

“It’s Not Just a Story We’re Telling”: How the Oil and Gas Industry Rationalize  
Fracking’s Safety

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On my honor I have neither given nor received unauthorized aid on this thesis.

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Abstract:

This paper examines the willingness of industry personnel and anti-fracking protester (fractivists) to engage in conversation about fracking in urban landscapes. Increasingly, fracking sites are situated in urban communities, near homes, schools, and playgrounds, leaving community members concerned and apprehensive about fracking's effects on the environment and human health. In response, the oil and gas industry promotes and encourages “authentic and transparent engagement with community members” in order to to assuage public fears. Using interview data, this study analyzes what frames of understanding industry personnel and fractivists see fracking through, how the frames prevent conversations, and how a frame that prioritizes a cost-benefit analysis benefits mineral extraction throughout Colorado and belittles community members lived experiences.

Key Words: fracking, fractivist, industry, community, open dialogue, frames, power, knowledge

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The combination of horizontal drilling and hydraulic fracturing has allowed, for the first time, unprecedented quantities of unconventional oil and natural gas to be released from impermeable rock formations, or “shale plays,” deep below the earth’s surface. Before this technology emerged, these sources of domestic oil and natural gas were considered costly and inefficient to collect (Finewood and Stroup 2012, Lave and Lutz 2014). But with evolving technologies, the development of hydraulic fracturing (herein referred to as *fracking*) has led to a major increase in domestic oil and gas production and has opened up new lands for oil and gas development. Urban areas in the United States were once thought of as incompatible with oil and natural gas developments, but with the advent of modern fracking, mineral extraction takes place right in the middle of neighborhood communities. While proponents of fracking point to its ability to strengthen economies, opponents focus largely on its potential to harm them and their family, and the environment as a whole (Ladd 2013, Boudet et al. 2013, Crowe et al. 2015).

The previously inaccessible shale plays that are now being developed are increasingly located under urban communities, meaning extraction activities occur in close proximity to schools, houses, and businesses. As fracking comes into contact with urban landscapes it is often met with fierce hostility, debate, and public fear. The urban communities situated above shale plays feel they are socially and physically vulnerable to the risks inherent in the technically complex industrial activity of fracking (Willow 2014). Members of communities affected by fracking often engage in community organizing to address their numerous concerns about fracking.

Addressing concerns about fracking can be difficult, as oil and gas industry personnel are among the few people in the nation who hold the information and knowledge about fracking's safety, therefore their voice is often the only legitimate source of authority. The stakeholders on both sides of the fracking conundrum verify a well-known theme in industrial and environmental tensions, that is, communities do not want industrial activities happening in their neighborhoods, and industrialists argue that placement of frack wells is vital for the nation and development is dependent on the location of the mineral resources.

In order to assuage public fears, oil and gas industry personnel publically appear in favor of more transparent dialogue with the apprehensive public. Their websites and brochures are frequently full of enthusiastic invitations for authentic, transparent, and collaborative community engagement to answer any questions people might have<sup>1</sup>. Understanding their willingness to engage in conversation, and what those conversations might look like, allows for deeper insight into how frames shape discourse and how power dynamics play out in favor of a politically and economically wealthy industry. In her study of public perceptions of fracking, sociologist Hilary Boudet (2013) argues that understanding national support and opposition towards fracking is “critical for planners tasked with addressing siting disputes...; for government agencies attempting to establish appropriate regulations...’ and for researchers, advocates, and others interested in communicating about potential impacts...” (57). Further, understanding the willingness of industry and concerned citizens to communicate is critical for researchers and

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<sup>1</sup> [www.coga.org/about/](http://www.coga.org/about/)

advocates attempting to understanding how the overwhelming power of industry benefits their ability to shape and guide conversations about fracking.

This paper uses interview data from industry personnel and anti-fracking protesters (herein referred to as *fractivists*) in Denver and Thornton, Colorado to investigate how different frames of understanding influence their perspectives and how these frames determine the two groups' willingness and ability to engage in productive conversation with each other about fracking. This case study examines how industry personnel in Denver, CO leverage the political clout of 'industry' science and knowledge in order to discount the lived experience of fractivists in Thornton, CO.

This study finds that industry personnel and fractivists think about hydraulic fracturing through inherently conflicting frames of understanding that halts the possibility of productive conversations between the opposed groups. Furthermore, this study concludes that the unequal terrain of power that benefits industry personnel results in the state of Colorado prioritizing extraction operations, and largely delegitimizing community concern. Because the oil and gas industry has scientific, legal, and political access the means of knowledge production, the industry frame of understanding is legitimized and used to discount and belittle the lived experience of community members, who lack this critical access. The power that industry personnel successfully utilize is a product of societal factors that benefit those with institutionalized knowledge.

## LITERATURE REVIEW

Before discussing literature on fracking it is important to define the fracking process. Fracking is the process of fracturing non-porous geologic formations (in this case, shale rock) to release pockets of hard to reach crude oil and natural gas. This paper

will consider the term ‘fracking’ to encompass the entirety of the process, which begins with drills running directly down into the earth for a mile or more, deep below underground sources of drinking water, then gradually turning horizontally, boring through the shale for another mile or two (Gerken 2013). The borehole is then lined with a layer of steel pipe and cement casing that strengthens its durability. Then, a combination of water, sand, and chemicals are pushed down the well with incredibly high pressure to crack open the shale rock formation, releasing trapped pockets of ‘unconventional’ oil and natural gas. The chemicals used in the fluid serve a range of functions, but are most commonly used as a lubricant. The frack fluid is removed and either disposed of in a separate underground injection well or recycled for a future fracking operation. The wells can be fracked multiple times before they finally retire and are capped.

The implications of fracking, however, are far wider than the mechanical process alone. Existing scholarship on public support or opposition to fracking has shown that proponents and opponents hold views of the industrial activity that are diametrically opposed. Numerous studies have found that proponents of fracking situate its benefits within both national and local contexts, citing it as essential for energy independence (Crowe et al. 2015), a means of strengthening national security (Hudgins and Poole 2014), and as a pivotal tool to revitalize depressed rural economies (Ladd 2015). Opponents, on the other hand, focus on fracking’s negative social and physical effects at both the local and individual level. They cite environmental degradation fears, such as groundwater contamination and fugitive methane leaks, and social fears, such as lifestyle changes, diminishing social cohesion and powerlessness in the face of “big” industry



(Crowe et al. 2015, Sangaramoorthy et al. 2016). Brasier et al. (2011) found that some of the social fears and community stresses include, “[increased] stress, [changing] patterns of interactions within communities, [decreased] community cohesion, and [changing community] character” (36). Recent qualitative scholarship on fracking highlights the importance of deeply investigating fracking’s social effects.

Fracking is a complex geologic process that has gained significant traction in public discourse and academic research. The parties involved have the tendency to label the opposing side as blinded by their commitment to either environmental or capitalist concerns. A deeper understanding of industry personnel and fractivist perceptions can best be accomplished by understanding the concept of frame analysis and its significance in explaining dogmatism. Approaching arguments by addressing their various frames and frameworks lays the foundation for a more productive dialogue between parties, as it clarifies the origins of deep-set worldviews.

### **Frames of Support and Opposition**

Frames function as a tool that helps one make sense of their experiences and guide one’s actions. Erving Goffman’s (1974) seminal work on frame analysis theory has been used heavily in sociological studies of political and social movements. His theory states that “...definitions of a situation are built up in accordance with principles of organization which govern events--at least social ones--and our subjective involvement in them...” (Goffman, p. 10). Frames are a schemata of interpretation that people rely on in order to make sense of their world. Given the contentious sphere of debate fracking causes across the nation, people use strong, evocative rhetoric to convey their messages in accordance to their subjective realities (Crowe et al 2015).

George Lakoff (2010) extends Goffman's frame theory and warns that frames can become seemingly objective to those who use and promote them too often. He states, "...since language that is repeated very often becomes 'normally used' language, ideological language repeated often enough can become 'normal language' but still activate that ideology unconsciously in the brains of citizens...one cannot avoid framing. The only question is, whose frames are being activated--and hence strengthened--in the brains of the public" (p. 72). Within the fracking debate, frames are often promoted, and thus activated in the minds of the public, in an attempt to garner widespread support or opposition. When ideological language becomes normalized, it becomes taxing to deconstruct perspectives in a way that is approachable to someone who holds an alternate viewpoint, as the subjective can become objective in the minds of those arguing. By deconstructing the ideological frames opponents and proponents operate within, and by clarifying points of contention, we can begin to see how frames affect willingness to engage in conversation.

### ***Environmental justice frame***

In her study on the differences between public and city council perceptions of fracking, sociologist Jessica Crowe (2015) studied the frames of understanding the two parties saw fracking through prior to development in their city, and found that community members often frame their message in terms of an environmental justice perspective. Crowe (2015) reported that residents overwhelmingly believed that their health and land would be compromised for the sole benefit of private industry, and there was little they could do to stop it. Environmental justice is defined as a social movement and form of analysis that focuses on the mobilization of "disempowered communities, especially

racial minority communities and the urban poor, [who] are disproportionately located in and around technological hazards, like lead smelters, garbage incinerators, power plants, and other potentially deadly sources of exposure” (Robbins, 2012 p. 74). The environmental justice movement borrows much of its organizational and problem-framing structure from the civil rights movement, and focuses heavily on issues related to fairness and the structural disempowerment of residents in a given community (Capek 1993, Crow et al 2015).

Environmental justice most critically describes the unfair placement of industrial hazards, and disproportionate burden of environmental toxins, felt by marginalized and disempowered communities, namely racial minorities and the urban poor. Environmental justice materializes when disempowered communities organize and protest against the industries that are polluting them. Increasingly, studies on fracking have argued that environmental justice is transpiring in white, middle-class, well-educated communities that happen to be situated above productive shale plays. The technology of modern fracking was developed after the middle-class communities were situated. In an attempt to collect as much domestic energy as possible, frack wells are placed in any area with productive shale plays. Residents in these communities have begun organizing to resist development in their area (Willow 2014, Gullion 2015).

Capek (1993) states that, broadly speaking, environmental justice communities “face a range of obstacles allowing them to take full participation in decisions that affect their lives” and are often social-psychologically affected by real or perceived contamination (p. 7). Figueroa (2006) argues for an expanded definition of environmental justice, one whose terms not only include minorities and the urban poor, but that extends

to communities who are disenfranchised and unable to participate in land-use decision making. Communities located in or around fracking operations nationally are largely unable to participate in land-use practices within their municipality, as permitting and location decisions are made between the state and private industry, commonly excluding federal and local level government participation. In many instances, cities and neighborhoods are legally unable to wholly fend off fracking developments in their area (Willow 2014).

Investigations into the community level impacts of fracking have argued that while the physical effects of fracking have been substantially researched, qualitative studies on the social effects of fracking on communities should be equally prioritized to highlight the nature of fracking's social disruption and systematic exclusion of community-level democratic participation. The growing body of qualitative social scientific literature on fracking largely emphasizes the disempowerment and apprehension communities feel when they live near active, or even proposed, fracking operations (Willow 2014).

### ***Growth Machine and Neoliberalism***

Proponents of oil and gas development often frame fracking as a revolutionary tool for national and city-wide economic gain: one that will increase local revenue, decrease oil and gas prices across the country, and decrease the United States' dependence on foreign fuels. In capitalistic economies, states, local municipalities, and cities must remain competitive within the geopolitical market, and in order to do this, they are driven to exploit the resources most available to them. The advent of modern fracking has opened up new land for oil and gas development, and thus, new lands that

promote the capitalist accumulation of wealth. Logan and Molotch's (1987) growth-machine theory states that place entrepreneurs, or people who are in a position to profit off land, are committed to the economic value of place, and thus must promote the exploitation of resources as a mechanism to increase economic gain. This capitalistic framework has led proponents of fracking to view this industrial activity in urban and rural areas as the solution to the nation's energy problems (Crowe et al. 2015).

Industry personnel see fracking through Logan and Molotch's growth-machine theory and act as place entrepreneurs. The theory of growth-machine allows oil and gas companies to focus on the development of land and exploitation of mineral extraction as a mechanism of job and revenue creation. At the same time, this frame allows industry to largely recategorize environmental damage and community apprehension as an inevitable nuisance, but essential cost of economic gain. Their subjective reality places fracking as an obvious solution for increasing domestic energy production and as an opportunity for local municipalities to increase their revenue.

Finewood and Stroup (2012) found that in order for proponents of fracking to rationalize the environmental impacts of the industrial activity, they often employ what they call a "neoliberal environments framework" which allows them to consider risk and environmental harm as a necessary part of a cost-benefit analysis (p. 3). This framework relies on an economic logic that functions as a "strategy for reworking society's perception of, and relationship to, the non-human world" by allowing a cost-benefit analysis to include a reasonable margin of environmental degradation (Finewood and Stroup 2012, p. 5). This cost-benefit analysis justification poses imminent dangers to communities directly surrounding fracking sites, as their safety is considered a single

factor in a broader goal of economic justice. Hudgins and Poole (2014) found that “Under neoliberal governance, where the state is the handmaiden to the market...water, land, air, community, quality of life..., and more are reframed such that their utility or fulfillment is defined around the market logic required to extract maximum profit” (p. 305). This cost-benefit analysis is a central part of understanding how proponents justify negative aspects of fracking, as it highlights that they understand a certain amount of environmental risk and degradation to be acceptable.

In line with growth-machine theory, the neoliberal environments framework has redefined the value of land and the natural environment by prioritizing frames that promote the accumulation of economic wealth through oil and gas, and degrades notions of unacceptable environmental risk and hazard. Finewood and Stroup (2012), state, “Local social and ecological resources (i.e. community, sense of place, water...) are situated within this scenario as mere factors in a broader marketplace of costs and benefits. In other words, the risk to water are perhaps a cost, but can be outweighed by the benefits created by the industrial extraction process” (2). Since proponents main goal in fracking is to provide cheap, affordable energy for the nation, this framework allows for certain amounts of acceptable environmental risk to be present in the areas directly surrounding frack wells. This framework allows for a rationale that states fracking is safe, as long as it economically benefits the United States.

### ***Notions of Risk and Beck’s Risk Society Thesis***

Willow and Wylie (2014) find that, when concerned citizens worried about risk are positioned against a neoliberal environments framework, “[they] are discursively positioned as irrational and unwilling to absorb the necessary costs that would benefit

their neighbors and the nation as a whole” (3). This necessary cost, or acceptable margin of risk, is a factor that largely plagues productive conversations between proponents and opponents. The dichotomous frames of understanding the groups see fracking through prioritizes either an environmental and human health consideration (one that does not allow for any risk) or a local and national economic gain consideration (one that deems a certain amount of risk to be inevitable), with little thought of the other.

In order to justify the industrial activity, proponents of fracking often point to technological advances and scientific studies that find fracking to be safe. However, opponents often distrust state and private oil and gas studies as sources of legitimate authority, and fear for their safety, stating that fracking, in any capacity, poses an inherent risk to water quality, air quality, and human health. Sociologist Ulrich Beck’s (2006) “risk society” thesis helps one understand how proponents and opponents understand and rationalize notions of risk.

Beck (2006) suggests that while industrialization and modernization has allowed for better technology and calculable risk determinations, it has also created new categories of risk for the public. While industry perspectives often focus on their ability to monitor leaks and prevent spills with ever improving technology, opponents often fear that technology alone cannot prevent problems, or reduce risk, in an inherently dangerous industrial activity.

Because of the invisibility of many sources of toxic exposure, and because of issues related to private industry secrecy and lack of transparency, community members exposed to fracking are required to remain heavily dependent on private scientists to confirm and legitimize the existence of hazard and risk through technology (Willow and

Wylie 2014). Gullion (2015) argues that those who can define and legitimize risks and scientific truths are often benefitting from an unequal power terrain that prioritizes their knowledge over others. She states, “[d]ecisions are said to be based on science [and technology], although as the science of the two groups [industry versus community] differs the more powerful group determines the outcome” (p. 138). This largely explains how and why opponents are dependent on industry to define and legitimize risk, since they do not have the social capital or political power to assert their own experience as scientifically affirmable.

Thomson (2015) discusses the socially constructed nature of science and truth, and states that, “...as science becomes more and more necessary, it becomes less and less significant for socially binding definitions of truth. In practice, while science and the experts who practise it are important in identifying and finding solutions to risk, they are seen increasingly as losing legitimacy” (p. 267). Issues of knowledge production and knowledge legitimacy plague the outcome of potentially productive conversations between the groups, as community-valued knowledge/science is seen as illegitimate to industry, and communities often distrust industry science, saying it is tainted, biased, and ultimately a conflict of interest. The political and economic clout of industry benefits and legitimizes their science as truth, leaving opponents dependent on industry defined risk. Bruno Latour’s (2010) *factish* thesis states that “a fact is defined as knowledge based on scientific practice (science in this case in the utmost sense of positivism), while fetish is knowledge based in emotion, opinion, or fallacies in reasoning” (p. 136). Industry often uses their political power to strengthen their facts and belittle and fetishizes community concern when fractivists distrust them, stating their fears are nonsensical and emotion



laden.

Neoliberal rhetoric and the normalization of environmental degradation in the name of national economic benefit leads to industry control over defining and legitimizing notions of risk (Finewood and Stroup 2012). Beck (2006) states that “Risk definition, essentially, is a power game. This is especially true for a world risk society where Western governments or powerful economic actors define risks for others” (333). Since the neoliberal environments framework and machine-growth theory both prioritize profit over environmental safety considerations, and the environmental justice framework does just the opposite, the meaning of risk is interpreted and defined differently. But the hegemonic control of industry science only allow for industry’s definition of risk to be legitimized. When opponents are positioned against a frame that supports national and local economic gain, their views of risk and concern for the environment are seen as irrational and unfounded, and in the way of economic stimulation. (Finewood and Stroup 2012, Willow 2014).

Industry personnel continue to say that they enthusiastically encourage dialogue between them and the apprehensive public. But because their frames are so diametrically opposed, and because industry benefits from an immense amount of institutionalized and hegemonic power, conversations might often be fruitless. By positioning industry personnel and fractivists next to each other, we can begin to uncover the true nature of these conversations, and see how industry might benefit from initiating conversations with concerned community members. Fractivists often struggle to gain a true voice in conversations with oil and gas personnel, they are frequently unable to legitimize their truth and science, and are often discounted and called irrational. No study to date has put

the two positions side by side and focused on the importance of looking at the goal of industry facilitated conversations. Putting the two positions next to each other allows for a richer analysis and one that fully contextualizes their differences of opinion and difference in power.

## BACKGROUND/LEGAL TERRAIN OF FRACKING

In order to have a richer understanding of the contentious debate, one must consider the legal terrain and laws specific to the state, as state regulations can differ quite dramatically across the nation. The ability of homeowners and local governments to regulate or prevent oil and gas extraction on or near their land is largely impossible, as national and state policies remain heavily in favor of the oil and gas extraction. In order to encourage the increased production of domestic energy, the oil and gas industry has been granted a number of special exemptions from federal law, placing regulatory authority largely in the hands of individual states. Warner and Shapiro (2013) discuss these exemptions most succinctly:

First, because congress exempted oil and gas waste from the regulation of hazardous waste under the Resource Conservation and Recovery Act (RCRA) of 1976, fracking waste is also exempted from the definition of hazardous waste...Second, fracking enjoys special exemption from disclosure requirements under the federal Emergency Planning and Community Right to Know Act. This act requires companies to submit annual Toxic Chemical Release Forms reporting their use of toxic chemicals...Fracking industry's claim that some of the chemicals they use are proprietary...Third, neither the federal Clean Water Act dealing with disposal issues, nor the Hazardous Materials Transportation Act covering transportation of hazardous chemicals, regulates key components of fracking. Finally fracking waste is exempt from the Safe Drinking Water Act's underground injection-well requirements, which are designed to protect drinking water aquifers... (p. 5-6).

These exemptions mean by in large, oil and gas companies are state regulated,

and each state has the discretion to enforce and monitor laws as closely as they see fit. State lawmakers are supposed to enact regulations that replace the federal laws, but this typically results in weak regulations and lax enforcement. The lack of federal oversight, and the uneven enforcement of state regulation, allows industry some discretion to monitor itself (Gullion, 2015). In Colorado, the Colorado Oil and Gas Conservation Commission (COGCC) regulates most aspects of fracking developments. Their website states that they are “as committed to protecting public health and the environment as [they] are to fostering the responsible development of Colorado’s oil and gas resources.” While their mission is to balance the health of the population and the state’s interest in oil and gas production, the COGCC’s allegiances lie in mineral exploitation and development in accordance with the Colorado Constitution.

The Colorado Oil and Gas Association (COGA) is an industry association whose goal is to “foster and promote the beneficial, efficient, responsible, and environmentally sound development, production, and use of Colorado’s oil and natural gas resources.” They function as a powerful legal entity that defends mineral right owners and industry’s ability to exploit mineral resources in Colorado. In May of 2016, the City of Longmont and COGA were involved in a Colorado Supreme Court case arguing about the legality of Longmont’s voter adopted city-wide ban on fracking. COGCC later joined COGA in the suit, and the Colorado Supreme Court ruled in favor of oil and gas production, stating that cities do not have the constitutional ability to ban oil and gas developments that impede Colorado’s interest in mineral exploitation. This stems from a 1992 case concerning a municipal ban in the Weld County City of Greeley, one of the most heavily

fracked counties in the state. This ruling came as a harsh reminder that the State's interest remains heavily in favor of mineral extraction.

The 2016 Colorado Supreme Court case also ruled that the Fort Collins 5 year moratorium on fracking, voted on in 2013, was also unconstitutional in that it equally impedes the state's ability to exploit mineral resources. This means that cities can no longer ban or temporarily prevent oil and gas developments that create operational conflict with state oil and gas interests and regulations in any capacity.

This study explores oil and gas dynamics in the City of Thornton, which is a part of Adams County. According to the COGCC there are currently 3,641 active, inactive, and capped wells in Adams County (see Appendix I) and 257 in the City of Thornton, 105 of which are currently operating (see Appendix II). This number is only expected to increase, as oil and gas companies continue to apply for permitting. The lack of legal authority that counties and cities have over banning or temporarily halting fracking development places total developmental control in the hands of the state and private oil and gas companies. Even with state and county level permitting processes, and even though companies must meet with communities as part of the permitting process, counties, cities, and neighborhoods have absolutely no legal ability to prevent fracking in their area. The hegemonic control the state of Colorado and private oil and gas companies have over communities is overpowering, and calls into question aspects of local level democratic participation. It begs a looming question: could the lack of legal ability to prevent fracking constitute an environmental justice scenario for people living in areas with productive shale plays?

My findings show that oil and gas companies appear to be committed and enthusiastic about maintaining communication and transparency between them and the public in order to assuage fears and be better “community neighbors”. This thesis also shows that industry benefits from political and economic power that prioritizes and legitimizes their knowledge and mineral extraction processes over community health and wellbeing. By analyzing the dominant frames of understanding both sides operate within, and by understanding the Colorado legal terrain that benefits industry, one can better determine how ideological frames of understanding affect willingness to engage in conversations between industry personnel and fractivists.

## METHODS

Through a series of semi-structured interviews, this research examines the willingness of people who work in the oil and gas industry, and people who have formed a community resistance group in Thornton, to engage in conversation. Thornton Residents Against Fracking was chosen as the case-study resistance group of focus, in part because this group maintains an active Facebook page of over 580 followers. The size of the Facebook page indicates that fracking causes widespread metropolitan concern, but the page is also small enough to show how a local neighborhoods (rather than the state) participate on an online platform. This provides ideal data that shows prevalent and currently circulating community concerns, and also indicated the most active fractivists in the area. During the time of this study, the resistance group was in the act of protesting two proposed fracking developments in their neighborhood that were in the final stages of the state permitting process. To gain insight into industry perspective, I

interviewed people who hold a range of industry positions, including geologists, the president of a fracking consultant company, and a spokeswoman from COGA. Their positions and perspectives serve as an appropriate example of the diversity of jobs and thoughts industry personnel hold.

This paper analyzes a set of 14 semi-structured interviews, lasting anywhere from 45-75 minutes. The interview participants were collected through the process of snowball sampling, in which I requested participants to pass my information to other people in their circles. I also posted on the fractivist facebook page and spoke to the most active members, and emailed industry personnel I knew. I interviewed six industry personnel, six fractivists, one self-identified “not in my backyard” resident (this participant is opposed to fracking only when it comes into close proximity to their house), and one city council member in Colorado Springs who fought against industry developments within the city limits. In order to understand their perspectives, I asked a series of interview questions such as “when people ask you about fracking what is your elevator pitch,” “do you speak with many people who have the opposite opinion of you” and more in order to understand their top of mind associations of fracking and of people who oppose their position. All of the interviews were recorded, transcribed in full, and kept confidential, meaning all of the names of interviewees and organizations they work with or for have been changed, with the exception of name Colorado Oil and Gas Association (COGA).

I conducted interviews during a time in which oil and gas companies were going through the state permitting process to drill in areas of unincorporated Adams County. The City of Thornton is in a unique position in that geographically it is both urban and

rural. Unincorporated pockets of Adams County exist within the Thornton cityscape (see Appendix II for an image). This is important because while these pockets of unincorporated Adams County are less densely populated, and thus easier to frack in, The City of Thornton surrounds the pockets entirely, the effects of fracking are urgently felt by Thornton residents.

Qualitative studies aim to understand the experience of people in terms of the meaning they bring to them. In order to understand the true contention of the fracking debate, I employed grounded theory as central to my research design. This means that I did not have a clearly defined question or hypothesis going into my research. Instead, I allowed the data I collected to form the foundation of my theories, guide my analysis, and generate the concepts I analyzed (Charmaz, 2009). Since grounded theory allows for flexibility, I was able to steer my research and interview guides in directions my participants wanted.

Drawing on relevant theories and the literature above, I examine how various industry personnel and fractivists frame the positive and negative effects of fracking, and their interactions with people who hold the opposite opinion of them. Crowe et al (2015) highlights that, “better information between the public and leaders leads to more information shared about the effects of shale development,” and this information will consequently lead to better policy development and a deeper understandings of the physical and especially social effects of fracking. I focus on industry personnel and an environmental justice resistance group in order to understand if there is room, or desire, for a pragmatic conversation to be had between the divided groups during the time of a

contentious site permitting process. To date, no research has considered the effects of framing on these conversations, and what power dynamics are at play, by positioning private officials and community activists against each other.

#### FINDINGS:

If fractivists and industry personnel can agree on one fact, it is that they fundamentally cannot agree on most facts. The two groups recurrently state that while industry promotes open dialogue, there is rarely room for productive conversation. Noah, the Vice President of Exploration and Development of a fracking company, said, “I don’t think there is an honest conversation...when you engage [in a] conversation the way to get compromise...is to agree on a set of facts and...we can’t agree on the set of facts.” The recognition of this problem from an oil and gas representative shows a certain level of awareness about the dangers of dogmatism and the (in)ability of industry and community members to communicate. Ruby, a fractivist in the Denver area, also spoke about the inability to have productive conversation. She said, “You have to find common ground on either side. Whether you’re an oil person or Trump supporter or a Bernie supporter or hate it all. There’s gotta be something that everybody can hear.” This lack of agreeability stems from a larger dispute about industry versus community valued science and who holds the ability to legitimize science and truth as facts. Science is often considered political in discussions surrounding the safety of fracking. But even more so, the dichotomous frames of understanding are so diametrically opposed that they prevent any form of understanding and common ground to occur. Community members often learn about fracking suddenly and unexpectedly, causing them to form an early suspicion and



distrust of its safety.

***Entry into the “fractivist” movement***

So last August a half a mile from my home an industrial site was proposed...the proposed site would be 505 feet from a bedroom, a child's bedroom. And when I went to the meetings I heard information from both sides. And I didn't know what to believe...I knew that it didn't sound like an ideal thing to have right next to a home...[The area] feels like a rural area because these homes are on a couple of acres. But it's just on the other side of a very busy street...So I had great empathy for my neighbors. [At the meeting] oil and gas was saying [fracking] was totally safe. There was a young woman who got up there and gave a lot of information about the [negative] health impacts [of fracking]...and the fracking guy...acted like he'd never heard of anything like that.

*Amelia, resident of Thornton*

In the passage above, Amelia recounts the first time she was introduced to fracking. She states that after hearing the perspectives of proponents and opponents, and after witnessing the “fracking guy” act like he'd never heard of fracking causing negative health effects, she was speechless. Amelia feels that industry's perspective about the lack of negative health impacts related to fracking is “all about deny, deny, deny. And at the time I'm like, ‘that's kind of rude’ or I didn't know what to think of it.” Her introduction to fracking left her feeling confusion and concern about the effects of the industrial activity on human health and the environment. On the onset of learning about fracking, Amelia already has reservations about it disrupting the natural environment of the neighborhood and negatively impacting human health. Her experience also reveals an underlying preconceived distrust of industry personnel, and an allegiance to community level health concerns.

Her experience of a sudden, unexpected and ultimately unsettling introduction to fracking was not isolated. Often times, residents of Thornton report that they first learned

about fracking somewhat unexpectedly, and attended community meetings in an attempt to learn more about proposed industrial sites. Grace, a resident of Thornton and active volunteer with 350.org, first heard about fracking from a fellow 350 volunteer who told her that a site was being proposed near her children's future middle school. Grace said, "I heard about [fracking] through people who don't live in my community which was, a little bit of a shock. [T]he first thing they told me about was a community meeting that was being held at [my children's future] middle school." Grace wondered why she was not initially notified about the proposed fracking site and says she only knew "basic stuff" about fracking before attending the meeting. When I asked what she knew before the meeting, she stated she saw the *Gasland* movie, a controversial 2010 documentary focusing on communities across the United States who purport being negatively impacted by fracking. This movie initially caused her to feel concerned about the global warming affects of fracking. However, after becoming more involved in the fight against fracking and after meeting people whose health may have been compromised by fracking, Grace became concerned about the environment and human health. She mentioned that the story of her friend, Allison deeply affected her.

Allison is the founder of the anti-fracking movement in Thornton and became involved in fighting industry developments after her and her daughter began experiencing negative health effects they associated with fracking. She said, "Last summer...my daughter and I started feeling like we were having trouble breathing, and like we had colds. But it never went away...It felt like your chest was heavy and you couldn't breathe. So I went to the doctor and the doctor said 'well, I'm going to give you an inhaler...I've

been handing these out left and right’.” A few weeks later Allison was notified about a community meeting to discuss a proposed fracking site that would “frack [her] neighborhood”. Allison has lived in Adams County for 11 years, and knew that her county was sprinkled with active and inactive oil and gas operations. After her and her daughter were prescribed inhalers, and upon hearing about a proposed site near her home, Allison became a fractivist.

All three of the above quoted women self-identify as ‘fractivists,’ environmentalists, concerned mothers, and active members of Thornton Residents Against Fracking. These identities are central to the construction of an environmental justice frame that considers the importance of environmental and human health as paramount to the economic development of oil and gas. Their accounts also highlight a major issue with oil and gas developments in urban landscapes. Community members often feel that there is a lack of available information about the existing or proposed fracking industrial sites in their communities. The only way for them to easily learn more about fracking requires them to talk with industry personnel, whom they might already distrust.

The community meetings fractivists referred to are routinely required as part of the official state permitting process, in which private oil and gas companies must notify residents who live within a 0.2 mile radius (1,000 feet) of the proposed site and hold a meeting to answer questions (COGA website). Neither Amelia, Grace, or Allison reside within the half-mile radius, but their accounts highlight that they feel their social lives and personal health and safety are compromised because of the proposed sites. Amelia’s

connection to her neighbors, Grace's children's future middle school, and Allison and her daughter's chest congestion might all be affected by the proposed industrial activity, but the state mandated permitting process reasonably does not require companies to notify all who might be affected. They would not have known about the proposed sites and meetings if it weren't for word of mouth that compelled them to attend. Industry often restricts information about fracking so that information remains controlled and released by them on their account.

Since information about specific fracking operations and proposed sites are hard to find, and information about the technically complex industrial process of fracking is often difficult to understand, industry facilitated community meetings offer one of only a few opportunities for residents to learn about fracking. At community meetings only representatives from private oil and gas companies present information. This imbalance creates a hegemony in which concerned citizens, or laypeople, cannot legitimately dispute the facts and information presented to them because only industry can fill the "knowledge vacuum" about fracking (Finewood and Stroup 2012, p. 76). At the same time, the firms have the benefit of becoming "expert counterpoints" to fractivist claims, making it even harder to gain a legitimate voice in the discussion.

***Industry conversations with the public (not specifically fractivists)***

While industry-community meetings are part of the permitting process, and thus required by state law, it does not follow that the meetings are not important to industry groups as well. My interviews revealed that industry personnel appear to be in favor of speaking to the public and maintaining transparency. Naomi, a spokeswoman from the

Colorado Oil and Gas Association (COGA) stated:

[You] gotta be really transparent and again, that isn't something that the industry acknowledged before. It really is an important part of it because what we saw in Colorado was that the urban Front Range moved into the oil and gas area and the oil and gas area moved into the urban Front Range. And that overlap - people weren't prepared for it, they didn't know how to deal with it. Because both developers and homeowners on one side and oil and gas industry on the other were just assuming to do their business as normal without really talking to each other and without figuring... out how do we figure it out in a way that works?

Naomi's comment reveals that previously, industry personnel did not consider the need to speak with the public about fracking operations, as oil and gas developments were largely placed in rural/industrial landscapes. However, as modern technology allowed for "the oil and gas areas" and metropolitan communities to overlap, the formerly disparate parties were compelled to speak with each other. Naomi explains that this overlap in physical terrain has forced industry personnel and communities alike to develop the language needed to express their concerns and explain their perspectives about fracking. As the urban Front Range and oil and gas operations overlap, dialogue between the divisive groups is a vital part of maintaining agreeability and what Naomi refers to as industry's "social license to operate." Maintaining agreeability benefits oil and gas industries as a whole, as it works to convince and ultimately silence those who are opposed to their operations. From an industry standpoint, they must explain why drilling must take place in a certain area, and reiterate their confidence in the safety of fracking.

This push for transparency between industry officials and community members was repeated by Oliver, a representative of a fracking corporation that has active wells in

Adams County. He states, “We, as industry, have long been reactive to folks speaking against us and now I think we’ve done a really good job the last few years, especially here in Colorado, of being proactive and educating people.” He continues by emphasizing the importance of explaining the technological aspects of fracking to concerned citizens, and assuring them that air emissions and water safety are monitored appropriately, as dictated by state law. Oliver feels that when he can educate the public, and dispel misconceptions about fracking, community members feel at ease.

However, even with this apparent push for transparency and desire to assuage public fears by explaining ‘the facts’ of fracking, interviews with industry personnel and fractivists alike reveal that the goal of agreeability is not entirely achievable. Opponents view of industry personnel is often tainted by a image of industry malice, and industry personnel are quick to determine that fractivists are an environmentalists group of ‘hysterical’ people who are unwilling to listen to the facts. (An industry employee was quick to tell me that “the radical environmental movement (fractivists) [have] no interest in hearing the facts at all.”) By understanding their frames as part of Lakoff’s (2010) conception of frame analysis theory, one can begin to understand how ideological language repeated often enough becomes normalized language that functions as highly partisan. As industry and fractivist position themselves as ideologically pro- or anti-fracking, their aim becomes to educate the public about their perspective from their ideological framework. In the sections below, I will explore the bounds of each framework separately.

### ***Representations of Environmental Justice Frame***

As this paper previously posits, entry into the fractivist movement generally begins with community members learning about fracking indirectly, and only then attending industry facilitated community meetings to learn more about proposed fracking sites. Those meetings result in community members feeling unsettled, and relying on an environmental justice framework in order to justify their view. Caprek (1993) found that communities experiencing environmental justice crises are often residents who live in contaminated areas and face a range of obstacles preventing them from participating in local land-use decisions. Fractivists argue that they are unable to contribute to decisions that directly affect their lives because of the amount of institutional and financial power industry holds over them.

Fractivists I interviewed maintain that the unequal amount of power industry holds over them often forms the basis of their skepticism towards fracking. The source of this power imbalance, as they see it, is industry commitment to capitalist gain over community health and wellbeing. Allison states that when it comes to oil and gas production, “Everything is designed around allowing the operator to make money, it is all about letting the operator make money. It’s not about anything else.” This shows that Allison thinks that industry consideration into community wellbeing is completely absent, and that capitalistic desire functions as a tool that halts industry’s ability to interact with the community in a meaningful way. Similarly Ruby, a fractivist who lives in Denver County, admits, “I get cynical about [the safety of fracking] because I think it’s pretty simple, like *Earth v. Money*. It’s that simple.” She continues by saying industry money often halts community resistance against fracking developments: “The problem is

there's so much money behind the lie [that fracking is safe] that they can stop anything we try to do." Together, these comments reveal that the financial power of the fracking industry creates community distrust and, in turn, limits citizen participation in local land-use decisions.

Not only do fractivists feel that a narrow capitalistic focus allows industry to ignore community level considerations, and weaken democratic participation, they also believe that the fracking industry is not receptive to any science that does not serve their interest. Wyatt, a fractivist in Denver, points to the power money can have over knowledge production and legitimization. He asserts, "Their greed, their view of the facts trumps the actual science." Often, fractivists wrestle with the validity of the science industry presents, and question if its "actual science". Ruby expressed an inherent distrust in industry science, and a general frustration with their bureaucratic nature. She said, "I don't believe [industry] throw[s] out truth. But I could be wrong...[but] what happens is everybody asks for another study. And we're going to study ourselves...into the end of the planet as we know it." The oil and gas industry holds a tremendous amount of political and economic power that often allows them to defend their own science and facts as truth, and question any scientific findings that contradict theirs. Here, political and economic power allows industry science to be privileged and legitimized over community concerns that are largely under supported by science. Ruby worries, in effect, that industry knows the scientific results they want to see, and will continue producing studies until they prove their science. In a power dynamic that allows this to happen, industry has the capabilities to do just that, and often does, leaving community



experiences scientifically unproven.

In her study about grassroots community resistance against fracking, Gullion (2015) writes about the socially constructed nature of facts, and the ability of industry to legitimize only their own science as true and push the burden of (dis)proof onto concerned citizens. If fractivists or concerned citizens cannot prove that fracking causes negative health effects to themselves and their community, fracking must then be considered a safe industrial activity for the nation to have in close proximity to schools, playgrounds and houses. Gullion reminds us that, "...all science is human creation," and therefore, all science has human intervention and thus becomes subjectively interpreted..." (136). The power and status of industry science, and their ability to produce studies, allows for the oil and gas industry to consider and publically state that their constructed facts are true, and therefore discount and belittle any findings that disagree with theirs.

Between industry personnel and fractivists, and within a power dynamic that privileges one side's constructed 'truth' over another, "conflict [develops] between the word 'fact' and how people define what makes a fact factual" (Gullion, 2015 p. 136). The oil and gas industries wealth and political influence allows them to protect their own science and facts as ultimate truths, and belittle and fetishise community concerns (Latour 2010). In doing so they continually use their power to belittle community experience. Amelia suggests that within this dynamic, "It's not easy...to advocate for the health and safety and wellbeing of a community. Especially when you have such a wealthy influential industry vilifying people who are trying to." Amelia feels that

industry power continually vilifies and delegitimizes her efforts to explain her experience by providing her with institutionalized science and statements that tell her that fracking is safe.

### ***Representations of Growth Machine/Neoliberalism Frame***

Industry representatives repeatedly frame their industrial activity as integral for national, state, and local economies. Naomi, the representative from COGA, focuses on the national benefits of energy development, situating it within the context of energy poverty globally:

We live in a world [where] a lot of climate discussions happen without consideration of energy poverty. We live in a world with 1.4 billion people who don't have access to energy, and according to the World Health Organization, 4 million people die a year from burning dung or wood indoors for their cooking and heating. And here we are with this kind of Not in My Backyard (NIMBY) attitude...?

NIMBY is often used as a pejorative term to describe a group of people who want to benefit from an activity but don't want to live in close proximity to it. Examples classically include neighborhoods protesting against hazardous waste sites, prisons or jails, garbage dumps and affordable housing developments. By framing NIMBYism as an irresponsible attitude, and by positioning it against the problem of energy poverty globally, Naomi situates the potential harms of fracking as part of a necessary cost-benefit analysis. She believes that fracking is an answer to solving energy poverty, and community resistance groups that reject fracking are acting in complete self-interest, against the betterment of the equal distribution of energy.

Ben, the president of a small fracking consulting company, recognizes that parts

of the fracking process cause inconvenience, but maintains that that factor is inconsequential compared to the good domestic oil and natural gas brings to national and local economies. He argues, “Many of the impacts that [fracking] has on those local communities is positive. In terms of making it economically possible for people to live and work...so does this mean there is somebody in that community that’s being negatively impacted or feels harm? There will be.” By suggesting that communities are experiencing community-level personal inconveniences, he can belittle their experience by positioning it against multi-level national benefit. Industry can then rationalizes the disruption and harm they cause by saying it ultimately helps the greater good.

Industry personnel frequently defend what they see as inevitable nuisances by boasting about their positive community relations and community building efforts. They tout that 20% of public school funding comes from the oil and gas industry<sup>2</sup>, company sometimes spend up to \$100,000 to build new roads on property owner’s land, and green spaces, playgrounds, and sound barriers are frequently installed, at the expense of industry, in order to reduce impacts. These ‘good neighbor’ gestures highlight industry’s sharp awareness that they bring disruption to communities, but by ‘giving back’ they attempt to maintain what Naomi refers to as their ‘social licence to operate.’ These gestures can make it difficult for communities to reject oil and gas developments, as the repairs and greenways can be powerful incentives. But increasingly, communities are seeing through the “kind” gestures. A Thornton resident told me, “they plant landscaping

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<sup>2</sup> On Jan. 26, 2017 Prospect Ridge Academy of Broomfield, CO received a donation from an oil and gas company to sponsor their annual school Gala. One week later, on Feb. 2nd, the school board voted to return the money in full, stating, “By schools not taking money from oil and gas companies, politicians will not be able to use that fact to justify why these operations should be located within and around residential communities and close to schools.”

to try to block the sight of the wells, they'll put up playgrounds for the kids...but by in large most people see through it...we'd rather just have the open field there.”

Communities know, and industry personnel consistently recognize that a certain amount of disturbance and legitimate risk is associated with any industrial operation, and sometimes this can be beyond their mitigation or control. James, an engineer with a major international oilfield company, solemnly states, “I’m not saying what we do is perfect, what I’m saying is...it is a necessary evil.” A neoliberal environments framework allows industry personnel to justify potential harm and risk as a necessary part of their ultimate goal: to provide national and international affordable fuel. Community apprehension and possible risk and nuisance are reframed and contained as part of a cost-benefit analysis that prioritizes mineral development. This reframing process normalizes potential and actual risk, such that “local social and ecological resources...are situated within [a] scenario as mere factors in a broader marketplace of costs and benefits. In other words, the risks [are a cost]...but can be outweighed by the benefits created by the industrial extraction process” (Finewood and Stroup 2012 p. 2). Therefore, the “necessary evil” of fracking necessitates a certain amount of allowable risk and uncertainty, as long as the benefits outweigh. Whenever the benefits are framed as national economic gain, personal level risk and apprehension are most likely always going to be considered an allowable amount of tradeoff.

To rebut citizen claims that fracking causes harm to humans, water, and the environment, industry personnel refer to studies that find no direct causation between fracking and physical harm. Ben explains, “I get why local people are impacted, and it’s a

reality...[but their] hysteria is unfounded.” When industry personnel speak to the public and explain the facts of fracking, Hudgins and Poole (2014) found that they often see themselves as “common sense arbitrators” and “defenders of democracy.” This mentality often dismisses the public as “‘uneducated’ and destined to change once they ‘get the facts’ [and] may serve as a form of silencing” since it privileges those who can speak a specialized language (Hudgins and Poole 2014 p. 311). Industry personnel always see themselves as unquestionably valid sources of authority, and do not allow community level experiences to disrupt their findings. At the same time, their findings might never fairly consider or confirm the legitimacy of communities fear and apprehension, as that would interrupt their ability to exploit mineral resources. In this scenario, community experiences are always ‘unfounded’ in that industry studies have not scientifically confirmed what communities are feeling or experiencing. Thus, industry continues to “deny, deny, deny,” as Amelia previously stated.

Industry personnel are among the few people in the nation who hold enough science, technology, industry information - and political and financial power - to define the bounds of fracking’s legitimate risks. Since the federal government has little, if any, oversight or information about how private industry fracks, and since state level agencies regulate inconsistently, and do not require independent third party investigations, they cannot define fracking’s risk with complete authority. Only industry can do this. While industry is aware that fracking has inherent risks, they seem confident that current technologies and calculable risk determinations are able to help them monitor risk and prevent unpredictable problems.

Oliver couldn't emphasize this enough, and stated "It's amazing, the evolution of technology, and how we can, one, be transparent and show everyone what we're doing...and how safe it is. But two, truly have it be that safe so it's not just a story we're telling. It's fact...[and we can show them,] here's how it's done safely." Oliver shows complete trust in the notion of technological protection. Fractivists, however, are rarely comforted by this explanation and feel that risk and uncertainty cannot be prevented by technological advancements. Beck's (2006) risk society thesis emphasizes that regardless of the increased reliability of technology, modernization and industrialization has created new categories of risk. Beck (2006) states that modern society is structured around, and affected by, new types of risk, especially as it relates to sources of risk that are unknown, invisible, and largely undetectable. While the 'unknowns' of fracking might not exist in the same capacity for industry personnel, as they are the sole experts on fracking, risk overwhelmingly preoccupies the minds of fractivists. New technologies do not assuage their fears, as technology and human error can cause grave failures. One fractivist stated, "anything man-made is made to fail, really..."

Industry personnel's frame of understanding, as these interviews emphasize, relies on a logic that recognizes nuisance and risk as a single factor within a broader cost-benefit analysis. Industry also relies on their own science and technology to define and legitimize risk for the nation. This, in essence, means that the nation depends on the oil and gas industry twofold: as a source that provide essential and affordable energy, and as the only source that tells us the process of fracking is entirely safe. Within this context, fractivists' perceptions are easily discounted and classified as overly emotional,

unfounded, hysteric, and in the way of oil and gas development. This leads industry to fetishize fractivists' ideas of facts and truth. As Latour (2010) postulates, "The world 'fact' seems to point to external reality, and the world 'fetish' seems to designate the foolish beliefs of a subject...Both conceal the intense work of constructionism that allows for both the truth of facts and the truth of mind" (p. 21). Within this power dynamic, the 'facts' of industry supersedes the 'facts' of fractivists, and industry paints fractivists as a group who are unwilling to "absorb a necessary cost" for the betterment of their neighbors and the nation as a whole (Finewood and Stroup 2012).

## CONCLUSION

In this study, I explore the differences between industry personnel and fractivists frame of understanding about shale developments, the willingness of each side to engage in conversation, and the hegemony industry holds over fractivists experiences. In order to investigate this, interview data were analyzed and coded according to theme and showed diametrically opposed frames of understanding and an apparent lack-of willingness to engage in conversation. Fractivists often report that the dominant power of industry personnel and industry science halts their desire or ability to speak honestly with industry. And while industry personnel show an apparent enthusiasm to speak with the public, they often discount the science and lived experience of fractivists. As fracking continues to come into contact with urban communities, a willingness to engage in conversation is critical in order for both parties to maintain agreeability and have a fair platform for expressing their opinions, concerns, and lived experience. Currently, however, the dialogue is controlled by industry personnel who have the political and

economic clout dictate the tone and direction of the conversation.

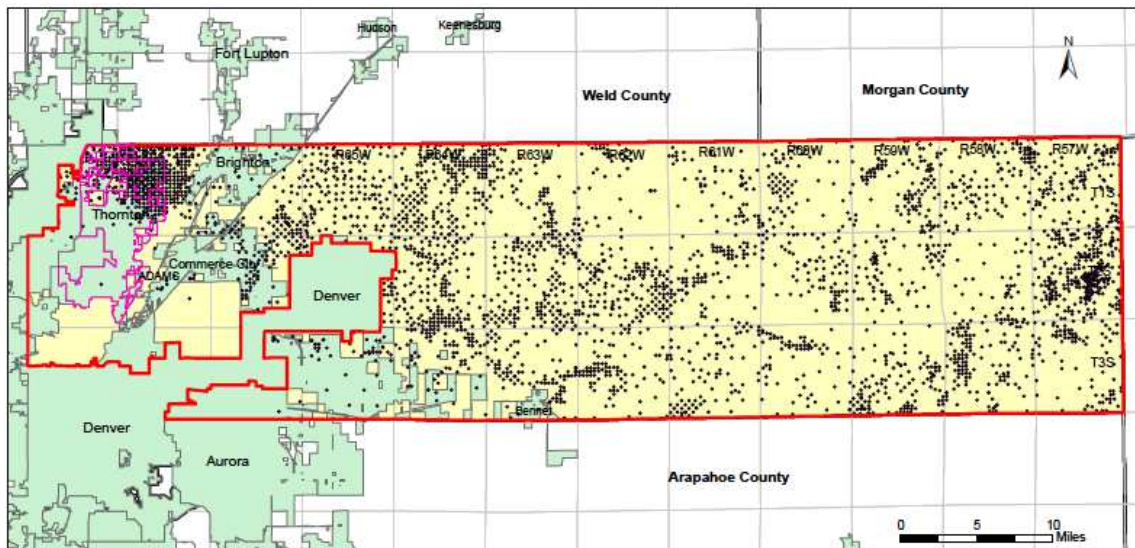
The findings in this research have implications for industry personnel, fractivists, concerned citizens, policymakers, and researchers alike. This research highlights the hegemonic role industry personnel benefit from, and how their power systematically halts fractivists and concerned citizens from gaining a legitimate voice in the conversation. Industry's apparent desire to encourage open dialogue and transparency between them and the public functions as an empty promise and "feel-good" measure that helps them maintain their "social license to operate," while simultaneously working to delegitimizing fractivist voices. At the same time, industry-facilitated conversations pose a great challenge for community members attempting to express concern, as industry has the unique positionality of being the sole experts on fracking for the nation, and therefore consider their knowledge unshakable.

Truth and facts are socially constructed and legitimized by those who benefit from unequal power terrains that prioritize their knowledge over others. The results of this study speak broadly to the role powerful economic and political actors have in controlling knowledge production and asserting infallible facts about operations that knowingly contain inherent risks. The hold of information industry has allows them to not only assert fracking's safety, but also to justify the risks inherent in fracking operations by placing fracking as an economic and moral obligation, one that lessens energy costs nationally and works towards solving issues of energy poverty. By maintaining a frame of understanding that prioritizes mineral extraction for the betterment of the national economy, industry has the ability to continue supporting and defending science that finds no correlation between fracking and negative human and environmental health.





Appendix I:



**Adams County All Wells**

Producing, Shut-in and Plugged Wells

- Adams County Wells
- ◻ Thornton
- ◻ Adams County
- ◻ Unincorporated Adams County



**COLORADO**  
Oil & Gas Conservation  
Commission  
Department of Natural Resources

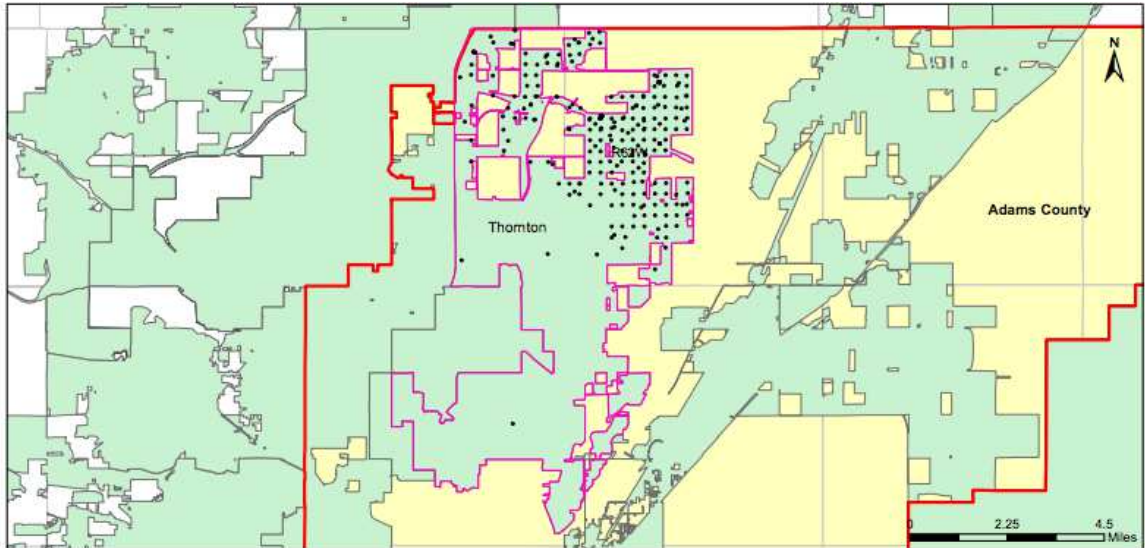
CODCC, January 31, 2017

Wells in Adams County: 3,641

Active: 953

\*Special thanks to COGCC's GIS Analyst for creating this map for me upon request.

Appendix II:



### Thornton Wells

Producing, Shut-in and Plugged Wells

- Thornton All Wells
- Thornton
- Adams County



**COLORADO**  
Oil & Gas Conservation  
Commission  
Department of Natural Resources

COGCC, February 10, 2017

Wells in City of Thornton: 257

Active: 105

\*Special thanks to COGCC's GIS Analyst for creating this map for me upon request.

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