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Student’s name: Deborah A Johnson

This work and its defense approved by:

Committee chair: Nicholas Dunning, Ph.D.
Committee member: Martin Pasqualetti, Ph.D.
Committee member: Colleen McTague, Ph.D.
Committee member: Kevin Raleigh, Ph.D.
Committee member: Roger Selya, Ph.D.
New Energy Landscapes of Pennsylvania: Forests to Farms to Fracking

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Deborah A. Johnson

Bachelor of Arts, French – Indiana University of Pennsylvania – 1981
Bachelor of Arts, International Studies – Northern Kentucky University – 2001
Masters of Public Administration – Northern Kentucky University – 2007

Committee Chair:
Nicholas Dunning, Ph.D.

Committee Members:
Martin Pasqualetti, Ph.D.
Roger M. Selya, Ph.D.
Colleen McTague, Ph.D.
Kevin Raleigh, Ph.D.
ABSTRACT

This dissertation adds to the literature on energy needed by industry, government, and citizens for decision-making. The pursuit to access or create new energy resources spawns new landscapes of energy in the early 21st century. The combination of hydraulic fracturing and horizontal drilling technologies – popularly called “fracking” – enables entry into previously inaccessible natural gas reserves such as the Marcellus shale much of which lies beneath Pennsylvania. Although this unconventional method offers a promising source of domestic energy and job growth, the potential for negative impacts raises concerns and questions. The questions include: What is the controversy about fracking in Pennsylvania? What are the impacts of fracking? What costs is Pennsylvania paying as it shifts to shale gas extraction? Are there activities taking place or material signs that point to the emerging new landscapes? Are the individuals and organizations that resist shale gas extraction – the so-called “Green Forces” – and others who live within the region of development more or less attuned to these costs?

A mixed methods approach consists of landscape and stakeholder analyses including visual examination of GIS-generated maps, satellite images, and photos taken in the field specifically from four counties: Washington, Warren, McKean, and Bradford. Research captures stakeholders’ voices across the public, government, and private sectors at different scales. A stakeholder matrix facilitates data organization and analysis. Data include 114 individual statements from an EPA Public Meeting, texts from 40 online-newspaper articles or blogs, and face-to-face interviews or focus group participation of 36 individuals. Further data come from a public health conference, industry convention, and public protest.

The new energy landscape covers spaces in Pennsylvania where oil and gas development previously had not been present. It obscures as well as exposes the legacy of past energy landscapes such as clear-cut forests, coal mining, and conventional drilling that linger in forests, in the minds of older residents, and photos of the past. Contest ensues between “green forces” and industry that utilize different tools for land use control.

Differences surface between what the oil and gas industry knew before, and what it is learning in the early 21st century. The magnitude of shale gas technology includes larger and more sophisticated machinery,
higher pressured fracking, increased material amounts, varied land use, and impact on public infrastructure. Cultural differences occur between Texan gas field workers and local Pennsylvanians generated by different physical geography, climate, and regulatory framework.

Further findings demonstrate a wide gap in communication between those of differing ideologies. Some stakeholders show up in the matrix as “omitted” from decision-making including small businesses and conventional drillers, public health sector professionals, and water well drillers. Other findings show an unwillingness to share in the costs of energy development. Interviewees explain the costs that they endure as the country pursues energy security, while others outside of Pennsylvania take in only the benefits. Over time, society conforms as a new “normal” is formed. All of this takes place while the world is watching Pennsylvania evolve through the early stages and unknown outcomes of shale gas extraction.

Keywords: Stakeholder, Energy Landscape, Hydraulic fracturing, Marcellus shale, Natural Gas, Land use
Dedication

My father Virgil H. Kittner, Jr., whose young passing taught me to pursue my dreams “now.”

My mother Sally Kittner, who unfailingly asked, “Are you working on your paper?”

My Pennsylvania siblings Cheryl, David, and Dawn who regularly added information about “The Woods,”

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Bradford County Residents
Members of the Meeting of the Bored
PREFACE

During 2010 through 2012 while I conducted research, the issue of fracking was hugely contentious. (The controversy continues as I write this paper in July 2014.) Perhaps the largest concern was the potential for fracking to contaminate drinking water. Although there had been anecdotal evidence of gas industry accidents, some of which were true, in other accounts the findings proved differently. For example, the documentary film Gasland (Fox, 2010) sparked worldwide fear that natural gas development caused methane to enter private water wells, migrate through the kitchen water faucet, and explode into flame when lit. The film’s iconic flaming faucet scene took place at a residence in Ft. Lupton, Colorado. The owner had filed a complaint that the gas industry had caused the impact to his water. In fact, on September 30, 2008 the state of Colorado concluded that the methane in his flaming spigot originated from biogenic methane, or naturally occurring methane in the ground, and that there were no oil and gas related impacts to his water well (Colorado Oil and Gas Conservation Commission, 2008). The following two excerpts are findings from my interviews in Towanda, Bradford County’s county seat, that relate to the fear and contention about water contamination.

1.1 The Flame Test

Ron Russell, retired PA DEP water quality inspector, describes the following scene from the late 1990s, more than 15 years before fracking would take place in Bradford County…

“I remember one house I went into down near Wyalusing where the guy was from down state and had built a brand-new house and contacted our office and said, ‘I think I have gas in the water.’”

And I said, ‘What makes you think you have gas in the water?’ I’d never run into methane down in that area.

And he says ‘Well watch this!’ And he reached over and he turned on the water spigot and he let the water run a few minutes and he reached up into his cupboard and brought out a box of wooden, what we call, barn burner matches. And he says, ‘John, you better step back.’

And I say, ‘You’re kidding me!’

He says - I stepped back a couple paces - he says, ‘I mean on the other side of kitchen.’
So I walked to the other side of the kitchen. He stood over…and he struck a match and he threw it in the sink and there was this gigantic ball of flame that completely covered the recess above the kitchen sink. I just could not believe the amount of flame he had in the kitchen! And, my parting and my written direction to him was to disconnect this well and get it the heck out of this house. ‘Man, you’re gonna burn your house down!’ And the man had not even thought of doing that. He had to have somebody else tell him (Interview at the Meeting of the Bored, April 9, 2012).”

1.2 The Well-kept Secret

Next, Lyle Harding, retired USDA program director discusses the local water. In his conversation he mentions the municipalities of Dalton, Dimock, and Granville which are each located within 55 miles of Towanda. In January 2009, a water well that exploded in Dimock related to poor gas industry practices sparked a combative and ongoing dispute. The PA Department of Environmental Protection (DEP) determined that Cabot Oil and Gas had improperly cased and cemented gas wells nearby which led to groundwater pollution by natural gas (Shankman, 2009). Other residents in the vicinity reported contaminated wells. By July 2012, the federal EPA had determined that five of some 60 tested water wells in the vicinity did contain hazardous substances, but that they were naturally occurring and not due to gas operations (EPA, 2012b). In Granville another highly contentious incident took place in April 2011. Resident Crystal Stroud accused Chief Oil and Gas of contaminating her well water. In July 2011, the PA DEP wrote to Ms. Stroud that tests it had conducted on her water well showed that the contamination was not due to gas drilling operations, but local pre-existing conditions (PA DEP, 2011 cited in Chief Oil and Gas, 2011). Both incidents sparked intense controversy. I found Lyle’s following comments somewhat of a surprise.

“We’ve had bad water in the area for a long time. I’ll give you an example. I worked for the USDA, actually the Conservation District, [we] built a new office in Dalton. We couldn’t drink the water, we’re talkin’ say 20 years ago. It had barium; it had arsenic in the water, manganese, sulfur. We had to treat the water before we could drink it. That’s what we have. That’s what people are finding out. It was a well-kept secret. Nobody wanted to talk about it because it would lower the value of their house! You’d test it for bacteria, not for anything else, and, OK. All you hear is the big thing about the Dimock area. OK? Most of the people in the Dimock area moved in from other areas.”

Ron Russell clarifies, “From the city where they had public water.”

Lyle continues, “Whether or not, Cabot, I think, was kind of a sloppy operator over there and they had some accidents and they had spills but not all the water was affected. And a lot of that water, it wasn’t tested before hand, so everything they tested afterwards they said we’ve got all this stuff in the water. Well, it was probably there. Now they’re blaming the gas
companies. We had a case out here. What was it? Over on Granville. But they already knew they had a problem. But they started blaming the gas companies.

Ron added, “There were areas in the county in the northern tier here that had water problems.” His voice rose and he emphatically stated, “They were normal problems” (Interview at Meeting of the Bored, April 9, 2012).

As local stakeholders in the Marcellus shale, these gentlemen’s comments introduce the wealth of information in my research. Their stories add to the many others that I recorded during my interviews, and to the overall richness of data that follows.
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CHAPTER 1: INTRODUCTION

Within less than 10 years from 2004 to 2012, a new technology arrived in Pennsylvania that would begin making its presence felt upon the landscape. The technology was the combination of hydraulic fracturing and horizontal drilling to release natural gas from the deep, black Marcellus shale deposits that lie beneath much of the state. Those in the oil and gas industry had already been calling hydraulic fracturing ‘fracing’ with a hard ‘k’ sound, but in popular jargon it became spelled differently as ‘fracking.’ In a short time, in popular parlance fracking came to mean more than just hydraulic fracturing, but the combination of it with directional drilling.

Fracking enabled access to previously unreachable spaces below the Earth’s surface by drilling more deeply and farther than traditional or ‘conventional’ methods. According to John Harper of the Pennsylvania Topographic and Geologic Survey, wells can be drilled to depths of 5,000 to 8,000 feet and upon reaching the targeted area can be extended horizontally by another 3,000 to 5,000 feet where previously the horizontal reach was only “a few 10s of feet” (Harper, 2008, p. 11). The process of fracking forces sand, water, and chemicals under high pressure through a well casing to better break and penetrate shale to facilitate the release of natural gas. Consequently, formerly untapped reserves of hydrocarbons deep below the earth’s surface and trapped within hard shale are now accessible for extraction. Additionally, due to the 90-degree turn the drill makes upon reaching the reserve, municipalities, wetlands, or other areas with restrictions on surface drilling no longer inhibit access as the drill quietly slips beneath them.

This new extraction method creates economic, political, and environmental benefits and costs. For example, economic benefits consist of an increase in jobs, royalties to land owners, and new source of government revenues; political benefits include increased energy security due to less dependence on foreign oil; environmental benefits include minimized damage to the earth’s surface and the “lowering of carbon emissions from industry, power generation, and transportation as the U.S. moves to a greener economy” (Flavin 2010). Typically the costs are environmental or social with the public paying the price for the consequences such as blowouts or uncontainable releases of oil or gas when complex pressure systems fail,

1 Since 2010 when I began my research, fracking technology has advanced to even greater depths and further horizontal reach than the numbers Harper gave in 2008.
damaged roadways from heavy equipment, and increased demand upon public services such as emergency responders to drilling accidents.

Numerous stakeholders are involved from the private, government, and the public sectors including industry, government agencies, and citizen organizations. This dissertation addresses the impact of fracking, the new technology, on society and landscape in the region of the Marcellus shale of Pennsylvania, or the “sweet spot” in the new shale play. Landscape analysis and stakeholder analysis are central to the study. A ‘stakeholder matrix’ is designed and applied to facilitate analysis that incorporates the public, government and private sectors across scale from the individual through global. The matrix offers a means to comprehensively discover and analyze activities and relationships among individuals and organizations placed within its cells.

The paper begins with an overview of past and present natural gas drilling in the Commonwealth of Pennsylvania (PA), basic explanation of mineral rights, and a summary of U.S. concern for its energy supply. Next, a literature review of landscape analysis, stakeholder analysis, and introduction of the “stakeholder matrix” situates the research in its theoretical context. Then, a narrative comprising two years of data collection through various activities in different places is told in sequence to describe the findings. The narrative includes observations of “green forces,” various organizations that attempt to hold back the advancement of fracking in different communities. The narrative also includes data in lists such as private stakeholders working in the Marcellus Shale play, transcribed face-to-face interviews with some of the more than 40 interviewees, and transcribed audio recordings of 114 individuals providing input for a federal government study. The paper then provides an analysis of the new energy landscapes, discerning stakeholders through the matrix including their interactions or non-interaction within or between sector and scale, and images that depict the presence of the new technology. The dissertation concludes with a summary of the findings, recommendations of how the findings can be used by various stakeholders, and topics for productive further research.

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2 The term “sweet spot” and “play” are terms used in the oil and gas industry. A “sweet spot” defines an area within an oil or gas producing region that contains the highest concentration of that resource. The Marcellus Shale is considered the sweet spot of the many U.S. shale regions. A “play” is a geographic area targeted for successful oil and gas production.
1.1 Natural Gas Extraction in Pennsylvania

Since the mid-19th century, the Commonwealth of Pennsylvania (PA), rich in fossil fuels, has been a participant and sometimes a leader in the oil, gas, and coal industry and other sources of electricity generation. Natural gas production began in North America in 1821 less than 40 miles from Pennsylvania’s northwest border outside of Fredonia, New York (Harper, 2008). A local gunsmith named William Hart drilled the 27-foot well into shale, then piped its gas to an innkeeper on the stagecoach route from Buffalo to Cleveland (Department of Environmental Conservation, New York, 2010). In 1859, another 40 miles south of the same site, Colonel Edwin L. Drake drilled the first producing oil well in Titusville, Pennsylvania at a depth of 69.5 feet (Ockershausen, 1995 cited in Pennsylvania Historical & Museum Commission, 2010). By the early 1880s, the state was producing 74 percent of the United States’ (U.S.) total production, and 64 percent of world production of petroleum (Miller, 1943, p. 177). In 1850, PA produced 42 percent of the nation’s bituminous coal, one-third in 1915, and most of the anthracite coal during that time (Hoffman, 1978 cited in Latzko, 2012, p. 8). In 1957, the first commercial nuclear power generating facility came online in Shippensburg (about 30 miles northwest of Pittsburgh). As of 2010, Pennsylvania maintains the number two rank in nuclear power generating capacity in the U.S. (U.S. EIA, 2010). In addition, the worst nuclear power accident in the U.S. occurred 200 miles east of Pittsburgh in 1979 at the Three Mile Island Unit 2 nuclear facility. This partial meltdown altered the trajectory of nuclear power development in PA and throughout the US with tougher regulations for safety, integrity, and the sharing of knowledge for nuclear safety worldwide (U.S. NRC, 2014). Hydro electricity is abundant along the Susquehanna River and smaller river basins and there is high potential for wind power along Lake Erie and in the Allegheny and Appalachian mountains ranges (U.S. EIA, 2010). In short, Pennsylvania has a long, complex, and continuing involvement with energy development, an involvement is spelled out in its landscapes.

In 2010, Pennsylvania ranked seventh in the nation in total energy production (U.S. EIA, 2010). It moved into fourth place at the end of 2011(U.S. EIA, 2014c). The state continues to lead in coal production, and although petroleum production has decreased, the state is a leader in petroleum refining. In 2010, natural gas production was less than one percent of national output placing the state’s rank at 15 out of 32 natural gas
producing states (Pennsylvania Budget and Policy Center 2010, p. 8). However, in 2012 there was a 72 percent increase in natural gas production over 2011, mostly from the Marcellus shale. This moved PA into third place in gas production in 2012 after Texas and Louisiana (U.S. EIA, 2014c). It had been determined that two thirds of Pennsylvania is situated on top of the Marcellus shale, the largest known deposit of natural gas in North America, the second largest deposit in the world after Iran (Penn State Extension, 2011), and which could supply the needs of the entire U.S. for approximately 15 years at current rates of consumption (National Park Service, 2009).

Since the 1930s, the U.S. knew about shale gas deposits in Pennsylvania and neighboring states with potentially vast amounts of methane reserves, but they were unreachable. Due to disincentives such as a lack of advanced technology, low gas prices, and abundant amounts of oil, investment in gas and natural gas development did not take place. The situation began to change though, after the oil shock in 1973 when the U.S. Department of Energy (DOE) funded research into a study called the Eastern Gas Shales Project (EGSP) (Harper, 2008). The study’s purpose was to determine the thickness, extent, complexity, and commonalities across all Devonian organic-rich shale in the Appalachian, Michigan, and Illinois basins. The project was to also fund development of new drilling technology and stimulate the natural gas industry.

1.2 New Technology

In the early years of the 21st century, access to natural gas trapped within the shale plus an interest to drill has increased due to rising gas prices, available geological and geographical EGSP data, and advancement in drilling technology. The new drilling process combines hydraulic fracturing and horizontal drilling, which recently has come to be known simply as “fracking” (Figure 1.1). The process of hydraulic fracturing involves pumping water, sand, and chemicals (frac fluid) under great pressure into a well casing to crack the shale rock and facilitate the release of gas. The term “slick water fracking” commonly refers to this process as chemicals are added to increase fluid flow. Horizontal drilling uses robotics to turn the drill head at a 90-degree angle once the drill bit reaches the reserve and continues to drill horizontally beneath the earth’s surface. The benefits of fracking and horizontal drilling extend the cracked, or fractured, rock for tens of feet to thousands of feet greatly increasing the quantities of accessible reserves.
1.3 Mineral Rights in PA

The topics of mineral rights and leases occur frequently throughout this study. In PA land ownership is split into surface and subsurface rights. The subsurface owner has the right to access reserves beneath the surface such as coal, oil, and gas. Sometimes the rights are further split into specific ownership of coal or oil and gas. When one owns both the surface and subsurface rights it is called a “fee simple estate.” If split, the mineral rights owner has the right to access the surface owner’s land to extract the subsurface minerals. The mineral rights are usually filed in the county courthouse where the land deeds are recorded. A mineral rights owner may sell or lease the rights to these commodities.

To lease, or legally contract the rights, is more typical than to sell them. A mineral rights owner (lessor) signs a lease with the lessee (individual or business entity). The lessee typically pays a one-time fee, or “signing bonus”, plus a royalty or share of the value of the produced oil or gas over a specified time (PIOGA, 2014). Lease terms can be quite complex. It is recommended that oil and gas attorneys be consulted to help

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5 The definition of the term “mineral rights” in Pennsylvania is disputed, though used generally in discussion about oil and gas rights. Mineral rights do not necessarily include oil and gas, but do include such substances as coal, limestone, or iron ore, for example. The decision as to what is included in the term “minerals” in a legal document is determined by the application of the Dunham Rule based on a PA Supreme Court decision (McGraw, 2012).
negotiate provisions such as how long the lease is in effect, which geologic formations are included, when and how often payments will be made, surface considerations, and free residential gas in place of royalties and so on (PIOGA, 2014). Most of the leases discussed later in this paper are for five-year terms.

1.4 U.S. Concern for Energy Supply

By the turn of the 21\textsuperscript{st} century, talk took place that peak oil output in the U.S. had been reached (Brandt, et al., 2013). Congress sought ways to relieve the U.S. of dependence on a foreign oil supply as domestic demand continued to grow. Political and economic turmoil took place in major suppliers such as Iraq and Venezuela. A political standoff ensued between the U.S. and Venezuelan President Hugo Chavez after Venezuelan oil workers walked out in April 2002 (Billig, 2004). The U.S. entered into armed conflict in what became the Iraq War in 2003. Production of domestic fuel was at a historical low point of 69 percent in 2005 (EIA, 2014b). President George W. Bush signed the Energy Policy Act of 2005, which opens with the line, “To ensure jobs for our future with secure, affordable, and reliable energy” (Office of Energy Efficiency and Renewable Energy, 2005, p. 2). Fracking and horizontal drilling activity soared in the Barnett Shale of Arkansas and Texas. In that region alone, the number of gas wells increased from 404 in 1997 to nearly 9,000 in 2000 (Pennsylvania Budget and Policy Center, 2010). The U.S. shale areas are depicted in Figure 1.2 below.
From 2004 to 2005, interest in the Marcellus shale beneath Pennsylvania had risen to “a fever pitch within the state’s oil and gas industry” (Harper, 2008, p. 5). The first Marcellus wells drilled in PA were in Washington County located in the southwest near an EGSP test well. Range Resources had permitted more than 150 wells in that county alone (Harper, 2008, p. 9). Between 2005 and 2008, natural gas companies drilled 257 more wells into the Marcellus while the PA Department of Environment (DEP) issued “446 drilling and 1,632 exploration permits” for the same field (Hobson, 2010, p. 8).

Excitement grew about natural shale gas production in regard to increased national security as evidenced by the Energy Information Administration (EIA)’s 2009 Summary of U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Proved Reserves (2010b), the creation of new organizations like America’s Natural Gas Alliance (ANGA), and media reports such as Drilling Boom Revives Hopes for Natural Gas in the New York Times (Krauss, 2008). Conversely, along with benefits come costs that quickly became apparent. As quickly as the industry arrived in Washington County and began to spread northeast across the state. Costs included...
such events as industrial traffic in rural areas that damaged roads, caused traffic jams, and increased accidents, fracking activity on well pads that generated a 24-hour nuisance of noise, light, and dust, and chemical spills that polluted surface water sickening animals and local residents. The following chapters describe the new energy landscapes of Pennsylvania that I researched from 2010 to 2012. These include the perceived or experienced costs and benefits from the technology of fracking that some argue is in the best interest of U.S. energy security.
CHAPTER 2: LITERATURE REVIEW

LANDSCAPES OF ENERGY AND STAKEHOLDER ANALYSIS

The relationship of this chapter to my main argument defines the different contexts in which my research is situated. This includes the relatively new research areas in geography of energy landscapes and stakeholder analysis.

2.1 Landscapes of Energy

2.1.1 Landscape

Landscape is a fundamental concept in geography. The idea, the term, has lived across time and evolved in meaning. *The Dictionary of Human Geography* defines landscape as "A cardinal term of human geography, landscape has served as a central object of investigation, organizing principle and interpretive lens for several different generations of researchers in geography (Gregory, et al., 2009, p. 409).

The etymology traces back to the year 1211 CE to the Germanic *landschaft* that meant “inhabitants of a legally defined zone or region” (Nye, 1999, p13). *Landschaft* encompassed legal and administrative beliefs of community, region and jurisdiction or administrative unit (Olwig, 1996, cited in Gregory, D. et al, 2009, p. 409). During the sixteenth and seventeenth centuries, the Dutch term *landschap* moved into the English language as *landscape*. The meaning encompassed both the land's visual appearance, especially of the countryside, and its graphic depiction through perspective techniques such as depth and space. The colloquial definition of landscape comes from its association with visual art, rural or natural scenery (Nye, 1999). Late in 17th century colonial North America, landscape developed as “an awareness of knowable space in time to include social, cultural, and political aspects of certain terrain and can be a panoramic view of the outdoors” (Allen, 1999, p. 191).

By the 20th century, geographer Carl Sauer, who believed that geographers have an innate sensitivity and understanding for landscape (1956, p. 289), had taken the term *landschaft* in 1925 and modified it into what he called the ‘morphological approach.’ Sauer defined this approach in his now classic essay *The Morphology of Landscape*, in which he introduces and advocates for geography to be a defined as a field science.
of landscape. He defined landscape itself as interactions between human cultures and natural environments which ultimately became known as the cultural landscape. In 1939, a disagreement arose between geographer Richard Hartshorne and Sauer. In Hartshorne’s essay *The Nature of Geography*, he challenged Sauer’s definition of geography. He argued that scientific geography could not be based on landscape. He found it difficult to understand how Sauer could operate with conceptual vagaries of the seemingly sloppy notion of a ‘cultural landscape’; it introduced ‘unnecessary confusion into our language’ (Livingstone, 1993, p. 308). Hartshorne objected to Sauer’s “emphasis on material culture and its tolerance for humanistic perspectives” (Mathewson, 2009). The two bantered back and forth as landscape studies lost attention while the quantitative revolution appeared and came to the fore in the 1950s and 1960s (Livingstone, 1993, pp. 304 – 346).

Nevertheless, landscape reappeared in the 1980s and 1990s as a methodology during the Cultural Turn in Anglo-American human geography. In *Discovering the Vernacular Landscape* in 1996, J.B. Jackson traces the concept of landscape to three phases beginning in feudal times, through the Renaissance, and into the late 20th century. He describes the vernacular meaning of landscape during feudal times as a changing space of peasants living in small villages. The landscape was a "cluster of small, temporary, crudely measured spaces, which frequently changed hands and even changed in shape and size" (Jackson, 1996, p. 321). The vernacular landscape held no visible signs of political history such as monuments that provide a collective memory, purpose, and future alive (Jackson, 1996, p. 323). These clusters were generally part of a permanent separate aristocratically held space created by political or legal decisions. During the Renaissance, Jackson describes landscape as clearly and permanently defined spaces. These uniform spaces were rural or urban and visibly outlined by walls and hedges or zones of open greenery or lawn for a single purpose. Landscape created spaces of social and topographical identity. John Fraser Hart, a prolific geographer known for his regional studies, contributed a definition that shares some of Jackson’s understanding and value of landscape. Hart defines three principal components of landscape as landform features on the surface; vegetation; and, finally, the structures that people have added including land division associated with economy, house types, and their agglomeration into villages or towns and their associated features (1998, p. 2.). He wrote an entire tome *The Rural Landscape* (1998) on how to conduct a study of it step-by-step.
In the late 20th century, the writings about landscape were mixed. Because people derive identity from their relationship with other people, the importance of 'place' includes the people that are in it, and not just the natural environment. Vernacular communities with “no political status, no plan, informal local custom, adapt to unlikely site and makeshift materials, last one or two years” (Jackson, 1996, p. 327). This space serves the main place of community such as gainful employment, recreation, and social contacts. It is “not scenery, it is not a political unit; it is really no more than a collection, a system of man-made spaces on the surface of the earth…never simply natural, always artificial… always subject to sudden or unpredictable change (p. 327). Jackson’s definition continued into the 21st century alongside other writers of his time.

A number of turn-of-the 21st century geographers continue to value landscape studies. In a 2003 article Kenneth Olwig wrote, “The concept of landscape is enjoying a period of scholarly development in contemporary geography that has spread to, and enriched, disciplines ranging from anthropology, archaeology, and sociology to history and philosophy. This development is occurring despite the fact the concept of landscape was once effectively dismissed by an influential geographical theorist, as being of "little or no value as a technical or scientific term" in geography” (2003, p. 871). He was referring to the work of David Lowenthal, a student of both Sauer and Hartshorne, who brought the differing geographers' views together in his biography of George Perkins Marsh. Lowenthal demonstrated the “contemporary analytical power of landscape…to turn the critique of landscape on end” (p. 871).

Landscape studies continue as researchers add differing perspectives. Nadaï and van der Horst write that by 2010 the concept of landscape had become “a material, dynamic and social process embedded into the local realm” (Nye, p. 3). Landscape is a "composition of manmade or man-modified spaces to serve as infrastructure or background for our collective existence” (Nye, p. 3). Denis Cosgrove and Stephen Daniel’s work demonstrates “landscape as a way of seeing and representing the world” (Gregory et al, 2009, p. 409). Cosgrove further argued that through landscape one can see with a sort of objective knowledge and distanced visual authority and control (p. 410). A landscape provides materials that "reflect and reproduce the values and norms of socio-economic elites” (Gregory et al, p 410). It is because of these researchers that I am encouraged to apply landscape analysis as the overarching method to inquire about change from fracking.
Where I was raised near the Allegheny National Forest in northwestern PA, the seemingly endless woods conjure the thought of a place untouched by humans. Yet the timber is only about 100 years old excluding a few small patches of virgin timber. By the early 20th century, many of the hills were stripped of forests for lumber and fuel (U.S.D.A. Forest Service, 2013). What appears to be natural to one generation often is the end result of a previous intervention” (Nye, 1999, p. 3). Humans have always modified the land for different uses, they are "part of the infrastructure of existence, and they are inseparable from the technologies that people have used to shape land and their vision for different uses” (Nye, 1999, p. 3). And how the land is understood is related to the observer. “Farmland represents an ideal and unchanging landscape only to people who do not live within it “(Nye, 1999, p. 6). One person may see the smoke of a distant factory as pollution and another as industrial advancement. And to take it a step further, one person can see a site like the Hoover Dam as a landscape of natural beauty, amazing feat of human technology, or as an intrusion into nature. It is not only differences perceived between people that vary, but also within an individual (Nye, 1999, p. 8).

Consequently, when one is reading a narrative about a landscape it is important to keep in mind the writer’s point of view. As Nye points out “the question of who is making the narrative of a place is just as important as who constructs the physical landscape” (1999, p. 7). Pickles echoes this in his book A history of spaces: “Like the map, the landscape is a particularly good example of a ‘text’ which has been presumed to require a straightforward literal reading, but which actually poses great problems of interpretation and understanding….specific problems of authorship, syntax and structure by which to read (and knowing what not to read), and distinguishing and relating the various levels of determination that historically constituted any particular map or landscape” (2004, p. 54). In my qualitative study, I ask the reader to accept my best attempt to overcome these problems and represent the situation as objectively as possible for the better good.

2.1.2 Energy

Illich writes that “‘E’ is an algorithm, ‘energy’ is a loaded word” (2009, p. 13). When one thinks of energy, one can understand that society’s demand for it permeates life. When thinking further it becomes apparent that energy resources are unevenly located and distributed. However, free market powers have
consolidated and industrialized these energies into one standardized commodity simply called energy that spans across scale contrasted to the concept of landscape which is local (Nadaï and van der Horst, 2010, p. 148). The procurement and distribution of energy takes place on the landscape, but is not always noticed or taken into consideration in decision-making. It is timely, during an anticipated transition to a low carbon economy, to look at landscapes through an energy lens. Additionally, Nadaï and van der Horst suggest that these observations raise a new question about landscape policy (p. 145).

The definition of energy has evolved over time just as landscape has evolved. Illich (2009, p. 13) traces the etymology from the ancient Greeks through the 21st century as follows: He writes that the Greeks defined energy as ‘being on the make.’ The Latin version in actu translated into form, perfection, or act in contrast to a mere possibility. 16th century Elizabethan English defined energy as the ‘vigor of utterance, the force of an expression’ as one valued another’s personal presence. In the 17th century, the term meant an impersonal impact like the power of an argument or the ability of church music to generate an effect in the soul. The idea of energy still has a meaning of psychic effects by those moved by either a person or a thing.

By the 18th century, in an attempt to ‘quantify nature’s forces’ the life force of the universe became understood as the ‘quantity of motion’. Language was scientific like ‘m.v.’ meaning the passing of power or efficacy. Later, in 1807, Thomas Young renamed this passing of power or efficacy ‘energy’ (Illich, 2009, p. 13). Energy was like a force or ‘force of nature’. Around 1847, it entered physics and became a something, a function, a scientific mythology of something that just changes its form in ever more precisely observed and measured appearances (Illich, p. 14). Subsequently energy became defined as ‘nature’s ability to perform work’ where work meant to produce a physical change and energy was the metaphysical cause (Illich, p. 14). More closely related to my discussion, work and energy became intertwined, “When oil became political, energy became the equivalent for fuel: watts for machines and calories for people” (Illich, p. 16). In conclusion, Illich (p. 17) writes that the word energy functions as a collage of meanings whose persuasiveness is based on the myth that what it expresses is natural. This last definition fits nicely with the concept of landscape.
2.1.3 Energy plus Landscape

The literature on an energy landscape first appears in the 1970s. Although this research topic finds itself in a mix of geography and energy, most of the work is from scholars in other fields or those from outside the United States. There is a need for more American geographers to enter the discussion (Pasqualetti, 2011, p. 978). Martin Pasqualetti, who has studied and published over four decades in energy geography, demonstrates the rich results of how geography and energy mix. His article *The Alberta Oil Sands from Both Sides of the Border* provides such an example when he describes “an iconic ‘landscape of power’ for all to see” (2009, p 257). He defines an energy landscape as not only the change that is made on the land by resource production such as oil, but also those changes on the landscape that are more permanent and continue to accrue “including home building, road construction, provision of consumer and industrial services, pipeline placement, and generation and distribution of electricity necessary to service the growing needs of every aspect of the projects (2009, p. 258).

This literature gap in energy and geography is further documented by Carola Hein. She defines the energy landscape to include the “vast network of oil production, consumption, and administration [that] has left its imprint on rural and urban landscapes around the world” (2009, p. 35). She describes how both local and global conditions impact an energy landscape. Local conditions affect drilling, storage, transportation, and refining facilities, while global patterns of production and marketing create a worldwide network of interests, investments, and influences that spread directly and indirectly to the built environment (p. 35). Hein indicates that even though petroleum-based technologies and infrastructures have made significant changes, the research on its impacts is limited even with oil's ubiquitous presence in daily life (2009, p. 35).

Along with fossil fuels, many other sources of energies are situated upon the landscape. The emerging renewables like wind, hydro, or solar generate new interest to research the landscape-energy relationship whose practicality often depends upon certain physical landscape features in order to harness it. Distinctively, these dispersed energy infrastructures are more readily apparent upon the landscape than fossil fuels. For example, Pasqualetti points out that wind power's unavoidable presence makes it “an energy resource that reminds us that our electricity comes from somewhere” (2000, p. 381).
At the time I conducted my research from 2010 to 2012, landscape had become an issue for energy policy debate. The biggest reason for landscape change in the twenty-first century will be related to energy including placement of renewables, location of resource extraction, transportation, and the emission of greenhouse gasses. The debate may not advance quickly. My findings from this landscape study show a thick wall of differing beliefs that separate proponents for and those against fracking. Scholar Barbara Allen writes about a disagreement as to the perception of landscape among stakeholders. She asks, “Who are the various claim makers? What are their claims? How have they arisen” (Allen, p. 191)? “What are the different stories of government, industry, and local residents” (Allen, pp. 198-199)? My work adds to the studies of the many stakeholder interests in a changing energy landscape. The findings provide ideas of how to cross the divide over time and space.

The term landscape has various definitions that have meant many things to different peoples and individuals over time. It is a concept whose meaning temporally and spatially changes. In this study I look at how a landscape of energy emerges in different areas of Pennsylvania at a time of great technological change, in response to a perceived national need of energy security, and an increasing rate of global demand at the turn of the 21st century. As mentioned by Hein, Pasqualetti, Nadaï, and others, there is a need for further research. I join the conversation to enhance understanding of how society’s perception and action about energy affects a landscape; how society’s immeasurable interests in energy cause benefit and harm simultaneously; and, how the thick walls of different beliefs can potentially immobilize problem solving. To augment understanding, one needs to know the stakeholders and their interests in the landscape. Next I describe how to find, organize, and analyze those entities of interest in the Marcellus Shale region.

2.2 Stakeholder Analysis

Journals of planning and business management have hundreds of articles about stakeholder analysis. However, I chose to limit my search to the field of geography. I found 42 articles in 14 geography journals that use the key term stakeholder analysis. The method originates in the 1990s in the fields of business management, political science, and planning. It became a standard practice for planners to include stakeholders in their work, but they were frequently limited to only a few groups (Burby, 2003, p. 34.). By
1995 stakeholder theory “had become a mainstay in management theory and stakeholder relationships were recognized as multifaceted, multiobjective, and complex phenomena” (Harrison and Freeman, 1999, p. 483; Epstein and Widener, 2011, p. 118). Over time, users concluded that when incorporating stakeholders into decision-making, they must be as inclusive as possible. Broader participation equals stronger plans, reduces potential for latent groups who oppose proposed policies to emerge unexpectedly at last moment, and increases chances for some consensus (Burby, 2003). In two geography journals, Acevedo et al (2008) and Affolderback (2011) discuss the exceeding importance for policy makers to be inclusive of stakeholders when considering resource policy. Elsewhere, the trends for stakeholder analysis show up as in sustainability reporting (Global Reporting Initiative, 2011), socially responsible technology design (Russell, 2008), and participatory social auditing (Hale and Opondo, 2005, p. 315).

2.3 Methodological Gap

While many researchers agree that stakeholder analysis is important, some argue that it demonstrates an incomplete methodology (Harrison and Freeman, 1999, p. 482; Giordano, 2003; Epstein and Widener, 2011, p. 119). There is no widely accepted integrated framework as different fields have developed various methods and approaches for different purposes (Reed, et al., 2009). For example, a study in Geoforum focuses on being inclusive, but of the four classes of stakeholders it defines, most are at the local scale, or “connected to the land.” The authors do not consider those at a further distance to be of high importance (Acevedo, Marc et al., 2008). A danger here is the risk of marginalization of distant stakeholders’ interest (Lockwood et al., 2009, p. 175). Another article published in Political Geography analyzes a study of a governance case regarding collaborative environmental management of the Florida Everglades. The findings show that outsiders were frustrated from being excluded in the decision-making process. The author concludes that a good stakeholder analysis design must include multiple ad hoc organizations in order to bring in different kinds of knowledge, a wider range of stakeholders, and some common good actors whose goal is to achieve a collaborative agreement (Dengler, 2007, p. 451).

Other articles demonstrate less articulated methodologies in the geographic journals Antipode, Applied Geography, and Geographical Research. For example, Hale and Opondo, (2005, p. 309) describe their stakeholders
as “including farmers themselves, employer associations, export agencies, embassy staff and government officials” but do not say why they chose these groups. Knuth come the closest to understanding the importance of who will be defined as stakeholder, when she included a subtopic entitled “Stakeholders defined” and writes, “Stakeholder selection is one of the most important tasks in this research project” (Knuth, 2010, p. 522). Finally, Lawrence’s investigation of contestation of forested lands in Finland demonstrates the importance of stakeholders in the subtopic “Scales of conflict,” however he neglects to define how he chose them (Lawrence, 2007).

2.4 Filling the Gap

This literature review demonstrates that while some geographers incorporate stakeholder analysis in their studies, there appears to lack a comprehensive methodology to define stakeholders or the process about how to find them. Those in the fields of planning and business who have considered stakeholders for a longer time acknowledge the need for such a framework, but I created a tool that I call the “stakeholder matrix” for this purpose. This new tool helps identify a more comprehensive list of stakeholders for a study, categorize others into a sector and scalar unit, and understand relationships, activities, and potential outcomes of the forces of their interests. Later in the paper I describe, for example, how the Matrix exposes stakeholders that had been left out of decision-making. If they had been part of the initial discussion, there could have been less concern in the future about decisions that were made. These include stakeholders in the public health sector (Goldstein, Kriesky, and Pavliakova, 2012), and others that I interviewed in the water well drilling business, and local oil and gas services. The Stakeholder Matrix is explained in detail in Chapter III: Methodologies.

Understood together, the combined literature reviews of an energy landscape study and stakeholder analysis demonstrate the value that my research brings in a time of energy transformation in the early 21st century.
CHAPTER 3: METHODOLOGY

In this chapter I present an overview of the methods that I chose for my research, the chronological order in which I conducted the research, the types of data I collected and where these were collected, and how I analyzed the data. I highlight an organizational and analytical tool that I designed called the Stakeholder Matrix.

3.1 Choosing Methods

3.1.1 Mixed Methods

In June 1955, at an international symposium in Princeton, New Jersey called “Man’s Role in Changing the Face of the Earth,” Carl Sauer presented his paper The Agency of Man on Earth (Bogucki, P. and John Hodgson, 2013). The conference was one of the first to consider the impacts of human activities on the environment with an interdisciplinary approach. In his paper, Sauer considers the qualities of man’s actions as they appear to affect his future well-being. He argued that it is important to be conscious about the effects of one’s activities on the environment; discusses how humans alter their natural environment for economic potential while organizing their lives around it; and, in particular, points to the problem that more resources are being extracted than are sustainably available. He advocated the study of these issues through a geographic lens to help the government and private sector design healthier environmental policies (Sauer, 1955).

How does one conduct research through a “geographic lens?” Since Sauer’s time, many methods, techniques, and tools have emerged, vanished, and even more have become accepted. It has been a long discussion, especially about which methodology is the only methodology to use, but many leading geographers advocate freedom of choice. For example, renowned geographer and 1982 Association for American Geographers (AAG) President John Fraser Hart told his audience to respect the types of studies of the past, continue to seek new styles, and use whatever technique or tool is needed for the work (Hart, 1982). 1984 AAG President Richard Morrill stated that geographers need their freedom of inquiry and expression protected and must be open to multiple methods to seek the truth, especially in dealing with sensitive issues such as sharing scarce land and resources (Morrill, 1984). In 1998, Trevor Barnes wrote that in order to
advance the discipline one needs to consider what is beyond commonly accepted beliefs or “How else is anyone going to think outside of that "blackbox"?” (1998)? Indeed, Nigel Thrift notes in *The Future of Geography* that changes in the field include the rise of ethnography and focus groups, renewed spread of research across landscape and nature, and geographers’ intervention into public policy, not just into that of the government and business sectors (Thrift, 2002, pp. 292-293).

As encouraged, I use a mixture of methods, techniques, and tools to discern the costs of shale gas extraction upon the Pennsylvania landscape. I look at the activities, material artifacts, and those who have an interest or otherwise “a stake” in the landscape for answers. The latter is most important because “Values drive the decisions of the human stakeholders in a geographical place” (Lambin et al., 2001 cited in Acevedo et al., 2008, p. 848). It is vital to know and understand what motivates decision-makers about a place. I invested much personal time and effort in the landscape by through my fieldwork and engagement with stakeholders. As a matter of fact, my research takes place in the Marcellus shale region as encouraged by Hart in his book *The Rural Landscape*:

"…we need to learn to talk to and listen to and learn from the plain, ordinary people who are the creators, the inhabitants, and the custodians of the landscape… We must know enough to ask them reasonably intelligent questions, and even more important, to listen carefully to what they tell us… We can understand the aspirations, the needs, and the values of ordinary people only by listening to them…because they do not necessarily record these on their own…The only proper way to learn about and understand the landscape is to live in it, look at it, think about it, explore it, ask questions about it, contemplate it, and speculate about it. Merely reading about it is a sorry substitute indeed… The primary source for studies of the landscape, oddly enough, is the landscape itself” (1998).

As many respected geographers before me propose, I research and analyze my findings in my own style to find my answers, keep the concept of landscape always at the forefront of my geographical lens, and observe and listen to the stakeholders. I used regional, political, and economic geographical concepts in discussion; perused the Internet; conducted fieldwork; and, created my own research tool, the Stakeholder Matrix, to both find and analyze data.

### 3.1.2 Study Area

My personal interest, along with knowledge of various geographies, guided me to choose Pennsylvania as my study area. I was raised in an energy landscape. My hometown, Warren, is about 35 miles northeast of the famous Drake’s well in northwest PA. The oil and gas industry continues to drive Warren
County’s economy as seen with a 1.86 location quotient value (Iannone, Donald T. & Associates, 2007, p. 13). The Marcellus Shale, which in 2010 had become a popular topic in the media, lies beneath two-thirds of the state (Figure 3.1). The study is in part regional, both formally and functionally. It is based on “significant elements of internal uniformity and external difference from surrounding territory” (Fellman, Getis, and Getis, 2007). Regional geography is the endless connections and activities taking place about it.

![Map of Pennsylvania highlighting counties](image)

**Figure 3.1** The highlighted counties of Washington, Warren, McKean, and Bradford are where I conducted most of my research. The numerous geopolitical boundaries including municipalities that control local land use, and the state that regulates the oil and gas industry, depict potential differences in political, economic, and cultural decision-making that take place in the geophysical area of the Marcellus Shale. PA’s municipal boundaries are delimited by metes and bounds as seen in the non-geometric pattern across the map that follows the physical landscape (Map by author, 2014).

### 3.1.3 Content Analysis

There have been numerous definitions of content analysis over the years (Berelson, 1952; Weber, 1990; Berger, 1991 in Spence, 2004, p. 10); however, Neuendorf’s (2002 in Spence 2004, p. 10) is the most comprehensive and succinct defining it as a quantitative analysis of messages that follow the scientific method. In order to apply this method, I reviewed numerous how-to articles and books; read journal articles...
that incorporated content analysis, and discovered software programs that automatically run analyses on their own.

Weber (1990) wrote an excellent step-by-step book on how to conduct a content analysis. He argues that it is an “indispensable technique” (p. 9), discreet, and helps make valid inferences from things like historical documents, news stories, political speeches, and interviews (p. 5). Krippendorf (2004) writes that traditional content analysis assumes a one-to-one correlation between verbal references, expressions of attitudes, and evaluations about the phenomena referred to (p. 346). Researchers have applied content analysis to social and environmental issues similar to my own such as local climate action plans (Boswell, Greve and Seale, 2010), natural resource management (Lockwood et al., 2009), and social and environmental reporting practices (Dong and Burritt, 2010). This method fit well with my research plans to go into the changing landscape, listen to various stakeholders, and observe what was taking place.

I used content analysis three times in my study. In the first case, I asked the question: What is the concern about fracking in PA? I searched the Internet for phrases, topics, or article titles that represented unease or worry about fracking in PA. I found 14 different websites from my search, including one blog and organizational sites of interested stakeholders. I reviewed each stakeholder’s website to understand and summarize its main concern. Then I created an Excel sheet on which I placed each stakeholder, their web address, and placed an “X” in one of 14 categories that best represented their main concern (Appendix A). Finally, I added up the number of times in each column that the concern was checked. This simple content analysis presented me with a first glimpse into what was bothering people about fracking. The most noted concerns included water pollution, regulation and safety, and responsible drilling. The next concerns were water use, landscape, and mineral rights and leases. And others included taxes, public safety, infrastructure, animal safety, air quality, jobs, erosion and sediment control, and seismic testing.

The second content analysis that I conducted was on 114 public statements given at an EPA meeting that I had audio-recorded and later logged into an Excel sheet (Appendix B). After reviewing the statements, I discerned a pattern of three opinions including those who supported fracking, opposed it, and were moderate. I created categories called “con,” “moderate”, and “pro” to describe the position that the account
represented toward fracking. Finally, I re-read each statement individually, analyzed its content, and placed it into the most appropriate category of the three for further analysis.

The third time I applied content analysis was to a list of Marcellus Shale Coalition (MSC) members. I copied the list of published members from the MSC’ website and placed them onto an Excel sheet (Appendix C). Then I created categories for the member’s name, membership level, type of business or interest, website, and country or state in which their headquarters were located. This data helped me understand where stakeholders were located in relation to the Marcellus Shale region of PA.

3.1.4 The Stakeholder Matrix

As reported in section 2.2, a review of the stakeholder analysis literature demonstrates it is an incomplete methodology (Harrison and Freeman, 1999, p. 482; Giordano, 2003; Epstein and Widener, 2011, p. 119) and one that not many geographers take advantage of in their studies. Furthermore, there exists the need to define a process and means to define stakeholders for a study. Those in the fields of planning and business who have considered stakeholders for a longer time acknowledge the need for such a framework. Hence, I propose the “stakeholder matrix.” This new tool helps me create a comprehensive but not necessarily complete list, identify key actors, and organize them to analyze my data. I created the tool after I became acutely aware of interactions between government, private, and public sectors from my Masters in Public Administration (MPA) studies by 2007, with the addition of geographic studies of scalar relationships from 2008-2010. My experience was that it worked well as a research and teaching tool, so I would add it to my dissertation research. I discuss how the stakeholder matrix works later in this paper when it exposes frustrated stakeholders making comments of feeling excluded in the area of public health (Goldstein, Kriesky, and Pavliakova, 2012), business of water well drilling, and conventional oil and gas services.

I define a stakeholder as an individual or organization (group) that has a specific interest in something and whose activities emanating from that interest affect others, or an individual or group that is affected by the interests and activities of others related to that same something. I formed my definition based on one written by a global private sector stakeholder named Talisman Energy Corporation in their 2001 Corporate Social Responsibility Report:
“Primary stakeholders are individuals or groups who are directly or indirectly influenced or affected by our operations. Strategic stakeholders are groups or individuals who can directly or indirectly influence or affect the Company’s operations. This influence can be local or global, public or private, great or limited in relationship to the economic, social and environmental aspects of the Company’s activities. Talisman defines its primary stakeholders as shareholders, debt holders, employees, governments, local communities, suppliers, customers and partners” (2002, p. 9).

The second term in the definition is matrix. Merriam-Webster (2012) defines the word matrix as “something within or from which something else originates, develops, or takes form.”

I also reflected upon Brian Berry’s “Geographic Matrix.” Barry added it to a list of methods in the midst of “debate about approaches to geographical understanding” and supported by his observation that “the spatial viewpoint has several facets” (Berry, 1964, p. 4). Berry’s matrix contains cells constructed by rows for each individual characteristic about a place and columns for each place. He recommends that a researcher limit their study problem in any particular context by making a certain specification of rows and columns that is “meaningful and useful.” In his recommended matrix for regional analysis, Berry provides 10 possible approaches to examine such as the five that I quote here:

“(a) the arrangement of cells within a row or part of a row or
(b) the arrangement of cells within a column or part of a column.
(c) comparison of pairs or of whole series of rows; and
(d) comparison of pairs of columns or of whole series of columns.
(e) the study of a "box" or submatrix” (Berry, 1964, pp. 5-7).

Barry’s next five approaches (f-j) are of a temporal dimension that takes the matrix and analysis into “Geographies of the Past.” I chose not to incorporate this added depth of study in my own analysis due to time constraints.

Half a century later, the stakeholder matrix is a similar systematic entity of separate interdependent parts. It has columns, rows, and cells for analysis in similar patterns. Each cell represents individuals or organizations by their column as government, private, or public sector and by row as their place in scale from the individual to global. The stakeholder matrix combines the social sector plus scalar position of the actor, an individual or a group, to analyze interests, actions, and relationships in a number of directions. It offers a
way to geographically analyze spatial arrangements, distributions, interactions, integrations, and processes of the data that is placed within each cell (Figure 3.2).

<table>
<thead>
<tr>
<th>SCALE</th>
<th>SECTOR</th>
<th>Government</th>
<th>Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Elected official, government employee</td>
<td>Consultant, contractor, landowner, mineral rights owner</td>
<td>Other than government or private</td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>Municipality</td>
<td>Business</td>
<td>Non-profit organization</td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>State or Commonwealth</td>
<td>Business</td>
<td>Non-profit organization</td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>Sovereign nation</td>
<td>Business</td>
<td>Non-profit organization</td>
<td></td>
</tr>
<tr>
<td>Global</td>
<td>Supranational organization or Intergovernmental Organization</td>
<td>Transnational, or Multi-national corporation</td>
<td>Nongovernmental organization, or Civil society organization</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.2 Stakeholder Matrix. The entities in the cells are generic descriptors to guide the user on what fits into that particular cell (Author, 2012).

To use the stakeholder matrix, first place individuals or organizations into a column by their type of societal sector of government, private, or public. The government actor’s interests are its authority to manage the political jurisdiction it encompasses. Examples of government are politically elected leader or employee, city, county, state, or country. At the global level is the supranational organization, or intergovernmental organization (IGO), in which sovereign nation members agree to participate by adhering to certain laws beyond their own sovereignty. The private actor’s interests focus on making a financial profit as a business or service provider. Terms common to a private sector entity are consultant, corporation, or investor. The public actor’s interest is to provide a service to a specific campaign or group and/or seek financing and other resources in order to serve its constituency. Other words and acronyms for those in the public sector are non-profit organization (NPO), non-governmental organization (NGO), or civil society organization (CSO). More simply, a public sector actor is not representative of a government or private entity.

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4 It can be difficult to choose a sector for an individual due to the different roles that he or she hold in society. Choose the one that makes the most sense for the decision at hand.
Next, fill in the rows that run across the columns. Each row represents the individual or organization’s position by scale in a hierarchical sense, or “as ‘nested’ (like a Russian doll) yet partially hierarchical relationship” (Swyngedouw, 2004, p. 34). I choose five categories ranging from individual to global, although other researchers may choose differently “just so the viewpoint is spatial for their own case” (Berry, 1964, p. 5). Others prefer more because “the effort is more complete and satisfying if done at several scales so the researcher and reader or listener may learn the relationships which appear and disappear with changes in scale” (Stone, 1968, p. 1). Conversely, one could eliminate scale because it is argued that the dominant-hierarchical conception of scale presents a number of problems that cannot be overcome (Marston, Jones, and Woodward, 2005). Or, one might take the other extreme by using the wormhole metaphor to capture the relationships between two relatively isolated places that become closely connected or interrelated in part due to globalization (Sheppard, 2002, p. 323). “Like networks, wormholes leapfrog across space, creating topological connections that reduce the separation between the distant places and reshape their positionality” (Sheppard, 2002, p. 324).

There is a long running discussion about scale that becomes a debate in regard to its definition, construction, application, and even its existence (Marston, 2000; Sheppard, 2002; Marston, Jones, and Woodward, 2005; Jones, Woodward, and Marston, 2007). I enter the scale debate in this paper; even though, I can perceive any of the previously mentioned theories applied the construct of my matrix. In the end, my stakeholder matrix is based on a simpler non-Euclidean relationship to the earth’s surface (Swyngedouw, 1997) with the five categories of individual, local, regional, national, and global.

I will offer some examples to further explain the matrix. Beginning at the individual level in the government sector, the person could be, for example, an elected leader or government employee; in the private sector a business consultant, contractor, or landowner; and, in the public sector a neighbor or activist. Next, at the local level, I place organizations or groups that physically situate themselves in a relatively small geographic area, and whose activities mostly take place within it. The government sector takes account of municipalities such as a village, borough, town, city, township, or county. In the private sector would likely be a small business whose market exists within that municipality or not much beyond its borders. In the public
sector an actor would be an organization like a religious group, professional association, or nested representative of a national non-profit organization like the American Red Cross.

Continuing in this hierarchy is the regional level. In government, the row equates to a political jurisdiction of state, commonwealth, or province. I use a political boundary to simplify my focus as laws and regulations affect similarities and differences. In the regional business and public sectors, the scale is less tightly bound for ease of completing this research. Here, a business would practice clearly beyond its local municipality, but mostly within the state in which its headquarters are located and in a few adjacent states. For example, I would place an oil and gas company located in a tri-state region such as Bradford, PA that conducts business in PA, New York and Ohio, at the regional level. In other words, it does not conduct business across the entire country within which it is located. The geographic size of each region will vary depending on variables like type of commercial activity, transportation costs, competition, or product, for example. Due to time constraint, this research does not consider the specific distance of a business’ market nor investigate whether the company practices Internet sales that would, for example, place it at a global scale in the matrix.

The national scale is also political in nature. In the government sector this equates to a sovereign state like the United States of America (U.S.) or Poland or South Africa, for example. It also encompasses agencies within those governments like the Environmental Protection Agency (EPA) in the U.S., or the Department of Minerals in South Africa. In the private sector, the business practices across the country from where it locates its headquarters such as Chesapeake Energy Corporation (CHK). The national scale company typically does not sell or provide services beyond the borders of its home country. In the public sector at the national scale, an organization is domestic like the Sierra Club, Lutheran Council of the United States of America (LCUSA), or Republicans for Environmental Protection.

Finally, organizations whose activities leave the domestic space, cross sovereign borders, or take place are at a global level, or a supra-national level. In the government sector would be an intergovernmental organization whose members agree to follow certain laws or treaties such as the United Nations (UN) or the European Union (EU). Other supranational organizations are more focused on regional economic activity
such as the Association of Southeast Asia Nations (ASEAN). In the private sector are trans-national corporations (TNCs) and multi-national corporations (MNCs) that have their global headquarters in one country, plus national headquarters in countries with significant operations. Examples of these are Talisman Energy Corporation with headquarters in Canada and operations in at least 14 countries (Talisman Energy Inc, 2011) and Vallourec, headquartered in France with a presence in 20 countries (Vallourec, 2011). In the public sector are organizations that may be based in one country but have interests around the world like Water Keeper Alliance that had 200 organizations on six continents working in more than 20 (Water Keeper Alliance, 2012).

The stakeholder matrix could be further refined by adding a column like quasi-government organizations. For example, the Pennsylvania State Association of Township Supervisors (PSATS), the interstate water quality commissions like the Ohio River Valley Sanitation Commission (ORSANCO) and Susquehanna River Basin Commission (SRBC), or even the United Nations (UN), are considerably active in both the public and government sectors. When an organization becomes ambiguous as such, I typically place it in the sector that makes the most sense relating to the previous definitions. For example, although the interstate water commissions do have authority bestowed on them, they do not have all government authority as they defer to federal law. Although the PSATS “is committed to preserving and strengthening township government by lobbying state and federal lawmakers and educating and informing its members through workshops” (PSATS, 2011a), it is a voluntary non-profit organization. Questions like this arise as data mounts. While recognizing that, I choose to keep the matrix simpler to ease conducting this research in a timely manner. The sector can be readily determined with one’s basic understanding of the differences between the terms public, government, and private. An additional way to know is by checking the organization’s Internet domain which typically for a government is “.gov,” a private sector actor is “.com,” and a public organization is “.org.”

With the stakeholder matrix defined, I next explain the process of how to use it. I begin by gathering data, and then point out stakeholder interests and relationships based upon one’s sector and scale, and finally how the matrix can be used significantly more in the analysis. At this point, I will explain how I began my
research to eventually discover and define “green forces,” stakeholders in the matrix with a shared interest against fracking.

3.2 Data

The data I collected came by various means. These include surfing the Internet, researching in libraries, and fieldwork by car, foot, or bicycle. I conducted one-one-one interviews and audio-recorded public meetings, speeches, a protest, and members of a focus group. I also sought other data such as gas well permits and production activity from the PA Department of Environment’s Office of Oil and Gas Management, photo images from an environmental organization, and satellite images through Google Earth and Bing. I found local through international news articles, records of public meetings, legal documents, white papers, peer-reviewed research articles, and posts by bloggers on the Internet. All of these data came over a two-year period from 2010 through 2012.

3.2.1 Research Activities

The tasks that I undertook to gather data include surfing the Internet, making intermittent visits to Warren, PA, and conducting fieldwork in seven pre-planned trips elsewhere in PA. I provide a chronological table followed by a description of each of these research activities (Table 3.1).
<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2010 – May 2011</td>
<td>Surfing for green forces</td>
<td>Internet</td>
</tr>
<tr>
<td>July 22, 2010</td>
<td>EPA Public Meeting</td>
<td>Canonsburg, PA</td>
</tr>
<tr>
<td>July 23, 2010</td>
<td>Explore landscape</td>
<td>Southwest PA</td>
</tr>
<tr>
<td>September 16 – 17, 2010</td>
<td>Gas Patch</td>
<td>McKean County, PA</td>
</tr>
<tr>
<td>November 19, 2010</td>
<td>Public Health Conference</td>
<td>Pittsburgh, PA</td>
</tr>
<tr>
<td>March 22, 2011</td>
<td>Gas Patch</td>
<td>McKean County, PA</td>
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<tr>
<td>September 7-8, 2011</td>
<td>Shale Gas Insight</td>
<td>Philadelphia, PA</td>
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<tr>
<td>September 8, 2011</td>
<td>Shale Gas Outrage</td>
<td>Philadelphia, PA</td>
</tr>
<tr>
<td>April 8 – 10, 2012</td>
<td>New Energy Landscape</td>
<td>Bradford County, PA</td>
</tr>
</tbody>
</table>

Table 3.1 Schedule of Fieldwork. The dates, activity, and place of my fieldwork are listed from September 2010 through April 2012.

3.2.1.1 The Internet

I surfed or perused the Internet between November 2010 and May 2011 to find examples of individuals and organizations that were pushing back the industry’s advancement into the Marcellus Shale. I call them “green forces.” I accumulated more than 40 news articles and logged each in “delicious.com” an Internet social bookmarking service for future reference. In delicious.com, I created unique headings to differentiate the articles’ green force or type of significant stakeholder by sector and scale. For example, I would place an article about a township public meeting into “NaturalGasGovtLocal,” or log an article about a state-wide environmental non-profit organization into “NaturalGasCSORegion.” CSO is the acronym for Civil Society Organization which I chose to mean public organizations. Moreover, for certain articles, if there were a specific company or entity mentioned that had been pushed back; I surfed further to see if there were a documented reaction. Those additional articles I logged into “NaturalGasPrivateResponseGreenForces.”

After collecting the articles in delicious.com, I made a database for them in Excel. Within the document, I noted the ‘green force’ stakeholder; the concern, issue, or activity; the location of the issue or the stakeholder; any actor affected; how it was affected; the media type that published the article like online
newspaper, organizational website, or blog; and, additional notes. I noticed that certain bloggers and public organizations were posting articles about the same events or situations, so saved those on a separate Excel sheet for later analysis of the shared interest (Appendix D).

3.2.1.2 EPA Public Meeting

While searching the Internet for green forces, I became aware of a U.S. Congressional inquiry that was taking place that focused on the oil and gas industry’s fracking activities. This led me to a different scale in the stakeholder matrix, the national scale, but still in the same government sector. The inquiry related to controversial legislation called the “Halliburton Loophole”, a term that would be referenced numerous times in the press and will be described below on page 68. An outcome of the inquiry was a series of public meetings about fracking during the summer of 2010 hosted by the Environmental Protection Agency (EPA).

On March 18, 2010 the EPA announced in a press release that at the direction of Congress it would re-allocate $1.9 million in response to the 2010 Appropriations Act to conduct “a comprehensive research study to investigate the potential adverse impact that hydraulic fracturing may have on water quality and public health” (EPA, 2010a). The study would be transparent through a peer-reviewed process including “significant stakeholder input” and reviewed by the Science Advisory Board (SAB), an external panel established by Congress in 1978 to advise the EPA on technical matters. On June 18, 2010 the EPA announced the dates, times, and locations of public meetings to be held from July 8 through August 12 in Denver, CO, Dallas, TX, Canonsburg, PA, and Binghamton, NY (EPA 2010b).

On July 22, 2010, I attended the EPA meeting in the Borough of Canonsburg, PA located in Washington County, home of the first Marcellus Shale well. The meeting took place in the Hilton Garden Inn at 6:00 p.m. I was one of 1,200 other attendees. Interested individuals would have two-minutes to read their public statements about what they wanted included in the study design. The agency sought suggestions and comments specific to drinking water, human health, or environmental concerns that needed considered into the study. I watched, listened, and audio recorded each of the 114 two-minute statements and supplemented them with notes in my field book. The meeting ran from 6:30 in the evening until nearly 11:00 o’clock at night. I later transposed the comments into an Excel spreadsheet for a content analysis (Appendix B).
3.2.1.3 Southwest PA Landscape

On July 23rd, I continued my fieldwork by driving through Washington County the location of many green forces that I had discovered on the Internet. Throughout my fieldwork, as a geographer, I intended to get a “sense of place” as Carl Sauer so often prescribed.

“It is one of our oldest traditions to start by observing the near scenes; it is equally in the great tradition that the journeyman goes forth alone to far and strange places to become a participant observer of an unknown land and life….to go where none of your kind has been, to see and learn to make some sense out of what has not been known to any of us” (Sauer, 1956, p. 296).

I planned to experience the landscape, the sights, sounds, and scents that I had read and heard about over the many months before. Those stories painted a formerly rural space of quiet country homes, narrow roads, farms, goats, cows, and horses that was undergoing great disruption by gas rigs, compressor stations, and lots of heavy trucks. I had come to study this talked-about space, this place from where much of the fracking hubbub was coming. Photos depict the physical landscape as described above in Appendix E.

3.2.1.4 The Oil and Gas Patch in Autumn

As I stated earlier, I grew up in a culture of oil and gas, an energy landscape that inspired this research. For example, residual waste trucks are a typical vehicle on the roadways (Figure 3.3). They haul frack wastes or brine away from well pads to disposal locations. Conventional drilling and fracking (shallow, vertical wells) takes place here plus northwest PA is situated on top of the Marcellus Shale.

Figure 3.3 Residual waste truck and oil truck on US Route 66 in Warren, PA (Photo by author, 2010).
I spent three days of research in the oil and gas fields in northwest PA. Jim Barnes, President and Owner of RJB Well Services hosted me while he worked during two days, September 16 – 17, 2010, in McKean County observing a frack job, and a second time on March 22, 2011. The research area is located 40 miles east of the city of Warren, past the Kinzua Dam on Route 59, through the Allegheny National Forest and near and the Bradford Regional Airport (Figure 3.4). I audio recorded interviews with Jim Barnes, owner of RJB Well Services, Inc., and John Holko, then Treasurer of the Independent Oil & Gas Association (IOGA) of New York, and spoke further with Paul Yaniga, founder of a multinational environmental consulting and remediation firm called Groundwater Technology (Appendix G). Both visits produced informative data and added substantive background information about the PA oil and gas industry.

![Figure 3.4](image)

**Figure 3.4** Aerial photo of Warren and McKean counties mostly covered with deciduous forests. The City of Warren is on the western edge. The black dendritic drainage pattern in the northwest centers on the Allegheny Reservoir. The reservoir and small black point to its southwest signify an energy landscape of hydroelectricity production. The tilted beige cross in the center of the map represents the Bradford Regional Airport near where I conducted fieldwork. The darker green spaces on the west side of the image represent the relatively dense Allegheny National Forest. To its east, the more numerous brown spaces suggest an extractive energy landscape including access roads and well pads (Google Earth, 2012).

### 3.2.1.5 Public Health Conference

I attended one of the first academic conferences about shale gas extraction that occurred. It took place at the University of Pittsburgh on November 19, 2010 and was free to the public. The Graduate School of Public Health (GSPH) acted as host. I discuss the findings from this first attempt at collaborative scientific-based research in Chapter IV: Findings.
3.2.1.6 Philadelphia

On Wednesday and Thursday, September 7 and 8, 2011, I attended the “Shale Gas Insight 2011 Conference” and on September 7, the “Shale Gas Outrage” rally in Philadelphia, PA. The Marcellus Shale Coalition (MSC), a quickly growing industry advocacy organization then in its infancy, hosted the conference. The intent for the conference was to explore “… best practices, top stakeholder perspectives and key networking opportunities for those in the exciting field of shale gas development” (Conference Program). The rally was organized in protest to this shale gas industry-sponsored event.

At the conference, I gathered data mostly about private sector stakeholders across scale. I worked the membership table as volunteer, attended speeches and panel sessions, and visited exhibitors. I negotiated a free student ticket in exchange for volunteer work. During lunch hour of the first day I left the convention center to observe the rally.

In protest of the shale gas industry, organizers for the “Shale Gas Outrage” planned a public demonstration. They rallied and marched during mid-day on September 7 immediately outside of the convention center in public space. I took this as an opportunity to hear directly from green forces and add to my data bank.

3.2.1.7 New Energy Landscape of Bradford County

After nearly two years of observing fracking events with a focus on the Marcellus in Pennsylvania, plus following media, blogs, and journals about other activities adjacent to the Commonwealth, across the nation, and around the globe, I planned to conduct my final fieldwork. This was situated in Bradford County located approximately 160 miles east of Warren in northeastern PA, along the New York state border. By April 2012, Bradford County had 1,008 Marcellus wells in the Commonwealth, the most of any PA county, according to PA Environment Digest (2012). Other than the initial drilling activity and excitement that was taking place in Washington County which I visited in 2010, this place was another important place to be in the history of shale gas extraction in PA. I intended to gain an on-the-ground perspective by exploring the landscape, interviewing stakeholders, and experiencing local culture.
I also chose to be flexible, as Morrill advised (see above), about how to collect data. My research was qualitative in exploring landscapes, observing and interviewing various stakeholders, and then placing them into the matrix for analysis. My goal for the Bradford County trip was to interview individuals from the public, private, and government sector by asking them one basic question: From your perspective, what are the impacts of fracking? This strategy increased my possibility to be led to further interviews or places important to my informants, not places that I chose from afar. This method is sometimes called snowballing,” where one thing leads to another, or a “… ‘follow-the-actors’ data gathering strategy, interviewees included the range of competing stakeholder groups networked through the varied organizations” (Giordano, 2003, p. 431).

To use my time most effectively, I developed an itinerary with a timeframe, scheduled interviews, locations of well sites to visit, and other points of potential interest to explore. I chose the Easter holiday weekend beginning Friday, April 6, 2012. I would travel to my mother’s home in Warren, PA, stay there and explore any Marcellus activity in the vicinity on Saturday, then continue to Bradford County on Sunday April 8, staying there through Tuesday April 10.

I used the stakeholder matrix to identify holes in the matrix for missing data. The first request for interviews I made was to fill the private sector category. I had established relationships with a few representatives of Talisman Energy at the Philadelphia conference. This ultimately led me to employees at the Talisman Energy USA office in Horseheads, NY that dealt in northeast PA drilling. I confirmed an interview with a stakeholder relations advisor for Monday April 9 at 10:30 a.m. This interview represented a multinational organization in the private sector. With limited time, I moved onto other sectors yet remained open if others turned up such as in the snowball effect.

Next, I sought out representatives from local government mostly from those officials listed on government websites. I began with a Warren County Commissioner asking him to help me network to Bradford County officials. This call both provided data from an unplanned interview, and a lead to Bradford County Commissioners whom he knew. Although I made numerous attempts to procure an interview with the Bradford County commissioners, I never received a response. I also called the Bradford County
Emergency Management Services (EMS) director who quickly agreed to meet with me. I had read about an increased demand upon local emergency services from fracking, so wanted to investigate this first hand. My goal was to get at least each sector of the stakeholder matrix represented, so the next to fill was the public sector. I planned to run a focus group with Bradford County residents. The challenge was that I knew no one who lived there.

I phoned the Bradford County Library and asked the director for assistance. After I introduced myself, explained my research project, and described my needs, the director asked me “What is your dream? Just what would you like to happen?” I told him the ideal would be to conduct a focus group with about 10 to 15 Bradford County residents, to ask them about the impact of fracking. He responded that I could have it. And, if I would be satisfied with members from his staff and members of the Friends of the Library group, he would invite them to participate. I agreed. He confirmed a room for Monday at 3:00 p.m. to 4:30 p.m., and said he would take care of the invitations, and arrange for setup. By the end of my phone call I not only had space confirmed, but I also had the invitees to fill it.

I sought out one more individual with whom I had previously communicated through a blog. He had created a Google map of all the Marcellus wells, leases, lease units, and associated companies in Bradford County. He regularly updates the blog with map lease data that he collects from the county courthouse. We scheduled a tentative meeting for Tuesday morning. My mission to schedule interviews was accomplished.

The fieldtrip itinerary began with Sunday as a travel day across the state (Figure 3.5). Upon arrival in Bradford County I would take a bike ride to witness the changing energy landscape. I had a full schedule of appointments Monday, and enough time on Tuesday for other interviews that might come along from Monday’s interactions or elsewhere. Next it was time to find a place to stay.
Figure 3.5 April 2012 PA Field Work Route. The highlighted points on this route begin at the City of Warren (I) traveling about 141 miles east on U.S. Route 6 (Rte. 6) to Troy (G) for a 27-mile loop on my bicycle. It continues another 20 miles to Towanda (E), and then runs due north, northeast another 40 miles to Horseheads, NY (D) for hotel and Talisman interview. The trip returns to Towanda for interviews and continues 15 miles southeast to Wyalusing (F) to head into the countryside for final exploration of wells and new gas lines. The return trip follows Rte. 6 west finally diverting northwest to the City of Bradford (H) in McKean County for my final interview with Joe, the oil and gas service man. Rte. 6 is in a rural area running through the Allegheny National Forest and skimming the northern edges of many state forests (Author, Google Maps, 2013).

There were about 15 accommodations from which to choose in the county including a couple of hotels in Towanda, the county seat and largest town in the area. I preferred to stay in Towanda, but due to demand from gas workers, the hotel costs were high. Where there was room availability the rate was around $150.00 per night. This was three times higher than outside of the County where I chose to stay in Horseheads, NY. This town was 40 miles to the north and a 50-minute drive from Towanda, the home of Talisman Energy headquarters, and only $50 in a Budget Hotel. I found out later that fracking not only impacted hotel rates, but pushed up rent and housing prices in the real estate market.

Next I mapped Marcellus gas wells to analyze and understand their location within the county boundaries with regard to patterns, relationships, or empty spaces that might appear. For example, what would it look like along the PA – NY state border? There was a moratorium on fracking in New York continuing from 2008 (Leahy, 2001). Would this be seen on a map? Where would the best opportunity be to find Marcellus gas wells during my visit?

On March 8, 2012, I retrieved oil and gas well permit data from the PA DEP website for Bradford County (Pennsylvania Department of Environmental Protection, 2012). The DEP facilitated access to oil and gas data such as permits issued, production, just Marcellus wells, all wells, or per county or local municipality,
and other factors in various formats like Excel or on-line through interactive software. Previously I had downloaded Excel data for over 72,430 wells. For Bradford County I extracted the data I needed to make a list of all 1,917 oil and gas permits issued for the County since 1991. As an example of what I was looking at, I provide a map of well permits by company located in Tioga and Bradford Counties spilling into Lycoming, Sullivan, and Wyoming counties (Figure 3.6).

Figure 3.6 Seven different companies operate gas wells that cluster or line up to show patterns of shale gas development upon the northeast PA landscape. Chief, EOG, and Southwestern stand out as clusters. Chesapeake operates mostly in Bradford County, SWEPI in Tioga County, and Talisman straddles both. The linear pattern of gas wells facilitates the construction of gathering lines. Counties south of Tioga, Bradford, and Susquehanna are relatively empty of fracking activity. Nine wells show up in New York State where a moratorium against fracking exists at the time (Map by author, 2014).

I was about to explore what one might call a true “Gasland.” After all, there were over 1,000 Marcellus wells drilled in a county of 1,147.40 square miles (U.S. Census, 2014). In addition I had read so much about this northeast PA “place,” even before I began my research. These media stories included

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5 For oil and gas well data see the PA DEP web at https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/DataExports/DataExports.aspx.
pictures of destroyed roads from heavy drilling equipment. The photo below depicts what can happen to a road that accommodates numerous overweight or oversized vehicles to access shale gas (Figure 3.7). Before I set out to conduct my fieldwork, I chose a few wells to visit and sketched out a map of roads that I would ride to find them. This completed my itinerary along with the lodging and scheduled meetings.

Figure 3.7 This Bradford County road has been widened approximately six to eight feet for industrial traffic. The foreground shows a rough surface of ruts and stones. The original road appears in the center of the photo as a hardened surface stretched to the point that in the distance on the right a grader apparently knocked over a mailbox (Photo by author, April 2012).

3.2.1.8 Serendipitous Fieldwork

Part of this trip included what I call “serendipitous” fieldwork. I use this term for those unexpected, unscheduled times when I would gather data. For example, on Saturday, April 8, 2011, while bicycling in Warren, PA I ended up finding a working Marcellus well pad. I not only gained an interview with the security guard, but a second interview from a local resident about drinking water. While oh a hike in the summer of 2008 in the Allegheny National Forest, I heard a mysterious hissing sound in the normally quiet woods. Eventually I came upon a gas line to discover that a compressor on the pipe was making the sound. Directly behind my mother’s house in Warren, PA lies an energy landscape that displays both active and antiquated artifacts of the oil and gas industry. Working pump jacks stand on the cemetery behind her house and a 100 yards east in the woods lay old rusted oil drilling equipment (Figure 3.8). Perhaps the most notable object of
the energy landscape is the United Refining Company one mile from our house (Figure 3.9). The data that I collected from these serendipitous fieldwork opportunities provided a helpful background to my energy landscape studies.

Figure 3.8 Material artifacts of an oil pump house lay scattered in the woods of northwest PA. These may be from the 1930s and 1940s when production had a resurgence in the area. (Photo by author, November 2010).

Figure 3.9 The United Refining Company in Warren, PA along the north side of the Allegheny River. The refinery is located six miles west of the Kinzua Dam and 35-mile long Allegheny Reservoir extending into New York State. It is a material expression of oil extraction that occurs within the landscape (Photo by author, November 2010).

In sum, I apply mixed methods and techniques including various geographical lenses, stakeholder analysis, content analysis, the stakeholder matrix, and serendipitous fieldwork to gather and analyze the findings that I describe in the next Chapter 4: Findings.
CHAPTER 4 - FINDINGS

The new energy landscapes of Pennsylvania appear because of stakeholder activities, beliefs, and values as well as material artifacts situated thereon. The stakeholder matrix facilitated their discovery and further understanding, while other methods including one-on-one interviews, a focus group, mapping, and exploring the landscape by car or bicycle provided others. The various findings from my initial search on the Internet through my last fieldwork in Bradford County show activities and physical impacts produced by the new activity of fracking in the Marcellus shale region. In particular I discovered: 1. Changing energy landscapes, 2. “Green forces” of municipal governments, non-profit organizations, and individuals pushing back an unexpected industry, 3. Mechanisms of control and equity, 4. Differences in PA from what the industry knew before, and 5. A communication gap between those who champion fracking and those who are against it including the excluded stakeholders. Throughout my research, I observed stakeholders that I situated in the matrix move within, across, and outside of their sector and scale to reach specific goals.

The following pages describe my research findings listed above and how they evolved. From my Internet research, I begin sketching how physical change and human activities on the landscape and resistance to the advancing industrial activity steadily arose. I then summarize these findings to compare them to other information disclosed from my surveys, meetings, and fieldwork that followed. Some findings are repeated throughout my work, some appear for the first time with each subsequent event, and others seem to disappear. Overall, it is clear that Marcellus stakeholders’ activities and new material artifacts indicate a newly forming energy landscape, the public response has been substantial, varied, and consistent; there is a disconnect between stakeholders, and, oil and gas laws need to be amended to meet the demands of the new shale gas extraction technology.

4.1 Green Forces: Findings from the Internet

“Natural Gas Supply, Jobs and Technique Debate Booming” was the first Internet article that I read about fracking (Vergano, 2010). In that piece Dan Vergano interviewed Robert Myers, English Professor at Lock Haven University and avid hiker, who voices concern for an ongoing encroachment of new gas drilling in the Pennsylvania woods. He is concerned about well pads requiring five-acres of cleared land and
impoundment ponds holding salty and chemically laced flowback water. He also expresses fear about the spread of this activity into streams, its effect on public safety, and a change of the natural landscape that he knows. Myers said, “It sickens me what the gas wells are doing to the places I love.” An example of Marcellus drilling in a PA state forest demonstrates fragmentation due to fracking in a photo below provided by the PA Forest Coalition (Figure 4.1).

![Figure 4.1 An aerial photo of Marcellus shale gas well sites including an impoundment pond and access roads in the Tioga State Forest of north central PA (Photo provided by of Dick Martin, Coordinator, PA Forest Coalition, 2010).](image)

As a native Pennsylvanian, part of me shares his concerns. I know how it feels to see bulldozers and backhoes tear up trees, lush ferns, and rich decaying matter for the oil and gas industry; I resent the noises of squeaky pump jacks, shrill pipeline compressors, and grating metal cables while hiking in the woods; and I worry about heavy equipment crossing crystal clear native trout streams sullying their waters. Even though I share Myers special interest in a peaceful, beautiful place, I have other views about the activity too. Abundant natural resources made my hometown wealthy decades ago and continue to provide for its economy in the 21st century. Oil, gas, and hard wood forests drew people to Pennsylvania to extract these desirables and market them to a growing economy. With that said, Myers’ words prompted me to pursue this emerging issue.
I went to Myers’ website on which he lists others who share his concerns (Myers, Robert, 2010). The PA Forest Coalition website was listed and became the first non-profit, public organization that I would explore. The Coalition’s activities include steadfastly rallying broad public support, advocating to PA government organizations, and effectively organizing appropriate activities to protect and conserve PA’s forests, water, and natural habitats even before recent fracking (Pennsylvania Forest Coalition, 2012). The website lists links to organizations interested in fracking including another that stood out in particular, The PA Council of Churches. I opened its link and read the following…

"Addressing Marcellus Shale Pollution Concerns. Posted on December 2, 2009 by s strauss The Forest Coalition (http://www.paforestcoalition.org/homepage.html) is asking for our help in contacting Senators Casey (http://casey.senate.gov) and Specter http://specter.senate.gov) and your Representative (get link to your Representative’s contact information at http://www.house.gov) (Strauss, 2009).

Further down the webpage the PA Forest Coalition is quoted asking…

“Is it possible to enable growth of the Gas Energy Industry and still protect our Water Resources? If we don’t do this correctly – from the start - taxpayers could be paying for a century of cleanup such as what we were stuck with from the Coal Industry Acid Mine Drainage cleanup.”

A succinct list of what issues to address follows including water withdrawals, runoff, and frackwater transport to name a few, otherwise considered costs to Pennsylvania for fracking. These two regional public organizations shared their concerns against fracking. They networked online within the same scale and region. I witnessed a possible outcome from this social networking one and a half years later at an anti-fracking rally in Philadelphia where a Lutheran minister protested from the main stage as she stood beside a Rabbi (Figure 4.2).
Figure 4.2 A Lutheran minister and Rabbi demonstrating at the Shale Gas Outrage 2011 Rally in Philadelphia September 7, 2011 (Photo by author).

The PA Forest Coalition website offered more information about fracking to the public upon request. Consequently, I emailed the organization and later spoke with the Coordinator Dick Martin who graciously sent me a CD filled with information. It included PowerPoint slides about fracking activities, copies of gas well permits, and other documents such as drilling permits related to fracking. He gave me permission to use this information in my research and he kept in contact with me during the process.

4.1.1 Blogs

Another Internet venue that I perused was the blog. One of the first that I would investigate was “Bob’s Blog” written by Bob Donnan. He writes from Peters Township (Figure 4.5), McMurry, PA in Washington County where he grew up in the small rural town of Hickory. “Bob’s Blog” is found within his landscaping business’ website. His writing and photographs motivated me to go see first-hand the Washington County that he describes….

“…the former biggest wool producer in the nation. Now beef cattle. The back roads out in the country around Hickory are nice for Sunday car cruises or motorcycle rides, with winding and rolling asphalt roads, usually just wide enough for two cars to pass. The annual fall Apple Festival. That is, until the Marcellus Shale gas boom came to town a few years ago. My first heads-up came from a landscaping client who works in the legal end of mineral and gas rights. While discussing the vast reserves of gas in Marcellus Shale underlying
Washington County, Pennsylvania she said "Hickory is the epicenter" of the Marcellus Shale gas reserves. I became personally interested in this rapidly unfolding gas drilling story when our drinking water turned putrid last fall” (Donnan, 2009a).

In April 2009, Donnan posted concern about fracking activity including spills, heavy equipment, well pads and negligent industrial practices. He is an individual stakeholder seeking to be heard, expressing concern, and warning others to be aware about the oncoming gas industry. The changing landscape that he witnesses clearly energizes him to advocate against the industry. His blog informs the public about fracking technology with photos of various equipment and different stages of fracking. He offers resources for landowners about how to deal with industry, publishes legislation regarding municipalities and PA government, and provides a list of other websites concerned about fracking. He became a force against fracking, or, as I define it, a green force.

I found a second blog called the Susquehanna County Gas Forum (SCGF) that I followed for over one year and eventually joined as a member. Its purpose is to be a “…general discussion and information forum for expanded public knowledge and involvement on the topic of natural gas drilling in Susquehanna County” (SusquehannaCoGasForum, 2012). As I read it over time, I noticed a change in tone from one of information dissemination to one of advocacy and organization against fracking. The group became another dissenter against fracking, a force against fracking, or an “anti” as known in the industry.

An example of its point of view is an entry on November 2011 referring to the Delaware River Basin Commission (DRBC) that had placed a temporary moratorium on fracking within its district…

“We did it! Now, keep those letters, emails, and phone comments coming. Don't believe it when the industry hacks and their political operatives say, "You'll never stop it." The industry is scared to death of community outrage and push-back. That's why they have to buy off politicians. Fortunately, we don't have to buy them off. We can just vote them out… How do you take down a behemoth like the oil and gas industry? "With a thousand paper cuts if necessary” (Anon, 2011a).

Through this blog I came to understand how outraged some people were in northeast PA, a location where many people’s quiet lives were upturned. The discussion indicates that some people living there had moved to this rural place to remove themselves from the bustle of east coast cities. However, the landscape was
changing and the costs of shale gas extraction weighed upon them. In this blog people were able to vent their emotions where others empathized and others became validated as activists.

A third blog that I continue to follow as I write is the Marcellus Daily News (MDN)(Willis, 2012a). Jim Willis, the editor, resides in Binghamton, NY approximately 10 miles north of the northeast PA border. He began the blog in 2009 as a source of news and resources regarding gas development for landowners. Willis scans the news each business day morning and posts what relates to his readers. His blog provides a collection of daily articles directly related to the Marcellus Shale. Initially, he held a moderate attitude about the technology, but over time I observed a transition to dislike of the anti-frackers. It was as if he had lost patience. Also, he turned his blog into a subscriber-only website thus benefiting from it as a source of revenue as an individual business owner, a stakeholder in the Marcellus shale.

Lastly, I consulted Go Marcellus Shale.com, a fourth blog that I found most informative and continue to read as I write. I joined it to engage in dialogue and research. It focuses on fracking in the Marcellus and Utica Shale. The blog’s subtitle is All Things Pertaining to the Marcellus & Utica Shale (Mauck, 2012). Along with following current conversations between bloggers, one can choose to join specific local county subgroups. I joined the Bradford PA County group, participated in occasional dialogue, and learned helpful information about shale gas extraction. I have asked questions about fracking technology, learned from people who claim they work in the field, read a lot about leasing, and gained more understanding about its complexity. I actually found a couple study participants through the blog as well.

The previous websites and blogs generously show different perspectives on fracking activity beginning to take place on the Pennsylvania landscape. Some sites are positive and others negative. The latter perspective interested me most. Why were people concerned about fracking, an activity that I had known since childhood in the 1960s? I expected to find the answer through stakeholders like these individuals who shared their concerns on the Internet. I came to call those who were against fracking a “green force” as they pushed back against the fossil fuel/natural gas industry.
4.1.2 Green Forces Reveal

From the 40 Internet articles that I acquired (See Chapter II), I identified 36 distinct stakeholders who were against fracking. These green forces include 14 PA township governments (one third of the list); towns, cities, or boroughs; counties, a landowner group, chamber of commerce, the PA Supreme Court and the Delaware River Basin Commission (DRBC) and the Susquehanna River Basin Commission (SRBC), compacts of state governments given the authority to oversee law in managing the Delaware and Susquehanna River watersheds; and others (Appendix A). Each of these organization’s story gives a preview of specific concerns, locations, and actions taking place due to the shale gas boom, or the impact of fracking in the Marcellus. I describe the concerns of these stakeholders beginning with local government which makes up 70 percent of the data.

4.1.2.1 Local Government

Local governments are prolific in Pennsylvania. As of October 2010 there were 2,562 municipalities plus 67 counties. Of the total municipalities, 1,547 are townships, 958 are boroughs, and 56 are cities and each is situated within a township. (Philadelphia City shares a contiguous boundary with Philadelphia County.) Seventy eight percent of the municipalities have populations less than 5,000 with nearly 30 percent having less than 1,000. To illustrate, one Bradford County resident whom I interviewed said that her town Burlington was only “a square mile” with “75 people.” The borough of Burlington is located in Burlington Township with a total population of 696 people. In 2007, PA had 72 percent more than the average number of local governments in the U.S. after Minnesota and Illinois (U.S. Census Bureau, 2012). The Political Subdivision Map of Pennsylvania below illustrates the thousands of different spaces controlled by separate local governments upon the PA landscape (Figure 4.3). In Pennsylvania, local government controls land use, which I found to be a significant concern due to fracking.
As mentioned in Chapter 1: Introduction, fracking technology was developed and perfected mostly in Texas. Among the companies first involved in the Marcellus were those from Texas such as Range Resources, Halliburton, and Schlumberger. Furthermore, of the 2009 members of the Marcellus Shale Commission (MSC), the newly established industry association, 40 per cent were headquartered in PA, 25 percent in Texas, 24 percent from 18 other states, and 11 percent from other countries (Marcellus Shale Coalition, 2010). Businesses from the state of Texas had a significant stake in how things would take place in the Marcellus region. (See Appendix C). Did political landscapes of Texas and Oklahoma, where fracking first began, differ from those of PA?

First, there is a difference in size of land area. A PA municipality has an average of 17.5 square miles in land area (Nationalatlas.gov, 2014) compared to 182.67 square miles for Texas and 104.17 square miles for Oklahoma (Table 4.1). Second, Texas has half the number of local governments as PA, and Oklahoma, 25 percent. The greater number of municipal laws to deal with over much smaller areas may be one reason of many that cases of push back against the industry appeared in my study. It may also be a reason why the
industry pressed the PA government to standardize zoning across municipal boundaries in ACT 13\(^6\). In sum, this array of small, scattered, numerous local governments, control the landscape of the Commonwealth piece-by-piece and by irregular, non-uniform portions.

<table>
<thead>
<tr>
<th>State</th>
<th>Total # Local Governments</th>
<th>Total Land Area in Square Miles</th>
<th>Average Land Area of Local Government</th>
<th>Rank in Local Governments</th>
<th>Rank in Land Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 U.S. States</td>
<td>39,043</td>
<td>3,718,626</td>
<td>95.24</td>
<td>Na</td>
<td>na</td>
</tr>
<tr>
<td>Minnesota</td>
<td>2,833</td>
<td>86,938</td>
<td>30.69</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Illinois</td>
<td>2,729</td>
<td>57,914</td>
<td>22.22</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>2,628</td>
<td>46,055</td>
<td>17.52</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>Texas</td>
<td>1,463</td>
<td>267,256</td>
<td>182.68</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>671</td>
<td>69,898</td>
<td>104.17</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Nevada</td>
<td>35</td>
<td>110,560</td>
<td>3,158.86</td>
<td>49</td>
<td>7</td>
</tr>
<tr>
<td>Hawaii</td>
<td>4</td>
<td>6,461</td>
<td>1,615.25</td>
<td>50</td>
<td>47</td>
</tr>
</tbody>
</table>

Table 4.1 Rankings of Number of Local Governments and Land Area. Government data from the U.S. 2010 Census Bureau and nationalatlas.gov show that PA ranks third in number of local governments in the U.S. and has an average land area one-tenth the size of Texas and 17 percent the size of Oklahoma, two states with significant interest in shale gas development in PA.

What defines local governments as a green force against fracking? What are their interests as a stakeholder? What costs do municipalities pay as the new energy landscape appears? Do the individual governments combine forces as a political power? Are industry stakeholders concerned about these actions? What about the Commonwealth? Is it affected by the local government green force? What is the political status of land use control in PA? What are the differences between state and local government land use policy? Many questions arise.

The definitions of local government in PA are rather complex and difficult to find. The PA Department of Community and Economic Development’s (DCED) website newspa.com offers basic definitions of municipal code, but after reading and speaking to a DCED staffer, I learned there are no short definitions. The Local Government Law Library (DCED, 2012) archives the original legal documents defining each municipality separately. Each local municipality is an area incorporated by law. In order to determine legal and operational differences, I would need to read each lengthy municipal code. In addition, there was only one town listed for PA, yet no town code and as an exception it follows borough code. There

\(^6\) In December 2013, the PA Supreme Court decided against an appeal by industry and others to re-impose Chapter 33 of the statute amending the Pennsylvania oil and Gas Act known as ACT 13. Chapter 33 would have prohibited any local regulation of oil and gas operations and require statewide uniformity among local zoning (PA Courts, 2012).
were two other types of municipalities called Home Rule Charter and Optional Plan. These met a need or desire, so that people can, by law, create a local government in this manner. Of the latter I had not seen these in my research.

Overall, most PA municipal codes are 100 years old or more, and their differences appear to be defined by population size; types and numbers of elected officials and staff; boundaries; services provided such as fire or police; corporate powers, taxation and finance; and infrastructure like sanitation, streets, and sidewalks, and parks and recreation. It remains somewhat unclear as to what factor determines what type of code the municipality should follow. I found no code for 1st Class City. The 2nd Class City code was written in 1901 (Pennsylvania General Assembly, 1901). There are some hints as to what might determine the type below…

“A 2nd Class City could be chartered whenever a majority of the electors of any town, township, or borough, or any two or more contiguous towns, townships, or boroughs, or any combination thereof, situate within the limits of the same county or situate in two or more contiguous counties, and having separately or together, as the case may be, a population of at least ten thousand according to the last preceding United States census, shall each separately vote at any general or municipal election in favor of the same” (Pennsylvania General Assembly, 1931).

In any case, the specific definition of each of the 2,629 local governments situated on the PA landscape would not matter to shale gas development. They combined their green forces into one against the industry.

4.1.2.2 Townships

The most common unit of green force within PA local government was the Township. The Pennsylvania State Association of Township Supervisors (PSATS), a public regional stakeholder, echoes the fact of its numbers and size. According to PSATS, PA has 1,455 very diverse townships ranging from rural communities with fewer than 200 residents to suburban communities with over 60,000 residents. Townships cover 95 percent of the Commonwealth’s land area and provide home to 44 percent of its population. The Many townships are situated in the 55 counties that feel the impact of shale gas extraction because they are “sitting on the second largest energy field in the world with the addition of Marcellus and Utica Shale gas” (Sanko, 2011a).
Township elected officials manage day-to-day responsibilities to maintain and improve their communities. Over the seven months that I monitored green forces, townships’ concerns were mostly about zoning issues. Zoning is a legal tool used by a municipality like a township, to define and regulate its land use. The local government will map various parts of its bounded space to require permits for different purposes such as residential, agricultural, or industrial. These local municipalities wanted to control a swiftly advancing Marcellus shale gas industry.

On April 12, 2011, the Mount Pleasant Township Board of Supervisors was taking that very action. Mount Pleasant is located in Washington County in the southwest corner of PA, formerly a thriving coal and steel center. Significant Marcellus Shale activity occurred in Washington County beginning in 2004 when Range Resources completed the first slick water fracked vertical Marcellus Shale well. Range did not announce its success with its Renz #1 well, the first Marcellus well to successfully produce gas, in Mount Pleasant until three years later in 2007 (Figure 4.4).

On April 12, 2011, the Mount Pleasant Township Board of Supervisors held a public hearing to deliberate a proposed amendment to the Zoning Ordinance pertaining to the oil and gas industry. The amendment would require permits for oil and gas drilling operations, pipelines, and compressor and processing stations in various zoning districts within the Township. It would also require operators to apply for various types of permits, deal with regulations about access roads, truck routes, signage, zoning districts for oil and gas drilling, compressor and processing facilities, and repeal Chapter 104: Gas and Oil Exploration.
of the Mt. Pleasant Township Code of Ordinances (Willis, 2011b). These would be added regulations for oil and gas activities.

In reaction to this resistance from the township, Range Resources—a national private sector stakeholder based in Texas—threatened to sue. It claimed “death by a thousand paper cuts” as the township’s way of imposing its own regulations on the industry that would result in a de facto ban on drilling (Willis, 2011b). Mount Pleasant represented only the beginning of these kinds of actions toward fracking and its government officials understood their historic position. "We kind of caught the brunt of everything here in Mount Pleasant Township," Supervisor Larry H. Grimm said. "We told industry we were kind of the guinea pig [sic], and the surrounding municipalities are doing better by our experience.” It would take many months before those surrounding others would do better (Figure 4.5).

![Figure 4.5](image_url) The municipality of Mount Pleasant Township lies in north-central Washington County. Its neighboring townships of Cecil, South Strabane, and Buffalo, among others, emerged as green forces in the news media (Ivenso, 2014).

During the same time period, more townships held public meetings to deal with zoning of gas drilling activities. These included Wysox in northeast PA, Greenfield in central PA, and neighboring Cecil and South Strabane. In October 2010, at a public hearing, Wysox township residents discussed concerns about
hazardous chemicals and the potential for traffic accidents resulting from increased truck traffic to and from a proposed water treatment plant for Marcellus activity. In January 2011, Greenfield Township in Lackawanna County presented Exco Resources (PA) Inc., a gas exploration company, a notice of violation of its zoning ordinance and that it must stop all drilling operations (Legere, 2010b). In March 2011, Cecil Township supervisors listened to citizens wanting either a total ban on fracking or others wanting a stricter ordinance (Brower, 2011). South Strabane Township held a public meeting May 24, 2011 to discuss proposed amendments to the Township Zoning Ordinance to delete the current definition for oil and gas wells, and add detailed definitions for such oil and gas activities such as compressor stations, subsurface facilities, and well head and well site, and to designate conditional use on sites of varied sizes in specific districts (Anon, 2011b). These meetings reflect activities taking place and material artifacts emerging of a new energy landscape.

Moreover, some meetings became emotionally charged. For example, in August 2010, attendees became stunned at a Cecil Township meeting when, in an act of defiance, all three Zoning Hearing Board members resigned in protest to water withdrawal for industry purposes (Johnson, 2010). On occasion, and by law, townships reached out for public comment to determine whether they would permit new businesses. Some found themselves dealing with decisions unlike any they had to make before. For example, in December 2010, the Buffalo Township Planning Commission in Washington County met about requested industrial development within its jurisdiction (Anon, 2010). A company named MarkWest, based in Colorado, planned to build one of the largest compressor stations in the U.S. comprised of 14 compressors. In February 2011, hundreds of miles to the northeast in Bradford County, The Daily & Sunday Review challenged Wyalusing Township supervisors about having met privately about a controversial development project just two days after heavily attended public meetings (The Review, 2011). The issue involved permitting three industrial plants to support nearby shale gas extraction.

The next month it became clear that green forces – residents other stakeholders – were holding the industry back. Only one of the three proposed projects was approved by the supervisors, which was an asphalt plant. The other two rejected projects were a frack wastewater facility and a facility that would
produce drilling lubricants. “People who lived near the site begged supervisors these past few months to say no to the plans” as they did not want to live near an industrial complex or worry about contamination (Marshall, C.J., 2011). The landscape would have changed had these sites been built. Green forces that reflected the will of local residents held back the oil and gas industry from development.

4.1.2.3 Other Local Governments

It was not only township government green forces in the media, so were other local governments like boroughs, cities, and counties. In December 2010, the three Mainline communities of Cresson and Washington Townships and Cresson Borough, concerned about the safety of water sources in Washington County considered completely banning drilling for natural gas or finding ways to significantly limit that activity. The township officials referenced an ordinance passed by the Pittsburgh City Council, the first of its kind in the nation that banned drilling into the Marcellus shale (Mellot, 2010). Another county expressed concern in September 2010 when Lycoming County commissioners discussed amending zoning ordinances to address industry concerns. They created a draft ordinance that they distributed to 18 municipalities that shared in its services and other interested non-partnership communities for comments.

Local municipalities were amending existing zoning ordinances and writing or adopting new codes at a near frantic rate. Through their efforts to maintain local control over land use, municipal governments recognized their limits because only the State held authority to regulate the oil and gas industry. Mahoney Township Solicitor Eric Lieberman said that while a township does not have authorization to override the state's rulings, a township can regulate where and when the drilling occurs from a zoning perspective. "It's important to stay ahead of the game," Lieberman said, "We can't prevent it completely, and we don't want to prevent it, we just want to be smart about it elsewhere" (Richardson, 2011).

"We want to make sure things don't get out of control," said Upper Burrell Township Supervisor Ross G. Walker III (Garrone, 2010). Upper Burrell’s township ordinance placed restrictions on noise, extraction locations, bonding roads, specific operation times, permits and emissions limited processing plants.

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7 A Mainline Community “is defined as those communities that live along the Mainline of the Norfolk Southern Railroad line, at least from Gallitzin - just across the Cambria County line through to just north of Portage - say Lilly and Washington Township” (Mellott, Kathy, 2013).
and compressor stations to certain zones, not allowing on-site housing, and requiring 24/7 contact numbers to be available. These cases exemplify tools that local governments applied to control land use, and how there could be conflict between entities at different scales such as between the Commonwealth of Pennsylvania and its local municipalities. The state controlled oil and gas, but the municipalities controlled land use.

### 4.1.3 Controlling Land Use

According to the 14th amendment to the United States Constitution, individual states have authority to regulate private activities including land development; however, most states delegate responsibility of land use control to local governments. Additionally, in 1868 the federal government instituted Dillon’s Rule that affirms communities only have those powers vested to them by specific state legislation. Dillon’s Rule allows a state legislature to control local government structure, finance methods, procedures and authority to undertake functions. An alternate option called Home Rule allows communities to use their powers freely unless the state specifically prohibits them. In the latter case, local governments have autonomy and state interference is limited. In the Marcellus Shale region, the states of Pennsylvania, New York, and West Virginia follow Dillon’s Rule, while Ohio follows Home Rule (National League of Cities, 2012).

In 2012, Pennsylvania state government challenged the century old practice of local government control of land by legislating House Bill 1950, an amendment to the Oil and Gas bill, and referred to as Act 13. The act has a number of components. It first establishes an Unconventional Gas Well Fee to be paid by producers; second, it creates an Oil and Gas Lease Fund in which these monies would be collected and later distributed to local governments; and third, it takes away local government control of oil and gas regulation. Considering the third part, Act 13 states, “The Commonwealth, by this section, preempts and supersedes the local regulation of oil and gas operations… (Pennsylvania General Assembly, 2012).” Attorney Steven Walton notes that…

“…the most onerous implication of Act 13 is the preemption of local municipalities’ authority to regulate oil and gas operations. Local zoning has long followed the dictate of promoting and protecting the health, safety, and welfare of the citizenry. That intent and duty has been eviscerated by Act 13 which, as enacted, forbids local municipalities from imposing by local ordinance (either pre-existing or newly crafted ordinances alike) conditions, requirements, or limitations on oil and gas operations that are more stringent than similar conditions, requirements, or limitations imposed on construction activities for other industrial uses within the zoning district where the oil and gas operations are intended
Act 13 was signed into law on February 14, 2012. It would require local municipalities to implement standardized regulations written therein on April 16, 2012 when the law would become effective.

Most commonly, local governments use zoning to protect land use from the advancing industry. Up until the early 21st century, municipalities had implemented land use regulations such as zoning to control conventional oil and gas drilling. Traditional types of zoning are residential, commercial, industrial, agricultural, conservation, overlay zoning, open space or cluster zoning, and conditional zoning (Randolph, 2003). Most townships were scrambling to protect their residential zones from the encroachment of industry by either re-zoning various properties from industrial to residential, or if they did not have a zoning law, establishing one.

Other tools that local governments implement to control land use are tax policies, infrastructure-development impact fees, and provisions requiring urban services and infrastructure (Randolph, 2003). Although, some municipalities had been requiring gas operators to place bonds on roadways to cover road damage, zoning was likely the quickest tool available to control the rapidly advancing shale gas industry. Most were not imposing impact fees or tax policies, likely due to the ease of implementing zoning instead. In regard to Act 13, the state’s intent was not to act as a green force impeding industry; rather it sought to generate compensation from the industry using its natural resources to distribute fairly across local governments. However, some individuals and local municipalities perceived more costs than benefits accruing from the new legislation. Within a couple months, they challenged the state that Act 13 was un-Constitutional by taking away land use control. Their challenge went all the way on appeal to the PA Supreme Court where they won in July 2012 (PA Courts, 2012).

The green forces of local municipalities and individuals came together in a single pushback as seen by the legal action taken above. Local governments heard their citizens’ concerns about the quickly arriving shale gas industry. These concerns included hazardous chemicals, emissions, high traffic volume, location of industrial activities including operating times and on-site housing, unfamiliar facilities like compressor stations and processing plants, and violation of current ordinances in place. These concerns all represent the perceived
and real changes in a new energy environment. They also concerned costs, especially the cost of losing control of one’s place, one’s land.

4.1.4 Regional Public Organizations

Another organizational type of green force appeared in late 2010 through early 2011. In the stakeholder matrix, the Pennsylvania State Association of Township Supervisors (PSATS) occupies the public sector at the regional scale. The Association serves the 1,455 townships of the Commonwealth to preserve and strengthen their governments through lobbying state and federal lawmakers, educating and informing its members through workshops and an annual conference, and distributing award-winning publications. Its members included the townships described above.

PSATS demonstrates the deep belief in local government held within Pennsylvanian culture. In September 2010, Executive Director David Sanko published an op-ed piece on PSATS’s website in which he reminded citizens about local government’s value and urged them to act against proposed House Bill 2431 (2010). House Bill 2431 would reorganize local government only within a county framework (PA General Assembly, 2010.) He described the pending law, that if passed would “radically reshape our commonwealth by snuffing out townships and boroughs (2010).” Indeed the citizens’ right to govern themselves locally, something sacred, could be taken away and Pennsylvanians’ way of governance could radically change. His article Forced-Merger Bills Are a Slap in the Face to Our Founding Fathers - Townships Rally to Protect the Rights of Their Constituents depicts this profoundly held value in local governance (2010). Sanko argues that through local government, citizens have a voice in what takes place in their communities. They can speak up and make a real and lasting impact on the place where they live. He urged citizens to join the 10,000 local PA public officials to fight against this legislation. Sanko’s words demonstrate the deep place where local government resides in Pennsylvania culture. Although PSATS advocates for local government, it is also a strong defender of the Commonwealth supporting all types of townships for the good of all.

Continuing the organization’s mission, on January 26, 2011, Sanko testified before the Pennsylvania Senate Majority Policy Committee on the Local Impact of Marcellus Shale Drilling in Harrisburg. He stated that the sudden growth of the gas industry across the Marcellus Shale region was unplanned by communities.
Therefore, some are “playing catch-up in trying to figure out what needs to be done to plan for a future that few had envisioned just five years ago. An additional challenge has been how to properly zone for the industry (2011a).” He noted that townships maintain the ability to regulate the location of gas wells through the land development process. He continued that the PA Supreme Court, as authorized in the Municipalities Planning Code and the Flood Plain Management Act, upheld a municipality’s authority to impose reasonable zoning regulations upon oil and gas well exploration, drilling and development.

Sanko announced to the Committee that PSATS had designed a zoning model for townships as a guide to deal with the gas activity. The organization had collaborated with other local government associations, the industry, and environmental groups to establish some commonsense baselines. PSATS intended the model to allow timely oil and gas exploration, while retaining local control over reasonable health, safety, and quality of life issues of each community. Key issues included buffers, emergency preparedness, and noise and lighting guidance to decrease the impacts of the industry. Overall PSATS supported the economic development of the Marcellus Shale, but wanted it done in an environmentally and socially responsible manner.

Subsequently, in March 2011, PSATS provided the zoning template to its members for zoning ordinance provisions designed for oil and gas development (PSATS, 2011b). The townships could review it and adapt it to their own individual needs. PSATS wanted townships to implement this model before PA courts and the legislatures defined the parameters of local zoning powers over oil and gas activities. Stakeholders such as industry and other interested parties were closely scrutinizing local zoning actions. The use of zoning is purely optional on the part of municipalities, but it is the sole means available to a township wishing to establish specific areas of the municipality for either permitted or prohibited oil and gas well exploration, drilling, and development.

4.1.5 Boroughs and their Regional Public Counterpart

After townships and counties, another local government stakeholder stood out – boroughs. There are over 900 boroughs and more than 9,100 borough officials in the Commonwealth according to the Pennsylvania State Association of Boroughs (PSAB) (2012a). In November 2010, the Borough of Brockway
sued Flatirons Development LLC, an oil and gas company, for illegally planning to clear and develop forested land from which the Borough procures the municipal’s public drinking water. It sued through the Department of Environment Protection (DEP) concerning pollution from fracking chemicals, flowback (produced wastewater) water, and erosion. The Borough requested the DEP place an injunction against Flatirons to prohibit further activities like impoundments, wells, pads, electric or pipelines; that it conduct a groundwater study; implement a site-specific sedimentation and erosion control plan and storm water management plan; and, submit copies of further authorization of construction activity or permits from any other agency. Brockway managed to deal with this situation on its own, but boroughs like townships have a supporting organization – PSAB (Ging, Jr, 2010).

The PSAB is an organization that serves public officials in their role to strengthen local government democracy, or as their website reads, the “bedrock of Pennsylvania's Commonwealth.” After February 14, 2012, when Governor Corbett signed into law the updated 1984 Oil and Gas Act, or Unconventional Gas Well Impact Fee Act (Act 13), there were certain actions that boroughs would need to follow. The PSAB’s website explained that these pertained to the determination, collection and disbursement of an impact fee, and development or amending of local zoning codes to adopt new uniform zoning ordinances. In March 2012, like the PSATS, PSAB also created a model framework local zoning ordinance for oil and gas operations for boroughs to review and adapt it to their particular needs. PSAB opened a webpage “Oil and Gas Focus” just to help its constituents with deadlines and to keep abreast of breaking news on Act 13 and related issues (2012b).

4.1.6 Cities

Like other types of municipalities in PA, cities were either talking about or taking action about fracking during late 2010 and early 2011. For example, in September 2010, Philadelphia’s City Council announced that it would hold a public hearing, scheduled for Tuesday, September 28, regarding the environmental and economic impacts of hydraulic fracturing in its region (Weekly Press, 2010). Philadelphia is not located in the Marcellus shale area; but its population depends on drinking water from there, especially in the Delaware River basin. This was not the last discussion that would take place in Philadelphia, even being
relatively distant from the drilling. Two months later the news announced that the City “acts to deflect possibility of pollution from gas drilling (Phillips, 2010).” Philadelphia was beginning to talk. Farther west, the city of Pittsburgh was beginning to act, and to do so in an unprecedented manner.

In August 2010, Pittsburgh City Councilman Doug Shields planned to introduce legislation to ban corporations from drilling for gas inside the city limits. “It’s about our authority as a community to decide, not corporations deciding for us,” he said. The “frenzy of industrial gas extraction once confined to rural communities and state forest lands took Pittsburgh by surprise (City of Pittsburgh, 2010a),” as it did other municipalities. By November, the “Pittsburgh Community Protection from Natural Gas Extraction Ordinance” passed by a unanimous Council vote of 8 – 0. The Council became a green force as it pushed back against industry by recognizing citizens’ alarms around threats posed by hydraulic fracturing methods used in the Marcellus Shale.

In a press release, the City noted reasons such as threats to surface and ground water, fatal explosions, contamination of drinking water, local streams, air and soil; lost property value, livestock ingesting toxins, mortgage loans not available for prospective home buyers, and threatened loss of organic certification for farmers in the affected communities. Not only did Councilman Shields push for Pittsburgh, he advised all municipalities in the Commonwealth to enact similar laws “to send a message to Harrisburg,” and he insisted that a temporary moratorium “will not be an acceptable consolation prize for a failure of the State to recognize this local law and these fundamental rights (City of Pittsburgh, 2010b).” This was not only about gas drilling, this was about a community’s authority, the rights of local self-government. The concern about protecting local rights first appears in Pittsburgh’s actions and was supported by a non-government stakeholder, the Community Environmental Legal Defense Fund (CELDF). The green force of the CELDF appears for the first time in regard to Pittsburgh’s ordinance (Figure 4.6). It would show its force later with other local government (Pittsburgh Tribune, 2010).
Figure 4.6 A draft of the bill of rights that the Pittsburgh City Council passed into law to protect the health and environment of City residents in October 2010 (City of Pittsburgh, 2010a).

4.1.7 Local Self-governance and the Rights to Nature

Other municipalities, both within the PA Marcellus Shale region and outside its borders, followed Pittsburgh’s action. On March 5, 2011, Mountain Lake Park, MD and on April 5, Morgantown, WV announced moratoria on fracking, and on May 19, 2011 Buffalo, NY announced it would copy Pittsburgh’s model. The CELDF was instrumental in a number of these cases as it pushed its mission using Pittsburgh’s example of the rights ordinance as a tool to ban drilling activity. “These local ordinances intend to turn that structure upside down – subordinating corporate ‘rights’ and corporate production to local self-governance and the rights of nature, rather than the other way around. For that reason, if we truly believe in economic and environmental sustainability, variations of the Pittsburgh ordinance must spread to a thousand other communities in the path of the Marcellus shale drillers.” (CELDF, 2012)

Green force activity continued among local governments as they hurried to deal with the emerging shale gas industry, knowing that their power was limited. On January 5, 2011, Benton Township in Lackawanna County held a public meeting to hear about how to protect its residents against the risks of shale gas drilling, and to consider using Pittsburgh’s model just as 20 other counties were doing. The township mentioned that the ordinance does not “attempt to limit drilling’s impacts through zoning, instead it asserts the right of community self-government as well as rights to clean air and water and then "prohibits activities
that would violate these rights,” said Mr. Ben Price of CEDLF (Legere, 2011). On March 17, 2011 Mahanoy Township residents in Schuylkill County were “considering adopting an ordinance concerning Marcellus Shale drilling” to “protect residents and their property as well as the environment (Richardson, 2011).” On March 23, Hampton Township in Allegheny County held a public meeting about zoning amendments regarding oil and gas wells development and extraction activities (Hampton Township, 2011). Later, on May 23, Cecil Township in Washington County, a neighbor of Mt. Pleasant as earlier predicted, held a public hearing to amend its oil and gas ordinance from one of permitted use to one of conditional use (Marcellus Protest, 2011). The distribution of green forces is presented below as they spatially relate to conventional and unconventional spudded wells as of the 20th century through 2011 (Figure 1.7).

![Figure 4.7](image)

**Figure 4.7** Green forces tend to relate to unconventional drilling as they set near red clusters of unconventional wells. Green forces lie in southwest Allegheny County, home to Pittsburgh, have green forces and almost no wells spud. The two large green forces in the far northeast are located in the Delaware River watershed. Northwest PA is covered by conventional wells and empty of green forces. The center and southeast side of PA is void of green forces and wells. (Map by Chantal Ivenso, 2014)
4.1.8. Acceptance of New Energy Landscapes

On January 20, 2011 in the city of Murrysville, PA a nine-member task force met to deal with a new ordinance to regulate deep well gas drilling along with protecting the community's health and environmental rights. The members were dealing with how to balance being open to change and keeping the best interests of the community in mind. "The (Pennsylvania) Oil and Gas Act of 1984 came about when the Marcellus shale was not yet in play," stated Mr. James Morrison, Murrysville chief administrator (Whipkey, 2011). "It put a set of handcuffs on us on what we can enforce." Bill Sittig, external legal counsel for the committee, said it would not be prudent for Murrysville to ban or even place a moratorium on Marcellus shale drilling. Although there were green forces emanating from municipalities, there were limitations on what they could do.

In Porter Township in Schuylkill County, supervisors vowed to "fight this" at their February meeting. In March, a CELDF representative urged local governments to draft ordinances designed to squash drilling. Yet, county officials appeared resigned to the fact that Marcellus shale drilling was coming. "You can't prohibit drilling, but we're concerned about environmental and infrastructure concerns," Scarbinsky said (Wolfgang, 2011). Joe Garner, district manager with the Susquehanna County Conservation District, said efforts to fight drilling will likely be in vain. "This is a viable activity whether you like it or not. Municipalities should plan for it," he told the crowd of more than 250 at the forum (Wolfgang, 2011). The industry had established a steadily expanding presence in a new energy landscape.

The previous cases of government green forces show in part how energy extraction creates a new landscape. They show human society reacting to industrial advancement in public meetings, attempts to implement law to control land use, and even the creation of a community’s bill of rights. These cases illustrate that the industry imposes their physical artifacts upon and beneath the landscape and by so doing remakes it over, once again. Does this new energy landscape differ from energy landscapes produced in earlier years or other parts of the state? The primary economic activity of energy resource extraction had already blemished different areas of PA for centuries. The remaining coal-mining infrastructure continues to cause concern to communities. Oil and gas drillers in the late 19th and first half of the 20th centuries spewed petroleum onto the
ground that eventually flowed into fresh water streams. Old rusty pipes, twisted wire, and pump houses remain in the woods. And, those who cleared land of forests for wood as an energy source or building material had stripped the land bare by the turn of the 20th century. It is evident that no landscape is spared from energy.

### 4.1.9 Public Sector Green Force

In addition to local government pushing back against an emerging new energy landscape, non-government entities in the public sector did so too. Organizations involved with land ownership or management like homeowners associations, land trusts, and community organizations are examples. Sometimes these organizations opted to pressure their local government to take the action against Marcellus drilling on their behalf, as did the Baylor Lake Association in Benton Township of Bradford County, PA, (Legere, 2011), while others pushed back against the industry more directly. Below I describe two cases in which public organizations successfully held back development by applying non-regulatory tools to control land use. These tools available to the public sector included land acquisition, conservation easements, purchase of development rights, and land trusts (Randolph, 2003, p. 143).

In November 2010, the Carnegie Museum of Natural History, trustee of the 2,200-acre Powdermill Nature Reserve, considered the economic benefit of leasing its gas rights at the same time maintaining the environment. Surface conservation easements prohibited drilling within its boundaries, but the new horizontal drilling would reach beneath the surface sparing damage. The organization joined 140 surrounding landowners to form a group to lease mineral rights, have some say in land control, and increase buying power. After meeting with five to six companies, the group rejected a bid from Williams Companies based in Oklahoma of $2,500 per acre plus 15 percent royalty that it thought was too low. Williams then went to the individual landowners who also rejected its offer. "We thought this would be a golden opportunity for a company to put their actions where their PR was," Dr. Taylor said. So far, it turns out that was naïve thinking (Hamill, 2010).” On the other hand, the group found it to be a hopeful sign that the gas companies seemed unhappy with the alliance and its conditions (Hamill, 2010).
Another example concerns Rider Park, a community park in Lycoming County. The First Community Foundation Partnership of Pennsylvania (FCFPA) owned it when in November 2010 the Friends of Rider Park petitioned the foundation against leasing the park for surface or subsurface gas drilling. They asked the foundation to be the steward of this land and take measures to protect it for future generations, as was the original intent of the donor, Tom Rider. Gas drilling anywhere in Rider Park is incompatible with its use as a recreational area. As a result, the foundation voted against drilling (Petition Online, 2010).

A few other green forces made Internet news during my initial observation of Marcellus Shale activity. On December 11, 2010, New York State Governor David Patterson signed a seven-month moratorium against fracking. While an environmental analysis was made, Earth Justice, a national public stakeholder intervened for Damascus Citizens for Sustainability, a public regional non-profit organization that was fighting the construction of a gas pipeline in three northeast PA counties. This green force would slow development of a major new project, the MARC 1 Hub Line, a major pipeline to get gas from Bradford County through southern New York State to market. Third, in 2009, a group of 19 families in Dimock, PA, Susquehanna County sued Cabot Oil and Gas of Texas for contaminating their water wells and lowering their real estate value. In December 2010, these families learned that they would receive $4.1 million between them in compensation from the company (Hurdle, 2010). This last example not only shows a green force against industry, it demonstrates costs to both local Pennsylvanians and the arriving industry as the landscape evolved to one of fracking.

4.1.10 Individuals as a Green Force

Local citizens began to express concern immediately after fracking activity began. These concerns appeared in news media and blogs often voiced through municipal government, but on occasion a single person could be a green force on her or his own. A prime example is the case of Stephanie Hallowich, an individual public stakeholder, and her family who had resided in Mt. Pleasant Township, Washington County since November 2007. This is the same time period that shale gas activity began to increase. Her case became one of the most vocal early on against fracking. In September 2010, the CBS Evening News (Keteyian, 2010)

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8 As of July 23, 2014, the New York State moratorium is still in effect.
highlighted her story and the following month a National Geographic online article did the same (Lavelle, 2010).

She and her husband’s dream drew them to move to a rural landscape of country homes, small working farms, and scattered little towns. But, their Mt. Pleasant home in Washington County turned into a nightmare. It became surrounded by an industrial infrastructure of oil and gas extraction within 500 feet of the property. This landscape contained “large water storage pits, tanks to hold gas byproducts, compressor stations, gas processing plants, pipelines, access roads, pumps to infuse the gas with its distinct odor. At first, the Hallowich family took legal action against Range Resources for water contamination (Legere, 2010a).”

Ultimately they filed a lawsuit against a number of companies including Range Resources of Texas, Mark West Energy Partners of Oklahoma, Williams Gas/Laurel Mountain Midstream Partners, a joint venture based out of Oklahoma, and PA Department of Environmental Resources (DEP). The Hallowich family claimed that the companies’ operations harmed their family’s health and contaminated water on their 10-acre farm. On August 22, 2011, a court-sealed settlement was agreed with the family members being placed under a gag order.9 This case is among the first to make national, even world headlines as a mishap of shale gas development; Ron Gulla is likely the second.

In 2006, Range Resources drilled Renz #2 on Ron Gulla’s farm outside of the town of Hickory in Washington County. In 2007, Gulla posted a letter on the blog marcellus-shale.us in which he expressed angst and rage against both the industry and the PA Department of Environmental Protection (DEP). He claims that since he signed a lease in 2002, the industry had deceived and lied to him about the drilling activity on his property. He observed the company’s activities which he deemed unacceptable in regards to improper

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9 The papers were unsealed in August 2013. In the papers the settlement gave Range Resources the Hallowich property, less the oil and gas mineral rights. The Hallowichs would receive a fee of $750,000 and continue to receive oil and gas royalties. The Hallowichs agreed, in a Mutual Non-Disparagement clause to not “make or cause to be made” any statement or comment to about their experience, hydraulic fracturing, and oil and gas development, for example, in the public including all forms of media such as print, radio, or social media like Facebook, Twitter, or YouTube (Court of Common Pleas of Washington County, PA, 2013). The Pittsburgh Post Gazette, who had sued the courts to make the settlement public, noted that the settlement included an admission by the family that it suffered no environmental, health or safety impact from drilling adjacent to their property (Hopey, 2013).
erosion and sediment control, chemical spills into his pond, human excrement left on his property by
workers, and his water wells contaminated by chemicals. He and his wife took Range Resources to court for
neglect and misconduct. He searched months to find a lawyer who would stand up to the industry and many
more months to file appeals. Eventually, in January 2011, Range Resources purchased his 141-acre farm for
$1.52 million (Campbell, 2010). The Hallowich and Gulla cases epitomize the costs paid by individuals due to
fracking in the Marcellus Shale. Likewise, these cases show costs paid by the industry.

4.1.11 Green Forces Broaden

At the regional scale, I discovered two quasi-governmental entities, the Delaware River Basin
Commission (DRBC) and Susquehanna River Basin Commission (SRBC), pushing back against fracking
activities. These organizations are compacts of state governments located within the Delaware River and the
Susquehanna River watersheds respectively. I place them into the matrix as public regional organizations.
Their authority comes from federal government, is limited to specific regions, and monitors and enforces
regulation of water quality and quantity issues.

In June 2010, the DRBC became a green force when it placed fracking on hold in order to re-write
environmental law related to the activity. It planned to monitor increasing demands by industry for water
withdrawals in its basin, expected increases of wastewater flows associated with the gas industry, and
consideration of additional costs posed on communities. Some call it a “de-facto moratorium” because it
banned all drilling activity until it determined its own gas drilling regulations (State Impact, nd). To its west,
the SRBC suspended the drilling operations of J-W Drilling of Texas for not having a permit for water
withdrawal and consumptive use, as well as the construction activities it has already completed. The SRBC
already had regulations in place and J-W Drilling slowed its own process by not following procedure.

The previous issue became highlighted in the media demonstrating other costs, that of contentious
relationships. At the time the commissions were dealing with fracking, a story called “The Shale Game Part 1:
County vs. County” airing on WHYY, a National Public Radio (NPR) station in Philadelphia (WHYY, 2010)
exposed contrasting views upon the landscape. While recognizing that environmentalists experienced
satisfaction in knowing their precious resource was valued, drillers and landowners in Wayne and Pike
Counties and southern New York State holding mineral rights were waiting in anticipation as their investments stood immobile. The Northern Wayne Property Owners Alliance, comprised of almost 1,300 families holding tens of thousands of acres for gas development, feared Hess Corporation of New York and Newfield Exploration Company of Texas would pull out of their leases (McConnell, Steve, 2010). In September 2010, a major gas player Cabot Oil & Gas Corporation discussed above sold its approximate 8,000 acreage holdings in Wayne County as a result of the DRBC moratorium (McConnell, 2010). The green forces had succeeded for the time being.

In summary, as the gas industry advanced its new technology onto the southwest PA landscape and proceeded northeast across the state, people reacted to the threat it posed of a new energy landscape. Individual and organizational stakeholders living in this place experienced costs of this changing place, and so did industry on occasion. Townships were first to push back to maintain land use control. They attempted to regulate environmental and public health concerns especially relating to water contamination and consumption, air pollution, and infrastructural damage, as well as the aesthetic of a landscape they cherished. The costs that local government experienced equated to money which they did not necessarily have. Local stakeholders felt threatened that their peaceful lives were in danger. Some even claimed that the Commonwealth was not protecting their rights.

Regional public organizations like PSATS and PSAB worked hard to protect their constituents’ authority over land use. They advocated in the media and at the state capitol, educated their members about fracking, and provided zoning templates to fend off standardization from the state. Public organizations like Earth Justice and CELDF showed green force by bolstering the efforts of municipalities to protect citizens’ rights against the shale gas industry. In addition, the DRBC and SBRC at the regional public level became green forces by either stopping all drilling activities or imposing strict regulations. The preceding cases begin to answer the question of why people were expressing concern about fracking in PA. Note that these stakeholders were ‘on the ground’ or very close to the activity. They felt direct change of their landscape due

10 In July 2013, the DRBC moratorium was yet in place. Hess Corporation and Newfield Appalachia PA L.L.C. notified Wayne County landowners and businesses that they were terminating the over 100,000 acres of leases they had held (Bauers, Sandy, 2013).
to the quickly advancing shale gas industry. Were organizations further away taking notice? Next, I discuss more distant stakeholders at the national scale.

4.1.12 U.S. Federal Government

By early 2010, both the U.S. Congress and the Environmental Protection Agency (EPA) were addressing public concerns about the potential threat of hydraulic fracturing to drinking water. Henry Waxman, Chairman of the congressional Subcommittee on Energy and Environment, had been leading an investigation on the issue since 2005 (Waxman and Markey, 2010). The committee reported its findings “Chemicals Used in Hydraulic Fracturing” to Congress in April 2011. At the time the Subcommittee was nearing conclusion of its inquiry, the EPA began holding a series of public meetings around the country addressing the same issue. I attended one of those meetings and collected data from it that I will describe after I share some important background from the congressional report.

4.1.12.1 Congressional Report

The inquiry led by Waxman related to controversial legislation notoriously named the “Halliburton Loophole.” The public had growing concerns that fracking fluids holding “numerous chemicals could harm human health and the environment, especially if they enter drinking water supplies (U.S. House of Representatives, 2011).” Cheney, then U.S. Vice President and former chief executive officer of Halliburton, one of the largest providers of hydraulic fracturing services, reportedly incorporated a clause into the Energy Policy Act of 2005 that exempted hydraulic fracturing from regulations under the Safe Drinking Water Act (Figure 4.8). Some chemicals that companies reported they used in fracting included diesel fuel, benzene, toluene, ethyl benzene, and xylenes, or BTEX chemicals known to pose environmental and human health risks. Benzene is a proven carcinogen and chronic exposure to toluene, ethyl benzene, or xylenes can damage the central nervous system, liver, and kidneys.

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11 A November 2, 2009 New York Times editorial called The Halliburton Loophole accuses Cheney as author of this clause, subsequently making him notoriously connected to it (U.S. House of Representatives, 2011).
Sec. 922. Hydraulic Fracturing.

Paragraph (d) of section 1421(d) of the Safe Drinking Water Act (42 U.S.C. 300h(d)) is amended to read as follows:

"(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."

Figure 4.8 Section 222 of the Energy Policy Act of 2005 in regard to the Safe Drinking Water Act excludes fracking fluids except diesel fuels from government scrutiny (Office of Energy Efficiency and Renewable Energy, 2005).

Chemicals used in fracking (Figure 4.9) are at the root of the national argument regarding potential pollution of drinking water sources. The chemicals in the graph are indicated by general terms. Specific chemicals are used for different purposes. For example, a ‘Gelling Agent’ as guar gum commonly used in foods like ice cream suspends the sand in water; a ‘Biocide’ like Tetrakis Hydroxymethyl-Phosphonium Sulfate eliminates bacteria in the water that produces corrosive by-products; and, a ‘Scale Inhibitor’ like Phosphonic Acid Salt prevents buildup of deposits in the pipe (Frac Focus, 2012). Different specialized chemicals are used by different companies and oftentimes their type and quantity are considered proprietary information, or a trade secret. Since beginning my research, at least 10 states (Colorado, Oklahoma, Louisiana, Texas, North Dakota, Montana, Mississippi, Utah, Ohio and Pennsylvania) now require that companies publically disclose the chemicals they use in fracking and use Frac Focus.org as the means to do so (Frac Focus, 2012).
The Subcommittee on Energy and Commerce concluded that hydraulic fracturing opened access to immense reserves of natural gas in the U.S. that could help the country move toward clean energy. However, the committee noted that the safety of the chemicals used in the process continued to be a problem difficult to overcome because many companies kept them secret as proprietary information. The Subcommittee claimed this was the most comprehensive study of its kind to date showing many leading hydraulic fracturing companies in the U.S. had used over 650 products containing chemicals known or suspected to be human carcinogens or hazardous air pollutants (U.S. House of Representatives Committee on Energy and Commerce Minority Staff, 2011, p. 12).” Waxman’s inquiry sets a backdrop of concern for some of the data I present next.

4.2 A National Level Stakeholder Reaches across the Matrix

On March 18, 2010 the EPA announced it would conduct “a comprehensive research study to investigate the potential adverse impact that hydraulic fracturing may have on water quality and public health (EPA, 2010a).” The study would be transparent through a peer-reviewed process including “significant stakeholder input” and reviewed by the Science Advisory Board (SAB), an external panel. There would be five meetings in the summer of 2010 held in Denver, CO, Dallas, TX, Canonsburg, PA, and Binghamton, NY.
(EPA 2010b). Each of these locations was near major shale gas fracking activity. I attended the July 22, 2010 meeting in Canonsburg, PA in Washington County, home to the first successfully producing Marcellus shale gas well (Figure 4.10)

![Figure 4.10](image)

**Figure 4.10** View to the north off of Route 50 east of Hickory in Washington County. A rig towers upon the distant landscape surrounded by construction trailers and other equipment on a leveled Marcellus shale well pad (Photo by author, July 23, 2010).

### 4.2.1 Stakeholders Speak

The 114 individuals out of the 1,200 audience stakeholders were varied. Some represented themselves, others the private sector such as the company they owned or worked for, and others government or public organizations with which they were affiliated. These individuals included oil and gas employees that were native Pennsylvanians and others from Tennessee, Oklahoma, or Texas; landowners with gas wells and landowners without gas wells; farmers, scientists, politicians, environmental activists, students, professors, physicians, a librarian, two Native Americans, military veterans, a lawyer, two representatives from the League of Women Voters, and a husband and wife on a “fracking vacation” from the Hudson Valley of New York.

Of those 114 who commented, 67 (59 percent) were against hydraulic fracturing, or “antis.” 16 (14 percent) presenters were not strongly opinionated either way, they mostly suggested what they would like to see included in the study, and 31 (27 percent) were pro frackers. I organized their audio-recorded statements
into three categories of ‘the antis,’ ‘the moderates,’ and ‘the pros’ for analysis. Below, I describe the findings from these speakers and compare them to my previous findings from the green forces. Individual quotes provide a sense of tone and emotion to the script for a clearer understanding. These quotes and more are listed in Appendix B.

4.2.1.1 Those Opposed

Those who object to fracking shared green force concerns that the industry was moving too fast, there was a need for new regulations, and the changing physical landscape was taking away their rural ways of living. What was the hurry? As one stated, “The gas has been in the earth for millions of years and is not going anywhere.” Another person exclaimed that the EPA’s plan was like “a study of the flammability of Rome while it burns!” On the topic of regulations, another began with “Welcome to the Wild West! The oil and gas industry can do whatever they want while Pennsylvanian citizens suffer.” At least three statements criticized the DEP including the agency is “a failure in PA,” has not done its job, and gives “no response.” Did the DEP have enough capacity to handle this new fast-arriving technology at the time?

The new energy landscape that the green forces previously described continued to materialize through stakeholders’ statements. Their views helped visualize this change, as open pits of flowback with no fences, the water turned brown, changes in nearby streams, plants, animals, and water ecosystem, and the need for hundreds of roadways to be repaired. One man said he was concerned because of unfenced “open pits of flowback that cattle or deer might become sickened.” A resident of Hopewell Township said an energy company built a well, a “Mount Marcellus” across the street from his house surrounded by a tent city. There were such awful vibrations from the well that they almost rattled his house right off the foundations. He was not the leaseholder and was concerned about his water well. He closed with, “Hopewell Township used to be known as the place near where Night of the Living Dead was filmed – maybe they will film the next sequel here as well.”

The new findings show a tremendous concern for water along with the growing problem of frack wastes, interrupted and changed lifestyles, and a communication gap between the industry and those who questioned the idea that fracking was a good thing. Water was the topic of the EPA’s meeting and as one man
said water was the “most valuable resource, more valuable than gas.” At least three individuals said they had animals or pets become sick and die on their property from fracking. During 2008 through 2009, one man lost ten calves and a two-year old heifer. He finally fenced off the pond and no more have died. He also dug a new water well, yet claims it is salty and has been buying drinking water ever since. A few individuals stated they or their family members had become sick. A medical doctor expressed concern about neuropathy, cancer, and hair loss. Two statements referenced the Halliburton Loophole including one person who said, “Thank you Dick Cheney” for the 2005 US Energy Policy Act that went against the 1974 safe drinking water law.

Water was a huge concern for Pennsylvanians. The second stakeholder of the evening was a representative of PA Senator Robert Casey who pointed out that PA had the second most water wells in the nation. Half a dozen speakers either stated their water wells had been contaminated, and many others expressed fear that fracking would contaminate their wells. One mother from Hickory, PA said there was acrylonitrile styrene found in her water and that her children were living “at ground zero.” Another said that acrylonitrile 2 bitoxy was found at their property, she had livestock and pets die from it, and she felt numbness in her body as well. Yet, another family’s water well was contaminated with cyanide. Others feared water contamination from endocrine disruptors, PPB, benzene, biocides, hydrochloric acid, and corrosion inhibitors used in fracking. Two individuals mentioned a potentially higher rate of radon due to the presence of uranium in Marcellus shale. People feared cancer and other diseases. A few people pointed out that the industry had not proven these chemicals safe before using them.

Frack wastes appeared to be a new problem upon the landscape that needed to be resolved. These flowback liquids and solids are comprised of high levels of total dissolved solids (TDS), heavy metals, residual chemicals added to the fracking process, and other elements found in the Marcellus shale itself. People stated that PA did not have the facilities to process these pollutants. The state did not have underground injection wells and its current municipal wastewater treatment plants were not set up to handle these wastes. For example, “like the one that dumps into the Beaver River (Speaker #31, Appendix B).” that adds chlorine to the treatment process which produces more dangerous chemicals like trihalomethanes and chloromene.
Furthermore, municipalities use brine to spread on the roads in the winter. Will they now be applying this new frackwater waste to the roads? In addition, people were illegally dumping into the Allegheny River and backyard creeks. One person demanded that gas companies be required to build wastewater plants.

A new issue that became clearer was stakeholders’ life style change in the new energy landscape. One woman said that because of the dirt and noise her family could not even open the windows or turn off the air conditioning. The activity ran night and day. Sometimes there were twin flare stacks shooting 20 to 30 feet into the air. One family experienced lifestyle interruption by a well casing blow out that forced them to buy their own water. Others experienced sickness and animals dying. Others now expressed fear for their health which demonstrates how they experienced an emotional adjustment too, especially the increase of worry and fear. People worried that fracking would bring prostitution and drugs to the community, historical sites could be destroyed, and that they were losing control of their property. One speaker said that after a seismic testing company entered their property without consent there “was a constant pit in our stomachs” and they “are at mercy of big business.” Another woman said, she was “shocked with a door knock and a man saying, “I am with Atlas energy and drilling on your land.” There had apparently been no advance notice.

Of the 67 stakeholders who described a negative situation, ten demanded a moratorium, a halt to fracking. One man said, “Exposure of the population without consent is inconceivable and would be considered criminal as was recited with pharmaceutical industries and no evidence of ill effect is not evidence of no effect.” One PA citizen reminded the EPA that natural gas extracted from the Marcellus Shale is a finite, carbon-based, energy resource and its production significantly affects the environment and the economy of the Commonwealth. The government needs to consider policies that protect and wisely manage these natural resources reflecting the Pennsylvania Constitution. She quoted Article 1, Natural Resources and the Public Estate. Section 27:

“The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people (Pennsylvania, 1776?).”
This last quote adds to those who conveyed the ideas of climate change, renewable energies, and question of natural gas being clean. Requests were made that the EPA study fracking “from cradle to grave,” and its “entire life-cycle including casing, wellhead, surface, impoundment, cumulative impact, waste management failures, damaged roads, and residential areas,” and “beyond drinking water, include air quality and animal life.” As seen above, a lot of discontent, angst, and fear filled the conference room that night. This combined emotion became a topic in itself to signify a division and a lack of communication between the antis and proponents of fracking. I discuss this observation at the end of this section.

4.2.1.2 The Moderates

Some stakeholders focused on giving their input toward the study design instead of an opinion whether fracking was good or bad. They had a more moderate approach. A University of Pittsburg professor acknowledged that although there had been 60 years of fracturing done in the Marcellus, there is concern in this new geographic area about the increase of radon gas and the long-term life of well casings. Someone reminded the EPA to be alert to abandoned underground coalmines. A woman from the Sierra Club suggested the study continue for years. The League of Women Voters representative and another speaker requested that the study cover the cumulative impact and to beware of orphaned wells. Others requested that the study look at all aspects of the water cycle and make it closed system by reusing the water. An elderly Native American Lakota Indian Sun Dancer who had worked in the industry said that they have got to do it right, that fracking started in Wyoming in 1948 and used “acidation” [sic] and nitroglycerin in the process. One person summed it up as, “We have a technology. We want it safer. Remember climate change.”

4.2.1.3 The Proponents

Most stakeholders at the EPA meeting who provided positive statements about fracking worked with the gas industry. The findings are in clear opposition to the previous green force Internet findings, and as a result they are new. I discuss statements that reflect the benefits fracking technology brings the region, the strong sense of pride and satisfaction held by those in the industry, and the feeling of being misunderstood by those outside the field. Finally, I discuss the concept of emotion that shows up four times by proponents and shows a growing lack of communication between the antis and the pros about fracking technology.
A representative from the American Petroleum Institute (API) claimed that fracking is a safe, sound technology. He said, “The marriage of directional drilling plus hydrofracking equals a minimal footprint. It is one and a half miles below sea level and cannot affect drinking water sources.” A petrogeologist stated that fracking has been the standard for more than 50 years and fracked shallow wells are producing. A farmer and geologist from Cecil Township said that they had fracked 20 wells on the family farm from 1977 to 1979 and some wells were still producing today. In addition to extracting natural gas, an engineer said that he had used hydrofracking to cleanup a Superfund site. He added, “One hydrofrack replaces 25 conventional wells.”

More often the terms “jobs” and “economy” came up among proponents of hydraulic fracturing. A southwest PA government representative stated that if careful about regulations, fracking would generate 211,000 jobs and $18 billion in Pennsylvania. A northwest state representative said if the EPA performed the study correctly, there could be 200,000 jobs and $1 billion in tax revenue per year. A landowner said that with responsible development, she saw fracking as a “feedstock for U.S. manufacturing.” Others commented that they had seen jobs come and businesses grow such as hotels and restaurants. In opposition to the ten stakeholders who throughout the event called for a moratorium, one proponent warned that a moratorium would mean the loss of 1.8 million jobs.

Most noticeably the findings vocalized industry’s strong commitment to the environment and a plea that those in industry were not different from those who were not. Three individuals said that they had moved with the industry to work in Pennsylvania. One introduced himself as a father, fisherman, geologist, and businessman. He said those in the industry had to “challenge ourselves to meet and exceed PA regulatory standards, to be at the forefront of sustainable energy development.” A Range Resources employee stated that his company had 400 employees, many of whose families were living in PA, and that they had quality as their goal. He furthered that shale gas is at the forefront of sustainable energy development and will flourish in an environmentally sound manner. The third gave the example that his company treats used waters and captures 90 percent of the volatile organic compounds (VOC). The President of the Marcellus Shale Coalition

12 There was tension between the state and federal government about oil and gas regulation to which these two representatives could have been referring.
(MSC) Kathryn Klaber argued that there has never been a case of ground water contamination documented. Furthermore she noted that the industry works to improve the process every day.

Another stakeholder specifically spoke to those against fracking. He introduced himself as a private citizen of Pennsylvania though originally from Tennessee. He wanted to address two things that seem somewhat false that people do not quite grasp. He “does not take his check from natural gas that he trains in [sic] and send it back to Tennessee. We do keep that money here in the state.” He has lived there for three years, pays a mortgage, and has his family with him. He does pay PA taxes. Secondly, he discussed how the industry has made great efforts to expand the workforce in Pennsylvania. Since January 1st, the Western Area Career and Technology Center has trained over 100 students. They all have jobs working in the Marcellus shale project, and all are making over $60,000 a year that they have reported independently and the money is not going back down south.

4.2.2 The Emotional Debate about Emotion

Emotion emanated from many proponents of fracking while they made statements, just as it had from the antis. However, when a proponent spoke the word “emotion,” the word “facts” usually followed. For example, stakeholders against fracking included two who encouraged the EPA to include emotion in its study. One asked, “Why are people having [sic] to prove the pollution of their [industry’s] wastes?” Another told the EPA that emotions are “absolutely necessary. Sickness is a fact.” Alternatively, supporters of fracking asked the EPA to base the study “on fact, not emotion,” as two individuals simply stated. A third declared that the emotional debate was intentional, that it was a misrepresentation of data. He said, “Use reason, facts,” and that “unfounded hysteria and fears were overblown.” Another said to base the study on fact, not “rumors, movies, or emotion.” In the balance, a moderate stakeholder who introduced himself as a professor of physics and astronomy declared, “Science is not done in the absence of emotion…emotion involving maybe subtler forms such as insight, intuition are very important. They propel peoples in terms of what they work on, how they work on it, and how successful they are. So, hard cold facts are not all of it. There is a lot of other stuff going on.”

13 A national argument was taking place at this time. EPA findings of a study it was conducting near Pavillion, Wyoming indicating possible ground water pollution from fracking activity (EPA, 2010b).
Important findings also include not only those among the 114 speakers who expressed themselves emotionally, or spoke about emotion, but the audience behavior. The audience loudly expressed emotion from time-to-time in the form of applause, cheers or boos, or cheers and boos together. When a stakeholder whom I cited earlier said “Welcome to the Wild West!” followed by “Pennsylvanian citizens suffer,” the audience cheered. After a call for “clean renewable energies” and pronouncement of “We have seen the enemy and he is us,” the audience cheered and whistled. When one industry employee stated that fracking is not new, media generates public hysteria, and there is no example of ground water contamination in the U.S., the audience laughed. When a Halliburton employee expressed her gratitude for having a job, the audience interrupted and booed. When the Range Resources employee mentioned that quality was the employees’ goal, the audience cheered. The topic of fracking had indeed become one of emotion. Yet, these findings also hint at a growing lack of understanding between those against fracking and those in the industry who work hard to protect the environment. I discuss the latter observation through findings that emerged later from an academic event in Pittsburgh, interviews in the gas field, a focus group, and events that I attended in Philadelphia.

A concluding finding from the EPA public meeting is movement within the Stakeholder Matrix. This is an example of a stakeholder at the national government scale inviting others from all sectors and scales to come into its space. There were state representatives, individual citizens as private sector employees or public sector landowners and residents. There were small business owners, retired workers, mothers, family members, and students who spoke to the federal government. Individuals and groups of different interests in the Marcellus shale expressed opinions about costs and benefits of the new energy landscape that was digging its way into their space. The new data their statements provide supplements, accentuates, and introduces activity and physical artifacts appearing on the landscape. The findings raise new questions.

Where and how will these new contaminated wastes be disposed? What new regulations need to be made? How are regulations made to balance both benefits of jobs and tax revenues with a promised healthy environment for Pennsylvanians? How is it that the industry can get away with using chemicals known to be toxic or carcinogenic and arguing the process is safe? Why do those outside of the industry often think that
those who work for the industry do not care for the environment? Does the industry experience costs as well? What does the public know about the new technology? Where do they learn about it? Is there a lack of communication between the antis and the pros? The five EPA meetings ran through the summer of 2010, after which time the study plan commenced and the study began. As of February 2014, the outcome yet remains to be published (EPA, 2014).

4.3 The Oil Patch

Immersed in an energy landscape of men making a living drilling for oil and gas, I literally stood on the edge of a frack job in the mud. There, men focused on their work that provides energy resources to the market. My findings from northwest PA provide a deeper understanding of the people who work in the oil and gas industry, likewise, how the physical energy landscape appears. Below I share perspectives about fracking held by those I interviewed including Jim Barnes, the owner and president of an oil and gas services company in McKean County, PA and three of his colleagues Dave, John Holko, and Paul Yanuga (Figure 4.11). Their place in the Stakeholder Matrix is in the individual and local scales of the private sector. Their comments, plus my observations of the place, reaffirm the changing material landscape, speak to the antis’ concerns, and intermix with the proponents comments at the EPA meeting. Appendix F references the interviewees’ comments to follow, and Appendices G and H show the transcribed interviews.
4.3.1 Local Expertise

A huge topic for Jim, who had worked first-hand in the oil and gas industry since the 1970s, is the difference between conventional and non-conventional fracking (sometimes called unconventional fracking). The term “conventional” refers to the oil and gas drilling and fracking technology that has taken place since about the 1950s. It typically occurs in shallower wells to about 3,000 feet in depth, requires thousands of gallons of water, uses 2,000 – 3,000 pounds of pressure per square inch, and there is one well drilled per pad (Figure 4.12). The new fracking, or horizontal drilling combined with hydraulic fracturing, is called “non-conventional.” This technology typically occurs at depths of 8,000 feet and then extends the well bore horizontally another mile or so, uses millions of gallons of water (two to three is a common number), 10,000 pounds per square inch of pressure (Boufadel, 2010), and there can be six, eight, or more wells per pad. These characteristics represent the very basic differences the technology brings and have spurred the significant change for regulations that the green forces demand.
Jim agreed that there was a need for different regulations, yet as a business he felt their weight, saying…

“This is a complex industry with complex rules. I have been doing it all my life – the right way. Over and above anything anyone else is doing. It is an industrial ballet and you are the danseur [sic]. Lead danseur of an industrial ballet - you have to learn how to dumb pace when policies, procedures bring you down to a norm.”

Apparently PA had recently legislated new regulations about drilling and casing programs to avoid ground water pollution and protect the aquifers. He said they made no sense. As a trained petroleum engineer, he read through the rules multiple times, and …

“…every time I read them [oil and gas regulations] it gets more, just more wacky. Why are they incomprehensible? Because they, when they wrote them, they wrote it [sic] saying this is what is going to happen every time. It don’t happen that way. So, when I drill this well right here, it’s going to be the same as drilling a Marcellus well. OK, but this well, the total depth of this well is 1,800 feet and the depth of a Marcellus well is 8,000 feet. I am not in the same topography, or elevations, I have different soils here. If I were going to drill a Marcellus well right next to this well I would have to do the same thing for both wells. It is just so far out in left field.”

Jim questioned whether the panel that wrote the legislation appropriately represented the industry. Were differences considered between conventional and non-conventional fracking? Did the government respond
too quickly to public demand? Or, did it respond by over-regulating because of the few in business who, as
Jim said, “…do not self-train, self-police. Some ruin it for all.” Warren County Commissioner John Eggleston
told me, the only bad thing about fracking was “those business people with no ethics (Phone conversation,
2012).” These two comments portend an action by industry players that I discovered at the Shale Gas Insight
conference in Philadelphia and describe later in this paper. Below is an oil and gas well worker dressed in
regulation-mandated clothing and gear (Figure 4.13).

![An oil and gas worker monitors a Marcellus gas well in the woods of McKean County. His government
mandated protective clothing and gear, in part provided by his employer, includes a hard hat, Nomex coveralls with
special laundry service, safety glasses, and steel-toed shoes (Photo by author, September 2010).](image)

Do those who ruin it for all cause the entire industry to be looked at in a negative way? Does the
industry as a whole not care about contamination of water? Jim explained the detailed process that drillers
follow to protect groundwater and the aquifers. He added, “That’s where I think the misconception is. I
think, everybody says we’re polluting the ground water which we actually aren’t. We are doing everything in
our power to keep the aquifer safe.” These precautions are to “isolate the well from the fresh water aquifer
(Figure 4.14).” He said the media has blown environmental issues all out of proportion using uneducated
people making statements they know nothing about. He said, “You sit down and read these articles and wonder where these people are coming from?” John Holko added, “No one is trying to get information from people who have done it for so many years.” The media, for example, gets information from “someone like Josh Fox who ran around the country taking pictures of stuff he doesn’t even know why is happening.”

John Holko, a business owner and then treasurer of the Independent Oil and Gas Association of New York (IOGA of NY) discussed the issue further. He told me that the last thing a driller wanted was for the gas and water to come into contact. “The intent of our industry is not to impact groundwater. It is purely negative for us. Any communication, with any other zone than that with the hydrocarbon is bad. We do everything possible to protect that.” He expressed frustration that other industries are not regulated like oil and gas in regard to drilling. For example, the environmental industry that drills holes in the ground for a variety of reasons to monitor facilities such as at a gas station is not required to get permits. What about septic systems that are everywhere? John asked, “What goes in them? Who puts hydrocarbons into septic? Petroleum, jelly, toothpaste, soap – same things they are complaining that we are putting into the ground.” He suggested there is a greater chance of hydrocarbon contamination from an eight-foot deep septic system located 92 feet from a 100-foot deep underground aquifer than from a Marcellus shale well that reaches hydrocarbons located 5,000 to 8,000 feet away from an aquifer. He commented, “Every day of our lives we do things that impact the aquifer and nobody does anything about it. Can’t see the forest through the trees.”

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14 Josh Fox wrote and produced the documentary film *Gasland* in 2010 which has been widely viewed and touted by those against fracking and frequently criticized by those who support fracking.
Jim pointed out that McKean County, PA, a leader in oil and gas for 150 years, has a healthy environment. He said that after 15,000 open hole completions, with 564 permits issued last year, the County still has “water, drinking water, very good springs, turkey, bear, no children with mutant arms growing off them.” He said in the past wells were fracked with just diesel fuel and no water. He believes that there are misperceptions about the industry and that it needs to be explained. He asked…

“What is the truth? I am serious. What is the truth? Not what the media presents us. What is the truth? What are the facts? And these are the facts: The facts are there are people in this industry who care. And want the environment to be safe. They want to make money. They want to create jobs. They want to create an environment for their grand kids and grandkids and generations and develop an energy source. Granted there are bad apples out here in this business. Any industry. College. Government.”

His comments echoed some of those from the EPA conference.

4.3.2 The Land Grab

Another topic revealed in the interview is Jim’s concerns as a local business owner about national and multinational companies entering this place that he knows so well. These companies do bring in jobs and money, and require health and safety training for those they hire. But as remote partners, they worry more about liability than production. For him, the “only end game is as much production at the least amount of
cost, and to be safe.” Corporations can remotely operate a computer stationed at a completed Marcellus well pad from as far away as Texas, but unlike the local business they are not on site to understand the sensitivity of daily weather upon a well. Nor, does a large corporation always follow through on promises to its clients compared to a local operator who comes to know its clients face-to-face and could almost do business “on a handshake.”

Jim said that the external corporations made a mistake when they started a land game. They made shale gas drilling a huge issue by paying thousands of dollars for leasing rights up front. They have hired guards to watch their security gates and require credentials to enter their sites due to anti-drillers who apparently trespass, damage sites, and put major players at financial risk. Whereas, how many times does McKean County, Pennsylvania, that has had the most drilling permits issued in the state, make the newspaper? Jim posed. “Not one, he continued…”

We’ve fracked wells in this part of the country for 60 years. Do you see trees growing? Do you see people having nice houses and green grass? I’ve lived here all my life, I know I’m fat and old, but I don’t have four hands and three eyeballs and I’m not a mutant.”

I asked, “What about fracking 50, 60, 40 years ago? Weren’t chemicals going into the fracking operations anyway? What’s the difference?” Jim continued…

“How about fracking wells with straight diesel fuel? I mean diesel fuel. No water. Not a drop of water. OK. We’re gonna frack with diesel fuel.”

I probed further, “All around here? It has not hit the media yet.” Jim exclaimed,

“Oh! That’s, what my point is, the industry did itself no favors by doing what they did.

He resented the decision by the big players to start the land grab. In his opinion …

“The biggest friction between the general public, the people who don’t have the mineral rights, don’t have the land, and the people who have land [is that they in turn created] environmental issues, township issues, state issues and federal issues and then inflated them so far out of whack that we’ll never get control again. I just don’t know how to word it to make sense to somebody who is not in the industry. It blew everything so out of proportion. But that is what happens in this industry. It becomes a land game. And I don’t play games so I am not used to custom of doing what these big companies are doing.”

He predicts that in the long run there will be four or five major companies controlling the Marcellus. They would likely be Exxon, Mobile, Shell, BP, probably Chevron and a couple others.
The differences between conventional and unconventional fracking, concerns about regulation, and misunderstandings about people who work in the oil and gas industry, and resentment about corporations entering the Marcellus appeared to be the biggest findings from the gas patch. These observations gained meaning from my position, as I stood adjacent to the well pad and watched roustabouts work on one rainy, dreary day in the woods. The ubiquitous water truck, the noisy, smoky blender, and the shaking rig pumping sand and water deep into the Bradford 3rd sands (Upper Devonian age sandstones) added understanding to these stakeholders’ perspectives. These stakeholders included small business owners, state and federal government representatives, national businesses, and multi-national companies.

4.4 Seeking a Measured Voice

The University of Pittsburgh’s Graduate School of Public Health (GSPH) created a venue for academia, industry, government, and public advocacy groups to gather and begin “thoughtful scientific investigation and collaboration” to overcome their “unsubstantiated assertions” about fracking (Burke, M.D., Donald, 2010). The purpose was to provide a more measured understanding in public health about shale gas extraction by applying scientific and methodological approaches. Indeed, my findings up to the November 19th conference lacked any systematic research. Conference speakers added to my previous findings such as differences in PA, concerns about environmental contamination, and stakeholders that had been left out of decision-making. Furthermore, they shared data from various baseline studies and research from other places that had experienced fracking.

Dr. Bernard Goldstein indicated that there are cultural differences that set PA apart from other petroleum producing regions. He pointed out that most workers in the Marcellus were from Texas and were surprised about the differences in industrial and government practices. For example, they were surprised that local companies were drilling successfully without baseline data, and that PA had no drinking water well regulations. Goldstein asked industry to acknowledge the local expertise, comply with law, respect local culture, and be open and transparent in order to avoid the costs of retroactive exposure assessment.

15 As of July 2014, conference videos are available at the University of Pittsburgh’s media site http://mediasite.cidde.pitt.edu/mediasite/Catalog/pages/catalog.aspx?catalogId=566b50d1-554d-42a5-977f-61354f1eda33.
Furthermore, he requested industry to follow the “precautionary principle,” to take responsibility for their actions by proving no harm comes from their activities such as the use of toxic chemicals. He emphasized that there exists “unity between human health and the environment,” that human health is a “complete physical, social, and mental wellbeing.” It was important that the industry participate in recognizing this important link.

Other speakers shared their baseline research including Carl Kirby, PhD of Bucknell University who offered facilities there as a repository for new data and a place of peer support, and researchers who had already conducted studies in shale gas areas shared their methodologies and findings as potential templates. Baseline studies looked at the potential chemical interaction between radioactive materials in the Marcellus shale and fracking chemicals (Tracy Bank, PhD), potential activation of legacy wastes from mining and agriculture by highly saline frackwater (Daniel J. Bain, PhD), and questions about waste reuse or disposal. The PA Department of Environmental Protection (DEP) shared two initial studies about residual wastes and short-term air quality impact (Nick Lazor). And John Veil of Argonne National Laboratory described the step-by-step process of an “environmentally friendly drilling program” as a model to be expected in the Marcellus.

Teri Ooms, of The Institute for Public Policy & Economic Development in Wilkes-Barre, Scranton, PA who presented baseline survey and interview findings from Texas, Arkansas, and PA that resonated green force and anti-frackers’ concerns like drinking water contamination, affordable housing, and traffic. The findings also introduced others such as distrust of landmen who first arrived, change in landscape aesthetics, and the need for a severance tax that included a local allocation. I would find these same matters again in my later interviews in Bradford County. Economic geographer Susan Christopherson, PhD, presented a study in process at Cornell investigating whether a boom-bust economy was taking place in PA, and if so how to avoid costs and exploit benefits to communities and the environment through policy.

Additional researchers in shale gas extraction offered their experiences as potential templates for those in PA. These studies include an ongoing air monitoring strategy of ozone in Sublette County, WY (Robert A Field PhD), an air pollution study in New York City that combined air pollution and social stressors
Jane E. Clougherty MSc, ScD, and an in-depth health impact assessment (HIA) to provide information to inform and advance decision-making to support community health that took place in Garfield County Colorado (Roxana Witter MD, MSPH, John Adgate PhD, and Jim Rada). Those of the Garfield study recommended research look at the cumulative effect of the nine-month well construction period to completion and make note of spatial and temporal variables. The study looked for the cumulative impact of factors on a community and how social stressors interact with chemical stressors. Finally, David Sterling PhD, CIH demonstrated his temporal mapping study of 24 counties in 5,000 square mile area of Barnett Shale in Northern Texas from 1976 – 2010.

This conference attempted to fill an informational gap that existed about fracking. It was one of the first about fracking in the Marcellus to promote scientific research and methodologies, collaboration and sharing among different sectors. There was a desire to avoid environmentally damaging practices that PA had experienced from the past. There was a call for answers from both those that supported fracking and those who opposed it. Would an entirely new set of questions emerge about energy reserves? Would hydraulic fracturing and horizontal drilling put those long-standing theories to rest? And, did the conference reach its goal to bring academia, industry, government, and public advocacy groups together to begin collaborative and scientific investigating? It will take time to answer the first two questions. The technology is too new to provide enough data to measure. In regard to the third question, the conference partly reached its goal. It did bring academia and government together and demonstrated various ways to measure and communicate about public health related to fracking. But, the industry, to which it reached out, was not present, nor was any public advocacy group, stakeholders that were an important part of the equation for success.

Two years later I discovered a peer-reviewed article written by Dr. Goldstein and his colleagues “Missing from the Table: Role of the Environmental Public Health Community in Governmental Advisory Commissions” published in Environmental Health Perspectives. I found it interesting that Goldstein, who at the Pittsburgh conference, had asked industry to include the local stakeholders in its work, had found his own profession left out of relatively high-level work related to this very issue, shale gas extraction. The activities taking place upon the emerging energy landscape appear to affect groups across sector and scale of the
Stakeholder Matrix. The Pittsburgh conference at least established a base for collaborative research toward a more measured voice.

4.5 Insight and Outrage in Philadelphia

On September 7, 2011 the Shale Gas Insight 2011 Conference and the Shale Gas Outrage 2011 Rally signified activities of the arriving energy landscapes. The events took place adjacent to each other. The conference required attendees to have tickets for access to its venue inside the Philadelphia Convention Center. The Outrage rally welcomed the public to its permitted venue on the cordoned off sidewalks and street outside. Security guards or police officers were present at both events. These gatherings recast previous findings, underscored others, and broached topics yet to be discussed.

4.5.1 The Industry Voices Considerations

Shale Gas Insight was an industry event. It created a venue that mixed all types of stakeholders such as those “different” from PA like Texan companies found out earlier to small business owners interviewed in McKean County. Leading industry stakeholders from the national and multinational private sector included Range Resources, Chesapeake Energy, CONSOL Energy, TalismanUSA, Williams MidStream, and Mark MidWest. Representatives of these companies mixed with 1,600 individuals, 76 credentialed media, 150 exhibitors, and over 70 speakers, plus six or so security guards whom I counted. Government stakeholders from regional and local levels participated too including two former PA Governors, one former and the current head of PA DEP, and top PA congressional leaders.

Signs of the changing material landscape appeared as businesses that dealt with the physical environment such as water recycling, protective liners for impoundment ponds and well pads, surveying, other drilling, or fracking needs. Many were exhibitors such as trucking companies, excavators, and numerous environmental consultants and engineering firms that dealt with technical requirements for well pads, pipelines, or access roads to meet environmental regulations, erosion control, or zoning restrictions.

Other stakeholders mixed across sector and scale such as Ducks Unlimited, the children’s hospital in Pittsburgh, an employee of the Pennsylvania Fish and Game Commission, and a representative of Vallourec a French multi-national corporation, a limousine service operator, sales representative from an elite business
resort, timber owners, and business representatives residing outside the Marcellus region from places like Boston, New York, or Baltimore.

### 4.5.1.1 Peer Pressure

At the event, the voice of the Commonwealth of PA was asserted by Michael Krancer, Secretary of the DEP. Krancer spoke in place of Governor Tom Corbett who had to attend to hurricane damage in the state. Krancer ensured that he takes a hard stance that industry practices fracking to meet regulations. He spelled out that PA expects economic benefits from industry that drillers are responsible to protect the environment, and everybody had to obey the same rules. He pressed industry to uphold and expect the highest environmental standards of its own members saying, “Peer pressure is critical.” He argued that the state, not the federal government is the appropriate regulator of the industry, stated that "sound science" would dictate state environmental policies, and recognized that there is an opposition based on an ideology, not based on science or fact, against the industry.

As previously aired at the EPA hearing, the industry again claimed quality as its goal. The Marcellus Shale Coalition (MSC) conference program announced it would explore “best practices, top stakeholder perspectives and key networking opportunities for those in the exciting field of shale gas development.” The following month, six MSC working groups would present recommendations for best practices regarding different aspects of the shale gas industry. The overarching goal of the conference was to raise industry standards and help governments make workable regulations. The industry was trying to keep control to avoid further government-imposed regulations that it considered costly.

Speaker Brett Harvey, Chairman and CEO CONSOL Energy a leader in coal production based in Pittsburgh said that governments must allow fair and reasonable access. He said industry wanted a level playing field in ways such as fair tax policies compatible with resource development. He wanted the gap to be closed between the public and policy, the government to provide shale producers with regulatory certainty, and that industry cannot and should not wait for regulations. Rather, industry must lead.
4.5.1.2 Excluded Private Sector Stakeholder

I observed that a stakeholder was being left out of this “game.” The MSC had nearly 50 full members at the $50,000 annual membership fee plus approximately 250 members at $15,000 per year. These fees add up to nearly $4.4 million in annual member dues (Appendix C). Is it an elite organization that excludes the small business owner? The president of the McKean County business with whom I spoke expressed concern about small business’ survival. At the conference I witnessed a few individuals stop by the membership table and ask about annual fees. Once they learned it was $15,000, they would shake their head and walk away. The MSC had apparently recognized this concern as my host told me that one of her next tasks was to work with small businesses. Has it since included the thousands of small oil and gas service businesses situated in PA? It is not clear. As of May 2014 the MSC website states, “Membership is for private sector businesses only. Individuals cannot be a member of the MSC. Government Agencies, nonprofits and media are not eligible to join as members of the MSC.” Applicants are screened and voted on by the Board. Board Members and Associate Members names and websites are listed and accessible. As of May 2014 there is no other information about other membership levels or fees.

4.5.1.3 The Divide Reappears

The EPA meeting and McKean County interviews showed that those in industry felt unfairly treated and took a defensive position. These observations reemerged through the speeches of industry leaders. John Pinkerton, Chairman and CEO of Range Resources, declared the industry is “under a tremendous microscope.” Chesapeake Energy CEO and Chairman of the Board (at the time) Aubrey McClendon emphasized that critics are so dangerous because facts do not matter to them. These corporate leaders argued why shale gas matters. Paul Smith, Executive Vice President, North American Operations, Talisman Energy Inc. of Canada argued that shale gas provides a much lower carbon footprint than coal and 70 percent lower greenhouse gas (GHG) emissions according to a Massachusetts Institute of Technology study, and, furthermore renewables cannot compete with the cost of supply and scale of natural gas. Harvey, CEO of CONSOL, asked why the U.S. should chase oil around the world when it has gas under its feet. Others argued that shale gas provides national security, cheaper energy, and jobs. After stating that shale gas would
provide a sustainable growth engine to the economy, Smith added that despite these, the public “harbor genuine concern about shale gas” and it is necessary for industry to communicate openly with all stakeholders to deal with this problem of contention.

The divide cropped up again. McClendon argued, “1.2 million fracked wells since 1949 and just now critics say fracking is unproved and untested.” He continued…

“Only in this, the free-est country in the world, can people express their opinions enthusiastically and publicly. That holds for the so-called "fractivists" protesting outside and the "factivists" in this room. When I say ‘factivist,’ I mean all of you who share a commitment to use knowledge and common sense to safely and responsibly produce the natural gas our country so desperately needs.”

He stated that the industry has an obligation to speak to our community to “kindle hopes and calm fears of those fair minded.” He pointed out the situation in northeast PA where 16 families’ water wells were ruined from a gas migration. He said the accident was due to a casing design issue, was solved, and “Was anyone hurt? No, no, no!” Would those leaders at the Pittsburgh conference agree? Their definition of health was a “complete physical, social, and mental wellbeing.” McClendon seemingly overlooked the others’ views. He said that gas migration had not occurred anywhere else. He contended that we know how to develop natural gas safely and use it wisely. His vision was for “a game changing opportunity and prosperity that is solely based on science, technology, American innovation and entrepreneurship.”

McClendon was pushed off the Chesapeake Energy Board in June 2012 and announced his resignation as CEO the following January under further pressure and allegations of questionable business practices regarding risky investments with investors’ money (Bloomberg, 2013).

4.5.1.4 A Shift in Industry’s Attitude

Although a rather antagonistic tone was set by McClendon, a larger part of the industry recognized the local stakeholder and held concern for the environment. CONSOL’s Harvey introduced the idea when he said, industry must be “a good neighbor or you don’t get permits…It is our responsibility. Society wants us to do [this].” He was followed by the most positive sounding corporate representative to speak, Paul Smith.

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16 On May 17, 2011 the PA DEP fined Chesapeake Energy $1,088,000 for violations for improperly cementing and casing gas wells that cause contamination of 16 families drinking water supplies in Bradford County PA (Commonwealth of Pennsylvania Department of Environmental Protection, 2011).
Executive Vice President, North American Operations, Talisman Energy Inc.; his topic: *Changing the energy landscape*. Smith declared that industry “must listen and address the concerns of stakeholders,” the public “harbor genuine concern about shale gas,” and sourcing, use, and disposal of water is a “highly emotive issue” to rural Pennsylvanians recognizing the potential for gas migration into shallow aquifers. Smith reminded the audience that industry is “only as good as the operator with the lowest standards.” He charged leading companies to work together to create best practices based on the principle of full and open disclosure. He was hopeful about more eco-friendly chemical formulations, a comprehensive water management framework to source, use, recycle, and dispose water. Above all he emphasized the industry’s responsibility to engage with local communities. I would observe more about this latter call to engage when I interviewed Talisman representatives the next spring.

### 4.5.1.5 Culture Seen through Dress and Language

The shale gas culture appeared in how attendees dressed, the physical venue, and other images presented with speeches (Figure 4.15).

*Figure 4.15* Attendees at a Shale Gas Insight 2011 panel session portray the cultural dress of mostly dark or subtle colored business suits in an organized setting (Photo by author, September 2011).
It also revealed itself through words and phrases that I heard staff, attendees, and speakers regularly use at the conference. Other places where these terms appear are in industry-produced information or supported activities such as blogs or media reports. They reflect the perspective of the industry stakeholder and ways in which it argues its case in the pursuit of shale gas and its profits. I suggest these terms and phrases are a part of the language, the culture of the shale gas industry. I have placed words and phrases thematically together in a partial list below (Table 5).

| Red, white, and blue product; The industry is red, white, and blue; and, Domestic energy source |
| Revolutionary, Shale gas revolution, Paradigm shift, Game changer, Game-changing opportunities |
| Creating jobs, job creation, jobs, jobs, jobs; and, Hiring high school dropouts to PhDs |
| Payments of billions of dollars to landowners |
| Be a good neighbor, Best practices, Social license to operate |
| Changing the energy landscape |
| The state (not the EPA) is best suited to oversee oil and gas development |
| Base it on facts, not on emotion, The tree huggers, The antis |

Table 5.1 Industry Language. A list of words and phrases that I regularly heard or read from industry representatives and proponents of shale gas at the conference and elsewhere during my research.

The list suggests American nationalism, energy independence, and a lifetime opportunity to grow the economy through jobs and royalties. It shows a sense of social and environmental responsibility with some resentment about those against shale gas extraction. Other statements could be added such as the Marcellus would be “an energy declaration of self-reliance for the U.S.” by Range Resources’ Pinkerton and the “middle classes arise” due to more access to energy by CONSOL’s Harvey who stood against the Powerpoint backdrop below advocating shale gas (Figure 4.16).
For many of the players, the oil and gas industry is viewed as a game. The game has changed; new rules are being written, and new players are joining in. In many places, not just at the convention, words about playing games appear. This convention was for those who want to participate in the Marcellus shale gas play. They want to help write the new rules, keep the losses down and earnings up, benefit from the portended geopolitical global shift as America develops her own energy source. Those who choose to play will strategically situate themselves upon the landscape within Pennsylvanian culture. But not everyone shares the same opinion. Just outside the convention hall’s concrete walls was a public protest.

4.5.2 Outside Considerations

In response to the Shale Gas Insight 2011 conference, a coalition of organizations against fracking organized a rally under the name Shale Gas Outrage to take place on the same day of the conference. The venue lay adjacent to the Philadelphia Convention Center. Angry anti-fracking protestors taunted conference attendees who peered out brick bordered convention center windows with words and posters to come out and confront them (Figure 4.17).
The culture appeared different in attendees, venue, and language from the conference. People dressed casually and colorfully, they carried signs and banners, and they energetically cheered a lineup of speakers at the podium. Rally attendees lined the sidewalks including mothers, children in strollers, grandparents, students, retirees, young professionals, grunge dressed, and hippie-looking individuals (Figure 4.18). Philadelphia police officers scattered themselves along the reserved, roped-off street for the organized march.
Figure 4.18 Protestors include the elderly, young professionals, and mothers pushing toddlers in strollers as they march with a sign worded ‘A Life lost to Drilling!’ above the images of a baby and young man (Photo by Author, September 7, 2011).

I had read hundreds of news articles and blog entries, watched numerous videos of people who were upset about fracking, but it was not until this moment that I was in anyone’s passionate presence other than in the oil fields up north. I could feel the upset. And, this was a time that I simultaneously felt the high energy of the industry inside the walls – happy, excited, proud about their work, and concerned that people were against them.

Inside those walls one of the biggest calls for industry, other than to impose peer pressure to conduct best business practices in fracking, was a call to educate not only the locals but also “all stakeholders.” My findings, and ultimately one of my conclusions, echoed those of speaker Rick Stouffer, Editor of *Gas Business Briefing* newsletter. He said, “Industry must ratchet up talking to and explaining to people what happens. Once they get it, it is good.” He described a divide between those on the inside and those on the outside. He stated there needs to be a bridge to link communication because each group claims to know and speak the truth and says that the others do not. This is the communication breech between the pros and the antis.
My sense from these two events is that nothing likely will stop the industry’s advancement into the shale play, or as some might call it ‘intrusion.’ The investment of resources is tremendous even beyond the $4.4 million dollars in MSC membership fees. The investment in research and development, environmental quality, and local communities that was touted by dozens of speakers and exhibitors seems to outweigh any green force that I have seen. Over time and across space, protests would continue and industry would increase its response, but the development momentum I witnessed was strong, fast, and crossing all scales from the local to global.

4.6 Bradford County: From Cows to Gas

The final destination of my research was Bradford County, PA in April 2012. Figure 3.5 depicts the various routes that I followed and places where I stopped during my fieldwork. I drove approximately 140 miles east from Warren on historic U.S. Route 6 through a rural landscape in northern PA. Route 6 traverses the Allegheny National Forest, approximately ten small towns, some farmland, and the northern edges of the Susquehannock and Tioga State Forests. I made stops in Troy for a 28-mile bicycle ride to explore the changing energy landscape; Towanda for interviews; Horseheads, NY, for accommodations and interviews;
Wyalusing to see the town and a pipeline under construction; and, the city of Bradford to meet with Jim Barnes on the return.

![Map of the fieldwork routes](image)

**Figure 4.20** Blue lines on the map represent the routes that I drove during my April 9 – 10, 2012 fieldwork. The lettered green symbols indicate the towns where I conducted research: I = Warren, H = Bradford, G = Troy, D= Horseheads, NY, E = Towanda, and F = Wyalusing (Map by author, Google Maps, 2013).

As discussed earlier, northwest PA displays a landscape of energy linked back to Drake’s well in 1859 through the 21st century. It is also a rural place. The 2005-2009 American Community Survey, U.S. Census Bureau indicates the density per square mile of Warren County was 47. The density per square mile for the Commonwealth was 284. The same indicator for counties to the east of Warren also show a rural population: McKean – 47, Potter - 16, Tioga – 37, and Bradford County - 55 (The Center for Rural Pennsylvania, 2012). Traveling west to east from Warren, the landscape shifts from one including fossil fuel extraction, forests, and small towns to one of dairy farms, forests, towns, and villages in Bradford County.

### 4.6.1 Oil and Gas Wells

To illustrate my findings in Bradford County, I discuss two types of data that explain the changing energy landscape. These PA DEP data are oil and gas well permits issued and the “spud” dates, the actual start of drilling. First I discuss the numbers of permits issued to demonstrate the rate of speculation (increasing stakeholder interest) and the potential for drilling activity. Next, I discuss spudded wells to show the rate of physical development upon the ground. When a well is “spud,” it is a started, and marks the
beginning of relative high-intensity activity and impact upon the landscape. I present data for Washington, Warren, McKean, and Bradford counties where I focused my research and the Commonwealth of PA.

4.6.1.1 Speculation: Activity about the Landscape

One way to study the energy landscape of oil and gas development is through speculative market behavior such as well permits issued. There had historically been very minimal oil and gas activity in Bradford County in the northeast compared to that of counties in northwest PA, and Washington County in the southwest. Oil and gas extraction takes place in 35 of the PA’s 67 counties. Of the 103,776 documented permits\(^{17}\) issued across the state from 1900 to 2000, Warren County had 3,327 (three percent of total permits), McKean County – 1,454 (one percent of total permits), Washington – 515 (less than one percent of total permits), and Bradford County had 37 (almost nil in comparison to total permits). Warren and McKean counties led the four counties in oil and gas development during this time and had historically been national and world leaders since the latter 1800s.\(^{18}\)

Until 2000, the energy landscapes of oil and gas were apparent materially, economically, politically, and culturally in northwest PA. They were less visible in the southwest, and hardly existent in the northeast. It is noteworthy that until 2000, only 29 of Bradford County’s total 37 permits issued in the previous century were issued in the 10-year period preceding shale gas development.\(^{19}\) This pattern was about to change when, in 2001, unconventional well permits began to be issued and rearrange the appearance of oil and gas activity upon the PA energy landscape. A flip-flop appears in the distribution of oil and gas permits issued between the last years of the 20\(^{th}\) century and the first years of the 21\(^{st}\) (Figure 4.21). I point to the differences that show up in the northwest, southwest, and northeast of the state. Keep in mind that from 1990 until 2000, all

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\(^{17}\) I use PA DEP well permit data including Combined Oil and Gas, Oil, Gas, and Multi-Well Bore wells. Other documented well types include Coalbed Methane, Dry Hole, Injection, Observation, Storage Well, Test Well, Undetermined, and Waste Disposal.

\(^{18}\) From 1880 through 1882 the Bradford Oil Field in northwest PA produced 63,000,000 barrels of crude equivalent to 74% of U.S. total production and 64% of world’s production. In 1881 alone, it contributed 83% of U.S. oil output. Tens of thousands of wells had been drilled there. Due to the oil’s high content of paraffin, considered one of the highest-grade natural crude oil lubricants in the world, the region became known in the industry as the ”High Grade Oil Metropolis of the World” (Miller, 1943; Allegheny National Forest, 2012).

\(^{19}\) In comparison, McKean had 1,799 issued permits, Warren – 1,737, and Washington – 77.
permits were for conventional wells.

Figure 4.21 Speculation for oil and gas development appears as “permits issued” on this map. All of the yellow dots represent conventional permits. The purple dots are a mix of conventional and unconventional permits. There is new speculation in southwest and northeast PA where there had previously been little. This new conjecture is likely for drilling into the Marcellus shale. In the northwest a northerly shift in speculation takes place. In the central west there is a spread from the earlier core. The center and southeast portion of the state are void of oil and gas development. (PA DEP Oil and Gas Well Data, Map by Chantal Ivenso, 2014)

In further consideration of this shift upon the landscape, I discuss permitting activity from 2001 through 2011 when I conducted fieldwork in Bradford County. By looking at the conventional development in Figure 4.22, an increase in permitting begins in 2004 and peaks in 2008. The highest activity is in McKean County (58 percent) and Warren County (29 percent). Washington County shows some permitting beginning in 2004. Speculation in Bradford County for conventional wells is so negligible it does not appear on the graph.
The speculative shift begins to appear after Range Resources’ 2007 announcement of its success with its unconventional well Renz 1 in Washington County. A sharper shift appears after the news about its Marcellus wells Duffey Unit 1 and Trusso Unit 1 in that same year in Bradford County. Interest in shale gas development grows exponentially from that point through 2011 (See Figure 4.23). In 2007, two of the total ten permits issued were for unconventional wells. In the immediate years following, the majority of permits were entirely for unconventional wells and the rate is unprecedented. By 2007, 13 unconventional well permits existed for Bradford County. Yet, in Bradford County from 2007 to 2008 there was a 2,800 percent growth in unconventional permits to 58. This was followed by 652 percent increase in 2009 to 436. In 2010, the rate slowed to a 92 percent increase of 839 well permits, and in 2011, with 759 permits issued the rate dropped ten percent. Bradford County received 66 percent of all unconventional well permits during that time period.
Figure 4.23 PA DEP permitting activities from 2001 through 2011 demonstrate an exponential investment into exploiting the Marcellus Shale, especially in Bradford County with McKean and Warren counties nearly negligible in value (Graph by author, PA DEP Oil and Gas Well Data, 2014). Approximately 1,600 permits were issued in 2010 and 2011 for Bradford County even though the activity shows up first in Washington County five years earlier. (Graph by author, PA DEP Oil and Gas Well Data, 2014a).

Hence, from looking at conventional and unconventional permitting data across the 2001 through 2011 time frame, conventional oil and gas well speculation is still happening in McKean and Warren Counties, but the new Marcellus wells, that had not existed at all before now, are being planned in Bradford County in the northeast and Washington County in the southwest. Unconventional speculation is barely visible in McKean County and certainly invisible on the graph for Warren County. This well permitting, or speculative activity, demonstrates the intensity of a growing interest to frack in the Marcellus shale. It is speculation, as not all of these permits materialize into wells on the surface. Next, to illustrate shale gas development on the landscape I will discuss spud data to further demonstrate shale gas development that actually takes place on the landscape, I discuss spud data.

4.6.1.2 Spudded Wells: Activity on the Ground

A second way to investigate at the changing landscape over time is through the physical activity upon the land. For this discussion, I place spud well data in Table 6.1 to show when the physical landscape begins to change. I compare it differently across time than previously with well permits. 20 This time, I compare data

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20 I use spud well data, the date when a well begins to be drilled. The data demonstrate when physical activity begins upon the landscape (PA DEP Oil and Gas Well Data, 2014c). Each spud well is a new imprint of an energy landscape.
from the entire 20th century to that from the first eleven years of the 21st century when shale gas drilling begins. This splits the data into one set from 1900 through 2000 and the second from 2001 through 2011. Again, I demonstrate a changing energy landscape.

The Commonwealth had documented 102,770 spud wells from 1900 through 2011 across the Commonwealth (PA DEP, 2014c). Of those wells, 85,276 or 83 percent remain active (PA DEP, 2014c). Table 6.1 shows spud data of the four counties I researched split into two time periods: 1900 – 2000 and 2001 – 2011. The data include the total number of the spud wells per county and PA, each county’s percentage compared to the group of four counties, and each county’s percentage of the state total. The data show that over the 20th century in PA, 28.6 percent of all spudded wells in PA were located in these four counties, with 28 percent in the northwest. In the short period from 2001 through 2011, 28.6 percent of all PA spudded wells continued to locate in these same counties, but the share of those wells shifts down to less than 22 percent (21.8) in the northwest, up to about two and one half (2.6) percent in the northeast, and over three percent (3.2) in the southwest. Will this trend continue into the 21st century? Will economies and politics be impacted by this new activity? Are the material impacts going to be perceived from this shift?

Next, I discuss a way to explore this latter question through the distant view of satellites.

<table>
<thead>
<tr>
<th>Wells Spud 1900 - 2000 (100 years)</th>
<th>Wells Spud 2001 - 2011 (11 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>County</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>Bradford</td>
<td>32</td>
</tr>
<tr>
<td>McKean</td>
<td>8,001</td>
</tr>
<tr>
<td>Warren</td>
<td>10,049</td>
</tr>
<tr>
<td>Washington</td>
<td>380</td>
</tr>
<tr>
<td><strong>Total Counties</strong></td>
<td>18,462</td>
</tr>
<tr>
<td><strong>Total PA</strong></td>
<td>64,376</td>
</tr>
</tbody>
</table>

**Table 6.1 Spud wells.** Of the 18,462 wells spud over the entire 20th century in the four counties of my research, nearly 98 percent exist or existed upon the northwest PA landscape. At the beginning of the 21st century, in a brief period of eleven years between 2001 and 2011, of the 10,558 wells spud in these same counties, nearly six percent are developing new energy landscapes in the southwest and northeast of PA as the northwest declines 20 percent for all wells spud (Pennsylvania Department of Environmental Protection (DEP), 2014b).
4.6.1.3 Distant Views of Lines, Points, and Patchworks

Another way to observe the changing energy landscape is from above with satellite imagery. Following are maps that I made with Google Earth and Bing applications of various parts of McKean and Bradford counties. The final image incorporates data that Bradford County resident Wayne Miller meticulously acquired and loaded into Google Earth. Each map gives a sense of land use in its respective county.

The first image below (Figure 4.24) is of the area in McKean County where I conducted fieldwork about 30 miles south of Bradford, the county seat. The energy landscape clearly stands out. Notice the numerous thin pinpointed lines extending across the wooded land. These are lease access roads for conventional wells. They lie in different directions. Some run parallel to each other while others are in various directions but in close proximity. The wells and pads appear as pinpoints along each line at approximately 500 feet apart. There are some darker forested areas that appear to have fewer roads, or narrower roads that cannot be seen through the trees, or shadows of older roads grown over. The latter areas appear to be relatively thick stands of less drilled woods; however, it is likely that they have regenerated from intensive timbering and oil extraction that took place during the turn of the 20th century. They would be currently used for hunting and other recreational purposes like snowmobiling, hiking and backpacking, or trout fishing. Some areas shaped geometrically or outlining the base of hills are agricultural, while areas cleared and filled with infrastructure of roads and buildings are residential. Transportation patterns stand out: State Route 219 and U.S. Route 59 cut the image into four pieces and the Bradford Regional Airport scratches the surface as a cross. Overall, more than half of this image contains signs of an energy landscape. Recall that McKean

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23 It is possible that the 500-foot well spacing derives in part from a secondary practice of production established in the 1940s called water flooding described by Miller (1943, p. 395). Miller explains that water flooding is a process to repressurize the oil sands that have already produced by injecting water into the ground. A common pattern called the “five spot” facilitates the process. Four wells were placed into a square each 500 feet apart plus one more in the middle. Water was forced down the four outside wells to drive the oil to the producing well in the center.
County has accumulated 150 years of artifacts from the primary economic activity of oil and gas production.

**Figure 4.24** This Google Earth satellite image shows the crossroads of where I conducted fieldwork in McKean County based north and northeast from the intersection of Routes 59 and 219 around the Bradford Regional Airport that appears as a cross on the right side of the map (2010).

The next image (Figure 4.25) is at a larger scale of approximately 3,000 feet to illustrate the footprint of unconventional shale wells. The Google Earth image highlights two Marcellus shale wells located approximately five miles east of the Bradford Regional Airport, south of US 59, and on each side of local road 3011. The well to the north is Heartwood 1 that Chesapeake Appalachia LLC of Oklahoma spud on October 16, 2008. The second horizontal well to the south is Heartwood 3H spud by the same company on March 30, 2011. The pattern of these unconventional wells is different than the linear pattern of the earlier conventional wells. They are each of a solid geometric shape of approximately one and a half acres cut into the woods and connected by a short linear access road to county road 3011. The land in which these wells are situated shows traces of roads cut through the timber, drainage patterns, and cleared areas among mostly timbered land cover. Patterns of conventional well activity appear in the lower southwest corner of the image. The two dark rectangular areas in the north are water. The larger one lies along an old railroad. The smaller one to the its east appears to be a beaver dam when looking closely in Google Earth. Overall, this
closeup shoes a wooded landcover that has been used across time and markings of a new energy landscape in the early 21st century.

Figure 4.25 An area of Keating Township in McKean County, PA about 18 miles east of the Bradford Regional Airport. Chesapeake Appalachia LLC drilled two horizontal Marcellus shale wells marked by yellow pins as Heartwood 1 drilled in 2008 and Heartwood 3H drilled in 2011 (PA DEP, 2014b, Google Earth, 2013a).

Next, I move east to Bradford County where I last conducted fieldwork. Figure 4.26 is a Google Earth satellite image of an area where I bicycled 27 miles in an area north and east of Troy to gain a sense of the place. The scale of this image is about 9,500 feet, the same as that of McKean County. Immediately the landscape presents itself as a patchwork of agricultural fields including contour plowing indicated by alternating light and dark parallel pleats. Denser residential land use is discerned near the intersections of US6 and SR14. The energy landscape shows up in two ways - wind and shale gas. Look to the southwest corner of the image. One long line with scallop-like figures attached to it runs from the southwest to the northeast. It ends at a dark blotch encircled by a similar line. These are access roads for wind turbines. The blotch is a reservoir. The other energy source that stands out in the mélange of miscellaneous shapes and shades of cornfields and dairy farms are shale gas wells or pads. They appear as sharply cut, bright, white patches scraped into the landscape. For example, look closely in the northeast corner. There are three shale gas pads.
there: two set in contoured fields and one further northeast along a local road depicted by a thin line. In the southwest corner of the image lie four other shale wells situated in fields between County Road 3032 and Route 14. The small dark splotches throughout the image represent water containments that are either glacial lakes, purposeful ponds for farming, reservoirs, or water impoundment ponds for fracking. The next image draws attention to the energy landscape by looking more closely at the wind farm.

**Figure 4.26** I bicycled over 27 miles to the west and north of Troy in Bradford County which is centered in this image. Biking, rather than driving, gave me the advantage to better learn the topography and land use, gain access to well pads, study artifacts, hear sounds of fracking or tractors plowing, and experience the heavily used dirt and paved roads. I found signs of the new energy landscape including well permits and water usage permit placards, Marcellus well pads, access roads, drilling/fracking rigs, and widened dirt roads. These sat in an area of mostly dairy farms and cornfields. (Google Earth, 2013b).

Figure 4.27 depicts wind turbines and their pads in Armenia Township that I regularly saw during my stay in Bradford County. Woodland is the most abundant land cover in this image spotted with artifacts of energy production. Notice again, the slightly sinuous line that runs from the southwest corner of the map diagonally to the northeast. This linear pattern plus its scalloped protrusions, each with a thin dark line projecting from the center, represent wind turbines along an access road through the woods. Gas drilling activity is present too. Notice the two dark rectangular objects with a light border indicated by arrows. These are water impoundment ponds for fracking where other water sources like a creek, river, or pipeline is not
available. They are dug out of the earth and covered with a plastic type of liner to protect the groundwater. Near these ponds and elsewhere on the image, the bright white square patches of land are unconventional well pads such as those beside each pond, and the other as the third arrow points to in the center south. In this image, the lighter green smooth patches of cleared land are typically pastured to graze dairy cows or grow crops. The light brown spotted surface is forest in early spring.

Figure 4.27 Wind turbines in the AES Armenia Mountain Wind project run diagonally through woodlands from the southwest of this image to the central northeast in Armenia Township located on the southwest edge of Bradford County and Tioga County. The yellow arrow at the north of the image shows a water impoundment pond for fracking as does the arrow in the southeast corner. The arrow centered south points to a gas well pad. These are signs of a new energy landscape in Bradford County to create landscape of mixed energy resources (Bradford County, 2014, Google Earth, 2013c).

Figure 4.28 expands the area at a smaller scale to include most of Armenia and Troy townships with Granville Township in the southeast corner and part of Canton Township along the southern edge of the

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24 These liners are made from products from the petrochemical industry and are required by law to protect the environment from leakage of frac water. I gathered samples of different types of these protective liners from the Shale Gas Insight conference.
The yellow arrows point to 25 shale gas pads.

Figure 4.28 Yellow arrows points to shale gas pads on the energy landscape of Armenia and Troy Townships in Bradford County as of 2014. Part of the wind farm snakes across the northwest side of the image (Google Earth, 2013c).

The next figure (Figure 4.29) looks closely at a portion of the Bradford County energy landscape. This large-scale image covers a land area of approximately 0.60 mile by 0.30 of the impoundment pond pointed out in the second image (Figure 4.27) above. In the center of the photo, two wind turbines align on rounded out spaces of cleared land three quarters to one acre each. Along the southern edge of the image, two square well pads of two and three quarters to three acres each appear on the landscape. Along the northern edge of this map sits an area possibly used for gas industry equipment storage, or possible wind farm support. In the southwest wooded corner lies a small water pond and at the southern edge in the center is a larger rectangular impoundment pond approximately two and three quarter acres. In sum, this latter image shows a relatively small, tight space as an example of mixed land-use including the economic activities of natural gas extraction, wind power generation, agricultural crop production, potential forestry, and
recreation. There appears to be a dirt bike track to the east and one or two residences to the south.

Figure 4.29 Armenia Township land use includes the two energy sources of wind and shale gas. This space contains two wind turbines, a water impoundment pond, a storage site, and two well pads in close proximity and in the midst of woodlands, croplands, roadways, and a few residential structures (Bing Maps, 2014).

The preceding series of landscape images make me ponder the comparative footprint that exists to generate equivalent amounts of energy from different sources. What are the comparative costs and benefits in a complete life-cycle analysis of energy production from these 60-some wind turbines and over 1,000 shale gas wells located in this area? So many factors must be included such as the foreign mining of rare earth metals for turbines and the increased revenue generated for Indian farmers raising guar beans for fracking, or from the harm done to bats by turbines to the lower gas energy prices for citizens and industry, and, from the pollution-free perspective of wind energy to the water stressing use of shale gas extraction. These are important questions that I leave for others to answer.

Finally in this section of satellite imagery, I demonstrate how the Earth is delimited below the surface Figure 4.30 shows how gas companies align mineral rights for sufficient access into “units,” or consolidated mineral rights leases, for maximum gas extraction through horizontal drilling. Each unit is limited to 640 acres. The overlay helps to explain how a leaseholder might have part of a lease in a unit, that is then considered “held by production” (HBP) and is otherwise inhibited from being re-leased at a higher rate. As Miller wrote, “Once you are included in a unit, you are HBP forever as long as the well is capable of
production. If you don’t receive royalties for whatever reason (no pipeline, over supply, etc) all they pay is a “shut-in” royalty usually $5/acre/year to hold the lease in effect (2012b).”

Notice the horizontal units stretching from the north, northwest to south, southeast. Pipes will run deep and horizontally within these delimited underground spaces. As will be discussed later, unitization is very confusing to leaseholders especially as to which company has control and pays royalties. Due to the unit size limit of 640 acres, some companies divided pads into two units north and south to get 1280 acres with one pad (Miller, 2012b). Furthermore, each of the invisible units lies beneath numerous above ground properties of which many landholders may not even be aware. I question whether these mostly rectangular figures will generate new patterns of energy extraction on the landscape. I wonder if what relationships might be affected of landholders inside or outside of these units. It is interesting to note that although the general shape of a unit is a rectangle, some are oddly shaped and uneven.25 I discovered in my interviews possible reasons for this such as leaseholders feeling left out and pursuing the gas company to include them. There are also spaces clear of unitization. There remain many questions to be considered concerning unitization.

25 Wayne Miller explained, “Then CHK [Chesapeake] bought those leases. They bragged that they were going to get everyone held by production (HBP) before the leases expired. They pretty much accomplished that by last fall. You are correct that a small portion of property (absent a Pugh clause in the lease which no one knew about back then and doesn’t matter as much in non-Marcellous wells) ties your entire property up. Yes this led to some strange shaped units” (2012b).
Drilling depths generally range from 6,000 to 8,000 feet beneath the delimited surface.

4.6.1.4 Clusters and Empty Spaces

There are endless ways to look at the impact of an energy industry or distribution of shale gas extraction across a place. Below is one more look by way of a small-scale map (Figure 4.31). Notice the well clusters in Washington County to the southwest, and then see how they scatter across central PA to reappear as heavy clusters in the northeast counties of Bradford, Tioga, Susquehanna, Lycoming, and Greene. The quickening pace of drilling over time is depicted. The dark red dots show that most drilling took place in 2010. The richest place for shale gas development is indicated where the majority of wells exist. In spite of this dotted map and the numerous others posted in media and conferences, there are the un-dotted spaces that remain to consider. Where are the other 82,000 spud wells that create the energy landscape? Will these

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I emailed Wayne Miller and asked him, “What are the impacts of fracking?” He responded, “As far as changes in the landscape, I see a very little. The drilling pads are a few acres, but they are typically one per sq mile. Some cover 4 sq miles or more. Once they are completed they blend in with the surroundings. They are presently putting pipeline across my property. In a couple of months when the crops are planted you will not be able to tell it is even there” (Miller, Wayne, 2012c).
empty spaces such as those found in Warren and McKean counties be forgotten? Has the conventional oil and gas industry been excluded? What about the expertise that lies within these regions? Fracking had occurred for many decades in these counties. Had there not been concern about tainted water, destroyed land, or sickened people that could be used as information now? Perhaps the un-dotted spaces hold significant answers to these questions.

**Figure 4.31** The Nature Conservancy map offers a look at how fracking moved spatially over time. Unconventional wells appear most in the southwest and especially in the northeast. Note the empty space in the northwest where tens of thousands of conventional wells cover the landscape. Maps commonly plot only unconventional wells. Will this empty space be forgotten over time? I question whether conventional drilling will become an activity of the past (2011).

### 4.6.2 Backdrop for a Changing Energy Landscape

Despite this northeast PA region being a rural, relatively unknown place, headlines soon became world news. In January 2009, due to improper well casing construction, 13 homeowners in Dimock Township, Susquehanna County (east of Bradford County) lost use of their water due to methane gas migration into their wells. The PA DEP fined Cabot Oil and Gas $120,000 for improper construction of the well casing plus other violations (Shankman, 2009). On March 27, 2009 the PA DEP announced its
conclusions of water well tests on other homeowners’ wells in the vicinity who had complained that there was no indication of contamination by fracking activities (PA DEP, 2009). The following year Cabot Oil incurred another fine of $240,000 plus other penalties (PA DEP, 2010). A number of Dimock residents experienced angst that resonated across the Internet, cable, and other media (Phillips, 2011). By then, fracking had become a global controversy and PA was at its center (Marshall, Peter, 2011). In addition, the EPA stepped in and tested wells in the area finding, “Sampling results from these 11 homes did not show levels of contamination that could present a health concern (EPA, 2012a).”

Conversely, not all Dimock residents were anti-fracking such as landowners Jim Grimsley and Ann Van Lenten who helped create a website Dimock Proud to “dispel rumors and bring to light factual data” about their town (2011). By the end of 2011, other residents were so annoyed that they formed a group called “Enough is Enough.” The group would combat the misinformation it claimed outsiders generated about its town. Spokesperson Bill Aileo published a statement which read…

“We are proud to live in Dimock. While the anti-gas minority has torn apart our community, tarnishing its reputation and beauty, and making our home sound like a waste land, we know what is true. Our water is clean and our community is ready to get back on its feet, back to the facts, and back to production. As tests from the Pennsylvania Department of Environmental Protection have shown time and again, which was confirmed again last week, our water is safe (Detrow, 2011b).”

By the autumn of 2012, there remained no consensus as to the overall environmental safety of fracking. In fact, researchers and scientists even argued and debated within the same university. The banter increased in 2011 when Cornell University professors Robert Howarth, Renee Santoro, and Anthony Ingraffea published a peer-reviewed article on the greenhouse gas (GHG) footprint of shale gas fracking. They concluded that new hydraulic fracturing methods produce more GHG from methane release over time than conventional fracking (Howarth, Santoro, and Ingraffea, 2011). Their statement not only caused a ruckus in the media, but within their own university when six months later, a Cornell team lead by Lawrence Cathles claimed Howarth’s research was flawed (Cathles, Brown, Hunter, and Taam, 2012).

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27 The BBC News Lancashire published Marshall’s article “How fracking affects a community in Pennsylvania.” The issue in Dimock over water contamination went on for over two years in state and federal government. The media published numerous news articles, blogs, and videos. Celebrities including Yoko Ono visited the town blocking the small road with her tour bus while there (Bunzey, 2013). During Ono’s visit, Phelim McAleer, producer of FrackNation and Josh Fox, producer of Gasland, two opposing documentaries about fracking were there too (Bunzey, 2013).
Other individual researchers and groups who published about fracking attracted media attention including Duke University (Warner, Jackson et al., 2012), the Massachusetts Institute of Technology (MIT) (Moniz et al., 2011), and Penn State University (Efstathiou Jr., 2012). The questions they research often relate to water contamination similar to the EPA study question discussed earlier, air emissions including greenhouse gas emissions and particulate matter, and then the complex economic and social impacts. The technology is so new that there simply has not been time to monitor and measure all of the effects.

Of the numerous publications that I reviewed, one video presentation in particular stood out for me because it involved local Bradford County residents, as would my research. During 2009 through 2011 when shale gas drilling was at its peak, Simona Perry looked into the health effects of the activity by interviewing Bradford County residents. She concluded, “There is no doubt in my mind that abuse on a massive scale is occurring within Bradford County and other places where the shale gas industry is operating. Until the perpetrators of such abuse are reformed or brought to justice there will be no end to the cycle (Perry, 2011).”

Perry stated that physical, social, and emotional changes occurred from a combination of rapid development, gas industry pressure, and local officials’ slow response to mitigate the impacts. The public began asking questions and fearing a sense of loss. They had concerns about increased traffic, road damage, dust, diesel fumes, noise, and of greatest concern – the gas industry’s presence. Some people had changed their daily routines due to road conditions and traffic. People who had returned to live in the county were now selling their land and moving elsewhere to avoid living in a gas field. Others had no option. They were in shock that they had lost their rights and the state offered no protection. They had to learn how to protect themselves from air, water, and soil contamination. Perry said that by the summer of 2010, these feelings paralleled individual trauma experienced by survivors of abusive relationships, a type of collective trauma induced by environmental and human caused disasters that happen over time and do not come on suddenly (2011).

Would I find the same experience of trauma from the residents whom I planned to interview? It seemed possible amid the numerous media reports, concerns from green forces, EPA statements, and emotional exchanges observed in blogs, the unfortunate accident in Dimock. I was prepared to find a place
where everyone that I would meet would be distressed about fracking. Nonetheless, as I approached Bradford County while driving along Route 6, one of the first signs that I saw showed something different. It was a sign welcoming gas workers to the region (Figure 4.32).^28

![Image](image.jpg)

**Figure 4.32** This sign, which represents the service industry’s welcome to the newly arriving shale gas industry, is located about 50 miles west of Bradford County along US 6 (Photo by author, April 8, 2012).

### 4.6.3 Meeting Stakeholders

In the following pages, I describe what I learned from the Bradford County stakeholders whom I interviewed and the landscape that I explored. I depict the newly forming energy landscape with commentary and imagery that I gathered while experiencing this changing. To introduce this section are two images that show different phases of shale gas development. Each image is a photo of the same place, a shale gas well pad, taken two years a part. The pad sets in a contoured plowed field at the crossroads of Taylor and Porter Roads 22 miles west of Troy. A one story residence, barn, and silo set across Porter Road with a pasture sloping upward from the barn. A second residence is further back to the west.

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^28 Tom Shepstone’s article *Dimock Forever? Or, Dimock Forgotten?* appeared online six months after my Bradford County fieldwork on a pro-fracking website Energy in Depth. He describes the media as presenting only part of the situation and omitting the views of many in or near Dimock who disagreed with the negativity portrayed (2012).
I took the first photo (Figure 4.33) on April 9, 2012 as I parked along Route 6 toward Towanda and looked to the north. The pad is covered with neatly arranged equipment such as the tall crane-like fracking rig, the platform, work trailers, shovel, pickup trucks, chemical holding tanks, frac tanks, and other equipment used during the fracking process. The leveled pad is encircled by spill and erosion control structures. A rounded mound of dirt rests on the west side probably left over from grading. The site was active as men worked on the platform, others moved about the site, and as I discovered later a female guard worked the guard shack. There was a steady humming sound coming from the site.

![Figure 4.33](image-url) Talisman Energy fracks a shale gas well just west of Troy, PA in a farmer’s field. This photo is looking north across the valley from of US 6 toward Porter Road. This type of activity can take six to eight weeks (Photo by author, April 9, 2012).

The next image by Google is of the exact same place, photographed from a different vantage point at a different time, two and a half years later (Figure 4.34). This is the completed Marcellus shale well. Notice the emptiness of this place compared to the earlier image. In the distance on the ridge of wooded hills are wind turbines with US Route 6 hid at their base. A planted field surrounds the pad south and east. Weeds cover the mound of dirt seen in the previous figure. An access road connects the well pad to Porter Road and appears to be used. A piece of farm equipment lies in the foreground. The size of the pad looks smaller than
before. Two condensation tanks, hard to detect wellheads, and orange markers set on the remains a gravel covered pad. It appears to be a quiet place.

Figure 4.34 The completed Talisman well pad (Feusner J 03-044 Unit TLM 41°48'32.06" N 76°50'04.54" W) as shown in Figure 6.14. The view is looking west along Porter Road toward the Taylor Road crossing called Columbia Cross Roads. Note the difference in this image of material artifacts and activity compared to the previous image during the fracking stage of shale gas development (Miller, 2012a, Google Maps, 2014).

4.6.3.1 Private Sector at the Global Scale

The first scheduled interviews in Bradford County were with stakeholders in the private sector, in a multinational company, working at a local level. I interviewed Amy Gilbert and Jack Showers, Talisman Energy USA Stakeholder Relations Advisors representatives at their Horseheads, NY headquarters (Appendix F). Scott Tompkins, Stakeholder Relations Director arranged the meeting and greeted me at the door. The company had 573 well sites listed as active in Bradford County at the time. 29 I asked them, “As a stakeholder, what is the impact of this technology on your company’s interests?” Jack answered, “We are victims of our own success (2012).” At the time of my visit, gas prices were at their lowest in years. In 2009, when the company began operations in the Marcellus, natural gas prices were at a minimum $7.00 per thousand cubic feet (mcf) I was told. By the time I conducted my fieldwork the price had dropped to around $3.00 mcf.

29 Production ranged was 778 thousand cubic feet (mcf) from its sole vertical well, to 70,014 mcf to 966,005 mcf on its other 128 producing wells. 147 wells were listed as not yet drilled. The horizontal well pads had from one to 13 horizontal well bores each.
Talisman had planned its business based on a price of $4.00 to $6.00 mcf and now, as other companies experienced, it had to adjust in order to profit.

At the Shale Gas Insight 2011 Conference, Talisman speaker Paul Smith emphasized that it was the industry’s responsibility to engage with local communities. Amy, Jack, and Scott echoed this charge. Their role in stakeholder relations was to create and maintain positive relations with the community. Jack said that the company worked to maintain social assets to operate, to find those who are defensive and convince them to collaborate. Amy added that their work was to take issues that arise and turn them into opportunities (2012). She said that in this region the industry was new and the local people did not know about leasing, royalties, or any of the processes of building, drilling, hydraulic fracturing, or pipelines. Their office educates the community about company operations by visiting landowners individually, being available to the public, and holding open houses. It is important that they be a ‘good neighbor’ by responding to other stakeholders, and that they take a proactive position. For example, in regards to building the technology, they sought to keep compressor station sound to a minimum to be respectful of residents.

Their responsibility also includes making financial investments into the community, learning about what is important to the community, and knowing with which organizations to work. In 2011, they donated $250,000 to the Red Cross and Salvation Army for flood relief plus its time and use of equipment. They also donated $40,000 to fund a Little League ballpark. The representatives do not invest at random, for example, in the previous case they took advice from the PA state representative about the numbers of people most affected by targeted donations. They also engaged with non-profit organizations like Ducks Unlimited or one that advocates for wild turkey (the name was not given). Amy also said she is working with the company at a global level to create a standard sustainability-reporting model. This northeast PA location was a local rural operation as part of an international company made up of numerous rural operations in the world such as Peru, Columbia, Norway, Vietnam, Papua New Guinea, and Canada.

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30 Jeffrey Singer, Director of the Bradford County Library told me that Talisman also donated $5,000 to the Library.
4.6.3.2 Local Government Stakeholders

I asked Bradford County officials the same open-ended question about the impacts of fracking. I met with John Ambrusch III, Emergency Management Coordinator, on April 9 at the County offices (Appendix F). He provided me with a document that he had prepared to best answer my question titled Bradford County Emergency Management Road Safety Initiative (Ambrusch, III, 2012). The purpose was to address “drastic changes occurring in the daily lives of residents.” The proposals reflect problems of traffic, lack of resources for emergency responders, and increased demand on local roadway and bridge infrastructure. His Safety Initiative included a “Traffic Congestion Map,” “Increased Traffic Signage,” and “Safe Driving Practices” in heavy truck traffic or congestion. John placed great emphasis on the County’s all-volunteer system of emergency responders and “the financial burden placed on the individual volunteers” being seen throughout the County. He proposed to partner with the industry to develop ways to offer reimbursement and incentives to the volunteers through a fund and/or grant.

He gave me a second document of a presentation made by the Northern Tier Planning Region (NT), WATS, and PennDOT Engineering District 3-0 in July 2010. The NT is a 4,000 square mile region of rural north central PA bordering NY to the north (Northern Tier Planning and Development Commission, 2010). The document discusses local impacts to transportation including heavy hauling permit enforcement, uniform local posting and bonding/permit issuances, and the ‘shear’ number of trucks. Fracking impacted rail by increased traffic growth from 44 carloads in June 2009 to 219 carloads in June 2010, or nearly a 400 percent change. The rail traffic carries mostly sand, pipes, and drilling equipment to serve the gas industry. A request had been made to add six new miles of rail sidings in the six-county region. The Williamsport Regional Airport experienced a 25 percent increase in passenger traffic attributed in part to a 60 per cent increase in corporate aircraft landings by shale companies.

The roads and bridge infrastructure was a big concern. For example, 70 percent of Lycoming County’s bridges serving its 52 municipalities were known to be in fair to poor condition. The County identified that municipalities lack knowledge and resources to manage weight – restricted bridges. If they implemented detours, the risk increased with long detour routes. Road traffic had increased on both primary
and secondary networks, with secondary increasing from 150 vehicles per day to an additional 700 trucks per day. Some roads cannot support heavy trucks such as those with 10-ton weight restriction. Bradford County had 44.05 miles of needed reconstruction, 1.45 completed and 6.62 underway, and 45.85 miles planned to be reconstructed by gas companies. There was concern about funding sustainable programs to inspect, permit, and enforce regulations. These were some of the impacts placed upon local municipalities.

The presentation addressed the “Impacts to Housing and Real Estate.” It stated that despite a Marcellus housing facility and training center under construction, the supply – demand ratio had doubled and rental prices tripled. Landlords were not renewing existing leases and local residents could not afford the increases. In addition, property listings with acreage were at an all-time high, subsurface rights are not included for those that are for sale, and appraisals of property have become difficult due to varying lease values.

Tourism was affected because there are “NO ROOMS at the Inns” although several new hotels and motels were being planned. Pedestrians, motorcyclists, and bicyclists are being affected by truck traffic. In any case, it was recommended that a tourism brochure for the Marcellus Shale be developed. The study showed unfunded needs including traffic counts, assessment of stress on state and local roadways, assessment of rail expansion, and administrative costs. “Just the Tip of the Iceburg?????” the final page asks (PennDOT, 2010).

At the same County offices I interviewed two staff members of the Community Planning and Mapping Services department. Scott Molnar, GIS coordinator and Samantha Edwards, newly hired GIS Planning Analyst (Appendix F). Their answers to the impacts of fracking were mostly about the greatly increased demand for their services. The department had experienced increased requests for maps especially by landmen, those who negotiate on behalf of gas companies with landowners for their mineral rights. The department was also implementing an innovative countywide 911-address locator program due to increased drilling. The program required each gas well to have a street address to facilitate emergency situations.

I could attest to the latter. I saw signs touting Route 6 as “One of America’s Most Scenic Drives” while driving to Bradford County. I could not imagine rationally riding my bicycle along that highway beginning in Potter County through at least Bradford County. The trucks were intimidating, and in the towns like Towanda, the roads were narrow and the congestion great.
Because this program development required so many resources, the department hired a second full-time employee to maintain drilling data such as permits, rigs, and pipelines.

The findings from these interviews and the informational documents gave a deeper insight to the impacts of a newly emerging energy landscape. Unlike the townships that were green forces in my initial findings, these county employees seemed to be accepting the workload, yet questioned how the work could be sustained. The concept that an all-volunteer emergency responder force would deal with a highly technological and potentially dangerous industry was dumbfounding. Workers, specialized and huge drilling equipment, and hundreds of trucks sometimes driven by new, inexperienced drivers inundated Bradford County. The demand upon public services was tremendous. Where was the money coming from to pay for these services? How would local municipalities maintain the quality of their communities under such pressure? Were other companies like Talisman providing financial donations to the communities? Were the millions of dollars being invested into drilling and fracking wells being invested into Bradford County?

Perhaps PA’s newly amended 1985 oil and gas law called ACT 13 would help. The new law would impose an impact fee upon operators to be distributed to those communities who adopted resolutions to impose them. In order to receive these fees, “the governing bodies of at least half of the municipalities located in a county or municipalities representing at least 50% of the population of the county adopt resolutions to impose unconventional gas well fees on all unconventional gas wells spud in the county, the fee shall take effect (Pennsylvania General Assembly, 2012).” The impact fee would be distributed to those municipalities affected. Counties had to tell the Commonwealth whether they wanted to participate or not by April 13 2012, the week that I was there. Some of my interviewees’ conversations included hearsay about different towns and townships and how they might vote. It was unclear if Bradford County would get the votes that it needed. However, after I left I checked back and the votes did pass, therefore the County would reap some of the funds. 32

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32 In November 2012, the Public Utilities Commission announced the first impact fees to be distributed. Bradford County would receive more than $8.4 million, Washington County – over $4.4 million, Warren County - $53,000, and McKean County - $416,000 (Pennsylvania Utility Commission, 2012).
4.6.3.3. Impacts through Local Eyes

In large part, the landscape is made up of the individuals who live upon it. Their experience and points-of-view from ground level are essential to learn about the changing energy landscape. Their words are important and not to be lost among data gathered as numbers, or silenced by louder voices such as the media. I interviewed 18 individuals between two meetings and captured most of their words on tape (Appendices F, G, and H). Jeffrey Singer, Bradford County Library Director, arranged the first meeting for me at which I led a focus group (Figure 4.35). John R. Borits, one of the focus group participants invited me to a second meeting which he called “The Meeting of the Bored.” I was pleasantly surprised by John’s invitation. It demonstrated what I had hoped would happen during my fieldwork: the “snowballing” method as mentioned in Chapter III, a ‘follow the actors approach.’

At these two meetings I asked, “What are the impacts of fracking? I just want to hear all the different impacts that I can…good, bad, or indifferent.” The focus group participants shared a great deal with me while at the same time finding themselves engaged in thoughtful and lively discussion. In fact, the next morning John thanked me saying, “That was interesting yesterday. I have to thank you people. That was interesting to share.” Below, I summarize their comments and supplement them with their own words as to the experience of living in a changing energy landscape.
4.6.3.3.1 Traffic, Noise, Dust, and Rapidly Rising Bonuses

By April 2012, unconventional drilling activity had been on the increase. In 2009, 158 wells were spud, in 2010, two times that number at 374, and in 2011, 396. Dr. Ernie Miller, an economic geographer at Pennsylvania State University and regular speaker in Warren, PA wrote concerning the period between 1876 and 1881. “During the boom period petroleum activities not only dominated the landscape, but controlled the actions and thinking of the entire population (1943, p. 184).” Perry had gathered data during the first two years of this intense period of activity (2011). Prior to my focus group, I had already explored the landscape by bicycle and noticed many signs of shale extraction activities. These expressed themselves as widened dirt roads for industrial equipment to pass, well pads placed on leveled squares of land in cornfields, frac tanks lined up to supply water or hold waste water from fracking (Figure 4.36), wood placards posted with as many as eight well permits per pad (Figure 4.37), occasional consumptive water use permits (Figure 4.38), and the ubiquitous orange truck sign notifying drivers of upcoming access roads (Figure 4.39). Next I would hear from the local people how these activities affected their actions and thoughts.
Figure 4.36, on the left, shows frac tanks in the distance lined up on the edge of a leveled well pad in a field rising from a hardened access road in the foreground. Figure 4.37, on the right, shows a metal pole holding a plated marked with the well’s physical street address, a wooden stake covered with a list of eight well permits issued for Talisman Energy USA, a mailbox, and a placard with paper well permits affixed to the front and back (Photos by author, April 8, 2012).

In Figure 4.38 on the left, the ubiquitous form of a work truck against a bright orange background signifies an upcoming access road to a Marcellus shale well pad. In Figure 4.39 on the right, a sign issued by the Susquehanna River Basin Commission authorizes up to a peak consumptive water use of 6 million gallons by Talisman Energy USA for a five-year period (Photos by author, April 8, 2012).

In nearly every conversation, beginning with employees at the Bradford County offices, I would hear about the traffic. Suzanne Reester, an employee in the planning department, told me that because of increased traffic, even her attitude had changed about driving. Prior to the industry’s arrival she would not think twice about letting cars go ahead of her at intersections. Now, she said, “If I let just one person take the turn first each day I feel good.” At the focus group, Jerri Renzo, Council President of the Borough of Burlington, a one square mile municipality along Route 6 said, “The traffic is terrible. We worry about the kids getting on school busses. We don’t walk anymore to the post office. You can’t. You are scared to death you might get hit by a water truck. Along US 6. That and throwing their garbage out, really, really bothers me. Garbage
along the sides of the road is terrible. [It is] something that was not there before.” (See figure 4.40). Some residents rescheduled errands such as going to the grocery store to pick up milk and eggs, and one man said he was afraid to mow the grass along the side of the road for fear a truck would run him off. Though, there was agreement that the traffic had calmed down as recently as the previous fall.

Figure 4.40 An intersection in the city of Towanda shows the mixed-use of the landscape by gas industry and the public sector. A number of people with whom I spoke were concerned about children’s safety riding the school bus (Photo by author, April 9, 2012).

Despite the fact of dust, noise, and disruption generated from traffic, it varied by time and place. The traffic was at its worst downtown and across the bridge to Wyalusing in the morning and late afternoon during shift changes from local factories, according to one gentleman. For those who lived in the countryside, away from the main roads, it was different. Gail and Andrew Love lived outside of town and had a well dug on her property. Gail explained, “The only time that we are impacted [is] when we go into town. You double the time that it used to take.” Roads could also be temporarily closed to the public while equipment passed through. Andrew added that dust from their dirt road still “infiltrates the house. But all the trucks are gone now.” Below is a brief conversation that draws another picture of the impacts of fracking in different times and place…

Rosemary Wynott began, “Our neighbors have wells south of us. And one to the north of us. We can hear their telephone ringing at four in the morning. It echoes through the valley.”
Allen Roloson added, “Can hear it one mile away. The winds.”

“The family that has the north well provides us with hay for our horses,” Rosemary continued. “She never hears any noise. So I don’t know if it’s the noise from the barn or the cows are what, but we can hear the noise all the way up the hill. Drilling trucks. Conversations. But, it’s all night, just this dnnnnn [a sound] and its only during the construction period cause its only during construction period.”

As participants agreed that activity had slowed down, a few questions came to me. Was it because time had passed since intensive fracking began that residents were adjusting to the new energy landscape? Was there less truck traffic due to the fact that multiple fracked wells can be drilled on a single well pad and many had been completed (Figure 4.41)? There certainly was drilling and fracking activity still taking place that I saw, but from what these stakeholders were telling me it had indeed begun to subside.

![Figure 4.41](image)

Figure 4.41 This EIA graph reflects what the focus group participants told me about a slowdown of industrial activity between 2011 to 2012 (EIA, 2013d). The number of “well starts,” or spud wells, dropped from approximately 2,250 in 2011 to less than 1,500 in 2012 according to the above data.

A number of individuals with whom I spoke had moved to Bradford County in their retirement. Gail and Andrew are an example of one couple who moved from Philadelphia 17 years earlier to retire. Gail said they “Just wanted to get away from everything and come to the peaceful, serene. We had quite a few years of peaceful, beautiful, no traffic lights and it was serene and we loved it and enjoyed it. They own a 33-acre farm built in 1851.” At first they were very much against leasing. But after they found out that “everyone else in the neighborhood has signed. Why not? Other people are reaping the benefits. So we signed on and received
a nice bonus.” Others in the group shared the same experience of not wanting to be left out. The Loves had renovated their farmhouse with the bonus money and found that was good. The money that people received “supported a lot of farmers that were not able to keep their properties or their farms and stay. I cannot say to date that we have been negatively affected with it. I try to see the plus. It helped us renovate the old farmhouse the bonus money. So that was good,” explained Gail. Below is the photo of a farmhouse that I rode by on my bicycle that I thought may have been renovated with gas bonus money (Figure 4.42).

![An old farmhouse positioned in the Bradford County countryside. The exterior vinyl siding, shutters, fresh painted trim, new steps and rails, new roof, and decorative trim suggest the house is recently renovated](Photo by author, April 8, 2012).

The amounts of payment per acre for lease bonus money seemed to have increased at a rate equal to permitting and drilling, from what I heard in the interviews. I was told that prior to 2008 the industry was offering less than $50 per acre. John and Claire told a story about an elderly couple from Texas who came to their home and attempted to scam them. In 2004 the couple offered them $5 an acre which they refused to accept. I spoke with people who received $50 an acre, $65 an acre, and one man who received as much as $3,500 for half an acre. By April 2012, payments had settled to $4,500 or $5,000. Richard Eaton and his wife owned a 200-acre retired family farm. When the gas rush began, they renegotiated a lease with a group of
others for “a substantial amount of money,” he said. If they had agreed to $4,500 per acre, they would have received a one-time bonus payment of $900,000. They used their bonus money to renovate their house.

4.6.3.2 Landowners Point Out the Industry’s Behavior

Fracking not only impacted the landscape with additional traffic, disappointment at missing out on rapidly growing bonus money, or a positive experience like Richard’s who received a windfall. There were cases when landowners and locals felt exasperation at the industry’s behavior. For landowners who had signed leases, the practice of being “locked in” to a lease caused frustration and for the community a lot of unpredictable activity upon the landscape. Many leases were five-year contracts with a clause to extend them another five years if the lease had been worked on. If the lease had not been worked on, then the landowner could put the acreage out to re-bid. This practice caused anger and frustration for leaseholders and the general population. Leaseholders could not renegotiate, and many residents’ lives were disrupted by not knowing when or where wells would be drilled. Below are stories given by focus group participants to describe this behavior…

“You can see them, it is lit up, it is noisy, it’s,” Terry Fritchman described. “I have a dog that still wouldn’t go outside for a while. She is, was, absolutely petrified to go outside. They do them one at a time. You get a well here they get everything done and you think they’re all gone for a while. Then my husband was sitting there looking out the living room windows and you could see upon the ridge, the trees started falling. ‘Well maybe they are just putting pipeline in up there.’ But no, another well went just recently there. They are constantly going around adding new ones,” she said.

Alan Roloson who lost out on renegotiating his lease added…

“As somebody commented, they jump all around. You see them here, they’re gone. You see them here, they’re gone. Throughout the whole county. It’s because of everybody’s lease, all written different. They expire – all the time. They have to hit everybody’s land to lock them in less than a month. They did it with a farm we owned that was my father’s. Two months before the lease expired, they locked in six acres from another well that was not drilled yet. The pad wasn’t even built yet, but out came the notification that here’s the unit so you are locked in. So you cannot resign the lease and have anymore lease money under an old lease that is at 12.5 percent. They only have to declare it, stake it out, show you where it’s gonna be and declare the unit. But even that is not even declared. We received no – and it’s been on line same amount of time different properties. One and a half miles apart. Different properties. Producing almost an identical time frame. No difference. We don’t know what amount of land will be in the unit because we still have not been notified.”

33 According to Wayne Miller, “When a unit is defined it is filed in the courthouse. You can search for all filed documents on Landex.com by county, company, document type use “other” (units are miscellaneous) and a range of

130
Not only were the companies slack at communicating about the unitization (Figure 6.11), below Gail and Andrew describing another example…

Andrew begins, “Remember the day the helicopter dropped the thing in the back yard? The librarian out here. Sarah. We had her over and we were sitting out on our deck and having burgers or whatever and…”

Gail interjected, “She was going to dog sit and we assured her that no one would bother her that we lived on a farm out in the middle of nowhere” She asserted, “These dogs are very protective. There is literally no one around. You will be safe. We were going for like three days. End of story.

“So we’re sitting there and of course they’d been working in the area for seismic testing and because of it being such a rural area, they were dropping these packages by helicopter. OK? Uh, it’s the equipment. They drop ‘em like an orange bag.

“Parachute kind of thing.

“And the next day the workers will come on foot, take the materials, and…”

“Spread the wires out.

“And we’re sittin’ there and all the sudden this helicopter is right there.

“Over the patio.”

“And she’s like this…[He gestures]. She thought it was an invasion. She was waitin’ to see people come down out of that helicopter.

[The other focus group participants burst out in laughter again around the table.]

“We had plates flying. Flower pots. Everything!” Gail exclaimed.

Andrew described, “Because the rotor going, the wind coming down…”

“We have all this acreage! And they dropped it right at the house,” Gail pointed out.

“Sarah’s ready to jumped up and run off the….

“There went my dog sitter.”

This situation raised a number of questions in my mind about the industry’s protocol, about notification of landowners of royalty payments, unitization, or other activity in their neighborhood. It seemed to me that, in a case like this one, some in the gas industry omit the fact that people actually reside on the

dates. This can be quite confusing as there are thousands of "other" type documents and new ones are filed everytime there is an amended unit” (2012b).
ground in which they work. Perhaps the industry looks at the landscape through a different lens than other stakeholders use. It only focuses on doing what needs to be done to extract shale gas without consideration of local people who live and work in that place. Some of these events came as a surprise to me.

4.6.3.3 Demand upon Real Estate

Another way fracking impacted the county was that real estate had increased dramatically. But, it was apparently not just the shale gas extractive activities that affected it. There was other energy producing activity upon the landscape that played a role too. Rosemary Wynott, who lives in Columbia said that her stepson who hauled milk had been looking for a rental or a home to purchase for the last twelve months and felt he could not afford it. She said, “The price range for rental housing has been pressured by the need of the gas workers and energy workers because of course just right up the hills from us we have wind turbines.” I had seen these wind turbines as I first drove into Bradford County from Route 6, the next day by bicycle, and later as I drove to various appointments (Figure 4.43). Even while visiting the County offices, Scott Molnar and I counted at least 130 of them on a digital map.34

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34 AES Corporation, a global power company based in Arlington, Virginia developed the wind farm (AES, 2014). Delmarva Power signed a 15-year lease for the 100.5 Megawatt facilities in 2008 enough to power 45,000 homes. It consisted of 67 wind turbines at the time expected to be operational in 2010. The power is delivered to its customers in Delaware and Maryland (Delmarva, 2014) I am uncertain why we counted more than are documented by these companies.
Alan Roloson, a real estate agent in my focus group, explained a huge housing shortage for rentals in the County. Rents had increased from $300 to $500 to $1,200 to $1,800 since the industry arrived. Some people were renting bedrooms in their homes for $500 a month and some were renting houses for $2,500 to $3,000 a month. Companies would come in and “stuff houses” with single beds for shift work rotation. They would place 20 workers to one house and bus them in and out with vans. Many workers lived in campers with 20 to 30 campers to a lot mostly found along Route 6 and Route 14 (Figure 4.44). Although, there was a great amount of real estate activity, it was not in sales. It was in housing and commercial rentals. Road frontage property was in high demand for storage. Two to three motels had been built with a couple more on their way. He did not see this activity sustainable and predicted it was already moving to Ohio. Was Susan Christopherson at the Pittsburgh conference correct to question a boom or bust cycle? Would this spin-off activity from fracking continue or would it end suddenly? Regardless, some in the community were benefiting.
Figure 4.44 A trailer park, probably temporary while gas workers are present, located to the north of Towanda along Route 14 headed to New York State (Photo by author, April 8, 2010).

Although the participants shared many examples about the negative effects of fracking, they spoke about the positive benefits too. Besides landowners who received bonus money, these included jobs, new roads, and community investment. Jerry said, “The gas company has its advantages too because there are people that live on my street that have better jobs now than they have ever had in their lives, so there are good things and there are bad things.” Terry added to that, “My daughter’s boyfriend he drives a truck, water truck. So we are kind of all the way around connected to it from all sides. It is different, interesting, just getting used to it.” She continued, “We have beautiful new roads up in the country that we never would have had.” Jeffrey mentioned, “As the director of the library, Talisman gave us $5,000 and Chesapeake donated 6 or 8 computer so that was very nice of them.” Gail continued, “It supported a lot of farmers that were not able to keep their properties or their farms and were selling maybe in some way it has helped them with taxes and able to stay put.” She and Andrew had the 1854 farmhouse and because of leasing their property, she said, “It helped us renovate the old farm house that needed many, many amenities.” Alan, who grew up in Bradford County and returned after military service leased his land, he said, “The impact to me, I built an addition on my house so I improved my property from getting the gas lease.” Furthermore, he said, “Now the local people can move and do things [because of jobs].”
There was also discussion about potential environmental problems. The discussion included some hope from overcoming past environmental issues through land reclamation. Those who had lived in the area a long time knew how the extraction of coal and timber from the landscape had devastated the environment. John recalled, “The acid from the coalmines went into the rivers down around where my grandparents lived by Lehighton, Moshockton, Jim Thorpe, and anthracite coal regions. And when I was a kid there was nothing alive in that river. There was no crayfish, no baitfish, no clippers, hellgrammites, no fish. Period. There was nothing alive in that river. Nowadays it’s tremendous fishing.” Claire Borits reminded the group about the reclamation of Barkley Mountain. She said it took 32 years to complete, but you would not know by looking at it now that it had been a mess. She said, “They got the coal. They got the lumber. They made the charcoal. And then they left! And the money wasn’t used here.” Another person said that pictures of the mountains surrounding the Sayre valley around 1890 to 1900 show it clear-cut. There were no trees. In the last 30 years it has become one of the richest hardwood stands around. Pennsylvania has a rich extractive economy that includes an immense number of costs and benefits. These Bradford County residents were witnessing another resource extraction that sometimes they feared and sometimes they welcomed. A summary of positive and negative affects expressed by the focus group members appears below (Table 6.2).

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>New jobs and money</td>
<td>Some jobs are more regulated i.e. driving a water truck, therefore return to driving a milk truck</td>
</tr>
<tr>
<td>New wonderful roads like never before</td>
<td>New roads not built to last</td>
</tr>
<tr>
<td>Financial donations from drilling companies to public organizations</td>
<td>Disruption such as roads torn up, traffic, noise, dust, garbage along roads of which some is temporary</td>
</tr>
<tr>
<td>Lease bonus money to improve house and property and pay taxes on farms</td>
<td>The industry is complicated to understand such as leases, royalties, unitization, and schedule of activities</td>
</tr>
<tr>
<td>Money for children and grandchildren</td>
<td>Lack of communication with or acknowledgement of the local population by the gas companies.</td>
</tr>
<tr>
<td>Rent increases for landlords and landowners</td>
<td>Cost of housing increases, concern for those on fixed income</td>
</tr>
<tr>
<td>Increase in service industry such as mechanics, truck sales, hotels, and restaurants</td>
<td>Ruined expectation of idyllic landscape for retirees</td>
</tr>
<tr>
<td>Water has not been contaminated</td>
<td>Fear of the unknown, it came so fast it scared people</td>
</tr>
<tr>
<td>It is different, interesting, just getting used to it</td>
<td>Fear that water will be contaminated</td>
</tr>
<tr>
<td></td>
<td>Friction between lease holders due to uneven share in units, different bonus payments</td>
</tr>
<tr>
<td></td>
<td>Peer pressure to lease mineral rights</td>
</tr>
</tbody>
</table>

Table 6.2 Summary of Impacts. A summary of positive and negative impacts from fracking as shared by the focus group members.
4.6.3.3.4 Water: The Well-Kept Secret

One of the most surprising findings from my Bradford County interviews was about the water. I learned most of all that it was a “well-kept secret.” I explain that term below. Leading up to April 2012, much of the concern about fracking was about potential water contamination from fracking. The media took great interest in it, the EPA was running a national study, protestors at Shale Gas Outrage were rallying about it, and a 2011 a New York Times series pressed on and on about dangerous frack wastes contaminating Pennsylvania waters (Urbina, 2011). Further controversy abounded in articles like “State searching for cause of methane in Franklin Twp. water wells (Legere, 2012b)” and “City people moving to rural? Gas always? EPA Again Says Dimock Tests Show No Contamination (WLW, 2012)” that referred to adjacent Susquehanna County. And, Josh Fox had produced Gasland that showed people setting their running faucets on fire. But not one person whom I interviewed had experienced their water being contaminated, nor did anyone talk about frack wastes. However, they did express fear that their water might become tainted. They knew that some people had experienced this nearby.

Terry said that contaminated water by fracking was a big scare around there, but recently her son who lives outside of Pittsburgh had questioned her as to why people were concerned now. Fracking had gone on for decades in western and southern PA with no problems. Jerri described that they had always had a problem with bad water near Burlington. She said it was likely “our water-quarry and a landfill” that caused it, not the gas companies. Furthermore, the water was naturally tainted in the area. It was normal to treat one's water well to meet certain legal standards, mostly aesthetic as Ron Russell a 30-year retired PA DEP veteran water quality inspector told me. Apparently drinking water had historically been a challenge throughout the area. He and Lyle Harding, a retired USDA Director discussed this at length with me at the “Meeting of the Bored (Figure 4.45).”
Lyle began…

“We’ve had bad water in the area for a long time. I’ll give you an example. I worked for the USDA, actually the Conservation District, [we] built a new office in Dalton. We couldn’t drink the water, we’re talkin’ say 20 years ago. It had barium, it had arsenic in the water, manganese, sulfur. We had to treat the water before we could drink it. That’s what we have. That’s what people are finding out. *It was a well-kept secret. Nobody wanted to talk about it because it would lower the value of their house!* You’d test it for bacteria, not for anything else, and, OK. All you hear is the big thing about the Dimock area. OK? Most of the people in the Dimock area moved in from other areas.”

Ron clarified, “From the city where they had public water.”

Lyle continued, “Whether or not, Cabot, I think, was kind of a sloppy operator over there and they had some accidents and they had spills but not all the water was affected. And a lot of that water, it wasn’t tested before hand, so everything they tested afterwards they said we’ve got all this stuff in the water. Well, it was probably there. Now they’re blaming the gas companies. We had a case out here. What was it? Over on Granville. But they already knew they had a problem. But they started blaming the gas companies.”

Ron had inspected thousands of wells over his career. He continued…

“There were areas in the county in the northern tier here that had water problems.” His voice rose and he emphatically stated, “They were normal problems.”
He explained that common elements like iron, manganese, barium, sulfur, manganese, salt, for example, were found naturally in bedrock and leached into the groundwater. People had to treat their water wells for these types of contaminants classified in the Safe Drinking Water Act as Secondary Standards. They were considered aesthetic problems. They would place filters on their wells to deal with them. Some had a minor problem with natural gas or methane that would get into the water supply. They would vent the methane from the well so it would not come into the house. Methane is not toxic but can cause explosions if at a high density in a confined area (Swistock and Rizzo, 2012). They would place a sanitary seal on water wells to deal with bacteria problems. He said that all of these problems were a “normal occurrence.”

Ron raised an interesting point about a stakeholder that had been left out. When he spoke about Primary Standards of the Safe Water Drinking Act, for example, barium that is considered a health risk he emphasized that they did not seek the “well drillers” advice. Radioactive elements were a concern as found at the University of Pittsburgh conference. He explained that a “vast resource of individuals in this county that have worked this county for their entire lives” was left out. He said they “were local people that knew the land, how deep they could go, and were to drill or not drill. The industry had apparently not reached out for their expertise. Even the chairman of the Pennsylvania Well Drillers Association who lives in Troy had not been asked. He said that they definitely had problems in the area and they knew what they were. They were mostly aesthetic threats. This calls to mind Goldstein’s request at the University of Pittsburgh Public health conference. He asked industry to include local expertise.

In regards to methane, he had tested many homes by “flame testing their spigot – flame testing their water.” He would “Collect an amount of water out of the spigot in a plastic jug. That’s one way to do it. And shake it up and let it set. This is with the lid on. Take the lid off. Hold a match to it. If the water burns or

35 The federal government website http://water.epa.gov/drink/contaminants/index.cfm explains primary and secondary standards and provides lists of contaminants. Primary standards are “legally enforceable that apply to public water systems” to protect the public health. Secondary standards are “non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water.” Each state can choose to make the secondary standards enforceable.
blows up you have methane in it.” He described one time when he went to a house near Wyalusing. The owner of the brand new home expected “gas in the water.” Ron describes that the owner…

“…turned on the water spigot and he let the water run a few minutes and he reached up into his cupboard and brought out a box of wooden, what we call, barn – burner matches. And he says, ‘Ron, you better step back.’ And I say, ‘You’re kidding me!’ He says… I stepped back a couple paces…. He says, ‘I mean on the other side of the kitchen.’ So I walked to the other side of the kitchen.

“He stood over and he struck a match and he threw it in the sink and there was this gigantic ball of flame that completely covered the recess above this kitchen sink. I just could not believe the amount of flame he had in the kitchen. And, my parting and my written direction to him was to disconnect this well and get it the heck out of this house. ‘God, man, you’re gonna burn your house down!’ And the man had not even though of doing that. [He chuckles.] He had to have somebody else tell him.” He suspected different reasons for methane in water wells. One, drillers were drilling too deep.

Second, there had been a number of previous shallow gas wells in this County that were not regulated, not plotted, and not properly plugged. These could present a problem if run into. He said that gas companies had been drilling about 15 – 16 years ago searching for most likely the Marcellus shale gas. He was concerned that some of these orphaned wells leaked into the water supply.

4.6.3.5 Economic Variations on the Landscape

The men whom I interviewed at Harkness Family Restaurant noticed the economic impact from fracking on the new energy landscape. Service businesses had increase in sales. One man said truck sales had tripled, there were lots of windshield repairs, and guys were building dormitories and modular homes. Those who gained fortunes from leasing spent their money to renovate houses or pay off farm taxes. They had seen some of the gas money invested in the local economy. They also knew about the larger issue at the time that gas supply had exceeded demand on the market and therefore industrial activity slowed down. This meant less traffic and smaller or no royalty checks. Natural gas prices had fallen from 25 percent to 50 percent depending on the sector (Figure 4.46). This was due to an earlier rush in Marcellus drilling, a lack of distribution infrastructure such as pipelines, warmer winters, and thus a flooded market, or over-supply.
In 2008 when fracking began in Bradford County natural gas prices were near their highest point in time of $7.97/mcf. Since then the price had steadily fallen to $2.66/mcf or 33 percent of the price that motivated industry to drill for a profit a few years earlier (EIA, 2014a).

The retirees also predicted that the industry was moving to Ohio. They doubted gas would bring manufacturing back to Towanda, and that the decent jobs were in Ohio or further west of them. Certainly, a natural gas called “wet gas” was being extracted in Ohio. Wet gas is natural gas that has high ethane content, a highly valued feedstock (raw material) for the petrochemical industry as discussed at Shale Gas Insight 2011. The industry had discovered that the Utica shale offered more wet gas than did the wells in northeast Pennsylvania, considered a source of dry gas, or mostly methane. The drillers were pulling down their rigs and moving them west to Ohio.

They talked about future activities from natural gas including gas generating stations and compressed natural gas vehicles. They had heard a gas generating station was to go in about two miles away in Wysox, and a second to the southwest Lycoming County, near Williamsport. I confirmed this later when on October 10, 2012, the PA DEP announced it had approved the first gas-generated power plant to use Marcellus shale gas. It would generate up to 936 megawatts of electricity, will be built in Bradford County and will create 500 construction jobs at its peak (The State Journal, 2012).
Some were very hopeful about compressed natural gas (CNG) in the transportation industry. One man began, “Vehicles. That’ll happen. Ya know, the chicken ’n the egg deal. Who wants to buy a gas-fired car if you can’t get fuel for it? So who wants to put fuel in if you have no one to sell it to?” Some had heard estimates that a conversion would run $9,400 to $10,000. Also, they had expected a local automotive distributor to take a lead in this by selling CNG powered Hondas and expected these types of vehicles to be in use all over the place in three or four years. This was latter expectation was faster than the rate discussed at the Shale Gas Insight conference. There it was pointed out that the oil infrastructure was so ingrained upon the landscape; it would take great political will and resources to modify it. It would take a lot of time. Primarily, these gentlemen observed the newly forming energy landscape and they saw that it would be deeply embedded into the future. And this landscape would not offer equal benefits to all.

4.6.3.3.6 The Issue of Equity

“We have factions here in the County. You can imagine there’s pro gas people and there’s anti-gas people. There’s haves and have-nots. Everybody is not a landowner in the County, ya know, but everybody uses the roads. OK. So a lot of people were affected negatively, right?” asked Ron. Since 2008, the economy had been in a recession. Schools had laid-off teachers and discontinued programs because of lack of money. It was Ron’s opinion that those who lived through all the negative aspects, as he called them, should see some positives too. In February 2012, the PA government had passed ACT 13 to address this issue. Counties had to vote by April 13 2012, the week I was there, to collect Impact Fees or not. A few of the men at the table expressed dissatisfaction with their local politicians. They said their politicians did not “want to offend the gas companies” by imposing fees. They believed the companies would leave. Ron said, “Well, they won’t leave. [His voice became loud and forceful with emotion.] There is only one reason they’re here. It is not ‘cause they’re friends of ours. We’ve got something they want. And it’s not millions of dollars. It’s billions of dollars. So they’re not gonna leave. The average citizen doesn’t see that.”

But when Ron mentioned the “haves and the have-nots,” it made me wonder about differences of opinion at a more personal community level. I had heard little discussion in my interviews about the impact on neighbor-to-neighbor relations that was reported in the media on occasion. There were those who felt
peer pressure to lease their mineral rights, but no one voiced anger or upset about any neighbor fracking
interrupting their life styles that much. Perhaps this was because my two groups consisted of both landowners
and non-landowners and they did not want to raise the issue. Would I have heard more discussion about
inequalities had I interviewed them separately?

4.6.3.7 From Cows to Gas

One “Meeting of the Bored” member said…

“We are going through a transition. See, us older guys, we remember cows and pastures and
corn and fields. We think that in about 10 more years everybody is going to be normal again.
We think it is an abnormal period of time because we are in transition between cows and gas. I
don’t think dairy is coming back. No. Dairy won’t be back. But all the younger people will
remember is gas. They won’t remember cows (Figure 4.47).”

Figure 4.47 Cows in pasture in Bradford County (Photo by author, April 8, 2012).

“How do you describe normal?” I asked.

He answered, “Gas company.”

“How do you describe pre-gas?” I pursued.

“We’ll be dead,” he simply answered. “It was cow country. Dairy cattle. Cow and veal, cattle,
hay, and they’re all gone.”

“Drilling will continue, I think, for a long time,” a friend added.
The gas industry was there to stay. The economy was simply changing “from cows to gas” and they were living in the transition. They were experiencing the impacts.

### 4.6.4 Signs of Normality as Normal Changes

The last place that I planned to explore was Wyalusing and its environs. Upon arrival in this quaint, little, historic town, I asked a local businesswoman where she would recommend for lunch. She suggested a restaurant down the street, and then invited me to drive the Barn Quilt Tour sponsored by the local Chamber of Commerce. As I walked to the restaurant, I noticed a community bulletin board across the street displaying announcements. I discovered they were about typical small town Pennsylvania life (Figure 4.48). They included a Knights of Columbus Breakfast Buffet, a B-I-N-G-O schedule, the Head Start program, a dog sitting service, and the L.A.W.S Penny Social event.

![Figure 4.48 A community bulletin board displayed on the main street of Wyalusing (Photo by author, April 9, 2012).](image)

Again, I reflected upon all of the media attention about northeast PA being ruined by fracking. Media had published copious articles about spills, explosions, truck crashes, road damage, and out-of-towners getting in trouble. Those types of scenes were nowhere reflected within this collection of announcements. In the earlier meetings, some participants shared about negative impacts including traffic, questionable industry
behavior, or fear of polluted water, but they also shared about the positive impacts and said that things were settling down. These community notices presented more of a normal daily life going on than one of disaster, dread, and abuse as portrayed elsewhere. There were no doubt negative impacts from fracking, some of which echoed findings elsewhere, however were these representative of a passing temporal situation? Was fracking at its worse during the two to four month stages of drilling and hydraulic fracturing than at other times? Had a “new normal,” the new energy landscape, established itself in Bradford County? Different signs such as this bulletin board appeared to indicate that it was so.

4.6.5 Ever-emerging Artifacts of the New Energy Landscape

The built environment associated with fracking was expanding. Not only were companies clearing land for new well pads, the need for a pipeline infrastructure to deliver gas to market was making its imprint on the landscape. In April 2010, a number of wells were capped (closed) because lines did not exist. Over the few days I was in Bradford County I had seen about six pipelines or parts of pipelines under construction. They were located mostly between Troy and Wyalusing about 45 miles to the east along the Susquehanna River. The disrupted land cover from construction varied from agricultural to forest. The scene appeared to be typical of those cleared for electric or gas right-of-ways that I had seen in the Allegheny National Forest and elsewhere (Figure 4.49).

Figure 4.49 A new gas pipeline under construction interrupts the woods near Wyalusing, PA (Photo by author, April 9, 2012).
In his paper about Alberta Oil Sands development, Pasqualetti writes, “Additional landscape changes of a more permanent nature will continue to accumulate, including those from home building, road construction, provision of consumer and industrial services, pipeline placement, and generation and distribution of electricity necessary to service the growing needs of every aspect of the projects (2009, p. 258).

The same accumulation of a more permanent nature was taking place in Bradford County. The well pads, access roads, water impoundment ponds, pipelines, and newly constructed hotels demonstrate this. The new energy landscape eventually would be the norm.

4.7 Summary of the Findings

I have presented the findings gathered from my research about the new energy landscapes of Pennsylvania. I gathered data in written text, spoken words, and visual material artifacts upon the landscape from a time when hydraulic fracturing and horizontal drilling, which came to be called simply “fracking,” had just begun to take off and reach a peak during the first decade of the 21st century. The data represents entities from various cells in the Stakeholder Matrix including the individual to global and in the public, government, and private sectors. Throughout my research, I observed stakeholders that I situated in the matrix move within, across, and outside of their sector and scale to reach specific goals. These entities pushed against each other as green forces, worked together for shared interests, or existed indifferently of any others’ presence as they concerned themselves only with their own concerns in the Marcellus. The various findings originated with the Internet, came directly from stakeholders’ voices, or presented themselves from a stage by way of speakers such as at an academic conference in Pittsburgh, an industry convention in Philadelphia, and a public protest in the latter city as well. These findings show a mix of costs and benefits produced by the new activity of fracking in the Marcellus shale region. The following pages present my conclusions from these findings as they cluster or disperse in different ways.
CHAPTER 5: CONCLUSION

5.1 Summary

This dissertation investigates the new energy landscapes of Pennsylvania that developed between 2010 and 2012. Landscape analysis and the stakeholder matrix provide methods to organize the study, gather data, and analyze the findings in Pennsylvania, specifically the four politically bounded counties of Washington, Warren, McKean, and Bradford. The voices of stakeholders, both spoken and in text provide data across the public, government, and private sectors at different scales. Images and maps of material objects and infrastructure supplement the study to depict the altered settings.

The results of this study indicate: 1) new landscapes form from dynamic human social, economic, and political activities related to shale gas extraction and the physical impressions that materialize upon from those activities. The new landscapes implant themselves upon the fading imprints of historical energy transitions that linger in the present, 2) contest ensues between “green forces” and industry that utilize different tools to control land use, 3) differences surface between conventional oil and gas practices and the new technology of the 21st century 4) cultural differences occur between locals and stakeholders such as Texans working in an unfamiliar PA physical and geo-political environment, 5) a gap in communication or consideration of others exists between those of differing ideologies, or those outside one’s sector or scale, 6) stakeholders show up as “omitted” from decision-making, 7) not everyone in society is willing to share in the costs of energy development, and 8) over time society conforms to the remolded place as a new “normal” forms. Overall, the pursuit of Marcellus shale gas generates a landscape of mixed and shifting costs and benefits, as do all energy sources.

Ever changing activities and infrastructures of shale gas extraction insert themselves into place to meld new landscapes. Activities transpire that encompass economic, political, and social interests in a mix of costs and benefits. New jobs, demand for goods and services, and transfers of revenues occur. Industry transplants its supporting workforce and equipment into the area. Land value change induces relocation. Stakeholders advocate their interests at meetings, conferences, and protests. Stakeholders build new alliances to protect the environment, their communities, or their mineral rights. Governments juggle resources to serve
their constituents’ demands and deal with decisions like never before. Local communities experience undesired or unfamiliar behavior of outsiders, fear the advancing industry, or feel a loss of control. Media’s roles range from publicizing hype that causes fear, educating and raising awareness, and placing pressure upon industry to stay in check. The magnitude of shale gas technology in larger sized equipment, increased material quantities, and technical expertise impacts PA in a number of ways.

The new physical landscape consists of scattered three-acre (on average) geometric shaped shale well pads, gravel access roads, well permit and water withdrawal permit placards, traffic, and clearings for pipelines. It covers spaces in PA where oil and gas development previously had not been manifest such as in Bradford County to the northeast and Washington County to the southwest. It obscures and exposes legacy energy landscapes such as relatively young forests resulting from clear cutting at the turn of the 20th century, bygone oil and gas fields since 1859, relics of rusty pump houses hidden in the woods, contaminated coalmines beneath the earth or overgrown by shrubs, and stories of past and current mining pollution. Disparate energy transitions leave behind unique marks that fade differently over time and space.

Fracking places both temporary and more permanent material imprints on the newly forming landscape. Temporary physical changes include damaged roadways and increased traffic, 24-hour fully lighted well pads, frack rigs, noise, dust, water haulers, truck crossing signs, well permit placards, water withdrawal permits, roadside trailer lots, convoys of industrial trucks, full parking lots at restaurants and hotels. More deeply implanted features include new road and pipeline infrastructure, agricultural fields or woods dotted with leveled well pads, condensate tanks, access roads, and compressor stations, plus new hotels, regional company headquarters, and training centers. Water impoundment or frack wastewater holding ponds, while initially prevalent, are temporary.

Contention arises as the industry advances into places where oil and gas activity had not previously taken place. Those stakeholders who push back against the industry, the so-called green forces, and those in industry as well, utilize different tools to control land use for their own interests. The stakeholder interests are different as well. The government interests are to provide services for its citizenry, private sector interests are to generate wealth, and public interests seek economic, political, and social wellbeing, or quality of life.
Government stakeholders use legal tools to pass law and enforce regulations. In PA, local governments have authority over where oil and gas development takes place within their jurisdictions. The green forces such as townships apply zoning to control the location of fracking. Governments, for example, also use taxation or bonding, construction and erosion permits, and enforcement of overweight and oversize vehicle limitations. The public voices concern to government, votes, protests and advocates to control land use. It utilizes the Internet for social networking such as blogs, Facebook, and Twitter to organize and be heard. It uses non-regulatory tools such as land conservation, purchase of development rights, and special permitting. Some mineral rights owners form groups to maximize bargaining power with gas companies. The private sector (industry) utilizes money to purchase land, mineral rights, capital and other resources. It pays green forces to be quiet such as the Range Resources case in Washington County (p. 66). It provides grants to local communities for good will. These various tools are not stakeholder specific. The private sector also expresses its concern to government, the public pays money to advocate its interests, and the government and private sector use social media as well. Each stakeholder utilizes the appropriate tool to meet a specific need.

Differences surface between what the oil and gas industry knew before, and what it is learning in the early 21st century. The magnitude of shale gas technology compared to conventional drilling and fracking includes larger equipment, higher pressured hydraulic fracturing, increased material usage of water, sand, and chemicals and other materials, technical expertise (educated workforce), and impact on public infrastructure. Heavy industrial trucks and equipment damage roadways, accidents on roadways and well pads require more frequent and sometimes more complex emergency response services, requests for maps, deeds, and mineral rights documents place pressure upon municipal planning departments and courthouses. The shale gas industry works in a 150-year plus ingrained culture of conventional oil and gas on the PA landscape that does not necessarily fit.

Cultural differences occur in a number of ways, with one such difference between Texan gas field workers in PA and local Pennsylvanians. These differences go beyond the typical cultural dress, language, and food. They include variations such as physical geography, climate, and regulatory framework. The deciduous forests, continuous hills, and plentiful water are unlike that of the flatter and drier Texan shale plays of
Barnett and Eagle Ford (p. 7) familiar to workers. In addition, the data show that the geo-political makeup of jurisdictions between the states of PA and Texas may contribute to different industry expectations. The number of local governments in PA is half the number as in Texas and ten percent of the average size in land (p. 48). One of the industry’s needs is to move equipment across a multitude of townships and counties in order to develop wells. This crossing of jurisdictions can equate to or surpass a similar number of regulations and required permits. One reason the industry wants PA to impose standardized zoning with ACT 13 (p. 55) is to make it easier to move around.

Other cultural differences demonstrate a wide gap in communication between those of differing ideologies – those who support shale gas development for energy security and those who harbor concern for clean water and air. Stakeholders can be categorized differentially as “the antis,” “the moderates,” and “the pros.” In some cases, a communication gap exists outside of one’s sector or scale such as between local and national gas companies. In Philadelphia, the demonstration outside the convention walls demonstrates the gap between beliefs as conference attendees peered out windows onto protestors who challenged them to engage (Figure 4.17).

Elsewhere, stakeholders claim they are left out. A local driller doubts that the Commonwealth of PA included expert conventional drilling advice when his company experiences new, ill-fitted regulations. Bradford County Commissioner Mark Smith wrote a scathing letter to Governor Corbett for not including him in the Marcellus Shale Commission, a working group for legislation input (Smith, Mark, 2011). Those in the public health sector also claimed to be left out of important decision-making as noted at the Pittsburgh conference (p. 17). A Bradford County family experienced disregard (as if people did not live there) when a helicopter dropped seismic testing equipment next to their patio during a picnic. The water well drillers were not consulted for their local expertise of the land.

Other findings show an unwillingness to share in the costs of energy development. Interviewees explain the costs that they endure as the country pursues energy security, while others outside of PA take in only the benefits. New York State shuns fracking with a moratorium, while its largest population center, New York City, builds infrastructure to increase access to abundant Marcellus gas. A number of industry
executives, stockholders, and recipients of natural gas energy live in faraway places from the local drilling activities. Even those who receive energy from the Armenia Township wind farm live hundreds of miles away in Delaware. Internet media bring awareness about the societal naïveté and indifference that there is a price to pay for electricity and that this price is unevenly spread.

Society conforms to the remolded place as a new “normal” is formed. Although human nature expects a fixed landscape, understands it as the norm, and resists unexpected change, there is a point in time when a transformation settles down. Some people only know the landscape as unscathed and intact, unaware of the signs of past changes. From 2010 through 2012, some of those whom I interviewed begin to adjust and accept the new energy landscapes in which they live, as a “viable activity (p. 63).” The Commonwealth writes new or amended oil and gas laws. At times industry pushes back, and at other times it attempts to take the lead on regulation. Bradford County residents describe less intense fracking activity and adjust to new routines. They have not experienced contaminated water among the group. As quoted in the Preface, “We think in about 10 more years, everybody is going to be normal again. We think it is an abnormal period of time because we are in transition between cows and gas” (p. vi).

All of these activities and physical changes to the landscape take place while the world is watching PA evolve through the young, unknown outcomes of shale gas extraction. The drilling accident that took place in Dimock (p. 115) drew the world’s attention. “If you want to know what a gas-rush does to an area there is no better place to look for answers,” wrote Peter Marshall (2011) in the BBC News. Fracking was taking place in the U.K. at the time, as well as developing in Poland. There were other countries debating shale gas extraction during 2010 – 2012. France and South Africa that had each begun to develop shale gas extraction had to place moratoria on fracking in 2011 due to public pressure (Food and Water Watch, 2012). Not only was fracking being contested locally in PA, it was being contested across scale at the global level.

In sum, the pursuit of Marcellus shale gas causes new energy landscapes of contradictory interests, physical impressions of human activities, and unevenly dispersed costs and benefits. It is these complexities that provide reasons for such a ruckus about fracking in PA.
5.2 Significance

This dissertation helps fill the gap in the literature of energy landscapes in geography. Most literature about energy and landscape is in other fields, and outside the U.S. Energy is a huge force that transforms the landscape. In the first years of the 21st century, the U.S. push for energy security and increase in domestic production of fossil fuels is historically significant. Yet, the research is limited about how these forces impact the landscape and there is not one particular method used by researchers to study it. Questions arise such as: Who is making the decisions? How do they decide? What is the best public policy? Other U.S. states and municipalities, and other nations around the world watch Pennsylvania as it deals with the new technology. It is as if the whole world is watching Pennsylvania. My study offer mixed methods that provide insight into the various societal values, conflict of interests over land use, and necessary or avoidable material changes that may need to be considered as new energy landscapes develop.

Compared with the other published literature about fracking in the Marcellus shale, this paper offers a different type of research, perhaps unconventional. Nearly 40 face-to-face interviews with stakeholders residing in the new energy landscapes took place in different regions of PA. The methods such as landscape and stakeholder analysis mix with a visual examination of GIS-produced maps, satellite images, and photos taken in the field. The data demonstrate green forces arise through various entities such as local governments that rush to set zoning in place, individuals who blog or speak to media about industrial mishaps or disregard, and public organizations that advocate for human health and the environment.

The stakeholder matrix provides a means to strengthen the breadth of those to study. Fieldwork offers a deeper sense of place, an understanding of the people, and knowledge of the geographical terrain and climate. It is “real world” research. Spoken words of Bradford County residents capture the essence of a unique time and place in the emerging landscape. Maps provide original representations of the distribution of green forces, conventional and unconventional well patterns, and empty spaces. The industry convention shows that it not only reaches for profit, but also strives to not contaminate water, minimize its use, and lessen the technology’s environmental footprint.
This dissertation shows the complexity of the fracking issue during its youthful stage, demonstrates the need to answer many questions about it, and introduces ideas for others to explore amid the intricate mix of new energy landscapes.

5.3 Future Research

The question in this dissertation about fracking and the new energy landscapes that transpire in PA is broad and in its infancy: There is endless opportunity for more sharply focused questions to be asked. Some are not ready to be answered, as data needs more time to become available. It is my hope that this dissertation inspires new questions to be studied by its readers. I share a few ideas for future research below.

The findings suggest further economic, political, and environmental analysis needs to be conducted that concerns fracking. Those who study legal geography, regional geography, and issues of scale have a plethora of data to excavate from the Marcellus. Geographers could conduct more focused financial, societal, and ecological cost-benefit analysis of fracking impacts to local individuals, municipalities, and the Commonwealth in which fracking occurs. This includes landowners who lease mineral rights, landowners without mineral rights, and non-landowners. Do government revenues fit the demand that the gas industry places upon them? Or, is the industry being taxed unfairly? Some municipalities are quite small in land area. Do costs or benefits flow across their jurisdictional boundaries? What ecological costs does fracking impose in its footprint? As introduced in the satellite images, what are the comparisons between those footprints of shale gas extraction and the renewable energy of wind, especially in their complete life cycles?

There seems to be duplicity of interests concerning fracking. Of the various impacts of natural gas production some are partaking in the benefits, but unwilling to share in the costs. The state of New York has a moratorium on fracking, while New York City outlaws fuel oil and increases its demand for natural gas from the Marcellus shale in PA (Meyer, 2013). The City of Cincinnati banned underground injection wells for fracking fluid in August 2012, yet builds a compressed natural gas fueling station (Babst Calland, 2012; Benson, 2014). What are the geographic characteristics of these contradictions? Does conventional oil and gas infrastructure affect this disconnection? Do energy policies meet the needs of current populations’ location and activities?
What about the “omitted stakeholders?” It was claimed that the water well drillers’ knowledge is omitted from industrial decision-making. Would a mix of variables from the two stakeholders generate better well location? And, what consequences will unconventional drilling have on the 150-year practice of conventional drilling? As written earlier, local business owners feel left out. The fast-growing, powerful Marcellus Shale Coalition focuses on unconventional drilling. Many maps plot shale gas wells and leave empty space where conventional drilling takes place. What impacts will the new fracking have upon age-long practices? Is it a vanishing technology?

Lastly, the dissertation minimally addresses Marcellus stakeholders at the global scale. As I wrote earlier, “The world is watching Pennsylvania.” Not only are countries like the United Kingdom, France, and South Africa observing PA, there are businesses from Europe, India, and Japan that have already invested in the Marcellus. The U.S. prepares to enter the international Liquid Natural Gas (LNG) market. LNG facilities projects have begun on the east coast to distribute Marcellus shale gas throughout the world. What are the future geopolitical consequences? How will the economic and political global map change? What about Russia, a major natural gas supplier to the EU and other countries like China? What about those countries with growing demand such as China and India? There are other shale plays around the world. How will future growth in global shale gas extraction affect that in PA? At the local level, will this increase the price of gas?

The technology is less than two decades old. Technological advancements go on. Societal green forces push back. It is an open field to explore.

5.4 Implications

The findings of this study have a number of important implications. Fracking creates new landscapes of human activity and physical artifacts that raise issues about land use among stakeholders. Many questions remain as to how the energy transition will unfold. In order to ameliorate the transition and reach a more fruitful outcome for all, I suggest that stakeholders communicate and engage across the matrix. To recognize how development affects different groups at varying scales, how the costs and benefits are spread, and how they could be shared more evenly is important.
A lack of communication between some Marcellus stakeholders is indicated earlier in the paper. An opportunity exists for industry to establish a better reputation through enhanced communication practices across sectors and scale. There would be less fear in the local population and potentially less local government pushback if gas companies were to communicate their intentions more effectively. Talisman Energy provides an example of this for other companies to follow. Through its stakeholder relations department, it builds positive relationships as it listens to locals’ concerns, educates communities about industry practices, and regularly speaks with residents about its drilling intentions. It is a leader in social and environmental accountability.

Another area where companies could increase their likelihood to gain a social license to operate is to enhance customer service for mineral rights leaseholders. Many landowners complained and shared stories in this area. They stated that the paperwork was confusing, companies transferred leases without notice, and company contacts were difficult to find. The data show that a number of companies neglect their clients after bonuses are paid and when royalties are expected to flow. This creates unnecessary friction and a loss of resources including good will.

Some actors in conventional drilling and fracking feel left out, say that multinational companies will take over, and also complain that new regulations do not fit both conventional and unconventional activities. Over time, as the Commonwealth writes new regulations for shale extraction, I expect it will more closely scrutinize the conventional practices that have evolved over 150 years. The more society expresses concern about unconventional impacts of water contamination, emissions, soil erosion, and encroachment into residential or rural areas that previously have not experienced fossil fuel production, the more it will become aware of the whole industry. In my research many maps omit conventional oil and gas wells, a reflection of the feeling by those who feel left out. Yet, I depict both conventional and unconventional wells on the maps made for this paper. On those maps, conventional drilling matters. It is expanding too. Oil and gas permits, spudded wells, and other point data can be easily acquired and plotted to show the past and future movement of industrial activity for decision-making purposes.
The stakeholder matrix, which I introduce in the dissertation, is a tool to benefit the decision-making process and its outcomes. The matrix helps avoid redundant work, increases the availability of knowledge, resources, and skills in decision-making, and lessens the potential to omit stakeholders. For example, redundancy ensued in early 2010 when the U.S. EPA, Department of Energy, Department of the Interior, and U.S. Congress each conducted inquiries into fracking. Eventually, President Obama pulled the agencies together. The University of Pittsburgh invited the private sector to its conference, however, I recall few business representatives in attendance. This absence produced missed opportunities for problem solving. Also, the two separately focused, non-communicative Philadelphia events (shale conference and demonstration) sharply stand out as areas where mediation could improve problem solving related to energy.

To close, the U.S. interest for energy security spawns effects that appear in new energy landscapes of Pennsylvania – from forests to farms and to fracking. Government, private, and public sector stakeholders across scale have decisions to make about their interests in a shared landscape. The stakeholder matrix provides a type of social map to look for unexpected relationships among stakeholders. Many ways link entities in cells beyond the vertical sector or horizontal scale. Interconnections exist diagonally and others skip over lines of scale and sector. The matrix is not a complete method, but it is an advantageous tool for problem solving as the demand for energy grows around the world. It provides a means to analyze each stakeholder’s needs and interests, inter-relationships, and lack of relationships. The information revealed could help facilitate more effective dialogue between the various parties and ameliorate cultural clashes.

In closing, it is my hope that this dissertation provides methods, data, and analysis to inspire further research into the oftentimes, challenging decision-making process about scarce resources on a shared planet.

5.5 Epilogue: They won’t remember Cows

It is of value to repeat one gentleman’s observations at the Meeting of the Bored breakfast. He summed up through his life experience what I had been assiduously and unceasingly studying for two years. He simply explained…

“We are going through a transition. See, us older guys, we remember cows and pastures and corn and fields. We think in about 10 more years, everybody is going to be normal again. We think it is an abnormal period of time because we are in transition between cows and gas. I don’t think dairy
is coming back. No. Dairy won’t be back…all the younger people will remember gas. They won’t remember cows.”  

I ask him, “How do you describe normal?”  

He answers, “Gas company.”  

“How do you describe pre-gas?” I pursue.  

“We’ll be dead,” he answered. “It was cow country. Dairy cattle. Cow and veal, cattle, hay, and they’re all gone” (Interview at Meeting of the Bored, April 9, 2012).


Bing Maps, 2014. Close-up Armenia Township Mixed Energy Resources. 41.763981, -76.851540 [online] Available at: <http://www.bing.com/maps/#Y3A9NDEuNzYzOTgxfi03Ni44NTE1NDambHZsPTEyJnN0eT1yJnE9OXItZW5pYSUvMFRvd25zJGw> [Last accessed 12 June 2014].


Chu, Steven, 2011. Memorandum for William J. Perry Chairman Secretary of Energy Advisory Board. [online] 05 May 2011. Available at: 


Environmental Protection Agency (EPA), 2010a. EPA Initiates Hydraulic Fracturing Study: Agency seeks input for Science Advisory Board. Press Release, 18 March 2010, [online] Available at:


Environmental Protection Agency (EPA), 2012b. EPA Completes Drinking Water Sampling in Dimock, Pa.[online] Available at: <http://yosemite.epa.gov/opa/admpress.nsf/0/1A6E49D193E1007585257A46005B61AD> [Last accessed 31 July 2014].


Google Maps, 2014. Columbia Cross Roads, P.A. [online] Available at: <https://www.google.com/maps/@41.809706,-76.833993,3a,44.8y,203.2h,88t/data=!3m4!1e1!3m2!1sXRE4QjBTc11-SZJU85h-ygl2e0!6m1!1e1> [Last accessed 16 June 2014].


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Mellott, Kathy, kmellott@trbdem.com, 2013. Define “mainline.” [email] Message to Deborah Kittner (kittneda@mail.uc.edu). Sent Friday 20 September 2013, 11:19. Available at Deborah Kittner’s UC e-mail account.


Miller, Wayne, 2012b. # well pads, # units. [email] (Personal communication, 17 April 2012.


### Appendix A: Exploratory Research Findings

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<th>CSO / Topic</th>
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<th>Website</th>
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<th>Activity</th>
<th>Argue</th>
<th>Date of Note</th>
<th>Links</th>
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<td></td>
<td></td>
<td></td>
<td>April, 2009</td>
<td><a href="http://www.donnor.com/Marcellus_Hickory.html">http://www.donnor.com/Marcellus_Hickory.html</a></td>
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<td>Clean Water Action</td>
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<td>Keystone Trail Assoc.</td>
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<td>Marcellus Shale Coalition</td>
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<td>Mountain Watershed Association</td>
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<td>PA Campaign for Clean Water</td>
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<td>PA Council of Churches</td>
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<td>PA Forest Coalition</td>
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<td>Pennsylvania Center for Responsible Energy Development</td>
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<td>Responsible Drilling Alliance</td>
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<td>Robert Myers</td>
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<td>Tioga County Gas Watch</td>
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<td>Citizens</td>
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<tr>
<td>Pennsylvania Budget and Policy Center</td>
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</table>
Appendix B: EPA Public Statements July 22, 2010 (page one of two)
### Appendix B: EPA Public Statements July 22, 2010 (page two of two)

<table>
<thead>
<tr>
<th>GovtRep</th>
<th>ReoSW</th>
<th>Pro</th>
<th>Careful about regs 211,000 jobs; $18B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Civil</td>
<td>Tex</td>
<td>farmer, geologist, farming on family farm 1977–79, 20 wells, some wells I prod today.</td>
</tr>
<tr>
<td>Female</td>
<td>Halliburton</td>
<td>Pro</td>
<td>applaud EPA (audience boos) keep study focused,</td>
</tr>
<tr>
<td>Male API</td>
<td>Pro</td>
<td>Safe energy sound energy</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Pro</td>
<td>Move here - happy.</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Pro</td>
<td>seen jobs come</td>
<td></td>
</tr>
<tr>
<td>Female landowner</td>
<td>Pro</td>
<td>Possible development. Feedstock for US manufacturing. 300,000 jobs $18B</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Pro</td>
<td>Business grows, hotels, restaurants. 1.8 m jobs lost if moratorium</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>Engineer who used hydrofracing to cleanup superfund site. Hydrofract replaces 25 conventional wells.</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Pro</td>
<td>Employment increase. Continued sustained growth</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>Emotional debate-intentional misrepresentation of data, use reason, facts, unfounded hysteria and fears overblown. 48,000 wells since 1960 hydrofraced PA -</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Pro</td>
<td>Never a case of ground water contamination documented. Work to improve process everyday</td>
<td></td>
</tr>
<tr>
<td>Female-Kleber</td>
<td>Pro</td>
<td>look at Eagle ford-busses, trunks, autos, burn natural gas</td>
<td></td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>Base on fact not emotion.</td>
<td></td>
</tr>
<tr>
<td>Male - Range</td>
<td>Pro</td>
<td>400 employees families live here. Quality goal. Audience cheered.</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>Marriage of directional drilling plus hydrofracing equals minimal footprint. 1 1/2 mile below sea level cannot affect</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Pro</td>
<td>Challenge source to meet and exceed PA regulatory standards. Forefront of sustainable energy development. Father, fisherman, geologist, businessman.</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Pro</td>
<td>base it on facts - not rumors, movies, emotion. People who live and work there are concerned about safety of environment.</td>
<td></td>
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<tr>
<td>Female</td>
<td>Pro</td>
<td>get job. Concerned over regs. 1 mile of pipe = $1m investment</td>
<td></td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>Protect watershed, soil erosion, use and disposal</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>No incidence about cross contamination</td>
<td></td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>base on fact, not emotion. Keep[ing] jobs in state</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>seismic testing manifals 6,000-8,000' down, water is 500' up.</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>Texan sees locals w jobs</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>look deeper to facts - chatauqua county schools w gas, methane migration in nature too,</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>700 windmills = 1 M well</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>got job $60k/year</td>
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<tr>
<td>Male</td>
<td>Pro</td>
<td>Those against hydraulic fracturing were loud in the audience.</td>
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</table>

At this time - July 2010 - people were calling for a moratorium. In spring 2012 - that word no longer exists in the PA rhetoric.

Water appears as most valuable resource - a tie between energy and water and society.

Female Mod A police officer sits beside the speaker at the podium. Does that influence the speaker? A couple people quoted the PA constitution.

PHY/Deutsch, Peter Physics, Astronomy Can not open up about chemicals to help researchers

Science is not done in the absence of emotion.A 02 18 0 0 52 Emotion involving maybe subtler forms such as insight, intuition are very important. cont. They propel peoples in terms of what they work on, how they work on it, and how successful they are. So, hard cold facts are not all of it. There is alot of other stuff going on. Fracking has been vertical for years have not had a problem. When you change the angle that is when problems occur.
### Appendix C: Marcellus Coalition Membership 2010 (page one of five)

<table>
<thead>
<tr>
<th>Date Cited</th>
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<td>Herzog Ull</td>
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<td>7/20/2010</td>
<td>Chinese CNOC</td>
<td>PRC</td>
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<tr>
<td>7/30/2010</td>
<td><a href="http://pott">http://pott</a> El Paso Cor (bought by Kinder Morgan)</td>
<td>US-HOU-TPA</td>
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<td>5/26/2011</td>
<td>Invest in N Sumitomo</td>
<td>JP</td>
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<td>7/30/2010</td>
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<td>7/2010</td>
<td>July2010rRange Resources</td>
<td><a href="http://www.rangeresource">http://www.rangeresource</a> US-FtWnt TX</td>
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<td>5/26/2011</td>
<td>LNG terminiDominion</td>
<td><a href="http://www.dom.com/">http://www.dom.com/</a></td>
<td>DE-TX</td>
<td>TX</td>
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<td>5/1/2010</td>
<td>Martin CD Shallenberger</td>
<td>??</td>
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<tr>
<td>7/2010</td>
<td>M5 15 SGC Engineering, LLC (Member of SGC Group)</td>
<td><a href="http://www.sgceng.com/">http://www.sgceng.com/</a></td>
<td>ME</td>
<td></td>
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<td>7/2010</td>
<td>M5 15 Langan Engineering and Environmental Services</td>
<td><a href="http://www.langan.com/web/">http://www.langan.com/web/</a></td>
<td>NJ</td>
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<tr>
<td>7/2010</td>
<td>M5 15 HDQ Resources/WaterTrac</td>
<td><a href="http://www.watertrac.com/">http://www.watertrac.com/</a></td>
<td>OK</td>
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<td></td>
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<td>7/2010</td>
<td>M5 15 Advanced GeoService</td>
<td><a href="http://www.aeginfo.com">http://www.aeginfo.com</a></td>
<td>PA</td>
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Appendix C: Marcellus Coalition Membership 2010 (page two of five)
### Appendix C: Marcellus Coalition Membership (page three of five)

<table>
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<td>7/30/2010</td>
<td>MSC 15</td>
<td>Weston Solutions, Inc.</td>
<td><a href="http://www.weston.com">http://www.weston.com</a></td>
<td>PA</td>
</tr>
<tr>
<td>5/26/2011</td>
<td>MSC 15</td>
<td>Ridge Policy Group</td>
<td>n/a</td>
<td>PA</td>
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<tr>
<td>7/30/2010</td>
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<td>Weatherford International Ltd.</td>
<td><a href="http://www.weatherford.com">http://www.weatherford.com</a></td>
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<tr>
<td>5/26/2011</td>
<td>MSC 15</td>
<td>Bourland &amp; Leverich Supply Co.</td>
<td><a href="http://www.bl-supply.com">http://www.bl-supply.com</a></td>
<td>TX</td>
</tr>
<tr>
<td>7/30/2010</td>
<td>MSC 15</td>
<td>Energy Transfer</td>
<td><a href="http://www.energytransfer.com">http://www.energytransfer.com</a></td>
<td>TX</td>
</tr>
<tr>
<td>7/30/2010</td>
<td>MSC 15</td>
<td>Frac Tech Services, Ltd.</td>
<td><a href="http://www.fractech.net">http://www.fractech.net</a></td>
<td>US-TX-CisTX</td>
</tr>
<tr>
<td>5/26/2011</td>
<td>MSC 15</td>
<td>Pipeco Services, LP</td>
<td><a href="http://www.pipeco.com">http://www.pipeco.com</a></td>
<td>TX</td>
</tr>
<tr>
<td>5/26/2011</td>
<td>MSC 15</td>
<td>Fluids Management</td>
<td>n/a</td>
<td>TX</td>
</tr>
<tr>
<td>7/30/2010</td>
<td>MSC 15</td>
<td>AMEC</td>
<td><a href="http://www.amec.com">http://www.amec.com</a></td>
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<tr>
<td>7/30/2010</td>
<td>MSC 15</td>
<td>Environmental Resources Management</td>
<td><a href="http://www.erm.com">http://www.erm.com</a></td>
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<td>5/26/2011</td>
<td>MSC 15</td>
<td>PwC Price/WaterhouseCoopers</td>
<td><a href="http://www.pwc.com">http://www.pwc.com</a></td>
<td>UK-IL</td>
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<tr>
<td>9/1/2010</td>
<td>MSC 50</td>
<td>Inflection Energy LLC</td>
<td>n/a</td>
<td>US-CD-EDCO</td>
</tr>
<tr>
<td>5/26/2011</td>
<td>MSC 50</td>
<td>Sumitomo Corporation of America</td>
<td><a href="http://www.sumitomo.com">http://www.sumitomo.com</a></td>
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### Appendix C: Marcellus Coalition Membership 2010 (page four of five)

<table>
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<th>Date</th>
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<th>Website/Details</th>
<th>Location</th>
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<tr>
<td>7/30/10</td>
<td>Weston Solutions, Inc.</td>
<td><a href="http://www.westsol.com">http://www.westsol.com</a></td>
<td>PA</td>
</tr>
<tr>
<td>7/26/11</td>
<td>Oxford Development Company</td>
<td></td>
<td>PA</td>
</tr>
<tr>
<td>7/26/11</td>
<td>Ridge Policy Group</td>
<td></td>
<td>PA</td>
</tr>
<tr>
<td>7/26/11</td>
<td>Shallenberger Construction, Inc.</td>
<td>n/a</td>
<td>PA</td>
</tr>
<tr>
<td>7/30/10</td>
<td>Weatherford International Ltd.</td>
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<td>SWTW-GV, SW</td>
</tr>
<tr>
<td>7/30/10</td>
<td>Allis-Chalmers Energy, Inc.</td>
<td><a href="http://www.allischalmers.com">http://www.allischalmers.com</a></td>
<td>US-TX, HOU, TX</td>
</tr>
<tr>
<td>7/30/10</td>
<td>Baker Hughes</td>
<td><a href="http://www.baker.com">http://www.baker.com</a></td>
<td>US-TX, HOU, TX</td>
</tr>
<tr>
<td>7/26/11</td>
<td>Bourland &amp; Leverich Supply Co.</td>
<td><a href="http://www.bl-supply.com">http://www.bl-supply.com</a></td>
<td>TX</td>
</tr>
<tr>
<td>7/26/11</td>
<td>CESi Chemical, a Flotek Company</td>
<td><a href="http://www.flotekind.com">http://www.flotekind.com</a></td>
<td>US-HOU, TX</td>
</tr>
<tr>
<td>7/30/10</td>
<td>Complete Production Services</td>
<td><a href="http://www.completeproduction.com">http://www.completeproduction.com</a></td>
<td>TX</td>
</tr>
<tr>
<td>7/30/10</td>
<td>Crescent Directional Drilling, LP</td>
<td><a href="http://www.crescentdirectdrilling.com">http://www.crescentdirectdrilling.com</a></td>
<td>TX</td>
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<tr>
<td>7/30/10</td>
<td>Energy Transfer</td>
<td><a href="http://www.energytransfer.com">http://www.energytransfer.com</a></td>
<td>US-TX, DA, TX</td>
</tr>
<tr>
<td>7/30/10</td>
<td>Epic Energy Resources</td>
<td><a href="http://www.epicenergy.com">http://www.epicenergy.com</a></td>
<td>US-TX, HOU, TX</td>
</tr>
<tr>
<td>7/30/10</td>
<td>FMC Corporation</td>
<td><a href="http://www.fmc.com">http://www.fmc.com</a></td>
<td>US-TX, HOU, TX</td>
</tr>
<tr>
<td>7/30/10</td>
<td>Frac Tech Services, Ltd.</td>
<td><a href="http://www.fractech.net">http://www.fractech.net</a></td>
<td>US-TX, Cu, TX</td>
</tr>
<tr>
<td>7/30/10</td>
<td>Gas Technology Institute</td>
<td><a href="http://www.gastechtechnology.com">http://www.gastechtechnology.com</a></td>
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<tr>
<td>7/26/11</td>
<td>Halliburton Energy Services</td>
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<tr>
<td>7/26/10</td>
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<td>7/26/11</td>
<td>Layne Christensen Company</td>
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<td>7/30/10</td>
<td>M-I Swaco a Schlumberger Comp Service</td>
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<td>Protechics</td>
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<td>US-TX, HOU, TX</td>
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<td>7/30/10</td>
<td>Schlumberger Oilfield Services</td>
<td><a href="http://www.slb.com">http://www.slb.com</a></td>
<td>US-HOU, TTX</td>
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<td>Universal Pegasus International</td>
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<td>7/26/11</td>
<td>Valerus</td>
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<td>7/26/11</td>
<td>Waste Management</td>
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<td>Fluids Management</td>
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<td>TX</td>
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<td>7/30/10</td>
<td>AMEC</td>
<td><a href="http://www.amec.com">http://www.amec.com</a></td>
<td>UK-Chesh, UK</td>
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<td>7/30/10</td>
<td>Environmental Resources Management</td>
<td><a href="http://www.erm.com">http://www.erm.com</a></td>
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<td>7/26/11</td>
<td>Fulbright &amp; Jaworski</td>
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# Appendix C: Marcellus Coalition Membership 2010

<table>
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Appendix D: Green Forces

DateIncidentDateCited GreenForce Regarding
WhereMap County
CtyFIPS
State CompanyAffected
HowAffected Source:Media/Minutes
ReportLink Author/Ctc
MapPAandCounties
AdditionalAdditionalAdditional
local regs
Mt. Pleasant, Washington Cty 51792 PA
1st M well 2004-Hallowich
Must comply w/
Marcellus
zoning Drilling
4/1/2010 11/15/2010 PASupremeCt OGA/MPA zoningPA state
PA
Many
probably put some
Marcellus
planned
ShaleWatch
drilling
http://marcellusshale.saulnews.com/archives/36
projects
A Law Blog
in temporary or permanent jeopardy. Must drill in zone
Moritorium drilling
Eastern state
PA
General
cannot drill pending
new regs written
Add
7/22/2010 11/15/2010 PASupremeCt Penneco Oil Co. Fayette
Inc., Range,
County,
and Independent
Dallas51
Borough,
O &G
Jackson
AssocTwp.
of PA
Penneco
v. theOil
CountyPAofupholds
Fayette lower
Thecos.
former
court
Unhappy
case.
12672 PA
Twp
zoning denied http://www.lockhaven.com/page/content.detail/id/520236.html?nav=5009&contentsaved=1
9/17/2010 11/15/2010 Lycoming Cty zoning regs
LycomingCty
81
PA
anadarko, range,various
chief restrictions
Sun Gazette
http://www.sungazette.com/page/content.detail/id/553740/Zoning-rule-to-focus-on-gas-industry.htm
ordinance
Twp
32624 PA
any
limit to 300 acres
Trib
zoned
Live C-3, etc.
http://www.pittsburghlive.com/x/valleynewsdispatch/s_705808.html
10/24/2010 11/15/2010 Alle-Kiski Valley
`
Upper Burrell, Lower Burrell,
78768,
Fawn,
44864,
Allegheny,
PA
25408,consider
00852,
Indiana,
36808,
zoning
Washington
81248
Must
amend
comply
Twps w/
TribLive
zoningnews http://triblive.com/x/valleynewsdispatch/s_705922.html#axzz2xfUubJXI
Stephanie Hallowich
10/26/2010 11/9/2010 Wysox Township
Zoning
Zoning
chgHearing
res chg
WysoxTwp
Board
rqst
86912 PA
Eureka Resources
Zoning
LLC Chg denied
dailyreview.com
for water treatment
Yes
http://groups.google.com/group/citizensconcernedaboutn
10/27/2010 11/15/2010 Damascus Twp consider zoning chg
18104
Newfield Appalachia
A consent order was worked out and signed by the township and Newfield, which would have allowed the company to go forward with virtually n
Rider
Foundation
Park
Partnership
Eldred,GambleTwps
of Pennsylvania22880 ,28352
remains intact and
SunsetGazetteNews
out of the reach
of natural gas drillers - for now
11/22/2010 12/20/2010 Brockway, Jefferson
Sue Flatirons
Cty
Brockway Borough
8960
Flatirons
Have been sued
http://www.responsibledrillingalliance.org/newsletter/12202010.html
Add
"Locally, you can't regulate the 'how,' but you ca
12/16/2010 12/18/2010 DimockRes
CabotSettlementDimock
19264 PA
CabotOilGas
In late 2009, a group
PA EnviroDigesthttp://www.reuters.com/article/idUSN1518374720101216
of Dimock residents sued
Cabot for contaminating
Add their wells and hurting the value of their real estate. $4.1Msett
12/20/2010 12/22/2010 EarthJustice intervenes
Will slowfor
development
Damascus
Bradford,
citizens
MARC
Sullivan,
15,
1vsHub
113,
pipeline
Lycoming
Line
81 (theCounties
“Project”)
PAcomplies
Gas industry
with (“NEPA”),
Deborah Goldberg
http://earthjustice.org/sites/default/files/FERCmotion.pdf
Bradford County, through Sullivan County, and into Lycomi
12/22/2010 12/28/2010 Ind inhibit co from
The accsess
Andens'property
refusal
Rostraver
to allow
Twp
LMM onto their property
66376 is
PAcosting
GasLMM
industry
$2,500 daily
Costas$2500/daylawsuit
construction crews "sit idle,"
http://www.pittsburghlive.com/x/pittsburghtrib/news/westmoreland/s_714861.html
according
http://www.wnep.com/wnep-brad-industrial-plants-wyalusing-twp,0,1251451.story
to LMM's lawsuit.
1/20/2011 1/27/2011 BentonTwp Concerned re exploration
Benton Twp Columbia
5688 PA
Southwestern Energy
Potential
http://marcellusshale.saulnews.com/archives/124
http://lexuniversal.com/en/articles/1
1/20/2011 1/27/2011 Murrysville
Concerned citizens
Murrysville
52432 PA
Consol Energy Potential limited area
http://www.post-gazette.com/pg/11020/1119373-100.stm
2/14/2011 2/15/2011 Cooperstown, NY
Formal
Chamber
position
of Commerce
against
Cooperstown
fracking
NY
General
Not welcome SCGF first
http://www.cooperstownchamber.org/pdfs/hydrofracking.pdf
Contaminated water
US
PA
General
Exposure
NYTimes
+ Joe of "Protect
Frackwater
Wyasuling
OurFlowback
Wyalusing"
Twp,
Treatment
Bradford
and the Plant
usual
Cty and
Concerned
86664
Drilling
PA Citizens
Mud
TX Formulator
Fluids Management;
/ Recycling
Not granted
NJ Ground/Treatment
permit
and
http://groups.google.com/group/citizensconcernedaboutnatgasdrilling/browse_thread/thread/a30c15
Technology
Park, Garrett
extractio
County
Mountain
of natural
Lake
gas
Park,
per Garrett
Pittsburgh
County MD Gas industry
corps may not drill
SCGF
3/8/2011 3/14/2011 Federal Court on
Refused
behalf to
of extend
Lachee
Middle
leases
District
for time
of PA
they were on hold due
PA to lessors
Keetontaking
Groupthem
LLC to court
Add
Banned drilling city
Lewisburg
limits.
42976 PA
Gas industry
Cannot drill http://www.wvnstv.com/story.cfm?func=viewstory&storyid=96139
Mahoning Twp
46632 PA
Gas industry
3/17/2011 3/18/2011 Schuylkill Cty and
Concerned
Porter Twp Schuylkill
107
PA
Gas industry
West Virginia
WV Gas industry
Must stop
SCGF
http://www.statejournal.com/story.cfm?func=viewstory&storyid=97172
Enviro rally
Fleetville not in FIPS shapefile
PA
Gas industry
Trying to stop drilling
Environmental Rally plannedhttp://www.marcellusprotest.org/node/1046
for Wednesday in Serene Fleetville Hamlet
5/2/2011 5/12/2011 Northeast
vote anti frack Northeast
PA
Gas industry
debates land use
GoErie.com
prohibited http://www.goerie.com/apps/pbcs.dll/article?AID=/20110502/OPINION08/305029991/-1/OPINION21
Denied land use Otsego(Cooperstown)
gas
NY
Gas industry
land use prohibited
SCGF
http://groups.google.com/group/susquehannacogasforum/browse_thread/thread/51c4cc35fc28b08c
Denied H2O wd Broome Cty
NY
XTO-Exxon-Mobil
nn to look elsewhere
SCGF
http://groups.google.com/group/susquehannacogasforum/browse_thread/thread/12fa7d9e3e3e8f84
308 PA
zoning chg well pad site proposed
tank pad
5/19/2011 5/19/2011 Benton Twp Public hearing application
Benton Twp
exploratry well
37
5688 PA
Landowners
http://www.marcellus-shale.us/news-and-events.htm
5/19/2011
May-11 Buffalo Twp Public hearing revise
Buffalo
O&G
Twp
ord
10008 PA
Proposed O&G ordinance
http://www.marcellus-shale.us/news-and-events.htm
Public hearing Cecil Twp
11800 PA
Providing for the Zoning of Oil & Gas Drilling Operations
Hampton Twp
32328 PA
zoning amendments
Public
Multi-twp
hearing Jefferson and Morgan Twps
37888, 50992PA
Special exception compressor station
5/19/2011
Kidder Twp Reg mtg Ordinance
Kidder
amending
Twp Chapter 180: Zoning
39608
of the
PACodeLots
of the
of supplements
Township
land
of Kidder
to
useO&G
zoning
by
regs
establishing
http://www.marcellus-shale.us/news-and-events.htm
permit limits
specific standards for Oil and Gas Development Facilities
5/19/2011 5/19/2011 Mahanoy Twp Public hearing amend
Mahoney
zoning
Twpord
PA
Gas industry
land use zoninghttp://www.marcellus-shale.us/news-and-events.htm
permit limits
5/19/2011 5/24/2011 South StrabanePublic
Twp hearing South Strabane Twp
72504 PA
to delete the current definition for oil and. gas wells and add definitions for compressor, compressor station, drilling, drilling equipment, natural gas p
11/9/1011/15/2010 City of Pittsburgh
bans drilling-thePittsburgh
first municipality in the United 61000
States to ban all
natural gas extraction
cannotwithin
drill itsPittsburghChannel.com
http://www.newsinferno.com/health-concerns/
since 2008 12/21/2010 NYGovernor places moritorium NewYork
on fracking
State
NY
Gas industry
an executive
Ken
order
Silverstein
stopping the process by which natural gas developers drill for shale until the state
11/11/2010 SRBC
Stop taking water
Lumber
J-W Drilling
http://www.srbc.net/about/meetings/minutes/Minutes031209wExhibits.pdf
1/9/2011 Greenfield TwpCites Exco
Greenfield Twp
31016 PA
EXCO
must stop all drilling
operations on the site.
First company given permit to drill in Eastern PA
underlined means mapped

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Appendix E: A Small Account with Photos of Washington County July 2010

Washington County and WV - July 2010
by Deborah A. Johnson

The path of my trip in Washington County is depicted below on a basic map that I made with GPS captured on my Garmin (Figure 1). The green line is where I drove in a place southwest of Pittsburgh. Traffic was light on the interstate, yet included a residual waste truck, and two huge water haulers. A residual waste truck hauls brine, also called flow back fluid or residual waste, from fracking sites to a place of disposal, typically federally designated underground injection wells. The water haulers were likely taking fresh water to well sites to be used in fracking. I exited west at Exit 54 onto Route 50 headed toward the town of Hickory.

![Map of Washington County](image)

**Figure 1** July 2010 road trip through Washington County in southwest Pennsylvania. (Author’s Garmin, 2010).

The landscape changed from interchanges of fast food and gas stations to one alternately covered by farms, woods, small towns, and houses with expansive yards. I passed a convoy of five frack trucks hauling large equipment as shown below. Two or three pickups followed. I now witnessed what people likely complain about when they express concern about their roads being ruined by heavy equipment. These trucks were big and heavy (Figures 2 and 3). The road was relatively narrow. I assume width and weight restrictions were met on the state route.
After I passed the village of Cecil, I stopped along the way to view my first Marcellus drilling rig in the distance. The rig is located in the distant center of the frame (Figure 4). It was to my northwest perhaps two to three miles away. The land on which it was situated appeared to be leveled with gravel and dirt on a far side bank. The immediate surrounding land looked like pastures. Less than half of the scene is wooded area. I took a second shot to show the rig’s size compared to the work trailers situated in the foreground (Figure 5).
I continued west on Route 50 to Hickory, turned north on a road passing through Cherry Valley, and just before the village of Joffre I turned south onto a back road that circled through the countryside. Farms and homesteads surrounded by various herds of grazing animals including dairy cows, beef cattle, and workhorses, riding horses, goats and sheep continuously filled the agricultural landscape (Figures 6 and 7). The barns of assorted architecture and color appeared well kept. Residual and active coal mining were present along the roadways. These latter observations reminded me of Pennsylvanians who did not want to deal with an environmental mess again.
As I circled back toward Hickory, I spotted a second rig to my east on the horizon. It was flanked by a black tower-like structure and had support cables tethered from its top to the ground (Figure 8). The photo omits the couple houses that were located in the foreground between the rig and me. I wondered who owned the mineral rights. Was it the owner of the house in front of me closest to the site? Was it someone else from outside this rural place? What about the other neighbors, those who did not have a stake in the promised royalties, what were their interests?

![Figure 8 Second rig cited near Hickory off unnamed side road.](image)

I circled back through the town of Hickory to witness it (Figure 9). This is the town at the center of Mt. Pleasant Township, a green force. This too is the place near where Range Resources’ first successfully drilled into the Marcellus and reached shale gas. It is near where the Hallowich family felt surrounded by industrial pressure. Hickory is the place where Bob Donnan’s blog story of Renz #2 and the nasty “chunky” water of the Monongahela arise. Although I had observed heavy equipment and a convoy on the road and two gas rigs, I did not see the intrusive, clustered shale gas activity that Hallowich described.
Dunkard Creek reminds one of environmental costs

After Hickory, I drove southeast along Route 19 to observe Dunkard Creek, a site that became notoriously connected with fracking the previous year. Along the route, I witnessed more material artifacts of fracking. One in particular stood out. It was an expansive lot full of activity and large equipment, trucks, piles of pipes of various sizes, and men working in hardhats. It was clearly to support drilling. The equipment was massive. Continuing another 20 miles or so a more impoverished economy lay on the landscape, different than the tidy farmland outside of Hickory. House trailers were un-skirted. Junk was strewn in yards. Upon arrival at an intersection along Old Route 19, signs read “Four miles to Davistown,” “Eight miles to Bobtown,” and “Mt. Morris is One Mile.” I then came upon a road that crossed Dunkard Creek and exited Route 19 to follow a narrow road adjacent to the creek.

Dunkard Creek had been a big news topic the previous autumn (Wellman, Jr, Clayton, and Jernejcic, 2011). Two individuals referred to it in their public statements delivered at the EPA meeting. Reportedly a mysterious toxic spill had ruined this then healthy creek in September 2009. Over 30 miles had been scattered
with dead aquatic life and plants consisting of “18 species of fish and at least 16 species of freshwater mussels, including the salamander mussel and the snuffbox mussel — both candidates for federal listings as endangered species (Pennsylvania Fish and Boat Commission, 2009). The public suspected fracking wastes as the offender (Donnan, 2009c). After a lengthy investigation by the EPA, golden algae was determined as the cause of the kill elevated by deep mine discharges coming from Consol Energy’s Blacksville No. 2 coal mine. Consol entered an agreement with the EPA, WVDEP, and US Department of Justice to provide the West Virginia Division of Natural Resources (WVDNR) funding to clean up the creek and restore it to pre-kill levels (Wellman, Jr, Clayton, and Jernejcic, 2011). Consol also had fracking activity going on in the region.

After many years of dealing with coal mining contamination and making headway in restoring the creek, locals were frustrated. Regarding the incident, one speaker blasted government for lack of enforcement saying, “What are we willing to sacrifice for energy: our children, our elderly? How many times do the citizens of Pennsylvania have to be disrespected or violated before they demand from the local, state, and federal government that they protect their quality of life? State agencies have refused to act properly. The citizens of Pennsylvania have waited for and welcome the U.S. EPA.” (See Appendix B). Many were of the opinion that the bad effects, the impact, was from the natural gas industry. This opinion suggested costs that Pennsylvanians were paying toward energy security.

I stood at the side of Dunkard Creek where it stretched between 15 to 20 feet wide, contained a low amount of flowing water, and touched the backyards of occasional small houses set back from its banks (See photos in Donnan, 2009c). Near a wooden deck, that seemed to be for fishing across from somebody’s house, I walked down to the creek bed. The water moved very slowly and it was unclear. The creek banks were covered with green foliage and trees flanked the background. That part looked healthy. However, closer to the creek plants grew sporadically between rocks with seemingly little animal life below. I related this view to what I knew of clear cold creeks in northwest PA that teemed with visible life. I stood there rather astonished to see such a relatively soundless place. The Dunkard Creek that I saw was recovering from apparent coal mine pollution for at least the second time. No wonder locals expressed exasperation about the potential pollution of fracking on water.
I departed West Virginia and drove eastward on route 7 along its border with PA. The landscape consisted of varied steep hills, narrow hollers, small farms, and forests. Appalachian homesteads with small pastures and gardens decorated the vales. I passed the entrance to a large coal mine. This was a mostly forested landscape of intermittent homes. Along a narrow tree-lined road, I came upon half-a-dozen Ford F150 white pickup trucks bearing signs of Chesapeake Energy on their side doors. As I rounded a bend in the forest, I nearly ran into a water truck about to climb a freshly laid drive up to a well site. I succeeded in collecting data that showed the impact of fracking upon the landscape. How did the addition of F150s, huge equipment trucks, water trucks, and workers from out-of-state affect these local people? Did the locals benefit from their presence? I nearly collided with a truck stopped on the road at a hidden entranceway. Did the locals get job opportunities from this activity? Many of the license plates were Texan. Where were the pipes built? Many questions arose.
## Appendix F: Interviewees

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<th>Last</th>
<th>First</th>
<th>Consent</th>
<th>Describe</th>
<th>Other notes</th>
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<td>Beates</td>
<td>Susan J.</td>
<td>Yes</td>
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<td>Cmnts landmen coming, told re M well Limestone Twp</td>
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<td>Eaton</td>
<td>Richard</td>
<td>Yes</td>
<td>Former commissioner Brfd Library</td>
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<td>Leona</td>
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<td>Edwards</td>
<td>Samantha</td>
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<td>Fritchman</td>
<td>Terry</td>
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<td>Gens</td>
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<td>Gilbert</td>
<td>Amy</td>
<td>Yes</td>
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<td>w/ Fortuna</td>
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<td>Harding</td>
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<td>Towanda</td>
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<td>Cincinnati</td>
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<td>Holthaus</td>
<td>David</td>
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<td>Face-to-face</td>
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<td>David</td>
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<td>Lacek</td>
<td>James</td>
<td>Yes</td>
<td>Breakfast</td>
<td>sent rqsts for photo id, comments</td>
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<td>Gail</td>
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<td>Dick</td>
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<td>Online</td>
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<td>Miller</td>
<td>Wayne</td>
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<td>Molnar</td>
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<td>Petree</td>
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<td>Yes</td>
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<td>Renzo</td>
<td>Jerry</td>
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<td>Burlington</td>
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<td>Roloson</td>
<td>Alan L.</td>
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<td>Real Estate - Century 21</td>
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<td>Farmers Valley Rd, Troy</td>
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<td>Schatz</td>
<td>Jarred</td>
<td>Yes</td>
<td>Security guard Hunt M site Limestone Twp</td>
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<td>Showers</td>
<td>Jack</td>
<td>Yes</td>
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<td>Texan - 28 yrs PA</td>
<td>Horseheads, NY</td>
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<td>Singer</td>
<td>Jeff</td>
<td>Yes</td>
<td>Bfd Cty Pub Library-Opened the door</td>
<td>Director</td>
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<td>Robin</td>
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<td>Tompkins</td>
<td>Scott</td>
<td>Yes</td>
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<td>1st ctc T.</td>
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<td>Trainor</td>
<td>Kathleen</td>
<td>Yes</td>
<td>Dairy Farmer</td>
<td>Educator Drake Museum</td>
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<td>Weaver</td>
<td>Dan</td>
<td>Yes</td>
<td>New public outreach dir. PIOGA</td>
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Appendix G: McKean County Interviews September 15-16, 2010

Jimmy Barnes, President RJB Well Services, Inc.

(Men on top of the blender monitoring the gages to manage pressure for breaking the rock. The roustabouts in their rain gear over top their hard helmets and Di-max regulated uniforms watching, jumping to where they are needed, keeping water flowing in to the pit and pipes on the rig as needed. What is their view of hydro-fracing? Safe, safer than other industries...)

JIM - 6/17
This is a multi-stage open hole completed oil well. But this oil well will produce natural gas but it's mostly an oil play. These sands we’re fracing here are the Bradford dirt sands which made this part of the world famous. So here we are 150 years later – still goin’ at it. But what we’re doing here is just blending water and sand and mixin’ it together at different concentrations and through these trucks pumping it down through a string of pipe which is isolated by a packer to that particular sand. A packer is just a mechanical device that creates a seal. You have a well bore, then you have a different sand here and here...we come in and notch this group of sand this group of sand. It might be the Bradford First, this might be the 2nd, this might be their Heritage Bird Run, Bradford 3rd. Now in this part of the country if I put a log out of this particular well bore and I had five geologists in the same room they’re gonna call each one of these a different name. They do. It’s just the way it is. I’ve worked with several different geologists that would say “That’s not the Harrisburg Run, that’s the Tiona.....etc.” It doesn’t matter to me, if that is at 1510 feet. I say 1510 feet. As an engineer that’s what matters to me. As a geologist they know what era this upper Devonian was laid down in the Paleozoic it doesn’t matter to me the time of deposition. But what we do in this well, there’s casing cemented back to protect the aquifer. And this is where the big debate is in the Marcellus or anything with pollutants and ground water. We case that off and cement it so there is no chance of polluting the ground water, the aquifer tables. And that ‘s where I think the misconception is, I think, everybody says we’re polluting the ground water which we actually aren’t. We are doing everything in our power to keep the aquifer safe. Nobody wants. But then after we get the casing put in the ground. We drill this hole which is 6 ¼ inches in diameter. The casing is first. In this particular well there are two strings of casings we call conductor which is a piece of pipe put into the ground to stabilize the top hole because the geology is sand and gravel and misc. We’re giving it a good foundation for that to start. Then drill out that. Drill through our aquifer that we call surface casing that’s usually 7 inch 8 inch 8 5/8 inch in diameter. That gets cemented back to surface. Your aquifer is protected. Then we drill a 6 ¼ open hole to bottom. In this case it’s going to be open hole completed. So we look at everyone of these sands. And we take a log and go like a clock. WHAT’S ALL THAT WATER POURING OUT. I’ll get to that. DEFINE HUMAN GEOGRAPHY. We are drilling geology on top of geography. 2200 FEET Yeah That’s Surface level here. You’re above sea level. We have a surveyor who comes out. Surveys all this puts it on a nice map for everybody sends it to the state of Pennsylvania so the state knows exactly where we’re at. The white piece of paper on that tree is the drilling permit. It gives you all the vitals. No matter what well bore it is, no matter it is this well or a Marcellus well, they all start the same. End results different casing programs. Different drilling techniques. So but they all start out the same. It may be bigger diameter because they’re going to add more pipe. May be Smaller diameter such as this cause we’re not going that deep. In the casing when you put that down first is it a big pipe? Yes this particular well has 9 5/8 and 7 inch. Picture a piece of pipe 10 inches in diameter and the next is 7 inch. It’s drilled. 12 ¾,13 inch hole. Every piece of pipe we put in the ground we have to drill a bigger hole. So when you put it in you have room to cement. Put a cement column around it. I think the state requirements are 2 inches bigger so you have a minimum of a 1 inch sheath around it, but I’m usually close to the 1 ½ inch around it than the inch. I always go for the bigger. 10 INCH PIPE
FIRST IS CONDUCTOR. CEMENT GOES AROUND THAT. THEN ANOTHER PIPE GOES INSIDE THAT 7-8 INCHES. MORE CEMENT BETWEEN THOSE TWO PIPES. THEN INSIDE THAT HOLE GONNA DRILL. The second piece of pipe is protecting the aquifers. That is the isolation between the fresh water aquifer and this well. HOW DEEP? This well is 550 feet. depending on aquifer or geology I may need more or I may need less. This well is 2200 feet deep. Drill put a log on it and see what we got. I have the log up on the truck when we’re done here. Yeah, it’s, when you’re looking at this particular well versus a Marcellus well the Marcellus well is going to be drilled so much deeper. And when you have a horizontal direction you’re gonna kick off and drill the horizontal legs off it. You’re in luck today cause a couple of partners of mine and Dave are here. One has been in business – a petroleum engineer – has been in business 30 years he owns a couple of companies. The other gentleman here is an environmentalist. He deals a lot with groundwaters and such. So you get to talk to Paul and John. I’ve got about another hour of this and another frack job will be done. I have two stages, three stages left to go. STAGEs? How deep you go down in depth. This truck directly in front of us holding the sand. These tanks right here are holding the fresh water. The truck I just came down off of is called the blender. That truck just mixes the sand and water to whatever consistency that I want. Cause maybe I’m going to put maybe a pound of sand per a gallon of water up to 2-3 pounds sand/gallon of water. I’m going to pump that down a well at 18-20 barrels per minute. So I’m moving 6-700 gallons per minute of water down that pipe and it goes down the pipe and isolated on the packer the packer seals anything coming up the hole so everything has to go down the well. LOOKING AT MAP. What is here at that particular sand depth is called a notch. That is done by high pressure air and sand. (In this style of well you have stuff beyond casing) In a Marcellus well its changed because now your gonna add another string of pipe in here and cement that back to surface Cause I’m going that much deeper. I’m going more high pressure. The highest pressure we’re gonna see here is 2 – 3,000 pounds. On a Marcellus well you’re gonna see 15,000 pounds. So we add another step to protect that much more. 6/17 0 57 00.

Multi-stage open hole completed oil well will produce natural gas
Oil play: Bradford 3rd sands made this part of world famous 150 years ago
Blending water and sand different concentrations
Pump through string of pipe isolated by packer to a particular sand
Packer – mechanical device creates a seal
Well bore –
   Different sands
Notch a group of sands
Bradford 1st 2nd Harrisburg Run Bradford 3rd
Log out of well bore
5 geologists same room will call each layer different name
As engineer the depth matters, studied mechanics
Geologists know era upper Devonian laid down time of deposition
Casing cemented back to protect aquifer
Big debate in Marcellus, pollutants of ground water
Case it off and cement it – no chance to pollute ground water, aquifer tables
Misconception –
Doing everything in our power to keep aquifer safe
After casing in ground
Drill a hole 6 1/4 inches in diameter
Conductor into hole to stabilize top hole geology is sand, gravel misc. giving good foundation
Drill through aquifer call Surface casing 7 – 8/8 5/8 inch diameter cement back to surface aquifer protected
Then drill 6 ¼ open hole to bottom. Open hole completed. So looking at everyone of sands
Look at log we go by. Ran an electric log across this.
Drilling geology on geography. 2,200 feet above sea level.
Surveyor puts on map send to State so everyone knows where at.
Get drilling permit. Vitals.
Any well bore, this or Marcellus, all strat the same.
Different casing programs for different drilling techniques.
Diameters bigger for bigger pipe
Casing pipe 9 5/8 and 7 inch on this
Drilled into ground 12 2/4 or 13 inch hole.
Room for cement column around it State requirement 2 inches so have 1 inch. Jimmy goes bigger. 1 ½
Casing 1 = conductor
Casing 2 = protects aquifers. Isolation between fresh water aquifer and well bore.
Casing goes per well. This 550 feet. This well 2,200 feet deep
Depends on aquifer level.
Drill, put log on, see what we have.
Marcellus drilled much deeper and horizontal legs
Stages of frack job moving down in depth. Start at top.
Water tanks 12,000 gallons
Blender truck mixes sand and water to desired consistency
1 pound per gal of water or up to 2-3 pounds per gallon of water
Pump down well at 18-20 barrels a minute o moving 6-7 gallons of water down that pipe.
Down pipe and isolated on the packer seals everything from coming up the hole so everything has to go
down and out
Notch – by high pressure air and sand
Below casing in this style of well
In Marcellus add another string of pipe because going more high pressure
Here 2,000-3,000 pounds pressure
On Marcellus could be 15,000 pounds so add another step to protect that much more
End Jim
He comes back from Blender pumps to pumper makes pressure and pumps down hole
At 2,000 feet
None of equipment is his – all contracted services - $4M of equipment to replace
“I’m the coordinator.”
Sand is brown sand conglomerate 20-40 mesh is mined is round, not angular sand, not beach sand
Pump into sand stone for proppent it is round and create holes between each grain called porosity
All connected = permeability
Media has blown us so far out of wack as far as environmental issues. Its nuts. Has created a lot of bad
scenarios on uneducated people making statements about something they know nothing about. A lot of
them are politicians and the news media. You sit down and read these articles and wonder “where are
these people coming from?”
Dave: 1,000 feet of 20” 2 mile job to do in phases EOG 3 feet per barrel. Digging testing directional drill
then gonna go. Wants to save water but only wants one tank. Jim: 2.80 feet per barrel. Think 3
feet/barrel. 330 - 350 barrels.
Marcellus well – being built, production, rig drilling, frac job – further out east – finished product, Can
show you the footprint on the geography – not much to see
Very complex on how things are done and why but have very bad wrap from media poisoning
everybody, making bad bad footprint on the geography. “If they would look at industry as a whole. Our
footprint on the geography isn’t anything compared to what other industries are .... Golf courses are twice as bad. “
Pump jack is all that is left plus road to pump jack.
All back to seed and mulch for wildlife deer and turkey
Companies have a lot of money tied up in reclamation work to put environment back to pristine or better conditions than before we got here.
Regulations are terrible, tough, BUT does not bother me because I try to do everything right the first time. Does not change my outlook. To me new regulations because “somebody did not do their job correctly.” New regs “because some people got careless.”
Flushing hole open to go to next piece of sand that we are going to frack.
Plugging agent is in well pee gravel flushing out to get ready to set packer to isolate where we want to go out. Mechanical sealing device. Very complex piece of equipment. Every joint of pipe we screw on it goes down deeper.
Do not use same type of packer in Marcellus well.
All fluids coming out going into a pit pumped back into tanks for re-use. Plus outside source.
Everything sucked out of pit taken to next well to re-use. Move tanks to next well. Start over again.
End

John –
Syracuse Univ drilling geothermal wells and hit gas
NY bedrock is relatively shallow. Drilling into hydrocarbon bearing shales at couple hundred feet,
Monitoring wells for environmental facilities – e.g. gas station to look for gas.
Do not need to permit.
Environmental industry, the same that says we are causing a problem will run around and drill holes in the ground for all kinds of stuff
Gasland – Josh Fox does very poor job of any analysis. Presents issues and does nothing to solve.
Engineer wants more information.
Like lighting taps – well, in this part of the world it has been common for years and years and years\ Gas and oil discovered from seeps – coming to surface – both naturally occurring. Not man-made thing we are finding.
We have a resource that we want out of ground. Something of value. “Is there a way to do it and not have any negative impact?” Most industries have some sort negative impact, but usually the positive outweighs the negative by a far cry. Huge positive, very little negative, and most can be mitigated anyway.
What affects groundwater – seems to be biggest concern to date. Major factors:
1. How close you are to groundwater when doing what you are doing
2. Are you really trying to have an impact on groundwater? Is that your intent?
Then intent of our industry is not to impact groundwater. It is purely negative for us. Any communication with any other zone than that with that with the hydrocarbon. It’s bad. We do everything possible to protect that. If we have that communication you could not complete the well. It would all go in the water.
Flip side – developing Marcellus in PA 6-8k underground. 5-6k from nearest aquifer.
What other things could have an impact.
Septic systems – how many around? What goes in them? Who puts hydrocarbons into septic. Petroleum jelly, toothpaste, soap – same things they are complaining we are putting into the ground.
Septic 8 feet underground Aquifer 100 feet. Separated 92 feet. Gravity in favor of bad going down.
Oil/Gas not easily going up.
Florida – salt water /fresh water aquifer – water company systems take fresh out, put bad underneath to not ruin aquifer.
We do things below aquifers – distances away – likelihood or any damage is nil to miniscule. Everyday in our lives we do things that impact the aquifer and nobody does anything about it. Can’t see the forest through the trees.

Somebody out there – the independent energy industry in this country has driven this country. Purely independent. The introduction of foreign oil and imports is government controlled – we do not work internationally without govt interaction. This huge resource is international game changer – not controlled by govt bothers contemporaries – wait we cannot control it – and will have has international impact – what’s it going to do. Only way controlled through regulation and legislation - society thinks industry needs controlled.

Govt does not have total control over independent oil and gas operations in this country. Imagine the positive impact of stable energy environment for next 30 years? Unbelievable. Have not had since WWII. Understood energy society. Lost sight of core process of what energy does. Would not be here. Energy guides all. TV. Wash clothes. Dial telephone. How we got here. UTube Video “Hydrocarbon Man” Take hydrocarbons out of society – We have lost sight. Become lax. Do not think about what we use. We take for granted everything. Food. Everything. How to get the best with minimal impact of how to get. Do not take attitude that you ‘cannot do it.’ Gvt has to regulate. Regulation comes best from those closest to it. Not federal – for interstate commerce, travel.


Hydrofracing exempt. There is no exemption. When they reviewed groundwater they looked at hydrofracturing as what it was, not waste disposal. Used in a process to develop something therefore unregulated. Society being dumb downed. A lot of people do not understand how, why things go on. Group of we need the government to do it for us, or help us. We rely on them to do something. Forgotten that government is us – regulation, charity. They have noting unless we give it to them. People need to get back to thinking about our country and what we have…. Independent Oil and Gas Association of New York. On the Board. We go out and speak. Amazing what they learned about how little people know about energy. New report from MIT – natural gas study. Enlightening. Creates relation of natural gas and wind turn wind into something usable because of random generation rates. Natural gas fired generation is cleaner and immediate ways. Gives “on demand” we need today. No more inventories. Demand profile so dramatically up and down day, month, year. Need something to flatten the demand. Flatten supply. Demand is more known but not predictable. On demand supply energy. Kilowatts, megawatts. A lot of energy use dependent on weather.

A lot of people NIMBY – do not want anything. Want nothing. Want to drive Mercedes, but believe they live in a green world. No word for it. Hector, NY – federal hearing – you’re gonna make noise, cut down trees, where am I gonna walk my dog. Lady in nursing home – if it is going to save my energy costs they can do anything they want. Cousteau using neoprene boats, Kawasaki motors complaining about pollution. Part of what they have is part of why we have pollution.

Does not understand sustainability report. Think about how company interacts. Printer cartridge recycle. ...blah, blah, blah education........................PhD becomes person who is believed. Guy without high school degree who knows what is going on. Not listened to. People of upper echelon. Too distant from those working. EPA does not listen to them. We only listen to the people who we think know. **No one is trying to get information from people who have done it for so many years.** Media. Get info from someone.
like Josh Fox who ran around the country taking pictures of stuff he doesn’t even know why something is happening. Spoke at Fingerlakes Region air and waste administration.

Everyone complaining will not 1. Come out here. 2. Will not think about what they are talking about. Water pollution is a huge issue.

This industry for its life has protected against water pollution. All of our activities. Experience. Service company. Research on cement. Integrate better compressive strengths. Gel will stop gas migration from zones that have gas. That is how we made money. This job sand, water 99.9% maybe plus guar gum (in chewing gum) to slick up water a bit to pump in. Surfactant – help it move

Biocide – pumping surface water down hole do not want organic growth – pumping from streams – natural growth

Friction reducer – making plastics, making baby diapers, laxatives

Scale inhibitors – to prevent buildup of salts – because fresh water in formation etches away from salts when comes back it will build up on steel pipe and tubular and surfaces –

Partner Project: Own small o&g gas production co. in ny.

End

Paul Yanuga:

4 years ago. Were gonna drill 60 wells, knew what money needed in, cash flow out, over 4-5 period of time. Now capital games now 15% set to lapse end of year. Nominally it will lapse and go to 20% - 5% additional cost. Current administration has its way, no favorable treatment for capital gains, it will be treated as ordinary income. So instead of 15 or 20% on January 2 we could pay 30 or 35%. Take away economics on shale wells. Washington don’t care. See any of them out here? What the react to they hear a story or see the movie Gasland. You see anybody out here?

It will for sure cost us 5% more on Jan 2 or could cost 20% more. Nothing else changes. It’s the profit. Building performa – spread sheet – assumptions.

One of most applied people around. Lives it, he knows it. “Tell her how the cow at the cabbage.”

2,200 foot well. 1,500 ft down to 2,250 identified 12 Zones. Look at geophysical log. Combo permeability, temperature, conductivity indicates possible oil and gas. After identify. Go to zones and notch. Each zone. 2-3 feet. Or 20 feet. Different lengths of pipe to get to different zone. Cut horizontal notch, spinning nozel that spits out sand – abrasive. Come in with frac pipe and packer. Frac from top down. Packer always above you. Work at particular notch. Hole usually filled up with sand or something to first zone you will frack. Bottom end of zone controlled by material you put in the hole. The top is controlled by pipe is located on packer to keep fluid from coming back at ya. Run out the pressure between 2500 to 4500 psi is where rock will break. The shallower the less pressure. Watching gauges on blender. Pressure indication. Building pressure slow and steady. When break rock it kicks from 4,000 to 2,000, 2,500 psi. It’ll break down. Breaking the rock. Up the RPM rate do not want pressures less than 2000 pounds keep pressure on formation so keep pushing fluid keep pushing sand in. Try to break at as low a pressure as they can. Try to break 2000-2500 to break. Treat at 2,000, 2,300 psi to keep pushing sand in.

Water you pushed down. Comin back at ya. Frack water. Loaded up well. Water is somewhat compressive. Take pressure off. It spits back at you. Constantly need water. Maybe 5,000 barrel frac. Probably 500 barrel tanks. There is a pit down there with liner in it. Frac water in it plus tanks plus trucks bringing water. Get back 1/3 to ½ water put down there when break cuplinks will come back to you. Other pushed out into the formation comes back more slowly over time. Need more frac water going deeper and deeper.

Marcellus wells pad 6,000 feet vertical then break horizontal legs 4,000 to 5,000 feet. “The biggest change in the industry in the last ten years is that ability to turn that corner and go out that far.” Yaniga.
The difference Marcellus 100 feet thick here. Vertical wells. 100 foot vertical pay zone. 6,000 feet of pay zone. = 60 wells out of one. That is the difference. That’s the benefit. One hole. You pay a lot more. $150,000 for here. $4-5M minimum to drill and complete Marcellus. Look three dimensionally 360 degrees in circle. Go every 60 degrees. Only way to make money. Capital investment is so great. Not bad for well pad. 2-3 acres for Marcellus. That’s huge. 60X60 2,200 ft deep. Typical vertical hole 2,300 deep. Marcellus 2-3 acres due to amount of drilling hardware and amount of fracing fluid, 3-5 M gallons. Only way to open the shale. Very indurated shale. Durometer – hardness. Sand lenses at this site. 1 foot thick to 10-15 feet thick. Granular. Shales are silt and clay particles. Platelets. Their configuration makes them want to stick together and have low permeability. Sand does not want to stick to gather because it is granular and has higher permeability. Go for sands, leave shale alone. With horizontal can get 100 ft zone and 20,000 ft pay zone can break open that is difference. Clay particles cemented together. Become shale. Marcellus is black reducing shale because full of organics. That is the hydro carbon.

Rig and pipes have different pressure capability. 30 year old piece of hardware. Pump truck 20 years old. Running pressure up to 4500 to try to et it to break. Shale has natural porosity but not natural permeability. Sands can have porosity of 25-30% and porosity in shale can e 40% but no permeability. The frac breaks it open to give connectivity. Make secondary permeability.

Try to prop open sand pores even more so with sand and push back further into the formation. Start #11

To mix a cocktail you have to have a ‘blender!’ $4M equipment to do $28,000 worth of money spent yesterday. Owner/operator pays the bills. Jim was consultant.


Well stimulation. Stimulation is generic term for fracing. 2,200 foot well. Need stimulation to sand stones or well is uneconomical. Some flow natural gas at these depths w/out stimulation but very few these days. Long ago with reservoir was fully pressured up before holes were punched. 5-10 barrels a day at first. Third looked like biggest zone. Bradford third. Yield flush production first 90 days 7-8 barrels of oil per day and god knows for gas as high as 20,30K per day or as low as 10k. Capture gas to make economics. 10:1 or 6:1 $ ratio oil to gas. Additional gas pays the bills. Third party maintenance 5-6$ per year. Gas will pay for well tending and administration. May get payback from oil production.

Hook up well. Plumb it. Set the jack. Well tender there every day. Need four jobs to make a living. Owns wells, owns production, consultant, contractor and well tender. To make a living. XTO. Range and East are local guys who make good. East is Shell. Anadarko is huge CO/WY. Talisman, Cabot – Canada. Chesapeake is biggest in country these days. Aubrey McClendan. Richest man. 2 years ago. $10M/$3.5M. Gas prices dropped. Rich to poor.

Does it matter that companies outside PA are coming. Bring cash into the area. He works for all except XTO and Shell. Need health and safety training to get on sites. Coveralls – NoMex. Fire retardant material. Everyone in oil patch must have this plus safety glasses, hard had, steel toed shoes, health and safety training and HAZWAPER training – hazardous waste operations and management. Communication, first aid, and how to run ATV. SnoCat. Carry water to well in winter to salt it off.
Hydrogen sulfide. Sour crude in Texas. Sweet crude in NW PA. Stand next to well. Do not smell anything.
Sweet crude = low sulfur. Turkey. TX crude geologically younger. Sour. Older crude produced in America
Devonian rocks. Real old. Most sulfur is scrubbed of. Little paraffinic. Wax. Famers Allen is company.
Tank battery. Green tanks large have oil. Smaller have brine in them.
Brine treatment. Have permit. Charge broad range – 0.07 gal to $1.50 gal. Has to be pre-treated for
municipal plant to take it. By dilution. Concentrated frac water with solids and bases in it. Politics sucks.
Anadarko. Chesapeake. 100M waste/day. Cut deal. Company has technology to treat it. Have Delaware
river into which to discharge it. PA PHL PIT – liberals. Alabama in middle. Could make money do wonders
for themselves wonders for PA. But ideological concept that it is a waste overwhelms them. Wastes
making their plants more efficient. “There are more ideological challenges than technological
challenges.” – Yaniga.
We have been drilling wells in PA for 150 years. University professors look for money for graduate
students and form opinions and lay out program to gather data to prove their opinion. Blows my mind.
We are in McKean County PA. How many holes do you think are here? How many square miles? 15,000
open hole completions., 500 permits issued last year. And we have not drove over a well yet?! We have
driven three miles. McKean County drilling 150 years still have water, drinking water, very good springs,
turkey, bear, no children with mutant arms growing off them.
First build an area like this. At first Climax forest – animals do not live here – first harvest trees, get
sunlight, get low growth, deer and turkey will move in for feed. Clear-cut seven years ago. Small, tight
trees. Timber company cleared everything but a few seed trees. Paul- Anti things, environmentalists, will
tell you whether lumbering or developing well field it destroys the environment. first thing you do is
harvest the timber to offset costs. Opposed to clear cut. It regrows quickly. Extraction of trees-
harvested.
At Marcellus well – completed. Solar. Clover planted down to feed deer and turkey. It is oil gas
development and production. When rules written in 1946-50 vintage. No such thing as pipeline quality
carried gas. You produce gas put in line they burn it Did not care if wet or dry – sulfur rich gas. 1950s
written code. Things have changed in new Millennium. Like 1950 no catalytic convertors. Is this subject
to scale of change. Refining process.

Production vs Refining.
Definitions – refining historically applied to heat treat fluids. Heat treating. Cooker kettle. Cracking
thermal. Cracking catalytical. Reforming. Definition of refining of hydrocarbons. Field prepping the gas
for pipeline quality. National fuel. Do not want more than 1000 BTU in it.
Crude oil holding tanks.
Tank on top is water/oil separator. Oil floats to top it is lighter. Water to bottom. All from pumping wells to these tanks. To little tanks Separate fluid (off bottom) and gas (off top). Dump fluid into little tank. Separation phase takes place. Oil off side into too large tanks. Water off lower into smaller brine tanks. Gas is measured and put in the pipeline.
Is there a pie chart on the field meter? –Paul
1 to 100 wells can come into battery.
Pushing gas into pipeline. Whoever transcontinental pipeline is. Have to have a deal of quantity. Have
meters. Have pressure to overcome line pressure is. May have to have compressor. A great expense.
Pipeline marker.
Electric risers. Service operation 440V electric power. Pump jacks electric motor, some natural gas w/
combustion engine, some by gasoline.
Conduit. 3-4 wire system. 2 hots and neutral. 500 feet between. Cables come to surface w/ conduit near
road.
Climax forest do not support animals. 2nd growth forests do. No ferns in climax. No sunlight. Hardwood timber does not do well.

When there is a crises. Rules and regs do not matter. Fixing does. 10 years in Russia. Everyday’s a party. Trans.

Do not integrate like Americans. Science + engineering + contracting. Pillar of excellence in communist world. State was going to make it work. “Where is the big plan?” “What plan?” Siberia – most god awful mess I have ever seen. First deer day season. Paid holiday at RJB Well Services. Do not want employees in the woods that day. If they are they carry gun. Guys who do not hunt so they do a ‘roam.’

Nothing gets pumped. No additional noise gets made. It is a very serious thing for people in this area. The people understand this guy is here to check this and he’s leaving he is not going to start pump jack to make noise. They chew snuff. Sponsor for honorary PhD for Workforce Psychology. Story about the Ethiopian Rig Hands --- Sommerset County --- gas well. Milport, PA. Rig operator. Scott. Best operator to put on a break handle. Rig hands. Per diem. Weekend Rich. PayDay heros. Survived on bagels, donuts for a week. Lost weight. Worked the shit out of them for a week.

New site: competed January. Control to keep 4 wheelers and motorcycles out. Horizontal well. Leg out. Room on this pad for 3-4 more sites. Bigger than pad I saw first. Four wells on this pad. Horizontal bore. Separator system. Different styles. Same thing. This is what you see when it is all done. Land may be used for tree farms, Christmas trees, one company will plant apple orchard. Sites are big. 2-3 acres of open land. Dirt is still OK on top. Well tender arrives.

Craig. Decked out well tender. NoMets. Uniform.

New requirement. New costs since mid-July. $14/week per employee. $60/month for uniform per employee. Rented. Fire retardant. Serviced. 50 employees X $60. Nobody gave increase for price of oil or price of gas. Makes margins tighter all the time. Profit margin on tending this well $20 month after pay truck, uniform, healthcare, pension plan, wage and fuel, tires.

10 hour OSHA card. Health and Safety Training Program – minimal.

Jim pays for training. 2 years re-up. Training by certified inspector. On-line offered too. $3,700 for 10 hour class. Train for what they have been doing for 30 years. Next week going to ATV training. To learn how to ride 4 wheeler. These guys have ridden 4wheelers all their lives. Regulations come some do not self-train, self-policing. Some Marcellus sites have guard at entrance of working site. Drilling operation or frac procedure. Credentials. Cleared by company on master list. Reason company is defending itself. The ‘antis’ anti-Marcellus, anti-drillers, have been incredibly rabid trespassing on sites, damaging sites, putting major players at financial risk, liability, trespassing. Damage they do to site and equipment. Turn around and sue. Antis trespass get themselves hurt or claim they were hurt and sue the entity, This operator 5 star gold rating on everything that they do. First class. It is thought of. Done to the tee. Not worried about spending $5. If it costs $50 they will spend $55 to make it right the first time. First year for Chesapeake Anadarko Cabot to be able to publish good data on their sites in PA – in last 12 months – post Macondo #1 – BP Well – bull shit – Pavlov’s bell for everybody that is Anti to rise up. All sorts of stuff hit this summer from nowhere. My guys had hard hats, steel toed boots – had to get new.

Regs came out. Rushed in. Could not get enough NoMex for everybody. From state of PA – OSHA. Rushed in two months quicker than planned. Could not cloth everybody. Only person in company not received is smallest guy in company. FR Coveralls. Fire retardant. Legally cannot send out to work without. Pants dragging. Sleeves too long. Violation. OSHA. DEP. Soon the FEDS. He makes a lot of money on environmental side defending business. Well tender is pushing buttons. $150 of material to protect him against physical harm including boots. Doing work on keypad. Pie chart? Houston or central PA. Barton Pie chart. Doors open on production unit. The white thing is a chart. This company does things with unorthodox methods. I have learned to shut up. Slow and steady wins the race. I am not here to reinvent the wheel. I love dealing with people from Oklahoma and Texas. Makes it entertaining. I can afford these guys. They want ya to do stupid stuff. Do this. I don’t want to. Do it. So I charge them.
The first Marcellus well in Somerset County by Qwest energy. I had a Consultant from Oklahoma call me. I need your help. How did you get my name. At Eden Park restaurant – breakfast. A gentleman overheard me talking about drilling. My son works for company that can help you. We are looking for someone to work 7 days a week. We work 7/24. That engineering firm – since then – I have done a lot with them. I am the organizer. Get all asses and elbows together and point in right direction. I do not even argue with them on phone anymore. Try. This is what I want. End result. Same company set largest pump jack in operation in state of PA my company set it. No other company in PA could handle this project. Four guys set a pumpjack over 60 feet high – six stories – set with four guys did it in 36 hours.

Soap dispenser. Additive feeder set in tub for secondary containment (blue thing 2X volume largest vessel)
Solar array next to well head.
Well head – heavy, big pipe. Deeper well, greater the pressure. Pressure gradient is roughly .4 to .42 lbs per foot of depth. 6,000 feet. = 2,000/2,500 lbs of pressure. Yesterday max out 500–600 lbs of pressure. Max out. Smaller pipe, lighter pipe. Match up with pressure gradients. Rule of thumb 0.42, 0.43 – casing – 0.43 X depth of casing to maximum allowable pressure. To protect surface water aquifers. 500 to 600 feet cemented in place. 0.43 X 500 = 225-250 lbs pressure allowed on well head to not overcome capacity of pipe in formation to keep gas from coming back up in water table. All protections done voluntarily. after regulations and policies and procedures. Schematics of wells have general same principles. Different for production zone you will complete. Complex industry, complex rules. Doing all my life. The right way. Over and above anything anyone else is doing. Industrial ballet and you are the danseur. Lead danseur of industrial ballet. Paul saying brings everyone down. Slowing me down.

Have to learn how the ‘dumb pace’ when policies/procedures bring you down to a norm. Have to readjust pricing. For our own wells, only end game as much production at least amount of cost and be “safe.” This program With remote partners and big corporations worried about liability more so than production. Learn about unit pricing expect $dollars for this amount of work. I can do that because here is the unit cost. Even if it does not produce more gas or more oil. As service contract he gets his $50 bucks. Contractor to partner shift.

Misperceptions. Jim. Need. Need to have defined question. Mine would be “What is the truth?” I am serious. What is the truth. Not what the media presents us. What is the truth? What are the facts? And these are the facts: The facts are there are people in this industry who care. And want the environment to be safe. They want to make money. They want to create jobs. They want to create an environment for their grand kids and grandkids and generations and develop an energy source. Granted there are bad apples out here in this business. Any industry. College. Govt.

Even though he is to be drilling oil and gas wells. He needs to be mindful of Hydrogeology of north central PA for McKean county. Book. Water supply well. Search around who has, pick and set surface casing accordingly to be deeper than these wells cement them back into the rock so they cannot make claim he has caused gas migration that. He has to sample these wells. To avoid lawsuits. Run analysis at your cost. Determine chemistry before you drill your well.

Water wells do not have to take samples. Nor do they have to worry about fuckin’ up our oil wells. This is old – 1970s. Domestic and commercial and residential. So many more not in here.

What is the truth? Purvey the truth to the general public.

July-august new draft regs for PA – nominally add 10% cost to drilling Marcellus well. %5 to shallow wells. Challenge as tender and owner/operator. Learn how to do yourself.

Non-capable people try to teach rules/regs 4495
Flour then to Stanteck $B Canadian bought three years ago. Trying to promote social agenda. Toll everything.
NorthPenn piping. Figure out steel market next quarter. Something that can make or break you. Materials. 20 cents a foot makes a difference. Pipe quality is so important. Want steel stamped and graded. A lot of people will buy ungraded materials – bad apples. Pull up satellite imagery of leases. “You look very tiny next to me.”
Jimmy Barnes, President RJB Well Services, Inc.

D is Deb Johnson, Interviewer

Jim calling Dave. We are in truck driving. Call into Hunter in Marienville District about hauling tomorrow. To get ‘oil out.’ Tractor trailer is first choice.

D-What’s new besides ‘mud season?’ What is mud season?

Could last we figure March 15 to April 15th, but we could be in 4 foot of snow yet and mud season would not be affecting us yet. The guy I was talking to about is crude oil trucking company. Where this oil is sitting is in middle of ANF so must get approval from them to run the roads. They do not want us damaging the roads, which we do not want to damage them either because 2:40 then we have to pay to fix them. The ANF puts out specifications. Can utilize roads if 20 degrees or cooler – if they are frozen. Will not do damage to them. Now it the time of year that I watch the weather every night at six o clock and the weathermen lie to ya….so you are always up against a problem. Nothing is ever easy no matter what business you are in.

When you were coming across Rt 59 they are not pumping. Already pumped – already done its cycle. Out of tank room so cannot haul their fuel. They’re shut down because the gas market is not there. There are a hundred reasons why. I would say main reason is they are already pumped. But I do not know, I do not take care of them.

You see typical tank battery – time for more questions later

Going to one of Jim’s properties to see a spot where the mud is – to show you environmentally we do not run these roads except with pickup trucks because if we brought in heavy equipment it would just destroy everything. So you stay off of them. The situation we have in this part of the country is that not everybody plays by the rules. I play by the rules. I do not want any government agency 5:15 whether it is federal w/ us forest service, state w/ department of environmental protection coming and saying “You guys did this.” Uh, uh. No no no. We don’t do this. When it is mud season. The only thing that goes into the woods unless its cold is our pickup trucks. And we run four wheelers if at all possible. Because I do not want to spend dollars out of my pocket to fix something that was not worth a little oil.

D-Is it up to the driller to monitor the weather? Or do they make announcements like the road is shut down?

The forest service will send out a letter to all of the operators – the forest service will call all crude oil trucking companies they will call all the water hauling companies and tell them OK the roads are shut down. Do not. We’ll let you know when you can get back on them. We’ll do a road inspection and say you know if it is cold you can run these roads.

D-What about the state? Do they do something similar?
The State. The state will not do anything. 7:07. Phone call.

D-For the state roads is that up to you?

The DEP O&G division they won’t call you and tell you anything but they will come out and fine you if you are creating erosion or creating sediment in the stream.

D-So the 24 degree rule is something you use?

This is one of my – I own this with a partner. You see this well is pumping. You see it going up and down. The reason it is pumping and no one is there cause it is electrified. There is electricity going. There is a little gray box. ....

D-Where do you buy tanks from? Who makes tanks?

In the US there is probably 20 different tank manufacturers. Locally our tanks come from either Ohio or West Virginia. The gray box behind us has a time clock in it. We can make it pump 24 hours a day – 15 minutes a day – or 15 minutes every hour. There are a hundred scenarios you can do. But, you look at this road and say this road is not very bad. 10:18  It isn’t. And there is a reason it isn’t bad because we have not run heavy equipment on it. You can see there is no deep mud. If we put heavy equipment on this road we would not make it this far without a bulldozer.

D-Is land timbered?

Yep. This property, the landowner is one of the biggest timber companies east of the Mississippi. And three years ago ? yeah, it had to be three years ago, maybe four. They came in and just annihilated it. But. That’s how they make their money. The hardwood cherry, the black cherry, that came out of here, some of the logs that I saw when I was here with a timber buyer watching them sold one 10 foot log for $28,000. And that is what they do 11:42  they grow a tree. Look. They left trees standing. I asked why did you leave that particular tree? You can see a couple of the big ones blew over cause the wind caught them. We left them for two things: wildlife and seed. The cherries, if you walked through here, about 10 acres. They literally have walked every square foot of this property. And counted how many cherry trees are coming up – seedlings – so that they knew the maturity of the trees that they could harvest, the dollar value, and they knew that those cherry trees did their job by generating new growth. So, two months from now you walk through there and they will come in and do that. They will say OK In this “What you can see that has been cut. There is 120,000 new seedlings coming up, 6 foot tall, 5 foot tall, their health is good and we know that out of the next 10 year cycle we will lose 30% of those 120,000 trees we will end up with this. (So they are managing this?) They are managing their forest and they do it well. Now, when all of this was trees, if, the company that owns this is based out of Seattle or Portland, OR – Collins Pine. The Collins Companies. Huh. Chuckle. When we were done drilling in here and we had everything finished. You know the roads were graded , the seed and mulch down, everything was green, everything was painted. I was coming out of here one day and about six vehicles were coming in . big suvs coming in loaded with people. This was before the trees were cut. The road we are on has been here for fifty years. Was not drivable. Obviously we fixed it up and drilled all the wells.
Everything done. It looked like a showcase. Everything green. I am coming out and up here by this tank battery. I thought I got an entourage coming and I did not know anything about it. It was the district manager for Collins office in Kane. I have known Wayne a long time. I pulled up to his car and asked him. “You got a problem Wayne” “Oh, no. 15:10. “I’m glad you’re in here. I am going to introduce you to the CEO, the CFO, and the President and the Board of Directors of Collins Pine. Why? I brought them in here to show them how oil and gas properties should be done. How O&G development on Collins properties should be done. Why did you not call me? If I had, you would have come in here to make sure that everything was right. I am going finding something you did wrong out here. I said ‘Good luck with that” Everyone was flinging out business cards. I had two. Do you want a guided tour? No, Wayne said come with us. We went out pretty much every well. They were like Chinamen they had cameras going. We got done. I answered their questions. This operation was used as models for all o and g development for collini pine properties. In PA they probably have 300,000 acres. That is a lot of land. Of the 300,000 acres probably 70% has o and g development on it. D- So here’s the template. 17:05.

D-How many wells are on it?

Deb, I have lost count of how many wells are out here.

D-Oh, this is not your land, but you have the mineral rights?

Correct. The land is not, We do not own the surface. We work well with – I mean that well is 10 years old – you don’t know, it looks pretty good for being 10 years old. We have a good working relationship with the landowner. 17:45 When you come in. Say this is, you are coming in and there were no wells here. This was all forest. We sent our surveyor. He plots a stack. He gets is GPS out. He knows how much minerals we have. So he knows we need to stay within these boundaries. And he is going to plot dots on the map to get as many locations as the state requires. Using state guidelines. Say this is 100 acres and we know it is 5 acre spacing. We can get you should be able to get if it were perfect scenario every 5 acres you would have a well. So 20 well locations on a 100 acre piece. So there is a stream here. (File A / 11) 18:33. You gotta be a certain distance away. So you are going to lose locations. You are going to have a wetland or a giant rock in the way. So you are down to say 12 locations. So we stack the 12 wells. We call the landowner. Collins Pine. And you can see the markings on the tree. There is some old blue striping there. They will come in and paint the trees they will put two stripe on the tree each side. So when the two-stripe that everything inside those stripes gets removed to build this road....then we pay if there is $100,000 worth of trees to make that road from that point to that location. They send us a bill. We pay for those trees. Because we are taking their livelihood away from them. We built this road. Building this road we took out x amount of sq ft that they cannot grow trees on. So, they calculate that? It’s a science. So now just to build that road to get to that particular well right there I might have to cut 10 trees and it does not matter how this big around or this big around. It costs you more to cut one this big around because of the future. In building a relationship with a surface owner is...You know, I am in business, they are in business, I have to make money, they have to make money. We spend a lot of time on foot traversing this country to figure out what is the best way to build that road. Is it straight? Is it at an angle? Does it go around? So that we can maximize their ground, ... Maximize output – D.

Yeah. 21:27
D-I see how soft these roads can be. Yes, And that truck was in here two days ago. That well just clicked off. It was pumping.....

So, when you work with those people. They understand what you have to do and you understand what they have to do. You become great partners. And I can go on a Collins Pinepiece of property right now. Call them up and say I’m going to be drilling wells, I have everything laid out, trees are marked 22:17 do you want to come take a look at it? No, you know what you are doing. Cut them and send us the trees.

D-That’s a strong relationship. That’s relation. I am not a forester. Blayne, the DM has taught me, I have paid attention. I know what small trees mean. I know that 22” I can measure a cherry tree and say we are better off going through here and taking these bigger trees because this tomato patch over here is going to grow up some day and make this tree over here. This tree is ready to harvest. These aren’t. Move the road.

D-About how long do they plan for new harvests?

This is a better picture of what it looks like. (for photo opt) I am just not a pretty face. Deb gets out of car and takes PHOTOS. 24:00

How many tank battery pictures can a person take?

Well I can take you to some that really look like hell. But I don’t want to......D-So remind me the big tank is for the oil and the small tanks are for the brine and that probably connects......

OK these two lines to the far left coming out of the ground. They are gas, oil, and water coming from this well so they are in this group. So you see 24:58 The two lines coming up. One has just gas. The other has oil and water. They come out of ground. They T together so everything is re-introduced, re-mixed, then it comes into this line and goes throughout that short stubby thing that looks like a beer keg and what that overgrown beer keg does is a separator. The only thing that does is separate liquid from gas. The gas goes up the top. Comes out the top and then where you see flammable gas sticker there is a pipe coming from the left. That pipe is only gas. Then it goes to little short tube. And what that is is positive shutoff drip. That is a little container that would gather fluid in case something happened. I got to draw you a picture. Where’s my book. OK. This might go into the archives so we need to make it pretty. D-When I use anything I will ask you...OK. In the separator we have everything coming in and going out is gas and coming in here is fluid and gas. Out the bottom is fluid. OK? The gas is coming in. And this little tank. The overgrown beer can. It is actually cycloning everything. In other words it is going to put it into a spin. 27:09 The way this is designed. So everything is spinning. Fluid is going to go down. It is creating a whirlpool. Gas is going to go up. OK. Once it comes out of the separator it is going to go down and go into what we call a positive shutoff. Separator. PSO Drip. D-Do you have to hire people to build those? See how it is all mounted on a skid. I buy em like that. But the company that builds them. I used to work for. So, that little separator – I helped design it, so I know how it works. 28:10. Now in this internal is what you cant see the gas is coming in following this path here and comes in here and what happens is if there is any fluid say, if something happened here and cannot go to tank it froze off something blocked it this would all fill up with fluid the fluid and gas would continue in there and go into
this vessel here the positive shut off and inside that little tank what you cannot see is a little tube, inside the tube is al ittle ball and in the top there is a little seat OK so the fluid comes in here and it will float that ball is gonna go up and stop and create a seal . So we are not gonna get any fluid into the gas line. You do not want that. And that is why we call it positive shut off. It’s a Positive displacement. It shuts it off. So, once that has happened and nothing is going out we are gonna start to build pressure. The wells are pumping, (full of o and g?)- not smart enough to know say Hey, the positive shutoff tripped we need to shut off and shut in. You can get the automotive systems to do that. But it is more Marcellus high volume high pressure gas. Yeah I can show ya a million dollar set up and you don’t have enough electronics and the steering wheels going. Size wise. I can show you a M dollars of electronics in a box that is no bigger than this to control everything. But, no matter what you have for electronics or controls, these are still the basics on every well in the field. 30:30

D-So, what would happen if the fluids coming in, for some reason too much fluid comes in and builds up this is a safety.

Yeah. And this fluid goes to..let me think.

D-Why would too much fluid build up?

If something happens. In this tank right here this is called dump valve. Like the lid on the back of your toilet opened. In this tank is the same thing. In this tank is a ball and an arm and it is controlled and here is a valve. This ball raises up when fluid comes in. It takes this arm which is linked to this steel rod which I will show you when we go out. The arm down via a steel rod linkages. It pushes the valve open and puts fluid into the tank. Very simple device. From here this is gas only. Going to measurement. For, sales. There is a meter on there to measure the gas.

D-Is this the point where the quantity is determined as to where you split who gets what monies?

Ok you are talking royalty payments.

D-Taxes? Royalties?

OK when the gas goes to sales going through you have a meter. Which is here – D. This is the Duffy #1 – six wells. This tank battery might have the same mineral right owners, the same royalty owner, but a different investor group. The investor group might be made up of two or twenty individuals. You have gas sales. Gas measurement. There could be a gauntlet of meter styles. It does not matter if it is going to get metered at this point. A thousand cubic feet = 1 mcf. We sell volumes of thousands. Right now 1 mcf on commodities exchange is let’s say 4 bucks. So 1mcf = $4. 34:20. Ok, now, how the payment is made since you asked that question. A standard lease. Pre-Marcellus. (chuckles) Before the Marcellus came in which makes a difference. 12.5% of a standard lease is the mineral owner. OK? So that leaves you 87.5% to work with. Working minerals. OK. So, Deb, you own this 150 acres of minerals. Jim Barnes comes to Deb and says – remember pre-Marcellus where everyone has a clear conscious, they don’t think everything is worth a billion dollars. OK? I come to Deb. Deb, I want to lease your property. The standard is that you get 12.5% right off the top. I take the 87.5% I work with you where the roads will go. I have to
have your approval. I will give you a map to show where it will be. Where all the wells are all laid out to make sure you are satisfied for future development. Where you have timber we want to work with your timber people to make sure that when we do something. So I am in negotiation with you. We sign the lease. You get your 12.5%. I’m getting 87.5%. So this is how it works. If I sell $100 of oil. You get $12.50 right of the top. So, that leaves me with $87.50 to pay for drilling, all the bills, the man power, and pay...and make money at it. You are guaranteed this no matter what. As a matter of fact, it comes right off the top. 37:20. When I set this tank and I call Ergon that who buys this oil they are going to ask me for division orders. And they want to know who owns the minerals. You say Deb Kittner owns the minerals. How do you know she owns the minerals? Well here is the documents recorded at the courthouse saying that she owns the minerals and here is a copy of the lease. Blah, blah, blah. When that check for $100 comes from Ergon, I do not see the $100 I see the $87.50. They send you directly the check for $12.50. So there is no foul play. I am not trying to get you. I am not trying to short you monies. That is what they picked up, that is what they measured, that is what was sold. I get the check, you get this. Now, getting back to gas volumes, it is a different ball game. D-So that was for oil? This is for oil. D-So there are two meters. NO. There is one gas meter. No, when we sell oil, it is a tank gauge. There is a gauge pole in there that tells you how many feet of oil. When they load that oil they take starting gauge 13.8” and when they are done it is usually 1.3”. So, that gets put on a tractor or tanker and gets to refinery. Refinery measures oil coming off through a meter so. 39:10. D- the unit of measurement is? Barrels. 42 gal per barrel. Now, we get to the gas which has gone through a meter. It tells you how many mcf has flowed through there. This one I just did the production on it. It is doing 18mcf/day. So it is making $70 some per day in gas revenue. When I turn that chart in. I mail it to a third-party integration service. In other words, I get that chart, I review it in my office. I put it in an envelope. This particular chart goes to Indiana, PA. Gas Analytical Services. They take that chart and read that chart which we will go out here and I will show you. They will tell you how many hours the gas flowed. They will tell you they know what the specific gravity of the gas is. They have been to every one of these sites, they have a sample of it, 40:30 Temperature, is another big factor. But we don’t have temperature corrected meters, so we base everything on 68 degrees. You look at that factor and say heat expands, cold contracts. Same thing with natural gas. If it is 20 below zero, that gas is contracted. Are we losing money? Are we gaining money? We are losing money. But in the summer time, when that dark green pipe is 120 degrees I am making money because the 1mcf of gas going through there is equivalent to 1.5mcf of gas, but in the wintertime when it is cold 1mcf = .75mcf. So, it averages out if you leave a base line of 60 degree temperature. 41:44. So, yet in the wintertime when it is cold the gas volume is smaller your not gaining anything but in the summertime when it is hot when it is expanded. D-you’re selling air. Well, you are selling/working with a gas, working with compressabilities, the gas can be fluid, the same no no matter what, you cannot compress fluid. But heat expands and makes volumes change so in winter you are moving same amount of gas, but if you temperature correct it you can get a more accurate number but we are talking less than 1% when all said and done. So is it worth another $750 investment? So, you as the landowner, I am gonna tell you I am not going to do that because it means pennies for pennies on hundreds of thousands of dollars. No our gas is not temperature corrected, but in long run it averages out. The money you lose in the winter, you are going to gain back in the summer. So, when we decide, Ok this well is making at current market $70/day, there are 30 days in a month, $2,100. The company that is buying this gas takes that integrated number and sends me the
check 43:31 for $2,100. My accountant/bookkeeper says ok I have a check for $2,100. Deb gets 12.5% right off the top. Your check for $2,100 is going to be about $230. D-the oil company pays the mineral rights owner. Gas, you have to do the accounting. I have to do the accounting because the people who are buying this gas could care less about who Deb Kittner is. They are concerned with balancing their system daily. In other words. If I tell them I am going to be producing $70 or 20mcf/day and I am giving that to them but something happened. I had a problem and I shut down. I shut down for three days. Now they are short 60 thousand volume they have to make that up to keep their system balanced. So they are constantly D-So the distribution system...is that really the driver? Yes. We don’t have that individually every day wher these volumes get reported through me. We ship into another pipeline and that gas is re-measured and that metering is looked at daily. They know that, the master meter, and they are down 20k it is no big deal to them because they can make it up someplace else. 45:40. So, they are constantly in balanced situations...because they’re nuts. (Chuckle) D-really interesting thinking of it. There are people at receiving end depending on steady supply of that energy. It is a more sensitive delivery system than that of oil. Yes, if you look at this gas that goes through this meter and gets into our pipeline system travels westbound goes through our compressor and dumps into the main, what we call our main transmission line, that main transmission line continues another 10 miles. 46:35 D-your transmission line? No, another. I’ll show you where the gas ends up. This mirage of pipes underneath the ground that no one sees. I could be burning this gas in my house not even knowing if this is the gas I produced. This gas gets dumped and ends up in National Fuel Gas’ pipeline and this gas can go anywhere in the world – basically. It could end up at my house, Buffalo, Pittsburgh, Newport news VA to get liquefied and shipped off to Bulgaria who the hell knows? 47:28. I don’t really care because I get paid for it right here. But I do care because if something happens down the line like a compressor or stripper I am not producing oil. So it is a two-way street. I am gonna help them as much as they’re gonna help me. D-Because if you would have to turn off the gas. You are just turning off the whole.. the oil and gas. That’s correct. You as the landowner make D-zero gas. Oh, gas is sensitive to the supplier also. You, as the mineral rights owner, your check has gone from $235 per month (or day or whatever $250/day) to this all stopped. Income when down the toilet because of gas problem, pipeline problem, because of government regulation on a pipeline. It ceases. That’s now, you have a basic understanding of how that works. Now we are going post-Marcellus 49:10. Marcellus has come in. Big dollars. Deb, they came to Deb your 150 acres is worth 5,000 bucks an acre, the lease costs are up to you, we will give you 15% royalty instead of 12.5%. Your dollar signs are going ..... you would be a fool not to take their money. But, the repercussions are they did it, in my opinion, all wrong. 49:50. They should have come and started and said “We’re gonna come in and we want to lease your property and we’ll give you 15%. But when they did when they started paying these big, high dollar amounts for these mineral rights and land it created, in my opinion, the biggest friction between the general public, the people who don’t have the mineral rights, don’t have the land and the people who have land, which then in turn took environmental issues, township issues, state issues and federal issues and then inflated them so far out of wack that we’ll never get control again. I just don’t know how to word it to make sense to somebody who is not in the industry. It blew everything so out of proportion. But that is what happens in this industry. It becomes a land game. And I don’t play games so I am not used to custom to doing what these big companies are doing. 51:20 But what is going to happen in the long run is your gonna have four or five major companies handling the Marcellus which will be Exxon, Mobile, Shell, BP D-Chevron?
probably Chevron and a couple others. What they’re gonna do is say “I’m shuttin the valve. When you wanna pay me for what my energy’s worth, I’ll turn the valve back on. Cause right now $4 gas does not cut the mustard.” 51:57 So, no matter what’s going to happen, I am going to tell you in the next five years, in this Marcellus-Utica Play, my personal opinion is, you’re gonna have five-six major companies Exxon, BP, Shell, the big boys, in the world. They’re gonna control the gas in the Marcellus and the Utica and they’re gonna shut the valves. And it’s going to get the attention of the President of the United States and every citizen of the United States and say “Yep, we better do what they want to do because they’re in the driver’s seat.” And then this gas coming through this little meter is going to help me, in the long run, because it is going to be worth more money. D-However, the decisions from those MNCs removed from the local citizens could affect peoples’ lives. Jim – “Big time.” Hey, there is not energy policy in this country, there’s never gonna be one, cause politicians don’t understand business, I don’t think, I know they don’t. So, if they don’t understand business and economics, and I’m not, I am the dumbest guy in the world about all of this, but you know as well as I do that you have to have economy to make things work. You need to be able to go and buy a loaf of bread for $1.50 and not $15.50. Doesn’t make sense. You have to be a balance. There has never been a balance and in my opinion there will never be a balance. 54:00. The ideal thing would be to have a balance where we have an energy source here in the United States that could, and should, eliminate any foreign oil coming into this country for the next 100 years. In the next 100 years if we are not smart enough to have a new energy source – efficient, development in, then we are pretty much out in left field. Umm, but natural gas in this country, just natural gas alone, there is enough natural gas to supply this country for 100 years. 54:40. D-All throughout the country? All throughout the country. That meter will still be turnin’ in 20 years. ( Just don wanna do it every day.?) So, you look at how things are going in .... Yes, the biggest industry in the world is the petroleum industry, whether it is oil or gas it does not make a difference, but it is all dollars and cents. and, then you throw in the states with their rules and regulations and the state of Pennsylvania just passed these new rules on drilling and casing programs to protect the aquifers, for the groundwater contamination and such. And if you would read the rules and regulations, they make no sense. And, I’ve read them twenty times and every time I read em it gets more, just more wacky. D-And why are they illegible? Why are they incomprehensible? Because they, when they wrote them, they wrote it saying this is what is going to happen every time. It don’t happen that way. So, when I drill this well right here, it’s going to be the same as drilling a Marcellus well. OK, but this well, the total depth of this well is 1,800 ′ the depth of a Marcellus well is 8,000 ′ I am not in the same topography, or elevations, I have different soils here. If I were going to drill a Marcellus well right next to this well I would have to do the same thing for both wells. It is just so far out in left field. Then, you read down through there and then it says if this happens, revert back to here, well if you revert back to here it doesn’t make sense.. So, engineering wise I have read it. I have had several discussions with other engineers and people like other drilling contractors. D-What about those writers of those regulations? Did they not consult industry? Supposedly they did, but the industry panel, uh still to this day, I have not found anybody on that panel. D-They haven’t found anybody on the panel? No, no no. I haven’t found anybody on the panel. So, it’s like, there’s some....anyway it’s goofy, real goofy. D-What about your politicians? Any help? Chuckle. D-No? Pissin’ in the wind. We’ll go out here and I’ll show you a meter. D-It’s an amazing industry. I’m reading a book that talks about ‘peak oil.’ About what? Getting to the peak oil discussion. That there are fewer reserves being found today, a growing demand, and what are we
going to do, and maybe natural gas would be?.... Well, if you would – just like this vehicle I am driving here or the large tractor-trailers that are driving on the highway they can all be converted and run off of natural gas. D-Liquid natural gas? Propane. Like running off of propane. The problem is the infrastructure is not built in our country to A. fuel these things efficiently, of course we’d have to build the infrastructure. But if you took, I don’t know what the statistics are, I think there are three major trucking lines like Schneider Int’l that were interviewed How much diesel fuel do you consume in a day? Oh, we consume 100,000 gallons or whatever. So you convert the 100,000 gallons into oil.....D-Could you stop here or back up so I can take a photo? So, you take 100,000 gallons of fuel per day convert to how much crude oil is that? Stats all done. Blah, blah, blah. So you can save a ton of crude oil by converting them to natural gas... which we have in abundance here. So there are of ways to do it. Like Wind energy. 100:33 The problem is with windmills, you see all the wind farms going up but there is a problem with the (here ya go) lubricating oil in these windmills, these transmissions, the oil made today, whether it is synthetic or natural cannot handle the heat that is made by these turbines, by these windmills, they’re all catching on fire. So, you now have windmills across the country catching on fire. And, of course, these blades are 130’ long and now we are going to fling a blade out into, you know.....and now we have a problem. D-Are there any turbines in western PA? Not any here. They want to put a wind farm right across the border in New York, in a little town called Allegany.  

(Get out of car. ) This is the easiest one to get to.

D-You probably have to measure the quantity of liquid that could be in this tank and how much would be held....?

Yes. This is older production. Probably 10 years old now. This is all, we only use one of the tanks. The oil production, the insular production has declined. This is what I meant by the meter (door opening banging) this is a separator. Everything from the field comes into the tank. Gas out the side in this case. That is a relief valve. Positive shut-off. Gas. This is called a flanged meter. If you would pull these bolts out, it has a precision hole in it 103:10 and its tapered. What that does is takes the gas, condenses it, and pushes it through the hole. And then makes it come back....you are taking turbulent and laminar flow out of it and measuring pressure differential across that hole. You are taking upstream – downstream through the known orifice size – hole size – you are measuring pressure differential across that hole size. Pressure comes up through this manifold system and the back of this meter – you see the lines go to each side, but behind this meter it is like an accordion. So, the differential pressure, is pushing on this accordion either letting it expand out or contracting it. That expansion and contraction is seen here in red. That’s what, ok, its compressing it is going to give me more its decreasing or expanding it is going to give me less. That is through mechanisms, if you follow this red pen that goes back to this bar, that rod which is twisting this pen up and down, that motion is transferred to a gear and that shaft goes up to another gear that is transferred into this arm and that arm is moving with the pen attached it gives you this. This little pressure change here is making this happen via this mechanism or this tool. 105:12. The blue pen, the blue line is taken here which is static pressure. It is showing this pressure. Line pressure.

D-It stays the same?
Not necessarily. That blue can be all over the place as well.

D-You would not want that right?

Well, no. This is the ideal thing. I can tell you right now my compressor is running without even going to the compressor because I have 15 pounds steady pressure. It is purrin like a kitten. Now if my compressor were down, this line pressure would be coming up in pressure. Because each of these little lines is pressure. This is 250 lbs range chart at 100” of water. We are measuring water column. Equivalent to 100” of water column. The pressure is pressure. So, knowing this size. Knowing my differential. The two pressures between this known plate and the line pressure I can figure out volume. This is how it works. It is the most, in my opinion, the most accurate measurement device to measure gas – is what you are looking at right there.

D-It is pretty simple looking and it works.

It will tell you what is happened at 2:00 in the morning. It goes seven days. I can flip it over 107:00, make it read 24 hours of the day. 7 days. 31 days. I can put a hole month on one of these charts. D-Do you have an employee coming out and reading this chart? Yep. He probably won’t be here for another half hour 45 minutes.

D-So that monitors your pressure?

This device right here is the pressure reducing regulator. If something happens. It’s gonna shut me down. This is a shut off. This is a safety device. If the line pressure gets too high.

D-So, the meter is?

We pull that chart off and we send it to the 3rd party people to integrate it. They’ll take it and put it under scanner and a computer does it. It calculates mcf. And obviously when the tank is full we call the local pickup people they come and hook on to that three inch valve right there and pump and haul the oil away.

It’s chilly. Begin driving again. Diesel engine running. Talking temperature yesterday up to 60. Not today.

109:40. D-So, this road because it’s on private land you could run it if you wanted to you could – but that would be stupid. J-Because I would have several thousand dollars invested in fixing it. D-But the roads that are state and federal and forestry and stuff? J-But no matter if it is private or federal.....

D- I have question about flammable numbers. FB5074393. Is that a number...?

Only difference is when I call Ergon trucking – Like 7912. I have tank 7912 ready for pickup. If I call American Refinery I tell them I have 430938 ready for pickup. 110:25 D-Different tank numbers for different companies. I don’t have to tell them where tank 7912 is because when they came out to put that number on the tank. This tank was measured from that hard road they had directions to this particular tank. All I have to do is call the dispatcher and tell him I have 7912 ready for pickup. I do not have to tell him that is a double J resource’s tank lease #2. He already has that information. That
number is assigned to Deb as well as having the 12.5% royalty. That flammable number 3. That is
flammable liquid crude. D-So, one has to invest quite a lot of money just to access...where you are
drilling, I mean? Ha! There’s $100,000 of my money from that hard blacktop to basically where we were
sitting. In this main road. D-and there are electric lines. And there is the gas line. Yep. D-Pipe inventory?
J-I just saw something. I can’t believe I just saw that. (Backs up the truck) 112:30. I thought I was
imagining things, but that is where my boat is. D-Your boat? You mean that skid? Do you use that? J-
Well I will now, now that I know where it’s at. D-I’m going to take a picture of it. J-Ah, it’s in the weeds!
D-I’m in the water. I’ve got my boots on. Whatever. I’m alright. (Takes Photo) J-I can’t believe that’s
where that thing is. D-How long has it been there? Probably about two years. D-you haven’t needed it
then. J-yeah, I did!! Um. I had a drilling contractor that called me and said can you build me a boat I
need one real quick. I said “While I have one. It’s right up in my yard. “ Well we searched that yard...... D-
Now I’m glad there is value-added to your job. J- yeah. Now if someone calls I can say yeah I have one
and I’ll sell it to you. I have another one. I know where that is. That is up in Erie, Pennsylvannia.

D- I have another questions. Of the $87.50 that you get. What is your profit margin? Where do you draw
the line?

OK, now we have to look at ...Would I pay you 15% to come in and drill these oil wells? Yeah. That’s my
line. I would not pay you –there’s people out there paying 20%. J-Did I answer your question or is it still
confusing. (D-Oil sent to company you get $87.50 check. Of that $87.00 that remains, you want as much
profit as possible. What is the line that you draw? What is your profit margin? J-What’s my profit
margin?! D-Where do you draw the line and say “This is not worth it?” J-Good question. D-You get $10
or you get less than the person getting the royalties? Or does it vary depending on quantity, volume...?

J- “Everything alright?!”Other –So far, so good. J-Just doing educational tour today. Other – Well you got
a good teacher. J-How is it going back to 2284? Other –It’s OK. J-Alright. I’ll go show her some mud.
You’ve been back there before. J-Have a good day. Thank you. (He works for Jim.) J-Ok to get back to
answer this question before we forget. What is my profit? I would always like to see 10%. But, 117:45
some days you just don’t get it. D-It dependent on so many variables. It’s risky. J-That’s right. It’s not
making widgets. I cannot forecast the price of crude oil next week. D-But right now it’s a good price. J-
Yeah, but six months ago it was $62/barrel. So, like I said you have to have kinda big cajones to play this
game. Because if you don’t or you’re not willing to work at it every day, it is no different than a poor
farmer, I mean he’s got to work 7 days a week to milk his cows or plant his crops or harvest his crops or
whatever he’s doing. I am married to this just like a dairy farmer is married to his farm. Because if those
wells are not going up and down every day putting product into the pipeline or into the tank I don’t
make any money. That guy wants a paycheck, he wants healthcare, he wants to have over time, he
wants to have you know a retirement plan that I match money that I put into it so he knows that when
he goes to retire he’s not going to be living off of social security. Umm. Do I make money? Do I lose
money? Some days you lose a lot and some days you lose a lot. It’s not like your making widgets that I
know I got orders for 100,000 widgets and its going to cost me the material, raw material costs, labor,
and this and this and it comes in and sell my widgets for $1.50 and I got 30 cents in __ building...so my
profit is going to be. D-So there is less control. J- I have NO control. There is nobody in this industry that
has control. So I said earlier, what I see, or my gut feeling. You’re going to have majors left in this
Marcellus or Utica Play that are now gonna control how much money they make. “Hey boys. You wanna play our game? We’re shutting these wells. They have the revenue behind them to do that. I don’t. I cannot shut down that well for five minutes. Im not a publicly held company. Im just Jim Barnes who started this with a bubble gum wrapper and a prayer. I still have the prayer. I might still have the wrapper. I might have the piece of gum, but.... D- They might want to buy your company one day. J-120:50 God, then write the big check. That is all I care. Will I ever get out of this business? It’s uh, it’s nuts. Why are you so.....in depth, or so in love with something that it’s in your ... D-It’s in your blood . J-Ah, yeah. I should be an alcoholic. I really should. Because you worry about everything. I got fifty employees....you got .... D- You know, um, these big companies that are invested. The companies that are not local, that are invested now in the Marcellus play. Is it worth there time to get to know the people before they start drilling? I’m monitoring what’s going on in NY, PA, MD, NJ, Ohio and I am starting to see some townships laying down zoning ordinances, restricting development J-um, huh. D- there are some land groups they’re saying, this block of land that we own together as a group it is off-limits. I wonder if companies do all of their planning to develop and maybe start their development and there may be local push-back that interrupts their production or their development and it may have been worth their time to coming in in advance to meet the people to see what’s going on in the land where they’re going to be working. 123:00. J-Definitely. There needs to have the PR work done. Like I said earlier. In my opinion it was done all wrong. You went and paid high dollars for this landgrab. You sent these land companies out there to lease this ground oh, $5,000 an acre. And you give them all the.....And it’s a land-grab. What these poor people don’t, if you were a farmer and had several hundred acres, farmed all this land all your life and someone came and said ‘I’ll pay you $4,000 an acre for every acre you have.....124:00. That’s more money than I have ever made in 50 years of farming that ground. That’s how they do. I can buy a new tractor, I don’t have to work 7 days a week, I might be able to hire a new hand, I can buy a new car, I can remodel the house...I can do all this stuff with this new money. That’s great, I’m all for that, but what its caused is the psyche in people’s mind that these companies are willing to pay and do and destruct whatever they want to do and money will get them out of it. Right? So that’s the psyche in everyone’s head. Of course....D-In the developer’s head? No, in the general public. So, what I am saying is, if the companies would have went and said, OK the normal going rate is $100/acre and we’ll give you 15% royalties. And it would not have made the papers. And all this land would have been leased up and still the people would have been happy. But, companies out there got greedy and wanted more and more and more...when of course when you’re going to an auction and you really want that little red sports car and money is no object your gonna bid that thing out so that you make sure you own it. Correct? That’s what you want. Money is not an object. That guy sitting beside you wants it too. Who’s gonna end up with it? The person with the most money. D-So, what did you see? You saw a fast...the...leases......J-My opinion is, A land grab. Everybody’s out paying these big dollars. And, when that all has taken place then it’s in the general public’s mind, the psyche, ok these people, these oil and gas companies are paying this big, big money for, billions of dollars went out just in lease costs....D-It is billions. J-....which did not have to be and then when it took the exposure that we have now, not to say we would not have exposure, but it would not have been in every newspaper in the English-speaking world about the Marcellus play. Deb, you’re in a county right now, McKean county Pa, this county alone in the state of PA in the last fifteen years has had more drilling permits issued than any other county in the state. 126:40 How many times have you heard about McKean County,
Pennsylvania, in your newspaper about have 532 drilling permits issued? Not one. We've fracked wells in this part of the country for 60 years. Do you see trees growing? Do you see people having nice houses and green grass? I've lived here all my life, I know I'm fat and old, but I don't have four hands and three eyeballs and I'm not mutant. D-And, I'm glad you brought that up because I know that fracking has been going on all my life and its only recently hit the newspapers and so...so, what about fracking 50, 60, 40 years ago. Weren't chemicals going into the fracking operations anyway? What's the difference? J- how about fracking wells with straight diesel fuel? I mean, diesel fuel. D-Just diesel fuel? No water? J-Water? No water. Not a drop of water. OK. We're gonna frack with diesel fuel. D-All around here? J-Oh!! D-That is a question that has not hit the media yet. J- That’s, what my point is, the industry did itself no favors by doing what they did 128:34 . And we are in an industry that is very competitive. Shell and BP are competitors, big competitors. Exxon Mobil, of course Exxon and Mobil at one time were huge competitors. How do you get rid of your competitors? You buy them out. So, then you had the wildcatters. D-Is this the one I’ve been on? J-No. This is the Ludy (sp?) Property. So, that’s what I’m saying if you could turn back the clock five years and start this over again, I would lay em money that every player that has been and is in the Marcellus would things a lot differently. D-You mean, slow it down a bit? J- Oh, yeah. Because they have ruined a lot of good situations. Because now what your seeing is like you said, the townships and the (D-or land groups) J- putting down zoning requirements, land groups buying acreage and saying no you can’t have this, which is great. You own the property, you can do whatever you want with it. These people who sign these leases, I don’t blame them one bit. I own some property, If someone came to me and said they would pay $2,000 for every acre you got to drill your Marcellus, I would say “Where’s the check?!” D-Hey, Jim, what’s the difference, I understand the mineral rights, as minerals are produced the rights owner gets a percentage of it, but what is the lease? J-The lease is a contract, Deb Kittner owns 150 acres. Jim Barnes comes to Deb and says I want to take a lease on your land. I have been to the courthouse. Your deed of course is in the courthouse it is public information. I’ve had my people research it. You own the minerals. You own the land. Here’s all the information documented. All the lease is is a contractual agreement that says Deb leases her property at this location leases this property spelled out in black and white, deed, page number, that Jim Barnes is going to do this, he is going to pay me 12.5% royalty, he is going to provide me with this information, all of these terms and conditions and if he does not do that this lease is null and void. We go on our merry way. That is all it is, a contractual agreement. You sign, I sign, we agree to set conditions. If I would give you a standard operating lease allowed in the state of Pennsylvania that is 18 probably pages that has more there wows, and therefore, are fores, and why these and I’m not an attorney. To me it is all senseless. To me you go, you sit down with the people, and you do things on a handshake, you write it down, you agree with it and that’s the way it is. But I don’t do business, I mean the people that I do business with know me. They know that Jim Barnes is going come here and he’s not trash my land and he’s gonna to do it right and there’s not going to be any questions and if he says he’s going to drill five wells this year he’ll drill the five wells and if he can’t do it he’ll come to me and tell me he cannot do it. 133:40 And, I respect him for that. So, I, they would do business with me before they would go to say, Shell, and Shell’s gonna promise them everything in the world and then they do nothing. And that, a lot of things that are happening, Shell came to Deb Kittner and paid $3,000 / acre and that’s all you’re ever going to see. Cause they’re never going to drill a well on ya. It was all land-grab. They grabbed all of this land, said they have all these reserves, put it on their books, their

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shareholders think it is a wonderful thing because we have x amount of trillion cubic feet in reserves, and then before you know it your five-year term is up and that lease is null and void, because they did not do anything with your property and there you are, you have zero wells drilled on your land and you have zero royalty coming in. D-You could have signed a lease w/Jim Barnes who said I’m going to be doing this. J-That’s what I’m saying. They saw all this big money up front. And of all the hundreds of thousands of acres that was leased up, I can, you can count the number of wells drilled on those acres. What I’m saying you have this huge land mass, all paid big dollars for it, but there have been only so many Marcellus wells drilled. So, just because you sign a lease does not mean you’re getting any royalty. And if these people would look at the situation and say wait a minute, yes they’re offering me big money up front, but the real money is in the royalty check every month. Because, I’m going to make you more money in the long term off the production of that well than you would ever in signing that lease for $3,000/acre. Do you see what I’m saying? D-I’m understanding the landmen now more, concept. That they’re being sent out grabbing land. The people who own the land, the whole time they have lived in that house or on that land, they have not thought about oil or gas, gas coming from it. So the first person who knocks on their door might excite them and just the play off of that psychology. J-What would you do? Seriously? If you lived over in eastern PA and you lived on the family farm of 172 acres and your grandfather, your great grandfather, got this land and has been farming it, your grandfather farmed it, your father has been farming it, and now you’ve got it. D-And your struggling to keep it going because of the economy. J-You’ve milk the 50-60 dairy cows, you put in a little hay, you plant a little soybean you plant a little oats, you try to plant the feed to feed your animals, you make a living its 7 days a week 24 hours a day and you and your husband are doing this and OK you might have 2 or 3 or 4 kids you are 42 years old and your family and your father can’t help you anymore because he’s crippled or deceased and somebody comes along and says they’ll give you $4,000/acre. OK you are thinking 200 acres X $4,000 that is a big number. OK. Give me the money,. It has put a lot of people in some great situations. A check for $800,000 is now in the bank and now tax time comes. They did not consult an attorney, they did not consult a lawyer about what to do with this money, alright? I’m not an accountant or lawyer but they put $800,000 in the bank because they did not even see half of it because Uncle Sam took it and now they’re down to $400,000. D-Hey look at that, that even has a mail box! J-This is my pride and joy. D-I’m going to have to take a picture of that. This is the best looking tank battery in any state in the union. (Deb – print photo and send to Jim) when we built this. This is actually a customer of mine. Um, he does not really know anything about the oil business, but he hires me to his consultant and bdo everything
Appendix I: Interviews Bradford County GIS and Planning

Interviews with: Scott Molnar, GIS Coordinator, Samantha Edwards, GIS Analyst, and Suzanne Reestar, Support in Planning

Bradford County Planning and Grants Offices on April 9, 2012

Interview by Deborah A. Kittner with support by William S. Johnson, Jr.

Note: Upper case text is comments or questions from D. Kittner

Scott: There is a Warren Township. What does technology refer to? I thought you were going one way then you said Marcellus, Talisman. How were they? They’re generally pretty good.

MAPS? The companies usually make their own.

02 02 31:15 IMPACTS? Sam: I got a job because of it. Scott: Yeah, I was a one-man show before this gas kicked in for five years. We had this old staff that kept us busy. NEW WORK? We are in the Planning Department. We are not planners, we are Geography-GIS. We address all the gas wells and all the facilities. That was probably the biggest one because we are constantly running them down because we actually want to address a site before they break ground. Of course the only time you can tell if they’re complying is if they have an address so roads, creating private drives by doing this. On top of the mapping that we are doing we are keeping track of all the gas facilities, all the pipelines, anything to do with water. Sam: Anything to do with water. Scott: It’s definitely busy. Actually our director stepped in and started doing some of the wells and putting them in for permits cause we couldn’t keep up and he had some GIS experience. And he could see what we needed. Most wells permitted. Sam: LOOKING FOR PRIMERS FOR ME with 12 different maps on the website to PRINT. 11 YEARS AND 3 MONTHS 2,188 MARCELLUS WELLS PERMITTED. DRILLING OIL IN NON-MARCELLUS? Older ones were gas? I think they were going into the Trenton Black River which is more north of us going into New York State along the border. They all seem to be in northern border townships. B 02/02 35 10 SAW OIL WELLS FEW ON MAP CONVENTIONAL. AWARE OF THOSE? They’re all plugged and gone. I don’t know why...they’re really old I think like from from the ’70s or ’80s We got tricked by that too. I think they are all up in Springfield Township. SAW WHEN RIDING PUMP JACK CONDENSATE. YESTERDAY WHEN RIDING WE SAY WHAT LOOKED LIKE OIL WELLS. BILL: 43 40 GO UP ABOUT 2-3 MILES ON 14 FROM TROY, TAKE A RIGHT ON SPRINGFIELD ROAD, THEN ANOTHER LITTLE LEFT. RIGHT BACK IN THERE. We haven’t seen anything like that. I wonder if it’s private. I don’t know. You’re not talking about drill rigs? NO THIS — ACTION. You know what you’re talking about, OK. I’ve never seen a pump jack in Bradford County, ever. WHAT ARE THESE COMPANIES LIKE TO WORK WITH? BETTER? Sam: Talisman is probably the best one, I would say. Chesapeake comes in 2nd. And then EOG and Chief and we don’t hear from any of the other ones. Oh, yes, Scott: Southwest is difficult. They do comply but we never know if we are getting current We constantly have to badger them. Sam: Oh, yeah, with their naming, they give every well the same name Greensway. Every well gets that name. It’s confusing for us. They want an address in advance. They say 1, 2, pad C. They will name it down the road, but we don’t get that name. So someone calls and says they’re on pad C and we don’t have pad C...so. Scott: We get Act 14 notice ahead of time, basically the engineering work behind the permit, so we get notice of that, so from that we plot it and it may change when it gets DEP permitted. Act 14 is earth disturbance, erosion, sedimentation control. Sam: They will let you know how much is going to be disturbed. This is how many acres, how much water is
going to be used. No one looking at it to say. It’s not an impact statement. We don’t really have that here. New York has that SEEKER an environmental quality review. they have to go through a environmental review. Sam: Working on some addresses. A website. Getting our stuff up on the website. Use ESRI Server Manager and websites for inter-office use. Scott: 911 is really a pain. Sam: It’s County wide. They are very demanding. TALK ON GIS DEPT BUDGET. Trying to keep our heads above water with addressing, we have census and parks and everything else. Commissioners need info to help assess if we need the Impact Fee. They will vote Thursday.

A couple from New York has come since they’re in the moratorium. We’ve had interaction from New York. They want the low-down on what’s happening. We get a lot of college students wanting data.

WHAT’S NEW ABOUT FRACKING? That was the biggest surprise with the people from New York they were all dead set against fracking...we’re just like What’s the big deal? It’s just not the issue that you need to be worried about. They could not believe they were so misguided. But they have so much propaganda thrown at them up there from different factions. Cause there are whole areas that are for it and against it. If you’re near a reservoir you’re against it, if you’re out in a rural area your for it, and it seems to follow those kind of trends...but oh my god....they were flabbergasted that we were not concerned about fracking. We’re more concerned with the traffic that it brings because that’s what really’s impacted us the most . Since they’ve moved to triple wall casings and stuff there hasn’t been one leak of anything underground to contaminate the water. It just doesn’t happen. And everything that has happened with contamination was so far back like at the beginning of the whole thing when they weren’t using the proper materials . And the same think applies to Dimock I don’t think they were even using casing. Substandard. ISSUES? Traffic. Biggest. You agree? They’ve really gone to build a lot of water impoundments which cuts down on traffic. They’re piping it to wells from centralized impoundments. Sam: Housing. Housing shortage. Scott: For an apartment that used to go for $250 in Armenia Township for them to get $1200 now is just unconscionable. Nothing is....Ya know that’s impacting County residents. These people come in and their monthly allotment for housing allowance is $1200 and they’ll plop down $1200 for the rent, and the people in the County are out of luck and they can’t find anything at a reasonable price. This whole housing coalition is popping up. They’ve got homeless shelters in the talks. In fact we have a subcommittee for planning in the natural gas committee and we actually had somebody come in and talk to us about the homeless shelter and the housing issues. WHO HOMELESS? Mostly renters were paying $250 before and can't afford to pay $1200. Landlords pulled them out and jacked their rent up. Cold hearted, but it’s a fact of life. Greed gets to people. There’s always good and bad in everything. This cutback that they’re in right now they’ve scaled back quite a bit because of the price of gas. It’s really kind of been a nice rest from having to wait half an hour in the little village of Ulster in the morning it got really old. We have a traffic light ya know and oh my god, that just throws everybody into a tizzy and get a little traffic backed up everyone is late for work in the morning. 55 10 And that hasn’t happened in the last month or two. BEFORE? WAS THERE A TRAFFIC LIGHT? No. They always wanted one but I think they got one because of the increased traffic. There is a bridge. A lot of activity comes across that bridge at Ulster. So everybody coming from the north wants to turn left across traffic and all it is is a stop light and these big trucks. Uhg! They need a turn lane but everything is boxed in houses are really close. There’s no solution. Sam: You’d have to tear down all the buildings. Scott: A quarter to 8 in the morning they’re backed up over the hill. Straight on 220. Sam: there’s a Dandy right on the corner. OTHER IMPACT? Sam: Deforestation. They’re just tearing down, even on your property. Scott: Fracturing the habitat. Sam: Tearing down the trees. Scott: We had a strip of trees, you know, a little woods and they were going to bore underneath it because I had a little creek going through it. The day, the day, THE DAY that we were signing the papers they changed it up. Oh know we have to cut. I mean we had worked through the whole system for months. With the pipeline company.
And it was all in words to go underground with the pipe. Then they had to cut it all down. And, oh my god, it’s just horrible. I don’t know. I wish we had never done it at all. It just takes a strip of woods and cuts a swath out of the middle of it and it’s just two chunks and its just ugly, nasty. Balsam Pipeline. Yeah. RIGHT-OF-WAY. ONE TIME FEE. IN FOR LIFE. Over 50 year life expectancy. Ulster Township. GOOD AND BAD. MONEY? Yes, ut then you have to see how ....like Samantha said It’s cutting things up You get used to something looking a certain way and it doesn’t look that way anymore. Woods with big hole. I’m not the only one. Just a little one. MARK I PIPELINE? We’ve mapped it. It just seems to be stirring up trouble. Sam: We get the permits – wetlands and all kinds of stuff. I think they have to pay fees. I don’t know about trees, but I know wetlands they impact certain acreage they have to pay a fine, not a fine, a fee. They get an option. You can replace what you destroyed or you pay a tour. We went on that tour Chesapeake said the DEP hasn’t been letting them replace anything they are just taking their money . They just say No, just give us the money. They’re just taking the money and not fixing anything. I don’t know. That was one side. RODE DIRT ROADS. Our roads weren’t built for this kind of traffic. Especially the size of these vehicles. The milk truck was the about the biggest thing that ever went on these kinds of roads. Right now you’re not going to see many cows, they are not being put out to pasture. The one up there near Ulster where they cross 220, I haven’t seen those cows.....Oh, they cross 220 at five to eight in the morning at rush hour when you’re late for work. Sam: They stop traffic. The worst time possible. Quarter to eight. You gotta stop for cows that prance across the road. Scott: To fields. BEAUTIFUL COUNTY. TURBINES. That was a nice forest over there. CUT LOTS OF TREES? That whole outfit had a really good public face on them when they were going through the permitting process and then just went through and just, something that was green, environmentally pushed heavily they were just not nice people. In this area, nobody over there gets along with them. France. I try calling the phone numbers and you get a French recording. What’s here is like a subsidiary of the French company. AES, I don’t know. And we’ve NEVER had them comply with 911 addressing. They just ignore you, there are roads up there that need to be named. THEY BUILT ROADS. HOW MANY TURBINES? We’ve got ‘em in both counties. The county line goes right through. 124. LOOKING AT MAP. There are few people up there for one thing. Armenia. Armenia didn’t have a paved road in the township before thisl. And these people just came through and clear cut. Complete opposite of the gas companies! The gas companies you will have trucks on dirt roads they will pull over and wave you on you know. They’re just so courteous. They don’t want anybody saying anything bad about gas companies. They go out of their way and it works. You just don’t hear people complaining about gas companies. Not that their rude. They just don’t like to share numbers of them .But at least they’re courteous when you meet them on the road. NOT COMPLYING? Not at all. ACRES CLEAR FOR ONE TURBINE? 0 12 17. I think that’s Tanrack Lake they’re all around that. BING VIEW. Sam: Nice imagery. Scott: Well, there are gas wells integrated all through there. It looks like about a quarter of whatever a gas well would be. ½ or ¾ of an acre. GAS TURBINES, WELL PADS, AGRICULTURE–SHARED LANDSCAPE. Most of their property owners are out-of-state, or out-of-county, owners. They have about 300 people there. BLANK SPACE ON THE MAP. This is State Game lands. State Forest.

Wyalusing, Wysox? ISSUES? Sam: That’s where all the traffic. Sue lives in that area. Scott: Talking about staying up all night LOL when the trucks are all passing your house. The Golden Mile is right here. This is the big bottle neck. Go at five o’clock if you want to get the whole experience. Scott: What road do you live on? Sue: Route 706. IMPACT Sue: I hate the trucks on my road. I wish they’d never come here That’s the way it is. I don’t like all the truck traffic. I don’t like the on my road. I wish they had never came here. I’m stickin’ to it. I think it’s great if they’re tryin’ to make money. No! I am on the main road. Plus they go up on the road behind us. It’s just a lot of traffic. A lot of dust. A lot of traffic. All hours of the night. You know. I mean It was a nice rural area. It was nice and quiet. It’s not anymore. LIVED HERE Sue: Forever. The last couple years. It’s really changed. And I travel. It’s 35 minutes for me to come to work
every day. There’s a lot of truck traffic. And 409 is not a good road for trucks. They’re always on your side of the road. You feel like ‘when I get hit’ not ‘if’ you know what I mean. You get a lot of traffic. And there’s a lot of trucks that got CDLs couple weeks of training. And my husband is a truck driver and it takes a lot more training than that. There’s a lot of people out there that should not be driving those big trucks ‘cause they don’t have the training that they need. I can tell you that right now. And we had a good winter because we had good weather this winter. Last winter, oh my gosh, accidents all over the place because the roads were bad. This year the roads were good. So we were OK. I mean 409 I go home every night. I’ve learned. I’m over the rumble strip, over the white line, ‘cause you know you gotta be that far over or I mean, they’re on your side of the road all the time. And those roads weren’t made for that size of truck. Scott: Well, they’ve built those roads UP in hopes that it is something that’s gonna last a little longer. But it’s also causing a problem if they go off that road they’re tumbling...they’re afraid to hit that edge of the road. As everybody is. Sue: I wouldn’t want to hit it with a car because it would flip you. They’ve done good about the roads. I’ve gotta give the gas company credit. We’ve got better roads than we’ve ever had. Ya know. But there’s just a lot of traffic on ‘em. PHASING OUT? Not according to them. I mean. At one point it quieted down a little bit then it got busier again. I will say it’s not as busy as it was a year ago. Scott: They’re not finishing anything. Ya know, they have the option of drilling six wells on one pad. They’ll drill one or two and move on. Just to hold the lease. They’ll get their activity done and move on. And you know fracking will follow at some point. But, you’ve got something that has been, you’ve impacted this area, but only a third of what you could of you know. And they’re spreadin’ out the impact is what they’re doing. And they’ll come back and do another one and move on and it just seems crazy, but....Sue: We do all the map counts here. Scott: Our junior GIS student. Sue: I’m a junior GIS student. We’ve had over 250 map accounts at one time. They were getting parcel data. Scott: Sue was going back and forth – she’s got the ArcView license and she does all the 8 ½ X 11 parcel mapping. So they would request one parcel and all the adjoining parcels. And Sue would do all of those and every day. Sue: I can’t complain. Scott: That was time consuming. Sue: I don’t know how he did it. Sue: Very nice people. They were very nice people. Scott: Really good crew of people. Most of them are gone now. They’ve moved on to Ohio. They came for the leases. Scott: It just ended recently. Sue: In the last few months. It’s widdled down. ANYTHING LEFT? There is stuff that hasn’t been leased. Scott: Yes. And they have to follow through too. Sue: And then we had to do that 911 addressing through the middle of all this. STATE MANDATED? Scott: No. We’ve been working on it for 12 years. We kind of ramped it up. Sue: Then all the well pads needed addresses too. It certainly made it busy here. The days go quick though. It’s nice. Ya know, the people are good and if it makes Bradford County money, I think that’s great it’s just...it has been a real change. I mean there were days I needed a helicopter license to get to work because I was so agitated by the time I got , I mean what used to take 35 minutes sometimes would take well over an hour. You were trying to fight the traffic to get here. And there wer no back roads for me to come on. PEOPLE STRESSED? Sue: No. Scott: Not much of that. Sue: And I think it’s just so much the time it takes you to get places and get through Wysox. Scott: Yes. But people here, you just adjust, and you leave your house earlier, you don’t have a choice. You just do it. Scott: It’s different where everybody used to go well, Go ahead, go ahead” now everybody’s like fightin’ whose gonna go first, nobody wants to get coffee and stand in that line of traffic. Sue: If I have to do one good deed a day if I let one person out that’s all I have to do all day so I can be mean the rest of the day (LOL All chuckling) You get that attitude ya know! CHANGE CARDS Like I said. I think it’s gonna be good, but it’s got its....you take a rural area where its quiet and all of the sudden it’s like everything has turned...
Appendix J: Interviews Bradford County Residents Focus Group

Interviews with: Andrew Love, Gail Love, Jeffrey Singer, Jerry Renzo, Terry Fritchman, Rosemary Wynott, John Borits, Claire Borits, Alan Roloson, and Richard Eaton

April 9, 2012 at the Bradford County Public Library in Towanda, PA

Interviewed by Deborah A. Kittner and assisted by William S. Johnson, Jr.

Text in upper case represents my comments or questions.

I JUST WANT TO HEAR ALL THE DIFFERENT IMPACTS I CAN…GOOD, BAD, OR INDIFFERENT.

I’m Terry live in a little burg called Liberty Corners It is 3 miles south of Towanda. up on the hill. I live w/in ½ a mile of several different wells, all around me. We only own 1.99 acres of land but yes we have a signed lease with them .We have not started receiving anything yet because they have not connected all the pipelines and all that stuff. It was a huge debate whether we signed or not. My husband is an environmental scientist. And he’s like, He doesn’t want any part of this at all. He does not think it is safe for the water, safe for environment itself, he doesn’t like seeing anything ripped up, torn apart whatever. But on the other hand they’re coming around they’re offering the money and the leases and if I don’t do it we’re gonna be left out. Chesapeake. I also have my daughter’s boyfriend he drives a truck, water truck. So we are kind of all the way around connected to it from all sides. It is different, interesting, just getting used to it. The pros of them being so are we did get nice new roads up our way that we never would have had. They tore them up at first and then they fixed it. Just bringing the equipment up our roads were posted so that you could not even come through there. That they buy what do I want to say, permits, permit use so they can drive on your road so if anything happens they fix the roads. So that we have beautiful new roads up in the country that we never would have had. I mean, I have been on a tar and chip road all my life since I lived up there. I have lived there since 1990 so it’s a positive now that we have nice new roads. Nobody’s water has been affected up there yet. D-YET? Yes, I say yet. You know that is the big scare around here for everybody is your well. Fracking has been around forever and 3:00 min western Pennsylvania is huge for fracking. My son lives outside of Pittsburgh and says I don’t understand what all the problems everybody is having in Bradford County cause it is just jammed packed out that way. But it is so new and came in so fast here that it scared people. D-IT IS NEW. It is very new here SO THESE WELLS HERE AROUND YOUR 1.9 ACRES OF LAND.

You can see them, it is lit up, it is noisy, it’s … I have a dog that still wouldn’t go outside for a while. She is was absolutely petrified to go outside. They do them one at a time. You get a well here they get everything done and you think they’re all gone for a while then my husband was sitting there looking out the living room windows and you could see upon the ridge 4:02 the trees started falling. Well maybe they are just putting pipeline in up there. But no another well went just recently there. They are constantly going around adding new ones. He just recently just left his job. He was working at a place called global tungsten powders, in the lab. He just signed on with a company doing water testing locally in the area. He feels he can have a little control over he sees as something uncontrollable situation. APPROPRIATE. HE CAN WATCH FOR HIMSELF. Yes, so that is what he is doing. …. BEFORE WE GO ON, SINCE YOU ARE ON 1.9 ACRES YOU HAVE ROYALTIES LEASES OUTSIDE OF THAT. Yes, from what I understand I am just figuring it out how the lines cross and everything so that you end up. Actually, My lease is with Chesapeake, but the ones that drilled nearby I guess I am with Chief for when they start paying off so you get on with multiple companies. It is a little more complicated that I thought it was going to be. I though you signed with one company and that was all it was.
JERRY I live in Burlington it’s the little town down here. It is only a mile square and we have one well. So that does not really affect me. But the traffic is terrible here compared to what we were used to. It is on route 6. (Alba or Sylvania little too). 75 people. DO YOU HAVE ELECTED OFFICIALS? Yes, I am. You really know most of your people. It is a private owned well. It doesn’t really affect us that much because we are not really close to it. ARE OTHER PEOPLE CLOSE TO IT? Yes. HAVE THEY BEEN AFFECTED? Um. We have always had a problem in Burlington with our water but I don’t think it is the gas company. We have a quarry and a landfill. I think it is one or the other of those. The traffic is terrible. We worry about the kids getting on school busses. We don’t walk anymore to the post office. You can’t . You are scared to death you might get hit by a water truck. ALONG US 6. That and throwing their garbage out, really, really bothers me. Garbage along the sides of the road is terrible. SOMETHING THAT WAS NOT THERE BEFORE. I think the gas company has its advantages too because there are people that live on my street that have better jobs now than they have ever had in their lives, so there are good things and there are bad things. WHAT’S YOUR TITLE? Borough President. We have a mayor. It is a borough. We don’t have that many services. We’re little. We have one road that we have to maintain in the winter time. And we have liquid fuel services that helps pay for that. We have a personal tax and that’s it. Liquid fuel funds pay for the roads.

JEFF YOU ARE IN NY STATE. Yes, I am a native new Yorker I live in Horseheads. As the director of the library, Talisman gave us $5,000 and Chesapeake donated 6 or 8 computer so that was very nice of them. (Laughter) A fellow from Warren township anonymously gave us the money to buy the bookmobile. That was very nice of them. $3000.00. So since fracing right now is not in NY State, there is still,I have a lot of friend who are fighting that. I also so the road conditions getting better. More and more traffic. I don’t understand a lot of it. The lease and the mineral rights. I know they made a pad up here I think it’s in Ridgeberry. And they all went away and the came back and they went away again and now it is just a big concrete slab. And some nights I will drive by and it’s all lit up and there’s a well and they’re pumping out stuff and if you drive by now it is just a concrete slab and there is nothing on it. I don’t understand the science of it I don’t understand the politics of it. I believe it is “follow the money.” COME ON IN. CLARE AND ANDY. Umm, I am pretty cynical and I think it is all about the money. It’s the golden rule – whoever has the gold makes the rules. They are fighting it in New York. If the governor wants it, I believe the gov wants it, a lot of local residents don’t want it they are afraid of the pollution. And a lot of the CEOs don’t live around here so you know the guy who goes form the hotel to the limo to the office. All they see is the dollar signs they don’t see the local impact. HAVE YOU SEEN AS DIRECTOR OF LIBRARY INCREASE IN CLIENTELE FROM 10-20K MORE PEOPLE HERE? Yes, and no. Well, a lot of them are Spanish speaking from Tex and Oklahoma, So there are some families moving in that we can service. Some families. Next door, my children’s librarian, is also the outreach librarian and she goes next door to the county jail and there are more Spanish speaking people there and we are supplying books to them.

Gail. We are together 54 years. We live on a farm. 1851 the date it was built. 33 acres. We were not going to sign. We were very much against it. And after we found out everyone else in the neighborhood has signed. Why not? What do we have to prove at this point? It’s going through. Other people are reaping the benefits. So we signed on and received a nice bonus. To date we have gotten virtually nothing. We just got a check for $45 for six months. So we are not in it for the money. . The pros it supported a lot of farmers that were not able to keep their properties or their farms and were selling maybe in some way it has helped them with taxes and able to stay put. The cons. Of course, We’re on a spring. So far have not been affected. WHERE ARE YOU? Mountain Lake. 3 miles from Burlington. We have a well practically in your back yard. It’s not producing. We don’t know what the problem is. They don’t tell you. We signed with Chesapeake. The couple checks we have received have been from Chief. It’s that crossover. We’re on a dirt road. It is still a dirt road. They had torn it up and repaired it to a dirt road. East Road. 3 miles from Jerry’s area at the Dandy. We moved up 17 years ago. Retired. Just wanted to get away from everything and come to the peaceful, serene. Moved from outside of Philadelphia, Bucks County. We had quite a few years of peaceful, beautiful, No traffic lights and it was serene and we loved it and enjoyed it. We are not affected like Jerry said close to the roads. We were when putting well in trucks 24/7 with trucks going with water and stone, whatever. That
ceased after the well was finished. We are off the beaten trail so we are not affected like a lot of people that live near the main roads. The only time that we are impacted when we go into town you double the time that it used to take. So I don't know, cannot say to date that we have been negatively affected with it. I try to see the plus. It helped us renovate the old farm house that needed many, many amenities. The bonus money.

15/17 13:40. So that was good. SO YOU SIGNED W/ CHES BUT YOU RCVD COUPLE CHECKS FROM CHIEF.

He HUSBAND was the one that negotiated that and kind of spoke with people cause we knew that people all around us were initially getting monies from that well but we weren't. 20:26.

CLARE'S (GAIL?) HUSBAND ANDY. The well was drilled by Chief. Initially, the land that surrounds a well is put into what is called a unit. Normally most run 720 acres. Approx. This well is 1,200' from our property line but we were not included in the unit. The little map that they gave the people who were in the unit showed –line like this – when it hit our property we were not in it. It notched us right out. We were not in it. So I was told to call a certain person at Chief's headquarters in Dallas. So, it was a woman, I got her phone number, extension, I talked to her. She said “Well I understand – she had our parcel # - she looked it up. I see that you are notched out. But the unit is not carved in stone so it could change in the future. She said call me in a few months. I did. “We're looking at it. Call me in a few months” He did. Finally she said “We are Definitely, we are changing the unit. I cannot say all of your property will be in unit, but a portion of it might be” Well, a part of it is better than none as far as royalties go. A neighbor received a map. He said “You're on there. Only a portion.” Then I got a letter from Chief telling me formally that “The unit has been expanded from 720 acres to 1100 acres! “How that 13 acres of my property is in the unit. This caused a friction between one of our neighbors because, his lease, he was incorporated also in this expansion, his lease was due to expire in less than a month. A FIVE YEAR LEASE? Yeah. When he signed years ago he got %50/acre at the current price at the time it was running $5000/acre. He's already looking at $ signs. He has 140 acres. He was looking at it. Renewing lease…ticky sum. Wrong. When the expanded unit. They threw it 140 acres in the unit. Nothin’. So. Cause now he is in the unit. It rolls over. He does not get a chance to renegotiated. 1:25:23 15/17 He is an accountant. He got his lawyer to look at it. He says I am not well versed in gas and oil but I have a buddy in Texas, sent copy of lease, looked at it. Lease is air tight. You cannot do anything with it. So actually he is not happy. So to speak. Nothing to do. So that was a negative in our area.

And of course when you expand a lease like that each person’s cut gets smaller. Cause when you divide a lease up like that 24:35 each person’s cut gets smaller. Dividing up with more people more acreage and the amount you get goes by the amount you have in the unit. And as it turns out. The well close to us has very low production. So therefore it is even worse. The money coming out of it is virtually nothing. You cannot even fill your gas tank up with that. And the price of natural gas is at all-time low,. Under $250 per 1000 so that does not help neither. The roads we have two pipelines. This well they put a pipeline right away to it. We thought royalties are gonna start. ……………You here all these stories about royalties what they’re making what not. WHAT % ROYALTY DO YOU GET? Oh, I forget……I would have to look. ……………But I know a few people who are getting quite large royalties. ………I talked to one a couple weeks ago. When this all first started he had 13 acres in a unit. He lives in different area. He was getting $4000 royalties a month. I talked to him a couple weeks ago. He said that money because the price of natural gas has gone down – it went from $4000/month to $3000 month to $500/month right now….........Supply is greater than demand. So it is down. They did put pipeline in right away. I was surprised. I was watching them put it in. Talking to the workers and all that. They had to extend the pipeline and had plans to put it right down the front of our road. There as a wetland there. When I say little wetland I am talking just a little boggy area, if you had a good rainfall you could have it in your lawn. ….But couldn’t do that had to detour the pipeline all the way around. Come across another road, come down another road, through farmers’ fields and whatnot all because of that little spot. EPA. They deemed it as wetland. So they finally finished that pipeline. You can imagine what it cost for that. Like my wife said the truck traffic. When putting well in, pad in, the dump trucks for stone for forming the pad, the water trucks and all that but of course once that well is in, they're gone. They did come back. And you just, it is a dirt road. She said they did not top it off with dirt again. And it is still a dirt road. Right? And now it is duster than ever. My wife will attest to that. She is constantly complaining about the dust. It infiltrates the house. We sit back about 75 yards from road. The house does and we have a pond.
between us and it still infiltrates the house. It is constant. Every day she can go like that and there is that light tan dust on everything in the house ya know. But all the trucks are gone now.

ALAN

Live outside of Troy a little town called Barn’s Valley. HOW LONG? Since 1995 been living there. From the area all my life. I’ve been gone in the military. We’ve got a lease. We signed in 2008. The property that I have. That is when the impact started hitting here. Came from 29:15 a miserly 50 bucks to on up to $5000 an acre throughout a year time. In theory by area by company what they were paying. So yeah the impact to me, I built an addition on my house so I improved my property from getting the gas lease. We’re probably at 15-16 per royalty. With Talisman., Mostly in the western part of Bradford County. Still is Talisman the one who has drilled. My neighbors land still no royalty money has hit me they have been taking gas from there since the middle of November I still have seen no check. I have no idea how big the unit is. They show a preliminary out there. I touch his land and the well is maybe 500’ from me but probably only 1/3 of my land, 31 acres, that will be in the unit. Again it is the direction of my land and the direction that the well is drilled. So, I’m running this way and well goin that way. So I’m only getting a corner of it and I’m right there through with what that noise was through the activity. My concern is well water. I feel there are many faults in the ground already and by going in and fracking it is going to create problems with wells, it’s got to. HOW DEEP WATER WELL? 300 some ‘. All in our area are quite deep. Who knows what will happen. Gas well over 1,000’ from house. 4 wells on pad with 7 permits. As somebody commented. They jump all around. You see them here. They’re gone. You see them here. They’re gone. Throughout the whole county. It’s because of everybody’s lease. all written different. They expire through all the time. They have to hit everybody’s land to lock them in in less than a month. They did it with a farm we owned that was my father’s. Two months before the lease expired, they locked in six acres there were approx. from another well that was not drilled yet, the pad wasn’t even built yet, but outcome the notification that here’s the unit so you are locked in so you cannot resign the lease and have anymore lease money under an old lease that is at 12.5 percent.

THOUGHT IT HAD TO BE PRODUCING. No, they only have to do is declare it stake it out show you where it’s gonna be and declare the unit. But even that is not even declared. We received no…and it’s been on line same amount of time different properties. 1 1/5 mile apart. Different properties. Producing almost identical time frame. No difference. We don’t know what amount of land will be in the unit because we still have not been notified. Ya know. The roads, everybody says they have improved the roads. Millions and billions of dollars. I agree partially with that. I believe they have created a problem. If you come in and build a road this much higher than it was and leave it for the township to take care of and fix forever and have a ditch that’s bigger and add blacktop like this and narrowed the road have created a problem for all municipalities in the state to take care of than before. Should have 32:00 done it correctly. Down in the ground built it correctly keep surface where it was at not to create bigger ditch problem water runoff problem. I think there is a bigger, huge problem for all the townships in the future. There are places they have built up roads 2’. And it’s created problems and will be a bigger problem down the road…..HUGE. it’s not even know yet. Part we saw last September when the flood came through in areas and they had just dumped in gravel on the edge. All that edging is gone and all you have is higher road. And that is just the surface of it from just one storm. Farmer’s Valley Road I live on. Troy township. So, good and bad, we’ll never change it. The impact fee that’s going, that will come. Same thing, good and bad, there needs to be something to help the local. They always take so many things on that it never served for the purpose it is intended to serve like 40% of the money is gonna go to Pt and Phl instead of come here where the impact is. So it’s not an impact fee.

OTHER. Only one township against – Southcreek Township only ones I know of to turn down. OTHER / JOHN there is a road in east Smithfield that goes off and comes on Milan road past Dandy mart has a sign there “No EOG Traffic” I called the people in township, politics and asked what is going on here? EOG does not want to fix the roads. So they’re bringing there trucks a different way so they do not have to fix the road.
I’m out every day play golf up to Tomasals in Waverly and talk to people about gas. It’s always in the conversation. Sit and drink coffee in the morning. Go to breakfast 2X week Harkness south Towanda and Tomahawk in north Towanda. Harkness is right near Chesapeake so I talk to the people from Chesapeake and talk every day and all’s it is about…..one guy’s asked me ”John when you gonna lease your ground? “Do you know what ‘agida’ is? Italian for aggravation. I am 75 years old there is no amount of money that I am going to sign if I’m going to get aggravation out of it.” I’m goin downhill. I listen to this. It is agida, aggravation. I hear it every day. Every day.

Gail “even though you haven’t sign up don’t you still feel the impact? What’s it matter that you signed or didn’t sign?” Just principle? Or?

I have feeling they’re gonna do whatever they are gonna do. If you want to fight it. They say get a lawyer. Take it to court. You think you’re gonna win that? Against the big energy companies? Exxon Mobil?

OTHER Don’t they end up taking your property anyway? If they’ve got it signed all around? I think they can pull it. To a foot w/in your property’s edge in fracking. So how many feet does that frack go from end of line? Still pulling gas from under you.

Everything I get from a company……everything written way beyond……you could be a lawyer and cannot figure it out.

Clare (John’s wife) Our neighbor has 600 acres – paid $60k for lease to be examined before he signed. with Chief. But Chief can sell off to anybody.

JOHN they’re gonna put a well……put sign out to neighbor right from his property. Right near mine. 400’ from line, then turned the well and went up sideways and passed it. Now they went right under the ground all leased by Chief crossed line owned by EOG. Well ends there right under his house. Now down a mile deep. Who knows what they’re putting in the ground? Poison it. Two days ago talking about putting radium….sends a red flag for me. I worked for Navy for 35 yrs. Fixing the new Jersey for Vietnam. Could not work 3 mos while get radiation off of clocks. Radium dials. … Putting in the water…they were using it to spread water, to melt the ice in the wintertime 2 yrs ago over in Troy. Armenia Mound. But that water runs into the ground, water supplies. The brine trucks, fracking…when state of PA took brine mixture and spread on road during winter. When I saw it they have detectable amounts – no problem – slight. But with me……4109

CLARE Three miles up --- from here. MAC Road.

JOHN: Drilled and fracked all around us. 1 ½ miles to 2/3 miles from our house 12 well pads. We are monkey in the middle. 14 acres. Piece of land. Not a farm. The lady that owned it had 56 acres farm all together. Bought 20 years ago. Raised in Sayre so I’m a life-long but worked my whole working life in PHL. When I took my pension, I never thought anything like this would happen. I live 17 miles from my hometown the guys tease me when you moving back to the valley? When I get two feeble to drive. I’ll have to move up to valley. Or let my younger woman drive me around. CLARE We did not sign because we did not understand the leases. We had man stop at our house years ago and he parked his van on the driveway and had elderly wife was in the care and he asked if she could use the bathroom and they were there for half an hour and they came back the next day. And at the time they were scooping up all the rights for $5, farms for $5 an acre. It was like a scam deal when you look back on it for a period of 8 years or so you see an elderly gentleman from Texas and his elderly wife and they were talking about your cat and your view and the next thing you know he left a check. And we never took the check we just gave it back. “You should think about it. You’re retired you need the money.” It was a scam. LIKE 8 YEARS AGO 2004? Yes. 2004. OTHER: Yes, $5/acre PER year. CLARE They were a 10 year lease. ALAN Yeah. They were a 5
year w/ a 5 year renewable. That is what the old leases say. OTHER FEMALE My mother-in-law signed one of those. She had 50 some acres. (LOTS TALKING AGREEGING) they wanted top actually have a substation, compressor station, but they couldn’t because she was still tied into this 10 year lease. Others signed for quick the Shaws the neighbors up the road w/ 30 acres/ they’ve been here for 35 years. They signed for a quick $5/acre and did not know it was renewable by the company. COMPANY? Sure Chesapeake – Jim Shaw JOHN Nah, they released with EOG. But then Chief is going under their ground so they must have an agreement with Chief. OTHER They swop. JOHN Chief has an agreement with EOG that they can go under their ground. Now, when I got the thing from, they did not get a notification either, and they’re going right under their ground. CLARE We got a notice because JOHN No we didn’t CLARE Well we got the notice from the water company came around to inspect water. They have to inspect every well w/in 1500’ of every well going in. OTHER. But that was before they drilled it right? I just got my water tested one month ago. And We’ve had wells up around me for 2 years. And They just came around to test our wells. Chesapeake came around. But it’s like….the wells have been done. OTHER It’s trendy to do water now. We got a 29 page report and cannot understand. TERRY My husband does not understand it and he does this for a living. And he took this into work so they could sit there and dissect it page by page because he has no clue. JOHN My brother Tom always says “Fear is temporary, greed is permanent. 102:30 15/17

START HERE DEB FOR INDIVIDUAL IMPACT TUESDAY 08MAY12

ROSEMARY. I live ½ mile north of Allen in Columbia twp and I’m an immigrant to united states for 10 years raised in Toronto and raised a family outside of Kingston rural residential I was here pre gas growth. Our 3.4 acres. Underground is leased to Talisman got better than $50/acre that was pretty motivating. 3 years ago leased. Our neighbors have wells south of us. And one to the north of us. We can hear their telephone ringing at 4 in the morning. It echoes through the valley. ALLEN can here it one mile away. The winds.

ROSEMARY The family that has the north well provides us with hay for our horses. She never hears any noise. So I don’t know if it’s the noise from the barn or the cows are what, but we can hear the noise all the way up the hill. Drilling trucks. Conversations. But, it’s all night, just this dnnnnnn and its only during the construction period cause its only during construction period. Even though they took his ‘best’ corn field. Dropped it right on there. This is his second pad on his property. But, there is another one just off his property line. So he is doing quite well, he is not complaining too much. We have another neighbor who has pipeline across his property and has been this close to being in jail because of difference of opinion with workers on his property. This close. He has been warned. By the judiciary. An impact as the result of the interactions between him and the workers. As a result, Talisman has hired a mediator. 59 20

Stepson #2 was hauling, well he learned to drive a milk, liquid, whatever and switched to work as water truck for a while and gave it up because of inconsistency of the work. that is sometimes you are working every day for months and months then all of the sudden there is nothing. Tensions were high. And because of the public perception of safety and everything it got, he just found it intolerable. His skill of backing up milk truck to milk house and he has no problem but now they have to make sure he is wearing his vest even though he is in the car/truck or whatever somebody else has to be out behind flagging him into place and you can’t back up unless that guys there and he’s waiting for his next load and then you are waiting for your next load….and anyway he just found it intolerable. Went back to milk hauling. THAT IS A PATTERN Yes, cows have to give milk or you lose your milk supply. He was recently married and with substantial help from his in laws he has been able to buy a house and so that’s really cool.

Step son #1 Older has been hauling milk all along and lives at home and has been looking for a rental or a home to purchase 57:39 for the last twelve months and feels he cannot afford it. The price range for rental housing has been pressured by the need of the gas workers and energy workers because of course just right up the hills from us we have wind turbines. So all of that pressure has just forced the cost of renting or purchasing beyond the scope of someone who is not involved in the gas industry who does not have help from their employer or bolstered wages or whatever. The other thing that they both report is the animosity for truckers is incredible. One was stopped one morning by a guy “You can’t be on this road with that truck!” “I can be on the road with this truck. it is posted as 12 tons. The guy says no it is 10 tons. Go check the
sighn. The guy walks back and he says “Oh, you’re a milk hauler. I thought you were one of those gas guys.” So….

I have horses that I water. I am concerned that if something happens to your 280 foot well with the residual gas that does not make it out the pipeline that four years from now if it percolates up through the layers and hits our spring and well then I don’t think the gas companies are gonna be there to provide decent water for my horses. I don’t know if that is part of their contract and that is a concern. My husband who has lived in this house since he was born says that if there is anything that makes emigrating to Canada to retire a positive thing it is that he can leave all this gas industry stuff behind. WERE YOU FARMING? ARE YOU? No, no we’re down to just four acres now.

Richard EATON. I was shanghaied. I have some business over here and something told me I should be here. 54:40. Well I have not heard what other people have said. We own a farm. WORKING FARM? No Been in the family. A retired farm. We live in metropolis of Leona a small town up the road outside of Troy. A 200 acre farm. We’ve leased it prior to current lease for a small sum of money at that time and when gas rush proceed our group we renegotiated for a substantial amount of money I would say nice compensation for the gas lease. DEB and idea – 200 ACRES X 4,500 = $900,000 They have not drilled in our neighborhood, our valley has been free of any drilling COMPANY? This has changed many times. We were with EOG and that has changed 3X from original lease. EOG tried to sell their large lot to a company called Newfield which I had never heard of before and I looked it up and they were into a lot of offshore work and they were not willing to pay the fee so EOG still retains the rights to the track that they are working with. In the long term I don’t know how you look at this. I know that I go occasionally to Ithaca new York, a nice town, and Cornell happens to be located there and Ithaca College is located there and they are the center of resistance it seems in New York state and been very powerful influence on NY State legislature. New York City has a watershed in the Adirondack mountains and they are very coveted of that because they face over several billion dollars if they had to put water improvements and they presently don’t have to do that. So there are a lot of forces in NY State preventing this. PA is a little different in that respect. We are not in Delaware drainage area, we are in the Susquehanna, so I guess our water is not used so much for municipalities as the Delaware water is. And plus we are rural, we don’t have many universities and colleges around to ….plus we are rural people when they first came out with these leases a lot of farmers here who had worked this land all their lives thought they had died and gone to heaven when that got $3000 an acre for the lease. So there was a big impetus to lease the ground. Later on after the drilling activity began, you still see a lot of farm families defending the drilling companies. And, so, we have some bad incidences in our county, not as much as in our neighboring counties. But Department of Environmental Services I notice in Dimock they just came back and said that 20 water samples were not contaminated. So you have that on one side, and then you have the idea - going to some meetings with Chesapeake - and they’re talking about their drilling activity that when you drill it down you may pierce pockets of natural gas on the way down and they tend to seep back up along the casing and then filtrate our watersheds near the surface more, and I think that’s a lot of what we are getting in our location here. So that argument has been going on and there is a longer argument of fracking and what’s the long-term effect going to be and I don’t know. Fracing has been going on a long time. It is now starting to be used up in WY and Dakotas in fracing for oil production as well as natural gas production DEB – NOTICE HE DOES NOT MENTION GOING ON FOR YEARS IN PA…. So it is not something that is going to cease being done and

The record at this point I think they are having some difficulty in pointing out it is a major polluting factor. History is long. What’s that old saying? Art is long and life is short? Well the same thing with Mother Nature, she’s a rather long life so we may not know what happen down the road. The payoff to the public to a degree is this natural gas is going to be replacing petroleum products that are more polluting than natural gas so you start to weigh off the things. You’re opposed to fracing, so what’s the replacement? Lots of people say well it’s the solar and wind. But we have not proceeded anywhere to near the degree if we were to rely on solar and wind if we were going to replace the power that you can get from petroleum products or natural gas. To me it’s a debate that is ongoing. What the answer is going to be politically I don’t know. NY State I am sure that eventually they will OK fracing maybe using different processes. I think it is going to come. Money has
a powerful influence. And uh, not to be gross about it but what’s the old saying in the street? “Money talks and bullshit walks.” Right? There is a lot of truth to that. I think the case is far from being closed. We just hope that they would do it in as environmentally safe manner as they could. 101:38. So that the tradeoff is going to be favorable, not unfavorable. JUST THINKING IN DIFFERENT DIRECTION ABOUT INDIVIDUAL COMPANIES HERE MENTIONED. DOES ANY ONE STAND OUT BETTER THAN THE OTHERS? HOW DO THEY RATE? eog, chk, talisman. SOUTHWESTERN.

ROSEMARY Which companies participate in the expos that they have at Alpron Park? RICHARD There is a multitude because alot of the companies that they have serving the major drillers. OTHER. They are supplying a lot of material and services. RICHARD There are a lot of lawyers there! Laughter. JOHN 47:15 15/17 These gas companies they trade leases back and forth. It’s like the good ‘ol boys club and if they were developing a certain area here and a competing company has land adjoining where they are developing, they will swop, they will trade, ‘I’ll take 50 acres here and I’ll give you so many acres over here’ so it all works out to their favor, everybody’s favor. I have been hearing this ever since this started because I have paperwork showing that people signed with certain lease companies six months later they were under a different lease company. SO WHEN YOU SIGN THAT LEASE IT CAN BE SWITCHED, RESOLD? Traded. Re-traded. OTHER WOMAN. It is kind of like a loan with a bank. RICHARD I don’t think any of us were very good at reading leases, I mean, they had a long time in developing leases and I’m sure that we, as neophytes did not realize the fine wording in a lease agreement. And we had to rely upon other people. And even some of our legal people I think were up to date on gas leases. Let’s face it, those companies have been in business a long, long time and they become very wise to ways that benefit them over people that they’re signing leases with. ANDY Another thing that I had heard according to some other people is that “This is just the start.” Below the Marcellus Shale is the Utica Shale. That will be the next target. Below that there is oil. There’s gonna be the third target. So they are gonna be here for a long, long time. It’s going to be a long haul. It is not going to be in and out in 20 years. They’re going to be here for a lot longer than that. RICHARD Well going around with what Andy’s saying – I’d heard that saying too and so I asked Chesapeake one time. I was serving on some kind of liaison committee with em. I asked em. Is this true that there is oil underneath? And they disclaimed that there was. However, a Shell man who was published in the paper that is published in Wellsboro was saying exactly what Andy was saying that they’re gonna be here a long time because there is the Utica Shale and there is oil underneath. So, one other thing, I have had about eight people contact me trying to buy a share a share of my royalties LAUGHTER. SO WHO ARE THESE? Well, they’re investment outfits CHATTER So, I have not responded to any of them but it kind of tickles me because I was at a drilling site one time, we were having a tour, and I brought this up to one of the gentlemen who was giving us the tour. I said sir “I’ve had these people trying to contact me to buy a share of my lease, or my royalties. Now how are they working it? Are they just taking a gamble that on some they’ll make out and on others they won’t?” And he kinda laughed and said “Son, they know more than you know.” So, what this means to me is a lot of this seismic, and that is what I wish we had, as citizens, access to seismic data. OK. So I am gonna write, I don’t know, the last one I got was from Harrisburg or Penn State or the area wanting to buy….”Say, so you’re interested in this, so your interest must be based on some kind of data. Would you mind sharing that data with me? So, I’m sure won’t get a letter back. But, ah, I think these companies do a lot of seismic work, they must be somewhat independent to a degree and other companies buy that data. Or these people would not be asking to get a share of your royalties. Because I don’t think they are just gambling with us. They are gambling with some information than more than what you have. So I think that Penn State University and Cornell 43:02 and the State in some way they have access to this and they do publish some of it. But it’s not finite, like detailed to the location of your particular property or area to know. And maybe you can’t get it but it would be nice to have that. You’d have a better idea. DEB – SEND RICHARD SEISMIC GUY OOGA. WHO’S CONTACTED YOU GAIL? GAIL. I’m not sure, Andy might remember. What I was gonna question you though if Im right or wrong. When you receive these letters and they want to buy your interest or your royalties or whatever…that is a done deal. OTHER. Yes, it’s a one shot deal. GAIL. It’s not like when you lease your property, we leased for five years, you have that option to up it or not. RICHARD It depends on how it is written because some are written with an automatic rollover, so, … GAIL I think ours was that we have an option to renew in five years. But with these royalties to these companies,
that's the final, because one of the things we were looking at, we have four children, we have seven
grandchildren and we thought if we probably will not profit from this. We are not expecting this. We did not
want it. We are looking to the future that maybe it would help our children somewhere along the way. And
that was one of the things that we had thought of. With this leasing you have that option. We could say to
our children, OK, we're up in age now, what do you think. But with the other, if you sold that, it was sound
money right now, but that's it, you are locked in, there is nothing to come for them, so……..ANDY there
were two different letters we got from two different organizations offering to buy it outright from you. Sigh
unseen. Almost unbeknownst to us. I WONDER WHAT KIND OF ORGANIZATIONS THEY ARE.
CLARE I remember when the people came to our house to do seismic testing on our property – as little as it is – fourteen acres – Well Duke University came and that was a special independent study that was last
summer. 40:35 They spent hours. They tested the wells. Measured everything. They were down in the
basement. That was Duke. And then we had people JOHN Chesapeake. CLARE the man came to the, Yeah,
well that was Chesapeake. But we had somebody came to the door and it was dinner hour and he said to John
“You know my dad.” And “Oh, yeah. Come on in.” And so the next thing we signed so that they could come
and do the seismic testing. We'll stay everything above ground. And if you want to come down and talk about
it they are down in the shopping center. Don’t cha remember? So, anyway, I mean, SO THERE’S
STRANGERS KNOCKING ON DOORS. CLARE Yeah. Yeah. Well this was not a stranger. We were not
obligated except through familiarity ya know. JOHN Well one of these companies did was come around and
check everybody’s ground. And they provided uh, It was all seismic testing. And I said. Yeah go ahead and let
them test. That was the only thing I have ever signed for. 75 bucks. So much an acre. Yeah.
ANDY Remember the day the helicopter dropped the thing in the back yard? The librarian out here. Sarah.
We had her over and we were sitting out on our deck and having burgers or whatever and that and GAIL. She
was going to dog sit and we assured her that no one would bother her that we lived on a farm out in the
middle of nowhere. These dogs are very protective. There is literally no one is around You will be safe.
We were going for like three days. End of story. ANDY So we’re sitting there and of course they’d been working
in the area for seismic testing and because of it being such a rural area, they were dropping these packages by
helicopter. OK? Uh, it’s the equipment. They drop ’em like an orange bag GAIL Parachute kind of thing
ANDY And the next day the workers will come on foot take the materials and GAIL spread the wires out
OH MY GOODNESS. ANDY And we’re sittin’ there and all the sudden this helicopter is right there GAIL
Over the patio ANDY And she’s like this….she thought it was an invasion. She was waitin’ to see people
come down out of that helicopter LAUGHTER GAIL We had plates flying. Flower pots Everything ANDY
Because the rotor going the wind coming down GAIL We have all this acreage! And they dropped it right at
the house. ANDY Sarah’s ready to jumped up and run off the…..GAIL There went my dog sitter
LAUGHTER. HAVE YOU HEARD ABOUT THE HELICOPTERS? ROSEMARY/CLARE? Oh yeah,
well they let you know when they’re coming and they wanna know whether you have livestock that would be
affected by it. GAIL Oh we weren’t informed. ANDY No. They just appeared and dropped the bag.
ROSEMARY Well it is probably because my neighbor made a big to do and…..LOTS OF CHATTER.
RICHARD Well I got a backhoe and I mowed some of their cables in half so…….Not on purpose,
but……they laid it out there. ANDY They lay them across the lawns. In our woods and all they drilled holes
20 feet down and put charges in the ground and run wires to the surface and then connect them to a sensing
unit and the cables and the cables go back to a sensing unit so ya know the sensing unit was right outside our
house. The cables across the lawn LAUGHTER and I was going along with a hand mower, moving parallel
to the cables because we both ride tractors. We both have our own. GAIL LAUGHING. If I make it nice
and clean here she won’t have to go to close with the tractor. Right? Well, she comes in and she says I run
through the cable and I cut it. LAUGHTER. So I called them down there in Wysox and I told them… GAIL
First he had to tell them that his wife did it. ANDY And so the guy said that’s ok we’ll send somebody out.
And here within an hour, here this, excuse me, little Mexican fella, he shows up and she runs out and she’s
apologizing to him, ya know, for cutting his cable. And he says somethin’ about (with accent) “Ok lady. I fix
it. It’s my job.” LAUGHTER And I thought they were just gonna just splice the cable. YA know, where she
cut it. But, nuh, uh disconnect the cable all the way back to the units and that. Lay all new cable! Yeah.
RICHARD I think one of the things long term, they talk about is vehicles fueled with natural gas. I happened
to be in Elmira on Saturday and I stopped at the Honda dealer. Who is owned by Williams consortium and
has the Dandy minimarts and everything and at one time they were supposed to put a natural gas service station at the new service station that they were building in North Towanda. And so I asked him So, do you have Honda cars fixed up to run on natural Gas? And he said “Oh, now, he says, they are only allowed in two states.” Well, I didn’t get into that with him. But it seems that you are part of the Williams group and you sell Honda vehicles and you have the Dandy mini marts that have the compressed gas supposedly coming that you would expeditie that process a little bit because it would help people have natural gas vehicles in this area. And, well, ya know ---- that’s business as usual….But it seems like they could have a lot more community favorable influence if they had accelerated this idea of providing natural gas places to refuel and providing availability of vehicles in this area fueled by natural gas. Not commercial vehicles. Private vehicles. And I asked him how much it would cost. How much it would cost them the difference. And they said $10000. And I said I find it hard to believe that it would cost $10000 more to provide a natural gas fueled vehicle than a regular gasoline fueled vehicle. TOLD HIM ABOUT WASHINGTON COUNTY SELLING NOW.

RICHARD yes. There is the capability but I have not seen it happening I do not see it happening here to this point for passenger vehicle. And if they are so interested about PR that is one thing that they could expedite a little bit quicker and it would help their image. WE’LL WRAP IT UP IN A COUPLE MINUTES.

JEFF 33:30 Something that Rosemary said. Since I live, I have a 50 minute commute. So my wife and I were looking at houses on this side of Pennsylvania, and there is, our price range is, well, not too much. But like in Elmira there were probably 50 or 60 houses that we could move into, and here there are maybe, MAYBE three…maybe. The real estate has sky rocketed. And you asked before – way back – um I did get a reference question, a guy called from Ohio, and he wanted to talk to a local farmer. And I said well I don’t know any local farmers. But I did give him a website addresses of Penn State and the County which would have its own slant and the PBS Station out of Binghamton has a link to everything about Marcellus Shale. And all the towns council meetings. So. SO YOU DID HAVE AN OUTSIDER. HAS ANYBODY ELSE?

ROSEMARY A Cooperstown woman came down here who was pretty active in the gas industry and they were I guess looking at what’s going on in the community as community organizers they needed to be aware of in order to deal with ya know their stance on drilling for their community. And they had one geologist with them I believe he was. His point of view was If you’re complaining that the water is all polluted where is your scientific proof that it has been polluted? And it’s kind of a challenging thing for somebody whose water has been fine all along and then suddenly their water isn’t fine and it’s ah, it’s really daunting to think of the degree to which you would have to provide scientific proof that something that seems to have been fine while your parents were there and their parents were there and who knows before living on the farm and now the water’s bad. DO YOU KNOW SOMEBODY WHO HAS HAD THAT EXPERIENCE? Well, only because there was a pamphlet was, that the woman who did the presentation had with her to represent this other person’s perspective. RICHARD You probably covered these issues, but there’s the social issues. Ya know there’s quite a significant increase in drunk driving arrests. I HAVEN’T HEARD. And that is debated by some of our politicians because this gets into a Party thing sometimes ‘cause one Party will say oh no, no it’s not that much and the other Party….I notice when I read the Daily Review, they always publish at the end of the week, the crimes and so forth and I start looking at where the people are from, ya know, Texas, Oklahoma, Arkansas and granted so you start saying well maybe there were 20 and maybe there were two. So is it significant. I don’t know. So then they went to the District Attorney and asked him. So yes, he provides corroborating evidence for DUIs and other crimes there is a significant increase – significant to him. Alright. And then you have the social service agencies – rape and crisis abuse centers and some….and they’re noticing some changes in their figures and everything like that. Then they’re saying OK, we’re having more social issues, are we getting any additional money to take care of these social issues? So when they had this, participating in this gas give-back, from this so-called money we are supposed to reap, is any of that money going to go into the County and is the County going to use that for problems, social service deals. So there are some “adjustments” I would say, that’s a polite word maybe, I would say to be made over time to make sure the services that are in need receive some ability to attend to those needs. ROSEMARY. There has also been some discussion among community groups that the generosity of the gas companies to support the community pools, like swimming pools and things like that will diminish because of the tax that they’re talking about being put on. The gas companies will say “Well we’ve only got so much and we’re given it to the tax now and ya know you’ll just have to, we’re sorry.” RICHARD They’re very astute politically too.
They’ve giving to the ones…they’ve been at this business a long time. And if you notice they’ll give to
sometimes, they’re not unworthy, but they get a lot of publicity out of ’em. I know my wife served on a
committee and it was a social service issue and the tended to back away because they did not want their name
to be connected with DUI, or their name with sexual abuse. That is something they did not want their name
associated with even though indirectly they may have helped contribute to it by bringing people in who were
less, let’s face it, a lot of those people are nomads. They come and go where the next job is.
GAIL I had a question to your question initially. Why are we upset about fracking today when it was going on
while you were younger. And I don’t know that that was answered, I don’t know if Dick would have an
answer, I don’t know was it we are more knowledgeable today because of newspapers, TV, maybe a little
more educated in environment. Years ago you didn’t really think about the environment. RICHARD I think
we’ve, we’re suspicious. We think we’ve been hoodwinked in the past over certain issues which were actual
things that should be concerned with and everybody says Oh, no that’s not of interest. I don’t want to be too
critical about it but let’s be honest there is a lot of lobbying by people with powerful interests. And if there’s
something that might be environmentally against their concerns they’re going to lobby extremely hard to try
to downplay it and ameliorate it to some degree and that is a fact of life. So over the years we’ve been
exposed to enough of that that when somebody tells you that this is white, well GAIL A little more savvy
RICHARD it’s almost an inbuilt suspicion. Maybe you call it the Missouri thing, ya know,” Show me.” We
want to be shown and proven that this is right before…….JOHN The acid from the coal mines went into the
rivers down around the where my grandparent lives by Lehighton, Moshockton, Jim Thorpe and anthracite
coal regions. And when I was a kid there was NOTHING alive in that river. There was no crayfish, no bait
fish, no clippers, hellgrammites, no fish, period. There was nothing alive in that river. Now adays it’s
tremendous fishing. CLARE Reclamation is good but you should look at the historically. Look what
happened at Barkley Mountain. It took 32 years to finish, They got the coal. They got the lumber. They made
the charcoal. And THEN THEY LEFT. And the money wasn’t used here. And now if anybody looked back
you know if there is nothing there. And 32 years. And, what are we saying here? Oh, it’s a peak we’ve got 100
years here and all the sudden it is a surplus. And the price is down. JOHN 1890. 1900. You could see
pictures taken of the mountains surrounding Sayre the valley. And you could see its clear-cut. There were no
trees. RICHARD You have to take into consideration too. Talking to foresters in the last 30 years we have
one of the richest hardwood stands. And a lot of those hardwoods were not native to this area. But when
they clear-cut it what came back was cherry and oak CLARE “CCC.” and some of the values. No, no, no.
This was mother nature. Traditionally our area was Most was pine and hemlock. And when they clear cut it
there were other deciduous trees took over and mixed in with it. Pine and hemlock became the minority. But
we live in this period of time. This 30 year period or 50 year period. GAIL. At least with the long view you’d
like to know that there’s some future benefit from this activity. It sounds like we’re carping around quality of
life details, and we’re not. At least I’m not. I just think that we should look a little bit further. RICHARD
And that’s something that we don’t do as a culture. GAIL Noooo..RICHARD And that is a shame. And
there are a lot of other cultures in the world that don’t have a good record on it either. And our capitalism,
free enterprise economy, part of it is competition so you’re always trying to cut the price. So you’re
competitively advantaged. And so you’re looking for ways to do and unfortunately that so there is a lot of
environmental degradation in the long run. And that’s a shame. But politically we are not active enough to try
to change it. ANDY I’ll add to about Dick talking about the natural gas vehicles. I’d worked for a gas
company for 36 years. Philadelphia Gas Works. They supplied all the gas to Philadelphia. Residential and
commercial. 25 years ago we bought a lot of natural gas, actually dual-fuel vans. They could run on gasoline
or natural gas. And we had the vans – 25 vans, about the same number in passenger cars. The problem was
nobody wanted to have a natural gas refueling station in their neighborhood. That was the biggest problem
they had in PHL with … there were companies that wanted to put them in various locations around the city
to try to get people introduced to this idea but all these local organizations put up such a fuss that it was
environmentally bad it was going to cause explosions they were going to …. It got into a fear thing with a lot
of the residents and they wouldn’t allow it. So all our vehicles had to go to one of our gas producing plants
down to be refueled. 15/17 2:1 05 So it was a test program. LAUGH. Each night we had two mechanics that
were assigned to the sub station that I was assigned to. Each night one of the mechanics would have to take a
vehicle. Take it down to the gas plant that was in southwest Philadelphia fuel it bring it back take another one
down, fuel it, bring it back, that’s how he spent his eight hour shift. Because you are going to opposite ends of the city. From the northeast to the southwest, cross through the city, you’re spending at least three hours traveling each time. So he spent his whole shift filling vehicles. And this went on for a couple of years. So finally, while they were trying to get these locally located stations, they wanted to get one ¼ mile from our substation. Phew! The public outcry. We don’t want it. The whole neighborhood does not want it. It killed them. They just lobbied the whole city. So that killed the whole plan. They were duel fuel. Running gasoline or natural Gas. Sticker on side of truck CNG. Just not cost effective to send these vehicles to that one location on Patchia Avenue not to far from .JOHN South PHillie. ANDY Not too far from where John worked in the Navy yard. GAIL I have another question . Is it true that Chesapeake is owned or how does Sweden play? ANDY Well they have interests in Chesapeake. Dick is smiling cause he knows. RICHARD Some of these companies. It was pretty expensive to come in here and do all this leasing and get starting with the drilling. Some companies did not have sufficient funds. And when the price of gas started going down, some of these companies were pinched pretty badly. So Chesapeake made a deal with the Norwegian state oil (STATOIL), so a portion of their business, I don’t know how it worked out, if it were leases incorporated and I think that I think it happened at least twice with Chesapeake. And then Mobil came in and bought out XTO out entirely because Mobil is the biggest company in the world as far as petroleum products go. Exxon Mobil. And so yeah it’s a game that is being played. And that’s where you’d like to be a little mouse in a board room to watch ’em play poker to see what is going on. THE NORWEGIANS HAVE INVESTMENT HERE. yeah. JOHN They had an article in Time magazine one time about chairman of the board, the big shot in Chesapeake, about his whole career about petro chemical industry, about the gas and oil, when I read about it, he was uh, he went to , he is the board of directors at Duke University, so when they came around to do our oil, they acted as if it was research….like what you’re doing... But I mean I think it was, probably had a lot to do with the gas company. McCLENDON. Yeah, he’s a graduated and he’s on the board of directors of duke university. RICHARD I don’t know how you look down the road. But the federal government has kept licensing these old coal fire powered power plants. And telling them that they’ve got to clean up their act. And a lot of them have been side-stepping that. So now it’s coming to the point where they’re not going to relicense, they have to go someplace else for fuel. There’s a market for natural gas. Nuclear now has a bad name. Russia has supplied Europe with their natural gas and they’ve kind of shut the valve off a couple of times to some of those countries, Ukraine and so on, so Europe is in fear of long-term events, so there is a market for our natural gas. IF THEY DON’T DRILL THEIR OWN RICHARD Well, they are doing that in Poland and places but I don’t know whether it is simply the size of the European part whether they have enough. 1:34:15 Then you go to the far east and Japan and Korea, dynamic economies, they don’t have enough natural gas, petroleum. Japan doesn’t. So we built these ports to import natural gas and now we want them to export. And as you said they are very explosive and there is a big cry as to where we want them located so everyone wants them offshore or away from major population areas. ANDY Back around 1980 from Venezuela they were bringing it in by ship. The Pasyung plant down there. We built special tanks to hold it. Refrigerated tanks and all. They tore em down since. They’re gone now. Venezuela was where it was coming from. JOHN They talk about 100 years down the line or 50 years or 60 years about picking up natural gas in this county. They’re putting lines all over the place. Pick up lines back and forth across your land. I shudder to think of how that is going to deteriorate over the years. And the start leakin’ and start havin fires and explosions and everything else. And once that line in there and you get a leak here and a leak here and it starts in and you probably have to replace all the lines. GAIL Kind of like in Philadelphia with all the gaslines. WE’LL WRAP IT UP. I REALLY APPRECIATE IT. I WOULD LIKE YOUR ADDRESSES TO SEND A THANKYOU……IT’S FASCINATING. WHAT YOU ARE EXPERIENCING I THINK IS UNIQUE. Did you do any of this research in Washington County? CANONSBURG. JOHN That’s Perry Como’s hometown. He was a barber. MCKEAN COUNTY – FRACK CONVENTIONAL WELL. BIKE RIDING WARREN COUNTY. CHANGED COURSE TO SEE MARCELLUS WELL. LIMESTONE TOWNSHIP.

CLARE Have you driven around here? JOHN How about Armenian Mount? Some of those pads with multiple drills on them…..west on Route 6 toward Mansfield…….RICHARD Thank you for coming. Good luck.
ROSEMARY Did you want that article about the girl whose water went bad?

JOHN Meeting of the Bored down in Towanda. 7:30A. Harkness Family Restaurant. 7/8 to 12 guys we have coffee. And they talk every day, twice a week, right down where Chesapeake is. Monroten. I was raised in this area. But when I graduated I joined the Navy. And when I retired I moved back up here. And I come from the valley up in Sayre. Old railroad town. My dad was a blacksmith on the Lehigh Valley for years. Picture of the building. Old Lehigh building. The biggest railroad shop in the country. It was very interesting. Thanks a lot.

ROSEMARY This is from the newspaper. And the paper she is presenting is this one. The fella who was at the Cooperstown group that met here to speak with this lady. The first thing he said was If she’s in hair dressing then barium is one of the products is in hairdressing stuff. So she would have to prove that barium did not come from the products.

JEFF – Excuse me Debbie. Alan, who works in real estate is on the phone and wants to talk to you.

ALAN –

ANDY – John was asking about the gas leaks in the pipelines. Right behind our house is the Tennessee supply line. It comes from over here near Troy. They are going to double the line. One is in there now it is 24 inch line, the second one they have cleared the line to lay second line in will be 30 inch a transmission main. They fly that pipeline once a month for leaks. With helicopters testing for leaks. That has been going on for years. He flies low above that pipeline with a device that samples the air. So they might do that sometime in the future like the feeder lines. That’s been in effect since we’ve lived up here for 17 years. They have been controlling for 17 years. I WONDER ABOUT THE WIND TURBINES. Well, she lives right close to Alan and Rosemary they are in sight of them. They make a _____ sound. When a lot of those people when they signed those leases up there, they were under the impression they were going to reap some of the benefits of the electricity generated. Only the electricity goes into New York State. What they got was lease money for the property but that’s it but no power. RESTAURANT?

ALAN – Called back since he works in real estate. Made comments:
- Impact “has kept us busy” now the local people can move and do things (because of jobs)
- Does not see sustainability Sees move to Ohio.
- Huge housing shortage for rentals. $300 to $500 and $1200 to $1800. Or houses bedroom for $500
- $2500 - $3000 for a house
- Company comes in stuffs dingle beds for shift work rotate
- Buses in and out in vans – 20 in a house
- Live in campers. 20-30 campers there in lots.
- No increase in home sales
- Commercial impact – not sales – mostly rentals
- Road frontage property – mostly storage
- 2 motels to 3 built in county
- 2 more being built
aroloson@frontiernet.net

Table in library. To my right: Terry, Jerry, Jeff, Gail, Andy, Bill, Alan, Clare, John, Rosemary then Richard came.
Appendix K: Interviews at The Meeting of the Bored April 10, 2012

Interviews with: John Boritz, Alton Homan, Ron Russell, Lyle Harding, Jim Lacek, Jim Bennet and a few others whose names I did not capture at the Meeting of the Bored

April 10, 2012 at Harkness Family Restaurant in Towanda, PA

Interviewed by Deborah A. Johnson, Photos William S. Johnson, Jr.

Questions and some comments in uppercase text are mine – daj

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Ron Russell, Jim Lasig, Jim Bennet, and I’m John Boritz. He’s money bags. We’ve already convened the “Meeting of the Bored.”

SHALLIONAIRE? HAVE YOU HEARD IT? JOHN: No. Maybe some of these. OTHER: You don’t see any Bentley’s in the parking lot.
Most not from here. Came here to work. I’m from Central PA area. George from Suffolk, NJ. We came up here to farm and raise some sheep. To the locals I am still an “outlander.” The next two are from over Tioga County. He’s from Wilkesbarre. One born in the house he lives in. Lake Wysocking.

At this table you have the spectrum. Most of the money that most of the people here have so far received lease money. It’s the market place at work. The earliest people who were sittin up there and of course the size of the land determines the factor. A guy with 20 acres does not get as much as guy with 200 acres. Yet have the same lease. The history is that when the land signup people came into the area $165, $120 was considered a pound of gold per acre. So if a guy signed up for $75/acre and he had 100 acre farm it was a hand full of money $7500 However very quickly w/in a couple of years the marketplace took ahold and the average it went up to about $25K then to $45K. I would offer myself as an unlucky example. The lease money quickly moved up to about $4500 per acre Bradford County. Of course there are sort of hurt feelings with a lot of people. Gee they got me for for $65/acre and he got $4500 so that’s the difference that evolved over the years. OTHER: I got ½ and acre and I got $3500. Well they don’t lot .37 acres $2175.50 lease. Just takes me ½ hour to mow it. OTHER I get 20% royalties. Yeah I do too. RECEIVED? Not yet. OTHERThat’s the other truth at this table. While all the landowners at this table probably got their lease money. There is a very reasonable chance that before a lot of royalties come in without these outside lines we’ll be dead with our estates. The original gas lines they started pumping right away. They’re just now starting to finish these pickup lines for these wells. It may be another couple of years before they pay on those leases. Those are the ones lined up. But of course the others that are not lined up they cannot sell any gas cause they’re not hooked up yet. OTHER I would guess that more than half of wells not hooked up. OTHER They got over supply now just think what it is going to be. OTHER Last summer, I believe 112 producing wells at that time. Last June/July. I think the gas companies have drilled themselves out of prosperity. There’s more production, more than we can consume. And the weather was so mild this winter. They started working on the well past DuPont. They’re shutting down. Bill Judd had two wells on property. They shut him down after two royalty checks. I live in town and sold my ½ acre. What did you get? I don’t know I have to ask my wife. She cashed the check. She has the money. 1 35 32 LOTS OF CHATTER. They call it Truckville. There’s trucks all over the place. Unbelievable. Service people around here busy. Tripled Pickup truck sales. Lots of windshield repairs. The roads with stones flying up from tires. Guy putting in dormitories. Modular homes. JOHN That was interesting yesterday. I have to thank you people. That was interesting to share. I can remember our neighbor signing up. And I did not sign. They gave me a check for $450. If you sign the lease you can cash the check. I said no. I am not signing up . I am not leasing land. I have a little bit of ground. Never had any before. He said John you’re going to be filthy rich! Hey – money ain’t everything. You can’t buy poverty with money but you cans sure spend yourself into poverty. Italian word for aggravation is adjoini . At my age there
is no amount of money that can make me want to suffer adjoin, aggravation, it is my old way of thinking. And it’s still there. They can go under your land. They can’t do anything on the surface but they can go under. They pay 12.5% royalty. OTHER They can’t be any lower. They put in a 42 unit modular hotel. One company, one week before putting it up, said they wanted half of the rooms and a week later they said we’ll take all 42 rooms. One young lady rented the entire place. North Towanda nearly all of that is rented by gas workers. We’re getting 30 more rooms north of town. Over in Wysox another hotel going in there.

OVERLAPPING CONVERSATIONS. JOHN Now my neighbor who is filthy rich – he is environmental – concerned about water table, soil – and there is a lot of people who feel very much about that. Raising cows, pigs, if you have a water problem you really got a problem. They’re used to dealing with problems cause they’ve been farmers all their lives. This is a chance after all those years … this is a godsend. OTHER There were rumors they were going to bring in the biggest derrick of all time – they were to start this month. I haven’t seen any extra large ones. There is one going down the hill into Wyalusing on the left. They are usually there from between 4 to 6 weeks, about 5 weeks at a time drilling. There seem to be three different drills. A small one to set up an area for the well to do the vertical well. And that’s usually the larger one. Then a smaller one comes in that does the fracing. Those are owned by the company other times………..People like Halliburton are hired by some to do the fracing. There were about 10 different companies doing the drilling. Chesapeake probably owns some of the rigs. But that is a smaller rig. It is surprising the entire rig is mounted on a truck for doing the fracing. It sets itself up. It is hydraulically raised into position over the well. A lot of change. Rents went up in the area. Two or three times. 2 ½. In some cases 3X. The elderly people need a place to stay on fixed income cannot afford the higher rents moving out into other facilities or with in-laws or somebody. They had been renting and the landlord said we can get a lot more money and they cannot afford it so they have to find somewhere else to stay. Right now there are several projects for trying to help solve that situation providing low income housing. And the was to lead us???? One of the county planners has some projects under way and the regional organization Treehab is buying some facilities already built to fix them up to build low income housing. Their headquarters are in Wyoming County I believe. The local planners on other low income for displaced because of higher rent. Anyone who can’t afford the rent increases are affected. When rent is doubled and they’re just existing anyway. Doubled or more. And other thing we deal with is TRAFFIC. There are times that traffic gets pretty difficult. Takes you quite a while to get from one place to the other. The cars are lined up. From the bridge all the way back the village of Wysox around 3 o’clock in the afternoon. When they were making repairs from the flood to the bridge where they slowed people down the traffic was backed up to 1 ½ - 2 miles on Route 6. So it does not take long for traffic to filled up. It has created problems for the local people for instance one of the local garages ordered a part from an automotive supply place in Tunkhannock about 45 miles from here and got partway here and they said we cannot spend our time sitting in line waiting to deliver parts We can deliver parts closer to home. It took too long to get here. So the dealer does not get the part to make the repair. So they had to reschedule when to make their trips here. Cause there are times when it is not bad here. Its bad from 7:30 through ‘til about 8:00 o’clock by then most people are at work. Then not bad until 11:30 to 1:30P people trying to find place to eat. Then it drops back until around 3:00 o’clock because we have Sylvania - ---- another company owns it ----- Tungsten Products GP 1:14:22 some of local companies like DuPont, Craftmaster used to be Masonite, stagger their work release time. Start at 3 o’clock, 4 o’clock, 5 try to eliminate the bottle neck. But the roads are still full until 5:30, 6. “So if you want to go to grocery store to pick up milk and eggs. You reschedule your time for the times in between when the traffic is…..So it changes your, when you do ….”

1:11:17

RON RUSSELL. I wish I could sit down and talk with you for a while. Why don’t you give me your e-mail address. I retired from DEP. You’ve heard of that before. I am from over near Wellsboro originally. I have a daughter and son-in-law and grandfolks live in Coudersport. So I am familiar with that part of the county. OTHER Do you know the area publication called The Driller. Northeast Driller. It looks like a newspaper. It comes out monthly now. You can go online. It is as thick as our regular paper, maybe thicker. Got all the well sites on it. Put out by gas companies. By the newspaper. Written by companies. You might want to check up in North Towanda County Office. 1:07:55 We are going through a transition. See us older guys we remember cows and pastures and corn and fields. We think that in about 10 more years everybody is going to be normal
again. **We think it is an abnormal period of time because we are in transition between cows and gas.** I don’t think dairy is coming back. No. Dairy won’t be back. But all the younger people will remember is gas. They won’t remember cows. **HOW DO YOU DESCRIBE NORMA?** Gas company. **PREGAS?** We’ll be dead. It was cow country. Dairy cattle. Cow and veal, cattle, hay, and they’re all gone. **OTHER** Since the farmers gave up dairy a lot of hung out and just raise some beef cows and some heifers sold hay. Kids don’t want to go into farming. So the ol timers are dying off. Farming will not support any debt. If you owned the farm that was one thing. But to borrow $100000 to start anything, you’d be dead. That would not get you very far. It would not even getcha land anymore. **YOU FELLS FARMERS?** We grew up on farms. I worked for USDA. You will have farms a lot of the people are using lease money. But, Farms are consolidating. If your gonna have a dairy farm here you’re gonna have several hundred cows, multiple members of your family operating the farm, a few of them left and they will probably continue. But for the most part the dairy farmers in this county are 50, 60 years old. When they retire that farm will not be a dairy farm unless they have expanded and they have their children help run it. **1:05:30. BIKE RIDING SUNDAY SAW FARMS NO COWS.** The farming area is between Troy and East Smithfield, that is probably the largest area in the county where farming has survived. A lot of cows you will not see in the fields this year. Big barns. They keep the cows in. I worked for the Bureau of Forestry. And the forest industry has called off too. There are a couple of sawmills left. People who had stuff, where collected a lot of money in the past, just selling mineral rights, they’re not interested in the woods anymore. And their kids, they’re all gonna move someplace else and sell the property here and collect money. That’s all. There used to be a lot of log trucks hauling logs over to CraftMaster. Yeah, you see one a day now. I mean CraftMasters is at a low in the last several years because of housing. The lumber companies are in southeast asia, south America. **JOHN Ingersoll Rand plant is here. I have to laugh when they say “the companies are gonna move” They got so much money invested in this county and there is so much gas down there that eventually they’re gonna need the gas. It might not be now.** It might be 15, 20 years down the road. We don’t care. We’ll be kickin’ up daisies. **BILL JOBS ARE INSECURE THEY SAY WHEN STARTS OUT TAKES 40 TO DRILL 20 TO FRAC AND ONE GUY TO TEND 20 WELLS WHEN AFTER ITS DONE OTHER: Oh yeah. After the drillin’ done, they’re all gonna be done. And that’s when these hotels will become senior citizen housing.** That’s the lodging I see into it. **OTHER Drilling will continue, I think, for a long time. OTHER Yeah, but there’s only a couple of guys who do this. You don’t need 40 guys. Two, three guys….OTHER Right, but how many wells are there? **OTHER** They can take care of 20, 30 wells or more. **O But they’re still going to need a lot of service people because you still have to have compressor stations. Still have to have the machine ops And they’re going to build pipelines here for a long time. And right now that’s….Maybe 10 years and they’ll be gone. **JOHN A year ago some guy from Chesapeake was in here. I was talkin’ to some guy from Chesapeake….Can you imagine me talking to somebody? But anyway, ….the guy said “This is 15 percent of what we’re gonna have, right now.” And this was a year ago. Puttin’ the holes in the ground. So, it’s gonna be a zoo around here. **OTHER I think the activity will continue for a lotta years because they will come back and refrac the wells that they’ve already fraced. **JOHN And re-drill. And drill more wells. OTHER And drill more wells. They’ll find a way to go back into that shale and extract more. There only getting a small percentage now. These pads when they put down one well, most they’re building ….like Chesapeake and other companies….they’re doing a couple of wells. They’re coming back and drill the other JOHN 7, 8 or 9, 10 wells on a pad. **OTHER In Texas coming back and these lines are going out 5,000 feet or whatever and they’re gonna go down and go in between ‘em. Ah, and then we are talking Marcellus but there is still the Utica layer and who knows what’s under there. So, I don’t think it is one sot and gone, it’s gonna slow down because as I say I think they drilled themselves out of prosperity. OK. There’s just so much gas and, they come in here, and they think it’s mainly cause of greed, they’ve had all these cheap leases like you said they got some for $50, $60 dollars and they went up to some say almost $6000 for payment. So they’re trying to get all this gas, get these drilled so the leases don’t run out so they don’t have to pay more so. **JOHN And then like I was sayin’ yesterday, there are so many lines in the ground that eventually they are going to deteriorate and start leakin’ and you know where the hell there going to go in the water supply…methane….** **OTHER Ahhh I think that is far, far overblown. **OTHER Yeah, those lines aren’t gonna leak. You’re gonna have leaks, I worked for the gas companies checkin’ gas leaks back in the ’50s when I was goin’ to college. Yeah, I would run into leaks every now and then but they were lines that had been in the ground for 40, 50 years already.
Comin’ up out of, these were old tentacle lines. So, this stuff they’re putting in the ground now, they’re wrapped better than they used to be. They’re getting away from the cheap Chinese pipe and getting better piping cause they found out they couldn’t wrap ‘em. HEARD ABOUT CHINESE PIPE 0:59:10 Yeah, that’s a bad metal. The pipe factories are re-opening here in the United States ‘cause they found out the cheap pipe doesn’t work. Won’t weld properly. OTHER It ain’t just China. We don’t know where. We used to sell thousands of pipe you could not thread on a machine. We had to carefully do it by hand. Ha, ha, ha. I used to work in a supply house. Plumbing and electrical heating. OTHER There is a gas generating station going in about two miles. Gas fired, air cooled, no water. OTHER Oh, yeah, there is water. Other No. Other Yes there is Towanda is supplying them with water. Other It is an air-cooled generator. Wysox. Other And they’re putting one in in Lycoming County also, near Williamsport. And then rumor has it that Pennsylvania is going to convert all the coal fired generating stations over to natural gas that’s over the next few years. Rumor has it, but I think it is a good rumor. 0 57 25. VEHICLES. That’ll happen. Ya know, the chicken n the egg deal. Who wants to buy a gas-fired car if you can’t get fuel for it? So who wants to put fuel in if you have no one to sell it to? OTHER The chicken and the egg. They done a program on CNBC yesterday and it had Sentelli there in a garage and he and the mechanic were putting a converter in a car and said it can be done in a day easily and there’s not a lot of cutting and ---- head on modules and somethin’ like that. I thought they were a little high but he said the conversion would run $9400 bucks. And they said something about putting a compressor station in your garage somethin’ in that range as well.. OTHER That’s if you have a fleet of cars. OTHER for the homeowner. If you had natural gas you have to compress it to use it. OTHER I think in the next 3 or 4 years there gonna be stationed all over the place. OTHER Randy Williams there, with Williams oil was supposedly gonna do one but I don’t think he has yet, but I don’t know. OTHER No he hasn’t. KIDS COME HOME DUE TO ECONOMY? My son-in-law came back from North Carolina he can make more money here. He got a job as a truck driver he has a CDL license They started him off at 20$bucks an hour. JOHN I started working --- in 1957 for computers for the Navy and I liked the public schools and basics and everything. They had the main computer on the ship was the size of a big freezer where they keep beer cold in a bar or somewhere …that big and when I retired in ‘91 just 21 years ago the computers were a lot smaller, but now a kid with an iPad has a lot more capacity than what we had on a whole ship when I retired. So, that’s what I say. When they say we’re gonna use gas to power the whole world, energy source. In 20 years it might be all gone, they might have something altogether different technology and use a different energy form that we know today. Cause everything’s movin ahead and like that’s why I can’t get excited. It’s like when I come up here I moved out in the sticks and it was 4 miles for a loaf of bread or a quart of milk. Now Christ almighty it’s like a zoo goin’ by the house traffic all over the place. The only thing we had when I first moved up here was milk truck in the mornin’, school bus twice a day, mail man – Federal Express or FedEx or whatever the heck or UPS once in a while makin’ a delivery and the local traffic – tractors and the people who lived out in the country. Now, cripes it’s just wild. You gotta be careful when you’re mowin’ the grass along the side of the road…somebody don’t come across the road and run off on the shoulder and knock you down and kill you. They’re driving the crest of the hill and they don’t see nobody. Then all the sudden you have an extra wide load of equipment goin’ somewhere and they force somebody off the road and you’re there mowin’ and you don’t hear ‘em ‘cause the lawnmower’s runnin’ Why I always tell my wife “Don’t mow near the road. I’ll take care of it.” And I am always lookin’ and watchin’ until I finish the edge of the grass on the road. OTHER The traffic was really bad here, but last fall, until things started slowing down. Drive through Wysox there were times it took ya a couple miles half an hour to get through Wysox. Today it’s not anywhere near that. There’s still a lot of traffic, but not like it was – backed up from the bridge clear to you’re goin’ up….OTHER About five miles OTHER to the top of the hill. And it would take forever to get through Wysox OTHER Bumper to bumper. OTHER usually the worst, for some reason always Friday afternoon, it was always time. If you’d come into Wysox between 4 and 6 in the afternoon you’re –traffic would be backed up all the way down to Wysox. Uh, sometimes in the evenings it would be backed up, but it’s not like it was last year. JOHN A guy told me from CHK a year ago that only 15% of the activity were gonna have up here- when they’re gonna get full blown and that means its gonna start up again and be 85% worse. OTHER I don’t think so. All you gotta do is wait for a cold winter. OTHER But I don’t think that a cold winter is gonna make that much of an impact anymore because of all the gas they have out there. We’ll have some but until they start exporting the gas which I think they will Until they start using the gas for
trucking and what not……OTHER (Talk about Solzinitzen…….books as gives a book to friend. “The Red Wheel 1914”)

OTHER How are they gonna tax fuel when the finally put it on the market? Natural gas. The state, the federal government. For road taxes. It’s easy to tax out the gasoline. But what if people start putting in private compressor stations? How you gonna collect fees on that? You’re still gonna have these vehicles runnun on the roads? What if somebody’s got a fleet of 6 or 7 trucks. Small trucks. They’re definitely gonna convert over. That’s who is converting first. UPS, FedEX, CocaCola people, the busses Are they gonna put in their own compressors or Who’s gonna do that? OTHER I’ve wondered that myself.

0 47 32 RON RUSSELL We have a little over an acre and a quarter JIM LACING JIM BENNETT JOHN BORITZ and we have a gas well that’s, we are in the unit, well it’s not on my property but we have one of the horizontal ---- we get a license the well’s drilled they’re --- a large gas main right now that is maybe ½ a mile from my house. WHERE? Right along ---- West of Towanda on Route 6 about 3 ½ miles from town here. And, we expect with an acre and a halve we don’t expect very much but I’ve got a ---- gas person we have factions here in the County you can imagine there’s pro gas people and there’s anti-gas people and a lot of that has to do with how people ---- with the gas company at the time of leasing ----- Low lease fees and high lease fees that was a big --- of any factor and a lot of people got angry about the conditions of the roads and stuff……..NOISE………..There’s haves and have nots. Everybody is not a land owner in the County, ya know, but everybody uses the roads. OK. So a lot of people were affected negatively, right? They aren’t all landowners as I said and they don’t receive any benefits. And, uh, that tends to instill a negative attitude in some of these people. One of the things that kind of surprises me and concerns me is the fact that the, there are people making a lot of money here. There are. There’s people who have sold property, there’s people who rent property, there’s people with businesses, all kinds of businesses, naturally they’re making a lot of money. And, uh, I’ve always thought that the American way was that if somebody had something in their county or their state that others wanted, for example the oil strikes in Alaska. I’ve been to Alaska as a tourist and I know that there’s a mechanism where every citizen in Alaska receives a benefit. They get an annual check. Every adult receives an annual check. I know cases where, when a township, a landfill, there are monies collected by the township and there’s advantages to that township for allowing that landfill to be in that township. Monies go to that township and is used to reduce taxes. Maybe provided benefits to those citizens. I see very little of that done by the gas companies. I can’t blame it on the gas companies. You gotta blame it on some of our politicians to do anything. We read in the paper every day “Oh, we don’t want to offend the gas companies. We don’t want to impose fees on the gas companies. Because they’ll leave.” Well, they won’t leave. There is only one reason they’re hear. It is not ‘cause they’re friends of ours. We’ve got something they want. And it’s not millions of dollars. It’s billions of dollars. So they’re not gonna leave. So you look across the northern tier of Pennsylvania and all our counties and they’re saying that Marcellus shale. We have all this gas. Uh. You read in the paper the economic stress the country is in. To a degree we have that same stress here. As I said earlier there are people in business who are making money here. The average citizen doesn’t see that. The average citizen sees that having teachers laid off in our schools every year. We have programs in our schools being discontinued because of lack of money. We have schools this year that have had to do away with home economics – discontinued the whole program of home economics. We’ve had schools that do away with shop. We’ve had schools do away with farm education. Laid off those teachers. Discontinued the program entirely. Because of the lack of state money coming into the county. Why should an area that has so much going for it, so much money. Why should we be losing our teachers? Why should we be losing our 0 40 47 (state universities?) ---- Why should we be having other states service employees being laid off because of lack of money? Just because we the rest of the state is in bad shape? I don’t think that’s fair. I think if we have to live through all the negative aspects we should see some positives too. I don’t think our teachers and our programs should be curtailed. And, uh, nobody talks about that. 0 40 16 It’s terrible. Personally I know teachers, not only in Pennsylvania, but up in New York State, see we are right on the state line. There’s
people who live in Bradford and Tioga county that teach in New York State. I know a gentleman that’s an ----
teacher. He’s a string instrument and orchestra teacher. He’s taught there for 23 years. He just got his pink
slip. At the end of the school year he went without having a job. They have to do away with their orchestra
and their string program. Because of state budgets. Of course this is NY state, but of course NY State has
Marcellus shale also. There’s been a lot of teachers who don’t know if they’re gonna have a job next year or
not. And that’s just one aspect of it. The other aspect of it is the kids. What about the kids? Where are they
 gonna get their jobs? I think that we are going through a period of time that you hear on the national news all
the time about all the jobs we’ve lost to overseas. And its not necessarily technical jobs. It’s jobs where
they’re making something. We don’t manufacture ---- And the only way you learn to manufacture stuff is you
gotta be schooled in it. So, why do away with the programs? Why do away with shop? Why do away with
home economics? Why do away with the farm program? And it’s being done. OTHER It’s part of the
dumbing down of America. Wealthy people go to private schools. What do the politicians say? Parents should
teach their kids at home. What’s against the public school system? --- is running for US senate. What kinda
people are running this country? The loonies. RON I remember back 8 – 10 years ago, one of the big things
that our politicians and our educators telling us is that the future of America is not in production. The future
of production is over in China, Malaysia, Brazil cause that’s where cheap labor is. What we’re gonna do, is in
America it’s gonna be service jobs. OTHER That is what they were telling us on the news. RON And we
listened to that and we believed it. Well, how many service jobs do we have in Bradford County? How many
tables can you wait on? How many McDonalds sandwiches can you serve? How many rooms can you clean in
a motel unit to afford to buy a house, to buy a car, to put food on the table for your children? You can’t!
Even if the mother and father were working at McDonalds or Walmart. They can’t afford a house. They gotta
have decent jobs. They’ve gotta have those manufacturing jobs. GAS INDUSTRY BRING MANU BACK?
OTHER I thought that was in Ohio or further west of here… it was in different states. OTHER 16/17 0 35
28 We’re getting the gas generating plant. Being at the source of electricity doesn’t make it any cheaper.
OTHER Yeah, but you’re at the source of gas and that’s gonna be cheaper. Yeah, just like pamper factory
down the river. Do ya think Pampers are cheaper around here? We’re going to have cheaper gas cause we’re
not gonna have to transport it. If they can negotiated with gas companies …. Uses a lot of gas like Procter
and Gamble down there Mishocken. About 25 -30 miles down the river. But, I think it’s an opportunity for
some industrial companies here. OTHER Well P&G put its own gas wells in. OTHER Have you talked to
what’s his name down in Progress….Tony Vitello….The Progress Building. Economic development. Quasi-
government. Knows anything about anything about the planning stage or what not. Anything going on today.
Tony has more contacts with the planning commission. COMMISSIONERS? They’re idiots. Laughter. Two
of them are. They were vehemently opposed to the Impact Fee. They were so afraid that the impact fee
would chase the gas companies away. I think they will vote for it. Cause they have two more days to pass it.
And according to what I’ve seen in the paper. The municipalities are …all but one has passed the resolution
in favor of it. Southcreek has not. In yesterday’s newspaper. They vehemently oppose it. For the most part all
the other municipalities have passed it. So I think the commissioners will vote for it. The Commissioners are
opposed to it. They just don’t believe in taxes, progress…they are always looking for government money but
taxes are no good. LOTS OF EMOTION CREATED Oh yeah. There are a few – I don’t know what you
want to call them – they’re opposed to anything, like, environmentally. We have three major industries in this
town which is unusual for a small town like this. We have DuPont, GTB which used to be Sylvania, and
CraftMaster. OTHER They are out of Belgium OTHER CraftMaster makes cardboard, it used to be
Masonite. They don’t make that there anymore. So we have three major industries in this town. Stable
industries. Very unusual. And they will be here. Craftmasters is low because of housing. Once housing picks
up they will pick up. The other two industries are pretty darn stable. The GTB company. There are only two
in the world. Something like that. They used to make television screens phosphorus. They made tungsten wire. Tungsten’s goin’ out. I don’t know if you’ve looked into New York State. New York State’s still got the moratorium going on fracking. But there’s this company called GasFrac, are you familiar with that? That frac with propane, not water. This is not that new the Canadians have been doing it for some time. It’s a company out of Canada. So there’s this group up in NY State Broom County what not north of Tioga a consortium of landowners and gas….so that want to go in and use gas the technique that GasFrac is using. And apparently there’s no moratorium in NY State on that. So it’s interesting for people who bought stock in GasFrac….LAUGHTER…..Or bought it high and sold it low….last week. LAUGHTER. I just wonder if NY will find some way to put a nix to that. OTHER They are so ‘anti’ up there. OTHER So anti. DEFINITION OF FRACKING TODAY? It’s a very dirty word. It’s worse than the ol’ F word. Ha, ha! It is the shattering of a layer with using compressed effluents. I think they’re upset about the unknown. They use volumes and volumes of water around here, and how do you dispose of that water? And there’s always accidents. You can’t avoid accidents. There have been a number of accidents here. Spills and that. OTHER Every industry has that. OTHER You’ve got a fuel tank going down in the back yard. That truck was hit up in Clif Athens sp? A fuel truck cut right in two and dumped. That was home heating oil tank though. So, I don’t know. You can’t have anything without accidents. I think for the most part fracing for the most part is environmentally safe. WATER OTHER We’ve had bad water in the area for a long time. He knows more about it than anybody. OTHER I’ll give you an example. I worked for the USDA actually the Conservation District built a new office in DALTON? … we couldn’t drink the water, we’re talkin’ say 20 years ago, OTHERS late ’80s early ’90s maybe. OTHER OK. It had barium, it had arsenic in the water OTHER manganese OTHER manganese, sulfur…We had to treat the water before we could drink it. That’s what we have. That’s what people are finding out. OTHER It was a well kept secret. Nobody wanted to talk about it because it would lower the value of their house! OTHER Well….nobody had their water tested OTHER Well they used to was test it for bacteria. OTHER You’d test it for bacteria, not for anything else, and, OK. All you hear is the big thing about the Dimock area, OK? Most of the people in the Dimock area moved in from other areas. OTHER from the city, where they had public water. OTHER Whether or not, Cabot, I think, was kind of a sloppy operator over there and they had some accidents and they had spills but not all the water was affected. And a lot of that water, it wasn’t tested before hand, so everything they tested afterwards they said we’ve got all this stuff in the water. Well, it was probably was there. Now they’re blaming the gas companies. We had a case out here. What was it? OTHER Over on Granville. But they already knew they had a problem. But they started blaming the gas companies. YOU WORKED FOR DEP. I worked for public water supply of DEP. Uh for about the last 20 years before 23 46 I retired. Before that I worked for the Public Health Department and I, when I first started working I worked I Bradford County I expanded into Sullivan County my last eight years I worked out of the Mansfield District Office and covered seven counties. Bradford and Sullivan County I probably picked up several thousand water samples. We had a program where we helped public and private homeowners if they had a problem. Usually if someone got sick in the house, referral from a doctor. Or if they had a problem that maybe they could not afford to go to a doctor but they had…..come in an ask for a water test kit. They’d pick up a preliminary sample just as Lyle said there were areas in the county in the northern tier here that had water problems. They were normal problems. They were not problems essentially caused by ?? they were naturally occurring. Most of these contaminants we’re talking about that Bob mentioned iron, manganese, barium, etc. those are found in bedrock and are also caused by – it leached out into the groundwater to the water fall and the surface and seeping down in the ground filtering through the soil filtering, flowing through the rocks and the water picks up these minerals you find in the ground water. A lot of these contaminants that you’d run into were what we call Secondary standards. In the Safe Drinking Water Act there are Primary Standards and Secondary
Standards. Secondary Standards are normally inorganic in nature. Metals. Which is Barium, iron, manganese, sulfur. A whole list of parameters. Barium is an inorganic but it’s a Secondary Standard. The difference between the Primary Standards and the Secondary Standards are not all health threats. They’re aesthetic in nature. They can bad taste, bad odor, can cause a problem when your home canning. Can cause a problem and you have to treat the public water supply …KIDS YELLING…. Pretreat. We have a lot of violations of Secondary Standards in our ground water. But they’re naturally occurring! OK? and they aren’t a health threat. Ok. Then we have the Primary Standards are health threats. An example of one that we have quite prevalently in this area is barium. Barium is usually associated with wells that are drilled into bedrock. Cause you find barium in the bedrock. There is a vast resource of individuals in this county that have worked this county for their entire lives. They are called “Well Drillers.” Omitted stakeholder Water well drillers. Yes, the drill water supplies for private individuals. And they know where you can drill and HOW DEEP you can go. There’s areas that you don’t drill below 70 feet or 90 feet or 100 feet because you know that if you drill below that you’re go into bedrock that is highly contaminated with these secondary standards and primary standards. They had very little input in any drilling out here. They were not used as a resource. And they were probably the most knowledgeable individuals in the whole county when it came to ground water. They were not used. They were not even asked. They wrote letters to the Editor. We had several well drillers who came out in some of the ?—0 17 55-between the gas people and the land owners and they made comments et cetera. But I don’t know a single one of them who was ever asked to come in a meeting or be on a committee. We had one individual in the County who was the chairman of the Pennsylvania Well Drillers Association who lives over in Troy. He was never asked. These people really knew what our current problems were and what you’re gonna run into. They weren’t asked. To make a long story short. I’d be the first one, because I was in the public health field, to say that we definitely had problems in the area. But we KNEW what they were. We know how to keep away from them. And we knew they weren’t health threats. They were aesthetic threats. If they were health threats we’d put treatment on them. You can go across the river here in Wysox. Over half the businesses had treatment devices on their water supplies because it was the only water they could find over there. It was contaminated with barium and salt. So the water was treated. It’s very easy during a drilling operation during this whole process that we’re going through in these last three or four years, that a person’s going to find out that their water is contaminated. The first thing is the homeowner going to blame the gas industry. It’s human nature. It’s somebody else’s fault. But then on the other side you have the gas industry that has picked up samples prior to the drilling to get a baseline on what the water quality was in the private person’s well. And also it’s a litigation issue. They want a basis prior to drilling in case something does happen and they are blamed for something. So there’s a lot of research done, there’s a lot of testing. But when a well is drilled and a homeowner starts saying “I don’t know what it is but my well is a little different than what it was before it was drilled. And they notify the gas company and they may notify the DEP and samples are taken. And the first thing they’re going to say is “The water’s bad.” And the gas company says “Well, it was contaminated before we drilled.” You gotta look at what it is contaminated with. Maybe before it was drilled they did not have barium. Maybe they just had sulfur and iron and manganese. Which were still a violation of the Secondary Standards but they didn’t have barium. And one of things that should be a concern of a lot of people that has been popping up in some of the wells is strontium. There’s been several wells in the County. There’s a number of wells over in Burlington that have strontium. Strontium is a radioactive material. Whether that was there before the drilling or whether it’s something has cropped up recently, I don’t know. A lot of times, as time goes on the experts in the water profession, as the water field improves, maybe the sampling that was done 20-30 years ago, maybe they didn’t test for strontium. If strontium wasn’t tested for they would not have a result. They should have if a recent sample was collected though, currently, they should have a strontium result. METHANE? As I said before
I’ve picked up lots and lots of water samples in the County. Occasionally I would get into a methane problem. Some of them were very severe. There were a number of places down in the Wyalusing area which is southeast of us that I had, as a health official on a private water supply, I had no authority but I can recommend. And there were a number of homes that I would recommend after looking at their supply and testing their water and flame testing their spigot flame testing their water. Collect an amount of water out of the spigot in a plastic jug. That’s one way to do it. And shuck it up and let it set. This is with the lid on. Take the lid off. Hold a match to it. If the water burns or blows up you have methane in it. I remember one house I went into down near Wyalusing where the guy was from down state and had built a brand-new house and contacted our office and said “I think I have gas in the water.” And I said “What makes you think you have gas in the water?” I’d never run into methane down in that area. And he says “Well watch this!” And he reached over and he turned on the water spigot and he let the water run a few minutes and he reached up into his cupboard and brought out a box of wooden, what we call, barn burner matches. And he says “Ron, you better step back” And I say “You’re kidding me!” He says….I stepped back a couple paces…. He says “I mean on the other side of the kitchen.” So I walked to the other side of the kitchen. He stood over and he struck a match and he threw it in the sink and there was this gigantic ball of flame that completely covered the recess above this kitchen sink. I just could not believe the amount of flame he had in the kitchen. And, my parting and my written direction to him was to disconnect this well and get it the heck out of this house. God, man, you’re gonna burn your house down! And the man had not even though of doing that.(chuckle) He had to have somebody else tell him. But, I’ve run into a lot of cases, excuse me, not a lot of cases, but a number of cases, a few cases where they had methane. But a lot of that had to do with as I said earlier, where the water well drillers were drilling too deep. Also, a lot of it, We had previous shallow gas well drilling in this County. What they would do is they’d come in the area sporadically and drill shallow wells looking for gas. Looking for that mysterious Marcellus black shale deposit or something. They were looking, they would drill the well. They would plug the well. And they would move on. Wouldn’t tell any landowner what they found, of course probably Harrisburg DEP and regulatory agency wrote this down, but nobody locally was. WHO DRILLING? Gas companies. And back about, I would guess about 15, 16 years ago there was a lot of drilling done in Bradford County of these type of wells. And, Who’s saying that wasn’t how the gas got to these drinking water aquifers. THOSE SHALLOW WELLS? They have no well regulations in Pennsylvania, so a lot of these wells were never properly plugged so everything’s coming up infiltrating the upper ground water layer. I worked a case over in Tioga County where there was a business that reportedly had gas in their drinking water supply and this was back in the, about 95, 96, and I got involved with that. And we did some checking. And we identified there was natural gas in the supply. And when you find a problem you start looking in the neighborhood too. So, This was a small area between Tioga Borough and Lawrenceville Borough, and it ended up that we found there was four or five houses that had natural gas and a school complex. And I was in the Public Drinking Water field. OK? I wasn’t an expert in gas and oil of Meadville. The Meadville office gas and oil office covered this area. So we got involved in a joint investigation. And, they came to the conclusion that it was either an old well, old gas well, cause there was a lot of gas exploration over west of us into your county also, Warren and Potter and McKean. But what’s under the ground is hard to tell. What’s going on under the ground. So they came to the conclusion it was either a well casing that was old that had developed a leak or over there they had some vast storage chambers. You go west out here and you’ll find gas wells that have been drilled and the gas has been all extracted and they use these huge caverns as storage facilities. So they came to the conclusion it was either one of these old gas wells or one of these storage units leaking. And up until my departure I don’t think they ever found out what it was. What we did was treated the sources. Treated the water supplies. HOW? What the school was forced to do is – on their own – taxpayers had to pay - was to hire an engineer and an engineer came in and designed an air stripping
tower. 06 18 And what that is is basically a unit, a tower, a four sided figure. Water is piped up to the top. Then flows down the sides and the natural gas dissipates into the surrounding air and that’s vented off.

NAME OF SCHOOL? I don’t think I want to mention that. There is only one school between Tioga and Lawrenceville. And they spent a lot of money dealing with that problem And it wasn’t their problem! OTHER I think you do see that migration There are pockets of gas naturally above the Marcellus, here, cause people have been drilling for years and years and years. And ya know although they’re drilling down thousands of feet, but they are going through aquifers they are going through pockets of gas. So I think if you get if that gas and they’re going down through the aquifers that you get your water from and they’re going for ---gas – some of this is going to migrate through that aquifer and show up in your water. So, I think that this is a problem . And I think it is a problem of drilling. If you put a grid across the County – how many pads are we gonna have in the County? – 2,000 or something like that. They’re drilling approximately every ½ mile one way and every 2 miles the other way. So if you put that grid in there they’re gonna go through aquifers and they’re gonna go through pockets of natural gas. And it’s going to migrate. RON Yeah. If you had in the past you had a minor problem with natural gas, methane getting into your water supply. A common drilling practice and construction standard on a water well – It was commonplace to bring your casing up above the ground or into a pit. And just what we call a cap over the casing. What that consisted of was just a metal cap the outside rim was about about an ½ inch bigger than the diameter of the casing. And you had three or four screws that you would turn. OK, there was an air space between the top of the cap and the casing. So if you had that, and you had a minor methane problem, all it did was that the methane came out of the well and spilled out into the atmosphere. You never had it into your house. But then, if you had bacteria or another problem is easy to do with a private well. If you do work on your hot water tank or your cold water tank, or you pull your pump off the well to replace it. It’s easy to contaminate your well with coliform bacteria. It’s a normal occurrence. And what you do if you do that is disinfect it with chlorine. That’s the normal practice. OK? But during that if, for example, I were to …on a contaminated well like that. One of the first things you would tell them is that you don’t have a sanitary seal. Sanitary seal on your well. You have a space that insects and varmints can get down in. What you should do is put a sanitary seal on – it is two plates with a rubber gasket between it and you put that down in the casing. You tighten the bolts on it. It puts these two metal pipes down together to squeeze the rubber out and it seals the casing. So if you have methane gas in your well, where does the methane gas go? It comes out of your drinking faucet. It doesn’t go up in the atmosphere anymore. It goes in your drinking water. COMMON? Having a sanitary seal on your well is number one. Any health authority or laboratory if they see a non-sanitary seal on a casing is they’ll ask you to put one on. I mentioned to you earlier that I was in a unit and I had the gas company come to my house and do a preliminary sample. One of the negative things, the only negative thing, comment they had on their investigation of the water source was that I didn’t have a sanitary seal. But my well is underneath my house and it is sealed off. The area itself is sealed. And I personally seeing it’s a private water supply, I think if I had any kind of a methane gas problem, which I do not have, but I do have a sulfur problem, I made a personal decision that a little bit of venting on my casing is better to have than a sanitary seal. But as expectable public health standards go my well does have a negative thing. It does not have a sanitary seal. IT’S BEEN A GOOD MORNING. THANKS EVERYBODY!

---- END OF “THE MEETING OF THE BORED” AT HARKNESS FAMILY RESTAURANT