

# **Causes and Implications of Public Opinion on Nuclear Facilities**

**By**

**Courtenay J. Burns  
Graduate Student  
courtenayjo@gmail.com**

**Department of Political Science  
University of Nevada, Reno**

Prepared for presentation at the Western Political Science Association Meeting, Seattle,  
Washington, April 17<sup>th</sup> - 20<sup>th</sup>, 2014

**\*\*WORKING DRAFT: PLEASE DO NOT CITE OR QUOTE WITHOUT PERMISSION\*\***

## **Abstract**

Nuclear energy, and by association, nuclear waste, has been a controversial issue for many years. As such, citizens have been more than willing to express their opinions and a significant amount of academic literature has been devoted to exploring these opinions, as well as the factors that influence them. However, this literature does not consider if confidence in the companies that operate nuclear facilities is an influence on public opinion regarding such facilities. I argue that this is indeed the case and that, contrary to the literature, it is more important than trust in government. Additionally, I consider who is most likely to express negative opinion of nuclear facilities. Specifically, I utilize data from the Energy Survey 2008 conducted by Knowledge Network for the American Clean Skies Foundation, which asked questions specifically concerning opinions on nuclear power generation. In conclusion, by particularly considering the factors influencing public opinion regarding nuclear power facilities, new light can be shed on the implications for constructing new nuclear power plants as well as nuclear waste disposal facilities.

## **Literature Review**

“A miracle of public opinion has been the unprecedented speed and urgency with which ecological issues have burst into American consciousness” (Erskine, 1972). It is this “bursting” of public opinion that is explored by one segment of the literature on the subject. This literature, however, ranges in its focus, from simple reports of opinion itself (de Boer, 1977; de Boer and Catzburg, 1988), to an exploration of the effect of public opinion (Kraft and Clary, 1991; Burnstein, 1998, 1999; Burnstein and Linton, 2002; Agnone, 2007), and when public opinion has the greatest effect, to attempts to predict public opinion and prescriptions for how to influence public opinion (Drew, 2003; Feldman and Hanahan, 1996). Each of these factors are important in understanding public opinion, the factors that influence it, and the impact it has concerning nuclear energy, technologies, and waste. Agnone (2007) specifically considers protest as a form of public opinion and how protest affects legislation. He posits an “amplification model,” suggesting that “protest will affect legislative action independent of public opinion and that the impact of public opinion on legislative action is greater depending on the level of protest” (2007). This approach is fairly unique and remedies what Burnstein (1998, 1999; Burnstein and Linton, 2002) sees as the problem with the examination of the influence of social movements on public policy: that they fail to take public opinion itself into account, which he claims would temper the perceived effects of protest. Agnone ultimately finds that protest does indeed amplify the effect of protest, a conclusion supported by other works considering the effect of dramatic events, which also suggest that public opinion, and the protest that influence it, cannot be considered outside of their political context (Amenta et al, 1994; Andrews, 2001). Agnone’s

conclusion that public opinion indeed positively affects production of legislation is further supported by Stimson et al (1995) who note that, “Public sentiment shifts. Political actors sense the shift. And then they alter their policy behavior at the margins.”

While Agnone, Stimson, Erksine and the others consider the impact of protest and public opinion on legislation in general or on specifically environmental legislation, this only begins a consideration of the change in public opinion concerning nuclear energy and nuclear waste. This, however, does not make it any less important; it simply makes it a basis for considering public opinion on nuclear energy and nuclear waste. One theory concerning this is that “public involvement (or non-involvement) in hazardous waste facility siting decisions is significant, because the accompanying perception of risk can affect the probability of citizen cooperation with subsequent decisions” (Davis 1986). In other words, the public’s expression of opinion does impact decisions made about the siting of hazardous waste facilities. Furthermore, it has been noted that economic health and safety concerns spur citizens to express their opinions (Nelkin, 1981; de Sario and Langton, 1984; Matheny and Williams, 1985). Citizens express opposition for a number of reasons. Dickson (1983) and Elliot (1984) suggest that one contributing reason for opposition is the uncertain nature of hazardous waste facilities. In their study, Feldman and Hanahan (1996) found that concern for future generations, lack of information about site hazards, desire for better analysis of risks to both individual health and the environment, and a desire to avoid generating more contamination were all given as reasons for siting opposition. Moreover, Rosenbaum (1985) and Kraft and Kraut (1985) note, that the tension associated with making siting decisions may be amplified by the intensity of opposition expressed by the citizens

in or near an affected community, while Davis (1984-1985) notes that amplification may be caused by decision-makers' refusal or inability to put restrictions on participation based on expertise (in other words, anyone can participate, regardless of how much accurate information they have).

How then can the public be persuaded to accept sitings near their communities? Morell and Magorian (1982) suggest that the first step in achieving acceptance is to convince citizens that such facilities "are not in the unthinkable or immoral category of risk but in the thinkable, liveable (sic) category of life's risks like living near an ordinary factory or chemical plant." O'Hare (1977) further suggests that monetary compensation be used to counter the economic, social, and psychological costs posed to a community associated with the siting of a hazardous facility. Davis (1986) notes, however, that convincing individuals who are opposed to a project to change their position and favor it, despite the risks, is a difficult task and he suggests that giving citizens access to information and the opportunity to express their opinions and/or concerns is the key to gaining acceptance. "[T]he resolution of hazardous waste siting controversies requires the reduction of citizen anxiety over health and community well-being and the development of respect for the integrity of the decision-making process. If programs that provide information and allow public involvement contribute to the realization of these objectives, the possibility of combining citizen participation with technical expertise may be considered in other policy areas also" (Davis 1986). Benson (1992) also notes the importance of risk perception as an influence on opinion of nuclear facilities.

Feldman and Hanahan (1996) posit that objection stems from concern about future site usage, affect on property values, and from general distrust of government. They further posit that this concern is influenced by multiple factors, such as sex or age. They ultimately find, however, that the only factor significantly associated with opposition was gender: women were more likely to express objection than men. While Hamilton (1985) makes the same finding, he more distinctly notes that it is women with young children who are most likely to express opposition to potentially hazardous projects. Other studies also note that concerns over hazardous projects are affected by parenthood (meaning that parents are more apt to be concerned), but that this effect is intertwined with the effects of age, which they found to be the single most reliable predictor of general environmental concern (e.g. Buttel, 1979; van Liere and Dunlap, 1980). Studies on public reactions to the accident at the Three Mile Island nuclear power plant offered similar findings (Dohrenwend et al, 1981; Flynn, 1981; McStay and Dunlap, 1983).

Levi and Holder (1988) also found gender to be a significant predictor of likelihood to express opposition to nuclear projects. However, they also found trust in government and government officials/experts to be the defining characteristic link to likelihood of opposition. Their study found that those who expressed more trust in government experts and officials were less likely to express concern about to opposition to the Diablo Canyon Power Plant, while they found no evidence “to support the contention that either nuclear power proponents or opponents suffer from lack of knowledge or emotion problems” (Levi and Holder, 1988), a claim they note as generally made. Moreover, DuPont (1982) notes that phobic thinking and irrational feelings of anxiety characterized nuclear energy opponents. Additionally, Inglehart (1984) and Pahner

(1975) suggest that anxiety about nuclear power was actually just fear of nuclear war that had been inappropriately repositioned, while Mulder (2005) argued for the importance of transparent government in order to assuage the fears of stakeholders in nuclear facility siting decisions. Levi and Holder's (1988) findings also support the conclusion made by Albert Bandura (1986) that "people who distrust the judgmental efficacy of risk analysts or their impartiality are likely to be swayed more by their own intuition than by analysts' probability calculations."

Kraft and Clary (1985) also find the only consistent predictor of whether an individual will support or oppose a project is how much credibility that individual attributes to the Department of Energy. Bella et al (1988) further notes that opposition to nuclear-related projects by citizens is based on lack of confidence in the nuclear industry by those citizens.

Trust in government, however, is not the only influence on public opinion, though it may be a significant one. Looking specifically at public opinion on nuclear waste transportation, Drew (2003) suggests that it is a lack of information that forces public opposition. Though technical complexity of the information about nuclear waste and its transportation is frequently considered a barrier to meaningful participation by the citizenry (Feldman and Hanahan, 1996; Probst and Lowe, 2000), Drew (2003) posits that giving citizens the opportunity to interact with technical experts can overcome this. Kaplan (2000) and Bonano et al's (2000) works further support this claim.

Other studies have shown that the public believes the risks associated with nuclear facilities to be exceptionally higher than what experts believe the actual risks to be (Slovic 1987; van der Plight, Eiser, and Spears 1987) and this fear contributes to opposition to nuclear-related

projects (Mills and Neuhauser 1998; Slovic, Fischhoff, and Lichtensten 1979; Slovic, Flynn, and Layman 1991). Moreover, the importance of this has been noted by Levi and Holder (1988), who state, “Whereas industry experts and government officials tend to focus on the probability that an accident will occur, the public appears to be more concerned about the potential seriousness of an accident and the fact that the hazard is unknown and involuntary.” In other words, even if the probability of an accident is low, the public may still express objection because of the fear of the risk posed by such an accident. Citizens recognize that the risk is there, and they are loath to accept it.

Finally, the literature on public opinion concerning nuclear waste and nuclear power simply reports that opinion. Two such reports note that public opinion on these issues has indeed changed over time (de Boer, 1977; de Boer and Catzburg 1988). In fact, these reports, which take into account many studies performed in multiple countries,<sup>1</sup> note that support for nuclear power and/or disposal projects has been low: “In all the countries from which polls are presented in this article, the long-term trend has been against the use of nuclear energy. The biggest shifts in public opinion on nuclear energy issues coincide with major nuclear accidents. However, these

---

<sup>1</sup> de Boer 1977 cited the following polls: AIPO – American Institute for Public Opinion (Gallup), USA; DMS – Institut für Demoskopie, West Germany; EMNID – EMNID-Institut GmbH and Co., West Germany; GMA – Gallup Markeds analyse AS, Denmark; Harris – The Harris Survey, USA; NIPO – Nederlands Instituut voor de Publieke Opinie (Netherlands Institute for Public Opinion), Netherlands; NOS – Nederlandse Omroep Stichting (Netherlands Broadcasting Foundation), Netherlands; NSS – Nederlandse Stichting voor Statistiek (Netherlands Foundation for Statistics), Netherlands; SOC – Social Surveys (Gallup Poll), Ltd., Great Britain

de Boer and Catzburg 1988 cited the following polls: CBS/NYT – CBS/*New York Times* Poll, New York; CIPO – Canadian Institute for Public Opinion, Toronto; Demoskopie – Institut für Demoskopie Allensbach, Allensbach, West Germany; EMNID – EMNID-Institut GmbH and Co., West Germany; Eurodim – Eurodim, Athens, Greece; Gallup – Gallup Organization, Princeton; Harris – Louis Harris and Associates, Orlando; MORI – Market and Opinion Research International, London; NIPO – Nederlands Instituut voor de Publieke Opinie (Netherlands Institute for Public Opinion), Netherlands; NOP – NOP Market Research, Ltd., London; NOS – Nederlandse Omroep Stichting (Netherlands Broadcasting Foundation), Netherlands; SCR – Sociocultural Planning Bureau, Rijswijk, Netherlands; SOC – Social Surveys (Gallup Poll), Ltd., Great Britain



large changes in public opinion are likely to be temporary” (de Boer and Catzburg, 1988). The reports posit, moreover, that “people fear accidents whose effects can still hardly be grasped, and there is widespread anxiety about the waste products, not only because their radioactivity constitutes a real danger to health but also because they can serve as raw materials for an atom bomb” (de Boer, 1977). Rosa and Dunlap (1994) track the same trend of decreasing support over a thirty-year time period. They also note significant moves toward opposition to nuclear energy following the accidents at Three Mile Island and Chernobyl. It is important to note, on the other hand, as Rosa and Dunlap do, that despite falling public opinion, more Americans support the use of nuclear energy than oppose it. This may be product of an American awareness that an alternative source of energy is necessary and that nuclear energy is already important for achieving this. While this may be the case, Rosa and Dunlap (1994) found that Americans were solidly opposed to the siting and construction of any new nuclear power plants. However, the recent approval of the construction of the first new nuclear power plant since 1978 by the Nuclear Regulatory Commission may indicate that this sentiment is changing.

Each of the elements considered by this extensive literature must be considered both individually and as part of the whole in order for one to fully understand public opinion about nuclear energy and nuclear waste. This understanding is particularly important because neither nuclear energy nor nuclear waste is going away. Thus, understanding public opinion and tracking the changes in it is necessary for achieving widespread public support of nuclear projects. However, there is a significant gap in this literature. While there has certainly been consideration of the role of risk perception and trust in government in shaping public opinion regarding nuclear

facilities, I have found no literature concerning the role of trust in companies. In the United States, though government serves in a regulatory and oversight capacity, it is private companies that construct and operate such facilities. Thus, it serves to reason that, if perception of risk posed by nuclear facilities influences individual opinion regarding them, then confidence in the ability of the day-to-day operators would ultimately influence opinion as well. My research attempts to fill this gap.

## **Methodology**

For my purposes here, I am utilizing the Energy Survey 2008 conducted by Knowledge Network 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 have chosen to focus 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 one variable to the data set that measures nuclear power plants per square mile in each state<sup>2</sup>. To create this 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. In order to test my hypotheses, my data set includes variables measuring a variety of personal and socioeconomic factors. These are discussed more below.

All respondents to the Energy Survey 2008 are age 18 and over, with the average age being approximately 44. The sample is 50.1% female and is predominately white (77.34%). Just

---

<sup>2</sup> 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.

over half of individuals in the sample reported that they are married (57.48%). The survey asked respondents to place themselves on scales regarding both political party and political ideology. While 5.73% of respondents considered themselves to be “undecided/independent/other,” 43.59% considered themselves to be Republican (“strong Republican” 15.88%; “not strong Republican” 11.98%; “leans Republican” 15.73%) and 51.24% considered themselves to be Democrats (“strong Democrat” 17.22%; “not strong Republican” 14.88%; leans Democrat 19.14%). However, when asked to place themselves ideologically, 24.88% of respondents considered themselves to be liberal (“extremely liberal” 3.02%; “liberal” 12.08%; “slightly liberal” 9.78%), 38.03% considered themselves to be conservative (“extremely conservative” 4.03%; “conservative” 18.76%; “slightly conservative” 15.24%), and 37.10% considered themselves to be “moderate, middle of the road.” Finally, the majority of the respondents (81.54%) reported that they lived in a metropolitan area.

Using the individual as the unit of analysis, my model considers each of six independent variables against a series of independent variables, focusing specifically on the relationship of risk, trust in government, confidence in the companies that own and operate nuclear facilities, and number of nuclear power plants per square mile in a state. Additionally, the models take into account multiple personal and socioeconomic factors as control variables.

H<sub>0</sub>: There is no relationship between any of the four variables of interest (trust in government, confidence in the companies responsible for operating nuclear facilities, willingness to take risks, and number of nuclear power plants per square mile in a respondent’s state of residence) and the independent variables.

H<sub>1</sub>: Individuals living in states with more nuclear power plants per square mile will be less likely to respond positively to questions regarding opinion of these facilities.

H<sub>2</sub>: Individuals who consider themselves more willing to take risks will be more likely to respond positively to questions regarding opinion of nuclear facilities.

H<sub>3</sub>: Individuals who express more trust in government will be more likely to respond positively to questions regarding opinion of nuclear facilities.

H<sub>4</sub>: Individuals who express more confidence in the companies responsible for the operation of nuclear facilities will be more likely to respond positively to questions regarding opinion of these facilities.

H<sub>5</sub>: Confidence in the companies responsible for the operation of nuclear facilities will be more closely related to each of the dependent variables than trust in government.

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.

The independent variables<sup>3</sup> 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, MSA category) 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 in generally are sited in low-income areas. Thus, race, income level, whether a respondent rents their home, and MSA category are included in order to consider their findings as well. Feldman and Hanahan (1996),

---

<sup>3</sup> A description of how each variable is measured is included in Appendix 1.

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 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 research, 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 ran ordered logit regressions clustered by state of residence for each of these dependent variables.

## **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.

For the first question regarding harm, I expect trust in government, confidence in responsible companies, and willingness to take risks to be negatively related to the dependent variable, while I expect plants per square mile in the respondent’s state of residence to be positively related. As for the control variables, I expect age, education level, party, income, and whether the respondent lives in a metropolitan (as opposed to non-metropolitan) area to be negatively related to the dependent variable. I further expect race, gender, ideology, household size, and presence of children in the household to be positively related. In the case of trust in government, confidence in responsible companies, willingness to take risks, plants per square mile, age, education, race, income, presence of children in the household, and metropolitan/non-metropolitan area of residence, the relationships are as I expect. In relation to my hypotheses, trust in government, confidence in responsible companies, and willingness to take risks, the

relationship to the dependent variable is in the expected and significant. Additionally, confidence in responsible companies is significant at a higher level ( $p > 0.005$ ) than trust in government ( $p > 0.01$ ). This supports my hypothesis that confidence in companies responsible for the operation of nuclear facilities is more closely related to opinion of these facilities than is trust in government. (see Table 1 in Appendix 2)

For the second question regarding expense, I expect trust in government, confidence in responsible companies, willingness to take risks and plants per square mile in the respondent's state of residence to all be negatively related to the dependent variables. I expect the control variables of age, education level, ideology, income, household size, and whether the respondent lives in a metropolitan (as opposed to non-metropolitan) area to be negatively related to the dependent variable. I further expect race, political party, and the presence of children in the household to be positively related to the dependent variable. For the control variables, all relationships are in the expected direction; age, level of education, and political party are significant at the 0.01 level while race, gender, and income are significant at the 0.005 level. For the four variables of interest (trust in government, confidence in responsible companies, willingness to take risks, and plants per square mile in the respondent's state of residence), the relationship to the dependent variable is in the expected direction (negative), but only confidence in responsible companies is significant (at the .05 level). The significance of confidence in responsible companies where trust in government is not significant supports my hypothesis that confidence in companies responsible for the operation of nuclear facilities is more closely related to opinion of these facilities than is trust in government. (see Table 2 in Appendix 2)

For the third question regarding how much individuals think we should meet U.S. electricity demands through the use of nuclear power, I expect all the variables of interest to be



positive. I further expect age, education level, gender, income, and whether the respondent lives in a metropolitan area to be positively related to the dependent variable, while I expect race, party, ideology, household size, and the presence of children in the household to be negatively related. Of the control variables, only ideology and household size are *not* in the expected direction and only ideology, household size and whether the respondent lives in a metropolitan area are *not* significant. For the variables of interest, only plants per square mile in the respondent's state of residence is not in the expected direction, nor is it significant. Additionally, confidence in responsible companies is significant at a higher level ( $p > 0.005$ ) than trust in government ( $p > 0.05$ ). This again supports my hypothesis that confidence in companies responsible for the operation of nuclear facilities is more closely related to opinion of these facilities than is trust in government. (see Table 3 in Appendix 2)

For the fourth question regarding how much individuals think we will rely on nuclear fuels for electricity generation, I expect all the independent variables, both those of interest and the control variables, to be positively related to the dependent variable. However, only trust in government, willingness to take risks, plants per square mile in the respondent's state of residence, race, and the presence of children in the household are in the expected direction. Additionally, only confidence in responsible companies, plants per square mile in the respondent's state of residence, level of education, and whether the respondent lives in a metropolitan area are significantly related to the dependent variable. Note here that, again, significance of confidence in responsible companies where trust in government is not significant supports my hypothesis that confidence in companies responsible for the operation of nuclear facilities is more closely related to opinion of these facilities than is trust in government. (see Table 4 in Appendix 2)

For the fifth question regarding how individuals would feel about a hazardous waste facility within twenty-five miles of their home, I expect trust in government, confidence in responsible companies, and willingness to take risks to be positively related to the dependent variable, while I expect plants per square mile in the respondent's state of residence to be negatively related to the dependent variable. Concerning the control variables, I expect only age, education level, and income to be positively related to the dependent variable. Of all the variables, only gender, household size, and whether the respondent lives in a metropolitan area are *not* in the expected direction. Additionally, only plants per square mile, education, ideology, income, and whether the respondent lives in a metropolitan area are *not* significant. Again, confidence in responsible companies is significant at a higher level ( $p > 0.005$ ) than trust in government ( $p > 0.05$ ), supporting my hypothesis that confidence in responsible companies is more important than trust in government. (see Table 5 in Appendix 2)

Finally, for the sixth question regarding how individuals would feel about a nuclear power plant within twenty-five miles of their home, I expect trust in government, confidence in responsible companies, and willingness to take risks to be positively related to the dependent variable, but plants per square mile to be negatively related. In the case of the control variables, I expect only age, education level, and income to be positively related to the dependent variable. I find only gender, and household size to *not* be in the expected direction and only trust in government, ideology, income, and whether the respondent lives in a metropolitan area to *not* show significance. Once again, confidence in responsible companies is significant (at the 0.005 level), where trust in government shows no significance, supporting my hypothesis regarding the importance of confidence in companies responsible for nuclear facility operation.

Overall, my analyses generally support the previous research regarding which demographic factors describe individuals who are most likely to oppose (or support) nuclear facilities. It also supports the research regarding the importance of willingness to take risks, as I find overall that those who say they are more willing to take risks also respond more positively toward the six questions. My analyses also reveal that number of nuclear power plants per square mile in a respondent's state of residence is not generally related to opinion about these facilities. Thus, my hypothesis regarding this variable is not supported.

However, the most interesting finding concerns confidence in the companies responsible for operating nuclear facilities. I hypothesized that confidence in these companies would be significantly related to each of the dependent variables and would be more significant than trust in government. This is indeed the case for each dependent variable and may therefore indicate that confidence in the companies responsible for operating nuclear facilities is more important to individuals than trust in the government providing regulation. Thus, it may be more important for policy makers to focus on how much confidence individuals have private companies that own and operate nuclear facilities if they wish to garner positive opinion regarding them, or at least avoid particularly negative opinion. Moreover, this may be the most important focus, regardless of demographic indicators. In sum, perhaps if individuals can be convince to have confidence in the companies that operate nuclear facilities, the influence of other factors will be negated or at least tempered.

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.

## Bibliography

- Agnone, Jon. 2007. "Amplifying Public Opinion: The Policy Impact of the U.S. Environmental Movement." *Social Forces*. 84: 1593-1620.
- Amenta, Edwin, Kathleen Dunleavy, and Mary Bernstein. 1994. "Stolen Thunder? Huey Long's 'Share Our Wealth,' Political Mediation, and the Second New Deal." *American Sociological Review*. 59: 678-702.
- Andrews, Kenneth T. 2001. "Social Movements and Policy Implementation: The Mississippi Civil Rights Movement and the War on Poverty, 1965-1971." *American Sociological Review*. 66: 71-95.
- Acevedo-Garcia, Dolores, et al. 2008. "Toward a Policy-Relevant Analysis of Geographic and Racial/Ethnic Disparities in Child Health." *Health Affairs*. vol. 27, no. 3 March/April. 321-333.
- Bandura, Albert. 1986. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Benson, Brien. 1992. "Public Opinion Factors Regarding Nuclear Facilities: An Examination of the Factors Defining the Regulatory Process for Advanced Nuclear Reactors." submitted for partial fulfillment of George Mason University Cooperative Agreement.
- Bella, David A., Charles D. Mosher, and Steven N. Calvo. 1988. "Establishing Trust: Nuclear Waste Disposal." *Journal of Professional Issues in Engineering*. 114: 40-50.
- Bonano, EJ. et al. 2000. "Application of Risk Assessment and Decision Analysis to the Evaluation, Ranking, and Selection of Environmental Remediation Alternatives." *Journal of Hazardous Materials*. 71: 35-57.
- Burnstein, Paul. 1998. "Bringing the Public Back In: Should Sociologists Consider the Impact of Public Opinion on Public Policy?" *Social Forces*. 77: 27-62.
- , 1999. "Social Movement and Public Policy." in *How Social Movements Matter*. Marco Giugni, Doug McAdam, and Charles Tilly, eds. University of Minnesota Press. 3-21.
- Burnstein, Paul and April Linton. 2002. "The Impact of Political Parties, Interest Groups, and Social Movement Organizations on Public Policy: Some Recent Evidence and Theoretical Concerns." *Social Forces*. 81: 380-408.
- Buttel, FH. 1979. "Age and Environmental Concern: A Multivariate Analysis." *Youth and Society*. 10: 237-256.
- Crain, R., E. Katz, and R. Rosenthal. 1969. *The Politics of Community Conflict*. Indianapolis: Bobs-Merrill.

- Davis, Charles. 1984-1985. "Substance and Procedure in Hazardous Waste Facility Siting." *Journal of Environmental Systems*. 14: 51-65.
- , 1986. "Public Involvement in Hazardous Waste Siting Decisions." *Polity*. 19: 296-304.
- de Boer, Connie. 1977. "The Polls: Nuclear Energy." *Public Opinion Quarterly*. 41: 402-411.
- de Boer, Connie, and Ineke Catsburg. 1988. "The Polls - A Report: The Impact of Nuclear Accidents on Attitudes Toward Nuclear Energy." *Public Opinion Quarterly*. 52: 254-261.
- de Sario, Jack, and Stuart Langton. 1984. "Citizen Participation and Technocracy." *Policy Studies Review*. 3: 223-233.
- Dickson, Paul. 1983. "Citizen Risk Perception and Participation Strategies: Siting Centralized Hazardous Waste Management Facilities in the Northeast." presented at the 1983 Annual Meeting of the American Society for Public Administration, New York City.
- Dohrenwend, BP. et al. 1981. "Stress in the Community: A Report to the President's Commission on the Accident at Three Mile Island." in *The Three Mile Island Nuclear Accident: Lessons and Implications*. T.H. Moss and D.L. Sills, eds. New York: New York Academy of Sciences. 159-174.
- Drew, Christina H., et al. "Nuclear Waste Transportation: Case Studies of Identifying Stakeholder Risk Information Needs." *Environmental Health Perspectives*. 11.3 (Mar. 2003): 263-272.
- DuPont, R.L. 1982. "The Psychology of Phobic Fear of Nuclear Energy." in *Phobia, A Comprehensive Summary of Modern Treatments*. RL DuPont, ed. New York: Brunner/Mazel. 193-200.
- Elliot, Michael. 1984. "Improving Community Acceptance of Hazardous Waste Facilities Through Alternative Systems for Mitigating and Managing Risk." *Hazardous Waste*. 1: 397-410.
- Erskine, Hazel. 1972. "The Polls: Pollution and its Costs." *Public Opinion Quarterly*. 35: 120-135.
- Feldman, David L., and Ruth A. Hanahan. 1996. "Public Perceptions of a Radioactively Contaminated Site: Concerns, Remediation, Preferences, and Desired Involvement." *Environmental Health Perspectives*. 104: 1344-1352.
- Flynn, CB. 1981. "Local Public Opinion." in *The Three Mile Island Nuclear Accident: Lessons and Implications*. T.H. Moss and D.L. Sills, eds. New York: New York Academy of Sciences. 159-174.

- Hamilton, Lawrence C. "Concern about Toxic Wastes: Three Demographic Predictors." *Sociological Perspectives*. 28.4 (Oct 1985): 463-486.
- Inglehart, R. 1984. "The Fear of Living Dangerously: Public Attitudes Toward Nuclear Power." *Public Opinion*. 7: 41-44.
- Jenkins, J. Craig, and Charles Perrow. 1977. "Insurgency of the Powerless: Farm Worker Movements (1946-1972)." *American Sociological Review*. 42: 249-268.
- Jenkins, J. Craig, David Jacobs, and Jon Agnone. 2003. "The Development of Civil Rights Protest, 1947-1999: Collective Grievances, Mobilizing Structures, and Political Opportunities." *American Journal of Sociology*. 109: 277-303.
- Jenkins, J. Craig, and William Form. 2003. "Social Movements and Social Change." in *The Handbook of Political Sociology*. Thomas Janoski, Robert Alford, Alexander Hicks, and Mildred Schwartz, eds. Cambridge University Press. 331-349.
- Kaplin, L. 2000. "Public Participation in Nuclear Facility Decisions: Lessons Learned from Hanford." in *Science, Technology, and Democracy*. DL Kleinman, ed. Albany, NY: State University of New York Press. 67-83.
- Kasperson, Roger E. 1986. "Six Positions on Public Participation and Their Relevance for Risk Communication." *Risk Analysis*. 6: 275-81.
- Kraft, Michael E. and Ruth Kraut. 1985. "The Impact of Citizen Participation on Hazardous Waste Policy Implementation: The Case of Clermont County, Ohio." *Policy Studies Journal*. 14: 52-61.
- Levi, Daniel J. and Elaine E. Holder. "Psychological Factors in the Nuclear Power Controversy." *Political Psychology*. 9.3 (Sept. 1988): 445-457.
- Matheny, Albert, and Bruce Williams. 1985. "Knowledge vs. NIMBY: Assessing Florida's Strategies for Siting Hazardous Waste Disposal Facilities." *Policy Studies Journal*. 14: 70-80.
- Mazur, Allan and Beverlie Conant. "Controversy over a Local Nuclear Waste Repository." *Social Studies of Science*. 8.2 (May 1978): 235-243.
- McAdam, Doug. [1982] 1999. *Political Process and the Development of Black Insurgency, 1930-1970*. University of Chicago Press.
- McLaughlin, Paul, and Marwan Khawaja. 2000. "The Organizational Dynamics of the U.S. Environmental Movement: Legitimation, Resource Mobilization, and Political Opportunity." *Rural Sociology*. 65: 422-439.

- McStay, JR. and RE Dunlap. 1983. "Male-Female Differences in Concern for Environmental Quality." *International Journal of Women's Studies*. 6: 291-301.
- Meyer, David S., and Debra C. Minkoff. 2004. "Conceptualizing Political Opportunity." *Social Forces*. 82: 1457-1492.
- Mills, GS., and KS Neuhauser. 1998. "Urban Risks of Truck Transport of Radioactive Material." *Risk Analysis*. 18: 781-785.
- Minkoff, Debra C. 1997. "The Sequencing of Social Movements." *American Sociological Review*. 62: 779-799.
- Morell, David, and Christopher Magorian. 1982. *Siting Hazardous Waste Facilities: Local Opposition and the Myth of Preemption*. Cambridge, MA: Ballinger.
- Mulder, K. 2005. "Managing the Dynamics of Technology in Modern Day Society." in R.M. Verburg, J.R. Ott, and W.M. Dicke, eds. *Managing Technology and Innovation: An Introduction*. New York: Routledge. 109-129.
- Nelkin, Dorothy. 1981. "Some Social and Political Dimensions of Nuclear Power: Examples from Three Mile Island." *American Political Science Review*. 75: 132-142.
- Obama for America. "Barack Obama and Joe Biden: New Energy for America." campaign issue statement. 2008.  
[http://www.barackobama.com/pdf/factsheet\\_energy\\_speech\\_080308/pdf](http://www.barackobama.com/pdf/factsheet_energy_speech_080308/pdf). (accessed February 1, 2012).
- O'Hare, Michael. 1977. "Not on My Block You Don't: Facility Siting and the Strategic Importance of Compensation." *Public Policy*. 25: 407-458.
- Pahner, P.D. 1975. "The Psychological Displacement of Anxiety: An Application to Nuclear Energy." in *Risk-Benefit Methodology and Application: Some Papers Presented at the Engineering Foundation Workshop*. D. Okrent, ed. September 22-26, Asilomar, CA. School of Engineering and Applied Sciences. University of California, Los Angeles. 557-580.
- Probst, KN., and AI Lowe. 2000. *Cleaning Up the Nuclear Weapons Complex: Does Anybody Care?* Washington D.C.: Resources for the Future.
- Quah, Euston T.E., and Khye Chong Tan. "The Siting Problem of Nimby Facilities: Cost-Benefit Analysis and Auction Mechanisms." Conference Paper for the University of California Institute on Global Conflict and Cooperation."  
[http://igcc.ucsd.edu/research/environment/presentations/Quah\\_Tan.pdf](http://igcc.ucsd.edu/research/environment/presentations/Quah_Tan.pdf) (accessed March 15, 2012).
- Rochlin, Gene I. 1977. "Nuclear Waste Disposal: Two Social Criteria." *Science*. 195: 23-31.



- Rosa, Eugene A. And Riley E. Dunlap. "Poll Trends – Nuclear Power: Three Decades of Public Opinion." *Public Opinion Quarterly*. 58: 295-324.
- Rosenbaum, Walter A. 1983. "The Politics of Public Participation in Hazardous Waste Management." in *The Politics of Hazardous Waste Management*. James P. Lester and Ann O'M. Bowman, eds. Duke University Press: 176-195.
- Soule, Sarah A., Doug McAdam, John McCarthy, and Yang Su. 1999. "Protest Events: Cause and Consequence of State Action? The U.S. Women's Movement and Federal Congressional Activities, 1956-1979." *Mobilization*. 4: 239-256.
- Slovic, Paul. 1987. "Perception of Risk." *Science*. 236: 280-285.
- Slovic, P., B. Pischhoff, and S. Lichtenstein. 1979. "Rating the Risks." *Environment*. 21: 36-39.
- Slovic, P., JH. Flynn, and M. Layman, 1991. "Perceived Risk, Trust, and the Politics of Nuclear Waste." *Science*. 254: 1603-1607.
- Stimson, James A., Michael B. MacKuen, and Rober S. Erikson. 1995. "Dynamic Representation." *American Political Science Review*. 89: 543-565.
- U.S. Census Bureau. "State and County QuickFacts."  
<http://quickfacts.census.gov/qfd/index.html#>. accessed 15 March 2014.
- U.S. Energy Information Agency. "State Nuclear Profiles." *Nuclear and Uranium*.  
[http://www.eia.gov/nuclear/state/2008/nuc\\_state\\_sum.html](http://www.eia.gov/nuclear/state/2008/nuc_state_sum.html). accessed 15 March 2014.
- van der Plight, Joop, J. Richard Eiser, and Russell Spears. 1987. "Nuclear Waste: Facts, Fears and Attitudes." *Journal of Applied Social Psychology*. 17: 453-470.
- van Liere, KD., and RE Dunlap. 1980. "The Social Basis of Environmental Concern: A Review of Hypotheses, Explanations, and Empirical Evidence." *Public Opinion Quarterly*. 44: 181-197.
- Wlezien, Christopher. 2004. "Patterns of Representation: Dynamics of Public Preferences and Policy." *Journal of Politics*. 66: 1-24.

## Appendix 1

**age4cat:** numerical age place into one category (18-29, 30-44, 45-59, 60+)

**educ4cat:** response to “What is the highest degree or level of education you have completed?” place into one category (less than high school, high school, some college, bachelor’s degree or higher)

**race:** respondents indicated one category (white, non-Hispanic; black/African-American, non-Hispanic; other, non-Hispanic; Hispanic; 2+ races, non-Hispanic) – dichotomized to White or Non-White

**income:** respondents placed annual household income in categories ranging from “less than \$5000” to “\$175,000 or more”

**marital:** response to “Are you currently... married, single (never married), divorced, widowed, separated” – dichotomized to Married (includes “married” and “separated” responses) or Not Married

**party:** response to “Political Party – strong Republican, not strong Republican, leans Republican, undecided/independent/other, leans Democrat, not strong Democrat, strong Democrat”

**ideology:** response to “Political Ideology – extremely liberal, liberal, slightly liberal, moderate/middle of the road, slightly conservative, conservative, extremely conservative”

**gender:** male or female

**housesize:** numerical response regarding number of people in the household ranging from 1 to 10

**rent:** response to “Do you own or rent your residence? Own, Rent, Do not pay for housing” – dichotomized to Yes or No

**children:** Yes or No determined based on if individuals responded with an answer more than 0 to questions regarding number of children ages under 2, 2-5, 6-12, or 13-17 in the household

**MSAcategory:** response to if the respondent lived in a metropolitan or non-metropolitan area

**risk:** “Are you generally a person who is fully willing to take risk or do you try to avoid taking risks?” – scale of 1 (unwilling to take risks) to 10 (very willing to take risks)

**govttrust:** “How much trust do you have in government agencies to monitor the performance of the companies operating each type of power plant? – not sure [missing], no trust, very low trust, low, moderate, high, very high trust”

**comconfidence:** “What is your level of confidence that the companies responsible for building and operating power plants will take appropriate measures to limit potential health and environmental risks of the plant? – not sure [missing], no confidence, very low, low, moderate, high, very high confidence”

**plants\_per\_mi2:** based on state of residence, number of power plants in 2008 in a respondent’s state (per the U.S. Energy Information Agency) divided by area of the state in square miles (per U.S. Census Bureau)

Table 1

“How harmful do you think [nuclear] power sources [are]?”

Independent Variable	Coefficient	Robust Standard Error
<b>Trust in Government</b>	-0.13**	0.05
<b>Confidence in Companies</b>	-0.25***	0.05
<b>Willingness to take Risks</b>	-0.12***	0.02
<b>Plants per Square Mile</b>	-233.76	503.20
Age	-0.39***	0.06
Level of Education	-0.22***	0.06
White/Non-White	0.68***	0.13
Male/Female	-0.71***	0.11
Political Party	0.09**	0.04
Political Ideology	-0.10	0.06
Income Level	-0.06***	0.02
Household Size	-0.05	0.06
Presence of Children	0.32*	0.15
Metro/Non-Metro	-0.07	0.15

\* =  $p > 0.05$

\*\* =  $p > 0.01$

\*\*\* =  $p > 0.005$

Number of Observations: 1262

Wald chi2 (14): 536.68

Prob > chi2: 0.00

Nagelkerke R2: 0.27

Table 2

**“How expensive do you think it is to produce electricity with [nuclear fuel]?”**

Independent Variable	Coefficient	Robust Standard Error
<b>Trust in Government</b>	-0.09	0.06
<b>Confidence in Companies</b>	-0.11*	0.06
<b>Willingness to take Risks</b>	-0.06	0.04
<b>Plants per Square Mile</b>	-287.24	420.92
Age	-0.28**	0.06
Level of Education	-0.11**	0.05
White/Non-White	0.32***	0.12
Male/Female	-0.42***	0.09
Political Party	0.08**	0.03
Political Ideology	-0.03	0.06
Income Level	-0.06***	0.02
Household Size	-0.00	0.07
Presence of Children	0.00	0.18
Metro/Non-Metro	-0.06	0.15

\* =  $p > 0.05$

\*\* =  $p > 0.01$

\*\*\* =  $p > 0.005$

Number of Observations: 1062

Wald chi2 (14): 182.07

Prob > chi2: 0.00

Nagelkerke R2: 0.12

Table 3

**“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.”**

Independent Variable	Coefficient	Robust Standard Error
<b>Trust in Government</b>	0.10*	0.05
<b>Confidence in Companies</b>	0.24***	0.05
<b>Willingness to take Risks</b>	0.11***	0.02
<b>Plants per Square Mile</b>	-3.06	332.60
Age	0.28***	0.06
Level of Education	0.25***	0.05
White/Non-White	-0.41***	0.13
Male/Female	0.68***	0.12
Political Party	-0.11***	0.03
Political Ideology	0.08	0.06
Income Level	0.05***	0.01
Household Size	0.04	0.06
Presence of Children	-0.33***	0.12
Metro/Non-Metro	0.17	0.13

\* =  $p > 0.05$ \*\* =  $p > 0.01$ \*\*\* =  $p > 0.005$ 

Number of Observations: 1269

Wald chi2 (14): 661.34

Prob &gt; chi2: 0.00

Nagelkerke R2: 0.24

**Table 4**

**“How much do you think the U.S. should rely on [nuclear] fuels for electricity over the next 10 years?”**

Independent Variable	Coefficient	Robust Standard Error
<b>Trust in Government</b>	0.02	0.05
<b>Confidence in Companies</b>	-0.09*	0.05
<b>Willingness to take Risks</b>	0.02	0.02
<b>Plants per Square Mile</b>	1940.20*	1004.96
Age	-0.03	0.05
Level of Education	-0.16***	0.05
White/Non-White	0.07	0.12
Male/Female	-0.01	0.11
Political Party	-0.02	0.04
Political Ideology	-0.02	0.05
Income Level	-0.02	0.02
Household Size	-0.00	0.07
Presence of Children	0.04	0.18
Metro/Non-Metro	-0.20*	0.11

\* =  $p > 0.05$ \*\* =  $p > 0.01$ \*\*\* =  $p > 0.005$ 

Number of Observations: 1262

Wald chi2 (14): 98.25

Prob &gt; chi2: 0.00

Nagelkerke R2: 0.02

Table 5

“How would you feel if a new hazardous waste facility was built within 25 miles of your home?”

Independent Variable	Coefficient	Robust Standard Error
<b>Trust in Government</b>	0.09*	0.05
<b>Confidence in Companies</b>	0.25***	0.04
<b>Willingness to take Risks</b>	0.09***	0.03
<b>Plants per Square Mile</b>	-316.14	1018.05
Age	0.24***	0.07
Level of Education	0.06	0.06
White/Non-White	-0.38***	0.13
Male/Female	0.63***	0.09
Political Party	-0.09**	0.04
Political Ideology	-0.07	0.05
Income Level	0.01	0.01
Household Size	0.13*	0.08
Presence of Children	-0.64***	0.22
Metro/Non-Metro	0.17	0.15

\* = p &gt; 0.05

\*\* = p &gt; 0.01

\*\*\* = p &gt; 0.005

Number of Observations: 1280

Wald chi2 (14): 223.24

Prob &gt; chi2: 0.00

Nagelkerke R2: 0.15

Table 6

“How would you feel if a new nuclear power plant were built within 25 miles of your home?”

Independent Variable	Coefficient	Robust Standard Error
<b>Trust in Government</b>	0.05	0.06
<b>Confidence in Companies</b>	0.32***	0.05
<b>Willingness to take Risks</b>	0.17***	0.03
<b>Plants per Square Mile</b>	-1417.32*	840.54
Age	0.32***	0.08
Level of Education	0.18***	0.07
White/Non-White	-0.44***	0.10
Male/Female	0.76***	0.11
Political Party	-0.09**	0.04
Political Ideology	0.01	0.06
Income Level	0.02	0.02
Household Size	0.14***	0.05
Presence of Children	-0.44***	0.17
Metro/Non-Metro	-0.01	0.19

\* = p &gt; 0.05

\*\* = p &gt; 0.01

\*\*\* = p &gt; 0.005

Number of Observations: 1280

Wald chi2 (14): 402.83

Prob &gt; chi2: 0.00

Nagelkerke R2: 0.22