas, which lie directly over the Fayetteville Shale. Arkansas provides an interesting case study for the future of hydraulic fracturing because it is newer than most states to the fracking arena. There is also significantly less public attention on natural gas production in the Fayetteville shale than in the Marcellus shale underlying New York, Ohio, West Virginia, and Pennsylvania: the proverbial ground zero of fracking operations and where significant environmental issues have already been documented. Thus the third chapter of this work will deal largely with situating the state regulations unique to Arkansas, and the demographics and culture of its people within the larger fracking debate. This chapter will conclude with an overview of state regulating agencies, and an assessment of the influence of citizens versus interest groups on the processes of policy implementation.

A key part of the unique culture of Arkansas is how fracked communities fit within the larger framework of environmental justice. The strongly individualist, overwhelmingly Caucasian population that occupies these counties shares a steadfast Republican vote and an adherence to the Christian faith. They also share a significantly high population of elderly residents, demonstrate a lower median income relative to the rest of the United States, and have higher rates of poverty than the rest of the state.⁵ Many citizens share an unceasing view that the natural gas industry is the lifeblood of their

⁴ Environmental Protection Agency (EPA). Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources: Progress Report. Dec 2012. Accessed on 24 Feb 2013. Can be accessed at (<http://www.epa.gov/hfstudy/>).

⁵ Data found using Census Quickfacts. Data for Arkansas 2010 Census can be accessed at (<http://quickfacts.census.gov/qfd/states/05000.html>).

communities, either because of the jobs that it brought to this previously economically stagnant area or directly through the royalties given to individual families in exchange for the mineral rights to their land. The natural gas industry moved in swiftly after a widespread exodus of the manufacturing sector from the area, to the excitement of many residents who were weary of economic stagnancy. These communities certainly fit within the traditional framework of at-risk communities for environmental injustice. The Environmental Protection Agency is expected to release a comprehensive overview of the potential effects of fracking on drinking water in 2014. This report will include an analysis of environmental justice in the communities under study, but it also states that the study will not specifically examine “whether co-location of specific activities and communities with certain demographics (low-income, minority, children, and elderly subpopulations) may lead to any positive or negative impacts on a given community.”⁶

The EPA will not attempt to establish a direct correlation between fracking and the health of communities as it is outside the scope of their research. Those same limitations, along with lack of both the funds and the time to venture on such a monumental endeavor, apply to the research at hand. This was an unfortunate realization, given that my interest was initially sparked by my grandfather’s multiple battles with cancer during the last few months of his life. I had noticed during one of my visits to Arkansas that signs for boil orders covered public spaces, a phenomenon that has become a regular occurrence in the area. Arkansas was a place in my youth where I, a lifelong city-dweller who was taught to fear tap water, had originally discovered nature. It was a place where as a kid I watched my grandfather drink straight from the tap before yelling in shock “you can’t drink that!”, where I learned that nature is nothing to fear.

⁶ EPA *Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water*, page 22.

When I asked my grandfather about the boil orders, he didn't know what they were about. When I asked my grandfather about his cancer, he said "seems like everybody around here has cancer". When I asked him about fracking, he knew that the industry brought much-needed jobs to his community. It was only after embarking on this research that these many little fragments of conversation became interwoven with one another, and inseparable in their implications.

I don't have the expertise or resources to establish a causal relationship between the chemicals running through the pipes beneath my grandfather's land and the rapid proliferation of tumors in his hip, his lungs, and his brain: a swift onset mirroring the proliferation of industrial fracking operations near his quiet rural home in Clinton, Arkansas. In the absence of trying to connect fracking with effects on public health and communities, I will instead seek to frame my previous research questions with another: how do the unique characteristics of Central Arkansas residents contribute to how these communities respond to uncertainties of fracking, and how does their struggle as an economically depressed community relate to larger questions of environmental justice?

What I learned from the conversations between me and my grandfather is the human element of this issue, an element that is missing from the growing volume of data on fracking in the past decade, stories that humanize the people living the "what-ifs" speculated by experts in the literature and modeled by computers for the EPA. This research will document the various ways that fracking operations are interwoven in communities through in-depth interviews with key players in the natural gas world and residents who face the reality of their decision-making in Central Arkansas. Their stories will constitute the bulk of the fourth chapter, which will be an ethnographic profile of

various community members and their experiences with the fracking industry, and how this industry has factors into their everyday lives.

What I hope to decipher in talking with community members is to investigate the following thesis: How does the unique sociopolitical culture of Central Arkansas shape community mobilization in favor of more stringent anti-fracking regulations? This question will naturally be informed by the narratives about the culture, history, and economics of the region. Within the larger landscape, we can establish where residents of this particular area fall in the political spectrum of the fracking debate between state-wide moratorium and pushing for more lenient regulations to further incentivize gas production. Ascertaining the relationship between industry, local governments, and residents is essential for establishing the lens and avenues through which communities are mobilizing. These players shape the arena of policymaking, an arena that often only allows a select few into the ring. Within the political arena of Arkansas, how extensively do those in power shape the debate?

Arkansans are by no means mobilizing en masse against the rapid proliferation of fracking operations. However, there are pockets of discontent, pockets where people are angry for what is happening to their land and their communities and feel that they outweigh the benefits that accompany it. It is these cases that I seek to tease out, to document the myriad ways people choose to engage with the state actors and industries that they perceive as threatening their way of life, and to determine how their experiences can inform the actions of others facing similar battles.

Fracking: Historical and Legislative Precedent

The natural gas boom in the past decade seemed like a rare win-win for both environmentalists and the energy industry. Natural gas burns half as much carbon dioxide and fewer pollutants during the combustion process than coal or oil, and subsequently results in less air pollution and an overall reduction in greenhouse gas emissions during use. This booming market for natural gas created momentum in a stagnant domestic economy and continues to bring high-paying jobs to communities. The industry builds an entire energy enterprise based in the United States, and reduces dependence on foreign supplies of petroleum. Eighty-four percent of current U.S consumption of natural gas is produced within the United States and 97% originates on the North American continent.⁷ The continental U.S produces between 1.8 and 2.8 trillion cubic feet of natural gas per year, and is projected to increase by another 2.8 trillion feet by the year 2035. President Barack Obama’s administration has identified natural gas as a key component of his “All-Of-The-Above” strategy for an energy independent future in the United States.⁸

⁷ Ground Water Protection Council (GWPC). Modern Shale Gas Development in the United States: a Primer. April 2009. Page 5

⁸ The White House. Blueprint for a Secure Energy Future. 30 Mar 2011. Accessed 7 Mar 2013. Can be accessed at (http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf). Page 9.

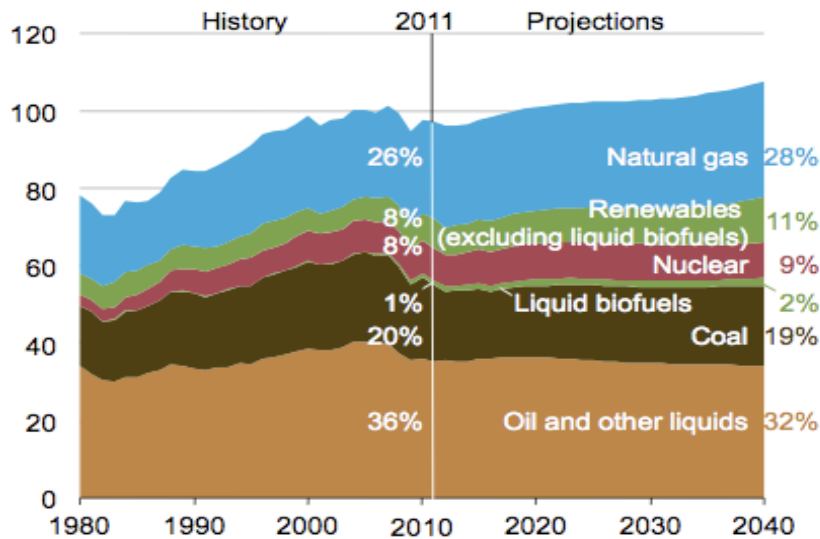


Figure 1. Energy portfolio of the United States including estimates for natural gas and other sources of energy until 2040 (in quadrillion British thermal units).^{9,10}

Per the data shown in Figure 2, this increase is in large part due to the exploitation of previously untouchable stores of natural gas in shale rock formations, which are described as having the consistency of cement slabs and were considered too costly to develop with available technology.¹¹ These stores became economically viable through an increase in the price of natural gas, which doubled from prices in the 1990s, and the proliferation of two cost-effective methods of extraction known as hydraulic fracturing and horizontal drilling. These two methods were used experimentally in the 1940s, but were previously only employed on existing wells where returns on natural gas were no longer cost-effective from using traditional methods. Hydraulic fracturing, more commonly known as “fracking”, is a process that involves the injection of a highly pressurized mix of water, chemicals, and proppants through a cement casing

⁹ Energy Information Administration (EIA). Annual Energy Outlook 2012. U.S. Energy Information Administration. June 2012. Page 2.

¹⁰ 1 Btu is the energy needed to heat one pound of water by one degree Fahrenheit.

¹¹ EIA Page 8

underground. The force of the injection breaks up underground shale rock formations containing small stores of natural gas, thus more easily breaking up small pockets of gas that are trapped in the pores of the shale “like bubbles in fossilized soda”.¹²

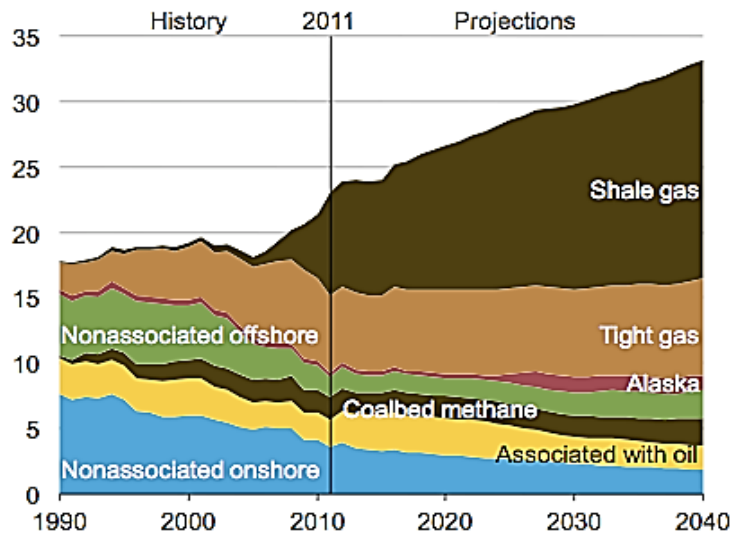


Figure 2. A projected significant increase in natural gas from shale rock formations over the next thirty years (in trillions of cubic feet).¹³

Approximately 90% of this fracking fluid is composed of water, and a fully operational shale gas production uses an average of 3 million gallons of water in its production lifetime.¹⁴ Approximately 9.5% of fracking fluid is the proppant, which is defined as fine silica and other large particles that are injected into fractures to “prop” them open and facilitate in the continuous release of natural gas from deep within shale stores.¹⁵ The remaining 0.5% includes a mix of chemicals that are deemed proprietary secrets to the industry, and thus the components are not definitive for any one well pad or

¹² Schmidt, Charles W. “Blind Rush?: Shale Gas Boom Proceeds amid Human Health Questions.” *Environmental Health Questions*: 119(8). Aug 2011. Page A349.

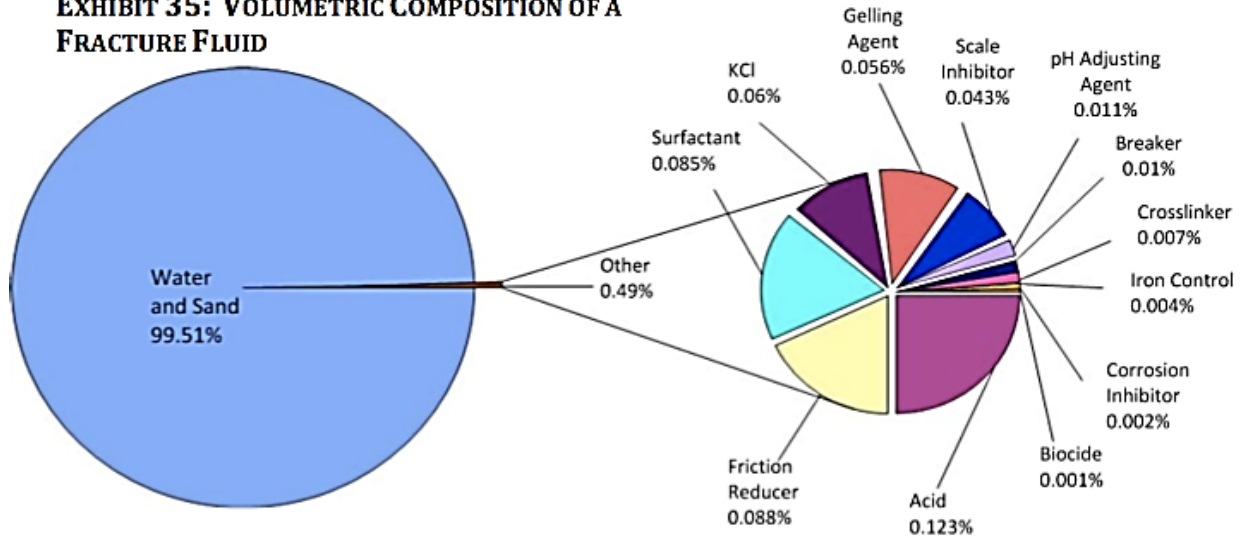
¹³ EIA Outlook, page 2

¹⁴ GWPC, page 64.

¹⁵ Nicholson, Barclay; and Blanson, Kadian. *Tracking Fracking Case Law: Hydraulic Fracturing Litigation*. *Natural Resources & Environment*:26(25). Fall 2011. Accessed on 4 Mar 2013.

company. Without knowing the exact chemicals are used for each purpose, the makeup generally follows the formula given in Figure 3.

EXHIBIT 35: VOLUMETRIC COMPOSITION OF A FRACTURE FLUID



Source: ALL Consulting based on data from a fracture operation in the Fayetteville Shale, 2008

Figure 3. Adapted from data by ALL Consulting. The various components of fracking fluid, a chemical substance that eludes most federal regulatory legislation.

These chemical modifiers alter the properties of the fluid, including pH and viscosity, to optimize the performance of the drill head and the proppants during the initial break-up of shale. While these chemicals make up such a small component of the total fracking fluid volume, when used in scales of millions of gallons, these trace amounts become significantly more concerning at a volume of approximately 1,500 gallons per well.¹⁶

To assess how the dispersion of these chemicals is regulated, we first look at issues of disclosure. No federal policy requires companies to disclose the recipe for their fracking fluid, and a multitude of state approaches have emerged to address, or not address, the issue. From there, the continued absence of federal oversight will be analyzed through the lens of the neutralization of the federal regulatory authority

¹⁶ GWPC, page 15.

embedded in several key assets in the environmentalist toolkit: the Safe Drinking Water Act, the Clean Water Act, the Clean Air Act, and the Resource Conservation and Recovery Act. In assessing the loopholes in the federal legislation, we are able to understand the landscape in which state regulatory agencies operate. The patchwork approach that has developed in response to a lack of federal authority lends itself to confusion on the ground and inconsistent applications of policies that depend widely on the politics of each state. I contend that fracking is not a state issue, and as such requires federal oversight to appropriate the consistent application of regulations necessary to guarantee the safety of the communities that fracking companies operate in.

Proprietary Secrets and Nondisclosure

Regulators and community members are often not privy to the components of the fracking fluid applied underground in their communities, leaving little room for causal linkages between fracking operations and contamination. The industry argues that the ingredients and volume of the chemical modifiers in their fracking fluid constitute a sacred recipe that would lose its economic edge were it fully released to the public, like the ingredients of Coca Cola. They subsequently argue that these recipes warrant proprietary secret status, also like Coca Cola. This reasoning has led to exemptions from federal regulations in the Emergency Planning and Community Right to Know Act (EPCRA).¹⁷ State laws generally agree with the industry on the reasoning for maintaining secrecy, with fifteen of the twenty-nine total states that have documented fracking

¹⁷ Emergency Planning and Community Right-to-Know Act of 1986 § 313(b), 42 U.S.C. § 11023(b); 40 C.F.R. § 372.23 2010.

activities requiring no disclosure of chemicals whatsoever.¹⁸ However, questions concerning the balance between protecting innovation and the potentially adverse effects of these chemical cocktails have recently become a hot button issue in the fracking debate.

Debate on the federal level concerning disclosure came to a head in 2011 when the House of Representatives Committee on Energy and Commerce investigation established a list of the chemicals using information voluntarily provided by fourteen oil and gas companies that employ hydraulic fracturing methods. The chemical seen most frequently in the industry's compounds was methanol, a hazardous air pollutant, while other notorious carcinogens such as benzene and lead also made the list. Overall, the various compounds disclosed used twenty-nine hazardous chemicals, including possible or known carcinogens or hazardous air pollutants. This list of components included 750 chemicals for a total of over 780 million gallons of fracking fluids between 2005-2009.¹⁹ The following chart was reproduced from data in the Congressional report, with the addition of chemical summary information provided by PubChem Substance of the most frequently used chemicals in fracking fluids as disclosed by major natural gas companies.²⁰

¹⁸ McFeeley, Matthew. State Hydraulic Fracturing Disclosure Rules and Enforcement: A Comparison. NRDC Issue Brief. Jul 2012. Page 8.

¹⁹ House of Representatives Committee on Energy and Commerce. Chemicals Used in Hydraulic Fracturing. April 2011. Available at <http://democrats.energycommerce.house.gov/index.php?q=news/committee-democrats-release-new-report-detailing-hydraulic-fracturing-products>). Page 5.

²⁰ Ibid 6, with the addition of chemical summary information provided by PubChem Substance. Available at (<http://www.ncbi.nlm.nih.gov/pcsubstance>).

Chemical Components Appearing Most Often in Hydraulic Fracturing Products Used Between 2005 and 2009		
Chemical Component	Description	# of products containing chemical
Methanol (Methyl alcohol)	Volatile, flammable, consumption may cause blindness	342
Isopropanol (Isopropyl alcohol, Propan-2-ol)	Common antiseptic	274
Crystalline silica – quartz (SiO ₂)	Sand (proppant)	207
Ethylene glycol monobutyl ether (2-butoxyethanol)	Nonvolatile, acts as a surfactant, categorized as a hazardous pollutant in California	126
Ethylene glycol (1,2- ethanediol)	Nonvolatile, used for automotive antifreeze	119
Hydrotreated light petroleum distillates	Ingestion causes vomiting, classified as harmful to aquatic organisms.	89
Sodium hydroxide (Caustic soda)	Corrosive, inhalation burns lung tissue, burns eyes and skin	80

Figure 4. A picture of fracking fluid's most prevalent components and some potential effects on humans and environment.

These chemicals, along with other less-concerning additives like instant coffee and gelatin, facilitate in the breaking up underground shale rock by lubricating well-heads and weakening the underground rock formations. Various industry responses suggest that because the chemicals in Figure 4 are found in everyday products that people come into contact with every day that they do not pose a potential health risk. In a table presented in *Modern Shale Gas Development in the United States: A Primer*, the Ground Water Protection Council includes an additional column on their chemical table that informs the reader that Ethylene glycol is basically automotive antifreeze, and that

isopropanol is nothing more than a glass cleaner or hair coloring agent.²¹ While this section is intended to calm the readers' fears about these scary-sounding additives, that the prevalence of these chemicals in our daily lives does not necessarily make them safe, especially should they appear in drinking water sources.

These chemicals are not exactly replicated in every shale site, as the unique geology of each shale deposit requires a fracking cocktail specific to that region. However, each site generally follows the breakdown of chemical requirements seen in Figure 3. Where the true differentiation occurs is within the different state regulations that govern whether or not residents of fracked communities are granted the knowledge of what is pumped underneath their land. The Natural Resource Defense Council (NRDC) published a report comparing state regulations that specifically pertain to the disclosure of fracking components. Eschewing an analysis of the normative findings of the report, it provides an excellent and succinct comparison of different state approaches to disclosure policies.

There are a few varying levels of disclosure that states can mandate. The basic policy that a state can enact is the requirement of the public disclosure of the universal Chemical Abstract Service (CAS) numbers for all additives used in the process, so that residents can easily compare these numbers to the American Chemical Society database for a complete understanding of the potential hazards of each. Of the twenty-nine states that have confirmed fracking activity, only seven states require the disclosure of CAS numbers for all additives.²² Among these few states, many allow for trade-secret exemptions to disclosure. An additional disclosure requirement would include both the

²¹ Ibid 63.

²² McFeeley, page 10

CAS numbers and their accompanying concentrations in the fracking formula; only Montana and Wyoming inconsistently require the disclosure of concentrations in addition to CAS numbers. An additional level of disclosure would allow for public access to pre-fracturing chemical disclosures for planned fracking sites, allowing citizens a window of time to make judgments about the projects planned in their communities before they actually commence, take baselines tests of water quality, and potentially organize to communicate their opinions with permitting authorities. Only five of the twenty-nine states with fracking have some form of disclosure prior to development, with most of these disclosure policies requiring the disclosure of a general list of proposed chemicals. Only Montana requires that operators disclose a full list of proposed chemicals in their permitting process.²³

When public health demands and the protection of trade secrets collide, a startling policy disconnect emerges where physicians are granted knowledge of proprietary trade secrets but are required to sign legally-binding confidentiality agreements so that they do not disclose the specific chemical information to their patients. These provisions raise ethical implications, as "the limits of what a medical professional can and cannot disclose are not clearly delineated, medical professionals may be prevented from sharing information because of fears that doing so could subject them to a lawsuit."²⁴

Hannah Wiseman, a professor of law at the University of Tulsa, argues in her paper *Trade Secrets, Disclosure, and Dissent in a Fracturing Energy Revolution* that the nature of fracking fluid warrants some protection for their trade secrets, but that there are scenarios where the interest of public health takes precedence over the need to ensure.

²³ Ibid 8.

²⁴ Ibid 13.

Wiseman suggests a middle-ground, where companies must disclose all of their ingredients but do not need to disclose the volume of each chemical used or the methods of mixing these chemicals that could create different reactions and different effectiveness. This would still ensure that economic incentives continue to exist and motivate innovation, while allowing public health officials some sort of resource to comparatively measure the health of communities with the proliferation of fracking operations.²⁵

The U.S currently plays the role of the proverbial canary in a coal mine for other countries who are considering widespread application of this method. Germany, Hungary, Romania, and Poland are participating in discussions with the U.S regarding the application of hydraulic fracturing to tap into their shale gas reserves. The U.S recently entered into an agreement with China, titled the U.S-China Shale Gas Resource Initiative, to facilitate international economic development of the method, guaranteeing a prevalent application of U.S fracking methods in the international arena.²⁶ The United States is thus at the forefront of refining an environmental and economic experiment, the unique processes of which fall under the jurisdiction of a lengthy list of both federal and state legislation. However, the following sections will demonstrate that the interests of the national energy agenda have directly resulted in this method of gas extraction receiving special exempt status from key national oversight jurisdiction.

²⁵ Wiseman, page 11.

²⁶ Rahm, Dianne. Regulating Hydraulic Fracturing in Shale Plays: The Case of Texas. *Energy Policy*:39. 2011. Pages 2974-2981.

The Safe Drinking Water Act

In 2005 Congress passed the National Energy Policy Act, a bill signed by the Bush administration as a way to incentivize energy production in the United States. Along with provisions to guarantee loans for innovative energy technologies and tax reductions for various industries, it also contained an inconspicuous clause with recommended language from Dick Cheney's Energy Task Force. This task force included Cheney's contacts at Halliburton along with other industry representatives, and the relative obscurity of this clause from public scrutiny has resulted in this provision being contemptuously deemed by environmentalists as "the Halliburton loophole".

This loophole amended Section 1421(d) of the Safe Drinking Water Act, which previously allowed the Environmental Protection Agency to intervene in fracking operations if "such requirements are essential to assure that underground sources of drinking water will not be endangered by such injection", and gave a wide-reaching exemption to fracking operators in the interest of facilitating domestic energy production. The amendment accomplishes this by specifically redefining the term 'underground injection' to exclude hydraulic fracturing from the federal regulations of the EPA's Underground Injection Control Programs under this comprehensive legislation.²⁷ If fracking were required to adhere to mandatory provisions of the UIC program, it would be significantly less cost-effective because each individual well-pad would be subject to federally mandated scrutiny due to the nature of fracking operations, which unambiguously require the "subsurface emplacement of fluids by well injection" as defined in Section 1421(d) of this Act, shown below.

²⁷ Safe Drinking Water Act. Section 1421 (b)(2). Full text available at (<http://water.epa.gov/lawsregs/rulesregs/sdwa/index.cfm>).

(d) “Underground injection” defined; underground injection endangerment of drinking water sources

For purposes of this part:

(1) Underground injection.— The term “underground injection”—

(A) means the subsurface emplacement of fluids by well injection; and

(B) excludes—

(i) the underground injection of natural gas for purposes of storage; and

(ii) 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.²⁸

In looking at the formal definition below and its amendment, it is clear that hydraulic fracturing operations fall squarely within the original definition of underground injection and thus the jurisdiction of the Safe Drinking Water Act. Its exclusion from federal oversight is not based on the nature of its practices, but rather is a blatant manifestation of political in the interest of facilitating the increased expansion of this industry to promote the national energy policy agenda.

Congress has recently begun examining the ramifications of this loophole more closely in response to a report conducted by the EPA that was the first to definitively link fracking operations and well contamination. An investigative report by the House Committee on Commerce and Energy confirmed that companies continue using diesel in their injection wells despite the specific exclusion of diesel fuels from fracking fluids as cited previously in the Safe Drinking Water Act. An EPA statement was issued stating that using diesel fuel in underground injection operations “posed the greatest threat” to

²⁸ Ibid (d)(1)

underground drinking water sources²⁹, and yet the report found that more than 30 million gallons of fracking fluids were injected with varying amounts of diesel fuel between the years 2005-2009.³⁰ Diesel is particularly worrisome because of the large benzene additives in most mixtures, but all of the notoriously persistent BTEX toxins (benzene, toluene, ethylbenzene, and xylene) made an appearance in the Congressional report. The Environmental Working Group published a report that concluded that state agencies generally do not enforce referring wells to federal regulation, even if these wells have been proven to use diesel as their additives, in blatant disregard of the SDWA amendment defined above which explicitly states that wells employing diesel fuel necessarily require federal oversight. Their report also mentions that the petroleum distillates employed in fracking operations contain more toxic additives than diesel, but are currently exempt from regulation because these chemically similar siblings of diesel are not pure diesel and are thus exempt from Safe Drinking Water Act.³¹

The same congressional report found that the use of 2-butoxyethanol was the fourth most widely-used chemical in fracking fluids, a chemical that is easily absorbed in the human body and causes the destruction of red blood cells when consumed in water at proportions of parts per million. Traces of 2-butoxyethanol were found in EPA samples from a study of drinking water wells in Wyoming that were in close proximity to hydraulic fracturing operations.³² Fracking operations in the state of Arkansas reported

²⁹ Environmental Protection Agency (EPA). Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs . June 2004. (EPA 816-R-04-003). Section 4-11.

³⁰ Committee on Energy and Commerce, page 10

³¹ Environmental Working Group. *Drilling Around the Law*.

³² Environmental Protection Agency (EPA). Fact Sheet: January 2010; Sampling Results and Site Update, Pavillion, Wyoming Groundwater Investigation. Aug 2010. Accessed on 24 Feb 2013. Can be accessed at (www.epa.gov/region8/superfund/wy/pavillion/PavillionWyomingFactSheet.pdf).

using 348,959 gallons of the chemical in fracking fluids between 2005-2009.³³ More troubling than the disclosed chemicals in this report is the many instances in which the companies couldn't provide information on all of the chemicals used in their fracking formulas because they stated that they were unsure of the exact components of their fracking formulas.³⁴

Following this amendment, Sections 1422 and 1425 of the Safe Drinking Water Act allows the EPA to delegate control of Underground Injection Control Programs to state regulatory agencies if they provide "minimum requirements for effective programs to prevent underground injection which endangers drinking water sources."³⁵ What has resulted from this legislation is an inconsistent patchwork of state regulations that meet "minimum" requirements rather than consistent federal guidelines.

The Clean Water Act

The Safe Drinking Water Act only applies to underground drinking water sources, but fracking also affects surface waters due to the flowback that fracking operations create. Flowback, or produced waters, refers to the water that after being injected underground forcefully returns to the surface due to the upward pressure of natural gas being released from the broken-up shale formations. The amount of flowback retrieved from any well is estimated to be between 30-70% of the original volume of fracking

³³ Ibid 7

³⁴ Ibid 2

³⁵ Tiemann, Mar. Vann, Adam. "Hydraulic Fracturing and Safe Drinking Water Act Regulatory Issues." Congressional Research Service. 2013. Pages 8-9.

fluid, which could be anywhere from 216,000 gallons to 2.7 million galls per well.³⁶ The produced water that does not return to the surface is left deep in underground pathways, and industry representatives maintain that the same geological layers that had kept gas locked up underground are more than sufficient to ensure that these chemicals will also be locked in these formations. These layers act as seals that prevent the leftover fracking fluid from migrating upwards into aquifers or drinking water wells.³⁷

Because of the chemical additives that remain in produced waters, this flowback falls under the regulatory jurisdiction of the Clean Water Act. Regulation is often delegated to state programs. The authority thus far on the science of flowback and its associated risks has been the groundbreaking work done by the New York State Department of Environmental Conservation (NYSDEC), which is in the process of finalizing an extensive statewide Generic Environmental Impact Statement that provides an unprecedented look into fracking operations in the New York state portion of the Marcellus Shale. The NYSDEC report indicates that fracking operators are pushing to recycle as much of their fracking fluid as possible on-site to reuse at other well sites and thus reduce the total volume of waste caused by this process.³⁸ However, 100% recycling of flowback water is not possible because of the trace elements that the water picks up from shale on its way back to the surface. The current industry standard uses between 10-20% of recycled water per operation.³⁹ In the Susquehanna River Basin, for example, an

³⁶ New York State Department of Environmental Conservation (NYSDEC). Revised Draft SGEIS on the Oil, Gas and Solution Mining Regulatory Program: Well Permit Issuance for Horizontal and High-Volume Hydraulic Fracturing in the Marcellus Shale and Other Low-Permeability Gas Reservoirs. 2011. Can be accessed at (<http://www.dec.ny.gov/energy/75370.html>). Section 5-99.

³⁷ GWPC, page 67.

³⁸ NYSDEC, page 5-118

³⁹ Ibid 6-10

average of 3.84 million gallons of freshwater and 0.43 million gallons of processed flowback water from other wells was used per well.

Other methods of flowback disposal include injecting the wastewater into deep underground wells regulated by Federal Underground Injection Control programs, or using municipal sewage treatment facilities to repurpose the fluid by first chemically separating the oil, grease, and other suspended solids from the flowback. Oftentimes, “repurposing” means spreading the treated fluid on roads for dust control and de-icing because the treated fluid exhibits high salinity levels.⁴⁰ The tertiary water treatment that these fluids undergo theoretically ensures that the fluid is no longer toxic but the risk of increasing the conductivity of soils and water sources persists. No research was found to have analyzed the effects of road spreading fracking wastewater on peripheral soils and waterways.

The Clean Air Act

In a mandated response to a lawsuit initiated by the environmental advocacy group WildEarth Guardians, the EPA issued new federal regulations on emissions from fracking operations under the Clean Air Act. Announced in April of 2012, these regulations constitute the first federal air standards for fracking wells. The EPA anticipates these rules will eliminate the emission of 95% of the currently emitted volatile organic compounds using “green completions”, which are modified well covers that capture gas that in conventional fracking wells escape freely into the atmosphere. The green completions include technology to separate gas and liquid hydrocarbons from

⁴⁰ Ibid 5-22

flowback; the separate final products can then be sold to offset the cost of compliance for an estimated value of \$11-19 million.⁴¹ The announcement of new regulations was met with resistance from industry groups such as the Marcellus Shale Coalition, a group of gas drillers, which contended that the issue would undermine national gas production.⁴²

However, dissatisfaction with the new regulations came from both sides. Many fracking operations continue to be exempt from regulations in the Clean Air Act because of the relatively low emissions from each individual well site. The Clean Air Act addresses sources of air pollution over ten tons per year, well over the amount from each well but substantially lower than the collective emissions of a company's total operations in an area. In a study conducted by the Pennsylvania Department of Environmental Protection, estimated levels of emissions for nitrogen oxides and volatile organic compounds were found to be well over the 10-ton threshold established by the EPA.⁴³

Some state governments have specifically expressed concern with the lack of explicit rules for methane emissions in the revamped provisions. The Attorney Generals of seven Northeastern states- Connecticut, Delaware, Maryland, Massachusetts, New York, Rhode Island, and Vermont- charge the EPA with failing to set standards for curbing emissions of this notorious greenhouse gas. Their letter of intent to sue alleges that the EPA is violating the Clean Air Act by choosing to not enforce Clean Air Act

⁴¹ Environmental Protection Agency (EPA 2013). Overview of Final Amendments to Air Regulations for the Oil and Natural Gas Industry: Fact Sheet. Accessed on 11 Mar 2013. Can be accessed at (<http://www.epa.gov/airquality/oilandgas/pdfs/20120417fs.pdf>).

⁴² Marcellus Shale Coalition (MSC). MSC Statement on Proposed EPA Air Regulations. July 28, 2011. Available at (<http://marcelluscoalition.org/2011/07/msc-statement-on-proposed-epa-air-regulations/>).

⁴³ Weinhold, Bob. The Future of Fracking: New Rules Target Air Emissions for Cleaner Natural Gas Production. *Environmental Health Perspectives*:120(7). July 2012. Pages a272-a279.

standards for this dangerous greenhouse gas, an inaction that has direct effects on the health of American citizens.⁴⁴

Resource Conservation and Recovery Act

In 1980 the Resource Conservation and Recovery Act (RCRA) was amended to temporarily exempt any fluids that were produced as the result of natural gas exploration and development from federal regulation.⁴⁵ This amendment predated fracking technologies and thus was not intended to include the operations that fracking uniquely necessitates compared to other natural gas extraction methods: namely, the vast amount of produced waters that are generated in the fracking process. The provision was initially intended to be temporary, pending an analysis from the EPA about whether or not natural gas drilling created an undue amount of toxic waste. The EPA formally determined that a national regulatory program was not warranted, based on data from the coalbed methane report published in 2004, which the EPA later acknowledged was not inclusive of methods unique to hydraulic fracturing practices.⁴⁶ The scientific foundations of this amendment are outdated in regards to hydraulic fracturing practices, and the law in this regard should delineate between fracking methods and traditional methods. With how the law is currently written however, these two practices are lumped together and granted a wide-reaching exemption from federal regulation.

⁴⁴ Clean Air Act Notice of Intent To Sue. As cited in: Johnson, Jeff. States to Sue Over Fracking Standards. Chemical and Engineering News: 90(51): 25. Dec 17, 2012. Can be accessed at (<http://cen.acs.org.ccl.idm.oclc.org/articles/90/i51/States-Sue-Over-Fracking-Standards.html>).

⁴⁵ GWPC, page 37

⁴⁶ EPA 2004.

The RCRA exemption was never considered a viable front in efforts to reform federal regulations pertinent to fracking. However, recent changes in exemption qualifications have resulted in unintended consequences for fracking regulation. The EPA tightened the cap on allowable benzene spills, and because benzene is prevalent in fuels and fracking additives this new change has resulted in far-reaching effects on fracking regulations.⁴⁷ Any soil samples deemed to have a concentration of benzene over a total allowable limit would be treated as RCRA hazardous waste, drastically increasing the cost of fracking operations due to the highly regulated process of disposing this waste. This change in benzene regulations has directly resulted in shutting down at least one project in Syracuse, New York.⁴⁸ Nevertheless, the RCRA regulations have yet to be employed on a consistent or widespread basis and thus constitute yet another piece of well-meaning legislation intended to safeguard the environment from harmful toxins, but in its under-applied state leaves egregious concessions to the oil and gas industry.

The call for federal regulation

The beginning of federal governmental response to concerns over potential environmental effects began in August of 2002, when the EPA responded to citizen reports of water well contamination from hydraulic fracturing operations by doing an investigative study on fracking in relation to its application in coalbed methane (CBM) production. The report found that CBM wells that were hydraulically fractured posed

⁴⁷ Gibson, Michael M. Young, David P. Oil and Gas Exemptions under RCRA and CERCLA : Are They Still "Safe Havens" Eleven Years Later? South Texas Law Review: 32(2). May 1991. Pages 362-398. Page 392.

⁴⁸ Ibid 393.

little to no threat to public health and thus did not require additional study or regulation. In 2010 at the request of Congress, the EPA was called on to reevaluate the process and to specifically address the relationship between fracking and horizontal well drilling on drinking water resources. The report, which will be released in 2014 for peer-review, intends to answer key questions in a scholarly landscape that lacks a scientific consensus.

Congress recently attempted to pass legislation specifically aimed at increasing federal authority over fracking entitled the Fracturing Responsibility and Awareness of Chemicals Act (FRAC Act). The bill presented to the 112th Congress contained two simple provisions: it would eliminate the Halliburton Loophole, and it would require the disclosure of fracking fluid components at each well and tasked the EPA to gather this data and make it publicly available.⁴⁹ The Democratic Senators and Representatives who proposed the bill argued that it would fill a much-needed void in the existing regulatory framework for oversight of the process. Industry representatives argue that the bill counters the interest of the nation's energy goals by adding an additional \$100,000 to the cost of each new well pad, and is unnecessary given that fracking has been "regulated assiduously by the states for more than 50 years".⁵⁰ As of this writing, the FRAC Act did not garner enough popular support to warrant the survive committee before given the chance for debate and discourse during the 112th Congress. Despite being presented in the Senate Environment and Public Works Committee, chaired by left-leaning Democrat Barbara Boxer and with a simple Democrat majority, the bill failed to pass.

The politics behind the failure of this bill are unclear. While there seems to be much scrutiny on the issue of hydraulic fracturing, this spotlight did not lend itself in this

⁴⁹ Tiemann, page 23.

⁵⁰ Lustgarten 2009.

case to the publicly-fueled momentum needed to overcome Congressional bureaucracy. This could be attributed to the general sentiment of the debate surrounding fracking, which as of now is riddled with uncertainty. Pending the EPA investigation, communities have few accessible and authoritative sources to which they can draw on to support claims of environmental harm definitively tied to fracking.

In conversations with residents of Central Arkansas, the focus of the research at hand, many residents expressed alarm at how easily their concerns were dismissed by industry representatives as “myths”. This rhetoric was especially prevalent during the swarm of earthquakes that hit these communities in 2010. Community members looking for aid or support from the industry or representatives were told that they were perpetuating “myths”, when instead they should be supporting the “blessing” of economic prosperity at the hands of the industry. The next chapter will evaluate the basis of these myths to evaluate their standing against the blessings.

Myths and Blessings: a scholarly assessment of the natural gas landscape

The past five years have witnessed an explosion of literature concerning the environmental effects of fracking, with much of it challenging the politicized image of natural gas as an environmentally desirous “bridge fuel” on the road towards renewable energy sources. In opening his analysis of the prevalent literature on fracking, Dennis Stickley aptly alludes to an Indian fable where six blindfolded wise men were tasked to describe what an elephant looks like to their King. With their blindfolds on, each feels a different part of the elephant and describes this part as a representation of the whole elephant. One describes the elephant as being a long, rope-like animal with a tuft of hair while holding the creature’s tail. One describes the elephant as being a thick, sturdy pillar while feeling its leg. This fable appropriately encompasses how subjectivity and a narrow focus prevent all of the blind men from seeing the whole picture. This allusion is entirely relevant to the issues of fracking, which necessarily require an evaluation of their potential environmental, political, and social ramifications.⁵¹

Existing data on fracking can be roughly broken up into fracking and greenhouse gas emissions, the effects of fracking operations on aquifers and surface waters, the potential and demonstrated dangers of fracking waste, and the correlation between fracking and increased seismic activity. A recurring point raised in these works is the question of balancing the economic benefits that fracking brings to economically

⁵¹ Stickley, Dennis. Expanding Best Practice: the Conundrum of Hydraulic Fracturing. *Wyoming Law Review*: 12(2). 2012.

depressed communities, and whether the federal government or state governments should be vested with the responsibility of mitigating risks of potentially irreversible environmental degradation.

Fracking and Greenhouse Gas Emissions

Many researchers are challenging the claim that fracking is the wonder-child of clean-burning environmental desires and cost-effective economic fuel development. There is no question that natural gas burns fewer pollutants and carbon dioxide in use, however, critics contend that natural gas loses its clean-burning edge when emissions during production are factored in. With natural gas, an especially contentious issue is the release of methane, a greenhouse gas more potent than carbon dioxide and equally vilified in climate-change discourse. Methane is found in deep underground stores in addition to natural gas deposits, and can manifest in high concentrations in soil geology due to various natural qualities of underground formations. Because of this, the presence of methane in groundwater is difficult to directly tie to fracking operations.

An important note in assessing the following literature about methane is that it focuses predominantly around the implications for climate change and water pollution directly resulting from fugitive emissions in wells. The literature doesn't touch the documented cases of exploding wells and homes, which have occurred in Pennsylvania and Ohio. These cases have recognized by their respective states governments as directly caused by faults with natural gas lines. Industry representatives dismiss these cases as isolated incidents, and blame the faulty casings responsible for the leaks on the

independent contractors that they hire.⁵² The following authors do not specifically address the potential for life-threatening explosions, but the potential is implicit in their findings for the potential for methane to contaminate waterways, as in both of these cases the methane has escaped the well casings and multiple layers of rock strata that the industry says will prevent any biogenic emissions from escaping.

Osborn et al sought to determine if methane concentrations in groundwater were due to naturally occurring methane, or if concentrations were attributable to increased fracking operations. They analyzed groundwater from 68 private water wells in Pennsylvania and New York and found that in shallow wells near fracking operations, methane concentrations were 17-times higher than wells in non-active areas, and were in concentrations high enough to be flammable.⁵³ This phenomenon explains the powerful images of flammable water coming from the kitchen taps in peoples' homes in the 2010 documentary *Gasland* that put the issue of fracking in the public spotlight.⁵⁴

Osborn et al's analysis was also able to discern between shallower, naturally-generated methane and methane from deeper thermogenic sources. They found that at the active sites, the methane contained ratios of ethane, propane, and butane indicating that the methane was released from deep underground sources and therefore could not be attributed to residual store of methane in the soil.⁵⁵ In their study, increased proximity to gas drilling sites demonstrated a clear correlation with an increase in methane concentrations and additionally an increase in the isotopes that indicate the methane

⁵² Ibid.

⁵³ Osborn, Stephen G; Vengosh, Avner; Warner, Nathaniel R; Jackson, Robert B. Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing. *Proceedings of the National Academy of Sciences* 108(20): 8172-8176. May 2011. Page 8172.

⁵⁴ Fox 2010.

⁵⁵ Osborn, page 8173.

originated from deep underground. The authors attribute the likely cause to leaky well casings that allow methane to escape through fractures deep down in well and subsequently rise to shallow soil levels through lithostatic pressure.^{56 57}

These findings have been met with contentious disagreement from Samuel Schon, a geologist with Brown University, who asserts that the unique geological properties of the Marcellus shale lend themselves to a natural migration of methane from underground stores. Schon suggests that Osborn et al did not provide a sufficient baseline of methane concentrations with which to compare their findings, that some of the wells closest to drilling sites did not demonstrate elevated methane levels, and that the lack of detectable fracking fluid in their samples was a clear signal that fracking was not the culprit. At the end of Schon's reply, however, he admits that the possibility of leaks in fracking casings "could conceivably enable methane migration from shallower horizons" but that industry best practices ensure this would never happen.⁵⁸ The Ground Water Protection Council denies that that methane would be released from procedures directly relating to fracking is even possible, that "A fundamental precept of oil and gas geology is that without an effective seal, gas and oil would not accumulate in a reservoir in the first place and so could never be tapped and produced in usable quantities."⁵⁹

Howarth and Santoro used documents supplied by the oil and gas industry to the General Accountability Office to assess "fugitive" methane releases at different phases of the fracking process. Their findings indicate that during the production lifetime of a well,

⁵⁶ Lithostatic pressure is the pressure of the weight of overlying rock pressing down on underlying geological formations.

⁵⁷ Ibid 8174

⁵⁸ Schon, Samuel C. Hydraulic fracturing not responsible for methane migration. *Proceedings of the National Academy of Sciences*: 108(37). 30 Aug 2011. Can be accessed at (<http://www.pnas.org/content/108/37/E664.extract>).

⁵⁹ GWPC, page 54.

an average of 3.6-7.9% of total gas production for the well is released into the atmosphere as methane. Conventional gas wells do not entail a flowback process, where the gas is forcefully returned to the surface as in fracking operations, and thus release significantly lower volumes of thermogenic methane sources. These researchers found that methane releases from fracking operations were at least 30%, and perhaps nearly two-fold, that of conventional drilling methods. To compare the emissions with conventional drilling methods over time, Howarth and Santoro used a 20-year time horizon to compare the shorter but more volatile presence of methane in the atmosphere comparable to carbon dioxide. They found the greenhouse gas footprint of shale gas is 22-43% greater than that of conventional gas and at least 20% greater than that of coal, even when factoring in the advantages that natural gas has during combustion.⁶⁰ The authors explicitly indicate that they do not present this as a suggestion that coal or oil are favorable alternatives to natural gas, but that natural gas does not warrant the public image hype or abandonment of key regulatory provisions for the sake of development that it currently enjoys.

In response to Howarth and Santoro's work, researchers from MIT assessed fugitive emissions from 3,948 horizontally drilled fracking wells, and applied narrower parameters in their calculations of methane release from wells to replicate "real world gas handling practices", including a smaller productivity lifetime per well and a smaller time-frame for initial drilling emissions. The authors also allege that Howarth and Santoro

⁶⁰ Howarth, Robert W; Santoro, Renee. Methane and the greenhouse-gas footprint of natural gas from shale formations. *Climate Change*. March 2011.

assumed that all of the methane released would be vented into the atmosphere, when in reality well operators capture 93% of fugitive emissions.⁶¹

Discerning the defensibility of each of these authors' methodologies lies far outside the scope of the paper, but the arguments provides the insight that the issue of methane emissions is a more recent addition the discourse of total environmental effects related to fracking and remains a contentious issue that warrants continued research. However, despite their disagreements, many authors are in consensus that a baseline-level of data is needed for a more refined accounting of methane release on new well pads to effectively gauge the true nature of methane emissions from fracking operations.⁶² A general scientific consensus concerning the parameters most accurate to the practice of fracking would ensure a justified deployment of regulations to curb avoidable emissions, methane contamination of waterways, and potential for explosions that endanger lives.

Fracking and Water Contamination

Each stage of the fracking operations creates the opportunity for potential drinking water contamination. When mixing freshwater with fracking fluids, spills or chemical transportation accidents can occur. During well injection, the fluid can migrate into aquifers. Once the initial well injection is completed and the flowback period has commenced, holding pits and containment tanks for the produced waters can percolate

⁶¹ O'Sullivan, Francis; Paltsev, Sergey. Shale gas production: potential versus actual greenhouse gas emissions. *Environmental Research Letters*. Nov 2012. Can be accessed at (http://iopscience.iop.org/1748-9326/7/4/044030/pdf/1748-9326_7_4_044030.pdf). Page 4.

⁶² Osborn, page 8175; Howarth, page 2011.

into subsurface water sources. During treatment of the residual fluids, incomplete treatment and wastewater transportation accidents could unintentionally taint water supplies.⁶³ Because of the intimate relationship between fracking operations and water, much of the literature focuses on establishing concrete causal relationships between the density of fracking operations in an area and the deterioration of water quality in that area.

Sally Entrekin, Michelle Evans-White, Brent Johnson, and Elisabeth Hagenbuch's work looks at the different stages of fracking and the potential for water contamination at each stage of the process. This work is especially relevant to the research at hand because the lead researchers are biologists at universities in Arkansas, and their water samples are from the areas of Central Arkansas that will be investigated in later chapters. These researchers stressed that because of the large volume of water needed for fracking operations, which averages approximately three million gallons of water per well, withdrawal rates from local water supplies contribute to water shortages and droughts and reduction of streamflow. This is especially troublesome in rural areas where both gas drilling operations and agriculture coexist.⁶⁴ Regulation of withdrawals is left to the states, and currently there is a dearth of literature comparing state-to-state policies on withdrawal permits and how natural gas extraction is prioritized comparable to residential and agricultural withdrawal.

⁶³ EPA 2012, page 9.

⁶⁴ Entrekin, Sally; Evans-White, Michelle; Johnson, Brent; Hagenbuch, Elisabeth; Rapid Expansion of Natural Gas Development Poses a Threat to Surface Waters. *Frontiers in Ecology & the Environment*:9(9). Pages 503-511. Page 508.

These researchers additionally used spatial analysis to determine that, while these well sites are typically constructed more than 100 kilometers from public drinking water supplies, that the wastewater from these operations can travel long distances and thus can affect distant water supplies. Their results found a strong positive correlation between turbidity⁶⁵ and well-density in a given area. The NYSDEC draft report identified turbidity as one of the most prevalent effects of fracking on groundwater supplies, and this suspension of solids can lead to eutrophication and affect aquatic life. However, the report also found that “the majority of these situations correct themselves in a short time.”⁶⁶ The United States Geological Survey conducted a sample of water sources in the same area as Entekin et al’s research, covering Van Buren and Faulkner Counties of Central Arkansas, but their research focused on groundwater sources. Their study found that “no regional effects on groundwater are apparent from activities related to gas production in the Fayetteville Shale in north-central Arkansas”, but did acknowledge that their work was conducted relatively early in the process of gas-production.⁶⁷

The industry continues to maintain that not a single instance of groundwater contamination has occurred as the result of fracking operations.⁶⁸ However, an EPA study of water wells in Pavillion, Wyoming provides a compelling case against the industry’s claims. In their two year long study, the EPA found an increase in detectable concentrations of benzene, xylene, diesel, and hydrocarbons near open pits that hold

⁶⁵ The EPA defines turbidity as an “expression of the optical property that causes light to be scattered and absorbed by particles and molecules rather than transmitted in straight lines through a water sample”, caused by “suspended matter or impurities that interfere with the clarity of the water”.

⁶⁶ NYSDEC 2011, 6-40

⁶⁷ United States Geological Survey (USGS). Shallow Groundwater Quality and Geochemistry In the Fayetteville shale Gas-Production Area, North-Central Arkansas, 2011. Can be accessed at (<http://pubs.usgs.gov/sir/2012/5273/>). Page 27.

⁶⁸ Wiseman, pages 8-9.

fracking wastewater with increasing concentrations as the study progressed.⁶⁹ Their research conclusively asserted that fracking operations were responsible for the contamination of deep sources of groundwater, but that further investigation was needed to determine if these operations opened up pathways for the materials to migrate up into shallower drinking wells.⁷⁰ Previous to this study, the results of various studies were highly polarized. Whenever studies were released demonstrating a correlation between fracking operations and degraded water quality, the industry could easily punch holes in the lack of baseline data for comparison, or claim that the detected chemicals were naturally produced in the soil or the result of other industrial activities. The results of this case study were able to definitively link the contamination to fracking operations because of the unique chemical signature present that was proven to be used by fracking operations. These findings provide a scientifically sound rejection of the assertion that fracking fluids left underground could not possibly migrate upwards to drinking water sources because of natural barriers of rock strata underground.

This pivotal case in Pavillion, with such extensive documentation and credibility, is rare. What the USGS report and the Entrekin et al paper share, and many of the scientists who currently study the effects of fracking on the environment share, is the agreement that baseline testing of communities before fracking operations commence is severely lacking in most areas and that these reports are of the utmost importance in determining the extent of connections between natural gas drilling and the health of public water supplies.

⁶⁹ EPA 2010, page 24.

⁷⁰ Ibid 39.

Fracking and Waste Disposal

Maloney and Yoxtheimer's work focuses on the volume and geographical distribution of fracking waste from hydraulic fracturing of the Marcellus shale in Pennsylvania. The Marcellus shale is the largest shale deposit in the United States, covering 95,000 square miles and with a natural gas estimate of 1,500 trillion cubic feet.⁷¹ Because of its size and rapid development, the Marcellus shale is considered ground zero for the proliferation of fracking. The effects of these operations have been extensively studied. The portion located beneath Pennsylvania's borders have come under exceptional scrutiny because of the proximity to several large urban centers on the eastern seaboard, a quality that additionally leads to a higher price for natural gas and therefore more incentive for fracking operators to invest operations there.⁷²

Using data from the Pennsylvania Department of Environmental Protection, researchers categorized the final destination of each load of fracking waste as either an industrial waste treatment plant, an injection disposal well, a landfill, a municipal sewage treatment plant, reuse other than road spreading, or unknown.⁷³ The authors propose that recycling flowback is the best option for managing fracking waste because this form of waste typically has lower salinity levels and is more suitable for recycling, thus reducing the ecological burden of water withdrawals. The results of this analysis in Pennsylvania showed that 89.8% of flowback was reused for further fracking operations.⁷⁴ The other

⁷¹ GWPC, page 21.

⁷² Kinnaman, Thomas. The economic impact of shale gas extraction: a review of existing studies. *Ecological Economics*. 70:1243-1249. 7 Apr 2011. Accessed on 1 Apr 2013. Page 1244.

⁷³ Maloney, Kelly O; Yoxtheimer, David A. Production and Disposal of Waste Materials from Gas and Oil Extraction from the Marcellus Shale Play in Pennsylvania. *Environmental Practice*:14(1). Pages 1-10. 2012. Page 4.

⁷⁴ *Ibid* 6

waste product of these operations are brine waters, which are the waters that rise to the surface after the well is fully in production. Brine waters tend to have higher levels of salinity and this leads to a lower rate of reuse, around 55%. This suggests that having economical desalinization methods on-site could reduce the significant difference in rate of reuse between the two waste products. They also showed that fracking operators frequently move this highly toxic waste across the boundaries of states, and thus become an interstate issue despite that states are primarily vested with the responsibility of regulating them. This interstate transportation of waste is especially prevalent when local municipalities establish rules that discourage brine disposal and fracking operators choose to transport these materials to out-of-state locations for more cost-effective disposal.⁷⁵

Fracking and Increased Seismic Activity

One of the more politically salient methods of fracking wastewater disposal is in underground injection wells that are monitored by the EPA. These wells render this toxic waste invisible, but the unobservable ramifications of this method became apparent when geologists began linking deep injection wells with an increase in seismic activity. Seismologist Richard A. Kerr states that researchers have “known for decades” that the mechanics necessary for fracking operations could result in an increase in earthquakes. He also quotes geophysicist Mark Zoback, who said that deep underground injection sites have existed for years without aggravating fault lines only because they were intentionally sited at areas with weak, porous rock that best accommodates fluid

⁷⁵ Ibid 7

injection. He attributes the recent increases seen in high-density fracking areas to the saturation of geologically optimal sites, so now operators are placing wells into rock formations that are more brittle and more susceptible to earthquakes. Kerr's report lists cases where a moratorium on fracking operations in an area resulted in a near-immediate tapering off of earthquakes. Fortunately, the solution in this case is easily rectifiable, and as simple as "look before you leap".⁷⁶ Kerr contends that the technology to accurately explore sites pre-injection and monitor the pressure of wells exists, but that it needs to be more assiduously applied during industry practice. Because of the Class II status of these wells, they are not subject to the rigorous federal regulations that Class I wells face. A potential route to increase application of relevant technologies and thus preventing increases in seismic activity would be to reclassify the status of underground injection wells used to dump fracking materials. The Natural Resource Defense Council (NRDC) agrees with this approach, and sees these definitive findings as an opportunity to demand this change in key federal policy regarding fracking operations. In a recent call to arms, the NRDC called on the EPA to reevaluate its application of the Resource Conservation and Recovery Act in light of new information linking fracking operations to increased seismic activity. The group is asking that the EPA reclassify fracking fluids under its Underground Injection Control program from Class II to Class I injections wells. With the Halliburton loophole, fracking fluid has been exempted from requiring disposal in Class I wells, which require more rigorous federal oversight, despite the nature of their chemical composition. Class II wells, on the other hand, are required by federal law only to have the "minimum requirements for effective programs" that are mandated for state-

⁷⁶ Kerr, Richard A. Learning how to NOT make your own earthquakes. Science:335 Pages. 1436-1437. 23 Mar 2012.

run programs.⁷⁷ As of this writing, the EPA has yet to respond and reclassification appears unlikely.

The literature concerning the environmental effects of fracking is, at best, inconclusive. This air of uncertainty benefits the industry, by placing the onus of responsibility on the communities they operate in to somehow find a causal connection between fracking operations and contamination of their landscapes without the benefit of scientific consensus to support them. Fracking presents a risk to the vitality of waterways, landscapes, and the health of communities. The difference in opinion between anti-fracking factions and industry is whether or not these risks are inherent to the nature of the practice of fracking or if managing these risks with effective organizational practices render these risks a marginal concern.

Risk is accepted as inherent in any human endeavor. In much of the literature, the question about the future of fracking policy is most often framed by whether or not the risks associated with fracking are outweighed by the economic benefits.

Environment v Economy

Existing reports that attempt to quantify the total economic benefits of fracking follow a roughly similar template, albeit with differing gauges and inherent assumptions. All attempt to summarize the total economic value of fracking through measuring the direct monetary benefits to citizens, the estimated benefits from job creation, and the

⁷⁷ Hammer, Rebecca; VanBriesen, Jeanne. In *Fracking's Wake: New Rules are Needed to Protect Our Health and Environment from Contaminated Wastewater*. May 2012. Accessed on 3 Mar 2013. Page 8.

taxes paid. No reports have been commissioned to specifically gauge these benefits against the measurable economic losses associated with the degradation of necessary environmental resources.

This portion of the literature is the most dominated by industry bias. In sifting through the sources, the need to try to ascertain the author's experiences and the potential lens that they bring in their analysis was especially crucial. Generally speaking, most economic reports were published by industry-affiliated groups. While industry has the benefit of primary insight into the data relevant to their industry, they also have the most incentive to skew reports to project an image of bursting supplies of natural gas to bolster financial backing for exploration and drilling operations. This issue is currently being explored in an investigation by the Securities and Exchange Commission (SEC), which has expressed the concern that the bias in industry reporting significantly minimizes the risks inherent to fracking operations and overstates the long-term productivity of each well, therefore misleads shareholders. A Wall Street Journal article indicates that in the aftermath of both the nuclear power plant meltdown in Fukushima and the BP oil spill, investors were shocked at the level of risk involved and withdrew their shares en masse. The SEC wants full disclosure of the processes, risks, and chemical additives involved, but additionally promises that the secret additives will not be disclosed to the public. Kathryn Klaber, president of the Marcellus Shale Coalition, responded that "While our industry absolutely supports common sense disclosure and transparency measures, such duplicative inquiries that may fall outside of an agency's core mission, are troubling and

counter to what our nation needs at this time”. Many industry spokespeople share a concern that the SEC is overreaching its jurisdiction.⁷⁸

Thomas Kinnaman’s assessment of six key papers that attempted to quantify the total economic benefits of fracking, both industry-affiliated and university-affiliated, ultimately found them all lacking in the fundamentals of their methodologies. Kinnaman asserted that these reports amount to little more than junk science, given their egregious presumptions on consumer behavior sometimes far-reaching categorization of indirect and induced economic benefits. One frequent methodology employed is to assume that all royalty payments and mineral leases are subsequently spent in the local economy, that companies spend 95% of their operating costs on expenditures that directly contribute to state economies, and the potential for overstatement when these reports include such induced economic benefits as hotel booking increases to accommodate out of state workers and increases in business establishments.⁷⁹

Kinnaman asserts that an accurate assessment requires a paradigm shift from attempting to quantify the total economic increases generated by any possible activities that are proximally associated with fracking, and instead use more objective measures with a different lens of analysis. Kinnaman ends his analysis saying:

Economists possess the tools necessary to estimate all benefits and costs associated with shale gas extraction. If the economic value of the gas exceeds the sum of the internalized production costs to industry plus the use costs plus the external costs, then the economic benefits of gas extraction exceed the economic costs. Gas extraction would have a positive *economic* impact, and the magnitude of this impact would depend on the

⁷⁸ Solomon, Deborah. SEC Bears Down on Fracking. Wall Street Journal. Business 25 Aug 2011.

⁷⁹ Kinnaman, page 1249. Original emphasis.

difference between the benefits and costs. Notice that jobs created, revenues generated, or taxes paid are not part of the analysis.⁸⁰

His statement drives home that fracking is as prevalent as it is because it provides a very visible and measurable benefit to the economy; within this paradigm the environment will never “win” in an empirical cost-benefit analysis of fracking on the environment; given the parameters of existing economic perceptions of resource value. Until economists and ecologists can forge a middle ground between their interests, and agree on the true cost of the externalities associated with the loss of irreplaceable natural resources, these studies will continue to under-represent the cost of the spectrum of environmental harms that fracking creates.

While there are no reputable economic inventories in the literature that effectively assess the impacts of fracking on a widely applicable scale, shale-specific reports do exist and one such report will be investigated in the next chapter. For now, it is equally insightful to assess the rhetoric surrounding fracking and weigh the relative merits of the arguments within this rhetoric in the context of the national debate. The primary framing of the debate is that natural gas is the lesser of evils in the existing nonrenewable fuel market. However, as evidenced previously in scientific evaluations of groundwater issues, greenhouse gas emissions, and seismic fault aggravations, the benefits of natural gas as a product cannot be divorced from the risky process that is driving its growth. The literature also does not address the extent to which truly renewable sources, such as solar and wind power, continue to be marginalized at the expense of explosive financial and political investment in shale gas development.

⁸⁰ Ibid 1248

News articles are useful in highlighting the social narratives that accompany the social changes that occur when fracking operations open their doors in a community. A prevalent theme is that gas fracking results in clear winners and losers: homeowners who lease their mineral rights become instant millionaires, but the effects on their downstream neighbors who do not benefit from the royalties of gas extraction create community tensions in addition to the slew of associated environmental risks. In addition to tension between homeowners, fracking operations often draw crowds of laborers who relocate to work on well pads who are met with mixed reactions from locals. The increase in population boosts local economies, but citizens in Pennsylvania described the additional and less tangible social ramifications of the influx: “These guys come up here with their southern accents all ‘yes m’am, no m’am’, flashing lots of money, and the women are impressed. The local men feel intimidated”.⁸¹

A point that is especially compelling is that the widespread response to fracking exemplifies NIMBYISM, the “not in my backyard” mindset, on a national scale. Critics point out that should a ban or moratorium be placed on fracking, operators would simply uproot and begin operating in nations with less stringent environmental standards and contaminate their waterways instead. This approach contributes to a cycle of global environmental injustice and environmental racism by redistributing these social and environmental ills to nations without the political pressure to reduce externalities as levied through taxes, permits, and regulations by the U.S government.

⁸¹ Hargreaves, Steve. Gas boom mints instant millionaires. 2 Nov 2010.. Accessed on 12 Mar 2013. Can be accessed at (http://money.cnn.com/2010/10/06/news/economy/penn_community/index.htm?iid=EL).

In surveying the recent scholarly work available, many authors agree that a few key missing pieces prevent the literature from truly encompassing the issues surrounding fracking. Baseline testing is severely lacking in most communities as the motivation for testing arises only after deleterious effects on the environment have affected a community's way of life. This combined with the lack of disclosure of chemicals makes establishing causality especially difficult. Cases like that of Pavilion, Wyoming are exceptional and as of now can be written off as an isolated incident until further comprehensive analyses are demanded by citizens and given the necessary funding.

For the literature that espouses normative recommendations, environmentalists generally share a call for a temporary moratorium on fracking operations until more definitive scientific consensus about the associated risks and best management practices are better established. The argument goes that shale gas has been trapped underground for millions of years, and will continue to be available for extraction in the future when governments can better discern how to effectively mitigate the risks to communities.⁸² The gas industry and its proponents argue that fracking is generally safe, and that regulations create unnecessary costs that deter innovation and job creation. Industry representatives argue that different states host different geological features and thus state regulation leads to more tailored regulations specific to the needs of each region as opposed to broad, generic federal regulations that do not take into account the diversity of each shale deposit. These positions represent the extremes of the political spectrum regarding these issues, and within this spectrum lies a whole middle-ground of legislation addressing different aspects of fracking that can drastically affect how this practice

⁸² Howarth, Robert W; Engelder, Terry. Should fracking stop? *Nature*: 447. Pages 271- 275. 13 Sep 2011. Accessed on 8 Mar 2013.

influences a community's environment. What is missing from the literature that would be an effective gauge of these different policies is a state-by-state analysis of state approaches to fracking regulation along with the effectiveness of their policies in practice. To assess effectiveness, this hypothetical research would necessarily include feedback from residents and natural gas operators about the policies in place and how they regard their relative power or powerlessness in the process.

Furthermore, the narratives of residents typically only make appearances in location-specific works such as local news outlets. Narratives are important because while different sources highlight the *de jure* political statutes that the federal and state governments have codified in legislation, the *de facto* experience of these regulations may not adhere to textbook conditions. Subjective voices are largely omitted in the rigid adherence to quantitative and scientific language. In a publication by a New York-based environmental organization titled "Fractured Communities: Case Studies of the Environmental Impacts of Industrial Gas Drilling", the totality of Arkansas' experience is summarized in four lines describing documented cases of creek and soil contamination.⁸³

Sifting through various small newspaper articles makes it more difficult for affected groups to connect across state and shale boundaries, and to organize nationally and generate further politicization of this issue. Community narratives are needed to humanize and contextualize the politics behind fracking, to generate a shared empathy from lawmakers and warrant a serious consideration of citizen interests in this debate, interests that may run contrary to the current national policy agenda.

⁸³ Michaels, Craig. Simpson, James L. Wegner, William. Fractured Communities: Case Studies of the Environmental Impacts of Industrial Gas Drilling. Riverkeeper. Sep 2010. Accessed on 23 Feb 2013. Page 18.

Arkansas and the Fayetteville Shale: an overview of state regulations and bureaucracy

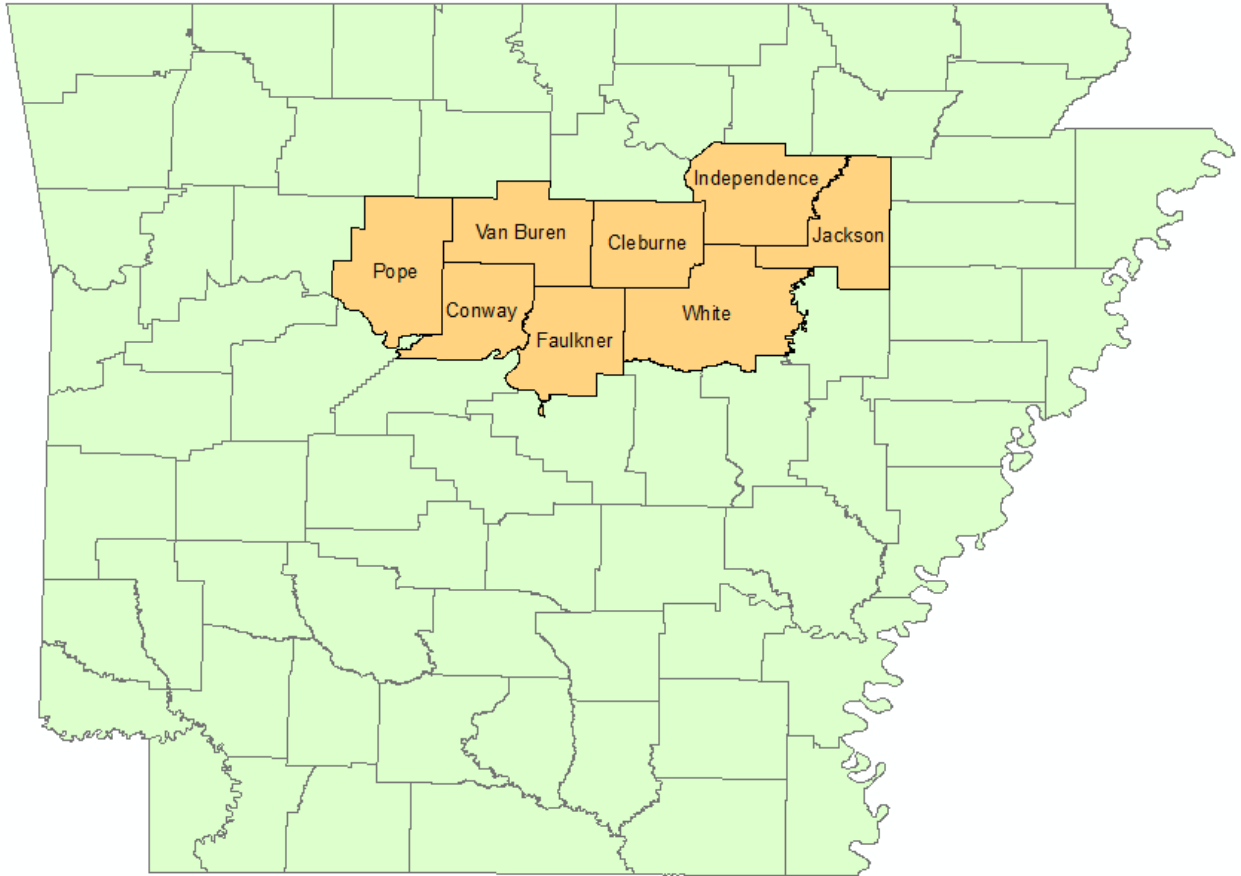


Figure 5. The location of the eight counties that employ fracking technologies in the Fayetteville Shale

“The Natural State” is relatively new to the fracking scene compared to states located over the Marcellus and Barnett shales that underly the northeastern United States and Texas, respectively. Central Arkansas lies over the Fayetteville shale, a smaller shale deposit than the two previously mentioned with an estimated area of 9,000 square miles spanning Oklahoma and Central Arkansas.⁸⁴ Reports differ in their estimates of the depth

⁸⁴ State Review of Oil and Natural Gas Environmental Regulations, Inc. (STRONGER). Arkansas Hydraulic Fracturing State Review. February 2012. Page 4.

of shale deposits, but the Fayetteville shale is geologically unique in that drilling operations are generally shallow compared to other shale deposits. Deposits are estimated between 300-2,000 meters below ground compared to the Marcellus shale deposits that typically lie between 1,200-2,500 meters under the surface.⁸⁵ This results in significantly lower overhead costs when drilling pipelines underground. A gas executive summarized the benefits of other unique geological characteristics of the Fayetteville shale that translate into economic efficiency in saying that, "...the shale is very brittle. It cracks easily, it breaks up and it gives you largely de-risk amounts of gas that we can count on and are dependable but at low cost."⁸⁶

Fracking development in the Fayetteville shale began in the early 2000s but production has increased dramatically since 2004 when Arkansas had only thirteen wells that employed fracking technologies. These wells collectively produced 100,627 thousand cubic feet (mcf), with a total market value of \$640,000.⁸⁷ By 2011, increases in the price of natural gas and the application of hydraulic fracturing and horizontal drilling saw the quadrupling of total gas production and a 50-fold increase in gas well construction from levels seen in 2004.⁸⁸ In 2012, the Fayetteville shale produced 1,030,845,541 mcf of natural gas.⁸⁹ With the 2012 value of natural gas priced at \$2.66 per thousand cubic feet at wellhead price, this totals to a natural gas value of \$2,742,049,139

⁸⁵ Entrekin et al 2011, page 504

⁸⁶ Brock, Roby. BHP exec discusses Fayetteville Shale. The City Wire. 21 Nov 2011. Accessed on 24 Mar 2013. Can be accessed at (http://www.thecitywire.com/node/18898#.UU_-oGXdfDM).

⁸⁷ University of Arkansas Center for Business and Economic Research. Projecting the Economic Impact of the Fayetteville Shale Play for 2008-2012. March 2008. Page 1.

⁸⁸ Entrekin et al, page 505

⁸⁹ Data from the Arkansas Oil and Gas Commission website, can be found under "Gas Sales Summary" under Fayetteville Shale Info, can be found at the following URL (<http://www.aogc2.state.ar.us/Fayprodinfo.htm>). Accessed on April 29th.

in business in the Fayetteville shale.⁹⁰ Approximately 4,000 shale gas wells currently operate in the Fayetteville shale, but industry experts estimate that the potential exists for 14,000 more wells to be put into operation and exponentially increasing the economic value of the area.⁹¹

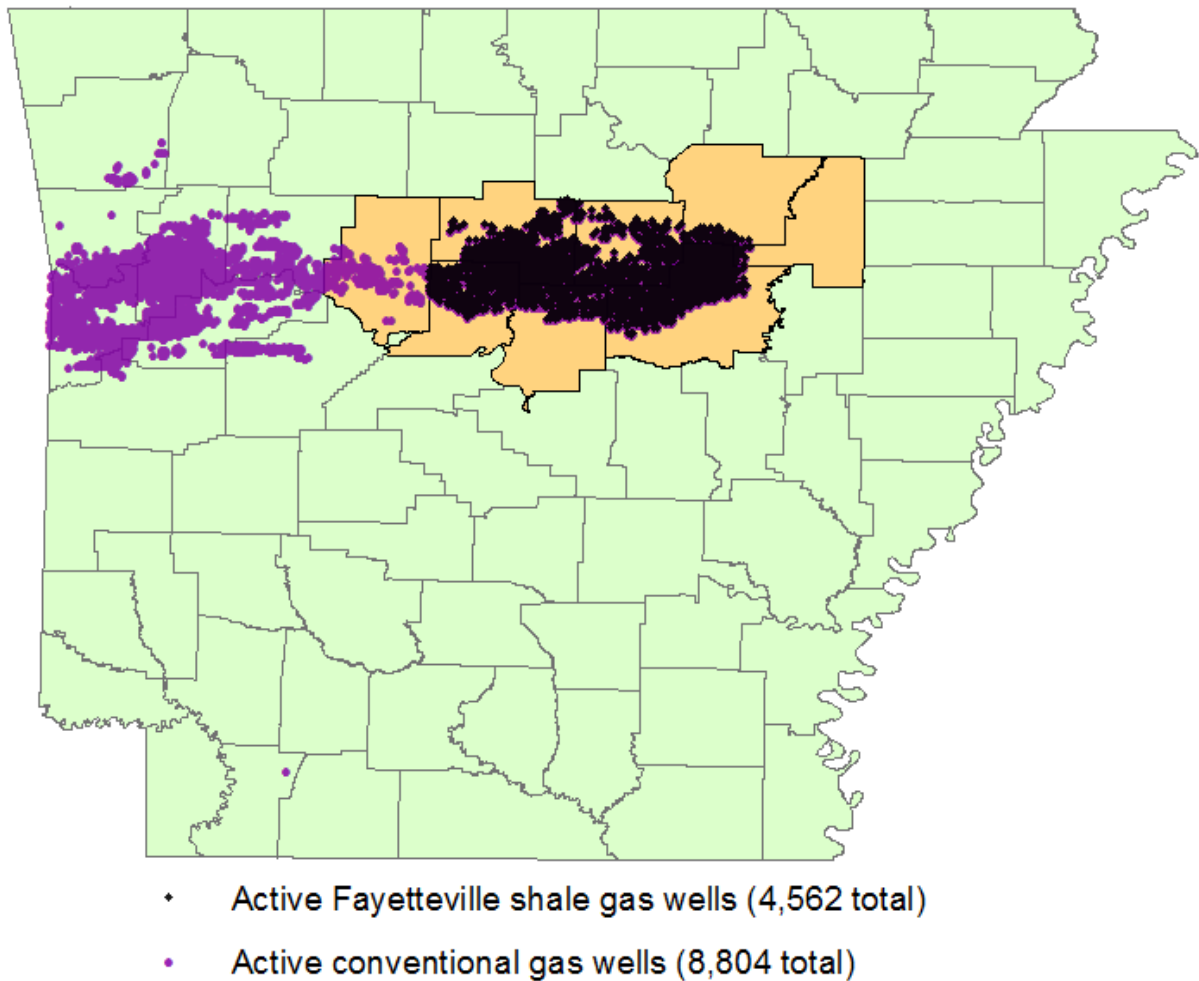


Figure 6. Locations of all conventional and shale gas sites in Arkansas as of 2013. Shale gas wells make up more than half the total wells, and this technology has only been widely applied since the mid-2000s.⁹²

⁹⁰ 2012 price of natural gas provided by the Energy Information Administration.

⁹¹ STRONGER 7

⁹² Data for well locations provided by the Arkansas Oil and Gas Commission. Map generated by author.

Fracking Companies in Arkansas

In Arkansas, three major companies own 99.7% of total fracking operations spread across Central Arkansas: Southwestern Energy, BHP Billiton Petroleum, LLC, and XTO Energy, Inc. Southwestern Energy, which often operates under the name of its subsidiary SEECO, Inc. and Southwestern Energy Production Company (SEPCO), dominates the market with holdings that are equal to approximately 80% of total operations in the state. Southwestern Energy is a company that focuses almost exclusively on shale development in the United States. Southwestern Energy (SWN) originated in Arkansas but currently holds its headquarters in Houston, Texas.⁹³ BHP Billiton is an Australian-based corporation with a more diversified production focus: working in over 100 locations throughout the world, BHP produces commodities like aluminum, copper, coal, iron, and uranium alongside their oil and gas ventures.⁹⁴ XTO Energy is a Texas-based company that was acquired by Exxon Mobil in 2010 and acts as the Exxon wing dedicated exclusively to developing unconventional natural gas sources. These unique factors create different corporate cultures that come into play in interactions with residents, and inform their view of these operators. During an interview with Tom Kimmons, a longtime local resident and the director of the Shirley Community Development Corporation, he reflected the common sentiment shared by many residents

Southwest Energy has been the most sensitive to public opinion...XTO has really made a lot of people mad. Chesapeake aggravated people but they

⁹³ Southwestern Energy website. Accessed on 24 Mar 2013. Can be accessed at (<http://www.swn.com/aboutswn/pages/ourprofile.aspx>).

⁹⁴ BHP Billiton. Our Company page. Accessed on 24 Mar 2013. Can be accessed at (<http://www.swn.com/aboutswn/pages/ourprofile.aspx>).

also have left and sold their shares to BHP Billiton. Now, they're an Australian company and many of us are concerned that they don't have the best interests of Arkansas in mind because they're international, one of the biggest in the world.

SWN also operates one of their company headquarters in Conway, Arkansas, the most populous city in the Fayetteville shale counties and economically central in the region. This accessibility potentially contributes to the perceived responsiveness that several residents expressed with SWN, given that XTO Energy's Arkansas headquarters is located at the fringe of these operations in the tiny town of Ozark, Arkansas, a town with less than 4,000 residents and BHP Billiton's headquarters for the region are located in Searcy, a town in White County with a little over 22,000 residents.⁹⁵

The location of these headquarters is also important in the perception of another important metric central to the discussion on the ground: jobs. The economic benefits to Arkansans from natural gas development are highly visible, especially given economic landscape surrounding its proliferation. The revenue generation in the nine counties where natural gas drilling takes place is amplified by the historically economically depressed status of these counties comparative to both others in the state and national averages.

Central Arkansas: a Case Study of Environmental Injustice

An important consideration in assessing the landscape in which these fracking companies operate is to first understand what makes communities particularly vulnerable

⁹⁵ 2010 Census Data. Compare with the population of Conway, AR at 58,908 people. Census viewer Accessed on 22 Apr 2013. (<http://censusviewer.com/city/AR/Ozark>, <http://censusviewer.com/city/AR/Conway>).

to environmental injustice. The EPA defines environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies”.⁹⁶ Communities that exhibit certain demographic qualities are especially vulnerable to exploitation of their social and economic status for the siting of environmentally degrading activities. The EPA specifically mentions that low-income, minority, or tribal communities are particularly at risk.

Another document that provides an excellent insight to the qualities of at-risk communities is the data compiled in the Cerrell Report, although this data stems from an altogether different intent. Cerrell Associates, Inc, a consulting firm, was contracted by the California Waste Management Board in 1984 to tease out qualities of communities that were “least likely to resist” the siting of Locally Unwanted Land Use (LULU) sites. While these qualities were selected in the hypothetical siting of trash incinerators, their analysis is useful in interpreting the qualities of compliant communities that are less likely to speak out against environmental degradation.

The Cerrell Report proposed that in order to avoid “unnecessary” opposition, sites located in older, conservative, and lower socioeconomic neighborhoods would face the least resistance.⁹⁷ A more comprehensive list of indicators that were deemed significant is outlined in the following table.

⁹⁶ Environmental Protection Agency (EPA). Environmental Justice. 11 Feb 2013. Can be accessed at (<http://www.epa.gov/environmentaljustice/>).

⁹⁷EJ Net. Cerrell Report. Cerrell Associates. 1984. Page 39.

Strong indicators	Associated qualities of “least resistant” communities
Region:	South, Midwest
Community Size:	Small, under 25,000 people
Community Location:	Rural
Economic benefit on community (perceived):	Significant
Political ideology:	Conservative, free-market orientation
Age:	Above middle age
Educational attainment:	High school or less

Figure 7. Factors determined to be “strong” indicators of the potential for resistance against traditionally unwanted industrial sites.⁹⁸

What the Cerrell Report perceives as being a more welcoming and appreciative atmosphere for industrial activity, the EPA views as indicating that a community is more vulnerable to bearing a “disproportionate burden of environmental harms”. The EPA’s Environmental Justice office maintains that it is essential that marginalized groups and vulnerable communities have the opportunity to fully engage with agencies to incorporate their voices in the process of deciding policy. If a process lacks an appropriate inclusion of minority, low-income, or tribal populations, then these processes are said to present an environmental justice concern, and additional steps must be taken to make sure that information relevant to developing sites, in this case hydraulic fracturing well sites, is communicated especially early and disseminated widely.⁹⁹ Their recommendations also include having ample comment periods through local governments for these projects. Whether or not this recommendation allows for a just representation of community interest will be assessed in the next chapter.

⁹⁸ Cerrell Report. Data reproduced based on findings of least v. most resistant communities found in Appendix C-2.

⁹⁹ EPA. Interim Guidance on Considering Environmental Justice During the Development of an Action. Page 6.

Demographics of Central Arkansas

The following table highlights selected attributes of the 2010 Census data for the eight counties studies in this work, comparative to averages for the state of Arkansas and total data for the United States.

	Fayetteville shale	Arkansas	U.S
<i>Poverty rate</i>	20%	18.4%	14.3%
<i>65 or older</i>	16.8%	14.6%	13.3%
<i>Bachelor's degree or higher</i>	16%	19.6%	28.2%
<i>Median household income</i>	\$37,391	\$40,149	\$52,762

Figure 8. 2010 Census data for Fayetteville shale counties, Arkansas, and the United States. The data sets for Fayetteville shale counties were averaged. Data provided by Census Quickfacts.

Even in the throes of oil and natural gas development in 2011, the eight Fayetteville shale counties and the state of Arkansas demonstrate significantly lower median household income, educational attainment, and poverty rates comparative to national averages.¹⁰⁰ The data demonstrates that these counties are socioeconomically depressed communities within a socioeconomically depressed state. These state averages are also not a representative picture of the rural and more economically depressed communities where natural gas development is occurring, as these statistics are inflated

¹⁰⁰ Census Quickfacts 2010. Median household income: \$40,149 (U.S: \$52,762); Bachelor's degree or higher: 19.6% (U.S: 28.2%); Persons below poverty level: 18.4% (U.S: 14.3%). Accessed on 24 Mar 2013. Can be accessed at (<http://quickfacts.census.gov/qfd/states/05000.html>).

by the incomes and economic activity of urban centers like the city of Little Rock. Seven of the eight fracking counties (Cleburne, Faulkner, Independence, Jackson, Pope, Van Buren, and White) had lower income per capita and median household income than the state and national average. However, key differences between the counties also exist which point to the different roles each county plays in the fracking arena.

Indicator	Cleburne	Conway	Faulkner	Independence	Jackson	Pope	V. Buren	White	United States
Population	25,808	21,287	118,704	37,025	17,600	62,765	17,030	78,493	313,914,040
65 and older	24%	17%	10%	16%	16%	14%	23%	14%	13%
White	97%	86%	86%	95%	81%	93%	97%	93%	78%
Median household income	\$38,510	\$31,890	\$47,649	\$34,878	\$31,352	\$40,325	\$32,906	\$41,618	\$52,762
Below poverty level	17%	22%	15%	21%	25%	19%	25%	16%	14%
Bachelor's degree or higher	16%	14%	26%	13%	8%	20%	13%	18%	28%

Figure 9. Breakdown of basic economic statistics for each county being studied. Data provided by Census Quickfacts.

Faulkner County outranks its neighbors in all variables, with nearly twenty percent higher median household income, a higher percentage of bachelor's degree attainment by approximately 6%, and a slightly lower percentage of persons below poverty level.¹⁰¹ While Faulkner's exceptional economy could be related to natural gas development, it is more likely that Faulkner County was already better positioned to take advantage of natural gas development before the industry arrived. Data from 2000 demonstrates similar trends of economic affluence relative to its neighboring counties before the proliferation of this industry. This is most likely explained by the presence of

¹⁰¹ Census Quickfacts: Faulkner County. Accessed on 24 Mar 2013. Can be accessed at (<http://quickfacts.census.gov/qfd/states/05/05045.html>).

Conway, the largest metropolitan area of the region and economic hub for transporting goods, located in Faulkner County. This larger population and economic draw would inevitably result in a larger working population and subsequently lower population of persons over 65 than its neighbors, all of which have rates significantly higher than the national average.¹⁰² The economic supremacy of Faulkner County is also reflected in the counties' differing levels of unemployment relevant to one another even including the onset of natural gas development: between 2000 and 2011, Faulkner County has had consistently lower levels of unemployment comparative to state averages, while other counties have fluctuated or remained consistently high.¹⁰³

Direct and Indirect Economic Impacts

Economists at the Sam M. Walton College of Business at the University of Arkansas conducted an economic assessment of the direct, indirect, and induced economic impacts created by natural gas activity from the Fayetteville shale in Arkansas. Direct fees include payments made directly from the gas industry to local and state governments, including well permit fees and severance taxes. Indirect impacts include payments made directly to landowners for mineral rights and jobs created for local residents, thus injecting income into local economies. Induced impacts include the increased property values and the increased use of local amenities by out-of-state gas employees, and these measurements are the most difficult to quantify. It is important to

¹⁰² The national average percentage of persons 65 years and over in 2011 was 13.3%. Faulkner County demographics show a percentage of persons over the age of 65 at around 10.2%.

¹⁰³ Deck, page 12.

note that this particular study was conducted based on voluntary information provided by the gas industry and the financial support of the Arkansas Chamber of Commerce.

The Center for Business and Economics' report allows us to evaluate direct and indirect impacts on the state for the years between 2004 and 2011. Well operators in Arkansas are required to register their wells with the Arkansas Oil and Gas Commission with a \$300 fee. This registration fee alone for the 4,878 permits registered between 2004 and 2011 generated almost \$1.5 million in collected fees. Arkansas has a historically low severance tax, but nonetheless this tax on the removal of non-renewable commodities from the Earth netted the state \$90.8 million between 2004-2011.¹⁰⁴ Data for royalty payments was only available between 2008 and 2011, but residents of the Fayetteville shale counties received more than \$1.2 billion directly in mineral leases and royalty payments.¹⁰⁵ Van Buren County received significantly more in direct payments than its neighboring counties, totaling

An important characteristic in the narrative of the dramatic increase of natural gas operations in central Arkansas is that it was preceded by a significant shift away from the manufacturing sector in the early 2000s, which resulted in the loss of an accumulated 9,558 jobs in central Arkansas counties. Between 2001 and 2010, jobs in the manufacturing sector decreased by nearly 30%.¹⁰⁶ Manufacturing had previously been a key industry in the region, and thus politicians and citizens were especially receptive to the onset of natural gas development as a much-needed economic engine of growth.

¹⁰⁴Deck, Kathy; Riiman, Viktoria; Jebaraj, Mervin. Center for Business and Economic Research (CBER). Revisiting the Economic Impact of the Natural Gas Activity in the Fayetteville Shale: 2008-2012. University of Arkansas Sam M. Walton College of Business. May 2012. Can be accessed at: (http://cber.uark.edu/Revisiting_the_Economic_Impact_of_the_Fayetteville_Shale.pdf). Page 67.

¹⁰⁵ Ibid 63

¹⁰⁶ Ibid 8

The industry has delivered on its promise of bringing jobs to the state, with employment gains in this regional sector that are significantly higher than state levels. In the subsector of mining, quarrying, and oil and gas extraction, employed Arkansans increased from 2001 levels by 116.8% from 3,855 to 8,358 employees in 2010.¹⁰⁷ Of the estimated 1,092 full-time employees of the natural gas industry in the region, a higher percentage of these jobs are centralized in Faulkner and White Counties. Within these 30.4% of employees are located in Faulkner County and 11% in White County. The high proportion of workers in Faulkner County and White County correlate with the location of SWN and BHP Billiton's regional headquarters. Another 9.5% of these jobs are located in Cleburne County, for reasons unknown. A sentiment often repeated by newspaper articles and interactions with local residents was that not only were these jobs prevalent, but they were "good" jobs. This is most likely a reflection of the salary, which for the oil and gas extraction sector averages at \$74,555, more than double the average annual pay for those in the labor force in Arkansas.^{108*}

What is impossible to tell from these statistics is how many of the employment positions were for native residents of Arkansas as opposed to transient, out-of-state workers who follow the drills wherever production takes them. Indeed all of the natural gas-producing counties experienced significant population growth attributable to gas development, with Faulkner County seeing an unprecedented 34.5% increase between 2000-2011 comparative to the state population growth of 9.7%.¹⁰⁹ Additionally, in assessing the attractive salaries available in this sector, it is difficult to ascertain the difference in annual pay between entry-level drill operators and the drivers who truck out

¹⁰⁷ Ibid 7

¹⁰⁸ Ibid 9. *Average annual pay in Arkansas for 2010 was \$36,254.

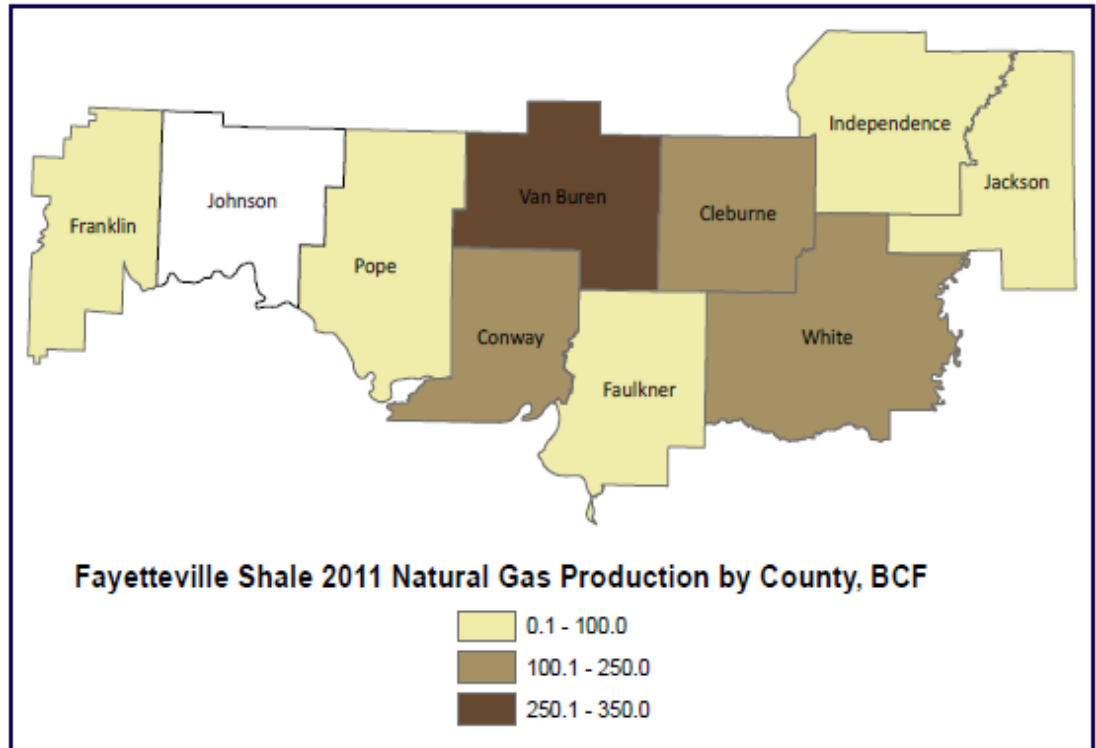
¹⁰⁹ Ibid 11.

the produced gas and its associated wastes as opposed to managers and specialists. These positions require specialized expertise that is not often found in the local economies where gas production occurs, and thus these employees must be imported from their positions at other developed shale deposits through attractive salaries.

While Faulkner County is the recipient of the most salaried positions in the oil and gas sector, due to Southwestern Energy Company's regional headquarters being located in the city of Conway, it demonstrates lower levels of gas production relative to its neighbors. For the sake of reference in outlining the gas production of each county, one thousand cubic feet of natural gas is enough to meet the energy needs of one average American home for four days.¹¹⁰ Van Buren County produces just over 30% of total production of the Arkansas Fayetteville shale counties with over .5 billion cubic feet produced. Conway County produces just over .2 billion cubic feet, or roughly 20% of total production; Faulkner produces just 7.5% of the total volume, approximately 125 million cubic feet in total.¹¹¹

¹¹⁰ American Gas Association. How to Measure Natural Gas. Accessed on 24 Mar 2013. Can be accessed at (<http://www.aga.org/KC/ABOUTNATURALGAS/ADDITIONAL/Pages/HowtoMeasureNaturalGas.aspx>).

¹¹¹ Deck, page 47.



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Figure 10. Gas production in units of billions of cubic feet. Franklin County was not included in this research because the wells were not labeled as Fayetteville shale gas wells by the Arkansas Geological Survey.

The more centrally-located Van Buren, Conway, Cleburne, and White counties contribute the bulk of natural gas production. Although production is more concentrated in the central counties, Faulkner County has lower volumes of gas production. Perhaps this could be attributable to Faulkner County’s more affluent, more urban, and more educated community profile, all of which would make it more prone to resistance against environmentally degrading projects per the Cerrell Report.

¹¹² Deck, page 59. Center for Business and Economic Research estimates.

State Regulations

In the absence of federal regulations, states are responsible for regulating natural gas fracking operations. Each state varies widely in their approaches to every aspect of the regulatory process, from requiring the registration of well sites with regulatory agencies to the extent of disclosure of chemical additives. Arkansas, being a relative newcomer to the fracking arena, benefits from being able to compare the results of policies in Pennsylvania, New York, and Texas to inform their policy approach to fracking.

Arkansas has many progressive regulations compared to other fracking states. It was one of the first states to require disclosure of the CAS numbers of chemicals used in fracking fluids and their accompanying proppants, and remains one of the few to require this extent of information.¹¹³ This information is subject to an open-records requirement, which mandates that information granted to state agencies is required to be available for public review.¹¹⁴ What Arkansas does not require is the percentage of each component in the fracking fluid, and the pressure that this fluid is applied in various wells.

Understandably, the first provision is reasonable given the legal balance of power entailed with balancing the rights of communities to know and the rights of businesses to maintain a competitive edge with the composition of their fracking substances. Only two states require this information, and even those two accept the estimated ranges of the volumes of each component in the substance.

¹¹³ STRONGER 4

¹¹⁴ McFeeley 12

The chemicals of principal concern in fracking are those that are especially persistent, and can lead to serious public health issues in tiny volumes of parts per million. What this provision could potentially aid in is allowing for more targeted testing of contaminants in a water source for community members who want to establish a possible connection between fracking and water pollution: instead of wasting their money testing for every single chemical on the publicly available list, citizens could target the specific chemicals that are used in higher volume and would therefore be more sensitive “canaries” for testing purposes. This would have an especially effective democratization effect on the scientific process soil, air, and water testing for the citizens and community groups who are often trying to find solutions on an extremely limited budget.

Arkansas also does not require operators to notify residents near proposed fracking sites prior to commencing operations.¹¹⁵ After operations begin, and although the state technically requires public disclosure, Arkansas regulators do allow for trade-secret exemption status for ingredients, and a full 20% of chemicals used in the state fall under this category. Arkansas is one of only two states that require trade-secret exempt applications supply a factual justification to substantiate exemptions, but is unfortunately not one of the four states that allows for trade secret exemptions to be challenged by the public.¹¹⁶ The trade-secret exemptions are accessible to health care providers, and the state avoids the ethical battles surrounding these provisions nationwide by not requiring health care providers to sign confidentiality agreements that inhibit their capacity to fully communicate with and treat their patients.¹¹⁷

¹¹⁵ Ibid 10

¹¹⁶ Ibid 13

¹¹⁷ Ibid 13

Given the spectrum of state policies, Arkansas lies on the more progressive end of regulations. However, while Arkansas is active in many respects, there are a few gaping holes that warrant some investigation. Issues of implementation are hinted at on paper, even before the difficulties of real-world application are visible on the ground. There are a handful of institutions that are directly and indirectly involved with regulating natural gas fracking in the state of Arkansas. Their jurisdictions often overlap in confusing ways that contribute to the general sentiment of apathy from the interviewed residents. The different agencies responsible are outlined below, along with their general responsibilities.

Arkansas Oil and Gas Commission

The Arkansas Oil and Gas Commission (AOGC) is charged with regulating subsurface operations of well sites and can be considered one of two primary regulators of practices in the field. Nine commissioners head the agency, and are appointed by the Governor for six-year term. The majority of these commissioners directly profit from oil and gas operations in Arkansas. In an e-mail exchange between the Arkansas for Gas Drilling Accountability and Larry Bengal of the AOGC, Bengal describes the commission as being made up of two attorneys, two petroleum geologists, a petroleum engineer, a chemist, and three oil and gas company operators. The three operators are Jerry Langley of Jerry Langley Oil Company, Mike Davis of Betsy Production Company, Inc, and Chris Weiser of Weiser-Brown Operating Company. Further inquiry reveals that in addition to these three operators, one of the petroleum geologists also runs an operating company (Chad White, of the Chad White Operating Company) in addition to

the resident petroleum engineer (Charles Wholford, of Wolf Exploration, Inc.). The nature of these companies is difficult to decipher, but it is sufficient to assume that they are subcontractors to the three main oil and gas companies in the region. Arkansas Code § 15-71-102(b) requires that at least a majority of the appointed commissioners "shall be experienced in the development, production, or transportation of oil or gas",¹¹⁸ however this provision does not necessarily entail requiring commissioners to have current and ongoing interests in the economic ramifications of the policies that these groups are shaping. This is a gray area where a clear conflict of interest can be construed as relevant expertise in the field.

This is a total of five of the nine sitting commissioners with a direct stake in the policies enacted by the AOGC. It is important to note that finding this information on the commissioners was not readily available. It was posted as a series of e-mail correspondences on the Arkansas for Gas Drilling Accountability blog. The only biographical information on the commissioners provided on the Arkansas Oil and Gas Commission website is the name and hometown of each commissioner. As the author behind *Stop Arkansas Fracking* website points out, eight of the nine commissioners live outside of the Fayetteville shale, and are thus insulated from the community outcry over this method.¹¹⁹ Arkansas Governor Mike Beebe has appointed five of the current members, and during a question and answer with citizens he was asked "how is it good public policy that a majority of Arkansas Oil & Gas Commission members have financial interests in the industry?" Beebe addressed this issue as "a legitimate concern" that he is

¹¹⁸ Provisions of Arkansas Code can be accessed through LexisNexis, details of provision mentioned here can be accessed at (<http://www.lexisnexis.com/hottopics/arcode/Default.asp>).

¹¹⁹ George Carden, one of the two attorneys on the board, is a resident of Searcy, a town located in White County.

guilty of, but added that commissioners have a vested interest in following regulations because they want to maintain a competitive advantage with other operators. His answer does not address the incentives behind creating regulations. Beebe promises that in the future he will focus on commissioners who will push “a consumer standpoint”.¹²⁰

In terms of implementation on the ground, the AOGC employs a total of thirteen full-time field inspectors to cover the entire state. These personnel are not granted the mandate to inspect wells, “because of safety concerns”.¹²¹ This begs the question of how effective inspections can be when, even on paper, inspection personnel are not equipped to inspect on-site.

Arkansas Department of Environmental Quality

The Arkansas Department of Environmental Quality (ADEQ) is responsible for regulating the surface impacts of fracking, along with all environmental regulations established by the Arkansas Pollution Control and Ecology Commission (APCEC). It is responsible for carrying out federally-mandated regulations.

In an e-mail correspondence with an ADEQ representative, I was told that landowners are the primary complainants. The department has received 198 complaints since 2010, mostly concerning construction activities and the application of untreated fracking fluids as a dust suppressant. While the anonymous representative I spoke to said that some operators are better than others, that “The ADEQ and the major operators in the FSP went through some rough patches, but we’re all on the same page now.”

¹²⁰ City Wire. Beebe quizzed on natural gas drilling, federal spending. 11 May 2011.

¹²¹ Ibid page 12.

This is congruent with complaints that I received from community members. Dirk D, a resident of Faulkner County, echoed a recurring theme throughout my interviews that ADEQ was not only understaffed and underequipped to properly inspect wells for violations, but that ADEQ was not particularly interested in looking for infractions. Dirk made frequent use of the ADEQ tip line to report activities at the wellpads located within sight of his backyard. He expressed his frustration and that of others in saying that

I have had one of them tell me to my face...*our goal is to work with the industry so there are no violations...*so your goal isn't to find violations? That would explain you and the oil and gas commission, why when you do inspections you don't even go to the well. You pull up to the gates, spend twenty minutes on your little computers, don't even open the gate, don't drive up to the well, that's some inspection! Can't find nothing wrong if you don't go there!

An ADEQ representative told me that the "vast majority" of complaints are deemed invalid. Dirk said this was attributed to the waiting time between reporting violations that he personally witnessed and the arrival of ADEQ representatives, often weeks later, after heavy rains had cleansed the area of immediately detectable toxins. In one instance, the companies were flaring off waste gas out of the drill heads., resulting in noxious fumes that permeated throughout Dirk's house and gave his family constant headaches.

I called ADEQ. I called them again. I e-mailed them. Nothing. So my wife wrote up an e-mail and sent it to the national EPA. The next day, a girl from ADEQ's Air division came up here saying "you opened up a big can of worms". I'm like, where have you been for three weeks? I said well now the diesel smell is gone, but I showed her pictures.

Unfortunately for Dirk and his wife Eva, they had to bypass their state regulators and go directly to the federal EPA where they were able to finally get a sense of responsiveness.

However, by then, the overpowering fumes had dissipated. The ADEQ has publicly listed all complaints on their website, but the date listed is the response date and the date of the original complaint was not listed. What is equally disturbing is the abrasive nature of the response: Dirk was made to feel like a nuisance for reporting conditions that were making it difficult for his family to live their lives. Dirk believes the problem is that ADEQ does not incentivize finding issues of non-compliance, and essentially creates an atmosphere of “giving away all this revenue in fines”. The ADEQ source informed me that the funds generated from fines goes into ADEQ’s Remedial Action Trust Fund, a state program similar to Superfund.

Dirk expressed exasperation in regards to the lack of accountability exhibited by the various agencies responsible for regulating fracking activities. While the general rule is that the AOGC regulates subsurface activities and the ADEQ reigns over surface issues, as with any environmental issue, these jurisdictions often overlap in unintended and confusing ways. In his experiences, Dirk has encountered a lot of resistance in his attempts to find responsiveness from the different agencies.

They all blame each other. Like, if there is a violation, they’ll say “oh that’s a violation of AOGC’s rule but ADEQ enforces it”. Or, “it’s a violation of an ADEQ rule but the Health Department enforces it”. Passing the buck and nobody takes action.

In an e-mail correspondence with another of ADEQ, I was assured that ADEQ conducts public meetings and hearings in response to requests from the public. There are two points in the permit process where ADEQ says that community members have the opportunity to present information that “may change the minds of the ADEQ”. A recent manifestation of this process was a hearing that took place in January 2013, in response

to a subsidiary of Southwestern Energy seeking a permit from ADEQ, requesting approval to dump up to 164,000 gallons of treated frack fluid into an unnamed tributary of the Arkansas River.

Guy Lester, the ADEQ representative presenting at the hearing, said that through the process of reverse osmosis, the fracking fluid would be left "almost pristine".

Showing a slide of a fox guarding a hen house, Lester explained that SEECO would "self-monitor" to make sure discharged fluids are clean before they hit the tributary. He said he knew allowing companies to police themselves worry some, but he said fines could be heavy and permits could be revoked if reports and inspections showed anything to be concerned about.

The imagery of a fox guarding a hen house was not perceived well by residents. Considering the lack of faith in inspectors, this reassurance did little to quell residents' concerns. Residents suggested that SEECO executives drink the treated water to prove to residents that it was safe for disposal in the pristine waters of this particular creek, which had been categorized as Extraordinary State Resource Water by the state. When asked, "What can we do here tonight to stop this?", residents were told that "as long as SEECO provides all the requested information, the permit was likely to be granted".¹²² Of those interviewed, no resident felt a sense of responsiveness or efficacy regarding the ADEQ. Their view was most certainly not reinforced back in 2011, when a subsidiary company of former ADEQ Director Marcus Devine's company, Poseidon Energy Services, was found to be responsible for illegally dumping fracking sludge in seven locations

¹²² Tucker, Anita. SEECO seeks permit to treat water. Van Buren County Democrat. 30 Jan 2013. Accessed on 24 Feb 2013. Can be accessed at (<http://vanburencountydem.com/news/local-news/seeco-seeks-permit-treat-water.html>).

throughout White County.¹²³ His company was fined a grand total of \$14,400 for the seven documented illegal dumping sites.¹²⁴

Arkansas Geological Survey

The Arkansas Geological Survey (AGS) has no regulatory authority over the activities in the Fayetteville shale. Its official goal is to provide geological information to develop and enable effective mineral, fossil fuel, and water resources while protecting the environment.¹²⁵ However, this objective, scientific mandate does not exempt this institution from holding power in the region and or even the politics of the current debate. The director of the AGS is Bekki White, daughter of the chairman of the AOGC and former petroleum industry consultant. A leading seismologist with the AGS, Scott Ausbrooks, was set to publish an article in a reputable seismology journal alongside Steve Horton of the Center for Earthquake Research and Information at the University of Memphis, titled *Disposal of Hydrofracking Waste Fluid by Injection into Subsurface Aquifers Triggers Earthquake Swarm in Central Arkansas with Potential for Damaging Earthquakes*, a paper that definitively asserts that there is a link between the disposal of fracking waste in underground injection wells and the dramatic increase of seismic

¹²³ Brantley, Max. Ex-ADEQ chief faces pollution reports. Arkansas Times. 17 Jul 2011. Can be accessed at (<http://www.arktimes.com/ArkansasBlog/archives/2011/07/17/annals-of-the-natural-state>).

¹²⁴ Brantley, Max. ADEQ meets with Marcus Devine. Arkansas Times. 22 Jul 2011. Can be accessed at (<http://www.arktimes.com/ArkansasBlog/archives/2011/07/22/adeq-meets-with-marcus-devine>).

¹²⁵ Arkansas Geological Survey website. Can be accessed at (<http://www.geology.ar.gov/home/index.htm>).

activity in the region.¹²⁶ Ausbrooks' name was taken off of the paper immediately before publishing at the request of Arkansas Governor Mike Beebe. As detailed in a *Mother Jones* article, journalist Michael Behar he recalls that

Ms. White conferred with our office," Matt DeCample, a Beebe spokesman, tells me. "We felt that putting the state and/or Mr. Ausbrooks as a coauthor would represent additional academic credentials beyond their usual scope of work. The survey is in the business of data collection, not interpreting that data and reaching conclusions." When I ask Ausbrooks for a better explanation, he laughs nervously. "Oh, let's just say, I want to say, but I can't. I'll just put it this way: There's money and politics involved."¹²⁷

Several residents expressed a more positive outlook on the AGS than other agencies. The agency is much more responsive to questions, and manages a much more accessible website. However, the power of the AGS is limited when it cannot regulate and when the political landscape surrounding and shaping it inhibit the opportunity to make policy recommendations.

The Fayetteville Shale Oil and Natural Gas Caucus

In 2011 members of the Arkansas Legislature created what was then referred to as the Fayetteville shale caucus, a group committed to voting in the interest of the natural

¹²⁶ Horton, S. Disposal of Hydrofracking Waste Fluid by Injection into Subsurface Aquifers Triggers Earthquake Swarm in Central Arkansas with Potential for Damaging Earthquake. *Seismological Research Letters*: 83(2). March/April 2012.

¹²⁷ Behar, Michael. Fracking's Latest Scandal? Earthquake Swarms. *Mother Jones*. March/April 2013. Can be accessed at (<http://www.motherjones.com/environment/2013/03/does-fracking-cause-earthquakes-wastewater-dewatering?page=3>).

gas industry. The group, headed by Senator Jason Rapert, announced their purpose in a press release, stating that

We, and many of our colleagues, agree that we need to send the right message to the business community that we appreciate their business and can find ways to work pro-actively through issues... We are confident this will be a constructive working group that will strengthen the relationship between this important industry and the people of Arkansas.¹²⁸

Eleven House Representatives and five Senators have signed on to this caucus, agreeing that they will unanimously stand against any legislation that runs contrary to the interests of the natural gas industry. These legislators all preside over districts that overlap the Fayetteville Shale. State representatives are not the only people committed to supporting the business environment most conducive for drilling. The County Judges' Association of Arkansas publicly announced opposition to a key ballot initiative that would have raised taxes on the natural gas industry. It is important to note that, two weeks prior to releasing this statement on behalf of the County Judges' Association of Arkansas, each of the judges from key Fayetteville shale counties received a truck from a natural gas company Chesapeake Energy.¹²⁹ These five county judges hailed from the five counties central for gas production in Central Arkansas: Cleburne, Conway, Faulkner, Van Buren, and White County.¹³⁰ Eva, a Faulkner County resident, explained that the motif of donating free

¹²⁸ Brantley, Max. Gas drillers get their own caucus. Arkansas Times. 10 Mar 2011. Can be accessed at (<http://www.arktimes.com/ArkansasBlog/archives/2011/03/10/gas-drillers-get-their-own-caucus>).

¹²⁹ Chesapeake donates trucks to counties in the Fayetteville Shale. The Log Cabin Democrat. 19 Feb 2011. Can be accessed at (<http://thecabin.net/news/2011-02-19/chesapeake-donates-trucks-counties-fayetteville-shale-0#.UYDLehx7c7t>).

¹³⁰ Buhrman, Matt. County Judges' Association of Arkansas opposes raising severance tax. THV. 20 Feb 2012. Can be accessed at (<http://www.thv11.com/news/local/story.aspx?storyid=197156>).

trucks to different agencies is a common modus operandi that has become a common practice in the region.

They know where to spread the money. Here, there's not a lot of money to go around. They'll say "we'll give you 10 thousand dollars to buy your upgrade equipment for your fire department, or here are 10 trucks for your highway department. That means a lot to people here. They aren't too excited about biting the hand that feeds them, even though that hand is killing them.

It is therefore understandable why residents who oppose fracking feel as if there is an overwhelming political tide in opposition to them. While Jason Rapert has made public calls for an independent report to assess state rules and regulations,¹³¹ the resulting report conducted by the State Review of Oil and Natural Gas Environmental Regulations (STRONGER) largely served to commend the industry and suggested only that notification be given to the state prior to hydraulic fracking operations begin, and that ADEQ and AOGC received more funding for field inspectors. While these are understandable recommendations, they do not make any policy recommendations and are careful to not incriminate the fracking industry in relation to increased seismicity in the area. The report also commends the AOGC for hosting a website that is "user friendly and educational", an assertion that this author personally contests.¹³² These results are easily attributable to the "non-profit, multi-stakeholder organization" of the STRONGER

¹³¹ Jason Rapert for Senate. Sen. Jason Rapert Requests Independent Review of Hydraulic Fracturing Rules and Regulations. 12 Aug 2011. Can be accessed at (<http://www.jasonrapertforsenate.com/content/sen-jason-rapert-requests-independent-review-arkansas-hydraulic-fracturing-rules-and-regulat>).

¹³² STRONGER. Arkansas Hydraulic Fracturing State Review. Feb 2012. Page 5.

members, which did not include any ADEQ representatives or representation of local stakeholders.¹³³

Agency Capture and the Fourth Branch

While many conclusions can be derived from the varying politics of the aforementioned agencies, what is clear is that there are few bureaucrats speaking for the residents on the precautionary side of the fracking coin.

Kelleher and Yackee sought to quantify the relatively unexplored connection between informal interactions between third parties and state agencies, and the degree to which these interactions influence the policies and state administrators. Although the answers seem obvious, these researchers found a significant positive correlation between time spent with interest groups and their subsequent effect on key budgetary and policy decisions.¹³⁴ Moreover, the perceived level of involvement of a third party in the eyes of a state agent directly correlates with group influence.¹³⁵ This impact of informal interactions holds true for the relationship between governors and state agencies, and legislators and state agencies.¹³⁶ This raises the question of who is really brought to the table in these debates. The informal interactions between state agencies and concerned

¹³³ Ibid 2. Three review team members were: Lori Wrotenbery of Oklahoma Corporation Commission; Wilma Subra of Subra Company Jim Collins of Independent Petroleum Association of America. The four official observers were Jamie Crawford of Mississippi Dept. of Environmental Quality, Debbie Doss of Arkansas Canoe Club, Jim Bolander of Southwestern Energy, and Nancy Johnson of the U.S Department of Energy.

¹³⁴ Kelleher, Christine A. Yackee, Susan Webb. Who's Whispering in Your Ear?: The Influence of Third Parties over State Agency Decisions. *Political Research Quarterly*:59(4). 29 Apr 2013. Pages 634-636.

¹³⁵ Ibid 636

¹³⁶ Ibid 638-639

citizens were not assessed in the study, but we can assume there would be a similar correlation. The question at hand is whether these groups are offered a seat at the table.

A recent shift in policy implementation that arose in response to the issue of inclusion of public concerns in these processes focuses on providing notice-and-comment periods to allow citizens and other interested parties to submit written responses to the decisions and proceedings of state agencies. Especially with the passage of the Administrative Procedure Act of 1946, scholars have assessed whether or not the mandated procedures of notice-and-comment allow for effective integration of public input into the bureaucratic process. Scholars generally agree that comment periods are ineffective in altering the course of policy implementation, but where these scholars disagree is the extent to which interest groups exert any influence in this stage of the process as opposed to citizens. Golden cracked open the question in a 1998 investigation that examined eleven different rules from three agencies, finding that public comments were unlikely to lead to significant changes. When these changes did occur, it was only when there was a large consensus among a large percentage of the submitted comments.¹³⁷ Shapiro found in a case study of nine different rules that agencies are more responsive to changes when the proposed rule is complex, and there is a high volume of submitted comments.¹³⁸ Yackee asserts that interest groups do hold weight in the comment period, by providing expertise to bureaucrats.¹³⁹ The findings of these studies indicate that notice-and-comment periods, one of the few avenues where citizens are given a platform to directly express concerns or grievances with policies, are not necessarily the

¹³⁷ Golden, M. Interest group influence in the rule-making process: Who participates? Whose voices get heard? *Journal of Public Administration Research and Theory*.8. 1998.

¹³⁸ Shapiro, Stuart. *Policy Science*.:41(33). 11 Dec 2007.

¹³⁹ Yackee, Susan Webb. Sweet-Talking the Fourth Branch: The Influence of Interest Group Comments on Federal Agency Rulemaking. *Journal of Public Administration Research and Theory*. :16. Page 104.

democratic and inclusive processes that they were originally intended and are not immune to politics. While the processes legitimize agency actions, they do not eliminate the marginalization of underrepresented groups in the process.

What I hope to demonstrate in unpacking of the political landscape and the assessment of ineffective representation at the bureaucratic level is that the oft-repeated sentiment of helplessness from residents of Central Arkansas is not empirically unfounded. Even residents who had positive sentiments towards the natural gas industry expressed a lack of faith in state agencies and representatives to provide solutions for residents. For these people, solutions were only possible when working directly with the companies or by reaching out to out-of-state resources. These are critical points that, when colored by residents' narratives, paint a picture of power and powerlessness in Central Arkansas communities.

De jure v de facto: Residents' lived experiences and fracking regulations

The following chapter will more intimately delve into the implications of state regulations and realities of their implementation for the residents of Central Arkansas, by integrating their experiences living with the unique brand of state regulation that Arkansas implements in regulating natural gas fracking practices. Their voices will evaluate the congruence or dissonance between the written word of regulatory statutes and the human element on which their implementation relies, and assess where political mechanisms are lacking to truly provide for the interest of residents of central Arkansas. Conversations with these residents paint a much different picture than the dry language of regulatory statutes. The politically-neutral language of scientific works suddenly gained color and texture: fugitive emissions became the ambient environment in which these residents' grandchildren play, and contamination suddenly represented the corpses of squirrel, deer, and birds found on residents' property.

Ethnographic Methodology

Eleven interviews were conducted over a one-week period. I first contacted a newspaper journalist who frequently writes stories in a local publication about the issues of fracking in the community, and additionally contacted the founder of the organization Stop Arkansas Fracking. From these initial two sources, I was given a set of potential sources. Beyond this first list, interviewed residents supplied me with personal recommendations and contact information for other sources. Potential interviewees were called or e-mailed and asked if they had the time to participate in a short interview

concerning their experiences with fracking in the region. Some interviews took place over the phone. Most interviews lasted approximately one hour. The residents I interviewed were noticeably more educated than typical Arkansas residents, and the majority of them were landowners in the region. The majority were referred to me because of their work in a community organization that was active in promoting fracking regulations or increasing visibility and working relationships with the gas industry. While most of the people highlighted in this work are significantly more active in the natural gas debate than the ordinary Arkansan, these citizens range widely in their perception of the industry and how they view future relationships between the natural gas industry and the communities of Central Arkansas.

Seth Kahn, in a chapter of his work *Putting Ethnographic Writing in Context*, says that the purpose of conducting ethnographies is not the cold collection of data, but rather to form relationships between writers and readers.¹⁴⁰ What ethnographies bring to the table is deciphering the relationships between people, events, and agencies. In negotiating access to the lives and insights of residents, my foremost concern was to remove my subjectivity and normative recommendations from my conversations to fully allow interviewees to drive the focus of the interview, and thus exhibit their conviction for their stance without feeling defensive. Kahn acknowledges that the lens in which we engage with other cultures is inherent to the process, but that “as long as you’re not trying to convince members of the cultures you’re studying to *think like you do*, to share your beliefs instead of your trying to understand theirs, you’re on the right track.”¹⁴¹ I opened

¹⁴⁰ Kahn, Seth. *Putting Ethnographic Writing in Context*. *Writing Spaces: Readings on Writing*, Volume 2:175-192. 2011. Page 185 Available at (<http://writingspaces.org/sites/default/files/kahn--putting-ethnographic-writing.pdf>).

¹⁴¹ *Ibid* 187, original emphasis

interviews simply by asking people their name and how they got involved with the fracking debate in Arkansas. In framing the interview by asking *how*, residents did not feel the need to defend their political views on the debate to a *why*. Rather, they presented stories relayed as a chronological narrative that provided me with insight as to the source of their mobilization and the developing complexity of their understanding and involvement in the issue.

Residents informed me that I would not find many locals who would be willing to talk about their issues with the natural gas industry, either because of the fear of being ostracized or because they had signed confidentiality agreements barring them from speaking negatively about their experiences with the industry. For the residents who did meet with me, they seemed more than willing to not only speak openly about their experiences but also more than willing to let me use their full names. Although I was given their explicit written permission, and although I am sure their experiences will be somewhat recognizable to others in the community, for the sake of this report I will only use the first names of residents. If an interviewee works within a regional organization, their first and last name will be used so that this research may hopefully promote their work. Industry representatives and regulators were somewhat responsive to questions by e-mail and phone calls, and their responses are included anonymously. While this research is concerned with getting a balanced view of the political landscape, it is clear that my research question is geared towards the citizen response to these socio-political changes and thus relies more heavily on the experiences of residents who live in fracking communities than those making the decisions. What follows is an integrated ethnography of residents who speak on various issues related to fracking. While the aim is to

contextualize the *de facto* scenario of regulatory implementation, the key research questions concerned the nature of residents' unrest with the industry. What standing do these residents have in the decisions that culminated in the current landscape of natural gas extraction, and the responsiveness of different political avenues to their concerns and grievances.

First, this chapter will explore the issue of severance taxes in the state of Arkansas, and how one man is trying to bring this hotly contested political battle to the hands of Arkansas residents. Then, the focus will shift to the issues of landowner v. mineral owner rights, and how this distinction has culminated in a recent legislative battle. The dramatic increase in seismic activity in Arkansas highlights national concerns associated with fracking, but the fears surrounding this change contributed significantly to the local mobilization of residents. This work will then look at how the confluence of pollution issues and public health issues has culminated in the region. This section will then end with an evaluation of the avenues available to residents to engage the industry and state actors: were any avenues of communication effective? If not, what are their alternative approaches?

Severance Tax Increase Initiative

One point of political tension in Arkansas is the issue of severance taxes. Severance taxes are taxes imposed on the removal of nonrenewable resources at their point of "severance" from the Earth. The fiscally conservative political culture of Arkansas has one of the lowest severance taxes in the United States for natural gas

extraction. While Alaska boasts a rate of 28 percent per thousand cubic feet, Montana charges over 12 percent, and Alabama charges a slightly lower 10 percent, Arkansas' official severance tax is 5 percent. The current tax rate is the result of a rushed special session of Congress called by Arkansas Governor Mike Beebe, in response to a citizen-led initiative filing that sought to allow citizens to vote on a severance tax increase. The initiative aimed to increase the tax from 0.3¢ per mcf to a flat 7%, with the proceeds going into a fund for road and highway repairs caused by the endless stream of semi-trucks transporting fracking fluid and natural gas from gas sites. Governor Beebe used his political weight to push the bill through, increasing the rate to 5% with exemptions, less than what the citizen initiative sought but significantly higher than the previous pittance.

However, companies enjoy many exemptions that result in the real tax rate averaging at the significantly lower rate of 1.5%, lower than all of Arkansas' neighboring states. Exemptions include "new discovery gas" exemptions, allowing companies to eschew paying the 5% rate until they finish paying off well-construction costs and begin making a profit. However, most wells run dry soon after the process of financing wells is complete.¹⁴² When wells run low, they are granted an additional tax reduction to 1.5% so long as they are producing less than 100 mcf per day. "High cost" gas wells are also granted a 1.5% tax rate, a designation that includes all fracking gas operations in the Fayetteville shale.¹⁴³

¹⁴² Franco, Cheree. New study on Arkansas's gas severance tax. Arkansas Times. 13 Jul 2012. Accessed on 25 Mar 2013. Can be accessed at (<http://www.arktimes.com/ArkansasBlog/archives/2012/06/13/new-study-on-arkansas-gas-severance-tax>).

¹⁴³ Arkansas H.B 1004": An Act to Increase the Severance Tax Rate on Natural Gas and For Other Purposes. 2008.

Some reformers argue that those taxes, whose purpose is to compensate the state for the costs associated with the environmental degradation that is associated with the extraction of natural resources, aren't even sufficient to cover the damage done to roads by the large tanker trucks that transport the natural gas from the rigs to the distributors. Politicians, on the other hand, counter the notion of the economic benefits of a tax increase by asserting that it would create an unwelcome business environment for natural gas companies that would drive them out of state. In the sensitive political landscape surrounding fracking, no legislator will attempt to pass legislation that would further increase the current severance tax without incurring negative publicity from the oil and gas industry, even just to tax levels more comparable to its Southern neighbors like Oklahoma (7%), Texas (7.5%), and Mississippi (6%).¹⁴⁴

The head of the campaign to hike up the severance tax arose in the unlikely character of Sheffield Nelson. Nelson is a Republican, a former CEO of the Louisiana Gas Company, and chairman of the former Arkansas Industrial Development Commission: a commission whose sole initiative was to incentivize industry in the state to attract companies and then protect their interests after they opened their doors.¹⁴⁵ Despite his career working in favor of the interests of the oil and gas industry, Nelson has been vocally in favor of increasing the severance tax to 7% for nearly three decades. After trying unsuccessfully to promote an increase through traditional legislative routes, in 2012 Nelson opted to circumvent the political system and bring the decision directly to

¹⁴⁴ Pless, Jacquelyn. Oil and Gas Severance Taxes: States Work to Alleviate Fiscal Pressures Amid the Natural Gas Boom. National Conference of State Legislatures. Updated Feb 2012. Accessed on 30 Mar 2013.

¹⁴⁵ Brantley, Max. Sheffield Nelson, unlikely severance tax champion. Arkansas Times. 10 Apr 2012. Accessed on 30 Mar 2013. Can be accessed at (<http://www.arktimes.com/ArkansasBlog/archives/2012/04/10/sheffield-nelson-unlikely-severance-tax-champion>).

the voters. In his words, “Too many of the legislators get their money from the oil and gas industry. The only way to do it is through the initiative process.”

Nelson’s proposed November 2012 initiative, titled the Natural Gas Severance Tax Act of 2012, sought to increase state severance taxes to a flat 7 percent, and eliminate existing exemptions. The proceeds of the proposed constitutional amendment would directly fund road projects to remedy damages caused by industrial transportation: 70% earmarked for state highway projects and 30% for city and county road funds. This is a departure from other states that use the funds to create a permanent trust fund to safeguard the state from a post-drilling era when these nonrenewable sources have been depleted. These states include Wyoming, Alaska, Montana, Colorado, New Mexico, North Dakota, and Utah.¹⁴⁶

This seemingly small increase in the severance tax was met with swift and brutal resistance from the industry, and they initiated an expensive smear campaign, with expected opponents from the oil and gas lobby, their industry-friendly legislators, and the Chamber of Commerce, which proved to be an exceptionally influential opponent. The Chamber of Commerce funded a study by the Perryman Group, whose findings echoed the opinions commonly expressed by legislators and gas executives: that the tax increase would cost Arkansas 9,986 jobs and 1.2 billion dollars in economic output.¹⁴⁷ The report argued that Arkansas’ severance tax rates were not significantly different from their neighbors, because other states also had policies in place to provide exemptions for the industry: Texas offers tax reductions until one-half drilling costs are recovered, and in

¹⁴⁶ Nyden, Paul. Study suggests putting severance taxes into trust funds. *West Virginia Gazette*. 29 Jul 2012. Can be accessed at (<http://www.wvgazette.com/Business/201207290061>).

¹⁴⁷ The Perryman Group. *The Potential Impact of Increasing Natural Gas Severance Tax Rates on Business Activity in Arkansas*. May 2012. Page 26.

Wyoming “new” wells are offered a rate of 2%.¹⁴⁸ While these examples are presented to make Arkansas’ rate look relatively competitive in comparison, Arkansas’ policies allow for tax relief until the full drilling costs are recovered, and a new well rate of 1.5% as previously stated, both of which continue to exemplify Arkansas’ lower relative tax rate.

The Perryman report also concludes that well production would be reduced by 8.5% with notable economic effects due to the associated multiplier effects throughout the economy¹⁴⁹. This reflects the general sentiment of the pro-gas lobby, who argue that this move would further cripple an industry already facing low gas prices due to an oversupply of their product on the market.¹⁵⁰ Nelson directly counters this notion, saying that the reason you don’t hear Arkansas governor Mike Beebe using this rhetoric, is “because he knows better”.¹⁵¹ He is of course referring to the previous severance tax increase initiated by Governor Beebe, and in assessing the current economic landscape of natural gas development, the increase did not result in an exodus of gas companies from the region. What, then, is the real motivation behind keeping the severance tax low? Faulkner County Judge Preston hints that the answer may simply be a resistance to altering the status quo. Preston, of the previously discussed Fayetteville Shale Caucus that includes state representatives and county judges committed to supporting a business-friendly atmosphere for the oil and gas industry, said that “We’ve grown with the industry

¹⁴⁸ Ibid 12-13.

¹⁴⁹ Ibid 15.

¹⁵⁰ Brock, Roby. Severance Tax Hike Study: 8,300 Jobs at Peril. Talk Business Arkansas. 12 May 2012.

¹⁵¹ Brantley 2012

and they've grown with us. We have a system that's working now. To go back and do this [raise the tax] is just, to borrow a term, a money grab."¹⁵²

Nelson further sought to combat allegations that increasing the severance tax would drive jobs out of Arkansas and increase the price of natural gas for consumers by going on the offensive. He commissioned Dr. Charles Venus to conduct a nonpartisan economic report to evaluate the costs. Venus conducted the study pro bono: he found that raising the severance tax to 7 percent would raise the state revenue by over \$150 million, money that would go towards hiring over 6,000 jobs for highway repair, the estimated costs of which are \$455 million in damages.¹⁵³ The results of this study point at the unexplored area of job growth created by this revenue increase, rather than focusing on the highly speculative loss of jobs in the Fayetteville shale region.

An article in the Arkansas Times stated that "In a fair fight-though it likely won't be, given the money to be spent against Nelson- he should win."¹⁵⁴ Nelson's campaign spent a total of \$170,000, mostly for petition circulating costs. The opposition, organized as a group called Arkansans for Jobs and Affordable Energy, raised over \$1.5 million: money spent on funding the Perryman Group study and, for those legislators who didn't publicly condemn the measure, full-page ads decrying them as tax-happy politicians were plastered in newspapers. The following ad was sponsored by the Arkansas for Jobs and

¹⁵² Freeman, Wanda. On the road, severance tax hike foes pan proposal. Pine Bluff: the Commercial. 1 Feb 2012. Can be accessed at (<http://pbcommercial.com/sections/news/state/road-severance-tax-hike-foes-pan-proposal.html>).

¹⁵³ Franco 2012.

¹⁵⁴ Brantley 2012.

Affordable Energy and appeared in smaller local newspapers in the Fayetteville shale

region.¹⁵⁵

**CLINTON MAYOR
ROGER RORIE
IS SUPPORTING
A 400% TAX
INCREASE.**

The Mayor wants to raise the severance tax on natural gas. Natural gas production is responsible for an estimated 16,000 Arkansas jobs in 2012 alone* - including many jobs right here in Van Buren County.

THIS TAX INCREASE WILL PUT THOUSANDS OF JOBS AT RISK.

Call Mayor Roger Rorie and tell him to oppose the natural gas tax increase - (501) 745-8110.

ARKANSANS FOR JOBS AND AFFORDABLE ENERGY
JobsAndAffordableEnergy.com

**Severance Tax Increase:
Bad for Jobs.
Bad for Arkansas.**

*Revisiting the Economic Impact of the Natural Gas Activity in the Fayetteville Shale, 2008-2012

Clinton mayor Roger Rorie, the target of the ad posted in the Van Buren County Democrat in July of 2012, faced much scrutiny and political backlash for his stance on the natural gas tax, but continues to express support for his measure. He continues to question where the 400% figure comes from in the ad, which implies that the tax would be a 400% tax increase on consumers.

Sheffield Nelson wasn't surprised by the blatantly false figures, and said that all of the ads taken out against supportive mayors "didn't have a shade of truth to them."

They had no intention of playing fair. It's called greed. They were bullies.

I hated seeing folks with some credibility get involved with their antics.

They put their hands in water that wasn't that clean.¹⁵⁶

The industry also went on the offensive in the field, taking the fight directly to the signature gatherers. Nelson hadn't anticipated that signature gathering would be an issue. The Arkansas municipal league endorsed the measure, and promised to use their network to get the campaign 50,000 signatures. While that many

¹⁵⁵ Mayor says tax stance his, not city's. 5 Jul 2012. Accessed on 3 Apr 2013. Can be accessed at (<http://vanburencountydem.com/news/local-news/mayor-says-tax-stance-his-not-city%E2%80%99s.html>).

¹⁵⁶ Nelson, Sheffield. Interview by author. Phone. 25 Mar 2013.

signatures would have made the rest of the campaign a simple endeavor, they only ended up garnering 2,000 signatures.

What happened in the process that hindered their capacity to get signatures? Nelson retells of stories where signature gatherers were publicly harassed, where gas executives would pay workers to go buy signatures off of signature gatherers who either believed that they were turning them in to the right person at the end of the day, or who felt they could benefit financially from selling the signatures to the opposition than turning them in. When that route seemed unlikely to get the necessary signatures, Nelson hired the agency Thompson and Associates. While this firm had experience in signature gathering for campaigns, they were understaffed and did not extensively check the validity of signatures. While Nelson submitted more than the required signatures needed to get the initiative on the ballot, but the Arkansas Secretary of State reported that only about 30 percent of the signatures were valid Arkansas voters. Many signatures were very obviously faked. Nelson suggests that this is an expected byproduct of the existing ballot initiative process, when canvassers are tempted to increase the volume of the signatures gathered and subsequently put more money in their pocket.¹⁵⁷

Nelson's proposal didn't make it to the ballot. While the campaign suffered from a major smear campaign on the part of the gas industry and the Chamber of Commerce, Nelson readily admits that internal issues with the signature gathering process equally contributed to the downfall of his campaign. However, he also doesn't write off the

¹⁵⁷ Brantley, Max. Sheffield Nelson 'suspends' gas severance tax petition drive. Arkansas Times. 24 Jul 2012. Can be accessed at (<http://www.arktimes.com/ArkansasBlog/archives/2012/07/24/sheffield-nelson-suspends-gas-severance-tax-petition-drive>).

potential for a second attempt in the next legislative cycle: this time, though, he is going to get his signatures.

The problem certainly exists. These people need to pay their fair share for the damage they are doing to Arkansas. The people of the state of Arkansas were abused because they were not given the chance to vote on something directly affecting them.

Nelson is optimistic about his measure passing in a future election, especially given the lessons he learned from this campaign and the changing tide of public opinion concerning the virtues of the natural gas industry. Writers Ernest Dumas and Max Brantley suggest an addition to his measure that could make it more politically palatable for politicians and the public: raise the severance tax, and redirect the proceeds towards consumers by eliminating the sales tax on natural gas.¹⁵⁸ While this would definitely help facilitate passing the severance tax increase, which would result in much-needed revenue to compensate residents for the destruction of their roads, this measure does not mitigate the environmental costs to residents or the state in any way. While it is one approach to balancing the costs of fracking, and while it is a symbolic litmus test of the value that a state places on its natural resources, this measure would not significantly alter the status quo of power dynamics in Central Arkansas communities. Through the continued difficulties that Nelson faces, this struggle typifies that even direct democracy is not exempt from the political power that oil and gas companies exert in the state of Arkansas.

¹⁵⁸ Dumas, Ernest. Brantley, Max. The lowly severance tax. Arkansas Times. 20 Feb 2007. Accessed on 3 Apr 2013. Can be accessed at (<http://www.arktimes.com/arkansas/the-lowly-severance-tax/Content?oid=868254>).

Landowner rights and notification

Forty-two years ago, Sandra and her father bought forty-acres of land in Heber Springs, Arkansas. The land has thick woods and a spring-fed creek running through it, and Sandra had plans to build four houses on this secluded haven to keep in her family for generations: one home for her, and three cabins for the families of each of her grandchildren to visit as they pleased.

Sandra exuded a quiet dignity, a stubbornness that has shaped her long battle with the natural gas industry and losing the dreams for her land that she held onto for decades. Sandra owned the surface rights to her land, and didn't know that the minerals underneath it were not included in her deed. Arkansas differentiates between landowners and mineral owners, and under the existing law mineral owners have supremacy. Should a mineral owner lease their rights to a gas company, the gas company has the right to manipulate the surface to access the minerals that are leased to them, regardless of the surface owner's wishes.

Although companies aren't required to negotiate with surface owners, it is more politically salient to do so rather than just constructing on someone's land.

They offered me money. I have letters from several years back that [XTO Energy] sent me trying to lease to me and I wouldn't because I value my land too much...I told them I didn't want them there. After awhile they stopped calling and I was worried they were about to do something. I had read enough to know they do what they want.¹⁵⁹

Sandra only discovered that operations had begun on her land when her and her grandkids stumbled across the well construction on a 500 x 500 plot. XTO Energy had

¹⁵⁹ Sandra. Interview by author. Subway in Conway, Arkansas. 20 Mar 2013.

bulldozed and burned down trees to make room for the wells. They had torn down a fence. Sandra found trash littered all over the ground: cigarette butts, fast food wrappers, and even a site where a rig worker had used her land as a bathroom and left their waste and toilet paper in the woods. Because she had chosen to stick to her guns and not sign a lease, she was left with less bargaining capacity and leverage than if she had negotiated with the companies.

A person who leases their land to people has the right to include a clause saying that you have the right to go out and inspect operations on your land, but if you don't sign anything then you don't have any rights. My point was that I have a right to be on my land...If you don't own your minerals, you cannot stop them in any way. You have no rights at all.... The Arkansas law says it is strictly a negotiation between [the landowner] and [the companies], and who's going to win when they have money and you don't?

Sandra called the police to report the littering on her land during drilling operations. An XTO representative asked her to leave, and when she refused to step off the land that had been in her family for decades, the representative threatened to call the police. Sandra held her ground.

They got there and I showed them the dead buzzard and all the cigarette butts I had collected off of my land...He takes my report and told me to go wait by the gate. He talked to [the gas industry representative] and came back...I said "they can't just order me off my land" and [the officer] said, "well, they can do whatever they want to".

Sandra wasn't arrested that night. She continued to visit the well site, and called the police again after she found cigarette butts within five feet of a well. She felt

that the risk of an explosion from that blatant negligence was a danger to her community and her land.

When the police arrived this next time, the officer had looked up her file. The gas representative showed up as well. They informed her that she was to be arrested for trespassing because she had received multiple warnings, and at this point she was a repeat offender.

I'm one of those that's real stubborn when I'm bein' pushed...I told them "that's fine, it'll be all over the news by tomorrow. Go ahead and do it". And the gas guy said "I don't think we'll be arresting anybody today". I got this all in the police report.

Sandra believes that XTO is the criminal trespasser in this situation, because the deed to the mineral rights beneath her land allowed for production until 2010 and the gas development didn't begin until August of 2011. The lease for the mineral rights was also filed in White County, not her county, and she thinks the deed may be illegitimate. In spite of the legalities, the reality is that the industry has operated on her land and will continue to do so against her will without legal repercussion under existing state law. Although the companies legally have a right to the minerals underground, they have scarred, polluted, and tainted the surface landscape that leads to it. Her family no longer has any intention of building a home on it, fearful of the chemicals that are in her water and her soil.

While the public is highly divided over the polarizing issue of fracking, it is difficult to comprehend the blatant disregard for Sandra's rights as a landowner that is codified in Arkansas law. Peyton Rose, an organizer with the Arkansas Public Policy Panel, hopes to change the situation for Arkansans. Peyton readily

admits that he is pro-industry, and that he and his family are royalty owners who directly benefit from the natural gas industry. But he stresses that this does not place him in a rigid pro-industry lens, and emphasizes that his positionality allows him to more deeply understand the gray nature of the debate, “It’s a lot more dynamic than dirty groundwater and broken fences. And these [oil and gas industry] people aren’t just running around trying to pollute the environment.”¹⁶⁰

As an organizer with the Arkansas Public Policy Panel, Peyton’s central goal is getting as many people to the table as possible so that he can try to help everyone. His central goal is to help those who are trying to find a middle ground, to find the solutions that represent the most equitable compromise. However, getting everyone to the table has been a long battle, “there was a major polarization that happened very early on that separated people into two camps: people pointing their fingers and people just trying to defend themselves.” Rose’s depiction of a political landscape necessarily includes the continued political influence of the natural gas industry, but he believes his work with both residents and the industry creates successes working within groups like Arkansans for Responsible Gas Development. This group represents several vantage points of the debate, and works directly with the industry rather than vilifying them. He asserts that this approach is more effective than a strictly citizen-based group because “you need to be able to work with the people who have the infrastructure. . . . five or six years ago it was just landowners coming together and nothing got done.”

¹⁶⁰ Rose, Peyton. Interview by author. Phone. 20 Mar 2013.

Peyton's work with both sides is what he hopes will result in the passage of the Landowner Notification Act, or H.B 2001, legislation that seeks to alter Arkansas' existing laws which currently grant supremacy to mineral owners over surface owners. The bill would require companies to notify landowners at least fourteen days before commencing their operations on their property.¹⁶¹ Peyton argues that this is the small, progressive step needed in the right direction.

Sandra reflects the sentiment of many others interviewed: she believes the bill doesn't go far enough. She argues that for working families, fourteen days is not enough notice, and doesn't provide any sort of process to prevent construction to occur. Essentially, it is the absolute bare minimum of change. H.B 2001 only covers notifying landowners, and does not aim to include a provision to notify neighboring landowners of impending fracking operations. In the current assessment of the relative power and powerlessness in the region, it is true that the bill does not involve any structural change of the status quo in current negotiations between gas companies and residents. It does not give landowners the leverage they need to protect themselves from unwanted exploitation. However, one cannot disagree that H.B 2001 is a necessary first step. In requiring companies to give notice, it allows for landowners to at least begin towards gaining the rights that they deserve. This legislation has been a long time in the making for Peyton. He argues that while this bill is small in terms of tangible progress, that it is indeed progress, something that the more radical faction of the pro-regulatory faction is unable to accomplish in the existing arena.

¹⁶¹ H.B 2001. Legiscan. The Landowner Notification Act. State of Arkansas 89th General Assembly, 2013. Accessed on 5 Apr 2013. Can be accessed at (<http://legiscan.com/AR/text/HB2001/id/812870/Arkansas-2013-HB2001-Draft.pdf>).

Fracking and Community Mobilization: Shaking up the community

Dirk and Eva own a stunning home outside of Greenbrier, Arkansas. Getting there requires taking a string of turns down country roads that traverse a sparsely populated landscape. One can't help but feel in awe of their property as you pull into the driveway. This was the dream of every retirement-aged couple: an expansive but cozy home with enough space to have all of the grandkids over for Christmas, in a neighborhood with wide open spaces in the pristine environment of the Natural State. Dirk and Eva certainly envisioned this home being a nucleus of their family gatherings, and they proudly told us that their son, a carpenter, helped build the home for them. The backyard faces a large expanse of wilderness, where Dirk and Eva would watch herds of deer grazing from their windows early in the morning.

Dirk's ready smile and quick laughter welcome you in as if you are family, and not a city-dwelling stranger who called him up and asked him if he would like to "share his experiences with the fracking industry". In telling their story, it quickly becomes evident that their beautiful home has turned from a respite to a prison. Bulldozers began leveling the land in the wilderness behind Dirk and Eva's house in 2009, and they assumed that it was construction for another housing development. No notification about the nature of the construction was disseminated to their community, and community members only found out after Chesapeake Energy had constructed three well pads and began fracking operations. They found out not through formal notification from the

fracking operator, but because of the deafening sound, the stadium lights used, and the endless shaking in their home that began in 2008.¹⁶²

In the nearly two-hundred years between 1811- 2009, Arkansas experienced 1,229 documented earthquakes. In the two years spanning 2010-2012 alone, there have been 1,570 earthquakes documented by the Arkansas Geological Survey, earthquakes that were additionally noted as “probable induced event[s]”¹⁶³ When this recent swarm of tremors began, most residents contributed it to a natural seismic event similar to that of the Enola Swarm, a cluster of earthquakes that occurred in the Central Fayetteville Shale area between 1982 until the early 2000s. Dirk recounts that the community was hesitant to link these events to the onset of fracking, “everybody was sayin’ ‘oh, it’s just like the Enola swarm. It just moved, it’s the Greenbrier swarm now’.” While the causes of the Enola Swarm remain unknown, the following figure contextualizes the vast difference in number and severity of earthquakes with then with the current seismic activity occurring in Central Arkansas.

¹⁶² Dirk and Eva. Interview by author. Personal residence in Faulkner County. 18 Mar 2013.

¹⁶³ Arkansas Geological Survey. Earthquake Archive. Accessed on 29 Mar 2013.

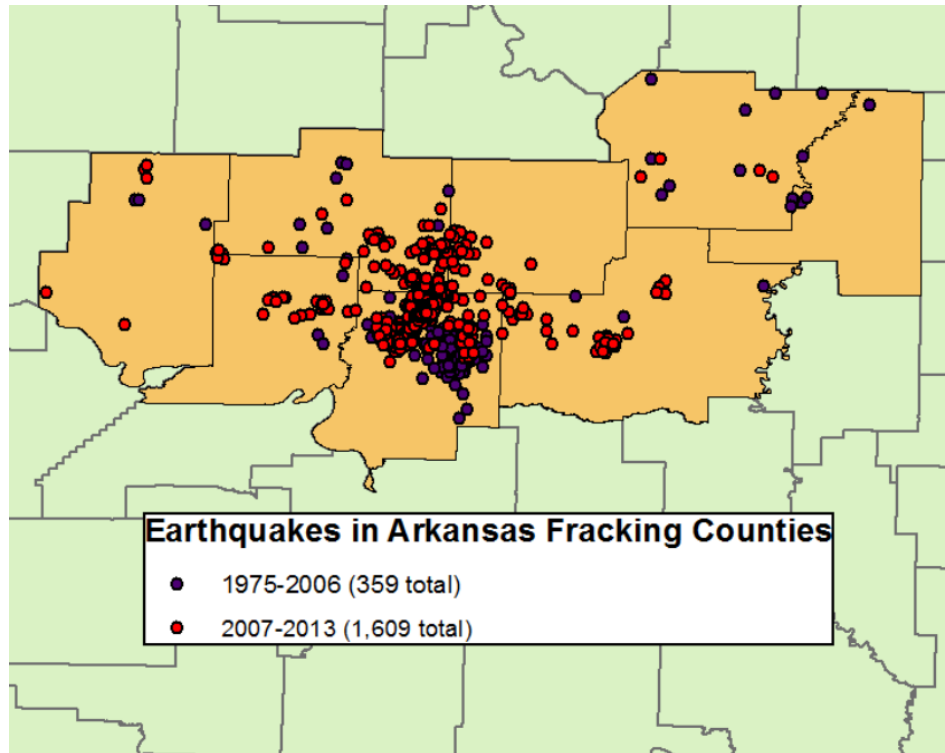


Figure 11. A comparison of seismic activity using data of all known seismic events. The entirety of the Enola Swarm, spanning over a decade, is not comparable to the activity seen in just the years between 2007-2013. 2007 was chosen because it marks a significant increase in fracking operations in the state.¹⁶⁴

Community members became increasingly concerned after a 4.7 quake hit that caused property damage at some homes. In response to the fear and uncertainty raised by this event, citizens formed the Faulkner County Concerned Citizens Advisory Group (FCCCAG) to focus the community's energy on emergency preparedness. Their primary mission was to ensure that the community and local authorities had a plan in case the big one hit. Originally, their antagonist was a faceless natural disaster that could potentially harm their families and against which their community had little defense. After the earthquakes were causally linked to natural gas operations, the Concerned Citizens realized that their unknown antagonist had a face. Thus, their citizen-based advisory

¹⁶⁴ Author-generated map. Data provided by the Arkansas Geological Survey.

group for earthquake preparedness shifted into an anti-fracking activist group, of which Dirk and Eva are active members.

While Dirk and Eva were organizing with residents of Faulkner County, the earthquakes also shook up residents of Van Buren County. Van Buren County, as mentioned previously, produces the highest volume of natural gas in the Fayetteville shale region. Tom is the founder and head organizer of the Shirley Community Development Council, a non-profit group that seeks to empower members of his community in Van Buren County. He works closely with Peyton Rose and acts as a mediator between the local government and residents. Tom arrived at our interview wearing paint-stained overalls and muddy boots. A self-described “country boy”, Tom threw me off when he described his lens on the fracking debate as an attempt to find Aristotle’s golden mean. With a doctorate in philosophy, Tom is an anomaly in central Arkansas communities. His commitment to protecting the people of his community has forced him to assess the gray area, or rather, the “golden mean” of the current debate to try to discern what is best for the most number of people.¹⁶⁵

Tom was instrumental in creating the Van Buren County Gas Advisory Board (VBCGAB). This group was also stirred up by the increase in seismic activity in the late 2000s, however, their origins couldn’t be more different than those of the FCCCAG. In 2010, Calvin Tillman came to Clinton, Arkansas in Van Buren County and gave a speech about his experiences as the Mayor of Dish, Texas. After overseeing the development of natural gas wells in his town, Tillman immediately realized that fracking operations were polluting his community. He commissioned an air quality study that found elevated levels

¹⁶⁵ Kimmons, Tom. Interview by author. Shirley Community Development Corporation. 21 May 2013.

of several chemicals present in the air including benzene, a known carcinogen. While there is no definitive link between the natural gas operations and the prevalent illness of Dish, Texas residents,¹⁶⁶ Tillman has become a spokesman for responsible gas drilling. Tillman's presentation in Clinton was received by a crowded auditorium, and got residents asking questions and demanding answers. The documentary *Gasland* was shown around the same time period, further inciting community interest. It is interesting to note that the Arkansas Chamber of Commerce released a letter before the showing of the documentary, criticizing the New York "schockumentary" filmmaker Josh Fox and asserting that "While questioning his scientific and journalistic integrity might be in order, what is not in question is the great benefit to our state that the exploration of the Fayetteville Shale has been in sustaining our economy during this difficult time."¹⁶⁷

Tom capitalized on the momentum in the community to reach out to other passionate citizens in the community to create a Gas Advisory Board, which was then approved as an official Advisory Board to the Van Buren County Quorum Court. However, approval for the VBCGAB did not come without a fight, "You could tell that the court didn't want to do it but they saw all those voters out there that were up in arms. So they appointed us." The VBCGAB had a specific goal: to conduct scientific testing and solicit community feedback, and ultimately submit a report of their findings to the Quorum Court. This also necessarily meant that the nature of the group was temporary.

¹⁶⁶ Hamilton, Jon. Town's Effort to Link Fracking and Illness Falls Short. NPR. 16 May 2012. Can be accessed at (<http://www.npr.org/2012/05/16/152204584/towns-effort-to-link-fracking-and-illness-falls-short>).

¹⁶⁷ Matthews, Gerard. State chamber bashes 'Gasland'. Arkansas Times. 18 Aug 2010. Can be accessed at (<http://www.arktimes.com/ArkansasBlog/archives/2010/08/18/state-chamber-bashes-gasland>).

While these two groups both share elements and vastly differ in certain regards, they both played a role in implementing a moratorium on underground injection wells in the region. Their fears that the fracking industry was a factor in the increased seismicity were reinforced by a report conducted by the Center for Earthquake Research and Information at the University of Memphis, which concluded that the earthquakes were definitively caused by fracking operations. While Arkansas has a history of mild seismic activity, this study found that 98% of recent earthquakes occurred within 6 km of one of three waste disposal well sites in the Fayetteville shale region of Arkansas.¹⁶⁸ This is the same report that Arkansas Geological Survey Geologist Scott Ausbrooks was pressured to remove his name from.

What had previously been dispelled as a myth by the industry was now decisively considered a fact: fracking waste injections wells caused earthquakes. The State Review of Oil and Natural Gas's (STRONGER) report of activities includes a confusing statement about the correlation.

Following an increase in earthquake activity in the Fayetteville Shale development area, there was conjecture on the part of some that the increase in seismic events was the result of hydraulic fracturing...The studies concluded that there was no indication that hydraulic fracturing operations were the likely cause of the increased seismic activity. The AOGC issued an order requiring one disposal well in the area to be plugged while the operators of three other disposal wells in the area voluntarily agreed to plug their disposal wells. The AOGC also placed a moratorium on new disposal wells within defined areas of the Fayetteville Shale development area.¹⁶⁹

¹⁶⁸ Horton 250

¹⁶⁹ STRONGER, page 15

STRONGER, largely considered an arm of the oil and gas industry, refuses to give credence to scientific findings that directly correlate the two variables. They present the moratorium and the plugging of injection wells as a precautionary measure, and not because of the community uproar. An ABC article attributes this to pressure from state regulators responding to constituent demand. Chesapeake Energy, which owned the closed injection well, did not agree with the closure arguing that “there is a lot of natural seismicity in this area”.¹⁷⁰

The moratorium was a huge victory for concerned residents that both groups claim as a victory. This key event marks the real progress that is possible when enough residents exert their political capacity to pressure their legislators, even progress that directly counters the interests of the oil and gas industry. Since the moratorium, the earthquakes have decreased dramatically. This hasn’t stopped the efforts of the two groups, but their goals and methods are vastly different. Emily said that the education and outreach her group has done were a deciding factor that led to the moratorium on deep-injection wells, although according to the official state report, any activities on the part of local activists had nothing to do with the decision-making process.¹⁷¹ Although the earthquakes have stopped, the work of CCFCAG is far from over. Dirk explained that the FCCCAG has since evolved and adapted to the needs of the community.

The earthquakes have stopped but there are other issues here. We got bad water. We got bad air. It’s an environmental health issue. We are trying to get data together about the public health problems, but you can’t prove anything.

¹⁷⁰ Bury, Chris. Are Arkansas’ Natural Gas Injection Wells Causing Earthquakes? ABC Nightline. Can be accessed at (<http://abcnews.go.com/Technology/hundreds-arkansas-earthquakes-linked-natural-gas-injection-wells/story?id=13431093#.UYIV6GWfQig>).

¹⁷¹ Lane, Emily. Interview by author. Phone. 19 Mar 2013.

According to Dirk, the size of the group has definitely dwindled from their prime during the initial stages of organizing, before the cause of the earthquakes was known. The group of previously over one-hundred residents has since dropped to around a dozen members, “Some have died, some have moved...a lot have moved. They’re just like ‘we can’t win this battle, were leaving’. I’m like, where you gonna go? They’re in 30 states.” While residents often show up to meetings to share their grievances and share stories, only a core handful are actively involved. To combat this, the FCCCAG has broadened their focus by addressing issues of public health in their community. They received a grant from the Robert Wood Johnson Foundation, for a total of \$4,800, to travel the state and present data that has previously been compiled by the University of Wisconsin Population Health Institute called County Health Rankings. The group is also participating in community-based air sampling as part of a larger project being conducted by the Global Community Monitor called the Bucket Brigade. This project aims to provide low-cost technologies and training needed to conduct citizen air testing, with the ultimate goal being to better inform residents of what is in their air and thus empower them with knowledge in what has thus far been a void of information from the industry regarding the potential dangers of the pollutants emitted during their practices.

The Van Buren County Gas Advisory Board also identified early on that baseline testing was critical to determine effects of natural gas development over time, and made it a central facet of their organization. In 2010, the group received \$7,000 to conduct baseline water testing for the surface waters in the county. Eighteen sites were selected for testing a whole range of chemicals, but the group intentionally selected volatile chemicals: heavy metals, chlorides, BTEX. What the chemists at the testing facility

didn't tell Tom is that volatile chemicals are notoriously difficult to detect on the surface. This initial testing process didn't detect much at the 18 sites chosen. Fortunately for Tom and the VBCGAB, the USGS stepped in and offered both financial and assistance with data collection to test for chlorides. Chlorides are stable, and their presence in water sources in the form of chloride plumes allows researchers to trace the chemicals back to their source. Duke University also offered to assist with methane testing in water wells. Tom was able to solicit support from his community for this research in ways that an outsider couldn't. In this way Tom is a more effective agent of engaging the wary residents of his community, residents who typify the marginalized voices that rarely feel empowered to speak out against environmental injustice in their communities.

If Tim [from the USGS] comes up here all the way from Little Rock and pulls up to someone's house they'll be like "uh oh, the government is here to help us", whereas this is my community. I can knock on doors and talk to people, explain what we're doing and that it won't cost them nothin'.

Their research found a lot of wells with high levels of methane, but other than that the group didn't detect any significant levels of pollutants or chlorides.¹⁷² Tom emphasized that their goal wasn't to find problems, that they employed dispassion in their data collection. What is important to him is that they have established a baseline. The VBCGAB expired at the end of 2012, but its members remain active through the newly created group called Arkansas for Responsible Gas Development.

¹⁷² The findings of their work can be found in the USGS report listed in the Bibliography. While no significant pollutants were found, the USGS stresses that this data was collected relatively early in the fracking development of the area.

Pollution, disclosure, and public health

For answers on how fracking has affected waterways specific to the region at hand I spoke with Sally Entrekin. Sally is a biologist with a particular interest in invertebrate responsiveness to changes in aquatic habitats, and is the leading author of a water sampling study in Central Arkansas that found a correlation between the turbidity of streams in central Arkansas and the increase of fracking operations.¹⁷³ Sally assured me that the findings in her paper did not necessarily imply causation: the increase in turbidity could have just as easily been caused by an increase in pastures. She also firmly established that she has no political agenda. Although her paper is an oft-quoted study that connects fracking operations to changes in water quality, she assured me that she was not some left-wing liberal. “I’m just collecting the data that is needed.”

In discussing the direction that research pertaining to water quality and fracking operations is heading, Sally characterized the current problems in the literature as “one problem is funding, and the other problem is funding.” Even with the surge of public interest in concrete analyses of the relationship between fracking and drinking water, the EPA focuses their funding on underground water sources and ignores the need for sampling done on surface waters. Sally felt that this disconnect was fundamentally misguided because streams and drinking water are hydrologically connected networks. Sally and her fellow researchers were able to get state funding for their work from the Arkansas Fish and Wildlife Service

¹⁷³ Entrekin et al 2011.

because of the presence of two species of federal interest in the creeks they sampled for their research.

Despite the existing funding landscape for this necessary work, Sally remained optimistic about future studies. She didn't describe a greater need for work directly evaluating the ties between gas drilling and water quality, because "if it's not natural gas drilling then it's something else." Ever the scientist, Sally's interest lies in the quality of the water, the political landscape of fracking was just one potential independent variable that could affect this. When asked about her opinion on the practice of spreading fracking fluid on roads as a method of disposal, she said that the practice could affect the conductivity of small streams and alter the environment for marine life, "we just don't know." She mentioned that there was a bill progressing through the House that would seek to increase the threshold for conductivity to allow companies to dump their waste fluid into small streams, "But that's not surprising."

Sally ended our interview by cautioning me to continually evaluate my lens in speaking with people who have a more personal stake in this issue, warning me that "the people you will talk to will be emotional." In saying this, she wasn't minimizing the lived experiences of those affected by fracking, but rather alluded to the mischaracterization of industry representatives that often accompanies negative experiences. She assured me that the natural gas industry isn't an evil industry full of evil corporate puppets. The problem, she said, was "process, not people." Sally intends to continue applying for federal and state funding to continue doing what she feels must be done, absent of any political

agenda.¹⁷⁴ However, her predictions about the emotions I would encounter were more accurate than I could have known. Even with her cautioning, it was difficult to separate emotion and blame from the facts of residents' stories.

Sandra's land that had been in her family for decades is now a fracking waste site. She and her family no longer have plans to build a home on the land given to her by her mother, especially given what Sandra knows about fracking fluid. The wells on her property are registered with FracFocus, a chemical disclosure registry that seeks to democratize knowledge about what additives are used in each drilling well.¹⁷⁵¹⁷⁶ According to the disclosure on Frac Focus, the well on Sandra's land used a total volume of 6,373,626 gallons of water, and contains hydrogen chloride, ethylene glycol, methanol, formaldehyde, and proprietary components. Hydrogen chloride is used to produce hydrochloric acid, which when in contact with skin produces redness and severe burns. Hydrogen chloride makes up 0.08278% of the fracking fluid on Sandra's land. With the large volume of water used in this particular operation, that means that over 500,000 gallons of hydrochloric acid has been injected beneath her property.

Theoretically, this pollution is contained in fracking pits that prevent these chemicals from leaching into soil and waterways, but like most environmental issues, the effects are not so cleanly contained. Taking a walk in her forested land in the heart of the Natural State, she no longer experiences the benefits of the rural environment that she intended to retire in.

¹⁷⁴ Entrekin, Sally. Interview by author. Starbucks in Conway, Arkansas. 18 Mar 2013.

¹⁷⁵ Frac Focus. Ground Water Protection Council. Interstate Oil and Gas Commission Copyright 2013. Can be accessed at (<http://fracfocus.org/>).

¹⁷⁶ The Frac Focus report for Sandra's well can be found in the Appendix A.

When you get close your eyes and nose start runnin'. It's really foul, the worst thing I have ever smelled. You can smell the antifreeze. There's nothing like it.¹⁷⁷



In practice, disposal is not always as clean as on paper.¹⁷⁸ A small stream that runs through her land has been compromised by large amounts of sedimentation from the bulldozing. The stream runs right alongside the siting of a frack pond which contains thousands of gallons of fracking wastewater. At least it used to, until Sandra caught the workers illegally bulldozing the fluid into the ground instead of disposing it within regulations. Despite having this photo, which shows a bulldozer covering a frack waste pond, Sandra received little support from government regulators. When Sandra called to complain, she

was told that they were simply building up the sides of the pond to reinforce it. She didn't buy it. How much of that was bulldozed into the ground and now runs through her soil and stream is unknown. Unfortunately, Sandra's experience seems to be consistent with that of other residents who reached out to ADEQ hoping for responsiveness.

¹⁷⁷ Photo credit to Sandra B.

¹⁷⁸ McCarty, James f. Reported waste dumping results in federal charges against fracking company owner. Cleveland. 14 Feb 2013. Can be accessed at (http://www.cleveland.com/metro/index.ssf/2013/02/reported_fracking_waste_violat.html).

They were covering it up and I caught them. I showed up and I called ADEQ and the gas commission and shortly after that they sent someone out to go pump it out. But they never sent anyone to go inspect it...they didn't test the soil, they didn't do anything like that.

During her many "criminal trespassing" incidences on her own land, Sandra collected water samples from the frack pond and had the water tested and found detectable levels of radon. Sandra found this concerning, considering that when she brought up her initial concerns about fracking fluid in a phone conversation with an XTO representative, he laughed and said, "Miss, you can drink that water and it wouldn't hurt you. It might make you sick, but it wouldn't hurt you." Later during her battle, during an in-person conversation with a representative, she offered a different representative a glass of frack pond water. The representative politely declined.

Don Richardson is interested to know what's in fracking fluid, but has other concerns. A former mayor of Clinton, Arkansas in Van Buren County, Richardson's conservation credentials are impressive. He currently sits on the Arkansas Natural Resources Commission, is the President of the Gates Rogers Foundation, and is a Field Officer with the Pew Charitable Trusts. "My major concern is that everything that has to do with natural gas drilling is disturbing the soil. They build a road to a pad, they build the pad, then they build the pipeline, it's all churning up soil and it's all non-point source pollution." Since his time as mayor, the water treatment facility is often overburdened with the sedimentation, the cause of the boil orders that are prevalent throughout the region. Richardson stresses that this is because fracking operators are not tailoring their practices to the region from the way they are accustomed to doing business, in places like Oklahoma and Texas that don't have the extraordinary water quality that Arkansas

boasts. Don Richardson is unique in that he doesn't believe that drilling operations and a clean environment can coexist, but that collaboration allows for the damages to be managed in a way that is acceptable. Don recently worked with SWN to oversee a \$900,000 grant to begin restoring a fork of the Upper Little Red River. Don suggested that ventures like this are where industry and residents can find a middle ground: the industry has the resources and the data, the question is how to best translate these resources into practical solutions for affected community members.

Unfortunately, not all residents are able to work as closely with the industry to find remediation for their pollution concerns. Dirk and Eva's experiences with fracking pollution first became evident when the companies that operate near their home began flaring the waste gas coming out of the wells. Before green completions were required of all Arkansas wells, the standard operating procedure was to burn off the greenhouse gases and other harmful chemicals emitted from the wells. Flaring began in 2010, resulting in the prevalent taste of metal in the air and an oily sheen on their walls and windows. Dirk and Eva no longer stand on their back deck watching deer play in the woods, because standing too long in their backyard leads to migraines, dizziness, and skin rashes.

Being retirees, Dirk and Eva commit a lot of their time to participating as fully as they can in the process where citizens are granted a voice. However, their efforts through various avenues have been met with resistance.

I have been going to the state water plan meetings, I asked for a handful of chemicals to be added to the toxic chemical tests of our water supplies. They had them in the draft up until July...but then they took them out. The Department of Health said in the June meeting "if we leave those chemicals in there...the state will lose half of its drinking water supplies".

So they know they're already there and they don't want to check for it. What I was asking for was toluene, benzene, thermogenic methane. There are a few things that only come from industry. But they don't want to check for them.

Dirk and Eva expressed equal difficulty in trying to work with the Arkansas Department of Environmental Quality (ADEQ). They have repeatedly called to notify the agency of infractions and hazards that they witness from their upstairs bedroom window, and express discontent with the response time of ADEQ regulators. They are certain that the industry takes advantage of this.

They always do their stuff on the weekends and state holidays when you can't call the state to turn them in. All the illegal dumping has been on weekends and holidays when you can't get anyone out here. People will send ADEQ pictures and even videos of illegal dumping and ADEQ won't come out here until two weeks later after a storm when all the pollutants have washed away.

Unfortunately for those who operate wells behind Dirk and Eva's house, Dirk is a retired industrial investigator who methodically notes the happenings of the industry in his neighborhood and community. He follows trucks that go to and from the property behind his home, and takes notes of their CAS numbers. He watched with his binoculars as frack fluid was sprayed into the woods with a fire hose, rather than properly disposed of. Given the often multi-week response times by ADEQ as noted earlier in this research, by the time inspectors show up dumped fluids have had time to soak into the earth or dissipate. In addition, there is no regulation of the water extracted from the many large and small waterways that create the lush, green woodlands of Arkansas' landscape.

Dirk mentions that the industry waned for a few years when the price of natural gas hit rock bottom in 2010, around \$2 per thousand cubic feet. The price has since risen, and companies have begun returning to their operations in the area. Dirk says that this relationship is noticeable in the climate.

They put us in a drought like I knew they would. If you look in the drought areas, that's where they were mass-producing natural gas wells. They used all the freakin' water...It's funny because when they were gone last year, it wasn't three weeks before it rained and it hadn't rained for seven months. Now the price of gas is up again, and they're back.

The roads in Dirk and Eva's community have been trashed by the endless stream of trucks running in and out of the fracking operations behind their house. When Eva attempted to contact the company directly about their grievances, they received a condescending note in reply that subtly suggested that, instead of complaining, that they be more grateful for the "blessings" that the industry has brought to their community.¹⁷⁹

Dirk showed me a shirt that his group wore to Washington D.C to protest fracking. In addition to having screenprinted "what the frack?" over the front, he had also written "turns out the blessing is a lie, and the myths are the truth" on the back.

Because that's what the legislators kept saying to us. We would say, "these injection wells are causing earthquakes" and they would say, "that's a myth". I would say, "they're tearing up our roads" and they would say "they're a blessing to the community". Blessing and myth, common words coming from the legislators, and those words are coming from the players' handbook.

Of the few condolences that Dirk and Eva find in their situation is that "there are other places where wells are in people's front yards". The wells that they watch from their

¹⁷⁹ The letter from Chesapeake Energy to Dirk and Eva can be found in Appendix B.

bedroom window and back porch are approximately a mile away from their home. Alma, another research participant, does not have that luxury.

Alma lives within 400 yards of a fracking well, and says that an elderly neighbor of hers lives within 180 feet of the same well. Her and her neighbors had attempted to halt the project during construction, but says that “the zoning director hand-delivered them a permit”. From an environmental policy standpoint, noise pollution does not register as significant on the scale of grievances with fracking practices. However, issues like noise pollution are so much more visible and immediate to residents, and understanding just how truly burdensome they are is only made possible through residents relaying how their everyday lives are affected. For Alma, the compressor is located right next to a cemetery, where her husband is buried. Funeral eulogies are drowned out by the endless cacophony of fracking operations. Living immediately near it, Alma described the noise as being “like you are at a train station with a diesel engine on twenty-four hours of the day”. She tried to communicate with her local representatives, and the attorney general, she said that while they assured her they were “working on it”, but that to her it seemed “as though no one was willing to step on the toes of the industry”.

Unlike Dirk and Eva, Alma’s direct communications with the industry were met with mixed success. Her frustration at the dead ends with her representatives led her to desperately craft an e-mail to BHP Billiton directly, the operators of the well. Instead of e-mailing their local headquarters, she sent her message to their headquarters in Australia. She received a call within hours, and the representative gave her the same assurance that it was a work in progress. She responded saying, “Why don’t you shut it off until you fix

it, then?” This conversation occurred at 10:30 in the morning. By 2:30 pm that afternoon, the rig was silent. Much like how elected officials can respond personally to a constituents’ complaint, and thereby gain rapport, Alma’s case proves that this is entirely possible when dealing with the industry. However, similar to the experience of other residents, she had to supercede the resources available to her within the state.

Alma says that her situation is better, but not ideal. A recent ordinance requires that all wells are soundproofed, surrounded by cumbersome soundproof barriers that are supposed to muffle the noise that has long plagued the lives of Alma and her neighbors. It has now subsided into a dull roar. Alma says that Southwestern Energy uses Red River compressors, which are noticeably quieter than other compressors, and that because BHP “went the cheap route” her community will never be truly silent. At least now for her the compressor runs intermittently, no longer roaring twenty-four hours a day.¹⁸⁰

Even the small victory that Alma won for her community is rare. But even Dirk and Eva, who have had no good experiences with fracking operators, aren’t arguing that fracking should necessarily be completely banned as a practice. They argue that fracking can be done right, and responsibly.

I’ve been to some wells in Clinton where there are no problems at all...then there’s other wells that are nothing but problems. It depends on what’s under the ground. There’s certain areas where they’re getting natural gas and there’s other areas where they’re releasing nasty stuff that’s under us... My wife said “God put it under there for a reason”.

Unfortunately for Dirk and Eva, the “nasty stuff” under the ground behind their home has directly affected their livelihoods. They tried to sell their home recently, but couldn’t bear

¹⁸⁰Alma. Interview by author. Phone. 21 Mar 2013.

the thought of selling their home to a family knowing the pollution would just burden another family. Dirk and Eva don't plan to run away any time soon, like many of their neighbors have.

My interview with Dirk and Eva lasted more than two hours. It could have easily lasted another hour, given the extent of their experiences, but unfortunately I had to leave due to a splitting migraine for the final twenty minutes of the interview. The migraine alleviated almost immediately after leaving their home, but the rash on my face and my mother's face took a few days to subside. What was a minor inconvenience to me is a stark, daily reality for Dirk and Eva. In a follow-up e-mail thanking Dirk for his time and hospitality, Dirk responded saying "I sure hope you's didn't get ill at our house, most do. Sad to have a half mil dollar home ya can't have your friends, family, grandkids at more than few hours not worry they getting poisoned".

Emily Harris is also worried about her grandkids. Emily has lived in the area for over 30 years, and works as a public health professional. Her interest in the long-term significance of public health effects on communities is what got her involved the fracking debate, and unlike many other residents she doesn't sugarcoat the situation in her community, "Living in proximity to industry comes with a price tag on our health. Southwestern Energy and Exxon are gassing our communities".

Emily has personally witnessed the health effects that accompany the introduction of fracking operations. She was born in Pennsylvania, where her father worked at a local refinery and she recounts that both of her parents died from pollution-related diseases. After Hurricane Katrina, she worked in the Gulf as part of the disaster response team. She saw Vietnamese children that looked like they had ringworm from head to toe. Instead of

providing the necessary physical treatment they needed, the industry paid for tons of psychological clinics and wrote prescriptions for depression. “Instead of treating people they are trying to drug them into forgetting.”

In addition to the effects on local residents, Emily is especially cognizant of the increased use of emergency room and walk-in clinics used by rig workers because of the injuries they sustain on the job. She said the industry creates an atmosphere of recklessness. Admittedly, she wasn't a huge fan of the workers to begin with. “They're scary. They need a shave and a bath, and they travel in large groups...Drugs and alcohol are not frowned upon at all in this industry.” Rather than discouraged, Emily H reiterated a point that was also made by Dirk and Eva: alcohol is readily available at frack sites and at the “man camps” that house thousands of workers. Alcohol creates an enzymatic reaction that anesthetizes the effects of chemical poisoning. It essentially coats the inside of the body and prevents immediate health effects from chemical exposure to take place. Dirk and Eva take a spoonful of grain alcohol a day to prevent them from being constantly dizzy. The drill workers consume larger amounts throughout the day to be able to continue their work.

Emily H has lost faith in the public health system in her community saying that they, like other government agencies, have been bought off. She describes a story from a few years back, when a gas representative showed up to do a presentation for medical professionals about the gas industry.

[He] gave an industry presentation with photos from Colorado and Ohio, none from Arkansas, told everyone that natural gas was a wonderful benefit to the state. The economic benefits were so wonderful, was going to make Arkansas independent. I looked around in a room of 80 public health professionals, every

single one was buying this crap hook, line, and sinker. I was the only one that stood up to say that there are so many things wrong with your presentation...I said "If you're not worried about the effects on the quality of water, you must accept that the influence on the quantity of water. How dare you approve the use of such a large amount of water for an industrial population, and populations needs come first". To put the gas industry ahead of community and agriculture, to me it's extinction waiting to happen.

Working with the FCCCAG, Emily H heavily involved in obtaining funding for community health research from the Roberts Wood Johnson foundation to create a Hometown Health Improvement Coalition, which will allow them to quantify the health of their community. Emily feels that this research will help their group better transition from awareness to action. The county health rankings are a door, they let her in to talk to people and engage them in what they are concerned about. Then she has the leeway to talk about how the group started in response to the earthquakes and then what caused the earthquakes. The results of her work with Emily Lane and the air pollutants monitored in the Bucket Brigade will largely inform their community health research.¹⁸¹

The FCCCAG and the VBCGAB were both effective at tapping into resources to measure their respective environments. They both also mobilized their communities and won a hard fought moratorium on underground injection wells. Their differences are subtle, and definitely reflective of their origins. While the FCCCAG originated as a purely citizen-based group in response to a disaster, the VBCGAB was an elite board reluctantly appointed by government officials and given a stake in the process. When VBCGAB became Arkansas for Responsible Gas Drilling, their political origins naturally primed them for cooperation and collaborating alongside the industry. The FCCCAG is

¹⁸¹ H, Emily. Interview by author. Phone. 19 Mar 2013.

not as receptive to industry, and perceives them as an enemy. The relative success of their respective strategies is largely shaped by the sociopolitical culture that they operate in.

The Sociopolitical Culture of Central Arkansas

In an assessment of the effects of fracking on a community in Pennsylvania, researcher Lena Connor found that the cyclical history of mineral extraction in the Upper Susquehanna River led to an “ethic of extraction” that leaves community members feeling as though their land isn’t worthy of environmental protection.¹⁸² The histories of timber, coal, oil, and now natural gas have seemingly scarred the landscape. In contrast, Arkansas is relatively unfamiliar with widespread pollution and the associated environmental degradation. The state has a rich history of conservation and a pristine environment that citizens take great pride in, and yet these communities are not organizing en masse to safeguard their unique landscapes from the demonstrated harms associated with fracking. This can be attributed to the long history of economic depression in the region, which unfortunately is another important aspect of the Arkansas narrative that holds equal weight in the minds of most Arkansans. The exodus of the manufacturing sector in the early 2000s left the area especially ripe for the exploitative atmosphere that surrounds an energy boom. Don Richardson explained how this history has lent itself to this mindset

[Residents] haven’t had anything in their lives and now all of a sudden this land out here that they’ve been livin’ on, that they’ve been eekin’ out a

¹⁸² Connor, Lena R., “Justified By Faith: The Upper Susquehanna Lutheran Synod and the Pennsylvania Natural Gas Fracking Controversy” Pomona Senior Theses. 2013. Can be accessed at (http://scholarship.claremont.edu/pomona_theses/83). Page 24.

livin' on is worth something. So in a lot of ways you can't blame them for that. They're not people who speak up readily.

In the landscape of Central Arkansas, the term environmentalist does not necessarily incite positive connotations with the majority of local residents. While the residents that I interviewed are actively involved in the political landscape of fracking, the true majority of residents express disinterest in the issue. Dirk reinforces the idea that the culture of Arkansas is not conducive for progressive environmental regulations. In his home state of New York, he argues that this would never fly.

New York will have a field day if they let them go up there and start fracking. They will make so much money from that industry, [the industry]'ll probably leave...because they're going to get hassled. Those people don't put up with the stuff they do here it's like one out of ten of us even care. I talk to ten people here and they're like "too bad", "shut up", "go home, Yankee". I'm like, "your water's bad too, fool!"

Dirk's statement brings up an interesting pattern that reiterated itself in other conversations with other actors in the fracking debate: locals would rather not rock the boat, and the local who seemed especially vocal about the issue tended to be significantly more educated than the average Arkansas citizen. Emily Lane summarized her understanding of this culture as a native Arkansan.

There's a lot of animosity in Clinton because the other factories closed, the only place to work is in the oil and gas industry. It's the South; you can't ruffle feathers around here. Everyone is concerned about what everyone else thinks.

Understanding this culture informs the FCCCAG's public health lens when engaging in their frackivism: the group first talks to residents about the effects of smoking and

unhealthy food, then as they get residents to discuss the health issues in their family they can begin talking about fracking. Emily's activism has not come without a cost: "We are definitely stigmatized in our community." This perception of environmentalists being outsiders does not help these activists when they are trying to work within institutional frameworks, either. When they brought forward several bills to the last Congressional session, they were called out by legislators as "outsiders" and "instigators".

Emily Lane argues that despite these barriers, community-based groups like hers have catalyzed changes in government policy. However, she also reflects the same sentiment of other activists in the area that widespread community mobilization will not happen organically given the demographics of the area. As many different sources confided, economic standing was very much related to residents' opinions about the gas industry, and while residents will show up to meetings they will not commit themselves sustainably to an organization. Tom Kimmons also regarded this as a factor in the current politics of the region.

Hillbillies just as a rule are independent, they're not joiners. They'll join a church and that's about it. As far as joining an environmental group, they'll come to one meeting and then they're done. This is like women's rights or civil rights...you can't just do it one time. It has to be a movement.

Emily is hoping that her film will turn things around, and draw attention to the conditions of her community. She is applying her education in film to increasing awareness about the situation in Arkansas. The trailer for Emily's soon-to-be-released documentary begins in saying that "We're doing this because we live here. Our childhood places are ruined, and will continue to be ruined. Even if we work hard, we mobilize the community, and

the video is a success, will anything change?” Emily H hopes that progress will come with a cycling in of the next generation of public officials, “Thirty years ago they drastically increased the federal work force, now those folks are older and not progressive and still holding on to their positions”. For Emily H, progress is not an option given the existing political structures that represent her community.

Peyton Rose argues that small steps towards increasing smart regulations that mitigate risk is definitely possible, but that the gas industry must be on board. Rose shows no sympathy for hardline environmentalists who say otherwise and refuse to work alongside the industry, and feels that radicalism inhibits the process.

Environmentalists can't get people to talk to them because they just have complaints, no solutions... Last year they brought forward seven or eight bills and they got their asses handed to them. They stood by their morals, and that's great and all but at the end of the day that's all they had to show for it... People say “we need more” but that's not how legislation works.

Peyton suggested that this deadlock between the industry and the anti-fracking faction occurred early on in the development of fracking operations in Arkansas. He describes the situation in simple terms: people began pointing their fingers years ago, and the industry took a defensive stance that has since prevented them from being open with communities. He said this early polarization continues to inform current debates, where camps are categorically black-and-white and the middle ground of the issue is rarely reported on. Tom Kimmons also experienced similar frustration with extreme anti-fracking activists, but says that the realities of the political landscape are not conducive for maintaining a “no frack, no way” mindset.

We've had some extreme radical individuals who originally tried working with us but lost interest...they wanted to shut everything down, no drill no way, and we couldn't work with those people. Not that we don't have any sympathy with the idea of stopping all of this, but we are realistic...What you can try to do is regulate. These people didn't want any compromise.

To find true compromise, one must look at communities in Arkansas that want to see the economic benefits of the gas industry but don't want their land irreparably damaged in the process. True compromise lies in finding golden mean. Fortunately, this seems to be the sentiment of most Central Arkansas residents. Before the VBCGAB disbanded, the group utilized a portion of their funds to conduct a local survey to gauge community response, key findings of which will be assessed here.¹⁸³

With a total of 237 respondents, 39% reported a change of odor, taste, or discoloration of their tap water. While the majority of residents did not notice a difference in air quality, those who did largely attributed the change to gas drilling.¹⁸⁴ The majority of residents had been affected by noise, and the majority of responses indicated that the roads had been worsened.¹⁸⁵ Only 4% of responses were from those working for the gas industry, and of that group, only one respondent had lived the Fayetteville shale play before becoming employed by the industry. An overwhelming 74% agreed that the industry has helped the local economy. Ninety-two percent agree that surface owners who do not have mineral rights deserve a say in what happens to their

¹⁸³ A full list of the findings of the community study can be found in Appendix C.

¹⁸⁴ Of the 23% who noticed a difference, 81% attributed the change to gas drilling.

¹⁸⁵ 60% and 70% respectively.

surface rights. 76% feel that the government does not regulate the gas industry properly.¹⁸⁶

These answers demonstrate that the community largely embraces the economic effects of the gas industry, but are also gravely concerned about how this theoretical economic engine is translating in practice. In hearing the stories of community members, it is clear that there is a huge disconnect between residents and their legislators. Clearly the natural gas companies exert a powerful influence over the legislators of the area, as evidenced by the formation of the Fayetteville Shale Oil and Gas Caucus. Even so, the continued existence Southwestern, BHP Billiton, and XTO requires at least some small part on their standing in the communities in which they operate, something that they currently enjoy because of their perception as critical job-creators in the region. Peyton spoke of the need for companies to increase their “social licensing” to reach out to residents that may have developed negative perceptions of the industry. Especially with the success of *Gasland* and the subsequent uproar of mainstream criticism, the industry feels the need to constantly rebrand itself with the community. Peyton feels that this type of social licensing will guarantee a longer lifespan of SWN operations in the community, and that this relationship with the community will make both parties more receptive to the idea of working together to find the “golden mean”.

Other residents don't trust the natural gas industry enough to simply ask for best management practices. Dirk colorfully referred to best management practices as “letting the crackhead run the drugstore”. What most residents called for was a repeal of the Halliburton loophole, a move that would drastically increase the oversight of the federal

¹⁸⁶ Van Buren County Gas Advisory Board. Community Survey. 2011. Findings can be viewed in Appendix C.

government and the recognition of fracking fluid as a toxic material. Rose's argument is that this approach is unlikely, and that his strategy is what is reasonably the most progressive method for delivering tangible results. Given the existing landscape in Central Arkansas, Peyton is right. For the alternate scenario to hold weight, communities need to be able to exert the type of outrage and influence about pollution as they do about man-made earthquakes. This is unfortunately not the current reality in Central Arkansas. However, should a critical shift occur that could once again shake up the community, this might be a demand that more residents can get behind. During our interview, Tom Kimmons said that these critical shifts in public opinion are often at the expense of experiencing a disaster:

I don't mean to be crude, but when you get people involved and upset and committed is when catastrophes happen. The big thing that happened that really got us going was those earthquakes...[residents] will come to meetings if an earthquake knocks them out of bed and your foundation cracks. We have not had any dead people. People do things when it hits them right in the face, we haven't had any massive earthquakes or massive spills or massive poisonings.

Conclusion: Power and Powerlessness

The Arkansan resistance to altering the status quo soon reach a critical watershed. On March 29th, 2013, an ExxonMobil pipeline channeling oil from Illinois to Texas ruptured and sent 19,000 barrels of oil spilling through the streets and waterways of communities near Lake Conway in Faulkner County. Storms drains leading into Lake Conway were overwhelmed with oil. Streets were covered in rivers of sticky black crude oil, and twenty-two homes had to be evacuated. The effects of the spill on the environment and wildlife was for some people an indicator of issues inevitable to the Keystone pipeline, and thus the spill in Arkansas has become a canary in the proverbial coal mine of long-distance oil pipeline development.¹⁸⁷ Days after the incident, ExxonMobil was awarded the Green Cross for Safety medal by the National Safety Council, for their “wonderful example of the role corporations can play in preventing injuries and saving lives.”¹⁸⁸ Residents don’t share this opinion. They are angry at what is easily the “worst spill in Arkansas history”, and this dichotomy highlights the continued disconnect between residents’ lived experiences and how companies operate on paper.¹⁸⁹

It will be interesting to how this spill affects the opinions of residents concerning natural gas. Because of the rhetoric of natural gas as the lesser of three evil non-

¹⁸⁷ Hays, Kristin, Robinson, Matthew. Exxon cleans up Arkansas oil spill; Keystone plan assailed. Reuters. 31 Mar 2013. Accessed on 6 Apr 2013. Can be accessed at (<http://www.reuters.com/article/2013/03/31/us-exxon-pipeline-spill-idUSBRE92U00220130331>).

¹⁸⁸ Graves, Lucia. Exxon Receives Safety Medal From National Safety Council Days After Arkansas Oil Spill. Huffington Post. 5 Apr 2013. Accessed on 6 Apr 2013. Can be accessed at (http://www.huffingtonpost.com/2013/04/05/exxon-safety-medal-oil-spill_n_3021132.html?ir=Green).

¹⁸⁹ Perpetua, Sofia. Arkansas residents seek millions after Exxon crude oil spill. NBC News. 7 Apr 2013. Accessed on 7 Apr 2013. Can be accessed at (<http://www.nbcnews.com/business/arkansas-residents-seek-millions-after-exxon-crude-oil-spill-1C9254722>).

renewable resources, in an arena with coal and oil, this spill could have a complementary effect on natural gas by leading to a demand in higher environmental regulations overall. However, the opposite effect could occur because of natural gas's posture as the cleaner of the two fuels, resulting in a rivalrous effect that could potentially leave residents arguing that the associated risks of natural gas are more palatable and cleaner than oil spills. In a follow-up e-mail correspondence with Emily Lane, she described the current atmosphere in Central Arkansas post-spill.

People are waking up... fracking has definitely been mentioned in public debate and in the community in relation to this oil spill. I suspect that this will really drive people towards our orgs, as they see us fighting for the people of Mayflower, and not just focusing on the Fayetteville Shale.

People will understand that we don't have some agenda against fracking, but that we care about all Arkansans and want to protect them from these types of disasters, no matter where they are or what industry/practice is affecting them.

Emily's experience seems to demonstrate that there is a complementary effect happening here, and that it is mobilize members towards their organizations, which is broadening their focus in response to community needs. It remains too early to declare any decisive victories. However this ultimately translates into the environmental ethos of Arkansas communities remains speculative, and warrants further scholarly attention.

Arkansas is on a threshold of public opinion. Many residents are looking for a change, but as in the case of the injection well moratorium, change only comes with intense public pressure on unwilling legislators. The rhetoric of government agencies being "bought off" by the industry is an open secret for Arkansas residents, and even

residents with favorable views of the industry readily admit that the oil and gas companies have captured local agencies.

While many existing efforts seek to find the “golden mean”, it is clear that the spectrum of interests between the residents and the gas industry weighs heavily towards the industry’s interests. Gaventa’s analysis of rural Appalachian communities in his book *Power and Powerlessness* attributes quiescence to the perceived powerlessness of communities in the face of seemingly insurmountable power dynamics. This perception works conveniently for those in power: not only do those in power set the agenda for what can and cannot be negotiated, but the powerful inhibit resistance by projecting their invincibility.¹⁹⁰ This is certainly applicable in Central Arkansas. What Peyton Rose regards as “the golden mean” is a much more convenient middle-ground than what gas companies would have to compromise if they were forced to sit down with the Faulkner County Concerned Citizens Advisory Group. This is especially evident given the results of the community survey. Over 90% of residents argued that landowners deserve a say in negotiations, and yet simply notifying a landowner that their land will be developed against their will is considered a compromise.

The lack of truly representative government in central Arkansas, and the perceived powerlessness of residents, means that the industry currently gets to decide what the golden mean is in the fracking debate, and subsequently the extent to which residents will compromise. Arkansans have already proven that they are capable of upsetting this monopoly on setting the policy agenda, by winning a hard-fought moratorium on underground injection wells. Given the intense national scrutiny

¹⁹⁰ Gaventa, John. *Power and Powerlessness: Quiescence and Rebellion in an Appalachian Valley*. University of Illinois Press. 1980.

surrounding fracking, changes can be anticipated from the top-down pending the findings of the EPA's 2014 report, changes that would quickly upset existing power structures in Central Arkansas. Arkansas fracktivists are currently working tirelessly to make sure that the Mayflower oil spill does not get swept under the rug as a one-time anomaly.

Emily Lane hopes that her documentary will also be a critical part of this shift, capturing both local and national attention the struggles of her small rural community in Arkansas. When she feels overwhelmed about the work ahead, about trying to educate residents about the dangers inherent in fracking that could potentially destroy her community, she said she is comforted by the idea that it may also just be a matter of time: "The oil and gas industry is doing our job for us: everywhere you turn, there are more victims to what the industry has done."

Appendix B

Dirk and Eva's letter from Chesapeake Energy, in response to complaints about road damage in 2010.



Community Affairs Manager
Corporate Development

May 6, 2010

Greenbrier, AR

Dear Friend:

The exploration and production of natural gas in the Fayetteville Shale has been a blessing to the state of Arkansas as a whole and to thousands of Arkansas royalty owners specifically. The associated economic activity has resulted in increased tax revenues, more good-paying jobs and millions of dollars in royalty payments to Arkansans.

However, we wish to acknowledge that this type and scale of progress is often accompanied by inconveniences, which is what you are experiencing as a resident living on or near road.

Chesapeake Energy is one of several operators actively developing minerals in and around the immediate road area. Our work is expected to continue into the foreseeable future.

Road, like many other county roads throughout our state, was simply not engineered and built to withstand the amount of weight that our trucks often carry while transporting equipment in and out of drill sites. This, along with a particularly harsh winter, has placed a great deal of stress on all county roads.

Please know that we are not avoiding our responsibility to maintain the integrity and safety of Road. On the contrary, we work regularly with the Faulkner County Road Department to make certain that proper repairs are made, primarily by our reimbursing the county in full for all incurred expenses or by our contracting with a third party to make repairs. Additionally, we use dust control measures and will step up those efforts in the late spring and into summer as the amount of rain we receive begins to diminish.

Once our work is complete, you have our commitment that Road will be returned to a much improved condition for your longer term satisfaction.

We genuinely appreciate your patience and entrust we can continue to address your concerns in the coming months. If you have any questions, you may reach me at

Sincerely,

A handwritten signature in black ink, appearing to read "Robert Zeiler".

Manager - Community Affairs

Chesapeake Energy Corporation
1401 West Capitol Avenue, Suite 430 • Little Rock, AR 72201
501.374.4005 ext 5971 • fax 501.374.4012 • robert.zeiler@chk.com

4-2 Of those that noticed a difference in air quality:

55 attributed it with gas drilling (81%)

13 did not attribute it with gas drilling. (19%)

68 Responses

Section 5

5-1 Have you been affected by noise?

89 said no (40%)

134 said yes (60%)

223 Responses

Section 6

6-1 Have the roads that you travel on a regular basis improved, worsened, or not changed.

155 said roads are worse (70%)

39 said roads had improved (18%)

26 said roads had neither improved or worsened (12%)

2 said the roads had improved and had worsened (<1%)

222 Responses

Section 7

7-1 Do you think the gas industry has helped the local economy

56 said no (26%)

163 said yes (74%)

219 Responses

7-2 Do you work for the gas industry?

215 said no (96%)

8 said yes (4%)

223 Responses

7-3 If yes, were you living in the FSP before becoming employed by the gas industry?

1 out of 8 answered yes to question 7-3.

7-4 If no, will you stay when your job ends?

No answers for this question.

7-5 Are you a resident of the FSP who does sub-contracting work for the gas industry?

13 said yes (8%)

157 said no (92%)

170 responses

7-6 If yes, has the increased gas drilling helped your business?

13 said no (48%)

14 said yes (52%)

27 responses

Section 8

8-1 Do you think gas drilling will affect, will not affect, or has already affected property values.

127 said property values have been affected (58%)

16 said property values have not been affected (7%)

76 said property values will be affected (35%)

219 Responses

8-2 Of those that said property values have or will be affected:

103 said property value will go down (53%)

90 said property value will go up (46%)

3 said property value will do both, go up and down (1%)

196 Responses

8-3 Do you plan to sell you property if value goes up or down?

4 said they would sell if property goes down (2%)

8 said they would sell if property goes up (4%)

12 said they would sell if property goes up or down (6%)

177 said they would not sell either way (88%)

201 Responses

Section 9

9-1 Should individuals who DO NOT own their mineral rights, have a say in what happens to their surface rights?

All Responses

No	18	(8%)
Yes	209	(92%)
Total	227	

Property Owners w/Minerals

No	16	(10%)
Yes	144	(90%)
Total	160	

9-2 Do you think the federal government, the state of Arkansas, or the county governments within the Fayetteville Shale regulate the gas industry Properly?

All Responses

No	152	(76%)
Yes	49	(24%)
Total	201	

Property Owners w/Minerals

No	103	(73%)
Yes	38	(27%)
Total	141	

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