

Environmental Injustice as Manifested in the Building of Incinerators within the State of New Jersey¹

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Abstract:

Data collected in collaboration with the New Jersey Grass Roots Environmental Organization Inc. are used to develop an operational definition of environmental justice that could be used by communities in evaluating government or industry proposals for environmentally controversial projects. The study uses a comparison of counties in which waste incinerators are not sited, sited but not built, or sited and built to reveal patterns of economic, educational, health, political, and racial/cultural inequality in exposing residents to certain types of pollution.

Introduction

According to the United States Environmental Justice Agency (EPA 1993), environmental justice or environmental equity is defined as the fair and equitable treatment of all people regardless of race, culture, income, or educational level with respect to the development, implementation, and enforcement of environmental laws, policies, practices, and regulations. The United States environmental justice movement began in 1982 when local officials decided to site a polychlorinated biphenyl (PCB) landfill in a small, predominantly African-American town in Warren County, North Carolina (EPA 1995). Community protests ended in a large-scale investigation undertaken by the General Accounting Office (GAO), which found that three of four hazardous waste landfills were located in predominantly African-American communities (EPA 1995). The 1986-1987 research project on "toxic justice" conducted by the United Church of Christ Commission (U.C.C.) brought the concept of environmental justice to the fore.

The project grew out of a series of complaints by and actions called for from U.C.C. congregations, particularly in the Deep South, regarding the disproportionate siting of waste facilities in small, rural communities largely composed of people of color. The U.C.C.'s report, entitled *Toxic Waste and Race in the United States*, became the first documentation of the confluence of race and the location of toxic waste facilities. A key researcher on the project, Vernice Miller, of the National Resources Defense Council (NRDC), "found that of the 75 to 80 variables examined, race proved to be the most statistically significant indicator and that it was not a random occurrence" (quoted in Little 1995, 44).

In October 1991, "The Principles of Environmental Justice" were written and adopted at the First National

People of Color Environmental Leadership Summit, held in Washington, D.C., by a group of more than 650 individuals from grassroots organizations calling for an end to the discriminatory poisoning of low-income communities and people of color world wide (Little 1995). The leaders of the movement put pressure on the EPA, constantly prodding for progress reports and requesting permission to review operating budget plans, procedures, policies, and agency reports.

The Michigan Coalition of Environmental Justice Issues, a group of social scientists, political activists, and biological investigators, formally brought environmental justice issues to the EPA's attention in 1990 (Westra and Wenz 1995), pressuring the EPA to focus greater attention on "The Principles of Environmental Justice." EPA administrator William K. Reilly formed a work group to examine the agency's past and current practices relating to environmental justice issues (Westra and Wenz 1995). The group's findings were published in a two-volume report entitled, *Environmental Equity: Reducing Risk in All Communities* (EPA 1992). On the basis of the report's recommendations the EPA created the Office of Environmental Equity in November 1992, which became the Office of Environmental Justice, to coordinate the agency's efforts to develop and implement environmental justice initiatives (Westra and Wenz 1995).

To the great satisfaction of environmental justice leaders, on February 11, 1994, President Clinton signed into effect Executive Order #12898, "Executive Order on Federal Actions to Address Environmental Justice in Minority and Low Income Populations." The Order established environmental justice as a national priority, focusing federal attention on the environmental and human health conditions of people of color and on low-income populations, with the goal of achieving equal environmental protection for all communities regardless of their race, income status, ethnicity, or culture.

In spite of the above-mentioned strides toward the recognition and legitimization of the concept of environmental justice, the EPA has yet to develop an acceptable legal definition of environmental justice, leaving a number of legal claims unsettled. Another major problem encountered in attempting to implement an effective national program has been the absence of any specific legislation on environmental justice. In lieu of federal legislation, several states have begun to address environmental justice concerns through laws requiring compensation to host communities, enhancing public notice and participation, improving risk assessment methods, creating state justice policies, and increasing public communication and information dissemination (Westra and Wenz 1995, 35).

Most analysts have focused on the economic dimension of environmentally unjust hazardous waste siting. One claim, accepted by the incineration companies, is that market forces are the major determinant of siting. One version of this argument claims that minority communities need the jobs and tax benefits the facility generates (Westra and Wenz 1995, 58). This is contradicted by Cerrell Associates, Inc., in a report prepared for the California Waste Management Board (1984, 13) in which the company states “[W]aste energy facilities in themselves provide relatively few jobs, and run a high risk of costing a community more than they pay back.”

Vicki Been, an NYU law professor, concluded that levels of poverty and percentages of minorities in the host communities increased only after the sitings. She claims that the reasons for this are that the more affluent choose to leave, property values decline, and housing becomes cheaper, attracting the poor and minority members (1994). However, regardless of whether they move in after the sitings, or are there before, minority, low-income individuals are disproportionately exposed to environmental hazards and their health, social, and economic consequences. Economic analysis ignores the fact that environmental justice is difficult to achieve when a community lacks political clout and other resources to protect itself. People may not have the political and media contacts to use on their own behalf. They may not even be aware of what policy decisions have been made.

Environmental Injustice in the State of New Jersey

The EPA's 1994 report, "Geographic Information System Index Mapping Project," calculated an environmental justice concern ranking for New Jersey census blocks. Areas with the highest population

density, percentage of minority residents, and lowest economic status earned the highest environmental justice concern ranking. These rankings correlate with the locations of existing and pending garbage incinerator projects and chemical toxic waste disposal sites in the state.

The area of New Jersey extending from the northern end of Hudson County down through the eastern parts of Essex, Union, and Middlesex counties forms a crescent of land which is among the most industrialized and polluted areas in the country. There are at least 32 toxic waste sites currently being detoxified by state and federal agencies using taxpayer dollars under the U.S. Congress's December 11, 1980 "Comprehensive Environmental Response, Compensation, and Liability Act," also known as "Superfund." Between 1980 and 1996, a total of \$134 million was spent or authorized to clean up these toxic waste sites (RESTORE 1996, 2). Within a three-mile radius of its center, this sacrificial zone has two operating municipal solid waste (MSW) incinerators, one in Newark and one in Rahway, a proposed hazardous waste incinerator in Linden, and a proposed medical waste treatment plant on Rahway River marshlands in Linden.

Incineration: Functions and Problems

Incineration is the controlled burning of wastes at high temperatures in a facility designed for efficient and complete combustion (Rhyner et al. 1995, 241). This means converting all carbon to carbon dioxide, hydrogen to water, and sulfur to sulfur dioxide (World Book 1997). The byproducts of incineration are ash, gases, and heat energy. Wastes are burned to reduce volume, destroy certain chemicals or alter chemical characteristics, destroy pathogens, or recover energy.

The steam produced through the combustion process is used to generate electricity. Approximately 10–20 percent of the electricity produced is used for the incinerator's own operations; what remains is sold to neighboring homes, businesses, government buildings, and universities (Rhyner et al. 1995, 259). Incineration only produces approximately 25 percent as much energy as that produced by burning the same amount of fossil fuels. Large facilities are sources of electricity but require huge amounts of waste to remain in operation, undermining waste reduction and recycling programs.

Incineration technology is the second largest source of dioxin in the United States, accounting for 31 percent of the total known dioxin emissions to the air (Gibbs 1995, 213). Dioxin is the most highly carcinogenic

substance known (RESTORE 1996). All five New Jersey incinerators are “mass burn” facilities which are believed to be the most dangerous, burning only 11 percent of the garbage waste burned in the U.S. but producing 72 percent of the total dioxin emissions from all municipal incinerators (Gibbs 1995, 213).

The major emissions into the atmosphere from the incineration of municipal solid wastes are carbon dioxide, water, particulate matter, sulfur dioxide, nitrogen oxides, polychlorinated biphenyls, dioxins, and heavy metals. With the passage of the Clean Air Act on December 31, 1970, incinerators were required to meet strict air emission standards through elaborate control devices (Worobec and Hogue 1992, 103-29).

Municipal solid waste incinerators also produce two distinct types of ash: bottom ash, the residue left from the burned materials; and fly ash, consisting of the particulates removed from the flue gas. Both types of ash consist primarily of metal oxides; mixed ash is deposited in a municipal solid waste landfill, as is fly ash. More recently it has been used in so-called recycling projects such as road paving and mall building. If it is tested and found to be hazardous, law requires it to be disposed of in a hazardous waste landfill.

Critics of Incineration

Opponents of incineration cite air pollution, ash disposal, and the competition for recyclable paper and plastic materials as concerns. Installing air pollution control technology increases costs of operation while air emissions continue to pose serious health threats and consequences for host community residents. Failed ash toxicity tests have led to state fines as well as costly hauling and disposal fees from hazardous waste landfill facilities. These financial burdens have often been transferred onto host community/county residents as property tax increases, as well as other types of tax increases (Blanchard 1997; Caldera 1997; Crane 1997). Another strategy aimed at cutting losses to the facilities has been the abandonment of recycling and composting projects which directly compete with the incineration industry (Caldera 1997).

Exorbitant bond debts remaining from the millions of dollars worth of municipal bonds floated to fund the building of these facilities have left the impacted counties and their taxpayers in a dire financial situation. Oversizing the facilities, allegedly aimed at regionalization, worked to benefit industry but only in combination with both “put or pay” contracts and “flow

control” laws. A “put or pay” limit is implemented when the operating entity and the county enter into a contractual agreement on a fixed tonnage and disposal fee per ton of garbage delivered to the facility per day. Regardless of whether the county is capable of supplying this specified amount of waste, they are required to pay the operating entity as if they were. “Flow control” laws arose from the 1982 Supreme Court ruling that the state had the authority to direct the flow of garbage within the state (Brubaker 1998). The 1996 Supreme Court ruling to “deregulate” trash in New Jersey overturns this earlier decision, finding the state control of the trash flow to be unconstitutional and counter-competitive (Brubaker 1998). The five existing facilities now find themselves in fair and direct competition with the landfill industry. Market forces ensure the fact that trash haulers will choose to do business with those facilities offering the best price whether in or out of the state, landfill, or incinerator. Currently, landfill disposal prices are less than half that of incinerators. To add to this financial disaster, out-of-state landfills offer prices that undercut those of New Jersey landfills.

Effects on Health

According to the EPA, dioxins, in particular 2,3,7,8 tetrachlorodibenzo-p-dioxin or (TCDD), finds its major source of production in the incineration of municipal and medical waste (RESTORE 1996, 20). The EPA estimates that the average person in the United States is at or near the saturation point for levels of this bioaccumulative chemical poison (RESTORE 1996, 20). Most human exposure is through the consumption of animal and plant foodstuffs that have themselves been bioaccumulating the toxin via dioxin-contaminated air, water, and/or soil.

According to the EPA’s 1994 “Draft Reassessment Report on Dioxin,” dioxin levels 100 times lower than that which cause cancer cause immunological problems, neurological problems, developmental problems, and reproductive problems such as abnormal sexual development, abnormal sexual organs, and decreased fertility (RESTORE 1996, 37).

Another health hazard wrought by incineration is methyl mercury. According to the DEP, current exposure levels to methyl mercury pose an unacceptable risk to women of childbearing age, pregnant women, and young children (RESTORE 1996, 33). This heavy metal, present at significant levels in MSW incinerator emissions, has been found to cause severe developmental problems. The FDA standard for mercury levels in fish sets human mercury exposure levels through fish consumption at a level several times higher than that

determined dangerous by the Agency for Toxic Substances and Disease Registry (ATSDR) (RESTORE 1996, 34). Poorer populations often exploit natural resources such as nearby wildlife for food. Populations living in close proximity to an incinerator are not only subjected to higher absorption and inhalation levels but are also disproportionately affected through food consumption.

Incinerators are also a potential cause of asthma. According to the New York City Environmental Justice Alliance (NYCEJA), asthma is often triggered by air pollution (RESTORE 1996, 68). The Cerrell Report states that incineration facilities pose health risks due to emissions consisting of varying amounts of nitrogen oxides, carbon monoxide, sulfur dioxide, hydrocarbons, particulate matter, and other matter for which health standards have not yet been established (1984, 10).

Effects on the Economy

Incineration corporations argue incineration will encourage industry, yet the Cerrell report concludes that commercial office spaces and residential lands within visual, auditory, and olfactive distance of the facility will likely suffer a decline in property value (1984, 12). The Cerrell report claims the host communities derive revenues through local taxing and/or tipping fees from outside communities and counties and are offered reduced rates for their garbage disposal and/or energy use (1984, 12). For example, Rahway residents have found themselves in the position of “bailing out” the Union County facility located in their town. Residents have suffered an increase in taxes due to the county’s inability to meet exorbitant “put or pay” limits set by Ogden Martin Systems Inc. in the initial contract (Blanchard 1997).

Another economic consequence endured by host counties is the extensive bond debts resulting from the construction of the facilities. One example is Union County. The Union County Utilities Authority took responsibility for \$250 million worth of bond issuance while the Union County freeholders agreed to back the remaining \$35 million, putting the taxpayers’ money into a highly risky venture. Although this saved money in the short run, taxpayers find themselves paying in the end. The facility is not only failing to return a profit, it is failing to break even.

Incineration in New Jersey

All five of New Jersey’s municipal solid waste incinerators are of the “mass burn” variety with higher

capacities, higher pollution levels, and higher control requirements than modular facilities. All operating facilities within the state are also designed for energy recovery. In these so-called waste-to-energy resource recovery facilities (RRFs), recovered energy, in the form of heat, is used to produce steam and generate electricity. In fact, these facilities do not literally recover any resource. Physically these facilities take a product, garbage, add fire, and through a complex process produce a new product, steam, which sets in motion giant energy-producing turbines. Revenues from the sale of these “recovered” products, often within the host communities, are used to offset the high capital and operating costs of the given incinerator. This has social, political, and economic consequences for the host counties and municipalities of New Jersey’s five incinerators.

Several factors worked in favor of incineration proponents during the climax of the New Jersey RRF campaign in the early 1980s. Just coming out of the energy crisis and facing a major population explosion, the state was willing to embrace technological initiatives in energy conservation (Blanchard 1997). In addition, waste management specialists projected that New Jersey would run out of landfill space by the year 2000, and that landfill technology itself had far too many environmental and social complications to be relied upon further. With no mention of aggressive recycling, landfill closures produced a forced, premeditated garbage crisis (Hoffman 1998). A facility that could turn garbage into energy while at the same time putting an end to the “garbage crisis” seemed like a solution. One incinerator critic noted many incineration companies were involved in building nuclear reactors: “These people are the same folks who helped build nuclear reactors when nukes were hot. When nukes fell out of favor they found a new business in garbage incinerators” (Cohen 1997).

The New Jersey Municipal Solid Waste Incinerator Siting Process

According to New Jersey Department of Environmental Protection (NJDEP) planning board member Robert Goodwyne, municipal solid waste incineration rose directly out of the 1975 *Solid Waste Management Act*; state legislation dictating that all New Jersey counties devise solid waste management plans comprising the best use of resource recovery (Goodwyne 1998). “Resource recovery” was broadly defined to include, from most to least effective: reuse, recycling, composting, and incineration. County planning boards and freeholder were responsible for all proposed sitings but held the state responsible for guiding the overall

waste management process. Although counties had the option of rejecting incineration technology as a means of solid waste disposal, most county freeholder boards communicated to their residents that the state was mandating incineration (Hoffman 1998). At this point, major disputes between residents and freeholders erupted. Ocean County residents used this dispute to

back out of their original plan, which included incineration by implementing an aggressive recycling and composting plan in combination with landfilling, arguing that the replacement plan more closely followed the best use of the resource recovery idea specified in the original act. (Sansone 1997).

Table 1. County, City, and Incinerator Status for New Jersey, 1998				
Case #	County	City	Incinerator Status I	Incinerator Status II
1	Cumberland		Not Proposed	No Incinerator
2	Hunterdon			
3	Atlantic	Egg Harbor	Sited but not Build	
4	Burlington	Florence		
5	Cape May	Woodbine		
6	Mercer	Hamilton		
7	Middlesex	Sayerville		
8	Monmouth	Tinton Falls		
10	Ocean	Waretown		
11	Salem	Carneys Point		
12	Somerset	Bridgewater		
13	Sussex	Lafayette		
14	Bergen	Ridgefield		
15	Camden	Pennsauken		
16	Gloucester	West Depford		
17	Hudson	Kearny		
18	Passaic	Passaic		
19	Camden	Camden City	Sited and Built	
20	Essex	Newark		
21 ^a	Gloucester	West Depford		
22	Union	Rahway		
23	Warren	Oxford		

Source: 1989 Major Solid Waste Facilities Project Status Report, NJDEP.

a. Case was not included in cited source

Research Methods

Of 21 counties, 19 submitted plans including incinerator sitings. Of these 19, Camden and Gloucester proposed 2 possible sites each.³ The 19 county sites plus Cumberland and Hunterdon, who choose against incineration, created the 23 cases for the following analysis. Each case was assigned to one of three research groups depending on the incinerator project’s status. The three categories are “not proposed,” “sited but not built,”(shortened to “sited”) and “sited and built” (shortened to “built”). 16 cities form the “sited” group. The “built” group includes the five cities where a facility was actually built and is presently functioning. Table 1 lists the cases.

The Dependent Variable

The dependent variable for this study is the incinerator status of the listed city and/or county:

columns 4 and 5 of Table 1. Column 4 (Incinerator Status I) represents the original incinerator status categorization (“not proposed,” “sited,” and “built”) for each of the 23 cases. Column 5 (Incinerator Status II) represents the same 23 cases with a slightly different categorization. For statistical purposes the Incinerator Status II variable combines the cases belonging to the “not proposed” and the “sited” groups to form one larger group termed “no incinerator.” Status was selected as the dependent variable since it allows for a direct test of the concept of environmental injustice. If environmental justice exists, the distribution pattern of incinerators should be random; that is, it should not correlate with major socioeconomic variables. By contrast, if the locations of the incinerators systematically associate with socioeconomic variables, then environmental injustice will be shown to exist in New Jersey in the siting and construction of municipal solid waste incinerators.

Table 2. Independent Variables and Their Abbreviations	
Variable Name	Abbreviation
Median Family Income	MFI
Median Gross Rent	MGR
Median Household Income	MHI
Median Household Value	MHV
Per Capita Income	PCI
Percent of Population Living in Poverty	Poverty
Percent of Population Living in Urban Area	Urban
Percent of Population 25 Years Old or Older in Possession of an Associates Degree or Higher	Educ.
Percent of Population Black	Black
Percent of Population Hispanic	Hispanic
Percent of Population White	White

The Independent Variables

Independent variables consist of economic and demographic indicators drawn from the 1990 United States Census Database (C90STF3A) for each of the 23 cases. Table 2 lists the independent variables and their abbreviations. These were drawn to measure and compare the economic and social conditions of the three incinerator status groups. The choice of age and

educational level for this indicator was influenced by the personality profile of “individuals most likely to oppose an incineration facility siting” noted in the Cerrell report. The report reads, “The kind of person who is most likely to oppose the siting of a major facility is young or middle aged, college educated, and liberal” (1984, 27). Racial indicators were calculated by dividing the number of Blacks, Hispanics, and Whites by the total number of persons for each case.⁴

Levels for Data Collection

Data were collected at the lowest possible level for each case.⁵ The county is the unit of analysis for Cumberland and Hunterdon County since no city-siting placement data existed. City level data were collected for both the “sited” and “built” groups since city names were placed on the siting documents. To effectively examine the neighborhoods most dramatically affected by incinerator projects, those geographically closest to the facilities, it was necessary to collect data at a level lower than that of the city for the “built” group. Because individuals living within a half-mile of an incinerator breathe in the largest concentrations of toxins, experience the most dramatic decreases in property values, smell the strongest foul odors, and bear the greatest health risks, I chose the half-mile radius as the unit of analysis for the “built” group.

Half-mile radius data were collected through use of the Census CD software package (Geolytics 1996). Because the program requires a full and specific address, half-mile radius data were not possible for the “sited” group. The incinerator facilities themselves, the “built” group, have actual street addresses, while the proposed sites which were never built, the “sited” group, merely had block and lot numbers.

Analysis of Variance

Two sets of randomized one-way analyses of variance (ANOVA) were run for this study. The ANOVA tests were run on both the city and half-mile radius data. The first ANOVA set examined the socioeconomic variation among the three incinerator status groups listed in the Incinerator Status I column of Table 1. The first group of tests used census data collected at the county level for the two “not proposed” groups (cases 1-2) and at the city level for both the 16 “sited” (cases 3-18) and the five “built” (cases 19-23) groups. The second group of tests used county level data for the “not proposed” group, city level data for the “sited” group, and half-mile radius of the incinerator data for the “built” group. The first tests answer the question of whether there are significant differences among those places where incinerator sitings have and have not occurred in terms of economic, demographic, and racial characteristics. This group of tests also answers the question of whether there are significant differences among those places where incinerators are sited but ultimately not built and those places where incinerators were actually constructed. The second group of tests answers the question of whether the socioeconomic differences found among the three

incinerator status groups increase in significance when the most heavily impacted half-mile radius areas around the presently functioning incinerators are used as the unit of analysis for the “built” group.

ANOVA Set 2 tests the significance of the differences between the two incinerator status groups listed under Incinerator Status II in column 5 of Table 1. This set of tests was run to examine whether significant socioeconomic differences exist between those places with an incinerator and those places without an incinerator. As with ANOVA Set 1, the tests were run with both city level and half-mile radius level data. The first group of tests used data collected at the county and city level for the “no incinerator” status group and data collected at the city level for the “built” status group. The second group of tests used county and city level data for the “no incinerator” group and half-mile radius data for the “built” group. This two-group strategy was used to examine the question of whether the socioeconomic differences found between those places with incinerators and those places without incinerators increase in significance within the most heavily impacted half-mile radius areas around the presently functioning incinerators.

ANOVA Results

Table 3 and Table 4 list all of the statistically significant ANOVA set 1 and ANOVA set 2 results respectively. I will highlight in writing only a few of the results.

ANOVA Set 1 Results

The first group of tests used city level data for the “built” group. Table 3 lists results comparing the “sited” and “built” status groups. An average of 16 percent of the population was found to be living in poverty within those five cities where incinerators were sited and built as compared to an average of 7 percent within the 16 cities where incinerators were sited but not built. Those five cities where incinerators were sited and built were also found to have an average of 28 percent Black residents as compared to an average of 8 percent Black residents in the 16 cities where incinerators had been sited but were not built. Statistically significant differences were not found when comparing the “not proposed” group to either the “sited” or the “built” groups.

For the second group of tests within ANOVA set 1, half-mile radius data was used for the “built” group. We see an increase from 2 to 8 in statistically

significant socioeconomic differences when using the half-mile radius surrounding the incinerator as the unit of analysis for the “built” group. We also see an increase in significance levels in the three formally significant socioeconomic differences. As in Table 3, the five cities where incinerators were sited and built had an average of 33 percent Black population as compared to an average 8 percent Black population in those 16 cities where incinerators were sited but not

built. The PCI (per-capita income) for the “built” group was \$11,827 as compared to \$16,569 for the “sited” group. Finally, the “built” group was found to have an average 13 percent of the population 25 years old or older in possession of an associate’s degree or higher as compared to an averaged 24 percent in the “sited” group. This difference is statistically significant at the $p \leq .05$ level.

Table 3. Randomized ANOVA Set 1 Results: “Sited” versus “Built” Significant Variables Only N=21				
Unit of Analysis	Independent Variable	Dependent Variable	Mean of Independent Variable	Randomized Significance Level
City	Poverty	Sited	7%	.03
		Built	16%	
	Black	Sited	8%	.02
		Built	28%	
Half-Mile Radius	MFI	Sited	\$45,702	.04
		Built	\$32,896	
	MGR	Sited	\$620	.01
		Built	\$407	
	MHV	Sited	\$140,494	.03
		Built	\$78,855	
	PCI	Sited	\$16,569	.04
		Built	\$11,827	
	Educ.	Sited	24%	.05
		Built	13%	
	Poverty	Sited	7%	.01
		Built	20%	
	Black	Sited	8%	.01
		Built	33%	
	White	Sited	85%	.04
		Built	62%	

ANOVA Set 2 Results

For this set of tests “not proposed” and “sited” groups were combined to form the “no incinerator” group which was compared to the “built” group. As shown in Table 4 the first group of ANOVA set 2 tests yielded results similar to those found in the first group of ANOVA set 1 tests. The second group of tests within ANOVA set 2 focused on half-mile radius data for the “built” group. As compared to the second group of ANOVA set 1 tests, the second group of ANOVA set 2 tests found greater levels of significance when comparing the average educational levels between those five cases that have an incinerator and those 18 cases that do not have an incinerator. ANOVA set 2 tests also uncovered an additional statistically significant difference between the two status groups. Those five cases that have an incinerator have an average MHI of \$29,116 as compared to an average MHI of \$41,110 for the 18 cases that do not have an incinerator.

Logistic Regression Analysis Results

Data as categorized for the ANOVA set 2 tests were used to examine differences between sites where incinerators were built or not built. Data at both city and half-mile radius were examined; all possible independent variable combinations were tested. With city level data, percent of population below the poverty line was found to be the strongest predictor of incinerator building, with a log likelihood ratio significant at $p \leq .03$. The emergence of percent below the poverty line as the greatest single predictor could be guessed from the ANOVAs, but the possible independent effect of other variables could only be discovered or ruled out with the logistic regression procedure. Regardless of the combination of variables, after entering the percent of the population in poverty into the regression equation, no other variables were found to have a statistically significant effect on whether an incinerator is built. This finding is consistent with the hypothesis that systematic environmental injustice exists in New Jersey.

For the half-mile radius data, the Black population percentage emerged instead of the percent below the poverty line as the strongest predictor of whether an incinerator will be built. The log likelihood ratio is significant at $p \leq .01$, and no other variables are statistically significant. This finding supports claims of environmental racism, since the closer one measures

the data to the incinerator, the more powerful the race effect becomes. The logistic regressions thus reaffirm the statistical findings in earlier sections of this analysis: poor and African-American households are disproportionately likely to live in cities or neighborhoods where incinerators are built and the disproportionate burden is statistically significant.

The Social and Political Processes Behind the Numbers

These statistical findings support the hypothesis that environmental injustice exists in the construction of municipal solid waste incinerators in New Jersey. The statistical analyses demonstrate that the distribution pattern of incinerators in the state is systematically associated with racial, social, and economic variables. This discriminatory distribution pattern leads to unequal risk of exposure to negative economic and health effects discussed earlier.

Case numbers mentioned in this discussion are drawn from Table 1. Anecdotal qualitative data were collected through semistructured, open-ended personal and telephone interviews with residents of New Jersey communities which either have a functioning MSW incinerator or had been sited for one (with the exception of Camden County), as well as anti-incineration activists, local government officials, and incineration corporation employees. Information collected through interviews supplements the quantitative data and findings. Interview material was crucial in uncovering the mechanisms through which environmentally unjust practices, policies, and procedures operate. Qualitative data are also used to analyze the potential political indicators of environmental injustice.

Statistical Conclusions

The ANOVA results verify disproportionate construction of incinerator projects in cities with significantly lower economic levels, poorer social conditions, and larger Black populations. Statistical evidence further demonstrates that the socioeconomic disparities increase in the neighborhoods immediately surrounding the projects. The independent variables show no significant socioeconomic difference between the two counties where incinerators were never sited and the cities where incinerators were sited but not built. The socioeconomic differences become significant when comparing those cases where incinerators were built and those where they were not.

Table 4. Randomized ANOVA Set 2 Results: “No Incinerator” versus “Built” Significant Variables Only N=23				
Level of Analysis	Independent Variable	Dependent Variable	Mean of Independent Variable	Randomized Significance Level
City*	Poverty	No Incinerator	7%	.03
		Built	16%	
	Black	No Incinerator	9%	.02
		Built	28%	
Half-Mile Radius	MFI	No Incinerator	\$45,941	.04
		Built	\$32,896	
	MGR	No Incinerator	\$618	.01
		Built	\$407	
	MHI	No Incinerator	\$41,110	.05
		Built	\$29,116	
	MHV	No Incinerator	\$140,678	.03
		Built	\$78,855	
	PCI	No Incinerator	\$16,717	.04
		Built	\$11,827	
	Educ.	No Incinerator	25%	.04@
		Built	13%	
	Poverty	No Incinerator	7%	.01
		Built	20%	
	Black	No Incinerator	9%	.01
		Built	33%	
	White	No Incinerator	85%	.03
		Built	62%	

Source: 1990 U.S. Census

@ Increase in significance level from Table 3

* “City” = “County” in 2 of the 23 cases

It appears that although MSW incinerators may have been randomly or arbitrarily sited throughout the

state, the building of these projects has followed a pattern consistent with the concept of environmental

injustice. At all tested levels of analysis, those places with MSW incinerators are clearly distinct from those places without incinerators in terms of economic, racial, and social characteristics. This finding suggests that the distribution of MSW incinerators within the state of New Jersey forces an unjust pollution and economic burden upon poorly educated, low-income, minority communities.

Logistic regression analysis was employed to discern which of the independent variables was the strongest predictor of the existence of an incinerator. The statistical tests show that the most relevant dimensions along which incinerators are distributed alter depending upon the given level of analysis. At the city level, percent of the population living below the poverty line most powerfully predicts the existence of an incinerator, while at the half-mile radius level the Black population percentage becomes the most powerful indicator. This finding suggests that race, more than any other variable tested, predicts the location of MSW incinerators within the state of New Jersey. In cases where the Black constituent is limited or absent, poverty becomes the greatest determinant of the location of a MSW incinerator. It seems the distribution pattern is such that race most accurately predicts the host neighborhood, while social and economic characteristics most accurately predict the host city.

Exceptions

Within-group variation for the five cases making up the “built” group necessitates explanation. In terms of racial characteristics, two of these five cases have a Black constituency below 4 percent for both the city and half-mile radius data collection levels. These findings are a reflection of the racial homogeneity found in Oxford (Case #23) and West Depford (Case #21). Although they stand out as exceptions in terms of the racial indicator variable, both Oxford and West Depford are consistent with the other “built” cases in terms of the economic and social indicator variables.

Another exceptional case within the “built” group is Rahway (Case #22). When analyzed at the city level, Rahway appears to be more like the “sited” group in terms of the independent variables; however, within the city of Rahway, Blacks make up 20 percent of the total population, while within a half-mile of the incinerator Blacks make up 66 percent of the total population. The percent of the population with a higher education drops from 23 percent in the city to 19 percent in the half-mile radius surrounding the incinerator, while the

percent of the population living in poverty rises from 6 percent in the city to 10 percent. Finally, all economic indicators drop considerably when comparing city level data to half-mile radius data. Kerri Blanchard suggests that this pattern of targeting minority, low-income, low-education neighborhoods is indicative of the sitings of hazardous waste facilities (1997).

Political Analysis

As mentioned above, each of the cases has a unique political story. While investigating the struggles around each of the sitings, some unexpected and perplexing information was uncovered. Drawing conclusions would be simple were the totality of the construction patterns due to socioeconomic factors alone. While speaking to informants, there was a consensus that the State had intended, from the onset, to build a limited number of regionalized facilities. All five of the incinerators existing within the state were designed to process amounts of garbage far exceeding that which the surrounding municipalities alone could provide. Although written proof of this political agenda has not been secured, an interview conducted with Mike LaRose was quite informative. Mr. LaRose, a former anti-incineration activist, was appointed to former Governor Florio’s task force on incineration formed in 1992. In our interview, Mr. LaRose mentioned a decision made by the task force to settle for the construction of five New Jersey facilities (LaRose 1998). Anna Maria Caldera recalls receiving a phone call from Mr. LaRose inquiring if she and other activists with whom she worked would support an agreement settling for the construction of five incinerators within the state (Caldera 1997).

All 21 communities sited for an MSW incinerator (cases #3-#23) waged some type of anti-incinerator protest. All of the communities organized and publicly expressed their opposition to the sitings. Strong public opposition and political pressure from the residents forced most of the freeholder boards to abandon the idea of hosting an incinerator project relatively quickly. Lorraine Sansone, an activist from Ocean County, explained that Waretown’s local government welcomed the idea of incineration while the residents strongly opposed the idea (Sansone 1997). According to Sansone, the local government was looking to capitalize on monetary and other amenities offered by the incineration company. Waretown’s low education and economic levels as well as high levels of poverty and minority population made it an ideal MSW incinerator siting, one which should pose little to no opposition. With the guidance and support of a band of

residents from surrounding Ocean County towns, Waretown residents used their electoral power to remove the pro-incineration officials and put in their place anti-incineration sympathizers. Support from wealthier, politically savvy Ocean County residents was critical to the Waretown victory. A strategic pattern seems to have developed. Organized residents, through a variety of creative strategies such as litigation, protests, and political pressure, stalled the contracting of the proposed projects and lobbied politicians to support an anti-incineration agenda. The question remains as to what happened in the five municipalities where the incinerators were built.

Gloucester County

According to Beth Crane, a Paulsboro resident, the original solid waste management plan submitted by Gloucester County sited a rather marshy and wooded area right up against the Paulsboro border in West Depford for the incinerator location. Crane explained “this site was within one mile of St. John’s Catholic School and within one and half miles of Paulsboro’s other grammar schools and high school. If built at this location, the incinerator would have been literally sitting on top of nearly 7,000 Paulsboro residents, of whom approximately 33 percent are African-American with a per capita income of \$23,318” (Crane 1997).

The original site was rejected because the smokestack would have been directly opposite Philadelphia Airport’s main runway. The county pulled this proposal and replaced it with a site on the border of Westville in West Depford. Technically, a small portion of the facility and its property crosses the Westville border. Further, the prevailing winds blow from West Depford in the direction of Westville and Paulsboro. The host municipality benefits are paid to West Depford, while Westville bears the greatest negative consequences, such as particulate fallout and odor. Crane recalls no public announcements in relation to this alternative siting proposal (Crane 1997). “The second site was located on the border of Westville and as physically far away from the ‘nicer’ neighborhoods in the area as possible and, once again, literally sitting on top of a working class neighborhood” (Crane 1997). The residents of the Westville area strongly opposed locating the incinerator on the border of their township, but by the time the completed plans were made public it was too late to organize any strong resistance effort. Crane believes, “the incinerator was definitely on the ‘fast track’ and permitted as quickly as possible” (Crane 1997).

Union County

The Rahway incinerator, a 250-ton per day facility, cost \$300 million to build. The two neighborhoods most immediately affected by the incinerator, the second and fourth wards, are geographically isolated and solidly African-American (Blanchard 1997). Several residents from these two neighborhoods, joined by other concerned citizens, formed the “Concerned Citizens of Rahway” in 1985. This group fought for and won the right to have the only referendum held on the incinerator project that appeared in 1985, but failed to follow the initiative through to the end, and it was ultimately used against them. The original wording was altered leaving room for confusion; the term “resource recovery facility” was used in place of “incinerator” so as to deceive those voters who were not close to the issue. The referendum also suggested that the project would save residents tax dollars. The non-binding referendum passed by a narrow margin of 5 percent, although 60 percent of ward two and 80 percent of ward four voted it down (Blanchard 1997). Out of frustration the “Concerned Citizens of Rahway” was dismantled and the “Concerned Citizens of Union County” was formed in 1989. This group sought to aggressively educate the broad public on the facts and potential ramifications of incineration. Public opinion mounted against the facility and ended with the election of Governor Florio who, at the time, claimed to be anti-incinerator. The 60 percent of the Rahway population voting for Florio assumed he would cancel the project due to public opposition and concerns. The contrary proved to be true; concerned citizens came to learn that four of Florio’s cabinet members had been intimately involved in promoting incineration (Blanchard 1997). Florio repeatedly refused to meet with Rahway residents and consistently supported the incineration industry. When asked why the struggle against the Rahway incinerator failed, Blanchard states, “[W]hen you have four figures leading the state government whom are hell bent on building an incinerator in your community, it is very hard to stop. They have money, lawyers, and authority. This project was bonded in the back rooms of county freeholders’ offices, behind the public’s back” (Blanchard 1997).

The leaders within the African-American community allegedly buckled under political pressure and coercion. Rather than vote against their leaders, the African-American residents in these communities chose to retreat, opting not to vote. Many factors help to explain this disturbing process. Interviews with African-American activists yielded explanations involving power relations, group cohesion, and

economic necessity. Often African-American leaders are forced to make a choice between taking a political stand against a detrimental initiative, such as a MSW incinerator, and either ensuring the resources needed by their constituents and/or protecting their political position. Although the constituents disagree politically, at times they find the actions and decisions of their leaders reprehensible, as was the case in Rahway. As explained to me, this phenomenon is in large part a direct reaction to racism. So as to not validate the manufactured stereotype of African-Americans, residents' disappointments over the mistakes, misdeeds, and poor choices of their leaders are often not vocalized. Additionally, the importance of maintaining a strong, united front in towns politically and socially dominated by Whites often takes precedence.

Rahway is largely a blue-collar community where government jobs account for some of the communities highest paying positions. In wealthier communities, government jobs are at the lower end of the economic spectrum and not worth sacrificing community goals. Upper government uses this vulnerability to manipulate, bribe, and persuade those individuals holding these positions (Blanchard 1997).

Warren County

Opened in June 1988, Warren County's Oxford facility was the first MSW incinerator to be put on-line in the state. The project went through although the New Jersey Historical Society found the area to be home to pre-Revolutionary homes, the New Jersey Department of Environmental Protection found endangered species present in the area, and the residents were in adamant opposition (Caldera 1997). Freeholders Charles Lee and Ken Miller allegedly targeted Oxford, the poorest town in Warren County. The involved incinerator corporation is Ogden Martin Systems, Inc. After over 10 years of pre- and post-operational struggles and countless technical and environmental disasters at the facility, the local government continues to protect the interests of the incinerator. Ogden Martin has secured its existence in this impoverished town through its nearly half million-dollar host fee. The Mayor, Phillip Rosenberg, refuses to shut down this failing facility for fear of losing this monetary amenity.

The facility is designed to burn 448 tons of trash per day. All of Warren County generates less than one-half ton of trash per day (Caldera 1997). The additional trash tonnage comes from Hunterdon County, one of the two Counties that never was proposed for an incinerator, and Somerset Counties. To financially

protect this facility, town taxes have been increased and the disposal cost (tipping fee) to the host residents has tripled with taxpayers paying, until most recently, in the neighborhood of \$100 per ton of trash delivered to the facility (Caldera 1997). Informants recall no public hearing held on the siting of the incinerator until after the facility was actually built. "Freeholder Ken Miller's dedication to the facility was so extreme that one had to wonder about the motivation and/or compensation behind it" (Caldera 1997). As it turns out, Miller was simultaneously serving as a freeholder and working for PSE&G and the PCFA, two private industries with a vested interest in the successful building and operating of the incinerator. Resident attempts to organize against the incinerator were undermined by threats to area farmers and activists. Oxford is a rural town where a majority of the residents rely on farming for their economic survival. Warren County residents, in their numerous attempts to overturn the local pro-incinerator government and replace it with anti-incinerator sympathizers have been lied to and misled. Politicians have continuously run on the anti-incineration ticket, but as soon as they got voted into office, they would become either middle of the road or pro-incineration.

A recent lawsuit settlement with Ogden Martin has caused a stir among local activists. Two groups in the area, Ridge and Valley, and Friends of the Earth, were granted \$100,000 through the suit settlement. The groups have made an agreement to use the funds in conjunction with matching funds put up by Ogden to purchase land 20 miles from the facility. A stipulation of these grants is that Ogden Martin will now work through these groups doing education in the surrounding communities and schools. "Ogden is now playing the 'good' neighbor role when in actuality they are simply buying off the opposition" (Caldera 1997). The incinerator, through the outreach program, is being touted as something not to be afraid of. When asked why she believes the facility was ultimately built in Warren County, Caldera responded, "pure political manipulation; all the strategies we used were successful in stopping incinerators in other communities" (Caldera 1997). Caldera believes incinerator companies carefully target poor, politically powerless communities that are not going to pose a problem so they can put their facilities in place before anyone really knows what is happening. "If a population is strong and united in its efforts, they can beat down the proposal very quickly. Those towns that wound up with these things had so much political corruption they were destined for trouble" (Caldera 1997).

Essex County

Arnold Cohen, formerly from the Ironbound Community Corporation in Newark and now working for the Affordable Housing Network in Trenton, describes the community immediately surrounding the Essex County incinerator as unique. "The community is unique for one because of the sheer number of polluting industries and two because it has always been a neighborhood that is viable with people willing to live near industry and willing to diversify" (Cohen 1997). Over the years, Ironbound has seen populations coming from Portugal, Brazil, and other countries throughout South America. Cohen noted that one of the most incredible effects of the Newark incinerator struggle was the fact that it was one of the few times that the various cultural sub-communities came together around a single issue (Cohen 1997).

At the time of the siting, former county executive Peter Shapiro, advocated the idea of incineration as progressive and forward looking. It was passed off as a way of updating and legitimizing a "little, parochial, backward area" (Cohen 1997). Most of the areas considered for the Essex County facility were located in Newark. In the absence of any public meetings, the site on which the incinerator was ultimately built was privately chosen. "Other proposed sites in Newark were found to be problematic due to their proximity to the airport, while the rest of the county was too wealthy to accept an incinerator. It is also very typical to put these facilities at the eastern edge of the whole county; in our case you cannot get any closer to Jersey City. The idea as told to us was, 'don't be worried about this, the prevailing winds are eastern, Hudson County is going to get the worst of it'" (Cohen 1997).

Although Newark is receiving a host municipality fee, their "put-or-pay" contract with the owning and operating corporation, American Re-Fuel, leaves the residents paying somewhere in the vicinity of \$80 per ton of trash delivered to the facility (Cohen 1997). Out-of-county disposal fees at the facility are about half of the host-county fee. Cohen believes he and the other activists involved in New Jersey's incinerator struggle were proven right over the past operational incineration years. "The garbage crisis of the late [19]70s was a forced crisis used to justify the building of these huge incineration projects within the state. Proof of this can be found in the fact that landfills that were shut down less than 10 years ago are now being re-opened" (Cohen 1997). When asked to what he owes the defeat of the anti-incineration struggle in Newark, Cohen points to the Port Authority of New York and New

Jersey. It seems the Port Authority financed the Newark project. Cohen and others believe it was the backing of the Port Authority that allowed the building of the incinerator to move forward in the face of enormous public opposition. "This agency is private one day then public the next. They were hard to fight because they have very deep pockets, but if you hold up a project long enough it can really hurt the bottom line. They threatened to sue us in the end because we made the actual process much more expensive for them" (Cohen 1997). The Newark struggle began in 1980 with the formation of a community group entitled, Ironbound Community Against Toxic Waste (ICATW). Over the next nine years, ICATW took the Port Authority to court three or four times, increasing the completion time and expenses of the project.

Discussion and Recommendations

Environmental injustice is a multidimensional issue directed by socioeconomic factors and set in motion by political and private institutions. The injustices are expressed in the building of incinerator projects designed to enhance "big business" profits and local political machines rather than solve New Jersey's garbage crisis. The discriminatory placement pattern has left low-income, minority groups facing disproportionately high economic and health risks. Low-level and/or low-quality education, as well as language barriers, often leave individuals unaware of their basic rights, producing the naiveté upon which corruption and exploitation depend. Local governments rely on votes and contributions. The most powerful lobbyists are the polluters and their allies, wielding political power through contributions. With money, power, and a plethora of resources available to them, they have the ability to shift monetary and voting support from one politician or party to another. Economically weak communities have little power and so tend to become sacrificial zones for hazardous industrial facilities. When people are working tirelessly to keep their families fed, clothed, and sheltered they have little time for political organizing and action. The needs of these communities are the last to be considered for just this reason. It seems, however, residents within these sacrificial zones are well informed, aptly concerned individuals working diligently to survive in a system that has little interest in addressing their needs and even less interest in protecting their rights.

Companies and government agencies often appear unwilling to conduct open procedures and policies to gain community acceptance, claiming they cannot respond to accusations of injustice or unacceptable

levels of pollution and contamination until they have sound scientific evidence indicating a need for such a response (RESTORE 1996, 5). The research presented here suggests that environmental injustice in the building of waste-to-energy facilities is endemic. Given this fact, it becomes imperative that the Department of Environmental Protection and the Environmental Protection Agency create new standards to combat the injustices existing in the areas of policy, planning, and practice.

Polluting, environmentally unjust corporations, as well as sympathetic government agencies or officials must be held accountable for the destruction and contamination they have caused regardless of intent. These entities should be required to bear their fair burden of responsibility for the economic, health, environmental, and social ramifications of their irresponsibility and corruption. To reach environmentally just reality, individuals must educate themselves, one another, and future generations. The qualitative data collected suggests that communities can conquer environmental injustice through voting down environmentally unjust referenda, voting out environmentally unjust officials, using their voices in public meetings, protesting against environmentally unjust initiatives, and educating the larger population on the issue of environmental injustice. Individuals must pull together, forming coalitions promoting justice, equity, and education. To address the reality of environmental injustice, individuals must be dedicated to using their civil rights in the fight against corporate domination, government corruption, and institutionalized racism as it relates to environmentally unjust policies, practices, and procedures. Dedication to this fight will pay back with the insurance of the health, stability, and sanity of this planet, its various societies, and the present and future generations of those societies

Notes

1. Preliminary data for this project were presented to a graduate-level biology class at Montclair State University in October 1997. The completed findings were presented in October 1998 at Drew University and in April 1999 at the Earth Day Forum on Environmental Justice.

2. Dana K. Natale, MA, currently holds the position of Clinical Research Coordinator of the Medical Intensive Care Unit at Mount Sinai School of Medicine in New York City, serves on the Board of Directors for New Jersey Peace Action, a peace and justice organization based in Montclair, New Jersey, and is a member of the

Society for Applied Anthropology. She can be contacted by calling 212-241-7258 or emailing dana.natale@mssm.edu. This research was made possible primarily through the cooperation, experience, and insights of New Jersey's tireless environmental and social activists. Dr. Richard W. Franke provided invaluable direction, guidance, and support throughout the project.

3. The second of the 2 Gloucester sitings was not included in the 1989 DEP document because it was submitted as a last-minute alternative to the original West Depford siting which was dropped.

4. Cases where the sum of the three racial groups is above 100% are due to Census collection procedures. The 1990 Census reported "persons of Hispanic origin" and "race" as distinct variables; hence, an individual originating from Cuba who considers himself or herself to be Black will have been included in both of these categories.

5. Douglas L. Anderson et al. (1994:232) suggest that previous research using data drawn from Census, zip code and SMA levels have been flawed due to the inferential problems experienced when using such high levels of aggregation.

6. The log likelihood ratio is roughly analogous in logistic regression to the r-square value for the combined effect of all independent variables entered into an ordinary least squares (OLS) multiple regression when the dependent variable is numeric. The meaning of the reported significance figures is thus the same as for OLS regression.

References Cited

- Anderton, Douglas L., A.B. Anderton, P.H. Rossi, J.M. Oakes, M.R. Fraser, E.W. Weber, and E.J. Calabrese
1994 Hazardous waste facilities: "environmental equity" issues in metropolitan areas. *Evaluative Review* 18(2):123-140.
- Been, Vicki
1994 Locally undesirable land uses in minority neighborhoods. *The Yale Law Journal*. 103:1383-1422.
- Cerrell Associates, Inc.
1984 *Political Difficulties Facing Waste-to-Energy Conversion Plant Siting*. California: Waste Management Board.

Geolytics, Incorporated
1996 *1996 Census CD*. East Brunswick, NJ.

Gibbs, Lois Marie, and the Citizens Clearinghouse for Hazardous Waste
1995 *Dying From Dioxin*. Boston: South End Press.

Little, Betty
1995 *Just and Sustainable Community*. New Jersey: Partners for Environmental Quality, Inc.

New Jersey Department of Environmental Protection. Division of Solid Waste Management
1989 *Major Solid Waste Facilities Project Status Report*. Trenton: NJDEP.

RESTORE
1996 *The Arthur Kill. Newark Bay Region: The Beauty and the Beast*. Flanders, NJ: Grass Roots Environmental Organization (GREO).

Rhyner, Charles R., Lester J. Schwartz and Robert B. Wenger, editors
1995 *Waste Management and Resource Recovery*. New York: CRC Press, Inc.

United States Environmental Protection Agency
1992 *Environmental Equity: Reducing Risk for All Communities*. June Volume 1: Work Group Report To The Administrator.

1994 *Environmental Justice Geographic Information System Index Mapping Project*. February.

1995 Environmental Justice. EPA Region II Spring.

United States Census
1990 *1990 United States Census Database C90STE3A*.

Westra, Laura, and Wenz, Peter S
1995 *Faces of Environmental Racism: Confronting Issues of Global Justice*. Maryland: Rowman & Littlefield Publishers, Inc.

World Book
1997 Multimedia Encyclopedia Deluxe edition. CDROM.

Worobec, Mary D., and Hogue, Cheryl
1992 *Toxic Substances Controls Guide: Federal Regulation of Chemicals in the Environment*. 2nd edition. Washington, D.C.: BNA Books.

Interviews

Blanchard, Kerri
1997 Personal interview about the Rahway incinerator project. 14 November.

Brown, David
1998 Telephone Interview about the Mercer County incinerator project. 12 February.

Brubaker, Scott
1998 Telephone Interview about the deregulation of trash in New Jersey. 9 February.

Caldera, Anna Maria
1997 Personal interview about the Oxford incinerator project. 26 November.

Cohen, Arnold
1997 Personal interview about the Newark incinerator project. 4 December.

Crane, Beth
197 Personal interview about the West Depford incinerator project. 28 November.

Goodwyne, Robert
1998 Telephone Interview about incinerator siting process in New Jersey. 9 January.

Hoffman, Madelyn
1998 Personal interview about incineration and environmental justice in New Jersey. 29 January.

La Rose, Mike
1997 Telephone interview about the incinerator siting process in New Jersey. 14 September.

Sansone, Lorraine
1997 Telephone interview about the proposed Waretown incinerator project. 12 September