PERCEPTION OF RISK AND BENEFITS OF URBAN NATURAL GAS AND OIL WELLS: A CASE STUDY OF BROADVIEW HEIGHTS, OHIO

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CHAPTER I

Introduction

The natural gas industry is experiencing a sea change in production capabilities due to market conditions, advancements in technology, and a regulatory environment actively encouraging drilling. While this has been regarded as an achievement for the industry, the perceptions of citizens experiencing the expansion of natural gas and oil drilling in urban areas was unlikely considered by state law makers at all. Perception of natural gas and oil extraction as an urban land use has not been researched in a way that examines how individuals and landowners are influenced by their environmental perception of the risks and benefits of drilling in their city and neighborhoods.

Background

Natural gas and oil production in the United States has expanded in recent years with continued progress in drilling technology, which has increased production and efficiency. Natural gas and oil production is typically associated with less populated rural areas, however as supplies from conventional sources have dwindled, energy companies have looked to urban areas for potential resources (Enders et al. 1991). The intent of urban drilling is to increase the efficiency of the oil and gas industry to bring marginal and urban reserves into production while allowing urban landowners the opportunity to lease their mineral rights for profit. The technology used to drill into
conventional and shale reserves include hydraulic fracturing popularly known as "fracking" and directional drilling that limits the footprint of a well pad and increases the lateral wellbore exposure of a well up to 5000 feet from the wellhead (Arthur et al. 2008).

The most common impediment to urban drilling is the use of local zoning, which may restricted the siting of natural gas and oil operations to industrial and commercial lands, or it may not be allowed at all. The tradition of using zoning arises from attempts to maintain a certain quality of life and to attract certain residents who share similar ideals and values (Taylor 1998). In 2004 the Ohio General Assembly passed House Bills 278 and 299, otherwise known as Ohio’s urban drilling laws, removed all local drilling regulations in order to centralize the permitting under state authority and create uniform regulation. The law eased the ability of oil and gas producers to seek mineral leases from urban and suburban landowners to create drilling units by bypassing all local authorities. Property owners who lease their mineral rights, and a well is drilled, will receive benefits from the lease agreement. However, allowing urban drilling has also created conflict among residents who believe that the drilling for natural gas and oil in urban areas, especially in residential neighborhood is not an appropriate land use, and is fraught with risks to safety, health, and the environment.

Perception is the product of how people cognitively interact with the environment. Given the change in natural gas and oil production patterns in urban areas, residents are confronted with drilling activity and conflict occurs due to
differences in the perceptions of the risks related to the extractive land use. In addition, policy changes have removed local authorities from siting, and decision-making, which affects the way people perceive urban oil and natural gas development.

Problem Statement and Hypotheses

This research examines the perception of natural gas and oil drilling among residents in an urban environment. In this study I view natural gas and oil drilling as a highly industrialized extractive practice, and an activity that could be subject to opposition among residents in a way that is similar to other industrial or hazardous facilities. The reaction of residents to support or oppose natural gas and oil drilling is likely influenced by how policy makers and industrial interests have physically and methodically fixed the scale of the process by the centralizing the permitting and creating uniform rules and regulation for natural gas and oil activity in Ohio.

As the natural gas and oil industry has developed in recent years, it has become apparent there is a need to examine factors relating to how urban residents perceive gas drilling and subsequently decide to support or oppose the activity. Levels of support can be measured by examining the environmental perception, and how individual homeowners assess the risk and benefits of drilling. The perception of individuals is influenced by the attachment of individual homeowners within their communities, and how policy and the media have influenced residents. To measure how the residents have a greater or lesser acceptance of urban drilling two hypotheses guided the
research: (1) Individuals are more accepting of natural gas and oil well development, if the individual believes they are safe, or if the individual is being compensated monetarily; and (2) individuals are less accepting of wells if they believe there are more risks than benefits from natural gas and oil wells in urban areas.

The environmental perception of residents who are experiencing natural gas and oil drilling as a new land use in their neighborhoods indicates how much the resident values the environment and their community. Residents who place a higher value on nature and environment, may be less likely to approve gas and oil well development as it has the potential to alter how they perceive their community. The hypotheses of how residents make decisions whether or not to support or oppose urban natural gas and oil drilling and development draws from concepts related to how people evaluate perceived risks and potential benefits. In this study the perceived risks are to the individual’s health, safety, and local environment and the benefits of royalty payments, a cleaner source of domestic energy, and more revenue for the state. This study aims to gage the level of support for urban drilling, and to evaluate if these perceptions are correct and the basis for a residents support or opposition.

Theoretical Perspective

This research evaluates perceived risks and benefits and how these may factor in the decisions to support or oppose urban natural gas drilling. Perception of natural gas and oil extraction as an urban land use has not been researched in a way that looks at
how individuals and landowners are influenced by their values and perceptions of the risk. Urban natural gas and oil development has expanded the industry’s reach by accessing urban land through mineral leases from private landowners. This has exposed a new populace to countless questions related perceptions of risk to individuals and society.

In urban areas of Ohio and elsewhere in the United States urban natural gas and oil drilling is a prime example of the intersection of science, technology, and public policy and is worthy of examination. First, environmental perception and behavioral geography unite the study of human activity and experience within a spatial context, and thusly influences residents and policy makers based on what is valued according to the acquired ideology (Golledge and Stimson 1987; Golledge and Timmermans 1990). At the local level the intent of policy makers’ use of planning and zoning restriction is a reflection of the perceptions of the residents’ community.

Within the environmental perspective approach to the production of urban natural gas and oil wells, it is important to note that it is an extractive industrial activity and has a unique set of risks and benefits that can be compared to mining, the building and maintaining of wind turbines and nuclear facilities (Jacquet 2012). The pressure to access the deposits needs to be balanced by the benefits of an increase in supply and, by the concerns of the risks to health, safety, and environment, makes the siting of facilities in urban areas contentious.
The ability of the industry to influence scalar relationships has transformed and manipulated the processes that allowed urban drilling to be a widespread legally accepted land use. The new scale relationship between individuals, oil and gas producers, and the state, eliminates the local level and residents who do not support the activity. This disrupts the expected democratic process for citizens who oppose residential drilling and creates distrust and amplifies the risk perception (Kasperson and Kasperson 1996).

Methods

Both hypotheses of how residents make decisions whether or not to support or oppose urban natural gas and oil drilling derive from risk-benefit analysis, which has been used to quantitatively evaluate environmental decision making (Cutter 1993). I used methods guided by grounded theory to measure the support of drilling in urban areas, and examine how the levels of support relates to the environmental perception of residents who are experiencing natural gas and oil development in their community.

Susan Cutter, in her book Living with Risk: the Geography of Technological Hazard, discussed the technique of quantitative evaluation of environmental decision making. Cutter compares the risks to the anticipated benefit within a broader view of what the costs could be, not just the predictable emphasis of potential future economic costs (Cutter 1993). Risk analysis is measured by how individuals tolerate risks in terms of the benefits to society. There are risks in natural gas extraction. Some are rare like
explosions, or are hard to quantify, like exposure to hydrogen sulfide, which is toxic and extended exposure can lead to health problems (Darley 2004). By conducting surveys and semi-structured interviews, I will find out how concerned the residents may be by their perception of the risks associated with urban gas wells, as well as how other residents accept and may anticipate the benefits of producing natural gas and oil in urban and residential areas.

Quantitative and qualitative techniques were used to acquire the data to determine the perceptions from greater or lesser acceptance of natural gas well drilling in urban areas. The quantitative data was acquired from a mail survey with addresses purchased through USADATA. 1,200 addresses were randomly selected from all home addresses in Broadview Heights. The Survey was mailed on November 3, 2010. Included with the survey was an endorsement letter written by the City Engineer of Broadview Heights, Eugene P. Esser, and a letter explaining the research with a request to return the survey within three weeks. Of the 1200 sent, 27% were returned (n=325). The survey was used to measure who would like to have a well or already is part of a drilling unit, to measure the level of support for drilling and why the residents support or oppose drilling in their community. The survey provided qualitative data from the comments provided by the respondents. First, providing additional reasons for supporting or not supporting drilling, and second, at the end of the survey space was provided for any additional comments. The additional comments provided an insider’s view of how the residents have experienced the growth of drilling in their
neighborhoods and added depth to the quantitative data. These results were coded by respondent for reporting.

Data was gathered from the Ohio Department of Natural Resources Division of Oil and Gas Resources Oil and Gas Well Database. The data for oil and gas development became available in January of 2008 and is available in a searchable online database. Some of the data related to older wells is not yet accessible in the database, or is absent due to poor record keeping. Current data was used to map all wells drilled and completed in Broadview Heights to demonstrate the rate of development of wells in the city before and after the urban drilling laws were enacted.

A 2009 study from the Armenia Mountains of Central Pennsylvania, examined the landowner attitudes towards wind and natural gas development the area experienced (Jacquet 2012). This study intended to measure attitudes based on proximity to the wind turbine or gas wells. While proximity had little relationship to attitude, residents with concerns for environmental issues, or had experience with leasing land for development affected attitude (Jacquet 2012). Overall landowner attitude towards natural gas development was found to be negative, while wind farm development attitude was more favorable (Jacquet 2012). Jacquet did a rural study with variations in land use, with small towns, farms and open space and this no doubt creates a lot of variation in the demographics of the sample. This research applied a similar approach, but to a smaller research, within a small city with natural gas and oil development.
Another source of qualitative data came from semi-structured interviews with city leaders, citizen activist and officials with the Ohio Department of Natural Resources (ODNR). I contacted interview subjects by attending formal and informal meetings where I observed and listened to the concerns of citizens and hear industry representatives and state official reassure the residents. From these meetings I made contacts with leaders of Northeast Ohio Gas Accountability Project (NEOGAP; the group has since changed their name to Network for Oil and Gas Accountability and Protection) and leaders of the Division of Mineral Resource Management (DMRM) office of ODNR (In 2011 Oil and Gas became a standalone division of the ODNR). I attended Senate Testimony hearings for Senate Bill 165, the bill that was written by the ODNR and representatives from the oil and gas lobby to remedy the concerns of citizen about the urban gas law revisions passed in 2005. Additional qualitative data came from mass media sources, reports from government agencies and the oil and gas industry. Multiple media sources were reporting on the growth and future potential of natural gas production, lower prices, and less reliance on foreign sources, as well negative aspects the risks of contaminating water sources, and other health and safety issues.

**Conclusion**

Conventional natural gas and oil drilling in urban areas of Ohio was once rare, but as cities grew and zoning and planning boards made decisions to restrict activities based on safety and acceptable community standards, drilling was less viable. Before
H.B 278 and 299, local municipal zoning laws for drilling were a complicated, multilayered, patchwork of regulations. Where a city’s local zoning allowed drilling, and enough acreage of land could be acquired for a drilling unit, gas and oil producers would establish a well. However, drilling technology has increased production from conventional natural gas and oil wells has and has increased interest in developing natural gas and oil reserves from old reserves to urban and suburban land.

The projected future of oil and natural gas production and potential benefits to the United States, depends on both continued conventional drilling and unconventional shale development. The potential has strengthened the industry’s influence among lawmakers to simplify regulations and permitting in regions where access to the reserves may be in the hands of smaller landowners in urban and rural regions of the United States. Despite stories of large signing bonuses, and continuous royalty payments as incentives to lease mineral rights in Pennsylvania and Texas, numerous residents living in shale boom states remain wary about natural gas drilling. The Eastern half of Ohio sits on the Marcellus and the Utica shale, and there is an uneasiness that stems from the “gold rush” mentality of the oil and gas producers acquiring land so hastily, leaving some residents uncertain of the risks, and the efficacy of the decision making process that has allowed natural gas and oil production in residential neighborhoods.
CHAPTER I

Literature Review

This literature review explores environmental perception of natural resource extraction and how urban residents analyze their personal risks and benefits of natural gas and oil drilling as a technical hazard in their community. In 2005, natural gas and oil producers began leasing mineral rights directly from residents and drilling in residential neighborhoods of Broadview Heights, Ohio. The state legislature centralized permitting and created uniform laws for the entire state, essentially recreating the scale relationships for the benefit of one industry. Examining environmental perceptions of residents experiencing natural gas and oil development in their community reveals how place attachment and the personal risks analysis of potential hazards of natural gas and oil drilling factors into the acceptance or opposition.

Energy Geography

The development of the specialty field of energy geography began with research of resource development, facility siting, and environmental impact assessment fossil fuel operations and nuclear power plants. During the 1980’s energy geography expanded to incorporate risk perception and emergency response and behavior, most of which was related to nuclear power (Solomon et al. 2003).
Human behavior, and perceptions of climate change are intertwined with how energy will be produced, and new sources of renewable and non-renewable are developed. As the energy industry invests in research and development to expand energy options, controversy follows. The literature has yet to produce research on the motivations and acceptance of landowners’ direct participation in energy development that may physically be in their backyard.

Natural gas is a valuable resource subject to commodity pricing, and is an integral part of the U.S. economy and infrastructure. A report produced by the U.S. Department of Energy’s Energy Information Agency (EIA) from January 2011, claims the total proved and unproved natural gas resources are estimated to total 2,327 trillion cubic feet, and as the shallow and relatively easier to access reserves are depleted, the cost will continue to rise as producers expand into reservoirs that are more costly and difficult to access (United States EIA 2011). Natural gas and oil deposits are found in many areas of the United States, as shown in Figure 1. Conventional deposits are relatively shallow and easy to access, like the reserves in the Appalachian, Permian and the Los Angeles Basin and both have been in production for decades (Chilingar and Endres 2005). The conventional deposits found in Ohio and Pennsylvania in the 1880’s sparked the oil boom, which spread west across the country to other oil producing regions. At this time, natural gas was not a useful resource and was flared until the oil could be pumped out (Debrosse and Goodwin 1990).
Another source of natural gas and oil comes from unconventional sources, and these reserves are actively being developed and hold great promise for future returns, see Figure 2. Unconventional shale gas plays like the Barnett in the Ft. Worth Basin, the Haynesville in the Texas Louisiana Salt Basins and the Marcellus in the Appalachian basin were once thought to be inaccessible due depths of 4,500 feet to 6,500 feet and the expense of retrieval.

Figure 1. Gas Production in Conventional Fields, Lower 48 States. Source: Energy Information Administration 2009.
Continued advancements in technology has made it possible to accesses shale reserves, first hydraulic fracturing or “fracking” is a process that was developed in the 1940’s as a method to stimulate the flow of gas and oil by using water and other chemicals in the drilling process. By the late 1940’s the link between using pressurized liquids began to be explored and was later the patent was acquired by Halliburton to use the process to stimulate production of natural gas and oil in hard rock reservoirs (Montgomery et al. 2010). Gas and oil producers began using hydraulic fracturing in the late 1980’s while exploring and developing the Barnett shale in the Ft. Worth Basin
(Chong et al. 2010). Another key technology is the use of horizontal drilling. Horizontal drilling begins as a vertical well, a precise angular bend or “dog leg” is made in order to drill into the horizontal gas and oil formation (Darley 2004). These technologies used together make the shale reserves viable which will be discussed in more detail in the next chapter.

**Hazards Geography**

Hazards research is quite broad, and incorporates the probability of an event occurring by the potential impact and magnitude. Ultimately, hazards are a threat to people and what they value, whereas risks are the measure of the threat of the hazards (Kates and Kasterson 1983). When the public contemplates large scale events come to mind; hurricanes, flooding and earthquakes. Despite the unpredictable nature of natural hazards, they can be planned and prepared for to limit the loss of life and destruction of property, with continual forecasting of weather events and establishing building codes to withstand the hazard.

Technological hazards originate in many ordinary activities, they are more pervasive and yet there is more public recognition of natural hazards than concerns of technological hazards. Large scale technological hazards, such as nuclear accidents and oil spills are concerns that are well known, but even small scale technological hazards can have serious consequences in the event of a failure, such as environmental degradation, loss of property and injuries (Cutter 1993).
Technological hazards arise from the interaction of social or economic needs, and the use of technology to address those needs. Nuclear energy is a prime example of technology meeting the social and economic need for safe, inexpensive, reliable and energy fell out of favor due to public perception as an abnormally high risk, and distrust of management and regulatory agencies. The public relies on regulators and the scientific community to ensure the lowest probability of risks. Citizens and lawmakers seek guidance to understand the risks and benefits in order accept the risks or guide society to adapt. Yet when industry is stimulating the advancements in technology; rather than the U.S. government, there is less rigorous testing of all possible outcomes (Waterstone 1992).

It is impossible to expect to prepare for all possible hazards, natural or technological accidents that can occur, as nothing we can create in our technological society is absolutely safe, but society determines what is an acceptable risk or not (Farr 1992). The best options is to promote public acceptance and confidence, first, by defining the terms associated with the technology to lessen a fearful reaction. As Morris Farr discusses in On the Public Perception of Nuclear Risk, once the word "radiation" is used a fear reaction is created among lay people and limits the ability to continue in a rational manner (Farr 1992). Second, the weight of the concept of safe and safety should be replaced. Nothing is absolutely safe, and the public's fear of some hazards could be reduced by reframing as to whether or not it is an acceptable risk based on calculable odds (Farr 1992). While this is an approach that would be
acceptable to policy makers and industry it does not factor is the emotions and attachments that heighten the risk response. When a risk threatens home or health, the calculable odds argument would be in opposition to citizens operating from a place protective action (Devine-Wright 2009).

Approaching natural gas and oil development in an urban environment as a technological hazard shines a light on the intricate interaction between advances in technology that provide a benefit, and the environmental perceptions of a community and a society. Observing what is valued, be it property, health or profits in relationship to how the technology is ‘sold’ to a community, will determine how accepting a community is of the technology.

Marvin Waterstone, in the preface to the book Risk and Society: the Interaction of Science, Technology and Public Policy, argues the source of many problems begins with the blurring of science and entrepreneurship and the eventual implementation of the technology (Waterstone 1992). When a problem is addressed by a technological advancement from the private sector, deployment may occur more rapidly, resulting in public policy needing to play catch up with independent testing and review.

Society will continue to benefits from advancements in technology, with continued instances of no adverse consequences to the majority of citizens, yet some will claim there are negative effects and outcomes from the technology and this is why independent research is so important. This has become more evident in the last fifty years, where the roles of science and technology have blurred with the roles of
entrepreneurship, and the separation is increasingly tough to discern (Waterstone 1992).

Issues of risk and hazards whether they are natural or technological are dealt with in the public policy arena. There is a need for specialized research that will review the broader impact of a technology. Policy’s role is to evaluate the science and technology, but also the moral, social and political costs and benefits (Waterstone 1992). Informed public policy can only emerge through a clear and comprehensive examination of all relevant issues with the awareness that policy makers, lay people and experts can have varied opinions and values.

*Risk Perception and Individual Analysis*

Perceptions of risk is influenced by the public response to the exposure to a risk or hazard and is mediated by a myriad of individual and contextual factors (Elliot et al. 1999). The numerous factors that influence public perception is where disagreements between the lay community, policy makers, scientists and industry begins. Decisions regarding land use and placement of facilities are formed from experts who are given the authority based on education and insider technical knowledge, to determine potential risks and construct guidelines, rules, and regulations (Sutherland et al. 2012). Active citizen participants who oppose a development are often criticized as not having enough knowledge to participate and contribute in any meaningful way. Too easily, experts, scientist, and academics will dismiss the perceived risk concerns of lay people.
who voice their concerns based on personal knowledge, and site specific issues. The attitudes and behavior of politicians and experts who attempt to circumvent the democratic process by disregarding the input from citizen participation leads to growing apathy and distrust of government, politicians, experts and industry (Fischer 2000).

The social amplification of risk is a theoretical framework that addresses the discrepancy between what the risk perceived by policy makers and industry and how risks are perceived by the lay citizenry (Pidgeon et al. 2003). In this framework risks are viewed as an interactive phenomena, involving the physical environment and the social relations (Kaspersson and Kasperson 1996). This framework not only measures amplification, but also the attenuation of risks that are shaped by social institutions and processes that approach risk in its full complexity. Where the amplification of risk to a hazard of inadvertent exposure to radioactive material in a low income city of brazil resulted in several deaths and dozens of hospitalizations, set off a ripple effect of irrational public concern (Kaspersson and Kasperson 1996). The exposure and resulting fallout to the exposure needs to be put into context of risks and hazards that society has accepts attenuated and pervasive risks. The long term risks of coal as a source of energy have relegated far less concern than risks of nuclear power, is this attenuation a product of coal viewed as a less volatile source or just more familiar (Kaspersson and Kasperson 1996).

The concept of risk-benefit analysis is a way to evaluate social decision making about risks related to health and the environment in a quantitative manner (Starr 1969;
and Hansson 2007). Susan Cutter has discussed the tradition of cost benefit analysis in environmental decision making, where the expected benefits from a technology or new land use is weighed against the expected cost (Cutter 1993). This raises the following questions: if individuals and decision makers perceive the environment and the land uses differently can all of the cost be enumerated if the potential hazard occurs? These quantitative measures cannot measure how an individual factors their own personal measure of the risk to community and the physical environment.

Risk can be classified as either voluntary risk or involuntary risk (Cohen 2000). With voluntary risk, individuals opt into the decision based on a conscious choice, and they may feel there is less risk. Involuntary risk occurs when the decision is made at a governmental level where individuals are mostly left out of the decision process, and this may influence their attitude of being less accepting of risk (Starr 1969, Cohen 2000).

Risks related to human health, environmental damage and economic impact should all be weighed together when examining the risks related to an activity. As noted earlier, natural gas and oil drilling is not free from hazards and accidents. Planning is a management technique that is meant to reduce the threat of hazard exposure through controlling the land uses and anticipating the threat by having an emergency response plan (Cutter 1993). The extraction of natural gas from shale deposits is increasingly found in urban and suburban areas (Sumi 2004), and the perception of the activity and the risks associated is an area that is under researched.
**Environmental Perception**

The influence of perception in geography stems from psychology, where it is a subset of cognition. Perception has been viewed as an “inferential process in which a person plays a maximal and idiosyncratic role in interpreting, categorizing and transforming the stimuli input an individual receives” (Golledge and Stimson 36, 1987). Individual receive signals through their senses and through environmental information obtained through media, hearsay and communications with peers (Golledge and Stimson 1987). The end product of an individual’s cognition is perception, and the filtering is a mental image of the objective environment. Geography expands on these ideas by attempting to explain how things are viewed, especially with respect to perception of resources and hazards.

This research examines the perceptions of citizens, policy makers, industry and activists, who have made decisions related to natural gas and oil wells in Northeast Ohio. I expect, in addition to how policy is implemented, an individual’s perception of their environment may influence the attitudes and willingness to support or oppose urban residential drilling. The field of environmental perception and behavioral geography is rooted in human activity and all the knowledge that is part of the external sources of information processed by the individual from the environment (Golledge and Stimson 1987).

Environmental perception influences policy, which dictates land use and this is a reflection of the policy maker, and engaged citizens to make decisions based on what is
valued according to an acquired ideology. The environment is both ‘natural’ and ‘built’ and encompasses the air, water and soils that humans, animals and plants need to survive. Environmental perception and behavioral geography engage in the study of human activity and experience in a spatial and environmental context (Golledge and Timmermans 1990; Golledge and Stimson 1997).

Behavioral geography elaborates on the psychological notions of individual and spatial behavior, in particular the cognitive and decision making processes between environment and human activity (Golledge and Stimson 1997). Behavioral geography examines the perceptions of the environment and decisions related to land use. The decisions actors make are influenced by their environmental perception and the associated process of weighing risk against benefits. How humans perceive, evaluate and interact with the land are key factors in explaining conflicting environmental perception. Environmental perception and behavioral geography specialties have melded into one area of study, as they are related, and remain relevant despite a decline in interest. This relevance is crucial to the foundation of this research, where the opinions and decisions of the legislature have stirred controversy and have impacted residents in many urban communities across Northeast Ohio.

Public perception of gas well drilling varies from support and acceptance, to those who rejected the land use because they view drilling as an environmental or safety hazard (Darley 2004; Sumi 2004; Bartis et al. 2005). Land owners who negotiate a
well to be placed on their property will receive royalties from the well production, and possibly have natural gas supplied to their home.

Citizens and policy makers who opposed drilling in sensitive areas believe the increase in drilling will have more negative consequences and risks than benefits (Bartis et al. 2005 and Sumi 2004). In Ohio, where there is a rush to increase the production of natural gas, questions continue as to whether the hazards and environmental impacts have been adequately addressed. Drilling involves heavy equipment, it can be loud, and while accidents are rare, there are potential dangers (Sumi 2008). The technological hazards associated with urban natural gas and oil development may include gas migration along faults created by improperly maintained wellbores, seepage from storage units, subsidence caused by fluid removal, and the failure of equipment that may cause air or water contamination or serious harm to person or property (Endres, et al. 1991; Darley 2004; Chilingar and Endres 2005). Other dangers include the release of toxic or carcinogenic gases that are contained in the emissions from the well bores or leaks from pipelines and holding tanks, both of which can cause serious health problems. Another issue is related to ground and surface water contamination from the drilling process (O’Rourke and Connolly 2003; Sumi 2004; Chilingar and Endres 2005). Finally, the presence of gas wells or other petroleum facilities in communities negatively impact property values (Boxall, et al. 2005). All of these factors influence the willingness of people to accept natural gas drilling.
**Place Attachment**

Much of the attachment literature is written in the context of leisure environments, but I would argue when a person moves to a suburban fringe community, leisure time and home life are intimately intertwined. Another motivation of residents who oppose a proposed land uses in close proximity to their homes is the sense of attachment to that place and the need to protect what is individually or communally valued. Attachment may center on one or several functions of the place; social, environmental, and psychological. A land use that presents a threat to the idea of the place may create “place protective action” opposition to protect the emotional attachments and the place related identity function of that place (Devine-Wright 2009).

In the social context, the conditions of attachment evolve from social involvement and the subjective feelings created. Attachment takes place as groups come together with shared definitions and appreciation of these symbols (Beckley 2003). The physical landscape is a significant source of shared symbol, for example the view of a mountain that become obstructed by a hotel and what the hotel symbolizes, can upset the attachments of those that came together and invested resources and time (Beckley 2003).

Attachment can be based on expectations of stability and the expected behaviors from participants and the local government that is entrusted to maintain and enhance the location. Of course this is not static; decisions on multiple scales can influence the balance between the expectations and the system. When this is viewed
positively, a person is attached, when there is an interruption in the bond, detachment and disruption takes places (Shumaker and Taylor 1983). When disruptions occur and detachment begins, the context and conditions of the original place attachment must be looked at holistically between people, process and the place (Brown and Perkins 1992; Devine-Wright and Howe 2010).

When an event or a land use threatens to disrupt the bonds of the place attachment, there are responses that some actors with strong attachment to the place will undertake. Most notably, NIMBY (Not In My Back Yard) movements that outline the opposition to siting of undesirable facilities, primarily waste and energy facilities and certain social welfare facilities. NIMBY is a place protective action used by citizens to engage and influence the policy makers and negotiate terms to make the siting more in line with community norms, by canceling or moving the facility, or creating safeguards to reassure the NIMBY activists (Devine-Wright 2009).

Understanding human decision making in a spatial context, such as whether or not a land use is a Locally Unwanted Land Use (LULU), can demonstrate what a population ranks as important. The results of the decision making process, and the conflicts among a divided population is worthy of study. In terms of LULU’s, be they socially or environmentally unwanted, the results of the decision making impacts people and the environment.

The demographics of the community should be considered when analyzing how residence and media respond to an unwanted land use, such as environmental threat or
a social facility that conflicts with community norms. LULUs are most often associated with facilities that are perceived by many to have a negative impact on health or the environment (Schively 2007). As a population engages in issues related to land uses in their communities, NIMBY became a standard response from residents who had the resources and political connections to fight undesirable development. As NIMBY responses became successful, NIMBY activism came under criticism due to their success in causing frustration of developers and the narrow focus of the health and safety of their community rather than a broader city or state activism (van der Horst 2007). The single focus of residents who oppose a facility without regards to the benefits to wider society be referred to as the ‘selfish NIMBY’ or the irrational and self-interested opposition (Gibson 2005; van der Horst 2007). This NIMBY framework fails to present a full picture of the complexities of the motivations of community activist who oppose the siting of a facility based on the large scale concerns regarding the technology associated with the projects, in this research natural gas drilling, the siting in urban neighborhoods and the planning which has limited the opponents ability to respond (Wolsink 2000).

**Scale**

Scale relationships influence how society and nature interact within the constructs of spatial and social scales. The issues related to the rapid increase in natural gas and oil extraction in the Marcellus shale crosses many scales related to government jurisdiction. Mineral rights of property owners, local zoning, and state and federal
environmental concerns are just a few examples of various scales. These scales are no longer nesting in the traditional sense where discrete scale are directly contained within another, they “evolve relationally within tangled hierarchies and dispersed interscalar networks” (Brenner 605, 2001).

Sallie Marston’s scalar conceptualization is that scales are constituted and reconstituted around capitalist production, social reproduction and consumption. Analyzing these relations and interactions of these three elements will lead to a better understanding of an issue and the decisions made (Marston 2000). Where one scale may hold power that restricts access to some resource, those in power may allow power to be taken away from a lower scale in order to exploit a resource and fuel consumption. Ideologies shift and resources are exploited; scales will be reworked, transformed and reconfigured.

The state’s decision with influence from natural gas and oil producers preempted the local government scale placing decision making in the hands of individual landowners creates a scalar fix for the benefit of the capital accumulation of oil and gas producers. Hilda Kurtz Introduces the concept of scale frames and counter-scale frames to present the discursive representations of an issue linking with the appropriate scales (Kurtz 2003). State governments can enact a scalar fix that will remove decision making from the local level. The industry heralds the endless benefits of development, only if they can operate with fewer bureaucracies to development new reserves (Sica, 2013). This is legitimized by reconstructing the scale frames to benefit the
industries without considering how removing home rule for one industry will be perceived.

This relates well to Kevin Cox’s concept of “jumping scales”, where scale is used as a way to conceptualize a way to shift or bypass spaces of engagement (Cox 1998). If the space of engagement will be troublesome and could possibly restrict access to a resource through zoning, laws and policies may be written in such a way to restrict a level of the nested scale from engaging in the process. As sources of natural gas and oil have been found to be in more urban and suburban areas, policy makers have amended the rules and regulations to allow for their retrieval. In Ohio, the adoption of H.B. 278/299 has allowed the “jumping of scales” by removing the ability of local policy makers to regulate and zone for certain land uses, and this imposition of Ohio H.B. 278/299 has influenced perception of scale and place among local and state policy makers. An important question is whether the loss of the ability to control one or more aspect of local control of zoning is a benefit for all or for only a few.

Examining scalar relationships in Ohio of natural gas and oil extraction is crucial in answering questions related to perception and risk benefit analysis. Scale will influence how the issue will be represented in the media and how local citizens, policy makers and industry can attempt to influence the laws related to the extraction. Examining what the policy maker’s view as a hazard or risk could be in line with the public or could be much more lax causing distrust in the government. Conversely, there will are those that expect policy makers to allow industry to access the resources they
desire, without much concern for perceptions of hazards or risks associated with new technologies that bring new deposits into play.

The human relationship to place is a critical element to lived experiences. Meaning is constructed by the participants of physical sites in their built environments and their place related attitudes behaviors and feelings evoke fond emotions and intensity with ownership, sometimes there are divergent interactions and meanings between actors (Tuan 1974, Milligan 1998 and Manzo and Perkins 2006). According to Lynne C. Manzo and Donald D. Perkins, there is a lack of cross disciplinary analysis between psychological studies of place attachment with a parallel discussion of social action and citizen participation (Manzo and Perkins 2006). This research will specifically focus on the way in which meaning is assigned from personal experience in relation to the residents home and significance related to how decisions are made in the context of the natural gas and oil drilling becoming part of the place.

**Conclusion**

Since 2005, there has been an increase in natural gas and oil wells in Northeast Ohio. The laws concerning oil and gas production in Ohio were rewritten to streamline the permitting process by removing home rule, and to gain access to underutilized natural gas and oil reservoirs. Some residents argue that the change in the law has subjected them to an risky land use too close to their homes. While other residents see no need for concern, and continue to support any and all opportunities to increase
energy production in Ohio. The difference in the environmental perception and individual risk analysis among resident and policy makers may illuminate the preconceived notions that have hindered the broader understanding of the factors that make urban gas wells such a contested land use.

There is wide range of opinion on the increase in natural gas and oil drilling in Northeast Ohio. The revisions enacted by the Ohio General Assembly allowing urban drilling by removing local rules and regulations demonstrated a lack of regard for the existing community standards and almost no foresight for how residents would react. Ohio’s development of oil and gas law has often been guided to take action due to crisis or has let special interests take the lead; this will be reviewed further in the following chapter.
CHAPTER III

History of Oil and Gas Development in Ohio

Ohio was once a major player in the early days of natural gas and oil development, and ranks fourth behind Texas, Oklahoma, and Pennsylvania in total wells drilled since the beginning of the oil boom in the late 1800’s. While the boom ended over 100 years ago, Ohio continues to produce oil and gas on a smaller but profitable scale, made up of small localized firms. For the driller operators, there is tremendous financial risk in the natural gas and oil industry, but their success has allowed Ohio to be a productive force in the state’s economy.

In 2011, Ohio's Oil and Gas Summary reported that Ohio wells produced more than 4.85 million barrels of oil, and more than 73 billion cubic feet of natural gas (2011 Ohio Oil and Gas Summary, 2012). Ohio’s natural gas production accounts for 12% of Ohio’s consumption, and continued production has generated new jobs, taxable income from profits, and can supplies free natural gas to landowners (2010 Ohio Oil and Gas Summary, 2011 and Kleinhenz and Associates, 2011).

The geographic distribution of natural gas and oil reserves have been found in 67 of Ohio’s 88 counties, and from more than 30 individual geological formations, as shown in Figure 3. (Oil and Gas Fields Map of Ohio, 2012). The Gas and Oil Field map
Figure 3. Oil and Gas Fields Map of Ohio. Source: Ohio Department of Natural Resources
was produced by the Ohio Department of Natural Resources division of Geological Survey created in 1974, revised in 1996 and again in 2004 expanded the areas with potential natural gas and oil reserves available in conventional reservoirs. The state encourages industry to expand and explore new opportunities for continued production, especially in the Eastern half of the state (Ohio Geological society: Canton Symposium 1996).

The geologic formations containing the reserves are created when natural gas and oil migrates into a permeable layers of sandstone or limestone formations. The natural gas and oil is trapped by an overlying layer of impermeable rock. Much of Ohio’s reserves originate in “marginal wells,” wells that produce less than 10 barrels of crude oil or less than 60 thousand cubic feet of natural gas per day (Interstate Oil and Gas Compact Commission 2009). Ohio has the fourth highest number of marginal natural gas wells, and the fourth highest number of marginal crude oil wells in the nation. According to national statistics provided by the Interstate Oil and Gas Compact Commission (IOGCC), marginal wells account for 19% of natural gas and 20% of crude oil produced in 2008 (2009). The Clinton sandstone formation present in the eastern third of Ohio, is the most actively drilled, accounting for 53% of all wells drilled, and according to Ohio Oil and Gas Association (OOGA), Cuyahoga County was the most active in 2010, with 37 wells drilled. (OOGA Economic Impact Report 2011.)

In addition to the conventional sources of natural gas and oil, reserves deep in shale formations are beginning to be developed, and hold much promise for future
production. The producers and state governments are touting all the benefits of producing natural gas and oil from domestic sources, jobs, lower prices, and reducing the reliance on foreign sources. The promise of trillions of cubic feet of natural is expected to bring long term benefits. Natural gas and oil producers with a nationwide presence are actively pursuing Ohio's reserves in the Marcellus and Utica shales.

There are other shale plays in the U.S., see map 2 in chapter two, page 14. However, Ohio has the unique position of both the Marcellus and Utica shale under the eastern half of the state. The Marcellus Shale, with average depths of 5,000 below sea level, stretches from southern New York, west to eastern Ohio then south to northern Virginia, and the Utica Shale with depth 2000 feet below the Marcellus (Wickstrom et al. 2011). The reports of retrievable natural gas and oil from the Marcellus shale vary, but in 2009, the U.S. Department of Energy’s National Energy Technology Laboratory estimates 1,500 TCF of natural gas in place, while the amount that is technically retrievable is between 400 TCF and 489 TCF (U.S. Energy Information Agency, July 2011). The Utica is a formation that lies even deeper than the Marcellus, and runs under much of New York State, Pennsylvania through the eastern half of Ohio down to northern West Virginia also has tremendous potential, yet to receive as much nationwide media attention. According to Fact Sheet from The Ohio State University, in 2011 the Ohio Department of Natural Resources estimates that recovering just 1.2 % of Ohio’s Utica Shale could result in nearly 3.75 trillion cubic feet of natural gas and 1.31 billion barrels of oil (the Ohio State University Fact Sheet: Community Development 2012).
The promise and potential for Ohio to be a leader in domestic energy production is very attractive to political leaders who want to deliver on the promise of jobs creation and a stronger economy. In 2011 the U.S. used 24.4 trillion cubic feet of natural gas, this in relation to the continual annual rise in usage of natural gas in industrial applications, home heating, and alternative energy source for automobiles and electricity production (U.S. Energy Information Agency, July 2011). This is one reason why Ohio and other states that sit on oil and gas shale deposits are garnering so much attention. Ohio producers and state government are eager to tap into these formations as it will keep Ohio in the top half of oil producing states.

Drilling into shale formations involve specialized drilling process; hydraulic fracturing and directional drilling technology is proving that previously inaccessible sources of natural gas and oil shale formations to be successful and cost effective. Deposits in shale formations are trapped in rock with low porosity and very low permeability. To access the natural gas and oil from shale, industry has developed drilling methods and technology to create fractures releasing the gas and oil trapped in the tiny porous spaces to the surface. This process is hydraulic fracturing and is commonly called “fracking” by proponents and opponents. To keep a well in production, fracking needs to be performed periodically to allow the continual migration of gas and oil to the surface.

There are public concerns over hydraulic fracturing and potential water contamination, and health and safety issues. A theme in Ohio’s history of natural
resources use is to let industry lead, and clean up the laws to accommodate the concerns of citizens and government regulations later. The Ohio General Assembly has demonstrated a reluctance to keep pace with oil and gas rules and regulations and have let industry influence legislations. The legislature has to walk a fine line to allow industry to stay profitable in a manner that demonstrates to the public that acceptable rules and regulations will be in place to placate the risk adverse.

Need for Policy

Commercial oil production first began in Macksburg, Ohio in 1860, and by 1896, Ohio was the nation’s leading producer. Following this height, Ohio’s oil and gas production steadily declined for the next 65 years (Emens and Lowe 1976). With the oil frenzy dwindling in Ohio and shifting west, there was little impetus to update the Ohio Revised Code laws for drilling. Ohio had small independent producers and allowed them to self-regulate within the lax law. Ohio’s rules and regulations for oil and gas drilling were administered by the state’s inspector of mines, and were primarily a safety precaution to protect coal mines near oil and gas operations (Emens and Lowe 1976).

With the decline in production, there was little interest in the General Assembly to address problems surfacing in other oil and gas producing states. By the 1930’s and 1940’s states to the west began adopting comprehensive conservation statutes. These statutes had two purposes, first, to maximize recovery over time and encourage
development and technology. Second to prevent physical and economic waste (Emens and Lowe 1976).

New oil and gas fields experience a rush on land and leases in order to possibly reap rich rewards and to gain insider geologic knowledge. These early years found oil producers rushing to drill as many wells as possible as quickly as possible once there was a murmur of a new productive gas field (Emens and Lowe 1976; Danintih 2012). This unnecessary drilling produced more wells than necessary to drain an oil field properly, leaving gas and oil in the ground due to decreasing the pressure need to get the oil out of the ground. Another limitation with so many active wells was the glut of surplus oil producers created, causing the prices to fall, just as new substantial fields were being discovered in Texas and Oklahoma.

The conservation statutes intended to impose and maintain the precarious equilibrium between public interest, the rights of private property owners and operators. These rights are referred to as correlative rights, i.e. the rights of those who own the fee interest to drill on land above the leased gas and oil formations (Emens and Lowe 1976). Property rights regarding natural gas and oil laws in the United States, at the federal and state level are heavily influenced by the rule of capture. The rule of capture was introduced at a time when legal rules were needed to end the waste and disorder of early American oil drilling and exploration (Daintith 2010). The rule is framed by the title owner of a tract of land, has title to the minerals beneath the entire property. The rule of capture comes into play when oil is produced from a well it may
migrated from another property, the owner of the well owns the resource, even if it is proven that a portion of oil has migrated from adjoining land. Laws and regulations attempt to limit the rule of capture to mitigate the “taking” of a landowner’s property rights. One way this is done is to regulate and reducing horizontal slant drilling under another property and establishing spacing rules to keep wells from being drilled to close to property lines (Emens and Lowe 1976).

First Revision: 1965

In 1963, an unexpected oil boom began in Morrow County Ohio, reminiscent of the first boom that began in the late 19th century. This resurgence witnessed 2,665 new wells drilled in 70 of 88 counties in Ohio. Only 41.5% of wells drilled yielded any production. With less than half of drilled going into production, it became apparent that the conservation and spacing rules enacted in other states to prevent such occurrences were nonexistent (Meyers and Williams 1965).

Outside pressure began to mount for Ohio to adopt conservation statues, including then current Secretary of the Interior, Stewart Udall calling Governor Rhodes to inquire why something was not being done to promote orderly development in Ohio (Debrosse and Goodwin 1990).

Later the same year, a Legislative study committee and OOGA, met together to revise Ohio’s oil and gas laws in order to address the inadequacies in conservation, and
correlative property rights of owners (Meyers and Williams 1965). Rules were established to safeguard citizens while allowing Ohio’s gas and oil industry to continue to maximize productivity without hindering the industry’s efficiency and profitability (Debrosse and Goodwin 1990).

In 1965, the Division of Oil and Gas was established within the Ohio Department of Natural Resources by the Ohio General Assembly amending the Ohio Revised Code. The most important aspect of this legislation was to balance public interest and private rights, to promote fairness in policy, protection of resources and respecting an individual’s property rights (Emens and Lowes 1976). The first purpose of this law was to protect Ohio’s oil and gas as a finite resource, and to maximize recovery over time. The experience that began in Morrow county showed no concern for spacing, creating problems with reservoirs over tapped, making a portion of the natural gas and oil irretrievable. Wells drilled too close to property lines interfered with an adjacent landowners correlative rights. These wells would draw resources without compensation to the landowner. It was believed that “Private rights and the public interest will usually coincide in the long run, since public and private entities have a stake in development" (Eames and Lowe 32 1976). However without regulations, it is often not the case and expecting citizens to achieve an acceptable balance between public and private rights is difficult to attain. The newly enacted codified rules enacted in 1965 met the public interest and industry’s for conserving natural gas and oil to be able to continue to drilling and increase the supply.
The statute allowed the Chief of the ODNR power to make additional rules and regulations specifying duties to use “the most approved methods of operations” (Myers and Williams 594 1965). The Chief had authority to enact new rules to prohibit the polluting surface and ground water, promote safeguards against technical hazards, protect life, limb and property, and to increase the efficiency of extraction. Yet, parts of the statute had explicit regulations that did not allow the Chief to change laws that would impact conservation. For example, that statute expressly allowed the flaring and burning of natural gas at the wellhead instead of forcing the driller to collect the natural gas, as this was not economically feasible for drillers where the infrastructure was not available (Myers and Williams 1965).

With conservation rules in place, the state had minimum acreage requirements for wells drilled to specific depths. See table 1. In cases where a landowner did not have the minimum acreage for a well, the law allowed landowners to voluntary pool properties to create enough acreage for a a drilling unit. These pooled properties would meet the acreage requirements and the landowners would both gain the benefit of royalty payments and or natural gas for home use. Pooling regulations established a means to protect an owner’s correlative rights, and of course, to increase the profitability and efficiently of oil and gas companies to produce natural gas and oil (Eames and Lowe1976, Meyer and Williams 1965). This created a new class of landowner with smaller tracts of land who could begin to benefit from their mineral rights, even if they did not own enough acreage to be the sole lessee.
### Well Spacing Regulations

<table>
<thead>
<tr>
<th>Depth of well in feet</th>
<th>Minimum acres for drilling unit</th>
<th>Minimum distance to other wells</th>
<th>Minimum distance of the well to boundary of the drilling unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 1,000’</td>
<td>1</td>
<td>200’</td>
<td>100’</td>
</tr>
<tr>
<td>1,000’ – 2,000’</td>
<td>10</td>
<td>460’</td>
<td>230’</td>
</tr>
<tr>
<td>2,000’ – 4,000’</td>
<td>20</td>
<td>600’</td>
<td>300’</td>
</tr>
<tr>
<td>4,000’ +</td>
<td>40</td>
<td>1000’</td>
<td>500’</td>
</tr>
</tbody>
</table>

Table 1. Well Spacing Regulations, Ohio Revised Code Ann. § 1509.2.7. Source: West 2005.

In 1965, most of the leasing of mineral rights and drilling operations were in rural areas with low population density, the ability for a driller operator to acquire the mineral rights was not difficult. A survey would be conducted for a new drill site, then the process of contacting the landowner or owners, and presenting them with a lease offer. The lessee of a landowner’s mineral rights would be able to voluntarily pool properties to establish the minimum number of acreage to allow a natural gas or oil well. Not only did this allow for more residents of Ohio to participate in using their mineral rights, the law addressed Ohio’s new oil and gas conservation statues. By allowing voluntary pooling and following the laws and regulation of the state, the gas and oil companies would be abiding by conservation statues by increasing efficiency as
the driller were able to tap into reservoirs with fewer wells and less intrusion on to the leased properties.

Another attribute of the pooling regulations was to protect and enforce the correlative rights of property owners by allowing a process called mandatory pooling. Mandatory pooling was authorized for two reasons, to prevent waste, and to insure a drilling unit is not “taking” a landowner’s correlative rights without compensation. The state of Ohio allowed for a permit process to access the mineral rights from a landowner without their permission for two reasons; first, the landowner was unable to be contacted to sign a lease, and second, the landowner was unwilling to sign a lease. The mandatory pooling permitting allowed for the compelling of the property in to a pool of properties for a drilling unit.

Mandatory pooling can be applied if a landowner has an insufficient size or shape of land to meet the drilling requirements, and the owner of the mineral rights has been unable to from a drilling unit. The owner of the mineral rights will attempt to contact the owner of a suitable adjacent tract. If the owner of the adjacent tract is unable to be located or they refuse to voluntarily pool, the state will allow a portion of their land, be mandatory pooled, provided basic requirements have been met, application submitted, reviewed by a geologist and presented before the Technical Advisory Council (TAC). If the permit is approved the state of Ohio is preventing a “taking” of property by providing monetary compensation to the absent or unwilling landowner. It is important to note that this unitization was would be authorized if the
TAC and the Chief found that the operation is “Reasonably necessary to increase substantially the ultimate recovery of oil and gas...” (Meyers and Williams 1965).

The revisions established in Ohio's 1965 oil and gas laws provided a foundation to bring the state's oil and gas industry up to similar standards for conservation and sensible petroleum development. The law's intended purpose of promoting orderly development for continued growth was successful for close to thirty years with little legislative involvement.

*Urban Drilling Law*

In 2004, the Ohio oil and gas industry, demonstrated their influence of the Ohio General Assembly by authoring the legislation to reform Ohio’s oil and gas laws. Ohio House Bill 278 was introduced in September 16th of 2003, and House Bill 299 was introduced as a companion bill a month later. Both of these bills quickly made their way through committees and were pass by both the House and Senate, and signed by Governor Ted Strickland’s without delay. H.B. 278 and H.B. 299 became effective within one year of introduction, with an effective date of September 16, 2004 (Ohio House Law summary H.B 278 and 299. 2004).

The law, commonly known as *Ohio’s urban drilling law* enacted revision that brought natural gas and oil activity to an urban and suburban population unaware of how the law could affect their community. First, the law repealed all provisions that
allowed local government control of permitting and restrict drilling through zoning regulations, in order to centralize the process by granted full authority of permitting and regulations to the Chief of the Division of Minerals Resources Management (DMRM). The Chief has the authority to adopt rules specifying minimum distances that wells, structures and equipment must be located from private dwellings and public recreation spaces and buildings.

According to Mike McCormack, a geologist and manager of oil and gas permitting for the ODNR DMRM (now known as Division of Oil and Gas), in personal interview, the centralizing of permitting, locating, drilling, and the operating of oil and gas wells is a matter of statewide interest, and the state will benefit from a uniform law. The previous law allowed local control and different standards throughout the state. If a community didn’t want gas and oil for whatever reason the gas and oil drilling would be regulated in such a way that it would be too difficult to pursue or not allowed due to local zoning restrictions. (McCormack 2009).

The companion bill 299 lowered the threshold population for an urban area, from 15,000 to 5,000. These bills work in concert together to standardized laws on a statewide level, allowing easier access to smaller producers and larger regional producers (Ohio House Law Summary H.B.299. 2004). The state provided a detailed list of subjects that the chief must identify when attaching terms and conditions to a permit in urban areas of 5000 or more residents. Permits will be denied if the Chief finds an operations to be in violation of oil and gas laws, or may present public health, safety or
environmental danger, however the Chief’s decisions are open to appeal. The approval of permits would be conditional to the following list:

1. Safety concerning the drilling or operation of well
2. Protection of the public and private water supply
3. Location of surface facilities of a well
4. Fencing and screening of a surface facility of a well
5. Containment and disposal of drilling and production waste
6. Construction of access roads for the purpose of drilling and operating a well.

(Law summary H.B. 299. 2004)

The law redefining urban areas for natural gas and oil production, from a population of 15,000 to populations greater than 5,000. This change had the primary purpose of allowing specific regulations for protection for the newly designated urban (McCormack 2009).

The small scale producers were ready to explore and exploit the resources that had remained off limits as many communities instituted zoning to maintain community standards. Cities such as Broadview Heights banned drilling in residential areas in 1998, and had other statutes that limited decibel levels in residential neighborhoods and banned drilling at night (Broadview Heights Code of Ordinances § 824.14, 1998).

Ohio’s driller operators began taking advantage of new property to lease; residential, commercial and industrial lands in newly designated urban areas, and bypassing any regulations that made drilling cost prohibitive and time consuming. In the
suburbs of eastern Cuyahoga County landmen began contacting residents to negotiate terms for leasing their mineral rights. The landmen use a variety of incentives to entice landowners, signing bonuses, royalty payments, and in some cases landowners would be supplied with natural gas from the well. The small scale producers were active in pursuing landowners to lease their mineral rights.

Communities in eastern Cuyahoga County were caught completely unaware that this practice could take place in their neighborhood. Neighbors became quite upset when someone would opt into a pool, or if someone would refuse to join jeopardizing the other landowner’s interest in accessing the resources. In an interview with Jennifer Mhanic, City Councilwoman of Broadview Heights Mayor Pro Tem for the 2009-2011 term, stated that she first became aware when city council voted for wells on city land and when drillers needed to use the city streets to make up the acreage (Mhanic 2010). Later in 2005, three wells were to be drilled in a neighborhood. Residents came to city council to speak out against the proposed wells, some residents came to every meeting and did everything they could to fight the wells from being drilled in their neighborhood (Mhanic 2010). Mrs. Mhanic found there was less support for drilling, and it had negatively impacting some neighborhoods (Mhanic 2010). While Mrs. Mahnic originally voted for the city to lease the right of way mineral rights she had changed her opinion about wells, if all the residents in an areas support it and want it, fine, but if there is vocal opposition the wells should be kept out (Mhanic 2010).
The expansion of urban drilling came at a very opportune time for oil and gas producers. The U.S. was engaged in the War in Iraq, and interested political figures wanted the US to pursue all domestic sources of energy available to reduce foreign dependence and strengthen the U.S. economy. In addition to expanding development of domestic sources, natural gas burns cleaner and produces less CO2 emissions, influencing some to consider natural gas as a way to wean the U.S. economy off of foreign fossil fuels while continuing to research and develop alternative cleaner forms of energy.

Urban drilling invited more residents, some unwillingly, into the decision making process of leasing their mineral rights to become part of a pool of properties for a drilling unit. The impact of drilling rigs, increased heavy truck traffic, clearing trees to build access roads, and the concerns about proximity to their homes caused some become active in their opposition. When they found out the state removed home rule many were upset and wondered how this could have happened.

Citizen Action

Resident of cities where urban wells were being proposed and drilled began contacting anyone who would listen to try and get the message out that the ODNR removed local control; and now local citizens cannot determine and maintain standards of their communities. One of the first groups to form was NEOGAP. They began by seeking advice from the Oil and Gas Accountability Project (OGAP), an offshoot of
EarthWorks on how to organize and to learn more about the issues (Pesec and Prosek 2010). NEOGAP met with local and state officials, held forums and raised awareness of their concerns about the potential risk of urban natural gas drilling. They got their message in newspapers, and local weekly circulars in these communities where the drilling had first stared in Northeast Ohio, such as Gates Mills, Mayfield and Broadview Heights (Pesec and Prosek 2010).

Citizens who opposed urban drilling did so for a variety reasons, concern for the environment, potential health concerns, safety risks of the drilling equipment so close to their homes. Others were concerned about lower property values, with visible equipment and negative press. However, the removal of home rule, and the state unable to curb industry's use of mandatory pooling of residents who refused to lease their land, became a serious issue for residents and policy makers, no matter if they supported drilling or not in the first place.

The concern over mandatory pooling and property rights stems from the lack of input and the removal of a crucial scale of government decision making process that determines community standards. Some of the first urban wells were sited in communities with larger lots and higher value properties. The decision making process behind why someone choose to live somewhere is not the purpose of this study, but it must be noted that homeownership in the U.S. is the largest investment people will ever make and they have an attachment to that place. As will be discussed in the results chapter, many residents of Broadview Heights were upset as they bought their property
because of the natural surroundings, not to have a view of a natural gas tank out their back window.

Landmen, are the representatives of the industry that approach landowners to lease or sell their mineral rights. People living in areas where drilling is a recent activity, or have always lived in an urban area were at a disadvantage when it comes to negotiating the terms of the lease (Urbina and McGinty New York Times, 2011 and Pesec and Prosek 2010). A lease may looks good on paper, however the lack of knowledge into how to negotiate, and rights of landowners puts the urban lessee at a disadvantage. In urban leasing if a resident refused to join a pool, a landman can circumvent the resident and approach other landowner even adjacent to the property, as long as the properties would still be able to form one contiguous unit. Some drilling units resemble gerrymandered districts, as shown in Figure 4.

An unforeseen consequence of HB 278/299 by the ODNR and the General Assembly, was the rate at which mandatory pooling would be used by the driller operators to get relatively small landowners to have their land pooled into a drilling tract against their will. Since 2005, 25% of all drilling permits have been designated as urban, and the correlation of the dramatic increase in mandatory pooling applications and the passage of these two bills is uncanny. (Logan 2010). Previously, before the passage of the urban drilling law, permits for mandatory pooling was understood to be a method of last resort landowners. After 2005, permits for mandatory pooling were being submitted more than anticipated. The application to apply for a mandatory
pooling permit was free for the applicant, yet the state of Ohio carried the burden of the cost, as well as the land owner who may choose to fight being pooled, providing very little incentive for some oil and gas companies to seek an alternative plat for the drilling unit. (Logan, Senate Testimony, and October 21, 2009).

Figure 4. Ohio Department of Natural Resources Division of Oil and Gas. Glazer Unit 1. 2007.

A resident of Broadview Heights testified in opposition to S.B. 165 in 2009 as to how much of a strain it was to attempt to protect his property after refusing to join a pool. The driller operator applied for the permit to have the mandatorily pooled, despite
other land configuration options to fulfill the pool's 20 acre requirement. The resident lost his appeal and well was drilled. He also contends that neighbors no longer trust each other and many are no longer friends (Chodkiewicz, Senate Testimony October 21, 2009).

These options of voluntary or involuntarily pooling are very different in nature. To opt in voluntary, reflects the values and perception of the interested parties where an agreement is accepted on the grounds of the economic incentives and acceptance of the risks. In contrast involuntary pooling is an agreement with one party is subjected to the subsequent choices of the producer with no leverage. Many believe this akin to a taking, while the industry claims that at least with mandatory pooling those that do sign up are not penalized by the hold out and the hold will not have their correlative rights violated as they will be compensated monetarily.

Natural gas is volatile if not handled carefully, but accidents do occur, technology fails and the ability to weigh the risks vs. the benefits should be an informed decision that these residents should have faith in. Residents who are subject to urban gas and oil drilling want to be assured that the regulations in place by the state of Ohio and implemented by the industry will not fail or result in a catastrophe.

Health concerns are related the effects of emissions from these sites and trust that the state government is strict enough and the producers will follow these guidelines to prevent fugitive emissions from any stage of the natural gas and oil production. Sources of air pollution associated with drilling come from every step of
bringing natural gas and oil to market, the drilling process, staging the site, transporting and processing the natural gas and oil of emissions including methane, benzene, and hydrogen sulfide and diesel exhaust (Crist and Ghosh May 2012). The industry and regulators estimate how pollutants are being emitted, but they are not subject to the Clean Air Act and there is little desire to do the sampling to measure the emissions (Shogren May 15, 2012).

Safety concerns are related to the ability of natural gas to migrate where it should not and spark an explosion, or too much pressure building causing a well blow out. An example of migrating gas resulting in property lose is the 2007 Bainbridge, Ohio incident, where a home was blown off of its foundation. The cause of the explosion was faulty cement during the plugging on a retired well. The high pressure at the capped well caused methane gas to migrate through the water table and collected in the basement of this home. It is believe the furnace sparked the explosion which lifted the house off of the foundation. No one was injured, but the ground water for the residents of the street remains contaminated with methane (ODNR September, 2008 and Mouawad and Krauss December 7, 2009).

Meanwhile Industry took notice and started feeling attacked and began an offensive to not look like they were the bad guys. They went to the media in op-eds in local town papers, and larger papers. They held their own forums and joined the same public meetings attended by NEOGAP held by the ODNR. They wanted to show their side and present natural gas and oil drilling in Ohio to be safe and the driller operators
want to ensure safety and use effective technology. Urban drilling is a great opportunity for property owners to access their mineral rights; this practice will create new jobs and start the path to energy independence.

**Third Revision**

The ODNR had a problem on their hands, the revision to Ohio's oil and gas laws the law did not have adequate planning for issues that became controversial is urban areas. Some driller operators were repeatedly taking advantage of the Mandatory Pooling provision, resulting in residents feeling bullied or they had no choice but to lease their mineral rights. Local governments and citizen were upset that they no longer could have zoning for community standards. NEOGAP began working with Senator Grendell, Republican from Chesterland and Representative Skindell Democrat from Lakewood, to co-write and sponsored H.B. 426 and S.B. 196. Meanwhile, the ODNR had received feedback from across northeast Ohio from citizens concerned about urbanized drilling and began working with the oil industry lobby to overhaul Ohio's oil and gas laws to address the issues of the citizenry while still allowing driller operators access to urbanized areas.

The ODNR introduced S.B. 165, co-written with the Ohio oil and gas industry. This bill made it out of committee hearings, to senate testimony, where numerous citizens presented their opposition to urbanized drilling. The bill passed both houses amendments influenced from citizen testimony and went into effect in 2010.
The need for the overhaul of Ohio's oil and gas laws, was another instance of the General Assembly letting industry take the lead to protect their interests, trusting industry to have the public's best interest too, which is not the role of industry, but the role of government. What finally passed was a bill that ODNR felt was a good compromise. In the same interview with Mike McCormac, he described how S.B.165 fixed the law where citizen saw the law lacking, saw industry concede to new regulations and permitting, and most important the ODNR would benefit from the new fee structure to support the agency’s budget (McCormac 2010).

Senate Bill 165 went into effect on June 30, 2010. The head of the ODNR was confident that the law would prove to be comprehensive and strengthen the rules and regulations for drilling operations and well construction. There will be more inspectors and the law allowed the ODNR to increase fees and introduce a new brine injection disposal fee (Logan 2009). The bill also addressed the vague and nuisance issues some citizens groups had with urbanized wells. Regulations and rules were revised for site construction, drilling considerations, restoration after the drilling operation is complete, erosion and sediment control and stronger protection for ground and surface water and homeowner wells (Schwartz 2010).

Shale Policy: Getting Ahead of the Game

While Ohio was struggling with how to manage urban drilling, shale drilling in the Marcellus Shale and other deep shale deposits around the country was gaining
attention as the next big energy opportunity. As a result, another gold rush mentality has been developing in the Marcellus Shale states. Natural gas and oil from shale sources are expected to vastly increase production in the state of Ohio, with projections of 15 trillion cubic feet of natural gas in shale and 5 billion barrels of oil in the Utica alone (Ohio geologic Society 1996).

Governor John Kasich, and the General Assembly in a move to ready the state for the unique challenges that shale drilling presents, signed H.B. 315 in 2012, which enacts regulatory laws directly related to shale activity and for overseeing new technology that allows for exploration and drilling for natural gas and oil (Zehringer, March 28, 2012). This is to eliminate the possibility of delay that Pennsylvania and New York have experienced with law suits and legislation and public outcry about health safety and environmental concerns (Jacquet 2012).

Governor Kasich knew that Ohio needed to anticipate new rules and regulations for exploring and drilling of unconventional shale gas and oil. Falling behind could risk delays and moratoriums put in place by courts to sort out the laws. Being behind during previous resource booms demonstrated the need for clear, strict enforceable rules and regulations. Regulations in place demonstrate to the industry that following the safeguards are important for conducting business in the state.

**Conclusion**

The General Assembly in Ohio have been reluctant to take an active interest in protecting resources. This is evident when under duress in the 1960’s the General
Assembly created a new department and enacted rules and regulations that other gas and oil producing states had instituted over 40 years earlier. The oil and gas lobby continues to be the most influential actor in creating gas and oil legislation, yet this cozy relationship was challenged in 2005 when small scale producers came head to head with landowners who no longer had the ability to truly addressing zoning and permitting issues. The late 2000’s found citizen action groups trying to be heard and the oil and gas industry continuing to claim that they can police themselves with little regulation. The legislation that was enacted attempted to address the concerns of both sides, yet many citizens who took an active role in organizing and fighting to keep wells out of their neighborhoods were disheartened with SB 165 and continue to advocate for sensible gas and oil development with more emphasis on research into health and safety and strengthen regulations. Governor Kasich has created a clear and concise framework for future development and not to just let the industry and technology drag Ohio’s legislature to make legislation. Concern, these wells are of varying depths, but to drill deeper, and access shale deposits producers need larger tracts of land. This could potentially open up these urban and suburban landowners to more drilling in the same areas.
CHAPTER IV

Results and Analysis

The enacting of the urban drilling laws in 2005, which centralized permitting at the state level and created uniform rules and regulation for the entire state, Broadview Heights, a small suburban city of Cleveland, compromising 13.07 square miles became an attractive choice for driller operators to test the waters. Broadview Heights is situated atop formations of sandstone and shale that contain reserves of natural gas and oil. These reserves have had little production since 1998 when the city banned residential drilling and instituted other rules and regulations making drilling prohibitive. Another factor that made Broadview Heights an attractive choice was the size of many residential lots, most comprise several acres, allowing fewer parcels of land to be pooled for well development. Finally, the interstate and highway connectivity to the city provides access for drilling equipment and workers to get to city easily.

At first it was easy to get residents to lease their mineral rights for various types of compensation (Mahnic 2010). Yet, once drilling began within the city limits and in residential areas, some residents began to question how safe is it to drill for natural gas and oil next to homes in the middle of their city?

According to ODNR data, there was no development in the city from 1998 until the urban drilling law went into effect in 2005. By April of the same year, the first
applications to form drilling units in Broadview Heights were sent to the ODNR DMRM in Columbus, and were approved in a timely manner. See map 1. The map shows the sites associated with applications received from 2005 to 2009, and sites driller operators submitted applications for after Ohio’s oil and gas laws were overhauled and went into effect in 2010.

The news coverage of the 2007 Bainbridge Incident, the Movie Gasland which shines a light on fracking as a potential source of ground water pollution, and news reports of on research into potential water table contamination in Pennsylvania caused many to became more aware of the risk and benefits related to oil and gas drilling and the practice of fracking (Warner et al. 2012; and Osborn et al. 2011). The pace at which land was being leased and developed juxtaposed with frightening worst case scenarios in the media caused many to urge law makers to reevaluate the law and strengthen environmental and safety regulations. Residents who faced the prospect of drilling and wells placed in their neighborhood wanted a more thorough look into the issues associated with drilling to learn more about the practice and the laws in order to evaluate the risks and benefits.

The urban drilling regulations primarily affect residents in eastern and northern Ohio where most of the natural gas and oil formations can be found. The fact that the law voids all local control of permitting and community standards was a way for the gas and oil producers to bypass local elected officials and eliminate virtually any ability for a
Figure 5. Gas and Oil Well Applications in Broadview Heights, Ohio, 2005-2013. Map by author.
community to decide best practices, essentially all siting decisions would be made by collection of individuals. Noticeably a sharp divide in acceptance began to take shape. Residents were either un-phased by the potential or perceived risks, rather they anticipated benefits of royalty payments, an increase in domestic energy production, or residents were largely wanted to avoid the potential of perceived risks, and did not want the practice in their city or neighborhood for health and safety reasons. The purpose of this research is to consider the motivations of residents to either support or oppose drilling of natural gas and oil in urban areas.

Analysis of the Survey Data and Comments

The purpose of this section is to evaluate the whether or not (1) individuals are more accepting of natural gas and oil well development if they believe they are safe, or if the individual is being compensated monetarily; and (2) Individuals who are less accepting of wells believe there are more risk than benefits from natural gas and oil development. 1200 surveys were mailed to residents of Broadview Heights. Of the 1200 sent, 325, or 27% were returned. Cross tabulations was used to evaluate data by demographics and the responses to questions about of urban drilling and by the respondents level of support and concern. The comments from the residents provided direct knowledge of the leasing process, drilling and concerns, and the comments were evaluated to draw out additional themes. Since the survey was anonymous, the
respondents had a level of comfort to elaborate on their personal motivations for support or opposition of urban drilling.

The survey provided data from the respondents that reflect the city’s overall demographics. Both males and females responded to the survey, with more women at 53%, than men at 47% women. The curve of the population represented in the graph reflects the baby boomer generation, with the largest age group of respondents coming from the still working 45 to 65 age range. While age distribution shows that there are fewer younger people, there is be a sizeable percentage of senior citizens, and according to the U.S. Census the age distribution of the respondents is similar to the figures for the city, as shown in Figure 6 (U.S. Census Bureau 2010).

![Gender by Age Groups of Residents](image)

**Figure 6.** Gender by Age Group, Broadview Heights, Ohio 2010. Source: US Census Bureau.
The median household income for Broadview Heights in 2009 was estimated at $71,069, compared to the rest of Ohio at $45,395 (U.S. Census Bureau 2010). The survey shows 53% of respondent's average income falls between $25,000 and $75,000; this mirrors census data for the city, and demonstrates that many residents live well above the state's median income (Figure 7).

Figure 7. Median Household Income, Broadview Heights, Ohio 2010. Source: US Census Bureau.

The survey did not ask about education level, but according to data published by the Cleveland Plain Dealer, 36.7% of residents in Broadview Heights, over the age of twenty-five have a college degree (Exner October 10, 2010). The education level of the residents and respondents is a factor of the income levels as the correlation between education and income is well established.
The cross tabulation of age by current household income indicate a significant percentage of residents 65 and older earn less than $25,000 per year. As the income ranges increase, the age grouping of 65 and older becomes a smaller percentage. The 45 to 65 year age group has the highest incomes (Figure 8). Related to the age by household income is the length of time the respondents have lived in their current home. 52% of the survey respondents have lived in their homes for a minimum of 20 years, and 22% have lived in their homes between 10 and 20 years (Figure 9). This is significant, in that it demonstrates Broadview Heights is an aging suburb, and indicates that many respondents to the survey will most likely live the rest of their lives in their current home, after having retired or preparing for retirement.

![Age by Current Household Income](image)

Figure 8. Age & Household Income among Respondents.
Finally, residents in the oldest age range show a correlation between the lowest household incomes with very little chance for a new income stream. It is likely the largest asset of a portion of respondents is their home (Figure 10). A recent study of seniors found that 1 in 10 are “involuntary stayers” and these seniors report more distress and health complaints (Strohschein 2012). This is significant, as it may indicate that a portion of the older respondents may feel stuck, and their support of drilling as well as their concerns may be influenced by worry about less mobility or concerns about drilling.
Measure of Support for Drilling in Residential Neighborhoods

The results from the survey show the majority of residents in Broadview Heights do not support drilling in residential neighborhoods. The Survey asked residents if they support drilling, do not support drilling or if they are indifferent. 31% support drilling.
while 52% do not support drilling and 17% of respondents are indifferent. See Figure 10.

The survey showed that 17% of the respondents have a well or are part of a pool (Figure 12). In return for leasing their mineral right they would receive a benefit of a percentage of the royalties when and if the well goes into production, signing bonuses and in some cases, the well would supply natural gas to their home.

![Bar chart showing Has a Well or is Part of a Pool of Properties](chart.png)

**Figure 12. Survey Respondents with a Well or in a Pool.**

When looking at support for drilling by has a well or is part of a pool, 53% support drilling, notably 28% have a well and do not support drilling, while 19% have a well and are indifferent to the drilling activity. While those that do not have a well, the numbers are oddly similar with residents who do have a well, 57% of those without a well do not support drilling, and 26% do not have a well, yet support the drilling (Figure 13).
The Drilling supporters who have a well, have a clear and concise response, overall they have less concern for the issues listed in the survey, and are quite content to name the company who owns their leased mineral rights, and have a realistic view of what the immediate and long term compensation would be. They see value in using the resources under their feet and are quick to criticize those that oppose drilling.

An interesting inconsistency became apparent among those that have a well and do not support the drilling in urban area, and several scenarios developed from residents clarifying their positions in the comments. First, several respondents plainly stated they felt pressured into leasing their mineral rights because they were told there would be a well drilled anyway, they might as well be compensated.

I am currently part of a pool of properties. Was strong-armed into it by neighbors. One of whom is a prominent politician member of Broadview Heights. Not happy about any of this (Respondent Code 75).
Some residents with a limited income and well into retirement listed they agreed in order to supplement their income or help with the rising cost of medication. Another instance came from respondents who felt they were not made fully aware of what they were singing on to, and are remorseful for not doing more researching. Finally, the scenario that has garnered media attention and sympathy citizen action groups and property rights supporters were the landowners who do not support drilling and had their property unitized by a driller operator into a drilling unit by a mandatory pooling order by the ODNR. While landowners have the right to an appeal to be heard by the ODNR’S Technical Advisory Committee (TAC), the chances of a successful appeal were slim. From 2007 to 2012 of the 123 mandatory pooling orders issued, only four appeals made it all the way through to a TAC appeal hearing. The TAC has ruled in favor of the gas and oil interests over landowners all but one time (Pompili February 19, 2012).

When residents were asked if they would like to have a well, the survey did not allow for those that already have a well to opt out (Figure 14). This figure only reflects if the resident would ever like to have a well or be part of a pool, that would like to have a well or be part of a drilling pool. Compared to those who actually have a well, the figure jumps from 17% to 33% indicating their willingness to have a well or be part of a pool. Conversely 67% do not want to have a well or be part of a drilling unit.
Would Like to Have a Well or be a Part of a Drilling Pool

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>33%</td>
<td>67%</td>
</tr>
</tbody>
</table>

Figure 14. Would Like to Have a Well or be Part of a Drilling Pool.

Figures for "Support for Drilling by would like to have Well or is Part of a Pool", shows 76% of the supporters would like to have a well, and 78% do not support drilling and do not want a well. This indicates that among residents, many have firm opinions on whether or not they want drilling activity on their land or near their home.

Support for Drilling by Would Like to Have a Well or Be Part of a Pool

Figure 15. Support for Drilling, by ‘Would like to Have a Well or be Part of a Drilling Pool
The decision to drill and build wells, cannot be a spatially uniform activity, geology, the built environment and the willingness of the public and private sector must all be determined and negotiated. There is no community where all residents support the drilling; however property owners have the right to use their property how they see fit. The Urban drilling law has made it possible to engage in using a property's mineral right on a small scale, and some are choosing to sell their mineral rights, to gain financial benefit and support the local economy and contribute to domestic energy production. Yet, even those that support drilling in the survey comments seem like they could be swayed with enough incentive or making the drilling sites less intrusive:

If it is going to go in anyway, might as well join. There are too many drilling sites too close to houses and residents don’t always get a say... if it is in woods or unseen its ok" (Respondent Number 30).

I support Drilling only if the well and storage tanks are a safe distance from any structure" 75

Have reasonable safety, environmental and esthetic requirements "81

Other respondents commented on how drilling has caused discord among once friendly neighbors. There are feelings of disappointment, and neighbors are left dismayed over the decisions of others to agree to allow drilling, without concerns for possible negative impacts to property values, health and safety.
Perception, Motivations, and Attachment

Needing to understand the motivations as to why residents do or do not support drilling is crucial to this study. The survey offered respondents several reasons why they do or do not support drilling with additional space to alternative reasons. See Figure 16.

![Reasons for supporting Drilling in Residential Neighborhoods](image)

**Figure 16.** Reasons for Supporting Drilling in Residential Neighborhoods.

Among drilling supporters, the response show the three reasons that ranked the highest were pocketbook related. Potential royalties is incentive for those on a limited income and those that are less concerned about the drilling altering the way they view their property and more interested in a potential windfall. One respondent commented:

> We were reassured at a group meeting that all safety precautions would be met, that there were no adverse health effects, and no contamination to the environment from drilling or storage tanks (Respondent Number 16).
Potential for free natural gas was the second most selected, indicating the respondents are eager to gain additional benefits from their property and have faith in the technology. Natural gas commodities can fluctuate wildly, yet for a resident to not have to budget for home heating is an attractive benefit to leasing mineral rights.

Third ranked was tax revenue for the city. Residents would like drilling to create additional revenue sources beside their own pocketbooks. Drilling supporters listed this as an avenue to improve the quality of life for the citizens, and others said it would be foolish for the city to not benefit.

Domestic source of energy and a cleaner source of energy rounded out the least selected reasons for support. These reasons have the potential to have natural gas garner more support for drilling in the future. As news spreads and well produced commercials and advertisements tout the tremendous availability of natural gas and the benefit that it may slowdown climate change these number could increase. Natural gas and oil producers are actively promoting the industry to sway public opinion, to have more Americans support the industry and become consumers.

Advertisement in mass media want to spread the message that natural gas produced domestically is a cleaner burning fossil fuel, that will create jobs, enhance the economy and will result in lower natural gas prices. Again this is supported in the comments.

Drill baby drill (Respondent 64).
The world has a limited supply of natural gas, we should use all available resources. We have too many ‘not in my backyard’ and yet they will scream...when gas supply runs out (Respondent 87).

The residents who do not support drilling responded enthusiastically to the reasons provided and overall agreed with all of the reasons listed. Many of the respondents checked all the options and continued to list additional reasons why they do not support drilling (Figure 17). Concern for safety issues ranked the highest among reasons provided. While safety issues may seem like a vague term, in the age of the internet it is relatively easy for lay citizens to find sources that will amplify their perceptions of the safety risk. Finding an antidotal story and residents sharing inflammatory information make an issue seem much more risky that the facts and science can demonstrate. Possible environmental contamination and health issues related to gas leaks were also ranked highly indicating respondents concerns with technology, and adequate rules and regulations to prevent contaminations.
The final two reasons that ranked lowest as reasons to not support drilling is that the equipment is unsightly and the increase in large truck traffic, are both nuisance related. If a resident is already opposed to drilling and the see the equipment in their neighborhood or in the city it is a reminder of they do not support and the lack of power the citizens have to determine community standards. While the large truck traffic creating more wear and tear on city streets is a cost the city will need to bear. Drilling is a water intensive activity and the trucks are need to transport water to and from the where the well is being drilled.

The respondents who do not support drilling felt much more compelled to list additional reasons they do not support drilling. The overwhelming additional concern was financial in nature, the concern that a natural gas and oil well on their property or nearby will have a negative impact on property values, and would the homeowner be
able to sell the property in the future. Another concern is an increase in home insurance rates.

Another additional concern that was listed multiple times was the perception of the indiscriminate cutting down of trees to build access roads and drilling pads. One resident decried that the drilling:

Forever destroyed beautiful virgin wooded areas (Respondent 182).

This loss of habitat had another respondent citing seeing more deer in yards and on the roads. Under the final question of the survey many said they moved to Broadview Heights for its beauty and nature and were quite upset that this practice is changing the nature of the neighborhood.

We moved to Broadview Heights in 2008 for the quiet, calm, nature and relaxed atmosphere. It seems as though drilling has reduced all of these desirable qualities” (Respondent 19).

Finally, the realization that the city had no control to regulate and zone natural gas wells and citizens had very little recourse was listed in the reasons they did not support drilling and in the additional comments. Many residents seemed baffled as to how they had their rights taken away. These results are from the comments:
State legislators should have left home rule alone - only a community knows our areas. We had legislation but cannot use it. I do not agree with pooling (Respondent 63).

This must only happen in a properly zoned area (Respondent 67).

I am most upset with the lack of local control over the number of wells and locations and control of pooling properties. The laws were drawn up to protect the companies and not the local cities, property owners or local communities (Respondent 118).

The fact that the city or even landowners have no say in these matters (Respondent 161).

I believe the city should have ability to regulate such use of land within the city boundaries (Respondent 198).

I do not agree or approve of state General Assembly taking from communities the ability to develop and implement restrictions on the location of well head and storage tankage and the ability to impose rules (Respondent 306).

Support by Age

Out of each age grouping, more residents do not support drilling in residential neighborhoods. The 18 to 45 age group has the highest number of undecided, as the age grouping increase, more residents do not support drilling in residential neighborhoods (Figure 18). Support for drilling in each age group averages 31%. The survey shows an interesting trend, as the age groupings increase the survey shows the percentage of indifferent response decreases, while the percentage of those who do not support drilling increases an average of 8% per increase in age groups.
This points to the residents having a positive place attachment, as Manzo and Perkins discussed, an attachment that is “communal in nature, where residents have a sense of bondedness and rootedness that took shape from both internal and social process (Manzo and Perkins 2006). Attachment is evident in how long residents have lived in their homes and how they have described how they support or do not support drilling, as their homes are providing them with concepts they value.

**Support by Income**

The distribution of support by income, continues to demonstrate that in all cases, those that do not support drilling outnumber the support and indifferent (Figure 19). Among income categories, the largest difference between support and oppositions is those with an income of $25,000 or less per year. 70% do not support drilling, and 12% do support drilling. While the income groups in the middle ranges of $25,000 to

![Support for Drilling by Age](image-url)
$50,000 and $50,000 to $75,000, have a similar distribution between support and opposition. As the incomes rise above $75,000, there is much less support for drilling. Referring back to table 4, residents over the age of 65 make up 87% of the $25,000 and under income range and again points to place attachment for the elderly, and a perception that drilling will create more risks to what they value in the community, and could negatively impact their largest investment.

![Support for Drilling by Current Household Income](image)

Figure 19. Support for Drilling by Household Income.

At the same time residents who do not support drilling and earn more than $75,000 become a larger percentage of oppositions. This increase may have to do with education and age, and most likely related to attachment, place protective actions and influenced by factors associated with risk amplification.
Support for Drilling by Years in Current Home

When looking at the years a resident has lived in their home and the level of support for drilling the age group where support for drilling is the strongest among the 5-10 years in the home (Figure 20). Residents may look at their home as an investment where they want to maintain the look and feel of the neighborhood, as they see value in it, while others may see their home, and property as an investment and would take advantage of the opportunity to make money off of their property despite the unknown risk drilling may have. The 0 to 5 year range is evenly distributed among support and opposition. The residents who have lived in their homes the longest have developed an attachment to their home and community over a longer period of time. It is likely they are less willing to support drilling due to a perceived threat to their property, and neighborhood.

Figure 20. Years at Current Residence by Support for Drilling.
Even of those that do not support drilling in residential areas they are aware that the benefits are wide ranging, from splitting royalties, having natural gas supplied to the home, but the years in their home and their attachments to place has a stronger pull in their decision making. This place attachment is a positive bond to their neighborhood that the residents depend on and supports identity (Agnew 2011).

Examining the support for drilling by years current home reveal those who have resided in their home the longest, between 20 and 50 years do not support drilling at 61%. While the support for drilling is at 28%, and the people who are indifferent is at the lowest percentage. This would show that those who have live in their homes the longest have the most invested financial and emotionally into the property and are likely to be more risk adverse.

Safety, Health and Environmental Contamination Concerns

All respondents were asked if they had concerns related to safety, health effects and potential environmental contamination. These questions were asked to gage the respondents trust in the technology to prevent disasters, the science related to concerns over health effects of gas leaks, and the potential for environmental contamination. These questions put all of the responsibility in the engineering, the workers, the oil industry, and the government. The residents have very little ability to engage or challenge the decision making of the siting, materials and whether or not to study if there are any health effects.
Any technological activity has potential risk associated with it, nothing is risk free. Laws and standards are established to protect those involved with the activity and residents and the environment. The concerns of risks to safety are based in the perceptions of the residents to the technology and familiarity with the technology and an understanding of the science and testing that occurs before government allows the public to interact. Unfortunately there can be a lack of trust from citizens, and prejudice from the experts.

Overall there are quite a few people who have concerns with the natural gas drilling. 17% have no concerns with any safety risk associated with natural gas drilling, while somewhat concerned is 40% and very concerned is 43% (Figure 21). It is possible that those that are somewhat concerned could be swayed by a landman, or a presentation from the oil industry, or they could be swayed by the citizen action groups fighting the gas drilling in neighborhoods.

![Concern for Safety Risks Associated With Natural Gas Drilling](image)

**Figure 21.** Concern for Safety Risks Associated with Natural Gas Drilling.
The level of concern for safety risk by the support for drilling, the supporters do have some concerns, yet those that do not support drilling are for the most part very concerned (Figure 22). While it is unsurprising that those who are somewhat concerned responded the most as indifferent, it is interesting to note that a few respondents who support drilling are very concerned. These result may be representative of those that sign leases for extra income or those that do not want the drilling apparatus in their neighborhood because it spoils the suburban appeal.

Figure 22. Level of Concern for Safety Risks by Support for Drilling in Residential Areas.

Among those that would like to have a well, the majority are not very concerned, yet when we look at the somewhat concerned for safety risks, 48% would like to have a well and 35% do not want a well. The figures are very similar for respondents who already have a well (See Figures 23 and 24).
The respondents who are not at all concerned about safety risks have little reason to question the regulations enforced by the state and the gas and oil producers’ ability to follow the regulations and operate while following best practices, this group trust technology, and the operators. They see no need to be concerned and most likely would consider the risks of acquiring the resources worth the risk and just the price of business.
Concern for safety by age show that as age groups increases the concern for safety rises, and those that are somewhat concerned, is 58% for the 18-45 range and decreases as the age categories increase. While not as distinct, those who are not at all concerned increases as the age categories increase, from 12% for 18-45, to 18% for both the middle age, and the 65 years and older. It is interesting to note that as the age groups increase, the somewhat concerned become more decisive. This most likely relates to stages of life and attachment to place, their home symbolizing a safe place, drilling and well development in close proximity to homes and in residential areas can threaten the function of what home means.

Level of concern for safety by years in home shows a similar pattern, and there can be some correlation due to longer someone lives in a home the older they will be. The longer someone lives in their home; they may feel more certain in their beliefs, opinions and ability to weigh risks and benefits to their home. The percentage of those that are somewhat concerned falls the longer they live in the home, and at the same time those that are very concerned also increase over time (Figure 25). The figures for those that are not at all concerned remain relatively constant from 18% at the 0-5 years to 15% at 20-50 years.
Reading the level of concern by safety risk by household income what is most striking is the 60% of survey respondents earning less than $25,000 chose the “very concerned” category for safety concerns, and to compare “very concerned” and income over $100,000 the percentage falls to just 24%. Those that are somewhat concerned rise from 32% at the $25,000 and continue to risk to the upper income category (Figure 26).
Finally, in the lowest income category only 8% of those that are “Not at all Concerned”, and this increases by category, but stay in proportion lower than the somewhat concerned. This supports the residents who have lived there longest, many of whom are on fixed incomes and indicated that they have an income of less than $25,000, see their home as a refuge, and a safe place, and with an income less than the median income for the city and for the state, it is unlikely they would be able to move to another community if they feel their safety is threatened by drilling activity.

Issues related to health are hard to document. There are toxic gases associated with the drilling process that can accidentally be released, and there are rules and regulations for the natural gas and oil industry to monitoring fugitive gases. Some residents are concerned about what could happen if there is an undetected gas leak and the effects on health (autoimmune disorders, cancer, and asthma just to name a few). These concerns may be circumstantial and inferred by many who do not want the activity in their neighborhood, while those that are not concerned may not attribute any of their current or future health issues to the proximity of a gas well.

The responses to the survey about the residents' concerns for health are very similar to the concerns for safety. 40% are very concerned, as well as 40% for somewhat concerned and 20% for not at all concerned (Figure 27). There is no overwhelming concern about health effects associated with natural gas well drilling.
The correlation between concern for health effects and support for drilling is less significant than other concerns addressed in the survey. Those that are somewhat concerned have the 39% who support drilling and 35% that do not support the drilling (Figure 28). There is a lack of scientific evidence to connect the emissions associated with drilling, production and storage that can negatively affect the health of residents in close proximity.
The concern for health effects and would like to have a well continues to illustrate that health concerns are very polarized between those that would like to have a well and those that do not, while that that are somewhat concerned are practically even between would like a well and would not. Urban drilling and deep shale fracking supporters and opponents are very interested in reaching a similar demographic to the somewhat concerned, and this illustrates that they still can be swayed (Figure 29).
The concern for health effects by age, and health effects by current years in home show similar patterns. Of those that are very concerned by age, the percentage of very concern increase as with the higher age group, as well as the length of time residents have lived in their homes, as shown in Figure 30. This can be attributed to “the NIMBY Syndrome”, and a lack of trust in local and government officials.
Residents concern for possible health effects increase with the number of years in the current home. The percentage of residents who chose “somewhat concerned” declines with the length of time in their current homes (Figure 31). These figures may demonstrate that as they age they are less indecisive and form decisions based on their experiences and ideology. As the length of time increases in the home, the residents concern grown, yet those less concerned about health effects remain relatively consistent as length of time in the increases home. Poor health can negatively impact quality of life, the fear of becoming ill due to something in the home or near the home can impact the attachment to place the residents may have.

![Concern for Health Effects and Years in Current home](image)

Figure 31. Concern for Health Effects and Years in Current Home.

Additional responses from the comments reveal how the residents valued the suburban wildlife habitat and other characteristics of a healthy suburban environment. With drilling activity, residents can hear, see, and smell the drilling operation. After the
initial drilling is complete, permanent equipment, such as the well head, and storage equipment that will vent off gasses to prevent pressure build up is a reminder of the changes to the landscape and how what they appreciated about their environment before urban drilling was allowed has been impacted.

The final concern inquired residents worry about potential for environmental contamination from the drilling and storing of natural gas and oil in residential areas of Broadview Heights. 48%, of survey response indicated they are very concerned, while the somewhat concerned is second with 36% and last is not at all concerned with 16%. See Figure 32. Again, we can surmise that the opposing sides of natural gas and oil drilling are trying to sway the 36%, and with time they will firm up their opinion and fall into either category.

![Figure 32. Concern about Potential Environmental Contamination of natural Gas Wells and Storage Tanks.](image-url)
Next, support of drilling by concern for potential environmental contamination shows 73% that do not support drilling are very concerned, while 40% are unconcerned and support drilling. Again there is a substantial percentage of respondents are somewhat concerned and indifferent to the drilling (Figure 33). This reflects quite a few people who have yet to study the issue, or experience drilling as offensive or just another aspect of the city's energy infrastructure.

![Figure 33. Concern for Potential Environmental Contamination and Support for Drilling.](image)

The residents who would like a well by level of concern for environmental contamination continue to show residents are concerned with potential environmental risks of drilling. Even among those who would like a well, 16% are very concerned and half of those that would like a well are somewhat concerned. Residents may have concerns for community stability over any risk associated with drilling, and trusting the
industry that the practice of urban drilling will not impact them or the environment negatively (Figure 34).

![Figure 34. Concern for Potential Environmental Contamination and Would Like a Well.](image)

This is supported when comparing this table with the concerns of potential environmental damage and age (Figure 35). The only age category where the somewhat concerned category had the highest percentage is in the youngest age grouping, 18-45. The percentage of very concerned increases, as the age categories increase, as the age somewhat concerned decline in almost direct correspondence in rise in concerned. The residents who are not concerned remains relatively stable and only increases by 1% per age grouping. Lack of concern for the environment, economic progress and faith that any damage to water, soil, and wildlife can be addressed is a factor in these findings.
The survey was completed by many residents who were older and had lived in Broadview Heights for many years. When we compare the data for the concerns for potential environmental contamination, years in home and age the relationship between these variables the data demonstrates a positive association with individuals who less accepting and concerned with the unknown risks due to the proximity of the drilling in their community. For those that have lived in their homes the longest, from 20 to 50 years those that are very concerned is 57%. Again those that are very concerned steadily increase in percentage, while those that are somewhat concerned peak at 50% for those that have resided in their homes for 5 to 10 years, and then next time span the sorting begins (Figure 35). It is interesting to note that those who are not at all concerned in the first grouping has the highest percentage. This is where much of the conflict reported in the survey amongst neighbors is occurring, between newer

![Concern for Potential environmental Contamination and Age](image)

Figure 35. Concern for Potential Environmental Contamination and Age.
residents and those that have lived there for decades, and have a value and attachment to the property that is stronger than any offer from a landman.

Figure 36. Concern for Potential Environmental Contamination and Years in Home.

Concern for environmental contamination by income is another fascinating finding that needs to be explored further. The table shows very clearly that residents with an annual yearly income of 0 to 25,000 are very concerned about drilling, as the income rises, very concerned steadily falls, while somewhat concerned rises at a higher rate than those not at all concerned (Figure 37).
Figure 37. Level of Concern for Environmental Contamination by Income.

To further examine these findings one needs to look at years in current residence and household income. It is evident those that have lived in their homes for the longest period of time make up the largest percentage of respondents, for example those that earn 25,000 and less, 60% of them have lived in their homes between 20 and 50 years (Figure 38). Theoretically, there is a cohort of residents living on an fixed income, their most valuable asset is their home, and it is where they plan to live out the rest of their lives. The comments from the survey support this:

The Royalty payment are a god send the payments help with our high cost of drugs (Respondent 140).

I feel like a hypocrite since I do get a check from Gonzoil each moth but I don’t like the wells even with the science around it is a lot on the landscape. There are too many wells already in Broadview heights (Respondent 101).
You have to always have a vision for the future. After 30 years all we will have is old abandoned gas wells with no plan to ever remove them. All on nice very rural land. What a legacy to leave to our children (Respondent 182).

![Years at Current Residence by Household Income](image)

Figure 38. Years by Current Residence by Household Income.

If we project out to the future, one could surmise this pattern would continue. Younger people and newer homeowners are often less concerned about health and health related issues. As residents age, which can correlate to the length of time one lives in a home, they become more decisive and develop an attachment to their home, where they feel safe, have clean air and water that will not contribute to health problems.

In Broadview Heights we have a population that is concerned for gas and oil development and the long term consequences. Signing a contract to lease their land can be attractive for those who are more interested in potential economic benefits for
themselves and the wider economy, but it is also a benefit for residents who may have concerns but see the economic benefits as a blessing due to limited income. Some have reluctantly signed; while the majority of residents do not support drilling because of a variety of concern that they do not feel have been adequately addressed by state regulators or the driller operators in the state of Ohio.

**Drilling on Other Land Uses**

The final questions on the survey inquired about other land in the city and if the residents would support drilling on commercial property, public lands and school property. In other words, would those that do not support drilling in residential neighborhoods care to see drilling elsewhere in the city, is there room for compromise? Natural gas and oil produced in Ohio is projected to continue to have a positive financial impact, especially with the increase in Marcellus and Utica Shale drilling. The residents were posed with the questions related to different land use, commercial, public and park land and school property. For commercial property the figures are evenly split between 40% not supporting drilling, and 41% supporting the drilling (Figure 39).
When the land use was related to more public access and school children, the support for drilling dropped significantly (Figure 40). 58% do not support drilling in public and park lands and 71% were opposed to drilling on school property (Figure 41).
The comments from the survey established that many were concerned for the health and welfare of the young people that could be affected by drilling, while a few commenters’ strongly advocated that any and all land should be drilled to lessen the burden on the citizens of Broadview Heights.

![Support for Drilling of Natural Gas on School Property](image)

**Figure 41.. Support for Drilling of Natural Gas on School Property.**

**Conclusion**

The data from the survey supports the first research question; individuals are more accepting of natural gas and oil well development, if the individual believes they are safe, or if the individual is being compensated monetarily. The survey showed that those that do support drilling support the benefits of royalty payments, being able to have a personal well for natural gas and for increased revenue for the city, and twice as many people would like to be a part of a pool or have a well then currently have one. The survey illustrated that despite support for drilling some do have concerns for health,
safety and environmental contamination. This was evident from the additional comments of those who support drilling as some outlined ways to make drilling safer or more acceptable, with further setbacks from homes and keeping children away from completed gas wells. Finally, those that support drilling in residential and urban are much less concerned about any risk.

Additionally the research supports the second research question; individuals are less accepting of gas well development if they believe there are more risks than benefits from natural gas and oil wells in urban areas. Not only are more residents less accepting of natural gas and oil development in Broadview Heights, those that do not support drilling are very concerned regarding the risks of the reliability of the technology, the ability of government to monitor the development and the impact to the social and physical attachment to their homes.

The environmental perception of the residents who support drilling was less evident from the survey questions, but from the comments the picture that developed related to owning the land and being able to use the resources for the benefit of the landowner and the potential to reduce dependence of foreign oil. Of those that do not support drilling the comments related to the health, safety of local wild life, and the outrage directed at the cutting down of trees to build the access roads and drilling pads illustrates that those who do not support drilling have a positive attachment to their home and their city in part because of their positive emotional bond with the environment (Altman and Low 1992).
The positive attachment with the environment may be disrupted by the drilling for natural gas in residential areas of Broadview Heights. As residents were approached to lease their land for natural gas and oil drilling, discord began taking root as there was differing perceptions of the environment, of their homes and a primary place attachment that began to disrupt some residents’ attachment to place.

As citizens discovered there was very little ability for residents to participate in community decision making because the urban gas laws, centralized the permitting removing local control, left citizens and local law makers feeling frustrated and helpless, a potential attachment disruption. The inability to participate in community planning can leave residents with deep feelings of dissatisfaction (Manzo and Perkins 2006).
CHAPTER V

Conclusion

This research set out to measure the degree of support or opposition to urban drilling in a residential area of northeast Ohio, which are the city of Broadview Heights. Environmental perception literature guided the research to determine what was valued by the residents. Environmental cognition, how we understand, and organize information and environmental appraisal, the personal evaluation, emotions and attitudes about the environment are two of the ways one can gage how an individual reacts to drilling as a new land use. Scale factors into this research because the state and the industry determined the local rules and regulations to be a hindrance to the development of natural gas and oil, and centralized all decision making to the state.

After HB 278 was passed and became law in 2005, Broadview Heights was one of the first cities in Ohio to experience residential drilling despite having a city ordinance banning oil and gas drilling in residential areas of the city. Residents were approached by landmen to lease their land as soon as it was legal and many signed on, possibly without fully understanding the long term relationship the landowner and the neighborhood would have with the natural gas and oil wells.

As the wells were drilled citizen who were opposed to drilling found out the city had no control to zone for oil and gas drilling. Since oil and gas drilling was now in the
hands of individual landowners to accept or refuse to sign a lease I developed two
guiding hypotheses for this research into the support or opposition for drilling in urban
areas: (1) Individuals are more accepting of natural gas and oil well development, if the
individual believes they are safe, or if the individual is being compensated monetarily;
and (2) individuals are less accepting of wells if they believe there are more risks than
benefits from natural gas and oil wells in urban areas.

In this study I conducted a survey of residents with a response rate of 27% of
1,200 surveys, 325 were returned completed. The results of the research found that
31% of residents support drilling for natural gas, and 52% oppose the practice. When
asked if the respondents support drilling on other properties, 71% do not support
drilling on school property at 71%, and 58% do not support drilling in park land, but the
support for drilling on commercial land was equal.

The survey showed that 33% would like to have a well, and of these residents
the reasons provided by the survey showed that the monetary benefits were a positive
to this group. Essentially, they support the ability to use all of the resources at their
disposal, and being able to reap an unexpected benefit from leasing mineral rights is a
benefit of owning the property.

Conversely, 66% of the respondents do not want a well, and the response in the
survey for not supporting drilling shows there is a great concern among those that do
not want drilling in residential neighborhoods over the potential risks that could occur.
Respondents cite damage to the environment, health and safety issues, concern from the citizens who recognize that they must trust the industry to follow rules and regulations, and trust the state government to have strong and enforceable rules in place and a workforce that can monitor the drilling and maintenance of the wells.

Removing local control created more problems for communities than expected, this is one reason why the state overhauled all of the oil and gas laws just 4 years after the urban drilling law was enacted. Ending home rule for drilling rules ruined any collaborative decision making that could find a compromise for those who would like to lease their mineral rights and those who have concerns about potential risks and the impact of how the drilling apparatus will have on the landscape. The impact of leaving the decision making of siting wells to individuals, the oil and gas producers and the state officials can create a disruption in the attachment to place and create discord among neighbors. If residents refuse to sign a lease, supporters are negatively impacted by their inability to benefit from their mineral rights, in contrast when other neighbors have signed on to lease their mineral rights those that oppose are concerned that drilling will ruin their property values and the beauty of their neighborhood.

Ohio is not a one size fits all state, by creating one standard of rules and regulations some communities to make decision in their best interests. There are sensitive ecosystems that a community may value for recreational and economic purposes that could be negatively impacted by a producer creating a drilling unit of
several properties. Ultimately removing local control creates problems when a community is not able to make decisions for their best interests.

This research will contribute to the understanding of the discord that can occur when scale is remade for the benefit of one group. While there are benefits landowners, gas and oil producers and the state for the expansion of drilling into urban areas, this was not an economic development issue that residents in urban and suburban neighborhoods have been clamoring for. Centralizing the permitting is a case of a special interest gaining access, and the loss of local control is not lost on the residents who are upset with the shift in power.

While this study garnered strong response rate from the citizen of Broadview Heights there were design flaws with the survey which could have answered the hypothesis with additional quantitative data. A future study could evaluate the actual benefits over time of drilling in Broadview Heights. Are these wells producing or are the wells not producing and being plugged. Due to the interest in natural gas and oil development, especially in shale, the response to any future survey would likely reproduce a sound response rate.

The scale of this research is quite small, a small town in northeast Ohio struggling with how to keep residents happy. The laws related to oil and gas are very precise, landowners have the right to use their mineral right, but other facets are unsettling. Many have argued that revoking home rule infringes on property rights, while the
natural gas and oil producers would argue that to not let a citizen develop their minerals right their rights are being compromised. The lack of thought into how many residents would respond ultimately created the conflict, which brought about the overhaul of Ohio’s oil and gas laws, but it must be considered that the opposition to drilling in residential neighborhoods is more than residents being risk-adverse NIMBY’s, but also citizens who are concerned with their rights to plan for their community.
Sources


Ohio Department of Natural Resources Division of Mineral Resource Management. 200, 16 October. Glazer Unit No. 1. Columbus, Ohio.


The Ohio State University. 2012. Fact Sheet: Community Development. Columbus, Ohio: Ohio State University Extension.


Appendix

Please mark boxes with an ‘X’ or circle with your ranking level of support

1. What is your age?
   - [ ] 18-32
   - [ ] 33-45
   - [ ] 45-65
   - [ ] 65 and older

2. Are you Male or Female?
   - [ ] Male
   - [ ] Female

3. What is your current household income?
   - [ ] Less than $25,000
   - [ ] $25,001 - $50,000
   - [ ] $50,001 - $75,000
   - [ ] $75,001 - $100,000
   - [ ] $100,001 – or higher
   - [ ] Prefer not to answer

4. Do you own or rent your place of residence?
   - [ ] own
   - [ ] rent

5. How long have you lived in your current residence?
   - [ ] 0-5
   - [ ] 5-10
   - [ ] 10-20
   - [ ] 20-50

6. Do you have a natural gas or oil well on your property or are you part of a pool of properties with a natural gas well?
   - [ ] yes
   - [ ] no

7. Would you like to have a gas or oil well on your property, or would you like to be a part of a pool for a natural gas and oil well?
   - [ ] yes
   - [ ] no

8. How much do you support the drilling for natural gas in residential neighborhoods of Broadview Heights?
   - Strongly support
   - Support
   - Indifferent
   - Do not support
   - Strongly do not support
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4
   - [ ] 5

9. If you DO support drilling in urban areas what are the main reasons (please check all that apply).
   - [ ] Potential for free natural gas
   - [ ] Would like more domestic sources of energy
   - [ ] Royalty payments
   - [ ] Cleaner source of energy
   - [ ] More tax revenue for city
   - [ ] Other __________________________

Continue on the back →
10. If you DO NOT support drilling what are the main reasons (please check all that apply).
   - They are unsightly
   - Increase in large truck traffic
   - Safety issues (explosion etc.)
   - Health issues related to gas leaks
   - Potential for environmental contamination
   - Other _______________________

11. How concerned are you about safety risks?
   - Very concerned
   - Somewhat concerned
   - Not at all concerned
   1   2   3

12. How concerned are you about possible health effects?
   - Very concerned
   - Somewhat concerned
   - Not at all concerned
   1   2   3

13. How concerned are you about any potential environmental contamination from the drilling of a natural gas well or the storage tanks?
   - Very concerned
   - Somewhat concerned
   - Not at all concerned
   1   2   3

14. Do you support the drilling for natural gas on commercial property in Broadview Heights?
   - Strongly support
   - Support
   - Indifferent
   - Do not support
   - Strongly do not support
   1   2   3   4   5

15. Do you support the drilling for natural gas in public and park lands in the city of Broadview Heights?
   - Strongly support
   - Support
   - Indifferent
   - Do not support
   - Strongly do not support
   1   2   3   4   5

16. Do you support the drilling for natural gas on school property?
   - Strongly support
   - Support
   - Indifferent
   - Do not support
   - Strongly do not support
   1   2   3   4   5

17. Do you have any comments about the issue or concerns you would like to share?