University of Nevada, Reno

# WE DON'T LIKE IT, BUT WE'LL LIVE THERE: THE CONFLICT BETWEEN STATED OPINION AND ACTION REGARDING NUCLEAR FACILITIES

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Political Science.

by

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# ABSTRACT

Courtenay Jo Burns: We Don't Like It, but We'll Live There: The Conflict between Stated Opinion and Action Regarding Nuclear Facilities
(Under the direction of Eric Herzik)

I examine the difference in public opinion between those living in the communities near nuclear facilities and those living farther away in multiple ways. First, I measure this quantitatively through analysis of two public opinion data sets: the General Social Survey is used to explore if/how basic public opinion (pro-nuclear versus anti-nuclear) can be predicted based on individual demographics. In other words, it is used to attempt to define who is most likely to express positive (negative) opinion. The Energy Survey 2008 conducted by Knowledge Networks for the American Clean Skies Foundation is used to explore public opinion regarding nuclear facilities in a more in-depth fashion via a series of questions focusing on harm, expense, amount of use, and willingness to live near nuclear facilities. Additionally, I measure expressed public opinion qualitatively through content analysis of newspaper articles and editorials published in the communities around nuclear facilities. I also analyze the transcripts of town hall meetings that took place (or are taking place) for each facility during the licensing process. Overall, this research attempts to explain the difference in public opinion concerning nuclear facilities by those living close to and far from them. Combined, the qualitative and quantitative portions of this research will allow for the development of a more complete view of the public opinion surrounding nuclear facilities, the factors that influence this opinion, and how this opinion changes over time. It will also allow for a move toward an explanation of why the communities around nuclear facilities grow in population, despite vehemently expressed negative sentiments. This research will lead to a better understanding of the true determinants of opinion regarding nuclear facilities and will suggest how decision

makers can use this new understanding during the policy development stages of nuclear projects.

*For my Father*

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# 1 INTRODUCTION AND LITERATURE REVIEW

## 1.1 Introduction

Individuals have long expressed opposition to proposed nuclear facilities, such as power plants and waste disposal facilities. Perhaps the most widely known of these, the Yucca Mountain Project, certainly has. For example, the residents of the town of Pahrump, located approximately fifty miles from Yucca Mountain, have vocally expressed their dislike of the project. When the first public meeting regarding the Yucca Mountain Project was held in Nevada by the Department of Energy at the University of Nevada, Las Vegas (March 30, 1983), then-Governor Richard Bryan acted as the first speaker, stating that he was "unalterably opposed" to the project. He went on to state, "It is unfair, in my view, for the rest of the nation to ask Nevada, in light of its past and present commitment in the nuclear field, to assume this new burden" (U.S. Department of Energy 1983). And this negative opinion has been echoed since in innumerable newspapers articles, in public opinion polling, and even through the dubbing of the 1987 Nuclear Waste Policy Act, which designated Yucca Mountain as the long-term burial site of the nation's high level nuclear waste, as the "Screw Nevada" Bill. However, the actions of individuals do not seem to support this negative sentiment.

The population of Pahrump has grown from 1,358 in 1980 (U.S. Department of Commerce 1981) to 36,441 in 2010 (U.S. Census Bureau 2014b), a 2,683% increase. The city of Las Vegas, located about 100 miles from Yucca Mountain, has also experienced significant growth, from 164,674 residents in 1980 (U.S. Department of Commerce 1981) to 583,756 in 2010 (U.S. Census Bureau 2014a), a 354% increase. These incredible growth rates would seem to undermine the stated dislike of the Yucca Mountain Project by Nevada residents. While it may be argued that, for the Yucca Mountain Project, the facility may only bother locals but

does not bother those individuals who choose to move there, this phenomenon is not exclusive to Nevada; the areas around other nuclear facilities have experienced similar growth despite expressed negativity toward those facilities and toward nuclear facilities in general as determined by national public opinion polls. This population growth ultimately undermines the expressed public opinion because it is contrary to that opinion. If opinion was, in reality, as negative as expressed, it is reasonable to expect that action would reflect opinion – that people would avoid living near a facility they feared and thought posed a risk to them. This research seeks to explore and explain this apparent dissonance.

### 1.2 Research Question

When individuals are asked about their opinion of nuclear facilities, they tend to state that they view such facilities as posing great risk and that they distrust government regulators and facility operators. However, despite stated negative opinion regarding nuclear facilities, the communities around these facilities continue to grow. Why, if people consider nuclear facilities to be dangerous and they distrust regulators and operators, are they willing to live close to such facilities? When expressed opinion is explored in ways other than through public opinion polling, are concerns different? If so, might these differences contribute to an understanding of the observed conflict between opinion as understood via polls and actual behavior?

### 1.3 Significance of the Research

While the literature on the public opinion regarding nuclear facilities is extensive, it fails to consider the dissonance between stated opinion and action. It stands to reason that if

stated opinion was fully accurate then people would not choose to live near such facilities. However, the communities around nuclear facilities have experienced significant growth. Moreover, it also doesn't fully consider how local interest groups influence the public opinion regarding nuclear facilities. My research seeks to fill this gap in the literature by exploring a possible explanation for the disconnection between stated opinion and action and by considering how local interest groups influence this opinion.

**1.4 Literature Review**

In 2013, nuclear power plants generated 19.4 percent of U.S. electricity (Nuclear Energy Institute 2014b) and twenty-eight new nuclear power units have been proposed (Nuclear Regulatory Commission 2014). Additionally, the generation of nuclear power has produced 71,780 metric tons of spent nuclear fuel (Nuclear Energy Institute 2014a), requiring the construction and use of nuclear waste disposal facilities. Because these facilities must go somewhere, public opinion is expressed regarding them and studies have shown that understanding this opinion is important for officials making siting decisions.

For example, Jenkins-Smith et al (2011) argue that understanding the causes of negative opinion of locally unwanted land uses (LULUs) can allow officials to construct a strategy to reverse that opinion. Additionally, it has been found that two major influences on an individual's opinion of a nuclear facility are the perception of the risks posed by such a facility (e.g., Rothman and Lichter 1987; Rogers 1997; Heath, Seshadri, and Lee 1998; Frewer 1999; Gawande and Jenkins-Smith 2001; Slovic and Peters 2006; Jenkins-Smith et al 2011, to name a few) and the amount of trust placed in the information provided by experts and officials (Slovic, Layman, and Flynn 1991; Heath, Seshardri, and Lee 1998; Williams, Brown, and

Greenberg 1999; Siegrist, Cvetkovick, and Roth 2000; Trettin and Musham 2000; Sjöberg 2008; Venables et al 2009, among others). Moreover, these two factors are intimately linked to one another.

The attitudes of the individuals living near proposed hazardous facilities are important in the planning, locating, and construction processes. For example, Easterling (1992) found that locally unwanted land uses, such as nuclear power plants or landfills, tend to face public opposition. More salient for the focus of this research, it has been argued that perception of the risks posed by potentially hazardous facilities is an important influence on public opinion (e.g., Rayner and Cantor 1987; Mushkatel et al 1989; Lerner and Keltner 2000; Lerner, Gonzalez, Small, and Fischhoff 2003; Sjöberg 2008), which itself is influenced by multiple factors. One of these is the potential benefit offered by a hazardous facility. Fincune et al (2000), for example, found that increasing (decreasing) the perceived benefit of a technology considered hazardous (such as a nuclear power plant) decreased (increased) the perceived risk of that technology. Alhakami and Slovic (1994), too, found an inverse relationship between perception of risk posed by a potentially hazardous technology and the potential benefits offered by its use.

Geography has also been suggested as a correlate of risk perception regarding nuclear facilities. Riddel (2009), for example, argues that risk perception in the case of nuclear waste transport is, in part, a function of distance from the proposed transport route. Via her survey of individuals living in Clark County, Lincoln County, and Nye County, Nevada, through which the U.S. Department of Energy has proposed transporting nuclear waste to the Yucca Mountain facility, Riddel finds both that individuals tended to estimate risk to be higher than the risk estimate by the Department of Energy and that risk perception decreased as distance from the

nuclear waste transport route increased. Focusing on Aiken County, Berkeley County, and Charleston County, South Carolina through which the Department of Energy proposed transporting nuclear waste to the Savannah River Site, Gawande and Jenkins-Smith (2001) found risk perception to be directly linked to distance from the proposed route via property values. In other words, those living closest to the transportation route both suffered from the most negatively impacted property values and perceived the greatest risk (specifically economic risk). However, it has also been found that the perception of risk by those currently living near a nuclear facility did not increase when an additional facility was proposed (Melber et al 1977) and, perhaps counter-intuitively, that those already living near a nuclear facility perceived its risk as lower than those living farther away (Kunreuther, Easterling, Desvousges, and Slovic 1990). Moreover, Dobra, Herzik, and Dickens (1994) found that, in relation to the Yucca Mountain Project in Nevada, that those living farthest from Yucca Mountain (for example, in Reno and Carson City) expressed somewhat more opposition than those living closest (for example, in Pahrump).

The potential for accident influences risk perception as well. Rosa (2004, 2007) and Whitfield et al (2009), for example, specifically show that risk perception was impacted by the Three Mile Island nuclear accident (1979 in the United States). Additionally, risk perception changes have also been documented following the Chernobyl accident (1986 in Ukraine) (Midden and Verplanken 1990; Peters, Albrecht, Hennen and Stegelmann 1990; Sjöberg and Sjöberg 1990), the Tokai accident (1999 in Japan) (Katsuya 2001), and the Fukushima Daichi accident (2012 in Japan) (Wittneben 2012; Kim, Kim, and Kim 2013).

Risk perception, of course, has its basis in the presence of actual risk. Zechhauser and Viscusi (1996) note that physical risks posed to individuals share three common

characteristics: surrounding uncertainty, significant consequences, and externalities, and that the primary sources of risk are generated directly by the human actions of lifestyle choices, contractual arrangements, and externalities brought on by the choices of others. Moreover, individual perception of risk and its seriousness depends on its specific source. Thus, it is important to understand the determinants of risk perception. Wildavsky and Dake (1990) consider five broad theories of risk perception. The first is knowledge theory, which argues that people perceive risk based on the actual presence of risk; an individual thinks a given situation poses risk because they *know* this to be the case. Second is personality theory, which argues that some individuals are more inclined to take risks, and therefore perceive risks in a different way than those who are more risk averse. Third is economic theory, which argues that individuals who are more economically affluent are more willing to take risks because they receive benefits but are shielded from consequences. Conversely, the "post-materialist" version of this theory reverses this reasoning, arguing that individuals who are less affluent are more willing to take risks in an effort to become more affluent. The fourth theory noted by Wildavsky and Dake (1990) is political theory, which views controversies concerning risks as based on competing political interests. Finally, cultural theory suggests that culture and society influence individual choices of what to fear and how much fear they should have. Regardless of which of these theories is correct, and they are all equally as likely depending on the unique features of a given situation, they should all be considered in order to fully understand the determinants of public opinion regarding nuclear power facilities or any other project that might engender negative reactions.

Understanding risk communication and risk management more broadly is also important to any consideration of the impact of risk on public opinion. Risk communication,

defined as the deliberate information exchange among stakeholders about hazards (Lundgren 1994; Trettin and Musham 2000), is most effective when it is interactive, obtaining information from the public and respecting that information about beliefs, opinions, and concerns (Chess, Salomone and Hance 1995; Johnson 1993; Renz 1992). Additionally, effective risk communication relies on credibility achieved through reliable standards, expertise, and dissemination of information in an easily understood way (Trettin and Musham 2000). Unfortunately, however, studies have shown that risk communication programs tend to be unable to overcome public distrust (Slovic 1993).

Risk perception, however, is neither the only influence on public opinion concerning nuclear facilities, nor does it exist within a vacuum. Specifically, trust in government, experts, and the companies responsible for nuclear facility operation has been proposed as both an influence on risk perception and an influence on public opinion directly (Rosa and Clark 1999). Moreover, it has been shown that trust is easier to destroy than create and, once lost, it is difficult to rebuild (Edelstein 1987; Slovic 1993).

In the case of nuclear technologies, multiple studies have shown that public opinion tends to be more negative when individuals express distrust of the nuclear industry, regulatory bodies, and/or government (Wynn 1992; Johnson 1999; Rosa and Clark 1999; Poortinga and Pidgeon 2003; Pidgeon, Poortinga, and Walls 2007; Venables et al 2009). Additionally, eroding trust in companies and government has been linked both to negative public opinion overall and an increase in perceived risk posed by a facility (Slovic 1987; Kunreuther et al 1990; Heath and Nathan 1991; Flynn et al 1992; Abel 1994; Heath, Seshadri, and Lee 1998). Slovic et al (2000) in their survey of residents in both the United States and France also found trust in government and trust in experts to be important predictors of risk perception and public

opinion regarding nuclear facilities. Venables et al (2009), too, in their survey of individuals living near nuclear power stations in Oldbury, Gloucestershire, England and Bradwell-on-Sea, Essex, England found that individuals who expressed more trust in officials were less likely to view these facilities negatively and less likely to consider them risky.

Like risk perception, trust has also been found to be impacted by nuclear accidents. Renn (1990), for example, showed that the number of opponents to nuclear power increased in Europe following the Chernobyl accident and linked this growing opposition to erosion of trust in officials. Katsuya (2001) made a similar finding: that trust in the facility operator decreased significantly following the Tokai nuclear accident and trust in government decreased as well, though marginally.

More broadly, a number of studies have shown that trust has a significant influence on the perception of any technology (Bassett et al 1996; Kunreuther et al 1990; Drottz-Sjöberg and Sjöberg 1991; Rijawka and Mushkatel 1991/1992; Bord and O'Connor 1992; Flynn et al 1992; Freudenberg 1993; Jungermann et al 1996; Groothius and Miller 1997; Sierist et al 2000; Siegrist, Gutscher, and Earle 2005). Additionally, Gregory and Miller (1998) concluded that individuals do not command a particularly deep knowledge about science or technology and Miller (1998) concluded that seventy-five percent of people in Europe and the United States lacked basic scientific literacy required to understand concepts such as molecules or radiation. Thus, when scientific or technical knowledge are lacking, social trust is essential in order to attenuate the complexity of issues faced by individuals (Earle and Cvetkovick 1995; Luhmann 1989).

While each of these factors themselves certainly serve to influence the opinion of individuals about any given nuclear facility, it is important to also consider influences other

than those created by the facility itself. Thus, the influence of local interest groups on public opinion must also be taken into account. Many studies have considered how interest groups exert influence. For example, it has been suggested that issue-specific factors, institutions, and characteristics of interest groups themselves all impact how much influence a given interest groups might have (Dür 2005; Smith 1995; van Winden 2003). Moreover, scholars have posited that interest groups exert their influence in a few overarching ways: (1) by seeking access to decision-makers directly (Beyers 2004; Bouwen 2002; Hansen 1991); (2) by influencing who becomes a decision-maker in the first place (Fordham and McKeown 2003; Moe 2006); (3) by working to shape public opinion (Beyers 2004; Gerber 1999; Kollman 1998); and (4) by strategically allocating funds (Dür and de Bièvre 2007). It is the third of these, specifically, that is of particular interest here. Beyers (2004), in fact, finds that interest groups frequently seek to influence public opinion and also frequently combine this with other strategies in order to reach their goals. Kollman (1998), too, argues that shaping public opinion directly is essential to outside lobbying strategies.

In general, traditional approaches probing interest group influence have primarily focused on characteristics of the groups themselves, motivated by Olson's (1965) outline of the challenges faced by individuals seeking to achieve collective goals, or have focused on individual legislator characteristics. The former focus mainly considers how interest groups utilize directly observable resources such as membership, financial support, and professional employees (Gais and Walker 1991; Schlozman and Tierney 1986; Smith 1984), as well as indirect resources such as ability to form coalitions and support for the group in a legislator's district (Berry 1989; Carpenter, Easterling, and Lazer 2004; Rothenberg 1989; Sclozman and Tierney 1986 Wright 1990). The latter focus has primarily considered how lobbyists determine

if a given legislator is an ally, opponent, or open to persuasion (Ainsworth 1997; Austen-Smith and Wright 1992; Bauer, Pool, and Dexter 1963; Baumgartner and Leech 1996; Hansen 1991; Hayes 1981; Milbrath 1963; Rothenberg 1992). More recent scholarship has begun to consider the importance of the political context in which a given interest group operates. For example, Gray and Lowery (1996a; 1996b) posit an Energy-Stability-Area (ESA) model that attempts to explain the importance of political context in determining the amount and type of activities of interest groups. They argue that a greater number of interest groups will dedicate time and money in areas where there is a bigger latent supply of organizations.

Additionally, interest groups may be understood as either social movements or pressure groups. Useem and Zald (1982) note that this distinction is defined by three key differences. The first difference lies in the fact that pressure groups tend to exist within the polity and can thereby routinely participate in the decision-making process, whereas social movements are founded in response to a lack of access to government that has led to an absence of recognition in the policy-making process. Second, where pressure groups are able to mobilize long-held constituencies, social movements must mobilize a constituency for the first time. Finally, pressure groups are able to utilize conventional forms of collective action associated with the political system to which they are attached, while social movements must rely on forms of influence that exist outside of the political system. Moreover, only "legitimate" organizations are able to actually achieve policy influence, and legitimacy can be achieved in two ways. Tilly (1978; 1978), Rimlinger (1970), and Zald and Ash (1966) note that *legitimacy of numbers* is achieved when a group is made up of a sufficient number of people to demonstrate that an organized, mobilized, and committed citizenry supports a given policy position, while *legitimacy of means* is achieved when a given interest group successfully convinces a

constituency that it has the ability to achieve its goal, ultimately leading to increased ability to recruit members, increased accessed to media, and decreased likelihood of repression by government.

The potential power of interest groups may also be understood through the Advocacy Coalition Framework. Developed by Sabatier and Pelkey (1987), Sabatier (1988, 1991, 1993), and Sabatier and Jenkins-Smith (1993), this framework helps to provide an understanding of those policy areas where conflicting goals exist, where there are technical disputes, and policy design and implementation may be complicated due to the presence of multiple levels of government (Hoppe and Peterse 1993; Sabatier 2007; Sabatier and Weible 2007).

The ACF has five basic premises. First, it argues that the best understanding of policy change requires a time period of at least a decade. Second, it suggests that the policy subsystem should be used as the unit of analysis when studying policy change, because the policy subsystem allows us to better understand how actors from multiple institutions interact in their attempts to influence policy decisions. Third, it argues that effective analysis must also understand that influence on policy change includes intergovernmental dimensions and take them into account. Fourth, the ACF notes the importance of incorporating technical information during the policy analysis. The final premise contends that policy subsystems can be conceptualized in the same way as belief systems (Sabatier and Jenkins-Smith 1993; Sabatier and Weible 2007; Weible et al 2011). No consideration of public opinion regarding nuclear facilities would be complete without taking into account the impact of both pro- and anti-nuclear interest groups.

Understanding public opinion and the factors that shape it is particularly important because public opinion has the potential to shape public policy. Conventional research of the

past suggests one potential link between opinion and policy: that mass opinion influences elite opinion and elite opinion, in turn, impacts policy directly (Held 1980; Hill and Hinton-Andersson 1995; Schumpeter 1942; Weber 1946). An alternative to this conventional wisdom suggests the reciprocal influence of mass and elite opinions when policy preferences coincide (e.g., Jackman 1972; Uslaner and Weber 1983; Weissberg 1976). Additionally, the theory of "dynamic" or "democratic" representation (Burnstein 1998; Jacobs and Shapiro 1994; Page and Shapiro 1983; Simson, MacKuen, and Erikson 1995; Wlezien 1995, 2004), suggest that shifts in public opinion cause policy makers to shift their behaviors and ultimately shift policy itself to coincide with opinion.

Though the literature on what shapes public opinion is extensive, this literature fails to consider any difference of opinion between those who live in the communities surrounding nuclear facilities and those who live at a distance. Following this, the literature does not consider what the cause of this difference may be, or why the communities around nuclear facilities have experienced population growth despite the expressed negative opinion.

### 1.5 Theoretical Approach

The theoretical basis of this research lies primarily in cost-benefit analysis. This largely economic notion argues that when individuals make decisions, they consciously or unconsciously evaluate the potential benefits versus the potential costs of each of their options and then choose the option in which the benefits most outweigh the costs (Becker 1976; Gramlich 1990; Gupta 2011). Within this calculus, individuals include consideration of direct, indirect, and intangible costs and benefits (Gupta 2011).

As nuclear facilities pose actual and tangible risks to individuals living in the communities near them and pose potential risk to individuals considering relocating to those communities, risk analysis is central to any costs-benefit analysis. More specifically, the perception of risk (Rayner and Cantor 1987; Mushkatel et al 1989; Lerner and Keltner 2000; Lerner, Gonzalez Small , and Fischoff 2003; Sjoberg 2008; and Greenberg and Truelove 2011, for example) and trust in government, experts, and the companies that operate nuclear facilities (Wynn 1992; Johnson 1999; Rosa and Clark 1999; Portinga and Pidgeon 2003; Pidgeon, Portinga, and Wells 2007; Venables et al 2009; and Greenberg and Truelove 20011, for example) have been shown to be highly salient influences on public opinion. Additionally, Slovic (2000) has noted that individuals tend to classify the benefits of nuclear power as relatively small and risks to be unacceptably large. Moreover, he notes that in psychometric factor spaces, the risks posed by nuclear facilities tend to occupy extreme positions, reflecting individual opinions that these risks are "unknown, dread, uncontrollable, inequitable, catastrophic, and likely to affect future generations" (229).

With this in mind, the theoretical basis of this research also partially lies in risk analysis and how individuals perceive risks posed by nuclear facilities, and how risk analyses are included in cost-benefit analyses. Zechhauser and Viscusi (1996) note that surrounding uncertainty, significant consequences, and externalities are common to all physical risks posed to individuals and that the human actions of lifestyle choices, contractual agreements, and externalities caused by the choices of others are the primary sources of risk. Moreover, Wildvasky and Dake (1990) consider five broad theories of risk perception under which risk is based on knowledge of actual risk posed, an individual's inclination to take risks, economic affluence allowing an individual to receive benefits while avoiding the negative consequences

of risk, controversies concerning risks based on competing political interests, or cultural and societal influences that determine what individuals should fear and how much they should fear it. Additionally, Alhakami and Slovic (1994) and Fincune et al (2000) have noted that the perception of risk posed by a potentially dangerous technology (such as a nuclear power facility) decreased as the potential benefit offered by that technology increased.

Thus, the logic of the argument of this research is as follows: If individuals are rational decision makers who consider costs versus benefits of their decisions, then those individuals who express negative opinions of nuclear facilities are those who consider the costs to outweigh the benefits. Moreover, those who speak at public meetings held concerning proposed nuclear facilities are adamant enough regarding their own cost-benefit calculus that they attempt to convince others that their calculus is correct. In order to consider how this cost-benefit analysis is actualized, this research considers first who it is that expressed negative opinion based on the academic literature that suggests certain people (such as women, parents, and non-whites) are more likely to express negative opinions. Specifically, it utilizes a national opinion poll to consider who is most likely to say they oppose increasing the use of nuclear power to generate electricity in the United States and who is most likely to consider nuclear power stations to be dangerous or extremely dangerous. Second, this research utilizes a second national opinion poll to consider if risk, trust in government, and trust in the companies that operate nuclear power facilities are as critical to opinion regarding nuclear facilities as suggested by the literature. This research then applies the quantitative analyses indicating who objects and how risk, trust in government, and trust in companies figure into the cost-benefit analyses of individuals to a qualitative consideration of the opinions expressed by individuals living in the communities surrounding proposed nuclear facilities. Additionally, this qualitative

analysis also considers newspaper articles, editorials, and letters to the editor as reflections of the opinion of community members, as well as indicative of the intensity of interest (where the number of articles published decreases as distance from the proposed facility increases, indicating decreasing issue salience).

Together, the national polls and the opinions expressed by those immediately affected by a proposed nuclear facility because they already live there, indicate how individual cost-benefit analyses might be expected to occur, potentially, as Slovic (2000) notes, because nuclear power facilities tend to pose risks that are "unknown, dread, uncontrollable, inequitable, catastrophic, and likely to affect future generations" (229). However, despite this, the populations of communities surrounding nuclear facilities grow, indicating that benefits outweigh the costs, potentially due to economic factors. Therefore, this research finally considers economic changes in the communities surrounding nuclear facilities.

In sum, because this research explores the seeming disconnect between the opinions expressed by individuals about nuclear facilities (opinions that tend to be negative) and the actions of individuals (that they move into communities near nuclear facilities), it relies on the assumption that individuals are conducting cost-benefit analyses and, contrary to what might be expected based on polling alone, some are determining the benefits to outweigh the costs. Thus, it is essential that the potential costs and potential benefits of living near a nuclear facility be understood. Therefore, this research considers first, who is likely to object to nuclear facilities and second, if risk and trust are as central to expressed opinion as the academic literature suggests they should be. Finally, in an attempt to apply the quantitative analyses to the real world, this research qualitatively considers expressed opinion at public comment

sessions for three nuclear power plants and if and how those opinions are reiterated in the newspapers serving the communities surrounding these facilities.

### 1.6 Hypotheses

Rationale: Some individuals are more likely to calculate costs to outweigh benefits of living near a nuclear facility and will therefore be more likely to express negative opinions of these facilities.

$H1_A$: The following people will be most likely to express negative opinions about the use of nuclear power:

- Older individuals
- Non-whites
- Women
- Democrats
- Non-veterans
- Christians
- Individuals with more children
- Individuals with more siblings
- Those with less education
- Those who are currently employed
- Individuals with family incomes below the poverty line
- Individuals with individual incomes below the poverty line
- Individuals who rent their homes
- Individuals living in non-metropolitan areas

$H1_B$: Individuals who express trust in government, confidence in the companies responsible for operating nuclear facilities, and/or willingness to take risks will be more likely to express positive opinions regarding nuclear facilities.

Rationale: If trust in government and trust in companies is as central to individual cost-benefit analysis of living near a nuclear facility as suggested by the academic literature, then these will be among the most mentioned topics by individuals speaking at public meetings regarding proposed nuclear power plants.

$H2_A$: The majority of individuals speaking at public meetings regarding proposed nuclear power facilities will mention trust in government or trust in companies.

$H2_B$: The majority of individuals mentioning trust in government or trust in

companies will make negative statements concerning these topics.

Rationale: If risk and the perception of risk are as central to individual cost-benefit analyses of living near a nuclear facility as suggested by the academic literature, then risk will be among the most mentioned topics by individuals speaking at public meetings regarding proposed nuclear power plants.

$H3_A$: The majority of individuals speaking at public meetings regarding proposed nuclear power facilities will mention risk.

$H3_B$: The majority of individuals mentioning risk will make negative statements concerning this topic.

Rationale: If interest in a proposed nuclear facility decreases as distance to that facility increases, then newspapers will publish fewer articles about the facility as distance to the facility increases. Additionally, articles published will reflect intensity of opinion in the areas served by the newspapers.

$H4_A$: Newspapers serving communities further from a proposed nuclear power plant will publish fewer articles about the proposed nuclear power plant than those closest to the proposed nuclear facility.

$H4_B$: Newspapers serving communities farther from a proposed nuclear power plant will publish fewer negative articles about the proposed nuclear power plant than those closest to the proposed nuclear power plant.

Rationale: Populations of the communities surrounding nuclear power plants grow because those communities receive economic benefits from having the nuclear power plant.

H5: Communities near nuclear power plants will experience an increase in median income, per capita income, and/or median housing values.

## 1.7 Methodology

In order to consider how individuals determine the costs versus benefits of living near nuclear facilities, leading them to express either negative or positive opinions regarding such facilities, this research considers first who it is that expresses negative opinion based on the academic literature suggesting certain people (such as women, parents, and non-whites) are more likely to express negative opinions. This analysis is performed using data from the 2010

General Social Survey and considers two general questions regarding individual opposition to the use of nuclear power facilities. Second, this research considers if risk, trust in government, and trust in the companies operating nuclear facilities are as central to the cost-benefit analyses of individuals as suggested by the academic literature. This second analysis utilizes the Energy Survey 2008 conducted by Knowledge Networks for the American Clean Skies Foundation and considers a series of questions that were asked focusing on harm, expense, amount of use, and willingness to live near nuclear facilities.

Third, I consider expressed public opinion qualitatively by analyzing the transcripts of public comments made at meetings for each of three nuclear power facilities, each in a different stage of development: one that is completed and operating, one that was proposed but never constructed, and one that is in the process of being approved and/or constructed. These are archived with the Nuclear Regulatory Commission. Additionally, following this analysis, I consider newspaper articles published in the areas surrounding three nuclear power plants in order to determine if content published by newspapers reflect the opinions expressed by those who speak at public meetings. The three facilities considered are the Diablo Canyon Power Plant in California, a proposed nuclear power plant in Victoria, Texas, and the currently unnamed nuclear power plant project in Levy County, Florida.

In order to consider if intensity of issue salience changes with distance to a given nuclear power facility, newspapers were chosen based on a map of each area. The newspapers represent two general areas: the area or town immediately surrounding the facility (Area 1) and the towns that exist in rings around this immediate area (Areas 2 and 3). The latter group of newspapers is utilized in order to consider the hypothesis that intensity of opinion is related to proximity to a facility. For the Diablo Canyon facility, the *Lompoc Record* serves Area 1;

the *Bakersfield Californian*, and the *Oxnard Press Courier* serve Area 2; the *Long Beach Press Telegram* and the *Redlands Daily Fact* serve Area 3. For the Victoria, Texas facility, the *Victoria Advocate* serves Area 1; the *Corpus Christi Examiner* serves Area 2; the *Galveston County Daily* serves Area 3. For the Levy County, Florida facility, the *Williamston Pioneer Sun Journal* serves Area 1; the *Sumter County Times* and the *Gainesville Sun* serve Area 2; the *Daily Commercial*, the *Suwanee Democrat*, and the *Panama City News* serve Area 3. Articles are initially identified in these newspapers based on their titles, which should include the name of the facility, a shortened version of the facility name (such as "Diablo Canyon" in place of "Diablo Canyon Power Plant"), or phrases that indicate the topic, such as "nuclear project," "nuclear plant," et cetera.

The analysis of the articles from these newspapers, as well as of the public meeting transcripts, will look for words that indicate the opinion of the article or speaker (in the case of the transcripts). These will include words[1] such as:

| In Favor Of | In Opposition To |
|---|---|
| agree | adverse |
| approve | against |
| favor | anti-nuclear |
| for | bad |
| good | dislike |
| like | hate |
| positive | negative |
| pro-nuclear | oppose |
| safe | protest |
| want | unsafe |

The entirety of an individual's statement and the entirety of an article will be considered and each speaker/article will be coded as positive, negative, or neutral. Additionally, the topics to

[1] A full list of positive and negative words can be found in Appendix 1

which an individual or article refers, as well as the tenor of the reference (positive, negative, or neutral), will also be recorded. In the case of speakers, if the speaker claims expertise (such as medical doctor) or affiliation with an interest group (such as Greenpeace), this will also be recorded.

As an additional note, the population change data and data regarding economic indicators (such as median individual income in a community) will come from the U.S. Census Bureau.

### 1.8 Contribution of this Research

Based on previous research, I offer an explanation for the difference in public opinion concerning nuclear facilities by those living close to and far from them. Combined, the qualitative and quantitative portions of this research will allow me to develop a more complete view the public opinion surround nuclear facilities and the factors that influence this opinion. My research will lead to a better understanding of the true determinants of opinion regarding nuclear facilities. Finally, I will make suggestions for how this deeper and broader understanding can be used by decision makers during the policy development stages of nuclear projects.

# 2 QUANTITATIVE ANALYSIS

The quantitative analysis section of this dissertation utilizes two independent data sets to explore the nature of public opinion regarding nuclear facilities in the United States. The first of these data sets comes from the General Social Survey and is used to explore if/how basic public opinion (pro-nuclear versus anti-nuclear) can be predicted based on individual demographics. In other words, it is used to attempt to define who is most likely to express positive (negative) opinion. The second data set comes from the Energy Survey 2008 conducted by Knowledge Networks for the American Clean Skies Foundation. These data are used to explore public opinion regarding nuclear facilities in a more in-depth fashion via a series of questions focusing on harm, expense, amount of use, and willingness to live near nuclear facilities. Additionally, while the General Social Survey data only includes general demographic variables, the Energy Survey 2008 includes variables regarding trust in government, willingness to take risks, and confidence in the companies operating nuclear facilities, which are ultimately the variables of interest while demographic variables are used as controls.

## 2.1 General Social Survey[2]

### 2.1.1 Data Description

This first quantitative analysis section utilizes data from the 2010 General Social Survey. This survey is conducted by the National Opinion Research Center (NORC) at the University of Chicago. The survey itself states that it "gathers data on contemporary American

[2] This section was previously prepared in part for this dissertation and submitted as a stand-alone paper for PSC 782, Advanced Research Methods on 8 May 2012.

society in order to monitor and explain trends and constants in attitudes, behaviors, and attributes." In 2010, there were a total of 2,044 interviews of individuals age 18 or above conducted in both English and Spanish. Respondents were 75.83% white, 43.59% male, 59.36% Democrat, and 76.46% Christian. Additionally, 10.63% of respondents indicated that they had served in the U.S. military, 83.03% had 12 or more years of education, 58.01% were currently employed, 43.61% were currently married, 72.46% had at least one child, and 95.39% had at least one sibling. Finally, 67.20% of respondents had a total family income above the poverty line and 51.24% had an individual income above the poverty line.[3] As this analysis utilizes these demographic variables to consider who is most likely to express negative opinions in each of two questions, they serve as independent variables. All are coded dichotomously, with the exception of age, years of education, number of children, and number of siblings, which are counts.

### 2.1.2 Methodology

Using the individual as the unit of analysis, I utilize logit regression to consider who is most likely to provide negative responses to each of two questions, which serve as the dependent variables. The first of these is,

> Which statement best describes your own views about increasing the use of nuclear power to generate electricity in the United States?: strongly favor, favor, oppose, strongly oppose

Responses were dichotomized to "favor" or "oppose."

[3] The poverty line was determined as having an income above "poverty" as determined by the US Department of Health and Human Services for 2010. "Family" was defined as a household of four; "individual" was defined as a household of one.

The second question is,

> In general, do you think that nuclear power stations are: extremely dangerous, dangerous, not very dangerous, or not dangerous?

Again, responses were dichotomized to "dangerous" or "not dangerous."

> $H_1$: Older respondents, non-whites, women, Democrats, Christians, non-veterans, respondents who are currently employed, respondents with less education, respondents who are married, respondents with more children, respondents with more siblings, respondents with family incomes below the poverty line, and respondents with individual incomes below the poverty line will be more likely to say they oppose the use of nuclear power to generate electricity in the United States.

> $H_2$: Older respondents, non-whites, women, Democrats, Christians, non-veterans, respondents who are currently employed, respondents with less education, respondents who are married, respondents with more children, respondents with more siblings, respondents with family incomes below the poverty line, and respondents with individual incomes below the poverty line will be more likely to say they think that nuclear power stations are dangerous.

The independent variables are each included based on previous research that suggests one or more of them to be influences on an individual's perception of nuclear-related projects. Nelkin (1981), de Sario and Langston (1984), and Matheny and Williams (1985), for example, suggest that concerns about economic health and safety make individuals more likely to express opinions on nuclear-related projects. Thus, socioeconomic factors are included here as potential indicators of likelihood to oppose nuclear power generation. Feldman and Hanahan (1996), Levi and Holder (1988), and Hamilton (1985) note the influence of gender and parenthood on opposition to nuclear-related projects. Gender and number of children are included based on their research. Number of siblings, and marital status type are included to expand upon their research; I posit that it is not simply the number of children one has but family size overall that influences opinion on nuclear power generation. Buttel (1979) and van

Liere and Dunlap (1980), among others, found age to be an influence on opinion concerning nuclear projects. Furthermore, Acevedo-Garia, et al. (2008), Quah and Tan (nd), and Mishan (1977) note that socially objectionable facilities in general are sited in low-income areas. Thus, race and education level are included (as it is generally accepted that income varies with these factors), as are the income variables. Finally, Levi and Holder (1988), Bandura (1986), and Kraft and Clary (1985) find trust in government to be associated with likelihood of opposition. Therefore, veteran status and political party affiliation are included here as independent variables.

### 2.1.3 Results and Conclusions

I use logit regression techniques to determine the relationship between the various independent variables discussed in the previous section and how individuals view the use of nuclear power to generate electricity, as well as how dangerous individuals consider nuclear power generation to be. The analyses are clustered by region of the interview (New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific). My key concern is attempting to determine who is most likely to object to nuclear-related projects.

In both analyses, I expect the relationships between the dependent variables (opinion on the use of nuclear power to generate electricity in the United States) and AGE, DEMOCRAT, CHRISTIAN, WORKING, MARRIED, NUMBER OF CHILDREN, and NUMBER OF SIBLINGS to be positive and significant. I further expect relationships between the dependent variables (opinion on the use of nuclear power to generate electricity in the United States) and WHITE, MALE, VETERAN, YEARS OF EDUCATION, FAMILY INCOME ABOVE POVERTY, and RESPONDENT

INCOME ABOVE POVERTY to be negative and significant. However, the analysis performed reveals some interesting differences from these expectations.

Table 2-1 presents the results of the quantitative analyses for these questions. Table 2-2 presents the average marginal effects of the independent variables in theses analyses.

**Table 2-1**

**Logistic Regressions**

| IV | Opposition | Danger |
|---|---|---|
| White | -0.78* | -0.25 |
| | (0.25) | (0.13) |
| Age | -0.01 | -0.01 |
| | (0.01) | (0.01) |
| Working | 0.17 | 0.15 |
| | (0.27) | (0.09) |
| Married | 0.59* | -0.22 |
| | (0.23) | (0.13) |
| Number of Children | -0.07 | 0.00 |
| | (0.09) | (0.04) |
| Years of Education | -0.04 | -0.08* |
| | (0.05) | (0.02) |
| Male | -0.14 | -0.57* |
| | (0.52) | (0.06) |
| Family Income above Poverty | -0.01* | 0.20 |
| | (0.26) | (0.11) |
| Respondent Income above Poverty | 0.61 | -0.30 |
| | (0.45) | (0.15) |
| Democrat | 1.33* | 0.34* |
| | (0.46) | (0.09) |
| Veteran | -0.02 | 0.09 |
| | (0.51) | (0.29) |
| Number of Siblings | -0.05 | 0.00 |
| | (0.04) | (0.02) |
| Christian | 0.17 | 0.01 |
| | (0.41) | (0.35) |
| _cons | 0.01 | 2.11 |
| | 0.89 | -0.35 |
| Number of Observations | 295 | 1356 |
| Log pseduolikelihood | -160.37 | -891.85 |
| Wald chi2 (17) | . | . |
| Prob > chi2 | . | . |
| Pseudo R2 | 0.12 | 0.05 |

Note: cell entries are estimated coefficients generated using logistic regression. Robust standard errors are reported in parentheses.
* = $p \leq 0.01$

**Table 2-2**

**Margins**

| IV | Opposition | Danger |
|---|---|---|
| White | -0.14* | -0.06 |
| | (0.05) | (0.03) |
| Age | -0.00 | 0.00 |
| | (0.00) | (0.00) |
| Working | 0.03 | 0.03 |
| | (0.05) | (0.02) |
| Married | 0.11* | -0.05 |
| | (0.04) | (0.03) |
| Number of Children | -0.01 | 0.00 |
| | (0.02) | (0.01) |
| Years of Education | -0.01 | -0.02* |
| | (0.01) | (0.00) |
| Male | -0.03 | -0.13* |
| | (0.10) | (0.01) |
| Family Income above Poverty | -0.19* | 0.05 |
| | (0.04) | (0.03) |
| Respondent Income above Poverty | 0.11* | -0.07 |
| | (0.08) | (0.03) |
| Democrat | 0.24* | 0.08* |
| | (0.08) | (0.02) |
| Veteran | 0.00 | 0.02 |
| | (0.09) | (0.07) |
| Number of Siblings | -0.01 | 0.00 |
| | (0.01) | (0.01) |
| Christian | 0.03 | 0.00 |
| | (0.07) | (0.04) |
| Number of Observations | 295 | 1356 |

Note: cell entries are estimated coefficients generated using logistic regression. Delta-method standard errors are reported in parentheses.
* = $p \leq 0.01$

In the first analysis, while the relationships between the dependent variable and WHITE, MALE, VETERAN, WORKING, YEARS OF EDUCATION, MARRIED, NUMBER OF SIBLINGS, and FAMILY INCOME ABOVE POVERTY are in the expected direction, of these only WHITE, MARRIED,

and FAMILY INCOME ABOVE POVERTY are statistically significant. In contrast, AGE, DEMOCRAT, CHRISTIAN, NUMBER OF CHILDREN, and RESPONDENT INCOME ABOVE POVERTY are not in the expected direction, and only DEMOCRAT is statistically significant. Thus, considered in a different way, this analysis indicates that non-whites, Republicans, married respondents, and respondents with family incomes below the poverty line are more likely to oppose the use of nuclear power to generate electricity than whites, Democrats, unmarried respondents, and respondents with family incomes above the poverty line, respectively. Additionally, consideration of the marginal effects further illuminates these relationships. In the case of race, consideration of the marginal effects reveals that white respondents are 14% less likely to say they are opposed to the use of nuclear power to generate electricity in the United States. Moreover, married individuals are 11% more likely than non-married individuals and Democrats are 24% more likely than Republicans to say they oppose the use of nuclear power to generate electricity in the United States, while respondents living above the poverty are 19% less likely than those living below the poverty line to offer this same response.

In the second analysis, while the relationships between the dependent variable and WHITE, MALE, DEMOCRAT, CHRISTIAN, WORKING, YEARS OF EDUCATION, NUMBER OF CHILDREN, NUMBER OF SIBLINGS, and RESPONDENT INCOME ABOVE POVERTY are in the expected direction, of these only MALE, DEMOCRAT, and YEARS OF EDUCATION are statistically significant. In contrast, AGE, VETERAN, MARRIED, and FAMILY INCOME ABOVE POVERTY are not in the expected direction, though none of these relationships are statistically significant. Again, consideration of the marginal effects further illuminates these relationships. In the case of education, consideration of the marginal effects reveals that as a respondent's number of

years of education increase, the individual is 2% less likely to say they consider nuclear power stations to be dangerous. Moreover, men are 13% less likely than women to give this response, while Democrats are 8% more likely than Republicans to give it.

The relationships indicated by the logit analyses lead to various conclusions. First, while Nelkin (1981), de Sario and Langston (1984), and Matheny and Williams (1985) indicate that economic concerns increase likelihood of opinion expression on nuclear-related projects, my analysis only shows a statistically significant relationship between family income and opposition to nuclear power. However, as the relationships between the respondent's individual income and either dependent variable or between total family income and the dependent variable regarding danger posed by nuclear power facilities are not statistically significant, my analysis neither supports nor contradicts their conclusions.

Feldman and Hanahan (1996), Levi and Holder (1988), and Hamilton (1985) suggest that gender and parenthood influence likelihood of opposition to nuclear-related projects. My analysis does not support their conclusion concerning gender; while in both analyses women are more likely to express negative opinions, this relationship is only statistically significant concerning the question on danger posed by a nuclear power plant. However, my analysis does not show a significant relationship between number of children and either of the dependent variables. To expand upon the research done by Feldman and Hanahan (1996), Levi and Holder (1988), and Hamilton (1985), I also included number of siblings and marital status as I generally posited that overall family size influences opinion on nuclear-related projects. My analysis showed, however, that only whether a respondent was married was significant and then only in its relationship with individual opposition to increasing the use of nuclear power

to generate electricity. Together, these factors lead me to conclude that, while gender may be a general indicator of likelihood to object to nuclear-related projects, family size is not.

Buttel (1979), van Liere and Dunlap (1980), and others indicate the influence of age on opinion about nuclear-related projects. My analyses neither support nor contradict their conclusion, showing that age is not related to opinion on the danger posed by nuclear power generating facilities or to opinion concerning increasing reliance on nuclear power generation in a statistically significant way.

The conclusions of Acevedo-Garcia, et al. (2008), Quah and Tan (nd), and Mishan (1997) that socially objectionable facilities tend to be sited in low-income areas prompted the inclusion of the race, education level, employment, family income, and respondent income variables. As noted previously, my analysis only shows a statistically significant relationship between race and family income and opposition to nuclear power, and between years of education and danger posed by nuclear power. Thus, while my analysis indicates that race, total family income, and education may be useful in predicting who is likely to object to nuclear-related projects, I cannot say that it supports or contradicts the conclusions of the other authors as it does not measure where favoring individuals think nuclear-related facilities should be sited.

Finally, the findings of Levi and Holder (1988), Bandura (1986), and Kraft and Clary (1985) indicate that likelihood of opposition to nuclear-related projects is associated with trust in government. My analysis includes veteran status and political party affiliation in order to test this. My analysis, however, does not show a significant relationship between veteran status and either of the dependent variables, though it does indicate a significant relationship between

political party affiliation and both dependent variables. Thus, my analysis only partially supports these authors' conclusions.

In sum, my analysis indicates that the best predictors of an individual's likelihood to object to (or favor) nuclear-related projects may be political party affiliation. Additionally, race, gender, level of education, marital status, and total family income may also be potential indicators.

## 2.2 Energy Survey 2008[4]

### 2.2.1 Data Description

This second quantitative analysis section utilizes the Energy Survey 2008 conducted by Knowledge Networks for the American Clean Skies Foundation. The survey was conducted during January 2008 and was administered to a nationally representative sample of adults obtained through random digit dialing. The survey was completed by a total of 1,430 adults. Though the survey asked questions concerning many potential energy sources, I focus on only those questions that were about nuclear power or nuclear waste, as these technologies are the focus of my research. In addition to these, I have also added three variables: one dichotomous variable for if a state has a nuclear facility, one for the total number of nuclear facilities in a state, and one for the number of nuclear facilities per square mile[5]. To create this final variable, I gathered the number of power plants in each state in 2008 from the U.S. Energy Information Agency (EIA) and the area of each state in square miles from the 2010 U.S. Census.

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[4] This section was previously prepared for this dissertation and was submitted as a stand-alone paper to Western Political Science Association annual meeting 17-20 Apr 2014.

[5] For the State of Nevada I consider the Yucca Mountain Nuclear Waste Repository to be the equivalent of a nuclear power plant because the facility was not yet closed when the Energy Survey 2008 was conducted.

All respondents to the Energy Survey 2008 were age 18 and over. Respondents were 77.34% white, 49.93% male, and 54.04% Democrat. Additionally, 43.51% had at least a high school education, 91.54% reported a household size of four or less, and 25.10% reported that they had children. Finally, 81.33% of respondents had a total family income above the poverty line[6], 22.80% reported that they were renting their home, and 81.54% were living in a metropolitan area. As this analysis utilizes these demographic variables to consider who is most likely to express negative opinions in each of two questions, they serve as independent variables.

### 2.2.2 Methodology

Using the individual as the unit of analysis, this quantitative section considers each of six dependent variables against a series of independent variables, focusing specifically on the relationship of willingness to take risks, trust in government, confidence in the companies that own and operate nuclear facilities, and number of nuclear facilities in a state. "WILLINGNESS TO Take RISK" is measured on a scale of zero to ten as a response to the question, "How willing are you to take risks?" where zero is "unwilling" and ten is "very willing." "TRUST IN GOVERNMENT" and "CONFIDENCE IN COMPANIES" are each measured on a zero to five scale, where zero is "none" and five is "very high." AGE and EDUCATION are each four-category variables. For AGE, these categories are 18 to 29, 30 to 44, 45 to 59, and 60 and over; for EDUCATION, these categories are "less than high school," "high school," "some college," and "Bachelor's degree or more." The independent variables of HOUSEHOLD SIZE and NUMBER OF

[6] The poverty line was determined as having an income above "poverty" as determined by the US Department of Health and Human Services for 2008 for a household of four.

PLANTS are counts, while PLANTS PER SQUARE MILE is a calculation of the number of nuclear power facilities in a state divided by the area of that state in square miles. All of the remaining independent variables are dichotomously coded.

The independent variables[7] are each included based on previous research that suggests one or more of them to be influences on an individual's perception of nuclear-related projects. Nelkin (1981), de Sario and Langston (1984), and Matheny and Williams (1985), for example, suggest that concerns about economic health and safety make individuals more willing to express opinions on nuclear-related projects, such as nuclear power plants and nuclear waste disposal facilities. Thus, socioeconomic indicators (education level, income, whether a respondent rents their home, family income) are included here as potential indicators of likelihood to express negative (or, conversely, positive) opinion. Additionally, Acevedo-Garia, et al. (2008), Quah and Tan (nd), and Mishan (1977) note that socially objectionable facilities are generally sited in low-income areas. Thus, race, income level, whether a respondent rents their home, and family income are included in order to consider their findings as well. Feldman and Hanahan (1996), Levi and Holder (1988), and Hamilton (1985) note the influence of gender and parenthood on likelihood to view nuclear projects negatively. Gender and presence of children in the household are included based on their research. Marital status and household size are included to expand upon their research; I posit that it is not simply the number of children one has but family size overall that influences opinion on nuclear power. Buttel (1979) and van Liere and Dunlap (1980), among others, found age to be an influence on opinion concerning nuclear projects. A measure of trust in government, political party, and ideology

[7] A description of how each variable is measured is included in the Appendix 3.

are included based on the research of Kraft and Clary (1985), Bandura (1986), and Levi and Holder (1988), who find trust in government to be associated with likelihood of expressing negative opinion. I expand upon these by also including a measure of confidence in the companies that are responsible building and operating power plants. I posit that this factor likely influences opinion on nuclear facilities because, while government may be responsible for regulation, it is companies who actually build and operate these facilities. Therefore, if an individual has little or no confidence in these companies, they are unlikely to view their facilities favorably. Finally, Davis (1986), Dickson (1983), and Elliot (1984) indicate the importance of risk perception on opinion regarding nuclear facilities.

The focus of this section, opinion regarding nuclear facilities in the United States, is measured based on individual answers to six questions asked by the Energy Survey 2008, dealing specifically with nuclear power plants or nuclear waste facilities. These questions were the following:

- **"How harmful do you think [nuclear] power sources [are]?"** Respondents were asked to select a single response from among "very harmful," "moderately harmful," "somewhat harmful," "slightly harmful," "not harmful at all," or "not sure." I coded these from "not harmful at all" as zero (0) to "very harmful" as four (4), with "not sure" coded as missing data.

- **"How expensive do you think it is to produce electricity with [nuclear fuel]?"** Respondents were asked to select a single response from among "very expensive," "somewhat expensive," "moderately priced," "somewhat cheap," "very cheap" or "not sure." I coded these from "very cheap" as zero (0) to "very expensive" as four (4), with "not sure" coded as missing data.

- **"How should we meet this demand [for electricity]? For [nuclear] power source[s] indicate whether you feel the U.S. should increase or reduce its use, or not use at all."** Respondents were asked to select a single response from among "reduce a lot," "reduce somewhat," "keep same," "increase somewhat," "increase a lot," or "not use at all." I coded these from "reduce a lot" as one (1) to "increase a lot" as five (5) with "not use at all" coded as zero (0).

- **"How much do you think the U.S. should rely on [nuclear] fuels for electricity over the next 10 years?"** Respondents were asked to select a single response from among "a lot (more than 25% of electricity)," "some (10-25%)," "not much (5-10%)," or "very little (less than 5%)." I coded these from "very little" as zero (0) to "a lot" as three (3).

- **"How would you feel if a new hazardous waste facility was built within 25 miles of your home?"** Respondents were asked to select a single response from among "strongly oppose," "somewhat oppose," "support," or "strongly support." I coded these from "strongly oppose" as zero (0) to "strongly support" as three (3).

- **"How would you feel if a new nuclear power plant were built within 25 miles of your home?"** Respondents were asked to select a single response from among "strongly oppose," "somewhat oppose," "support," or "strongly support." I coded these from "strongly oppose" as zero (0) to "strongly support" as three (3).

I utilized ordered logit regressions clustered by state of residence for each of these dependent variables.

These analyses are used to consider the following hypotheses:

$H_1$: Individuals who consider themselves more willing to take risks will be more likely to express positive views of nuclear facilities.

$H_2$: Individuals who express more trust in government will be more likely to express positive views of nuclear facilities.

$H_3$: Individuals who express more confidence in the companies responsible for the operation of nuclear facilities will be more likely to express positive views of nuclear facilities.

$H_4$: Confidence in companies responsible for the operation of nuclear facilities will more frequently have a statistically significant relationship to each of the dependent variables than will trust in government.

$H_5$: Individuals living in states with more nuclear power plants per square mile will be less likely to express positive views of nuclear facilities.

In these hypotheses, positive responses are those indicating that an individual does not consider nuclear facilities to be particularly harmful, thinks electricity production via nuclear fuel is not

particularly expensive, favors increase use of nuclear power, or does not express opposition to a nuclear facility near their home.

### 2.2.3 Results and Conclusions

I use ordered logit regression techniques to determine the relationship between the various independent variables discussed in the previous section and how individuals view nuclear technology use via the six survey questions. My key interest is in the relationships of trust in government, confidence in companies, willingness to take risks, and number of power plants per square mile in a respondent's state of residence to each of the dependent variables described above. Table 2-3 presents the results of the quantitative analyses for these questions. Table 2-4 presents the average marginal effects of the independent variables in theses analyses.

## Table 2-3

**Ordered Logistic Regressions**

| IV | Harm | Expense | Demand | Reliance | Waste | Plant |
|---|---|---|---|---|---|---|
| Willing to Take Risks | -0.12* | -0.06 | 0.11* | 0.00 | 0.09* | 0.17* |
| | (0.03) | (0.04) | (0.02) | (0.02) | (0.03) | (0.03) |
| Trust in Government | -0.14* | -0.09 | 0.10 | 0.01 | 0.11* | 0.06 |
| | (0.06) | (0.06) | (0.05) | (0.05) | (0.05) | (0.05) |
| Confidence in Companies | -0.25* | -0.11 | 0.23* | -0.08 | 0.24* | 0.31* |
| | (0.05) | (0.06) | (0.04) | (0.06) | (0.05) | (0.05) |
| Nuclear Plant in the State | -0.11 | 0.02 | 0.16 | 0.10 | 0.04 | 0.24 |
| | (0.02) | (0.19) | (0.15) | (0.19) | (0.25) | (0.21) |
| Number of Nuclear Plants in State | 0.02 | -0.01 | -0.04 | 0.05 | -0.06 | -0.07 |
| | (0.05) | (0.03) | (0.02) | (0.04) | (0.05) | (0.05) |
| Plants per Square Mile | -126.74 | -84.06 | 40.45 | 1308.32 | 143.59 | -1237.24 |
| | (426.54) | (321.49) | (310.66) | (857.05) | (1361.88) | (1002.92) |
| Age | -0.39* | -0.25* | 0.27* | 0.00 | 0.23* | 0.31* |
| | (0.06) | (0.07) | (0.05) | (0.05) | (0.07) | (0.07) |
| Education | -0.28* | -0.17* | 0.29* | -0.17* | 0.07 | 0.19* |
| | (0.06) | (0.05) | (0.05) | (0.04) | (0.06) | (0.07) |
| White | -0.68* | -0.32* | 0.41* | -0.03 | 0.42* | 0.47* |
| | (0.13) | (0.13) | (0.14) | (0.14) | (0.16) | (0.11) |
| Family Income above Poverty | -0.42* | -0.16 | 0.51* | -0.10 | 0.28 | 0.16 |
| | (0.15) | (0.17) | (0.12) | (0.19) | (0.17) | (0.17) |
| Democrat | 0.50* | 0.38* | -0.54* | -0.09 | -0.30* | -0.46* |
| | (0.10) | (0.12) | (0.09) | (0.15) | (0.13) | (0.11) |
| Male | 0.73* | 0.45* | -0.71* | 0.03 | -0.63* | -0.79* |
| | (0.11) | (0.09) | (0.12) | (0.11) | (0.09) | (0.11) |
| Household Size | -0.07 | -0.02 | 0.05 | -0.02 | 0.13 | 0.14* |
| | (0.05) | (0.07) | (0.06) | (0.08) | (0.07) | (0.05) |
| Rent Home | 0.19 | 0.40* | -0.26 | 0.25 | 0.13 | -0.11 |
| | (0.11) | (0.13) | (0.13) | (0.14) | (0.14) | (0.15) |
| Number of Children | 0.32 | 0.00 | -0.31* | 0.07 | -0.64* | -0.44* |
| | (0.15) | (0.19) | (0.12) | (0.19) | (0.22) | (0.18) |
| Live in a Metropolitan Area | -0.07 | -0.08 | 0.13 | -0.24 | 0.15 | -0.04 |
| | (0.15) | (0.16) | (0.14) | (0.12) | (0.15) | (0.21) |
| /cut1 | -5.85 | -4.85 | 0.30 | -3.42 | 2.68 | 3.21 |
| | (0.42) | (0.44) | (0.37) | (0.28) | (0.65) | (0.39) |
| /cut2 | -4.57 | -3.37 | 1.50 | -1.49 | 4.41 | 4.39 |
| | (0.40) | (-0.41) | (0.38) | (0.27) | (0.65) | (0.40) |
| /cut3 | -3.69 | -2.21 | 2.27 | 0.29 | 7.53 | 6.33 |
| | (0.39) | (0.40) | (0.39) | (0.26) | (0.71) | (0.44) |
| /cut4 | -2.73 | -0.75 | 3.35 | | | |
| | (0.39) | (0.38) | (0.40) | | | |
| /cut5 | | | 4.82 | | | |
| | | | (0.41) | | | |
| Number of Observations | 1120 | 1024 | 1229 | 1220 | 1239 | 1239 |
| Log pseduolikelihood | -1615.83 | -1490.54 | -1947.97 | -1499.64 | -1151.48 | -1319.57 |
| Wald chi2 (17) | 632.39 | 154.43 | 1019.81 | 180.53 | 309.70 | 355.82 |
| Prob > chi2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pseudo R2 | 0.09 | 0.04 | 0.08 | 0.01 | 0.07 | 0.10 |

Note: cell entries are estimated coefficients generated using logistic regression. Robust standard errors are reported in parentheses.
* = $p \leq 0.01$

**Table 2-4**

**Margins**

| IV | Harm | Expense | Demand | Reliance | Waste | Plant |
|---|---|---|---|---|---|---|
| Willing to Take Risks | 0.02* | 0.00 | -0.01* | 0.00 | -0.02* | -0.03* |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) |
| Trust in Government | 0.02* | 0.01 | -0.01 | 0.00 | -0.02* | -0.01 |
| | (0.01) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) |
| Confidence in Companies | 0.03* | 0.01 | -0.01* | 0.00 | -0.05* | -0.06* |
| | (0.01) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) |
| Nuclear Plant in the State | 0.01 | 0.00 | -0.01 | -0.01 | -0.01 | -0.05 |
| | (0.02) | (0.01) | (0.01) | (0.01) | (0.05) | (0.04) |
| Number of Nuclear Plants in State | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 |
| | (0.01) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) |
| Plants per Square Mile | 15.23 | 4.97 | -2.63 | -76.41 | -31.23 | 253.60 |
| | (50.96) | (18.88) | (20.23) | (54.09) | (296.23) | (205.19) |
| Age | 0.05* | 0.02* | -0.02* | 0.00 | -0.05* | -0.06* |
| | (0.01) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) |
| Education | 0.03* | 0.01* | -0.02* | 0.01* | -0.01 | -0.04* |
| | (0.01) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) |
| White | 0.08* | 0.02* | -0.03* | 0.00 | -0.09* | -0.10* |
| | (0.02) | (0.01) | (0.01) | (0.00) | (0.03) | (0.02) |
| Family Income above Poverty | 0.05* | 0.01 | -0.03* | 0.01 | -0.06 | -0.03 |
| | (0.02) | (0.01) | (0.01) | (0.01) | (0.04) | (0.03) |
| Democrat | -0.06* | -0.02* | 0.03* | 0.01 | 0.07* | 0.09* |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.03) | (0.02) |
| Male | -0.09* | -0.03* | 0.05* | 0.00 | 0.14* | 0.16* |
| | (0.01) | (0.01) | (0.01) | (0.00) | (0.02) | (0.02) |
| Household Size | 0.01 | 0.00 | 0.00 | 0.00 | -0.03 | -0.03* |
| | (0.01) | (0.00) | (0.01) | (0.00) | (0.02) | (0.10) |
| Rent Home | -0.02 | -0.02* | 0.02 | -0.01 | -0.03 | 0.02 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.03) | (0.03) |
| Number of Children | -0.04 | 0.00 | 0.02* | 0.00 | 0.14* | 0.09* |
| | (0.02) | (0.01) | (0.01) | (0.01) | (0.05) | (0.04) |
| Live in a Metropolitan Area | (0.01) | 0.01 | -0.01 | 0.01 | -0.03 | 0.01 |
| | (0.02) | (0.01) | (0.01) | (0.01) | (0.03) | (0.04) |
| Number of Observations | 1120 | 1024 | 1229 | 1220 | 1239 | 1239 |

Note: cell entries are estimated coefficients generated using logistic regression. Delta-method standard errors are reported in parentheses.
* = $p \leq 0.01$

For the first question regarding harm, the relationship between the dependent variable and WILLINGNESS TO TAKE RISKS, TRUST IN GOVERNMENT, CONFIDENCE IN COMPANIES, NUMBER OF NUCLEAR PLANTS IN THE RESPONDENT'S STATE, WHITE, DEMOCRAT, EDUCATION, NUMBER OF CHILDREN, RENTS HOME, FAMILY INCOME ABOVE POVERTY, and LIVE IN A METROPOLITAN AREA in the expected direction, while the relationship between the dependent variable and NUCLEAR PLANT IN THE STATE, PLANTS PER SQUARE MILE, AGE, MALE, and HOUSEHOLD SIZE are not in the expected direction. However, only the relationships of opinion regarding harm posed by nuclear power sources and WILLINGNESS TO TAKE RISKS, TRUST IN GOVERNMENT, CONFIDENCE IN COMPANIES, AGE, WHITE, MALE, DEMOCRAT, EDUCATION, and FAMILY INCOME ABOVE POVERTY are statistically significant.

Overall, these results indicate that those who are more willing to take risks, those who express more trust in government, those who express more confidence in the companies responsible for a nuclear facility, younger individuals, non-whites, males, Democrats, those with less education, and those with family incomes below the poverty line are less likely to think that nuclear power sources are harmful. Consideration of the marginal effects further illuminates these relationships. However, when these marginal effects of each independent variable are considered independently, the relationships become attenuated. In the case of willingness to take risks, consideration of the marginal effects reveals that for every level increase on the willingness to take risks scale, the probability that the respondent will identify with a higher level for harm posed by nuclear facilities increases by two percent; the same is true for every level increase on the trust in government scale. For every level increase on the confidence in companies scale, the probability that the respondent will identify with a higher level for harm posed by nuclear facilities increases by three percent. Additionally, as an

individual moves up in level of age or education, the probability that the respondent will identify with a higher level for harm posed by nuclear facilities increases by 5% and 3%, respectively. Moreover, white respondents are 8% more likely than non-white respondents and respondents with family incomes above the poverty line are 5% more likely than respondents with family incomes below the poverty line to identify with a higher level for harm posed by nuclear facilities. Finally, Democrats are 6% less likely than Republicans and males are 6% less likely than females to identify with a higher level for harm posed by nuclear facilities. These results generally support my hypotheses that individuals who express more confidence in the companies responsible for the operation of nuclear facilities and individuals who are more willing to take risks are more likely to express positive views of nuclear facilities.

For the second question regarding expense, the relationship between the dependent variable and WILLINGNESS TO TAKE RISKS, TRUST IN GOVERNMENT, CONFIDENCE IN COMPANIES, NUCLEAR PLANT IN THE STATE, NUMBER OF NUCLEAR PLANTS IN THE STATE, WHITE, EDUCATION, RENTS HOME, and LIVE IN A METROPOLITAN AREA are in the expected direction, while the relationship between the dependent variable and PLANTS PER SQUARE MILE, MALE, NUMBER OF CHILDREN, HOUSEHOLD SIZE, and FAMILY INCOME ABOVE POVERTY are not in the expected direction. However, only the relationships of opinion on the expense of using nuclear power to generate electricity and AGE, WHITE, MALE, DEMOCRAT, EDUCATION, and RENTS HOME are statistically significant.

Overall, these results indicate that older individuals, whites, females, Republicans, those with more education, and those who do not rent their homes will consideration the production of electricity with nuclear fuel to be less expensive. In this case, consideration of the marginal effects further illuminates these relationships and when these marginal effects of

each independent variable are considered independently, the relationships become attenuated. As an individual moves up in level of age or education, the probability that the respondent will identify with a higher level for how expensive they believe nuclear power to be increases by one. Moreover, white respondents are 2% more likely than non-white respondents to identify with a higher level for how expensive they believe nuclear power to be. Finally, Democrats are 2% less likely than Republicans, males are 3% more likely than females, and respondents who rent their homes are 2% less likely than respondents who do not rent their homes to identify with a higher level for how expensive they believe nuclear power to be. However, the lack of statistical significance of the relationships between the question and willingness to take risks, trust in government, and confidence in companies does not support my hypotheses.

Regarding the third question about how we should meet the demand for electricity, the relationship between the dependent variable and WILLINGNESS TO TAKE RISKS, TRUST IN GOVERNMENT, CONFIDENCE IN COMPANIES, NUCLEAR PLANT IN THE STATE, PLANTS PER SQUARE MILE, AGE, WHITE, DEMOCRAT, NUMBER OF CHILDREN, RENTS HOME, FAMILY INCOME ABOVE POVERTY, and LIVE IN A METROPOLITAN AREA are in the expected direction, while the relationship between the dependent variable and NUMBER OF NUCLEAR PLANTS IN THE STATE, MALE, EDUCATION, and HOUSEHOLD SIZE are not in the expected direction. However, only the relationships between opinion on how we should meet demand for electricity and WILLINGNESS TO TAKE RISKS, CONFIDENCE IN COMPANIES, AGE, WHITE, MALE, DEMOCRAT, EDUCATION, FAMILY INCOME ABOVE POVERTY, and CHILDREN are statistically significant.

Overall, these results indicate that those who express more willingness to take risks, those who express more confidence in companies responsible for nuclear facilities, older

individuals, whites, females, Republicans, those with family incomes above poverty, and those without children are more likely to say that the use of nuclear power to generate electricity should be increased. Again, consideration of the marginal effects further illuminates these relationships and when these marginal effects of each independent variable are considered independently, the relationships become attenuated. In the case of willingness to take risks, consideration of the marginal effects reveals that for every level increase on the willingness to take risks scale, the probability that the respondent will identify with a higher level for how the United States should utilize nuclear power meet electricity demands decreases by one percent; the same is true for every level increase on the confidence in companies scale. Additionally, as an individual moves up in level of age or education, the probability that the respondent will identify with a higher level for harm posed by nuclear facilities decreases by 2%. Moreover, white respondents and respondents with family incomes above the poverty line are each 3% less likely than non-white respondents and respondents with family incomes below the poverty line, respectively, to identify with a higher level for how the United States should utilize nuclear power meet electricity demands. Finally, Democrats are 3% more likely than Republicans, males are 5% more likely than females, and respondents with children are 2% more likely than respondents without children to identify with a higher level for how the United States should utilize nuclear power meet electricity demands. These results once again generally support my hypotheses that individuals who express more confidence in the companies responsible for the operation of nuclear facilities and individuals who are more willing to take risks are more likely to express positive views of nuclear facilities. Additionally, the statistical significance of the relationship between the questions regarding how we should meet the demand for electricity and confidence in companies when no such statistically

significant relationship exists for trust in government also supports my hypothesis that the former is more frequently important than the latter.

In relation to the fourth question regarding how much individuals think the United States should rely on nuclear fuels for electricity over the next ten years, the relationships between the dependent variable and WILLINGNESS TO TAKE RISKS, TRUST IN GOVERNMENT, NUCLEAR PLANT IN THE STATE, NUMBER OF NUCLEAR PLANTS IN THE STATE, PLANTS PER SQUARE MILE, AGE, WHITE, MALE, DEMOCRAT, EDUCATION, and HOUSEHOLD SIZE are in the expected direction, while the relationship between the dependent variable and CONFIDENCE IN COMPANIES, NUMBER OF CHILDREN, RENTS HOME, FAMILY INCOME ABOVE POVERTY, and LIVE IN A METROPOLITAN AREA are not in the expected direction. Notably for this question, only of the relationship between the question and EDUCATION is statistically significant. Consideration of the marginal effects in this case additionally indicates as an individual moves up in level of education, the probability that the respondent will identify with a higher level for reliance on nuclear power increases by one percent. Therefore, this analysis of this question offers no support for my hypotheses.

For the fifth question concerning how an individual would feel if a hazardous waste facility was built within 25 miles of their home, the relationships between the dependent variable and WILLINGNESS TO TAKE RISKS, TRUST IN GOVERNMENT, CONFIDENCE IN COMPANIES, NUCLEAR PLANT IN THE STATE, PLANTS PER SQUARE MILE, AGE, NUMBER OF CHILDREN, and RENTS HOME are in the expected direction, while the relationships between the dependent variable and NUMBER OF NUCLEAR PLANTS IN THE STATE, WHITE, MALE, DEMOCRAT, EDUCATION, HOUSEHOLD SIZE, FAMILY INCOME ABOVE POVERTY, and LIVE IN A METROPOLITAN AREA are not in the expected direction. However, only the relationships

between the dependent variable and WILLINGNESS TO TAKE RISKS, CONFIDENCE IN COMPANIES, AGE, WHITE, MALE, DEMOCRAT, and NUMBER OF CHILDREN are statistically significant.

Overall, these results indicate that those who express more willingness to take risks, those who express more confidence in companies, older individuals, whites, females, Republicans, and those with fewer children are more likely to support the construction of a new hazardous waste facility within 25 miles of their home. In this case, consideration of the marginal effects further illuminates these relationships and attenuation of the relationships occurs when these marginal effects considered independently. In the case of willingness to take risks, consideration of the marginal effects reveals that for every level increase on the willingness to take risks scale, the probability that the respondent will identify with a higher level for how they would feel if a new nuclear waste facility was built within 25 miles of their home decreases by two percent. For every level increase on the trust in government scale, the probability that the respondent will identify with a higher level for how they would feel if a new nuclear waste facility was built within 25 miles of their home decreases by two percent. For every level increase on the confidence in companies scale, the probability that the respondent will identify with a higher level for how they would feel if a new nuclear waste facility was built within 25 miles of their home decreases by five percent. Additionally, as an individual moves up in level of age, the probability that the respondent will identify with a higher level for how they would feel if a new nuclear waste facility was built within 25 miles of their home decreases by five percent. Moreover, white respondents are 9% less likely than non-white respondents to identify with a higher level for how they would feel if a new nuclear waste facility was built within 25 miles of their home. Finally, Democrats are 6% more likely

than Republicans, males are 14% more likely than females, and respondents with children are 14% more likely than respondents without children to identify with a higher level for how they would feel if a new nuclear waste facility was built within 25 miles of their home. The results here once again generally support my hypotheses that individuals who express more confidence in the companies responsible for the operation of nuclear facilities and individuals who are more willing to take risks are more likely to express positive views of nuclear facilities.

Finally, for the sixth question regarding how an individual would feel if a new nuclear power plant was built within 25 miles of their home, the relationships between the dependent variable and WILLINGNESS TO TAKE RISKS, TRUST IN GOVERNMENT, CONFIDENCE IN COMPANIES, NUCLEAR PLANT IN THE STATE, AGE, NUMBER OF CHILDREN, and LIVE IN A METROPOLITAN AREA are in the expected direction, while the relationships between the dependent variable and NUMBER OF NUCLEAR PLANTS IN THE STATE, PLANTS PER SQUARE MILE, WHITE, MALE, DEMOCRAT, EDUCATION, HOUSEHOLD SIZE, RENTS HOME, and FAMILY INCOME ABOVE POVERTY are not in the expected direction. However, only the relationships between the dependent variable and WILLINGNESS TO TAKE RISKS, CONFIDENCE IN COMPANIES, AGE, WHITE, MALE, DEMOCRAT, EDUCATION, NUMBER OF CHILDREN, and HOUSEHOLD SIZE are statistically significant.

Overall, these results indicate that those who express more willingness to take risks, those who express more confidence in companies, older individuals, whites, females, Republicans, those with more education, those with more children, and those with large household sizes are more likely to support the construction of a new nuclear power plant within 25 miles of their home. Finally, again, consideration of the marginal effects further illuminates these relationships, with attenuation occurring when these marginal effects of each

independent variable are considered independently. In the case of willingness to take risks, consideration of the marginal effects reveals that for every level increase on the willingness to take risks scale, the probability that the respondent will identify with a higher level for how they would feel if a new nuclear power plant was built within 25 miles of their home decreases by three percent. For every level increase on the confidence in companies scale, the probability that the respondent will identify with a higher level for how they would feel if a new nuclear power plant was built within 25 miles of their home decreases by six percent. Additionally, as an individual moves up in level of age or education, the probability that the respondent will identify with a higher level for how they would feel if a new nuclear waste facility was built within 25 miles of their home decreases by five percent and four percent, respectively. Moreover, white respondents are 10% less likely than non-white respondents to identify with a higher level for how they would feel if a new nuclear power plant was built within 25 miles of their home. For every level increase in household size, the probability that the respondent will identify with a higher level for how they would feel if a new nuclear power plant was built within 25 miles of their home decreases by three percent. Finally, Democrats are 9% more likely than Republicans, males are 16% more likely than females, and respondents with children are 9% more likely than respondents without children to identify with a higher level for how they would feel if a new nuclear power plant was built within 25 miles of their home. The results here once again generally support my hypotheses that individuals who express more confidence in the companies responsible for the operation of nuclear facilities and individuals who are more willing to take risks are more likely to express positive views of nuclear facilities.

Statistical significance is observed in the relationship between confidence in companies and each dependent variable in five of the analyses; statistical significance is observed between willingness to take risks and the dependent variable in four of the six analyses. When considered together, these analyses generally support my hypotheses that individuals who express more confidence in the companies responsible for the operation of nuclear facilities and individuals who are express more willingness to take risks are more likely to express positive views of nuclear facilities. As statistical significance between trust in government and the dependent variable is never observed, my hypothesis that individuals who express more trust in government will be more likely to express positive views of nuclear facilities is not supported. Finally, as statistical significance between NUCLEAR PLANT IN THE STATE, NUMBER OF NUCLEAR PLANTS IN THE STATE, and PLANTS PER SQUARE MILE is not observed in any of the analyses, my hypothesis that individuals living in states with more nuclear power plants per square mile will be less likely to express positive views of nuclear facilities is not supported.

While this analysis offers new insight into public opinion on nuclear facilities, there is still work to be done. One simple way to expand the analysis presented here may be to increase the size of the data set. Additionally, having data over time may also contribute to a more detailed analysis. Finally, the individuals included in this data set are overwhelmingly Caucasian; it may be important to include more non-white individuals in order to perform a more detailed and accurate analysis. In conjunction with this, Not In My Back Yard (NIMBY) sentiment can theoretically be measured if a future survey included more detailed questions concerning *where* an individual would support the construction of a nuclear-related facility.

# 3 QUALITATIVE ANALYSIS

Public opinion surrounding each of the three nuclear power facilities I have selected for my case studies is assessed through two general sources: meetings held for the purpose of soliciting public comments as part of the licensing process and newspaper articles published in the areas surrounding each facility. For the former, only meetings that allowed for public comment (as opposed to simply being open for the public to attend or listen to but not allowing public participation) are included. (It should be noted that this occurs in a slightly different format for Diablo Canyon than for the other two facilities, as licensing requirements changed over time. During the time Diablo Canyon was seeking its operating license, hearings were held in front of Congressional subcommittees, mostly occurring in Washington, D.C.; licensing requirements for Victoria Station and Levy County demanded public scoping meetings be held nearer to the communities affected.) For each meeting, the full official transcript was obtained from the public archives maintained by the Nuclear Regulatory Commission (NRC) and coded. Transcripts included both verbal and written testimony. Each speaker was coded individually in each meeting at which they spoke for gender, position (in favor of the facility, opposed to the facility, or neutral), if they represented an interest group, if they claimed expertise of any kind (such as a doctors, ecologists, hydrologists, geologists, et cetera and termed "self-proclaimed experts" as there is no way to verify their claimed expertise), and if they claimed affiliation with any local or county government body (such as members of county commissions or city councils). Additionally, individuals representing the energy company responsible for each facility, as well as members of the Atomic Energy Commission (AEC), NRC, or, in the case of Diablo Canyon, the Congressional subcommittee,

and the court reporter at each meeting are excluded from coding as "speakers" because they cannot reasonably be called members of the "public."

For the latter source of public opinion, newspapers were selected to represent areas moving out from each facility in rings; one newspaper represents the town closest to the facility itself, one to two newspapers represent the areas in a ring immediately adjacent to the facility, and one to three newspapers represent areas in a ring again further away. The exact newspapers selected will be detailed below for each facility in turn. Newspaper articles were selected by searching for the name of each facility in the content of all articles printed in each newspaper for the time period from proposal to the grant of license (for Diablo Canyon), request to withdraw the application for license (for Victoria Station), or through 2015 (for Levy County, currently in the processes of licensing). Every article found, including general articles, editorials, opinion pieces/letters to the editor, images, announcements, and advertisements, was included for each facility. Each article was coded as positive regarding the facility, negative regarding the facility, or neutral. Neutral articles were additionally coded as considering positive topics (such as court rulings in favor of a facility or assurances that there is no danger) or negative topics (such as discovery of earthquake faults or impact on sea life). It was also noted who the author of each article was (if an author was listed) and if the article came from a wire service (the Associated Press (AP) or United Press International (UPI)). While I am not arguing that newspaper articles necessarily sway public opinion, the literature indicates that media and public opinion exert reciprocal influence on one another: individuals utilize media coverage to formulate opinions on issues and media utilizes public opinion to evolve and solidify the public discourse (Gamson and Modigliani 1989). Additionally, there is also general agreement that media affect the policy process (Agnone 2007; Downs 1972; Gitlin

1981; Guber 2003; Iyengar and Shanton 1987; Lipsky 1968; Page et al 1987). Thus, the volume and tenor of articles published in the areas surrounding nuclear facilities may serve as an indication of both public opinion and the likelihood of policy change based on that opinion.

## 3.1 DIABLO CANYON

Case Study 1
Diablo Canyon, California
An Established Nuclear Project

The Diablo Canyon Power Plant, operated by Pacific Gas and Electric (PG&E), is located on approximately 1,000 acres of land about 12 miles west-southwest of San Luis Obispo in Avila Beach, California (Pacific Gas and Electric 2015; Nuclear Regulatory Commission 2015A, 2015B). The station is made up of two (designated reactors "1" and "2") Westinghouse 4-Loop Pressurized Water Reactors, each licensed to produce up to 3,411 mega-watts of electricity (Nuclear Regulatory Commission 2015A, 2015B). The reactors were licensed by the Nuclear Regulatory Commission in 1984 and 1985, respectively, and each went on-line in the year following the issuance of its license. They are currently licensed to operate through 2024 and 2025, respectively. Together, these two nuclear reactors produce a total of 18,000 gigawatt-hours of electricity per year – about 10 percent of California's total energy portfolio (Pacific Gas and Electric 2015).

There were a total of four public comment sessions held for the Diablo Canyon nuclear power facility. Unlike for the other selected facilities, hearings for Diablo Canyon were held in front of Congressional subcommittees. Three of these hearings (taking place on 30 June 1977, 8 March 1983, and 30 August 1984) occurred in front of the Subcommittee on Energy and the Environment; the fourth (taking place 10 July 1985) occurred in front of the

Subcommittee on Energy Conservation and Power. Of these, only the 30 August 1984 meeting occurred in California and this meeting saw the vast majority of speakers. Across all four meetings, there were a total of 137 speakers – 57 (41.61%) were female, 79 (57.66%) where male, and one (0.73%) was identified as the City of Arroyo Grande. Overall, 112 (81.75%; 49 female, 62 male) of the speakers expressed negative opinions, 24 (17.52%; 8 female, 16 male) expressed positive opinions, and one speaker's (male) opinion could not be reliably identified and was coded as neutral. Additionally, 25 of the speakers represented 11 interest groups, including San Luis Obispo Mothers for Peace, the Sierra Club, the Audubon Society, and the Abalone Alliance; 19 of the speakers claimed expertise, such as geologists, civil engineers, and physicians; 11 of the speakers claimed association with government entities, such as chambers of commerce, planning commissions, and city councils[8].

Those expressing negative opinions pointed to a variety of topics[9], the most prominent of which were safety of the facility itself (90 speakers, 66.12%) and concern over the potential for earthquakes (42 speakers, 30.88%). These sentiments are exemplified by a few of the speakers. For example, in regard to impacts on safety of the facility by cost-saving measures, one speaker noted, "But what were intended as shortcuts, have, in every instance, turned out to be the long route, have prolonged review, and have resulted in serious corner cutting with regard to safety" (Subcommittee on Energy and the Environment 1984, p. 25). A second speaker indicated that inspectors and other employees were ill-trained, quality control problems were covered up, and "I can state without any question there is one law for Diablo Canyon and another more stringent law for the rest of the county" (Subcommittee on Energy

[8] For a full list of the interest groups, areas of expertise, and government associations of the speakers, see Appendix 2.
[9] For a full list of topics mentions, see Appendix 3.

and the Environment 1984, p. 48). Again regarding safety, though particularly that of children, a speaker said,

> Recent findings demonstrate the crippling effect of pervasive fear of nuclear war being likely not only on adults and adolescents, but children as young as preschool age. In my professional judgment, fear of nuclear contamination and nuclear accident also exist for people of Diablo Canyon, and with good reason. Such pervasive fear gives rise to a sense of helplessness and anxiety as people sense that there may be no future for themselves, their families and their communities. Such pervasive fears are incompatible with good mental health.
>
> The willful endangerment of children either physically or psychologically is labeled as child abuse and considered criminal. I would like to introduce here the parallel term "people abuse" and state that the opening of the plant, constructed as it is on an earthquake fault and with imperfect technology for waste disposal, would be not only people abuse but a crime against the future. (Subcommittee on Energy and the Environment 1984, p. 81)

Additionally, one speaker suggested that the Nuclear Regulatory Commission was deliberately trying to downplay the danger posed to Diablo Canyon by the Hosgri earthquake fault.

> I am quite certain that public disclosure of the Hosgri Fault was deliberately planned to occur when construction was nearly completed in July 1973. This carefully orchestrated plot was carried out by the regulatory staff and PG&E with a crucial assist from the Commission itself. The U.S. Geological Survey was manipulated by the regulatory staff to participating in this, and I tip my hat to the USGS because I have read the documents-and I know that the USGS fought awfully hard to get what they felt was, a very proper basis for a reanalysis of this plant and the were fighting the staff of PG&E and they were fighting staff of the NRC. If anybody wants to really look into it, I will be glad to help them and show them the documents. (Subcommittee on Energy and the Environment 1983, p. 41)

Other topics mentioned in a negative way included radiation, storage concerns, health, the environmental impact of the facility, cost of the facility, impact on water, impact of storms on the facility, and potential for floods and their impact. In fact, speakers expressed their objection to Diablo Canyon quite vehemently.

> We strongly protest *(emphasis in original)* the licensing of the Diablo Canyon Nuclear Power Plant. We advocate the immediate shutdown of this plant; it

> should be abandoned by PG&E in favor of safer forms of energy, such as wind-generated, solar-generated, hydroelectric and geothermal, all of which are in abundant supply as untapped resources right here in California.
>
> We feel that the licensing of the Diablo Canyon Power Plant would be a crime against the people of California and the United States. (Subcommittee on Energy and the Environment 1984, p. 287-288)

Additionally, eleven (8.09%) speakers noted that they did not trust the government or regulatory bodies regarding Diablo Canyon and four (2.94%) speakers noted they did not trust Pacific Gas and Electric, the company responsible for the construction and operation of Diablo Canyon. These final two sentiments are also clearly illustrated.

> Our original faith in the regulators to do their job in a way that would make public health and safety their overriding concern has been eroded, away by years of NRC efforts to downplay, deny, and cover up the significance of safety issues at Diablo Canyon. Our current concerns can only be understood in the context of the past 9 years. (Subcommittee on Energy and the Environment 1984, p. 18)
>
> It is critical that local governments near nuclear powerplants *(sic)* have confidence in the NRC's commitment to public safety. The NRC's past actions have not inspired this confidence because of its fixation on expediting the licensing process. Only the presence of the most glaring and serious defects at Diablo Canyon have caused the NRC to hold hearings or take remedial action. Other issues, just as important but perhaps less obvious, have been given only cursory review by the NRC. This *(sic)* posture, taken together with the particular safety issues remaining at Diablo Canyon, have resulted in the city's call for congressional action. (Subcommittee on Energy and the Environment 1984, p. 69-70)

However, just under two-fifths of the total number of speakers expressed positive opinions regarding the Diablo Canyon nuclear power plant. Topics noted among these speakers included safety (16, 11.68%), increase in jobs/positive impact on the local economy (4, 2.92%), positive impact on the economy (4, 2.92%), earthquakes (2, 1.46%) and trust in the government

or regulators (2, 1.46%). One speaker noted, in fact, that candidates for public office in the previous election were supportive of Diablo Canyon.

> In our county during the last election I believe every candidate that was running for office openly discussed the issue of nuclear power, as well as Diablo Canyon, and every supportive candidate of nuclear power won. I believe this demonstrates as much as the polls that are floating around the continued support of nuclear power in our county. (Subcommittee on Energy and the Environment 1983, p. 42)

Additionally, one supporter submitted written testimony expressing passionate support of the project.

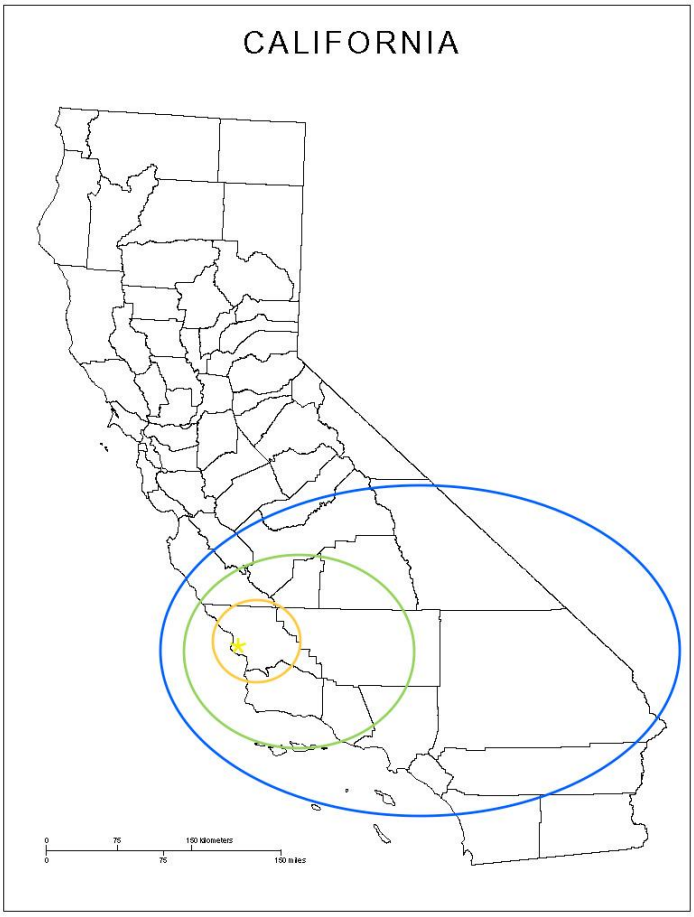
> I am writing to inform you that I feel Diablo Canyon is desperatly *(sic)* needed. Up until about two years ago, I was opposed to nuclear power. I was afraid of it. People are generally afraid of the unfamilor *(sic)* which was my case. I decided to learn what I could about nuclear power. I now feel that it is a safe means of generating power. If one takes into consideration how many people are killed or die mining coal each year from cave-ins and black lung. Or how many lives are affected by acid rain, or how many millions of dollars are spent each year on foreign oil from countries who gladly take our money but damn our name, nuclear energy sounds even better. Not to mention the number of people these plants employ.
>
> As for Diablo, I am very confident that with as many structure changes and safety precautions that have been take, it will be one of the safest plants ever built [.]
>
> I feel there is a great injustice that exists in California over Diablo. There is a handful of people most of whom are not registered to vote, do not hold down any jobs or pay any taxes that have nothing better to do than jump on a wagon for a cause. Most of these people have not and will not logically study the problem of Diablo. If they were to truely *(sic)* weigh out the alternatives, they would probably see Diablo is needed.
>
> I hope to see this plant licensed as soon as possible. We need it!
> (Subcommittee on Energy and the Environment 1984, p. 280-281)

Public opinion was also explored through consideration of the newspaper articles published in the areas surrounding Diablo Canyon. Area 1, the area closest to the facility, is represented by the *Lompoc Record*, which published a total of 121 articles concerning Diablo

Canyon from 1969 to 1977. Area 2, an area in a ring immediately adjacent to Area 1, is represented by the *Bakersfield Californian*, which published a total of 45 articles from 1969 to 1977, and the *Oxnard Press Courier*, which published a total of 27 articles from 1966 to 1977. Finally, Area 3, again a ring immediately adjacent to Area 2, is represented by the *Long Beach Press Telegram*, which published a total of 21 articles from 1966 to 1977, and the *Redlands Daily Facts*, which published a total of 5 articles from 1972 to 1974.

**Figure 3-1**

**California – Areas around Diablo Canyon**



A cursory look at the number of articles published in each newspaper indicates that interest in the facility decreases as distance from it increases. However, further consideration is required as well.

The 121 articles published in the *Lompoc Record* included 82 (67.77%) general information articles, 16 (13.22%) editorials, 3 (2.48%) letters to the editor, 5 (4.13%) announcements, 10 (8.26%) images (some of which were published with other types of articles), and 12 (9.92%) announcements. The overall topic of each article was coded as "positive," "negative," or "neutral" based on if the topic was good for the facility (such as approval of bond sales or approval of construction), bad for the facility (such as protest activity or filing of lawsuits), or neither (such as general announcements). A total of 28 (23.14%) of these were positive, 28 (23.14%) were negative, and 60 (49.59%) were neutral. Positive topics in the *Lompoc Record* included assurances that storms and earthquakes will not affect the safety of Diablo Canyon, awards given to Pacific Gas and Electric (PG&E), and the advertisements taken out by PG&E. Negative topics included potential risks posed by the existence of earthquake faults, potential negative impacts on the environment and aquatic life, and protest activity regarding the facility. Neutral topics included announcements about meetings regarding Diablo Canyon and images of the facility published without an attached article.

The 45 articles published in the *Bakersfield Californian* included 37 general information articles, 1 editorial, 3 letters to the editor, 0 announcements, 2 images, and 4 advertisements. A total of 8 of these were positive, 11 were negative, and 26 were neutral. Positive topics within this newspaper included impact on the economy, articles on the initial approval of the facility, and all of the advertisements, which were taken out by PG&E itself.

Negative topics included objections to facility made by interest groups (such as the San Luis Obispo Mothers for Peace), potential negative environmental impacts of the facility, and the negative impacts of potential earthquakes. Neutral topics included general announcements about hearings or meetings being held for the Diablo Canyon and articles regarding general updates about the progress of the facility.

The 27 articles published in the *Oxnard Press Courier* included 22 general information articles, 0 editorials, 0 letters to the editor, 8 announcements, 0 images, and 1 advertisements. A total of 6 of these were positive, 10 were negative, and 12 were neutral. Positive articles in this newspaper covered just two topics: lack of available electricity in California necessitating the Diablo Canyon nuclear power facility and approval for the facility. Negative topics included potential dangers posed by the facility and protest activity surrounding the facility. Neutral topics again included general announcements and updates about Diablo Canyon.

The 21 articles published in the *Long Beach Press Telegram* included 18 general information articles, 1 editorial, 0 letters to the editor, 2 announcements, 2 images, and 0 advertisements. A total of 2 of these were positive, 9 were negative, and 10 were neutral. The two positive articles published in this newspaper noted the need for a new source of electricity in the face of increasing need in California and a public opinion survey that indicated 75% favorability for Diablo Canyon. Negative topics included potential detriment to the environment and controversy generated by the plant. Neutral topics, as with the previously explored newspapers, included general announcements about the power plant.

Finally, the 5 articles published in the *Redlands Daily Facts* included 5 general information articles, 0 editorial, 0 letter to the editor, 0 announcements, 0 images, and 0 advertisements. A total of 1 of these was positive, 3 were negative, and 1 was neutral. The

topics of these articles included approval for Diablo Canyon (positive), delays in construction and suggestions that a coastal location was not the best site for a nuclear power plant (negative), and general need for more power in California (neutral).

In general, articles across these newspapers followed similar topics within each category (positive, negative, neutral). Excerpts from the articles themselves exemplify each of these sentiments. For example, an editorial in the *Bakersfield Californian* (23 Feb 1970) stated that, "Customers will benefit from the fact that atomic power is becoming the least expensive way to generate electricity". Additionally, letters to the editor of the *Lompoc Record* noted that, "I don't believe that any Nuclear Power Generation Plant in the U.S. has had a failure that has endangered the general public" (9 April 1976) and,

> We also need nuclear power because it has the least impact on our environment: its fuel is available in the United States; it generates electricity at considerable savings to our customers and it conserves the fossil fuels that have so many other beneficial uses in our society...
> No one has ever been killed or injured by radiation from a commercial nuclear power plant in this country. That includes the operation of 59 plants in the U.S. and the transportation and storage of their sasates (*sic*). And more than 120 ships in our U.S. Nuclear Navy. Can you point to another industry with that safety record?
>
> Let's not foreclose the nuclear option in California. (3 May 1976)

Negative sentiments were included in letters to the editor of the *Bakersfield Californian*, such as, "Has the glitter of tax dollars blinded the county to the possible health and safety hazards which are unanswered by the PG&E in its application for a second nuclear unit at Diablo Canyon?" (1 Feb 1970). The *Lompoc Record* also noted that interest groups were legally challenging Diablo Canyon: "Among candidates to be interveners in the plant

safety hearings are the Scenic Shoreline Preservation Conference, the Ecology Action Club at Cal Poly, the Sierra Club and the State of California" (20 Dec 1973).

Finally, neutral articles noted both general announcements about the Diablo Canyon facility such as,

> The Atomic Energy Commission ruled this morning that, with two exceptions, PG&E may continue construction of the Diablo Canyon nuclear power facility pending completion early need year of an AEC environmental impact study. … The two exceptions were that the utility must take steps to avoid erosion along their powerlines (*sic*) and reforest power line areas and that it may not remove the plant's cooling discharge coffer dam. (Lompoc Record 8 June 1972)

as well as assurances provided by Pacific Gas and Electric such as,

> The Diablo Canyon project has been held up by criticism that it is dangerously near the Hosgri fault, which was discovered offshore last year.
>
> But the spokesman said PG&E is optimistic the commission will approve the interim license application to run the huge facility, which could produce about the same amount of electricity generated by 64 hydroelectric dams now used in Northern and Central California. (*Lompoc Record* 13 Apr 1977)

When considered together, a few features are notable. The first is that there is an appreciable decrease in the number of articles published as the distance to the Diablo Canyon nuclear power facility increases. Though the intensity of sentiment cannot be determined through newspaper articles, the decreasing number of articles indicates declining interest in the facility, suggesting support of Hypothesis 4B. Second, the synthesis of topics across the articles published in all the newspapers as well as the public meetings suggests that these are in fact accurate reflections of the areas of interest to the general public. The implications of this will be considered later.

Finally, the majority negative sentiments expressed during the public comment sessions coupled with the fact that half of the articles expressing sentiment were also negative

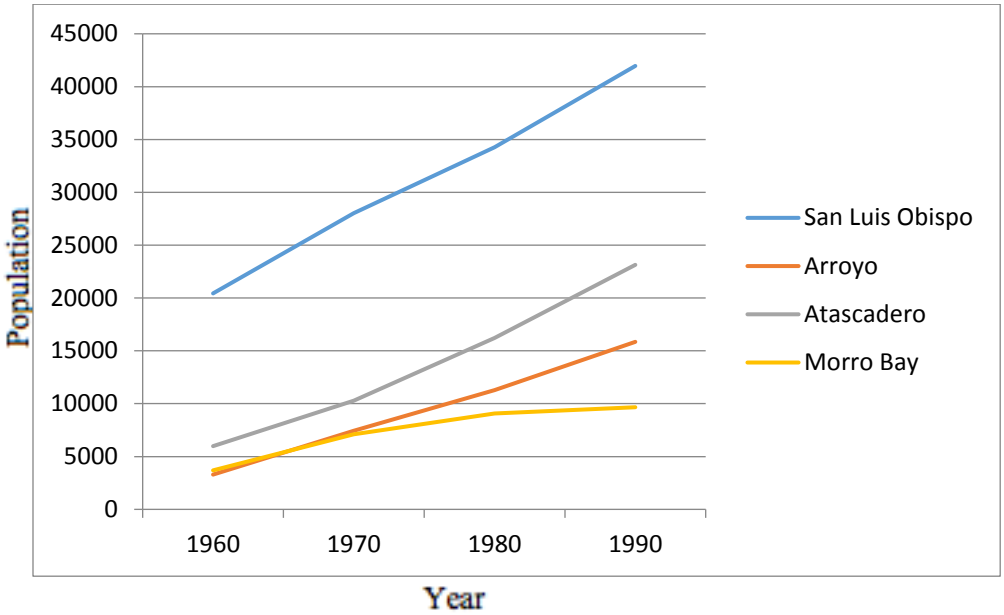
indicate that the overall public opinion about Diablo Canyon during its construction and licensing was negative. However, this exists in contrast with the population change in the communities nearest to the facility during the same period. Population of the cities near the Diablo Canyon nuclear plant increase significantly from prior to its proposal to after its full establishment, licensing, and operation. San Luis Obispo, located about 12 miles from Diablo Canyon, for example, boasted a population of 20,437 in 1960. By 1970, just after newspapers in California began to print articles about the proposed Diablo Canyon power plant, the population had increased 37.18% to 28,036. The population continued to increase through 1980 to 34,252, an increase of 22.17%. Finally, by 1990, after Diablo Canyon was fully established and operational, the population had again increased 22.5% to 41,958.

This increase in population was also not unique to San Luis Obispo. The city of Arroyo Grande, located 16.2 miles from Diablo Canyon, exhibited a similar pattern of growth over this period time. This city's population grew 126.44% from 3,291 in 1960 to 7,452 in 1970, 51.50% to 11,290 in 1980, and 40.40% to 15,851 in 1990. The population of Atascadero, located 21.8 miles from Diablo Canyon, increased by 71.99% from 5,983 in 1960 to 10,290 in 1970, 57.75% to 16,232 in 1980, and 42.55% to 23,138 in 1990. Finally, the population of Morro Bay, located 10.7 miles from Diablo Canyon, nearly doubled in population from 3,692 in 1960 to 7,190 in 1970 (a 92.55% increase), and grew again 27.5% to 9,064 in 1980, and 6.21% to 9,664 in 1990[10].

[10] Population data for these California cities were obtained through the California Department of Finance, www.dof.ca.gov/html/demograp/reportspapers/censussurveys/census-historical/documents/calhist2.xls

**Figure 3-2**

**Diablo Canyon – Population Change in Surrounding Areas**




These ever-increasing populations of the communities surrounding exist in stark contrast to the negative opinions expressed in the public meetings held on the facilities and those expressed via articles printed in area newspapers. Thus, some other factor or factors must be overriding the negative sentiments of individuals, driving them to those areas instead of away from them. I posit that prominent among such factors is the economic benefits brought to the area by the establishment of the facility itself.

The counties surrounding the Diablo Canyon nuclear facility all experienced increases in the median income from 1969 to 1989[11,12]. Median income in San Luis Obispo County increased from $24,411 in 1969 to $25,287 in 1979 and again to $31,164 in 1989. Santa

[11] Median income information data for these California counties was obtained through the U.S. Census Bureau, https://www.census.gov/hhes/www/income/data/historical/county/county1.html

[12] All income data for these counties is adjusted for inflation to 1989 dollars using the Bureau of Labor Statistics Inflation Calculator.

Barbara County experienced a medium income increase from $13,430 in 1969 to $27,030 in 1979 and again to $35,677 in 1989. Kern County, too, experienced a similar median income increase from $26,709 in 1969 to $27,939 in 1979 and to $28,634 in 1989. Finally, the median income of Monterey County increased from $29,236 in 1969 to $30,206 in 1979 and to $33,520 in 1989. While this does not constitute enough data from which to draw definitive conclusions, it allows for beginning support of Hypothesis 5.

## 3.2 VICTORIA STATION

Case Study 2
Victoria Station, Texas
A Terminated Nuclear Project

The Victoria County Station was a nuclear power station proposed by Exelon Nuclear Texas Holdings, LLC (Exelon) (Nuclear Regulatory Commission 2015D). The station was to be made up of two General-Electric-Hitachi Economic Simplified Boiling Water Reactors and located near Victoria City, Texas. Exelon submitted an application for combined license of the two reactors in 2008 (Nuclear Regulatory Commission 2015D). Via a letter dated June 11, 2010, Exelon submitted a request to withdraw its license application for Victoria Station (Kray 2010); a letter dated July 20, 2010 from the Nuclear Regulatory Commission granted this request (Kray 2010).

There was a total of one public comment session, broken into an afternoon and an evening part, held for the proposed Victoria Station nuclear power facility on 2 December 2010. The lack of opportunities for the public to express their opinions in this format is most likely due to the fact that this facility was proposed and then abandoned in a relatively short period of time, meaning that the licensing process did not progress particularly far. A total of

31 individuals spoke at this meeting – 8 (25.81%) were female, 23 (74.19%) were male. Overall, 16 (51.61%; 10 male, 6 female) of the speakers expressed negative opinions, 14 (45.16%; 12 male, 2 female) positive opinions, and one speaker's (male) opinion could not be reliably identified and was coded as neutral. Additionally, 11 of the speakers represented 10 interest groups, including Nuclear Energy for Texans, the Seadrift Lions Club, and Texans for a Sound Energy Policy; 2 of the speakers claimed expertise (one noted they were an attorney and the other noted that they hold a Ph.D.); 3 of the speakers claimed association with government entities (a State representative, an emergency management coordinator of the city and county, and the director of city environmental services)[13].

Those expressing negative opinions pointed to a variety of topics[14], the most prominent of which were concern about impact on the water (14 speakers, 45.16%), concern over the impact on local wildlife (7 speakers, 22.58%), and safety concerns (5 speakers, 16.13%). Negative sentiments included such arguments as,

> How the Nuclear Regulatory Commission (NRC) could seriously consider a proposal to construct a behemoth, multi-unit nuclear power plant on top of freshwater forested wetlands (one of our most effective carbon sinks) embedded in a fragile karst flood plain riddled with relict sinkholes interspersed with fracture networks in the midst of one of the most environmentally sensitive areas in the state defies comprehension. (written testimony, 27 Nov 2010)

and

> The plant seems to be good for jobs and economy and prosperity for Victoria but no one seems to be concerned about the agricultural farmers, fishermen, shrimpers, oystermen, people that make their living on the water, on the bays of San Antonio Bay. (Victoria Station Early Site Permit Public Meeting Afternoon 2 Dec 2010, p. 53)

[13] For a full list, see Appendix 2.
[14] For a full list, see Appendix 3.

Other topics mentions in a negative way include cost of the facility, impact on cultural heritage, economic impact, environmental damage, impact on aquatic life, general health, radiation, potential damage caused by storms, waste disposal, impact on quality of life, and lack of trust in Exelon (the company responsible for construction and operation of the plant).

However, just under half of the speakers expressed positive sentiments about the proposed Victoria Station nuclear facility. The most frequently referenced topics by those expressing positive sentiments included jobs and the economy (8 speakers, 25.81%), the environment (7 speakers, 22.58%), and impact on water (6 speakers, 19.35%). One speaker noted that the project would play a part in reducing the country's overall carbon emissions.

> The Victoria Chamber of Commerce supports the fact that nuclear energy reduces the greenhouse gas effect since it does not burn anything to generate electricity. And since it will source of emission-free electricity, the Nuclear Energy Institute projects that the volume of greenhouse gas emissions prevented already at the nation's 104 nuclear energy plants is equivalent to taking nearly all passenger cars the be a off America's highways for one year. The Chamber of Commerce feels it's important that the Victoria region play a vital role in reducing an energy company's carbon footprint. (Victoria Station Early Site Permit Public Meeting Afternoon 2 Dec 2010, p. 48)

Other speakers also expressed fervent support of the facility.

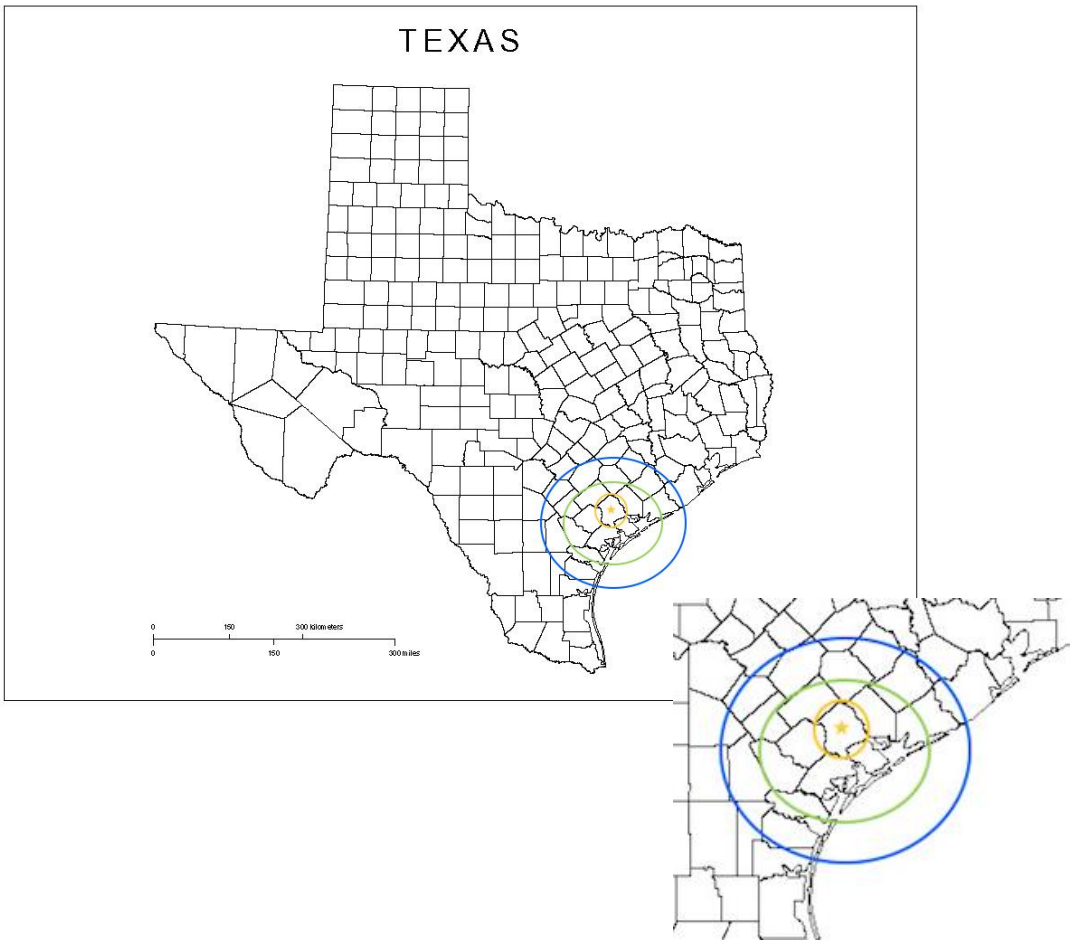
> To the NRC, you're our partners in this, we're counting on your process to make sure that we have one of the safest and most reliable nuclear facilities on our planet. I believe that with your help and your oversight, Exelon can build a facility that will rival or surpass the safety record and the reliability record that we've grown to expect in this region form our neighbor in Matagorda County, the South Texas Project, and we've all lived within 60 miles of that project for 30 years. We hope that because of the factors through your investigation that you will grant Exelon this early site permit. (Victoria Station Early Site Permit Public Meeting Afternoon 2 Dec 2010, p. 42)

Public opinion surrounding this facility was also explored through consideration of the newspaper articles published in the areas around the facility. Area 1, the area closest to the facility, is represented by the *Victoria Advocate*, which published a total of 46 articles

concerning Victoria Station from 2008 to 2012. Area 2, an area in a ring immediately adjacent to Area 1, is represented by the *Bay City Tribune*, which published a total of 1 article in 2009, and the *Corpus Christi Examiner*, which published a total of 3 articles in 2007. Finally, Area 3, again a ring immediately adjacent to Area 2, is represented by the *Galveston County Daily*, which published a total of 7 articles from 2008 to 2011.

**Figure 3-3**

**Texas – Areas around Victoria Station**




As with those surrounding the Levy County facility, while there is a seeming lack of data available through these newspapers, this lack itself is indicative of sentiment about the facility.

Additionally, this lack of data can be attributed both to the short period of time from proposal to end of the project as well as to the existence of another, established facility in close proximity that was seeking license for expansion during the same period (South Texas Project). While a cursory look at the number of articles published in each newspaper indicates that interest in the facility decreases as distance from it increases, further consideration is required as well.

The 46 articles published in the *Victoria Advocate* included 37 general articles, 1 editorial, 7 letters to the editor, one announcement, and one image. Once again, the overall topic of each article was coded as "positive," "negative," or "neutral" based on if the topic was good for the facility (such as approval of bond sales or approval of construction), bad for the facility (such as protest activity or filing of lawsuits), or neither (such as general announcements). A total of 19 (41.30%) of these were positive, 19 (41.30%) were negative, and 8 (17.39%) were neutral. Positive topics in the *Victoria Advocate* included approval of grants to support the construction of the facility and acceptance of the early site permit application. Negative topics included delays in the original construction schedule and coverage of contentions raised by interest groups. Neutral topics included an announcement about a meeting regarding the proposed facility and general coverage of that meeting.

The single article published in the *Bay City Tribune* in 2009 was a neutral, general article, the topic of which was opposition to loans being granted for the facility, despite the economic downturn.

All three articles published in the *Corpus Christi Examiner* in 2007 were also neutral, general articles, all covering the general topic of Victoria Station's proposal.

Finally, the seven articles published by the *Galveston County Daily* were all general information articles, three of which were positive, three were negative, and one was neutral.

Topics of the positive articles regarded the potential benefits of nuclear power. Topics of the negative articles regard the potential dangers of nuclear power. The neutral article considered both potentially positive and potentially negative aspects of the facility.

As with those articles published regarding the Diablo Canyon and Levy County nuclear power plant, articles published across these newspapers followed similar topics within the positive, negative, and neutral categories, respectively. Excerpts from the articles again exemplify each sentiment. For example, articles noted that the Exelon sought to allay concerns expressed by residents.

> Nuclear companies monitor storm runoff on-site and nothing leaks into the atmosphere, Steve Kraft, senior director of used fuel management for the Nuclear Energy Institute, said in response to Makhijani's questions.
>
> Taxpayers will not have to pay for cleanup or decommissioning, Kraft said. Companies pay in advance the money needed to decommission the plant. (Victoria Advocate, 8 Oct 2008)

Additionally, the potential positive impact on the available supply of electricity and water was noted.

> Nuclear plants providing power and potable water from the Gulf would open new opportunities for the future of the Texas Gulf Coast region. It might take a generation to get it done but if we start now we might be surprised how quickly the concept catches on around the world.
> (Galveston County Daily 6 Aug 2011)

Conversely, newspaper articles, editorials, and letters to the editor also observed negative opinions. For example, articles considered the still-looming problem of waste disposal.

> We do not know if radioactivity from Japanese plants will locally disperse or be widespread contaminating the planet. Cooling by seawater discharges radioactivity into the oceans. Radioactivity from precipitation on the upper surfaces of oceans kills plankton the base of the chain of life.

> Jerry Szymanski's voluminous warnings of problems at Yucca Mountain are ignored. So are the warnings of Eugene Smith who pointed out in 2002 that an unusually thin crust under Yucca Mountain is perilously close to sources of volcanic energy.
>
> New nuclear power plants should not be built. Waste must be dealt with intelligently in contrast to approaches of nuclear power companies. (Galveston County Daily 19 Mar 2011)

One article even noted radio campaigns objecting to the construction of the plant because of its impact on the Guadalupe River Basin.

> Grammy Award winner Ray Benson from Austin will sing in radio spots questioning the use of water by a proposed nuclear plant.
>
> Benson, known as the guitarist and singer for Asleep at the Wheel, joined the Texans for a Sound Energy Policy Alliance in urging residents to question how two nuclear reactors would affect the future of the Guadalupe River Basin, an Alliance news release stated.
>
> "Water is the life blood of each one of us, our families and our future. We all depend on it," Benson said via the release. "A proposed Exelon nuclear power plant near Victoria will create a water shortage that will forever change the river." (Victoria Advocate 23 Oct 2008)

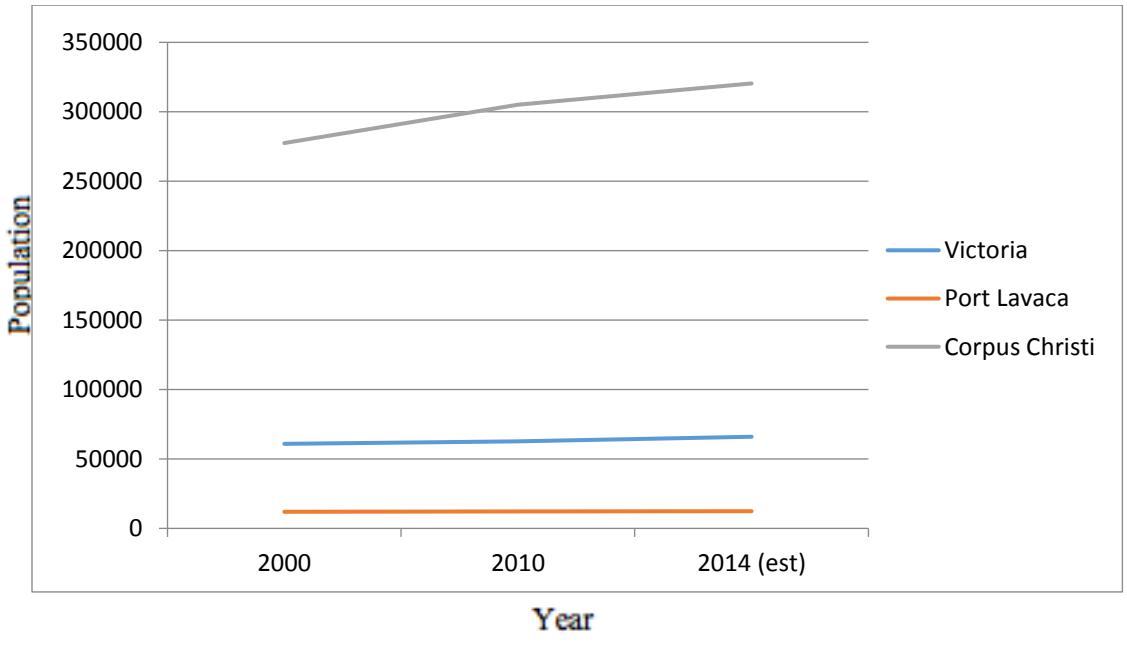
When considered together, again notable features are found. First, as with Diablo Canyon, there is perceptible decrease in the number of articles published as distance to the facility increases, indicating support for Hypothesis 4B. Second, the coherence of topics across both the published articles and opinions expressed during the public meeting suggests that the interest areas of the general public are accurately reflected.

Finally, the majority negative sentiments expressed during the public meeting together with the majority negative articles (of those expressing sentiment; plurality of total articles) indicate that the overall public opinion about Victoria Station during its short-lived conception and licensing was negative. However, as with the previously considered facility, this exists in contrast with the population change in the communities nearest to the facility during the same

period[15]. For example, the population of Victoria, located 13.3 miles from the proposed Victoria Station power plant, increased from 60,893 in 2000 (prior to the initial proposal of the plant) to 62,592 in 2010 (just after the initial proposal of the plant), an increase of 2.79%. Additionally, Victoria had an estimated population of 66,014 in 2014, an increase of 5.47%. Again, this type of population increase was mirrored in other cities as well. Port Lavaca, located 36.07 miles from the proposed facility, experienced a population increase of 2.24% from 11,980 in 2000 to 12,248 in 2010, and an additional approximate increase of 1.23% to an estimated 12,399 in 2014. The population of Corpus Christi also increased 9.98% from 277,523 in 2000 to 305,215 in 2010, and again an approximately 4.99% to an estimated 320,434 in 2014.

**Figure 3-4**

**Victoria Station – Population Change in Surrounding Areas**




[15] Population data for these cities was obtained, respectively, through
http://censusviewer.com/city/TX/Victoria
http://censusviewer.com/city/TX/Port%20Lavaca
http://censusviewer.com/city/TX/Corpus%20Christi

Once again, these population increases are incongruous with negative opinions expressed in the public meetings held on the facilities and in the articles printed in area newspapers. Again, however, a look at the economic benefits brought to the area by the establishment of the facility itself may suggest a reason people seem drawn to these areas, rather than pushed away from them.

These cities did in fact all experience increases in the median income and per capita income from 2000 to 2013[16], as well as increases in median house or condo value during the same period. Median income in Victoria increased from $36,829 in 2000 to $50,592 in 2013, while per capita income increased from $19,009 in 2000 to $24,821 in 2013. Median house or condo value in this city increased from $69,400 to $115,800 during this period. Port Lavaca experienced an increase in median income from $33,626 in 2000 to $42,551 and an increase in per capita income from $15,431 in 2000 to $20,995 in 2013. Median house or condo value rose from $50,900 to $83,358 during this period. Finally, Corpus Christi's median income rose from $36,414 to $49,686 during the period from 2000 to 2013 and per capita income rose from $17,419 to $24,676 during this period. Median house or condo value increased from $70,500 in 2000 to $110,700 in 2013. Again, while this does not constitute enough data from which to draw definitive conclusions, it allows for beginning support of Hypothesis 5.

[16] Income and house value data for these Texas cities were obtained, respectively, from
http://www.city-data.com/city/Victoria-Texas.html
http://www.city-data.com/city/Port-Lavaca-Texas.html
http://www.city-data.com/city/Corpus-Christi-Texas.html

## 3.3 LEVY COUNTY

Case Study 3
Levy County, Florida
An "In Progress" Nuclear Project

The Levy County Project is a nuclear power that proposed by Duke Energy Florida, Inc. and currently seeking license (Nuclear Regulatory Commission 2015C). The station is to be made up of two Westinghouse Advanced Passive 1000 (AP1000) Pressurized Water Reactors located in Levy County, Florida (Nuclear Regulatory Commission 2015C). Application for license was submitted on July 30, 2008 (Nuclear Regulatory Commission 2015C). In August 2013, Duke Energy announced that it had ended the engineering, procurement, and construction (EPC) agreement for the Westinghouse reactors, citing delays on in the regulatory process and concerns about cost recovery (Duke Energy 2013). However, the same statement noted that

> Although the proposed Levy nuclear project is no longer an option for meeting energy needs within the originally scheduled timeframe, Duke Energy Florida continues to regard the Levy site as a viable option for future nuclear generation and understands the importance of fuel diversity in creating a sustainable energy future. Because of this, the company will continue to pursue the COL [Combined Operating License] outside of the nuclear cost recovery clause.

As the operating license is still being sought, the Levy County Project can still be considered an "in progress" nuclear project because the application process from 2008 to 2013 required public meetings and additional meetings will be required for the license to be obtained.

There have been three public comment sessions, each broken into afternoon and evening portions, held for the proposed Levy County nuclear power plant. These hearings were held on 4 December 2008, 23 September 2010, and 12 January 2012. A total of 103 individuals spoke across these meetings, including 15 individuals who spoke more than once.

Thus, counting repeat speakers only once, there were a total of 84 unique speakers – 30 (35.71%) were female, 54 (62.29%) were male. Overall, 35 (41.66%; 6 female, 29 male) of the speakers expressed positive sentiments and 49 (58.33%; 24 female, 25 male) of the speakers expressed negative sentiments. Additionally, 27 of the speakers represented 24 interest groups, including the Clean and Safe Energy Coalition, the Florida Green Party, Occupy St. Pete, and United Way of Citric County; 7 of the speakers claimed expertise of some sort, including physicians, an economist, and a biologist; 10 of the speakers claimed government association, including county commissioners, city managers, and city council members[17].

Those expressing negative opinions pointed to a plethora of topics[18], most prominent among which were impact on water (both the quality and quantity of available water) (40 speakers, 38.83%), radiation (21 speakers, 20.39%), and cost (20 speakers, 19.42%)[19]. For example, one speaker suggested,

> Blasting is with ammonium nitrate and oil. Nitrate is infiltrating the area's springs already. Do they need more? Possibly there is no real need for the nuclear but there is a need for more wind and water. (Levy CLA Public Meeting Evening Session 4 Dec 2008, p. 78)

Other speakers expressed concerns about such topics as the impact of potential storms on the facility and the impact of the facility on local wetlands.

> According to the Army Corps of Engineers, this proposed nuclear plant would wipe out a shocking 765 acres of wetlands. The project would take Florida back

[17] For a full listing, see Appendix 2.
[18] For a full listing, see Appendix 3.
[19] Percentages were calculated based on the total number of speakers (103), including those who spoke multiple times as topics were coded each time they were mentioned in each meeting/session, regardless of whether the speaker had previously been included.

> 100 years to a time when we viewed wetlands as worthless until drained or filled.
>
> Let's save some wetlands. We don't have tsunamis, so far as I know, in the Gulf, but we do have hurricanes. A category 5 storm arriving at high tide could generate a huge storm surge to flood and damage the plant. We could be just as unlucky as Japan at the Fukushimi *(sic)* Daiichi plant. Let's not gamble. (Progress Energy Florida Levy County Nuclear Power Plant Limited Appearance Afternoon Session 12 Jan 2012, p. 750)

Additionally, some speakers expressed general discontent with the facility, such as,

> Can I have a show of hands of who would just love to live next door to a nuclear power plant? Let me see some hands. Okay. We've got one, two, three, four, five, six. Oh, about ten or twelve people. Actually the majority is saying no but there are some people that actually would love it. That's interesting because they are putting this plant so far away from the population that it supposed to be serving. The more populace areas would be a lot more costly to cover should there be a disaster. (Levy CLA Public Meeting Evening Session 4 Dec 2008, p. 58)

Negative speakers even included one individual who referred to the facility operator as "Regressive Energy" (an unfavorable play on the company's actual name, Progress Energy) (Levy Nuclear Plant Draft EIS Public Meeting Afternoon Session 23 Sep 2010, p. 70).

On the other hand, just over two-fifths of the speakers expressed positive sentiments about the proposed Levy County nuclear facility. Topics that garnered positive coverage included jobs and the economy (20 speakers, 19.42%), the environment (20 speakers, 19.42%), and security of the facility (6 speakers, 5.83%). For example, a speaker noted,

> We believe that the development of the nuclear power project in Levy County will bring jobs and economic benefit, not just to Levy County, but also the surrounding communities. We welcome Progress Energy's initiative in bringing a balanced approach to the future energy demands of Florida in our region." (Levy CLA Public Meeting Evening Session 4 Dec 2008, p. 35)

Additionally, some speakers noted that Progress Energy, the operator of the proposed power plant, contributed to the community in general.

> Progress Energy has been a tremendous partner with [Marion Technical Institute, a technical high school in Ocala, FL] over the past two years as we've developed our power academy in their help in preparing students to be linemen, preparing students to work in the energy field. Whether it be providing guest speakers, providing internship opportunities, or employment opportunities, providing resources for our students, they are there. They provide manpower. They are really a tremendous supporter of education and a tremendous steward to our community. (Levy CLA Public Meeting Afternoon Session 4 Dec 2008, p. 82)

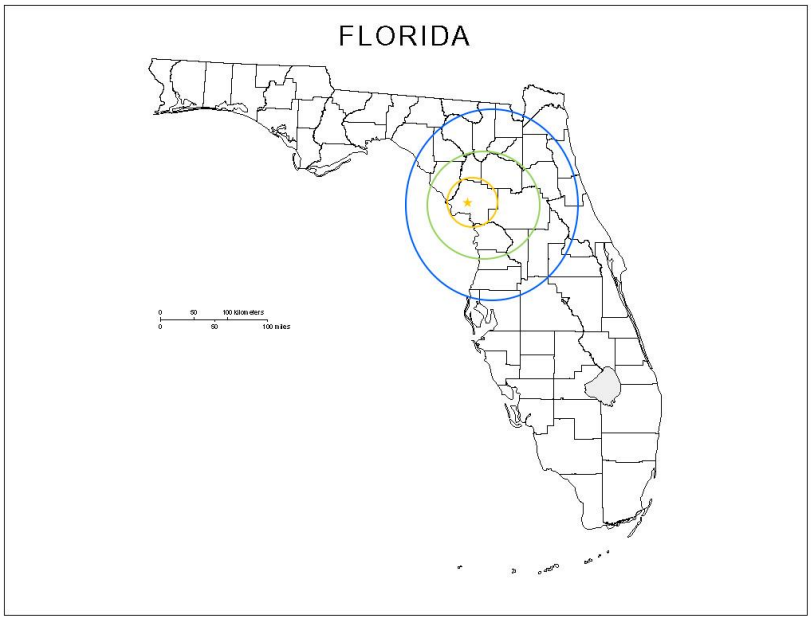
One child even spoke in support of the facility.

> My name is [---] and I am nine years old. I attend Seven Rivers Christian School and I want to be a trained engineer when I grow up. I want the new power plant because it can help people get jobs and to lower the energy cost for my family and friends. Thank you. (Levy CLA Public Meeting Evening Session 4 December 2008, p. 68-69)

Newspapers were also used as a medium through which to explore public opinion surrounding the proposed Levy County nuclear power plant. Area 1, the area closest to the facility, is represented by the *Williston Pioneer Sun News*, which published a total of 12 articles concerning the Levy County plant from 2008 to 2014. Area 2, an area in a ring immediately adjacent to Area 1, is represented by the *Gainesville Sun*, which published a total of 95 articles from 2006 to 2015, and the *Sumter County Times*, which published a total of one article in 2007. Finally, Area 3, again a ring immediately adjacent to Area 2, is represented by the *Daily Commercial*, which published one article in 2013, the *Panama City News*, which published one article in 2013, and the *Suwannee Democrat*, which also published a single article in 2009.

**Figure 3-5**

**Florida – Areas around Levy County**




While there is a seeming lack of data available through these newspapers, the lack itself indicates the sentiment regarding the facility. Additionally, this lack of data may be attributed to the existence of another, established facility in close proximity (Crystal River Power Plant). Unlike with the other two facilities considered, the largest amount of articles was published in Area 2, followed by Area 1 and then by Area 3. While this doesn't follow the exact pattern that might indicate support of Hypotheses 4A and 4B, the near absence of articles in Area 3 lends quiet support to the same hypothesis.

The 12 articles published in the *Williston Pioneer Sun News* included 11 general information articles and one letter to the editor, as well as one image published with the letter to the editor. Of these articles, four (33.33%) were positive, four (33.33%) were negative, and four (33.33%) were neutral. Positive topics included the potential benefits to the area and early approval for the plant. Negative topics included construction delays and wary sentiments

expressed by residents. Neutral topics included general announcements about upcoming meetings and progress of the facility.

The 95 articles published in the *Gainesville Sun* included 59 general information articles, 7 editorials, 26 letters to the editor, and 3 announcements, and included 3 images. Overall 25 (26.32%) of these articles were positive, 42 (42.21%) were negative, and 28 (29.47%) were neutral. Positive topics covered in these articles included potential benefits of the facility and general progress of the licensing and construction process. Negative topics included articles about dangers posed by the plant, potential negative impact on water, and high costs of construction and operation. Neutral topics included general announcements about the original proposal of the plant and upcoming meeting regarding it.

The remaining articles published in the *Sumter County Times*, the *Daily Commercial*, the *Panama City News*, and the *Suwannee Democrat* were a neutral general information article, a negative letter to the editor, a neutral general information article, and a neutral general information article, respectively. The topics of these articles were the impact of new power transmission lines on residents, suggestion for review of Progress Energy's cost recovery plan, general information about the contribution of nuclear power to the overall supply of energy, and assurance that delays at other plants will not affect the Levy County plant, again respectively.

As with those articles published regarding the Diablo Canyon nuclear power plant, articles published across these newspapers followed similar topics within the positive, negative, and neutral categories, respectively. Excerpts from the articles again exemplify each sentiment. For example, an article indicated that the facility was well on its way to approval, stating

> Progress Energy sailed over one of its last hurdles Monday when the Florida Department of Environmental Protection gave the utility permission to continue with its plans for a 2,200 megawatt nuclear power plant in Levy County.
>
> The "conditions of certification" report by FDEP was one of the final steps Progress Energy needed before starting its $17 billion project. (Gainesville Sun 12 Jan 2009)

One letter to the editor stated,

> These projects are going to bring in tax revenue to Levy County–more money than the county every thought about.
>
> I live less than a mile from the mine, am across the street from the nuclear plant. So if I can live with that, and am not concerned, I don't see why others are fussing. (Williston Pioneer Sun News 17 Mar 2011)

To the contrary, articles also presented negative views. For example, articles noted concerns expressed by residents on various issues.

> Progress Energy is coming with its nuclear power plant construction and the Levy County Commission is starting to feel the impact from the public.
>
> In Tuesday's regular county commission meeting a request to re-zone 4 parcels of land from along US Highway 19/98 and Southeast 68th Avenue in Inglis from agricultural to C-2 which would allow a variety of retail and personal services uses sparked a discussion among citizens about the coming changes.
>
> Darryl A. Diamond, a licensed real estate broker who is moving his business from Kissemmee to Inglis, requested the change to allow a real estate office and mini-storage facility to be constructed.
>
> Residents in the area opposed the change because Diamond could sell the property after winning the C-2 designation and an alcoholic beverage operation could use the re-zoning for a bar. …
>
> Another concern, addressed by residents in the area and Commissioner Tony Parker is the wetlands on the rear half of the parcels. (Williston Pioneer Sun News 6 Aug 2008)

Some editorials suggested the plant was a disaster waiting to happen.

> Whether or not you support nuclear energy as a technology for our times, the location of an industrial nuclear energy plant on a site that can threaten our drinking water and other natural resources is cause for grave concern. (Gainesville Sun 2 Mar 2009)[20]

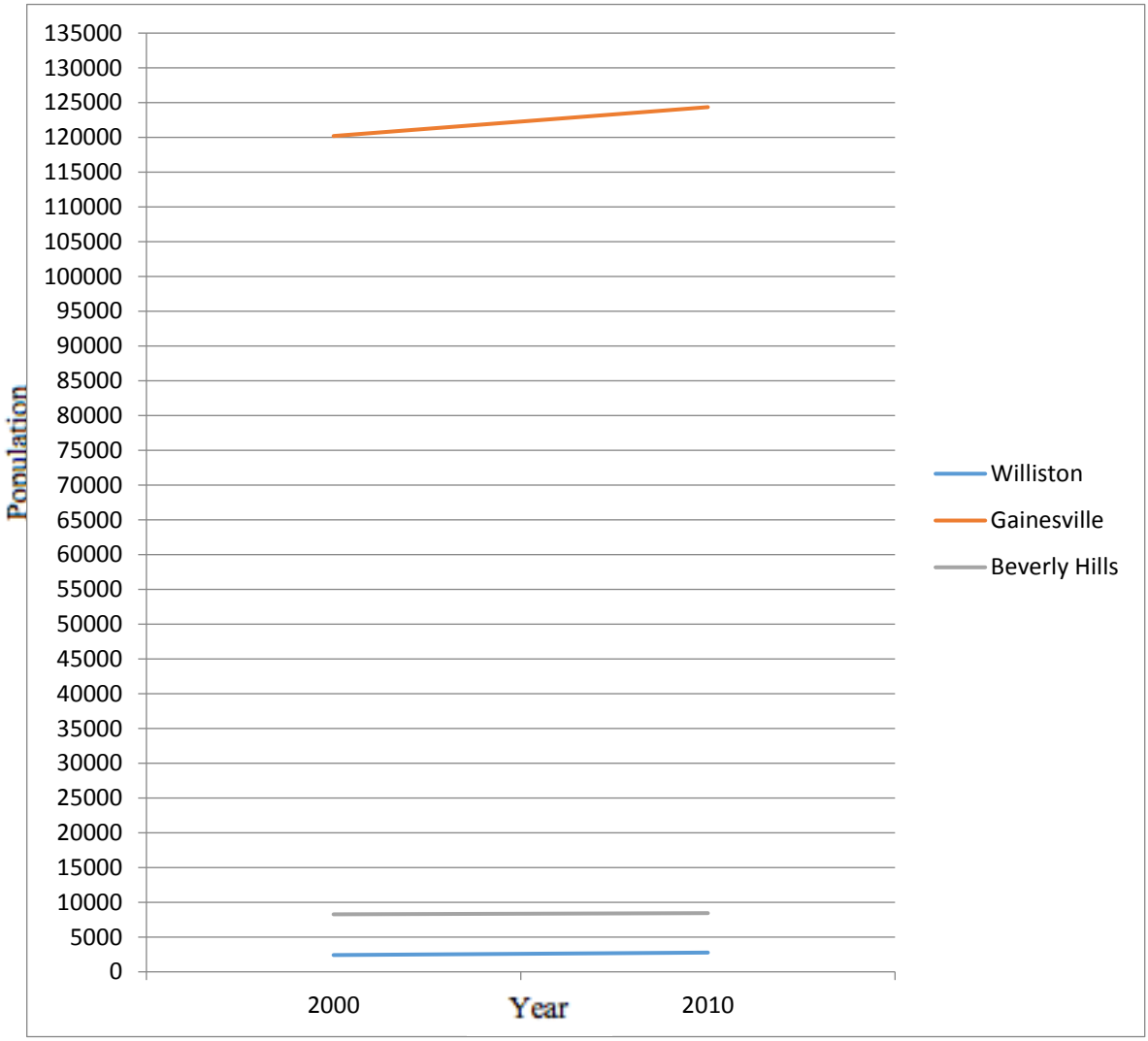
The coherence of topics across both the published articles and opinions expressed during the public meeting suggests that the interest areas of the general public are accurately reflected. Moreover, the majority negative sentiments expressed during the public meetings together with the majority negative articles (of those expressing sentiment; plurality of total articles) indicate that the overall public opinion about the Levy County nuclear power plant during the licensing process. However, once again, this is at odds with the population change in the communities nearest to the facility during the same period[21]. Williston, located about 28 miles from the Levy County nuclear power plant, experienced a population increase of 14.66% from 2,414 in 2000 to 2,768 in 2010[22]. Gainesville, located about 50 miles from the facility, increased in population 3.45% from 120,204 in 2000 to 124,354 in 2010, and approximately 3.30% to an estimated 128,460 in 2014. Additionally, Beverly Hills, located 26.5 miles from the facility, also experience a population increase of 2.07% from 8274 in 2000 to 8,445 in 2010[23].

---

[20] A drawing of an eye with the radiation symbol in place of the iris appeared with this article.
[21] Population data for these cities was obtained, respectively, through
http://censusviewer.com/city/FL/Williston
http://censusviewer.com/city/FL/Gainesville
http://censusviewer.com/city/FL/Beverly%20Hills
[22] An additional population estimate was not available.
[23] *ibid*

**Figure 3-6**

**Levy County – Population Change in Surrounding Areas**




However, these population increases are again in contrast with the negative opinions expressed in the public meetings held on the facilities and in the articles printed in area newspapers. Again, however, potential economic benefits brought to the area by the establishment of the facility itself may suggest a reason people move into these areas.

These cities did in fact all experience increases in the median income and per capita income from 2000 to 2013[24], as well as increases in median house or condo value during the same period. Median income in Williston increased from $25,795 in 2000 to $32,090 in 2013, while per capita income increased from $15,628 in 2000 to $16,680 in 2013. Median house or condo value in this city increased from $54,100 to $101,339 during this period. Gainesville experienced an increase in median income from $28,164 in 2000 to $31,600 in 2013 and an increase in per capita income from $16,779 in 2000 to $17,744 in 2013. Median house or condo value rose from $83,700 to $130,900 during this period. Finally, Beverly Hills' median income rose from $24,875 to $28,114 during the period from 2000 to 2013 and per capita income rose from $17,014 to $17,730 during this period. Median house or condo value increased from $54,800 in 2000 to $75,726 in 2013. Once again, while this does not constitute enough data from which to draw definitive conclusions, it allows for beginning support of Hypothesis 5.

[24] Income and house value data for these Florida cities were obtained, respectively, from
http://www.city-data.com/city/Williston-Florida.html
http://www.city-data.com/city/Gainesville-Florida.html
http://www.city-data.com/city/Beverly-Hills-Florida.html

# 4 INTEREST GROUPS

Overall the goal of any given interest group is to achieve policy change toward its own position. Much of the literature on interest groups has sought to explain how these groups achieve their collective goals. For example, one subsection of the literature argues that financial resources, professional staff size, and the number of active members an interest groups has are all key to the group's ability to overcome collective action problems and thus achieve their goals (Smith 1984; Schlozman and Tierney 1986; Gais and Walker 1991). Additionally, other scholars have argued that success is also tied to the ability of an interest group to build coalitions (Schlozman and Tierney 1986; Berry 1989; Hansen 1991; Austen-Smith and Wright 1992, 1994; Ainsworth 1997; Carpenter, Esterling, and Lazer 2004).

In a different vein, Lohman (1993), Burnstein (1999), and Burstein and Linton (2002) argue that the impact of interest groups decreases as public opinion regarding the group's area of focus becomes more intense. In fact, Lohmann (1993) states that "[it] is puzzling that rational political leaders with majoritarian incentives would ever respond to political action" (319) of interest groups. Burnstein (1999) echoes this sentiment, saying "the greater and more persistent the majority favoring a particular policy, and the more important the issue to that majority, as perceived by legislators, the smaller the direct impact of interest organizations on legislative action" (9).

For the purposes of this paper, the existence of interest group activity can only be determined if it is mentioned in newspaper articles or if speakers at public meetings identified themselves as representatives of an interest group (or, occasionally, of more than one interest group). In total, 14 interest groups were identified surrounding Diablo Canyon, 10 were identified surrounding Victoria Station, and 29 were identified surrounding Levy County.

Notably, only Greenpeace was identified as active regarding more than one facility. Additionally, only articles concerning Diablo Canyon covered protest activities not organized by labor unions.

However, it should be noted that at each facility interest groups acted as official interveners in the licensing process, filing lawsuits against the respective energy companies.

# 5 CONCLUSIONS

Analysis of data from the General Social Survey allows a starting point from which to consider public opinion regarding nuclear facilities. Overall, this analysis indicates that the likelihood of any individual to have a positive or negative opinion of a nuclear facility is best predicted by their sex and race. Additionally, age, level of education, number of siblings, and political views may serve as secondary indicators. This general analysis, while interesting, fails to be complete and therefore leads to a secondary analysis.

The Energy Survey 2008 allows for application of the conclusions garnered from analysis of the General Social Survey to specific survey items regarding risk posed by nuclear power facilities, expense of the facilities, and how one would feel if a new facility was located near them. This analysis supports the previous analysis of the General Social Survey regarding demographic variables. Additionally, this second analysis indicates that willingness to take risks is positively correlated with positive opinion regarding nuclear facilities. It also indicates confidence in the company responsible for a given nuclear facility is significantly and positively related to opinion about the facility and this may be more important than trust in government.

Together, the quantitative analyses indicate that, when moving to the qualitative analyses, a few specific factors should come to the fore. First, particularly in relation to the town hall meetings, women should be more likely to express negative opinions of the facilities in question. Second, trust in companies should be a prominent topic of discussion. However, neither of these are the case. Analysis of the public meetings for each facility reveal that more men than women expressed their opinions and that more men than women expressed specifically negative opinions regarding the facility in question. Moreover, nearly zero

speakers mentioned trust in the companies responsible for the nuclear facilities. This divergence of actualized opinion from the opinion garnered through polling leads to two interesting conclusions.

The first conclusion this divergence leads to is that public opinion polling might not be the most accurate source of information about who is likely to express objection to a proposed nuclear power plant. Second, this divergence may also indicate that, while trust in companies may be important when an individual's attention is specifically called to it, other factors are more important to those who express opinions in actual (as opposed to theoretical) circumstances. Thus, taken together, the quantitative and qualitative analyses presented here lead to four overarching conclusions important for influencing public opinion of proposed nuclear facilities during the licensing process.

First, while it may be tempting to believe that women are more likely to express objections to a proposed nuclear power facility, in reality they are not. Therefore, both male and female residents must be convinced to accept the facility.

Second, there are just three topics that are overwhelmingly of concern to those living near a proposed nuclear facility: impact of the facility on the environment, safety (both in terms of risk posed to citizens by the facility and in terms of the facility's ability to cope with emergency situations such as storms or earthquakes), and impact on local waters (both potable and oceanic). Thus, these are the issues that any campaign aimed at swaying public opinion should focus on. If an operator or regulation body can adequately address the negative opinions associated with these topics, they may succeed in garnering support for, rather than objection to, a proposed facility. Furthermore, they may build the trust in companies and trust in government that polling data suggests is lacking among those who object to nuclear power

plants. In contrast, however, this also suggests a strategy for interest groups seeking to defeat a proposed nuclear power plant. If these groups can emphasize the environmental concerns, safety issues, and potential impact on water to a great enough degree they may be able to erode opinion about the facility.

Third, analysis of newspaper articles suggests that these attempts to influence public opinion should be primarily focused on the area closes to the facility. The sharp decline in number of articles printed as distance to the facility in question increases indicates that people are less interested the further away they live. Therefore, the people more likely to object should live closer to the facility. Thus, the focus of public opinion influencers should be near the proposed facility.

Finally, the negative opinions expressed by those who spoke at public meetings, by published newspaper articles, and suggested through public opinion polls exists in contrast to the growing populations of the communities surrounding nuclear facilities. I suggest that this objection can partially be explained by economics – real economic benefits experienced by these communities as a result of the establishment of the facility contributes to drawing people to the communities and overriding their negative opinions. While these communities did indeed experience economic upturns, there is not enough data to truly accept this as a factor in drawing people to the communities. However, this does suggest an additional facet the operators of a proposed facility might focus on when attempting to influence public opinion.

**Implications of this Research**

This research offers a few broad and overarching implications. The first of these is that public opinion polls do not show the whole picture. In other words, while these polls may begin

to identify the overall tenor of public opinion, they are unable to identify the core influences of that opinion. For example, the public opinion polls considered here indicate that trust in the company responsible for a facility is a key influencer of opinion. However, when individuals are given the opportunity to speak freely about their concerns through public meetings, trust in the responsible company is almost never mentioned. Therefore, this serves as an indication that trust in the responsible company is only important when an individual's attention is specifically drawn to it and, more broadly, that the polls are not garnering complete information. Understanding the limitations of public opinion polling in this context is important because nuclear projects so frequently engender Not in My Back Yard (NIMBY) or Not in Anyone's Back Yard (NIABY) sentiments. If operators and/or regulators want to overcome negative opinions (and, potentially, actions), they must first understand the limitations of the information provided by public opinion polls alone.

This also leads to a second implication: that, if polls are to be conducted, they should ask different questions focusing on different topics. The fact that the public opinion polls considered here indicate importance of factors that ultimately do not show up during public meetings suggests that future polls should include questions about different topics. When analyzing the content of public meetings regarding Diablo Canyon, Levy County, and Victoria Station, three main topics overwhelmingly arose as concerns: impact of the facility on the environment, safety (both in terms of risk posed by the facility and in terms of the facility's ability to address emergency situations), and impact on local waters (both potable and oceanic). If future public opinion polls are conducted, questions on these topics should be included in order for any poll to truly consider potential concerns of local residents. The importance of this

implication again lies in the fact that it may lead to a better understanding of opinion, and therefore of opposition or support, for both operators and regulators.

The third implication of this research is that it actually suggests how operators or regulators may begin to adequately address public opinion associated with any given facility. By understanding the limitations of the information currently provided by public opinion polling, by recognizing how these polls could be improved, and by considering the topics of significant concerns indicated via public meetings, operators and regulators can begin to develop a strategy for shaping public opinion. For example, based on this research, any campaign that attempts to influence public opinion in favor of a nuclear power facility should seek to assuage concerns about the facility's environmental impact, perhaps by educating the public about actual environmental impact and providing a remediation strategy for any impact that occurs. Such a campaign should also address safety concerns expressed by the public, perhaps again by providing more education regarding actual risk posed by the facility and regarding emergency procedures that have been put into place. Finally, any attempt to move public opinion in favor of a given nuclear facility should address concerns regarding the impact on both local drinking water and aquatic habitats. Again, this could perhaps be done through educational efforts or through providing an impact remediation strategy. It should also be noted, however, that while this research may be used by operators and regulators to attempt to influence public opinion in favor of a given nuclear facility, it may just as easily be used by nuclear opponents in order to erode public opinion and ultimately block a proposed facility.

Finally, this research also suggests current nuclear energy policy may not reflect actual public opinion. As noted above, this research indicates that public opinion polls do not allow for exploration of the deeper concerns of individuals and, thus, of the true drivers of opinion.

However, if polls represent the dominant lens through which policy is developed, policy may not be an accurate reflection of true opinion. In other words, if policy reflects only the incomplete information provided by public opinion polls, policy itself is incomplete.

**Limitations of this Research**

This research is limited in three ways. First, while it considers both public opinion polls quantitatively and opinions expressed at public meetings and via newspaper articles qualitatively, these two considerations are disconnected. The public opinion polls were not necessarily conducted in the same areas from with the qualitative data was drawn. Therefore, it is difficult to make many specific or particularly concrete conclusions about the topics of concern indicated by the public opinion data versus those indicated by speakers at public meetings.

Second, the facilities selected for inclusion in the qualitative section of this dissertation are disconnected by time. While they were selected to represent three different phases of nuclear facility development (completed, under construction, and discontinued), they do not exist in the same regulatory eras. Thus, it is difficult to compare number of speakers at meetings concerning Diablo Canyon (as regulations at the time of construction required only a single meeting take place in California) with number of speakers at meetings concerning Levy County (as new regulations require many opportunities for the public to express opinions). Additionally, this large span of time also means that individuals living near the facility in question have different abilities to access information. The Internet allows individuals living near Levy County or Victoria Station to be more informed that may have been possible for individuals living near Diablo Canyon. Unfortunately, this presents a hurdle that cannot be

overcome as no nuclear power construction was authorized between the late 1980s and early 2000s.

Finally, while the areas around these facilities have certainly grown in population and these areas experienced increases in the median income, not enough data is available to truly indicate a causal relationship between the two. Thus, though I suggest that the contrast in stated opinion and action of individuals may be explained by the economic benefits provided by the establishment of the nuclear facility, this research cannot make a definitive conclusion either way.

**Future Research**

The limitations of this research considered above also indicate potential future research. While the qualitative and quantitative data considered here are disconnected, future research should consider them together. Thus, a future project would need to obtain public opinion polling data from the areas around a proposed facility, and consider this data in conjunction with the opinions expressed at public meetings. Moreover, while this research attempts to account for distance from a given nuclear facility, future research should account for distance in a more precise manner. Additionally, in order to address the question of causality between economic benefits and population growth, polling would need to take place before, during, and after construction of a nuclear facility, and would need to specifically ask individuals moving to the area during and after construction what brought them there.

Future research should also attempt to correct for the disconnection in time experienced here. As new nuclear power plant construction is once again being approved, future research should be limited to either the first construction era or the second, though it may also compare

the two eras overall. Ideally, future research should also expand this work to include more nuclear facilities, thereby ultimately accounting for the various regions in which they are built, as well as different types of nuclear facilities (power plants, waste disposal sites, and weapons manufacturing).

# APPENDIX 1
## Positive and Negative Words/Phrases Used to Determine Opinion of Speakers/Articles

*each listed word includes stem words (e.g., "abuse" includes abusive, abused, abusing, etc.)

### Positive

| | | |
|---|---|---|
| abated the noise | creation of jobs | favor |
| adequately addressed | dedicated | feel pretty safe |
| advance | dependable | feel very comfortable |
| applaud | depth and quality | get pretty excited |
| approve | diligent partner | good continuing features |
| assistance | don't really mind | good neighbors |
| benefits | economic growth | good partner |
| best source | efficient | good steward |
| betterment | effort | great corporate citizen |
| carbon free | embrace | green process |
| charitable | encourage | have no problem |
| cheaper | endorse | help all businesses |
| clean | energy excellence | I am basically for |
| collaborative | engage | important |
| come to pass | enhance | impressed |
| commend | environmentally friendly | improve |
| commercially feasible | excellent | in favor |
| community support | exceptional corporate partner | interested |
| complete cooperation | extremely good | investment |
| confident | extremely intelligent | knowledgeable |
| contribute | extremely organized | leadership |
| cooperate | faith in the scientists | less impact |
| cost-effective | faultless | many benefits |

**Positive (continued)**

| | | |
|---|---|---|
| move ahead | provide | stand behind them 100% |
| move forward | public support | support |
| never have I been afraid | raise the state average wage | they've done a good job |
| new tax revenues | recognized experts | thousands of jobs |
| not afraid | reduced energy rates | tremendous benefit |
| offer much-needed jobs | regulate | tremendous economic impact |
| on behalf of | reliable | tremendous partner |
| opportunity | responsible partner | trust |
| partners | responsive | unanimous support |
| positive | safe | upstanding |
| preserves | should be used | very friendly |
| proactive | speaks in favor | very good location |
| prosperity | spinning off jobs | vital part |
| protect | sponsorship | wonderful neighbor |

**Negative**

| | | |
|---|---|---|
| abuse | defies commonsense | extinction |
| adverse impact | degrade | extremely damaging |
| afraid | deleterious | fail |
| against | deny | fallacy |
| bad location | deplete | farce |
| betrayed | destroy | flood |
| brain tumor | devastate | fraud |
| breach of confidence | disadvantage | generally not supportive |
| can't be good | disagree | genetic mutations |
| can't trust | disappoint | greed |
| cannot afford | disaster | grossly inadequate |
| cannot support | disaster waiting to happen | hazard |
| careless | discrepancy | heart disease |
| catastrophic | dishonest | held hostage |
| concern | disregard | highly controversial |
| contaminate | distrust | highly improper |
| controversy | disturb | horrify |
| cover up | do not allow this | I have a bad feeling |
| criminal disregard | do not really trust | ignore evidence |
| damage is done | does not belong | ill-advised |
| danger | does not need | ill-fated |
| deceit | doesn't suit | illegality |
| deeply concerned | don't like it | in doubt |
| deeply trouble | don't want it | inadequate |
| defective | downplay | increase cancer rate |
| defiance of law and logic | error | increase infant mortality |
| deficiency | expensive | incredibly foolish |

**Negative (continued)**

| | | |
|---|---|---|
| insane | no to nuclear power | threaten |
| invalidate | no way we should authorize | toxin |
| irredeemable damage | not an advocate | trick |
| irrevocable alterations | not happy | troubled history |
| irreversible damage | not permitting | ugly |
| Is it safe? | nuclear accident | unbelievable risks |
| Is it secure? | oppose | uncomfortable |
| isn't a pretty site | pollute | unfair |
| jeopardize | problems | unlucky |
| lack of consideration | protest | unusable |
| large impact | regulatory blundering | unworkable |
| less promising future | riddled with cracks | urging a delay |
| lethal | risk | vehemently against |
| leukemia | safety hazard | very serious concern |
| lie | safety issues | very, very dangerous |
| major concern | screwed it up | violate federal law |
| makes no economic sense | seriously deficient | vulnerable |
| mechanical failure | shouldn't be legal | we cannot say yes |
| negative impact | shrinking | we stand against |
| neglect | stop | wipe out |
| no coming back | target for terrorists | withhold issuance |
| no safe way | terrorists | wrong |
| no sense financially | this is a bad idea | |

# APPENDIX 2
## Interest Groups, Areas of Expertise, and Government Associations of Speakers, by Facility

### Diablo Canyon

Interest Groups

- Abalone Alliance
- Associated General Contractors of America
- Audobon Society, Sierra Club, Greenpeace
- California Manufacturer's Association
- Citizens for Adequate Energy (6)
- CODES
- Common Aim
- Consumers in Defense of Energy Safety (6)
- San Luis Obispo Citizens for an Effective Emergency Plan (2)
- San Luis Obispo Mothers for Peace (3)

Expertise

- attorney (2)
- auditor
- civil engineer
- engineer (2)
- engineering mgt consultant
- geologist
- PhD (2)
- physician (3)
- prof of mechanical engineering
- quality control inspector (3)
- structural engineer
- welder

Government Association

- California Chamber of Commerce
- Council Arroyo Grande
- Council, Pismo Beach
- County Administrator
- County Board of Supervisors, San Luis Obispo (2)
- County Planning Commission
- Mayor, City of Morro Bay
- Mayor, San Luis Obispo
- Morro Bay City Council
- Pismo Beach City Council

**Levy County**

Interest Groups

- Advocacy for the Tampa Bay Partnership
- Burrell Engineering
- Citizens Coalition for Clean Water
- Citrus County Chamber of Commerce (2)
- Citrus County Council
- Citrus County Economic Development Council
- Clean and Safe Energy Coalition (2)
- Community Action Foundation of Citrus County
- Enterprise Florida
- Florida Green Party (2)
- Florida League of Conservative Voters
- Floridan Aquifer Legal Defense Organization
- Greenpeace
- Hollinswood Ranch
- Levy County Public Education Foundation
- Nature Coast Business Development Council
- Nature Coast Sierra Group
- Occupy St. Pete
- Physicians for Social Responsibility
- Preserve our Wetlands of Alachua County
- Remley Foundation
- Seven Rivers Regional Medical Center
- Southeast Office of Nuclear Information and Resource Center, North Carolina
- Southern Alliance for Clean Energy
- United Way of Citrus County
- W.W. Carruth estate
- Withlacoochee Area Residents, Inc.

Expertise

- attorney
- biologist
- civil structural engineer
- economist
- physician (3)

Government Association

- Administrator of the Environmental Radiation Section of the Florida Department of Health, Bureau of Radiation Control
- Citrus County Commission (3)
- Citrus County Department Development Director
- Citrus County Manager
- Crystal River City Manager
- Levy County Commission (2)
- Public Works Director

**Victoria Station**

Interest Groups

- Arkansas
- Project
- Blanco River Project
- Nuclear Energy for Texans
- Paradise Ranch president
- Port of Victoria
- Seadrift Lions Club
- Texans for a Sound Energy Policy
- Victoria Chamber of Commerce
- Victoria Economic Development Corporation (3)
- (unspecified interest group)

Expertise

- attorney
- PhD

Government Association

- Director, City of Victoria Environmental Services
- State Representative Dist. 30
- Victoria County/City of Victoria Emergency Management coordinator

# APPENDIX 3
## Topics Mentioned by Speakers, by Facility

**Diablo Canyon**

| *Positively Mentioned Topics* | | | *Negatively Mentioned Topics* | | |
|---|---|---|---|---|---|
| Topic | # of Mentions | % of Total Speakers | Topic | # of Mentions | % of Total Speakers |
| Earthquakes/Fault Lines | 2 | 1.47 | Cost | 5 | 3.68 |
| Jobs/Economy | 4 | 2.94 | Earthquakes/Fault Lines | 42 | 30.88 |
| Environment | 4 | 2.94 | Environment | 5 | 3.68 |
| Safety | 16 | 11.76 | Flood | 1 | 0.74 |
| Trust in Government | 2 | 1.47 | Health (General) | 9 | 6.62 |
| | | | Radiation | 18 | 13.24 |
| | | | Safety | 90 | 66.12 |
| | | | Storage | 11 | 8.09 |
| | | | Storms | 2 | 1.47 |
| | | | Water | 4 | 2.94 |
| | | | Trust in Government | 11 | 8.09 |
| | | | Trust in Company | 4 | 2.94 |

**Levy County**

| *Positively Mentioned Topics* | | | *Negatively Mentioned Topics* | | |
|---|---|---|---|---|---|
| Topic | # of Mentions | % of Total Speakers | Topic | # of Mentions | % of Total Speakers |
| Cost | 3 | 2.91 | Animals | 15 | 14.56 |
| Jobs/Economy | 20 | 19.42 | Climate Change | 1 | 0.97 |
| Environment | 20 | 19.42 | Cost | 20 | 19.42 |
| Fish | 3 | 2.91 | Jobs/Economy | 6 | 5.83 |
| Health (general) | 1 | 0.97 | Environment | 18 | 17.48 |
| Radiation | 2 | 1.94 | Flood | 4 | 3.88 |
| Safety | 5 | 4.85 | Health (general) | 10 | 9.71 |
| Security | 6 | 5.83 | Radiation | 21 | 29.49 |
| Climate Change | 2 | 1.94 | Safety | 8 | 7.79 |
| Water | 2 | 1.94 | Security | 5 | 4.85 |
| Animals | 3 | 2.91 | Sinkholes | 5 | 4.85 |
| Earthquakes/Fault Lines | 1 | 0.97 | Storage | 5 | 4.85 |
| Flood | 1 | 0.97 | Storms | 7 | 6.80 |
| Storms | 2 | 1.94 | Water | 40 | 38.83 |
| Water | 3 | 2.91 | Wetlands | 13 | 12.62 |
| Wetlands | 1 | 0.97 | Aesthetics | 3 | 2.91 |
| Trust in Government | 1 | 0.97 | Endangered Species | 6 | 5.83 |
| Trust in Company | 3 | 2.91 | Culture | 1 | 0.97 |
| | | | Earthquakes/Fault Lines | 3 | 2.91 |
| | | | Fish | 5 | 4.85 |
| | | | Mining | 2 | 1.94 |
| | | | Trust in Government | 2 | 1.94 |
| | | | Trust in Company | 4 | 3.88 |

**Victoria Station**

| *Positively Mentioned Topics* | | | *Negatively Mentioned Topics* | | |
|---|---|---|---|---|---|
| Topic | # of Mentions | % of Total Speakers | Topic | # of Mentions | % of Total Speakers |
| Animals | 2 | 6.45 | Animals | 7 | 22.58 |
| Jobs/Economy | 8 | 25.81 | Cost | 2 | 6.45 |
| Environment | 7 | 22.58 | Culture | 1 | 3.23 |
| Fish | 2 | 6.45 | Jobs/Economy | 3 | 9.68 |
| Radiation | 1 | 3.23 | Environment | 4 | 12.90 |
| Water | 6 | 19.35 | Fish | 1 | 3.23 |
| Safety | 5 | 16.13 | Health (general) | 3 | 9.68 |
| Trust in Government | 1 | 3.23 | Radiation | 4 | 12.90 |
| Trust in Company | 2 | 6.45 | Storms | 1 | 3.23 |
| | | | Waste | 1 | 3.23 |
| | | | Safety | 5 | 16.13 |
| | | | Water | 14 | 45.16 |
| | | | Quality of Life | 2 | 6.45 |
| | | | Trust in Company | 1 | 3.23 |

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