

AND JUSTICE FOR ALL? AN ANALYSIS OF PROCEDURAL EQUITY IN THE  
IMPLEMENTATION OF SUPERFUND IN THE SOUTH

by

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(Under the Direction of E.M. Beck)

ABSTRACT

This study provides an evaluation of whether procedural equity is a problem in the remediation of Superfund sites in EPA Region IV. Specifically, using multivariate and categorical regression techniques, this research explores whether the race and class composition of communities influences the length of time site remediation takes and the quality of site remediation. The present study explores the length of time from Superfund National Priority List proposal to National Priority List finalization, and the length of time from National Priority List finalization to having construction completion at the site. Quality of cleanup is measured by the amount of money spent on site remediation and the permanence of the selected remedy. Other variables of interest in the Superfund remediation process that are explored in these analyses include the extent of community involvement, the size of each site, the federal status of sites and the hazardous ranking score of each site. Findings show race and class equity to be a problem in only one area of site remediation, the length of time from Superfund site proposal to site finalization.

Other significant findings show that greater community participation lengthens the site remediation process and leads to less desirable cleanup methods. Larger sites also endure a longer remediation but have more money spent on remediation. Additionally, the present study explores if how community is spatially defined influences quantitative findings. This study compares analyses using census tract level data and census block group data. The geographic comparisons reveal little difference in statistical findings indicating that at the smaller spatial scales there is some flexibility in how social scientists geographically define communities. Finally this study provides a small case study of a community action association in Region IV that is currently working with EPA to cleanup unwanted land uses. The case study data reveal that many community members are reluctant to work with EPA in cleaning up sites due to fearful and mistrustful relationships with government agencies. This study provides additional suggestions and directions for future research.

INDEX WORDS: Categorical Regression, Environmental Justice, Environmental Protection Agency (EPA), Environmental Racism, Procedural Equity, Superfund

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A Dissertation Submitted to the Graduate Faculty of

The University of Georgia

In Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2004

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## DEDICATION

*This is dedicated in memory of my father Robert James Petrie.*

## ACKNOWLEDGEMENTS

There are many people to whom I am deeply indebted and I could not have successfully completed this project without their help. First and foremost I have a tremendous amount of gratitude to my doctoral committee of Dr. E.M. “Woody” Beck, Dr. Reuben May and Dr. James Coverdill. My committee is comprised of an extraordinary group of scholars who I am very grateful to have had the opportunity to study under. Each member provided me with constructive feedback that greatly improved this research. My committee members also made themselves available to help me throughout the dissertation process. I am especially thankful to Dr. Beck, my committee chair, who provided much assistance in the early stages of this project which took well over a year to complete.

I am also indebted to many people outside of my committee that made themselves available to assist me in answering questions and providing necessary data for this research. Staff at the Environmental Protection Agency answered numerous questions I had and provided me with data in a timely fashion. Katia at Geolytics was very helpful in answering many of my questions regarding running data programs. John Prechtel of data services at the University of Georgia Library provided a great deal of assistance in obtaining necessary data and software. Finally, Armstrong Atlantic State University allowed me unlimited access to important data sources at their library.

Of course completing a Ph.D. program requires more than carrying out dissertation research and there are many people who have been extremely helpful to me while I was in graduate school. First I owe thanks to Dr. Paul Roman for providing me with a research assistantship to fund my doctoral studies. I simply could not have completed my doctoral degree in a timely manner without such assistance. I also had the opportunity to enroll in a wide range of classes in the sociology department and I learned a tremendous amount from the faculty that I took classes with and who provided me with the tools needed to successfully complete the dissertation. I am especially indebted to James Coverdill for all of his statistical expertise he shared with me.

Finally, I could not have managed the stresses associated with graduate school and with writing the dissertation without the tremendous amount of social support I received from friends and family. First, I have to thank my family for loving me unconditionally and always reminding me I could do it even when I was slightly unbearable to be around. I especially have to thank my dad, who did not live to see me finish this, but whose constant praise kept me motivated and encouraged. He always encouraged me to aim high and he never withheld how proud he was of my accomplishments.

Stephanie McClure, Micki Neal, and Abbi Snyder are great friends and colleagues and I am thankful to have gotten to know them through the sociology program at Georgia. Michael Ramirez gave me a much needed social life outside of school and provided a tremendous amount of support both collegially and personally. Last but not least, my dog Wally and my cat Franklin kept me company while I spent inordinate amounts of time in front of the home computer.



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## LIST OF ACRONYMS

CERCLA- Comprehensive Environmental Response, Compensation and Liability Act

EPA- Environmental Protection Agency

HRS- Hazardous Ranking System

LULU- Locally Unwanted Land Use

NIABY- Not In Anybody's Backyard

NIMBY- Not In My Backyard

NPL- National Priority List

O&M- Operation and Maintenance

OU- Operable Unit

PRP- Primary Responsible Party

ROD- Record of Decision

SARA- Superfund Amendment and Reauthorization Act

TAG- Technical Assistance Grant

TRI- Toxic Release Inventory

## CHAPTER 1

### INTRODUCTION

It was over twenty years ago that I first visited Savannah, Georgia and yet the visit remains etched in my memory. It is a memory that sparked my interest during college and graduate school to study environmental justice. I had just celebrated my eighth birthday and was about to start the third grade. My family lived on a small coastal island in the southern part of South Carolina and we were traveling to Savannah to do our “back to school” clothes shopping. At that time the island had little development and the stores mostly catered to the active tourist population. This meant that trips to Savannah were necessary to get items that the tourist shops did not carry. It was a warm late summer day when we drove down the State road that ran through rural parts of the southern coastal area of South Carolina that would eventually take us into the northern coastal mainland of Georgia where Savannah is located.

As we approached the Savannah Bridge, which connects the coastal regions of South Carolina and Georgia, I had my first glimpse of the historic city. As we crossed the bridge, my growing excitement dwindled as I looked out at the large mass of paper mills that lined the waterway. Thick billows of white smoke filled the sky and the stench emanating from the mills was almost unbearable. Like a typical eight year old, I closed the car window and held my breath but the remnants of the odor seemed to be following us. As we drove away from the unsightly manufacturing area I remember looking at the

faces of the people in their cars and along the street. I thought about how awful it must be to live here everyday.

It would be many years later before I would begin to come to terms with the nature of my own privilege and privileged environment. And even more time would come to pass before I would realize that living in a clean and safe environment did not have to be merely a consequence of racial and class privilege but could and must be a right for everyone.

Savannah, of course, is but one of many cities and rural towns within the United States, and globally, that struggle with environmental obtrusions, unwanted environmental hazards and environmental quality of life issues. During the 1980s, Savannah's minority population was well above the national average. For example, according to the 1980 Census, Savannah had an African American population of 36%, well above the national average of about 11% at that time. Due to the nature of institutionalized racism is not surprising that Savannah also had high poverty rates. As the environmental equity literature demonstrates, there is a link between race and poverty that is associated with living in environmentally compromised communities.

Since the early 1980s, however, Savannah has cleaned up its act. Home of recent popular films such as *Forrest Gump*, *The Legend of Bagger Vance*, and *Midnight in the Garden of Good and Evil*, Savannah is a renewed and pristine southern city. Savannah now has a thriving tourist industry and has claimed a spot with the other matriarchs of southern cities such as Charleston and Atlanta. My last trip to Savannah was a few years ago and as I crossed over the Savannah Bridge I once again looked at the paper mills along the waterway, which now had small thin pale puffs of smoke and no stench that

filled the air. It looked completely different and certainly did not seem like a bad place to live.

It seems ironic that at the time I made my first trip to Savannah the nation was undergoing massive changes in environmental policy and would soon be undergoing extensive changes in policies regarding environmental equity. In fact, it was at this time that the largest federally sponsored environmental cleanup program in the nation's history, Superfund, was being implemented. Twenty years later the opportunity presents itself to assess the outcomes, as well as issues of race and class equity, in the implementation of the nation's largest environmental law passed to date.

### **The Growth of Environmental Legislation and the Development of Superfund**

The growth of the modern environmental movement from the early 1970s until the present resulted in the enactment of an unprecedented volume of environmental legislation and an array of new regulatory measures (Szasz 1994). Along with conservation and wildlife protection issues, such as the enactment of the Endangered Species Act of 1973, much of the major legislation passed at this time focused on human health issues. For example, in 1970 the Clean Air Act was passed, followed by Federal Water Pollution Control Act of 1972, the Safe Drinking Water Act of 1974, the Resource Conservation and Recovery Act of 1976, the Toxic Substances Control Act of 1976, the Federal Insecticide, Fungicide and Rodenticide Act of 1978, and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Hird 1994).

It is this last act, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), which is the focus of this study. On December 11, 1980, President Carter signed the CERCLA legislation or what is now commonly



known as Superfund. Congress authorized 1.6 billion dollars to be allocated to the Superfund project over a period of five years, which was to be implemented and overseen by the Environmental Protection Agency (EPA). The agenda of the Superfund project was to address the growing public concern over the risk of abandoned toxic hazardous sites in their community. Stories such as that of Love Canal in New York, which received massive media attention, had increased the public's awareness of possible risk in their own neighborhoods of the deleterious, and sometimes fatal, health risks posed by abandoned and neglected hazardous waste sites.

Around the same time that Superfund and other environmental acts designed to protect human health were implemented, scholars began to pay attention to what seemed to be suspicious links between environmental outcomes and the racial characteristics of neighborhoods. This eventually became termed environmental racism. These groundbreaking studies conducted in the 1980s, primarily focused on the distribution of unwanted environmental intrusions and established links between race, class, and living with unwanted environmental hazards. In the early 1990s scholars began exploring how federal agencies responded to communities facing or in the midst of toxic threat. The Environmental Protection Agency (EPA) was among those government agencies that were accused of privileging white and middle-class communities in the process of addressing and cleaning up environmental hazards.

Studies indicated that EPA penalties given to industries for environmental violations were greater in white communities than in minority communities (Lavelle and Coyle 1993; United Church of Christ 1987). For example, The United Church of Christ's Study *Toxic Waste and Race* reported that in 28 multi-law cases, minority communities

had lower fines than in white communities, with fines in white communities approximately 306% higher than in minority communities. In Superfund enforcement cases, which are lodged mainly against polluters who have been noncompliant in cleaning up abandoned toxic waste sites, EPA fines were higher in minority communities by nine percent. This was the only area to show that minority communities fared better than others. Federal enforcement of the Clean Water Act, the Clean Air Act and the Safe Drinking Water Act resulted in average penalties that were 28%, 8% and 15% lower in minority communities respectively (cited in Lavelle and Coyle 1993). Lavelle and Coyle (1993) found that penalties at Superfund sites were 500% higher than penalties at sites with the largest minority population. In addition, for all of the federal environmental laws designed to protect people from air, water, and waste pollution, penalties were 46% higher in white communities. Since penalties are a means of deterrence for industries that threaten public health, the message sent in the iniquitous enforcement of EPA penalties suggests a higher value placed on human health in white communities (See Lavelle and Coyle 1993). Other research suggested that minorities were more likely to be exposed to air pollution but less likely than whites to benefit from the Clean Air Act (Lavelle and Coyle 1993).<sup>1</sup>

In 1993, the EPA passed a series of policy changes that sought to redress charges of environmental racism. EPA administrator Carol Browner, who assumed office in 1993, was an important figure in making environmental justice a concern and priority for EPA. Browner developed a five-point strategy for agency action regarding environmental justice. Her strategy stated five principles for agency action including: 1) Environmental

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<sup>1</sup> More specifically, of 352 Clean Air Act cases in the seven years prior to 1992, the population that benefited was 78.7 % white, 14.2% African American and 8.2% Latino.

justice must be integrated fully and consistently into the Agency's policies, programs and activities 2) Additional research is needed to address human health and environmental risk to high risk populations, including the identification of multiple and cumulative exposures or synergistic effects 3) Environmental data must be collected, analyzed and disseminated routinely. This is particularly true for data comparing environmental and human health risks to populations identified by national origin, income and race 4) Compliance monitoring, inspections and enforcement actions must be targeted and have a multimedia focus 5) There must be early involvement in the Agency's activities by all stakeholders and information on human health and the environment should be clear and readily accessible to all stakeholders (as cited in Gaylord and Bell 2001: 36).

On February 11, 1994, President Clinton signed Executive Order 12898 Federal Actions to Address Environmental Justice, which gave national attention to the issue of environmental justice. Since the early 1990s, however, there has been little research conducted regarding equity in the EPA's process of cleaning up communities exposed to hazardous waste.

The present study attempts to partially fill that void by focusing on one aspect of environmental justice: procedural equity. Procedural equity addresses the underlying causes of environmental inequities such as cleanup, siting decisions, and differential enforcement of laws and regulations as opposed to the distribution of environmental hazards (e.g. distributive equity). Since Superfund is a program designed to cleanup sites that for the most part have been abandoned already, it is ideally suited for an investigation of procedural equity since it is implemented and regulated by the EPA and is the largest environmental cleanup program in the United States.

As a regulatory agency, EPA plays the role of a federal watchdog of industry and capitalist expansion, which tends to wreak havoc on the environment when unregulated. EPA seeks to conserve the environment and protect human health. The organizational structure of EPA, however, results in an agency that tends to be exempt from regulation of their practices. Nonetheless, and as noted earlier, critiques of EPA programs have emerged from scholars, environmentalists, grassroots activists, as well as from the general public (Goldfarb 2001). Evaluation and criticism of EPA programs though, and especially that of Superfund, tend to disproportionately focus on issues related to cost and liability as opposed to issues of equity. In fact, Superfund has commonly been referred to by critics as a “toxic” or “hazardous waste” of taxpayers’ money.

Concerns regarding equity have typically risen in respect to the distribution of hazards or the demographic composition of communities with unwanted environmental hazards and what EPA can do to assure safety and health for all groups of people, regardless of class or race. In other words, EPA is seen as a friend to citizens and communities protecting them from unbridled environmental degradation and threats to human health, which result from unregulated industry. EPA is viewed by most as an agency seeking to protect the public, which should particularly benefit lower socioeconomic status and minority groups who have been proven to bear the brunt of unwanted environmental hazards. Overall, few criticisms have emerged that have explicitly focused on the regulatory practices of the EPA. A handful of critics, however, have addressed issues of equity in EPA’s regulatory activities. I explore these criticisms in depth in the proceeding section.

## **EPA and Environmental (In) Justice**

In July of 1991 EPA administrator William Reilly received an open letter from the Southwest Network for Environmental and Economic Justice documenting 10 years worth of neglect and lack of enforcement of environmental regulation in their region. The letter drew attention to numerous examples of iniquitous treatment in their region including the predominantly Mexican community in Kettleman City, CA where EPA had approved a large expansion of a landfill without holding a hearing for affected residents. In south Dallas, EPA folded under pressure from local industries to keep life threatening lead smelters running despite the fact that thousands of African Americans and Latinos were getting poisoned daily. These are just a few examples of the inequities documented in the letter (see Moore and Head 1993).<sup>2</sup> A few months later the First National People of Color Environmental Leadership Summit convened in Washington D.C., where the initial seventeen principles of environmental justice were outlined. One of which called for “public policy to be based on mutual respect and justice for all peoples, free from any sort of discrimination or bias.”

In 1992 the EPA created the Office of Environmental Justice in response to the growing public awareness and concern regarding environmental equity in the management of EPA programs and the overall established link between hazardous intrusions of communities and the race and socioeconomic characteristics of communities. A separate structure was developed to specifically focus on the implementation of environmental justice reform in the EPA’s programs, the

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<sup>2</sup> Open letters were also sent to the “Big Ten” mainstream environmental organizations calling for equitable resources and fair representation of minority members on their governing boards.

Environmental Justice Coordinators Council (EJCC). The EJCC is specifically responsible for ensuring policy input, program development and implementation of environmental justice through the Council. Furthermore, the Council argues to have established a commitment from the EPA's management and key personnel that environmental justice is a priority (EPA: National Environmental Justice Advisory Council Overview, 2003).

In response to the study conducted by the United Church of Christ and a study sponsored by the National Law Journal which documented environmental inequity in the implementation of many of the EPA's programs, including Superfund, the EPA produced a report in 1992 entitled "Environmental Equity: Reducing Risk in all Communities." This report concluded that although there were large gaps in data, enough was known with sufficient certainty that the EPA could act (EPA: OSWER Environmental Justice Action Agenda). In 1993 Carol Browner became EPA administrator, and as previously mentioned, laid out a strategy for Agency action regarding equity.

The EPA claimed a new commitment to taking into account environmental justice in their decision-making processes, research, and data collection. On November 29, 1993 the EPA's Office of Solid Waste and Emergency Response (OSWER) developed an Environmental Justice Task Force, which included representatives from each OSWER program area, one of which is Superfund. The "OSWER Environmental Justice Task Force Draft Final Report" was published on April 25, 1994 and was soon followed by a press conference. At that time, the OSWER Assistant Administrator, Elliot Laws, requested that EPA regional offices as well as OSWER program offices begin implementation of the recommendations outlined in the Task Force report.

The 1994 Executive order 12898 on Environmental Justice signed by President Clinton, held federal agencies, and particularly the EPA, responsible for developing a plan for environmental justice reform from one year of the signing of the Order, although this was later extended by two months to April 11, 1995.<sup>3</sup> In May of 1995, the EPA released “Environmental Justice Strategy: Executive Order 12898”. The report describes Environmental Justice strategies in regard to six cross-cutting mission areas: health and environmental research; data collection, analysis and stakeholder access to information; enforcement and compliance assurance; partnerships, outreach, and communication with stakeholders; Native American, indigenous and Tribal programs; and integration of environmental justice into all agency activities. Since the Executive Order, EPA has primarily committed itself to greater community involvement and outreach. The EPA implemented a number of Community Advisory Groups (CAGs) at select sites with environmental justice concerns, which are currently being implemented by some of the Regional divisions. Additionally, EPA has developed Technical Assistance Grants (TAGs) for grassroots organizations in communities with a Superfund site to assist them in understanding, and having input into, the rather complex remediation process.

In the executive summary of “Waste Programs Environmental Justice Accomplishments Report” EPA outlines numerous successes they have achieved regarding the implementation of Environmental Justice reform. Regional divisions of the EPA are addressing environmental justice concerns through various techniques, although this is not consistent across the ten autonomous EPA regions. Some regions are actively

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<sup>3</sup> President Clinton also proposed legislation to amend the Superfund program, although this legislation failed to pass. The EPA has implemented a few of the proposed environmental justice reforms despite the fact that the legislation was not passed.

involving communities in the site remediation process, others are employing advanced geographical analyses to assess possible environmental justice concerns in their regions, while others are analyzing site selection criteria in their regions. For example, Region V now uses environmental justice concerns as a qualifier in site screening criteria to assist in establishing priorities within the Region's Superfund program implementation. In addition, Site Assessment Teams (SATs) and Regional Decision Teams (RDT) routinely factor in environmental justice concerns into their assessments and decisions. Some of the other regions are using Geographic Information System (GIS) analyses to assess possible environmental justice issues at Superfund sites in their regions. While there is much going on within EPA regarding issues related to environmental justice, there is less known about the actual process EPA uses in Superfund site remediation and whether lower income communities and/or racial and ethnic communities are serviced differently by EPA's remediation process.

Despite the fact that the EPA has devoted a great deal of press, and some might argue rhetoric, towards their commitment to environmental justice there have been but three studies published that have actually explored issues of environmental justice in the implementation of the Superfund program (Lavelle and Coyle 1993; Hird 1994; Gupta, Van Houtven and Cropper 1995). Moreover, these studies show mixed results in whether certain types of communities, namely white and higher socioeconomic status communities, receive more favorable treatment from the EPA in the process of Superfund site remediation.

EPA's promise to environmental justice reflects a commitment to community involvement and listening to members of the community. All Superfund decisions are



required to be made available to the community and a public hearing is required where concerned citizens, as well as other interested parties such as lawyers, government officials and the press, can voice objection to Superfund decisions as well as ask EPA for clarification of what tend to be very technical documents.<sup>4</sup> The public is given a thirty day period to submit in writing any further objections or questions they may have regarding EPA's decisions. Despite EPA's commitment to community involvement there have been no studies conducted to date that have explored whether community involvement actually influences outcomes in the Superfund site remediation process.

### **The Present Study**

The present study explores aspects of procedural equity in the implementation of Superfund sites in the EPA's Region IV. Region IV is headquartered in Atlanta, Georgia and oversees eight states that comprise the Deep South: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee. Region IV is ideally suited for an investigation of procedural equity in Superfund because it is over represented, e.g. above national averages, in percentage of poor households and percentage of racial and ethnic minorities. Additionally, because of the poor economic conditions of the South many southern states have lax environmental regulations in order to encourage much needed business and economic development. The South is consequently burdened with a disproportionate amount of toxic waste (see Bullard 1990).

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<sup>4</sup> The requirement for community acceptance of Superfund site remediation has existed since the origin of Superfund and is not a result of a renewed commitment to equity and environmental justice. Arguably, since the commitment to environmental justice has been made EPA has expended a greater effort to inform and include members of communities in the remediation process.

South Carolina, for example, receives a considerable portion of its revenue from taking other states' waste (Bullard 1990; Cutter, Holm and Clark 1996). A complete census of Superfund sites in Region IV is the focus of the present study, which span three decades of Superfund from the early 1980s to the early part of the 21<sup>st</sup> Century.

This study seeks to explore such questions as:

- Does EPA privilege certain types of communities, namely white and higher socioeconomic status, in the remediation of Superfund sites?
- What factors can account for such examples of inequity if it does exist? For example, does community involvement/activism result in more equitable treatment by EPA? Are lower income and minority communities more likely to participate in community involvement?
- Does the extent or nature of the toxic hazard, measured by the sites EPA administered hazardous ranking score, influence the quality of cleanup or the length of the site cleanup process?
- Are certain communities, such as upper income and white communities, more likely to be given higher hazardous ranking scores? If so, does this influence the quality of service received from EPA?
- Does the size of the site make a difference in length and quality of site remediation?
- Finally, does how we spatially define community influence statistical findings?
- More generally, this study addresses whether the pace of Superfund site remediation and the quality of site remediation varies by the demographic composition of communities when controlling for site specific factors.

This study also explores how site specific factors such as the hazardous ranking score and the size of the site may also influence equity in the remediation process. Other community variables of interest include percentage of residents in an urban area and percentage of residents who rent as oppose to own their homes.

In order to address these questions I employ multivariate statistical analyses using data obtained from the EPA public records. I explore the time it takes for a Superfund site to achieve final NPL status from proposal status, the likelihood of a site to achieve construction completion status over a ten year period, the amount of money spent on site remediation, and the type of remediation (e.g. a more permanent and thus more preferable solution or a less preferable more temporary solution). I also gather data from the EPA on community involvement at each site, the size of the site, and hazardous ranking score, which assess the threat to human health the site poses. Demographics of communities are obtained using data from the 1980-2000 U.S. Censuses. These data are collected at two levels of geographic scale, census tracts and census block groups.

This study is unique from previous studies on equity in Superfund implementation in that it compares different geographic scales that have not previously been used in spatially defining Superfund communities, it incorporates previously unexplored independent or causal variables, it employs more rigorous statistical techniques than some previous studies (Lavelle and Coyle 1992), a considerably larger sample than one study (Gupta, Van Houtven and Cropper 1995) and it allows for a larger time frame to follow sites which are matched with Census data that reflect neighborhood demographics at the time of site proposal. Furthermore, although it is too early to evaluate the full effects of EPA's promise to environmental justice, this study allows us to glean insight

into possible changes that are occurring in equity by including sites that were proposed over the last ten years. This is particularly important because it is the last decade that comprises the period of environmental justice reform in Superfund.

In addition to addressing equity issues related to the execution of Superfund, the present study also presents an organizational case study of an environmental justice group in Region IV that currently lives with a remediated Superfund site and is actively working with the EPA on additional toxic hazards in their community. Since organizations are seen as an influential resource in grassroots mobilization, the case study provides a descriptive picture of the organization as well as exploring the organization's relationship to the EPA.

In the chapters that follow, I provide an overview of Superfund (Chapter 2), and an overview of the environmental justice movement literature, with a particular emphasis on environmental justice and Superfund (Chapter 3). Chapter 4 discusses the methodology and data collection for the quantitative portion of the study that examines equity in Superfund. In Chapter 5, I present the main findings from the quantitative analyses on the pace of cleanup at Superfund sites. The results from the analyses on the quality of Superfund site cleanup are presented in Chapter 6. Chapter 7 presents a case study of a grassroots environmental justice organization in Region IV involved with the EPA in a Superfund site remediation. Finally, Chapter 8 provides a discussion of the study findings, limitations of the study, suggestions for future research, and policy suggestions for EPA in achieving environmental justice in the Superfund program.

## CHAPTER 2

### SUPERFUND: AN OVERVIEW

This chapter provides an introduction to the Superfund Law and remediation process. I review the historical development of Superfund as well as significant changes, or amendments, which have been enacted. I also review the technical aspects of the Superfund remediation process such as the site listing process and the stages of site remediation. This will allow the reader to gain a better understanding of the actual remediation process and what it entails for a contaminated area to become a Superfund site. In order to understand whether minority and/or lower SES communities face inequitable treatment in the remediation process we first must gain an understanding of the process. Additionally, this chapter provides some basic demographics of the Superfund program, such as number of sites within regional divisions and the status of these sites. Since the focus of the present study is on Region IV, a more in-depth discussion of Superfund implementation in this region is included. Finally, this chapter reviews EPA's commitment to community involvement and Superfund legislation requirements for such involvement.

#### **Superfund: A Brief History**

The Comprehensive Environmental Response, Compensation and Liability Act (Public Law 96-510), commonly known as CERCLA or Superfund, was passed in December of 1980. Funded through a tax on petroleum products and certain chemicals,

the 1.6 billion dollar trust fund established prohibitions and requirements concerning closed and/or abandoned hazardous waste sites. The act also included a provision for the fiscal liability of primary responsible parties (PRP) (Hird 1994). CERCLA specified that EPA was to work closely with states and other political subdivisions regarding cleanup of mostly abandoned hazardous waste sites. CERCLA authorized two types of response actions (EPA 2003): 1) Short-term removal, where actions may be taken to address releases, or threatened releases, requiring prompt responses and 2) Long-term remedial response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of serious hazardous substances but that which are not life threatening. Long-term removal actions are reserved exclusively for sites listed in the National Priorities List (NPL).

Administered by EPA, the Trust Fund, officially called Hazardous Substance Superfund but also referred to as the Trust Fund, was to be used if no party could be held liable for the cleanup or if the primary responsible party was unable to afford restitution. The primary or potentially responsible party (PRP) consists of “an individual, business, or other organization that is potentially liable for cleaning up a site. The four types of responsible parties include “a site’s present owner(s) and operator(s), its’ previous owner(s) and operator(s) during the time when it received hazardous substances, the generators of such substances, and any waste transporters responsible for choosing the site” (Probst, Konisky, Hersh, Batz, and Walker 2001: 272-273).

A PRP lead action is a remediation that is financed by a PRP. A portion of the remediation action may be paid for through the Trust Fund. This has also been referred to as an enforcement lead, where the PRP is financially responsible but the EPA and state

governments oversee cleanup activities. If the EPA, who may contract out with the state, the Army Corps of Engineers or other outside contractors, finances in whole or in substantial part a cleanup then it is a fund lead action. For the most part, sites typically have a combination of lead actions and EPA almost always has at least one fund lead (Probst et al. 2001: 271).

#### Amendments: SARA

On October 17, 1986 the Superfund Amendments and Reauthorization Act (SARA) amended CERCLA. SARA developed out of reflection upon EPA's first six years in administering the Superfund program and made several fundamental changes and additions to the original Superfund Law (EPA 2003). SARA emerged from criticisms that the implementation of Superfund was inefficient, ill managed, and in short, ineffective. The following is a brief overview, provided by EPA (2003), of the main changes that SARA enacted.

First, SARA stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites. Second, SARA required Superfund Actions to consider the standards and requirements found in other State and Federal environmental laws and regulations. Third, SARA provided new enforcement authorities and settlement tools. Fourth, SARA increased State involvement in every phase of the Superfund program. Fifth, SARA increased the focus on human health problems posed by hazardous waste sites. Sixth, SARA encouraged greater citizen participation in making decisions on how sites should be cleaned up. Seventh, SARA increased the size of the Trust Fund to 8.5 billion dollars (EPA 2003). In 1990, an additional 5.1 billion dollars was granted to the Superfund trust.

## Superfund Site Listing and the Stages of Remediation

Currently Superfund sites are managed by one of EPA's ten autonomous regions.

Table 1 shows which states or US territories are managed by each of the ten regions.

While Regions are given leeway in the management process for their sites, both the site listing process and remediation process follow a standardized format.

**Table 1.** States and US Territories in the Ten Autonomous EPA Regions

Region	States
I	CT, MA, ME, NH, RI, VT
II	NJ, NY, Puerto Rico, Virgin Islands
III	DE, DC, MD, PA, VA, WV
IV	AL, FL, GA, KY, MS, NC, SC, TN
V	IL, IN, MI, MN, WI, OH
VI	AR, LA, NM, OK, TX
VII	IA, KS, MO, NE
VIII	CO, MT, ND, SD, UT, WY
IX	America Samoa, AZ, CA, Federated States of Micronesia, Guam, HI, Northern Mariana Islands, NV
X	AK, ID, OR, WA

There are ten stages of the Superfund site remediation process (see Hird 1994 pp 14-20), which I will briefly describe.<sup>5</sup> The first stage is site identification. During this stage potential Superfund sites are brought to EPA's attention through a variety of sources such as concerned citizens, state and local officials, hazardous waste handlers or through EPA's own identification process. The second stage is the Preliminary Assessment which includes activities undertaken to evaluate the severity of contamination at sites, this

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<sup>5</sup> There is not a clear written organization of the stages. For example, EPA (2003) actually describes six stages, which seem to combine some of the stages demarcated by Hird (1994). EPA's stages include: 1) Scoping (which essentially consists of the assessment tactics) 2) Remedial Investigation 3) Feasibility Study 4) Remedy Selection (ROD) 5) Remedial design/Remedial action, and 6) Deletion/Five Year Review. For our purposes, Hird's ten-stage approach provides a more detailed overview of the rather complicated process of becoming a Superfund site and the consequent site remediation.



usually includes an analysis of past written records to assess what toxics were dumped at the site, how much was dumped, and if EPA thinks it warrants a more thorough inspection. If EPA decides the written records of the company warrant further investigation then a site proceeds to stage three where a Site Inspection is conducted.

The Site Inspection involves analyzing samples of soil and water, which are evaluated using the Hazard Ranking System (HRS). In order for a site to proceed to stage four, listing as a National Priority List (NPL) site, the HRS score must reach or exceed a value of 28.5.<sup>6</sup> The HRS is the principle mechanism EPA uses to place sites on the NPL. It is a numerically based screening system that uses information from initial limited site assessments to assess the potential of the site to pose a threat to the environment and/or human health (EPA 2003).

Four pathways can be scored under the HRS including ground water migration (e.g. drinking water), surface water migration (e.g. drinking water, human food chain, and sensitive environments), soil exposure (e.g. resident population, nearby population, sensitive environments), and air migration (e.g. population, sensitive environments). After scores are calculated for one or more pathways they are combined using a root-mean-square calculation to derive one general HRS score. HRS scores are not used to determine the priority in funding EPA remedial response actions because HRS scores are

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<sup>6</sup> HRS is the most prevalent form of having a site reach NPL status. There are two other mechanisms available, however, for a site to reach NPL status. The first allows States or Territories to designate one top priority site regardless of HRS score. The other mechanism allows for NPL status if the site meets all of the following criteria: The Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Public Health Service has issued a health advisory that recommends removing people from the site 2) EPA determines the site poses a significant threat to public health and 3) EPA anticipates it will be more cost effective to use its remedial authority (which is available only at NPL sites) than to use its emergency removal authority to respond to the site.

not based on sufficient information to assess the extent of contamination or the appropriate response for a particular site (EPA 2003). The HRS essentially assigns numerical values to three general factors related to risk including: 1) the likelihood that the site has released or has the potential to release hazardous substances into the environment, 2) characteristics of the waste (toxicity and quantity) and 3) people or sensitive environments (targets) affected by the release (EPA 2003).

HRS scores are the determining factor in a site achieving Superfund status. While all Superfund sites are CERCLA sites, not all sites listed through CERCLA reach Superfund status. In fact, the majority of sites do not reach NPL status. Table 2 shows the number of CERCLA sites in each region, the number of Superfund sites and the percentage of CERCLA sites in each region that achieve Superfund status. It is interesting to note that while Region IV has the most CERCLA sites it has among the lowest percentage of sites that are Superfund sites, followed only by Region I and Region VII. Given the lax environmental regulation in the South, it is not surprising that Region IV has the largest number of CERCLA sites, but the fact that such a small percentage of sites achieve Superfund status suggests that the South has more, but perhaps less toxic sites, and that concerned citizens in the South are more active in bringing sites to EPA's attention. It is also possible that this discrepancy reflects a problem with equity in the Superfund site listing process or in conducting HRS score evaluations since percentage wise fewer CERCLA sites reach NPL status in Region IV.

**Table 2.** Distribution of CERCLA and Superfund Sites by Region

<b>Region</b>	<b>Total CERCLIS sites</b>	<b>Total Superfund sites</b>	<b>Percentage of CERCLIS sites that are Superfund sites</b>
I	1257	111	8.8
II	1116	259	23.2
III	1231	204	16.6
IV	2260	209	9.2
V	1566	298	19.0
VI	834	118	14.1
VII	1246	80	6.4
VIII	583	67	11.5
IX	1279	126	9.9
X	516	99	19.2

Source: EPA 2003

The fifth stage of the Superfund process is the Remedial Investigation and Feasibility Study. This consists of a site study that determines the type and extent of contamination at the site and analyzes the feasibility and costs of alternative cleanup methods. This stage can be conducted by EPA, contractors, state agencies or the primary responsible party (Probst et al. 2001). At this point, an estimate is made of the risk the site poses to the surrounding population (Hird 1994).

After the remedial investigation and initial feasibility study is conducted, EPA administrators then select the remedy after conducting a detailed analysis of alternative strategies. This leads to the sixth stage, the Record of Decision. The Record of Decision (ROD) is a public document in which EPA identifies the cleanup alternative to be used at the operable unit of the site (Probst et al 2001: 273). Larger sites, usually those with multiple media of contaminants such as ground water and soil, may be divided up into multiple Operable Units. Each Operable Unit (OU) must have a separate ROD. A ROD may, however, combine OUs but each OU is addressed separately in the ROD. Due to heavy criticism of the early implementation of EPA, SARA and the National

Contingency Plan attempted to standardize the resource allocation and remediation process for EPA. This means alternative remedies must go through a nine-stage assessment process, which is divided into three criteria.

Hird (1994: 141) summarizes this process: The first criteria are threshold criteria which require that the selected remedy be protective of human health and the environment and 2) the selected remedy must be in compliance with relevant and appropriate regulations. The second criteria are primary balancing criteria which include: long-term effectiveness; short-term effectiveness; reduction of toxicity, mobility or volume through treatment; implementability; and finally cost. The third group of criteria is modifying criteria, which include state and community acceptance. Each ROD is organized to address how well each alternative remedy holds up under these criteria.

In addition, the ROD provides detailed site summaries of the contamination and risks, a history of the site, and a description of site remedy alternatives. RODs detail the final selected alternative and provide a compare and contrast format of all of the proposed alternatives for site remediation for the operable unit. This usually takes the form of a comparative analysis including a cost benefit analysis, which examines costs along with long-term and short-term effectiveness in protection of human health and the environment including permanence of cleanup, and implementability.

After the ROD is signed by an EPA administrator (usually the regional administrator) the site proceeds to the next stage of remediation, Remedial Design. The Remedial Design is the engineering plan for site cleanup and usually includes technical drawings and other technical specifications (Probst et. al. 2001: 273).

After the Remedial Design, the Remedial Action stage is implemented. The Remedial Action stage consists of the actual implementation and/or construction of the specified remedy (Probst et al. 2001: 273). The next stage of the remediation process is Construction Completion. During this stage the physical construction of all cleanup actions is complete, immediate threats have been addressed and long-term threats are under control (Probst et al. 2001: 271). The final stage of the remediation process is NPL Deletion. At this stage EPA, with state concurrence, has determined that no further action is required to protect human health and the environment. During this stage, EPA must approve a “close-out” report, which establishes all necessary actions have been taken; EPA then publishes a deletion notice of the site in the Federal Registrar (Probst et al. 2001: 271). EPA also requires sites to conduct five-year reviews, which provide an update of the site in the post-remediation stage.

### **Superfund: A National Perspective**

As of September 30, 2003 there are 1572 Superfund sites in the U.S. and in surrounding US territories.<sup>7</sup> Of these 1572 sites, 1244 are currently on the NPL, 54 sites are proposed for the NPL and 274 sites have been deleted from the NPL. Eight-hundred and seventy-three (873) sites have reached the stage of construction completion (including the 274 sites that have been deleted from the NPL). Table 3 presents the status of each Superfund site by region. Table 4 presents the status of each Superfund site in Region IV by State.

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<sup>7</sup> Territories with at least one Superfund site include American Samoa, Guam, Federated States of Micronesia, Northern Mariana Islands, Puerto Rico and the Virgin Islands.

**Table 3.** Superfund Site Status by Region

<b>Region</b>	<b>Proposed NPL sites</b>	<b>Current NPL sites</b>	<b>Deleted NPL sites</b>
I	3	98	10
II	4	214	41
III	3	167	34
IV	7	160	42
V	15	226	57
VI	6	89	23
VII	3	59	18
VIII	7	49	11
IX	13	111	13
X	4	70	25

Source: EPA 2003

### **Region IV**

Because the focus of the present study is contained to sites in Region IV, is it important to consider the ways in which Region IV differs from the other autonomous EPA regions. Region IV is headquartered in Atlanta, GA and oversees what most would consider the Deep South. There are few studies that have explored how implementation strategies vary by EPA regions, and specifically Region IV, although one notable exception exists.

**Table 4.** Superfund Site Status by State in Region IV

<b>State</b>	<b>Proposed for NPL</b>	<b>Currently on NPL</b>	<b>Deleted from NPL</b>
Alabama	2	13	1
Florida	1	51	19
Georgia	1	14	3
Kentucky	0	14	6
Mississippi	2	2	3
North Carolina	0	29	1
South Carolina	0	25	3
Tennessee	1	12	6

Source: EPA 2003

A study by Church and Nakamura (1993) compared and contrasted some regional implementation strategies in Superfund including Region IV. Their findings indicate the EPA Region IV's implementation tactics are distinctive from the other regions included in their study. Church and Nakamura (1993) argue that Region IV is known nationally for its "engineering approach that de-emphasizes the liability aspects of the statutory scheme in favor of using trust fund resources to achieve rapid physical improvement on the ground" (pg. 96). In other words, Region IV will act prior to having attempted to negotiate cleanup or even locate a PRP.

One mechanism employed to this end is Regions IV's high use of emergency removal procedures. Emergency removal procedures allow Region IV to use trust fund money for speedier cleanups instead of being delayed by legal proceedings in the more cumbersome regular remedial removal procedure. This public works style of cleanup has resulted in Region IV achieving a reputation for quick cleanups to immediately remove the hazard. Region IV is also known to have less antagonistic relationships with PRPs when they are involved (Church and Nakamura 1993). In sum Region IV, more than the other autonomous EPA regions, is more likely to use federal money to get cleanups started than rely on PRP money, which often result in lengthy delays of the process.

Region IV is also less likely to have contentious relationships with state government agencies. This is primarily due to the fact that the Deep South is notorious for its lack of environmental concerns and regulations which means EPA is less likely to meet resistance from States in this area regarding cleanup selection and implementation. In addition, because most of the states comprising the Deep South are economically marginalized and have fewer resources to allocate to cleanup, EPA faces little resistance

since their public works style of cleanup primarily relies on federal money (Church and Nakamura 1993). In sum, Region IV has comparatively more autonomy than regions comprised of States with more aggressive environmental concerns.

### **Allocating Superfund Resources: The Politics of Cleanup**

Few students of Superfund have explored the politics behind resource allocation to the autonomous EPA regions; most have focused simply on resource allocation to sites after the fact. One notable exception is Hird's (1994) analysis of the political economy of Superfund. Hird notes that the allocation process begins in Washington with the annual budget. Representatives from each of the ten regions present their sites that they would like to prioritize and to start cleanup activity. All of the sites for each region are ranked according to risk, and money is allocated accordingly until the budget is exhausted. According to Hird, this democratic style of decision-making allows for a "fair share" budgeting style, which means no region's budget will be drastically reduced or enhanced from the previous year. Thus regardless of the merits of each region's requests or the number of NPL sites, regions can expect to receive their fair share (Hird 1994: 145). But what other factors besides fair share budgeting affect resource allocation and how do some Superfund sites get priority over other sites?

Hird suggests two political mechanisms that may influence the resource allocation process. The first is distributive equity and the second is a "pork-barrel" politics approach. In this section, I explore each of these in turn as well as discuss Hird's main conclusions from his analysis of the resource allocation process. According to Hird, the political principle of equitable distribution, e.g. distributive equity, is based on the federal



government's emphasis on providing aid to the most needy. Thus, federal aid is typically inversely related to State financial resources. Aid is meant to even out the playing field and result in greater equity.

A pork-barrel politics approach, however, is based on legislators favoring their own districts in order to gain favor when reelection rolls around. Thus legislative self-interest supercedes national interest. According to Hird, pork-barrel politics exists when a legislator tries to earn favor with her district and constituency by prioritizing their interests and lobbying for them. Thus by emphasizing the need for site cleanup to start, or for a site to be placed on the NPL, the legislator can expect to be repaid by future votes. Legislators can tilt geographically based policy outcomes in their favor when geographic benefits are distributed by Congress or an executive agency through oversight or appropriations committees in Congress (Hird 1994: 146).<sup>8</sup>

Hird argues, however, that not all legislators are interested in reelection and not all legislators place their own interests over those of the nation as the pork-barrel politics approach implies. Moreover, some correlations with congress appropriations and geographically based policy outcomes may actually reflect national interest and not self-interested politicians. Hird further delineates two types of pork-barrel politics: allocative pork which exists when "legislators direct site specific federal resources to their districts in a manner that violates public interest" and programmatic pork "when legislators expand a program to include more regions of the country than merit would allow in order

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<sup>8</sup> Hird also argues that since the 1990s some legislators are less willing to lobby for a site to be placed on the NPL due to bad publicity and fear of declining property values as well as the potential to get caught up in the complex and expensive remediation process. Once a site is on the NPL, however, it is in their interest to promote a speedy and permanent cleanup.

to generate more political support” (pg. 148). Hird’s analysis of the allocation of resources in Superfund indicates little to no support for the allocative pork-barrel politics approach.

His findings do, however, indicate some modest support for programmatic pork-barrel politics. Hird’s analysis explores whether the number of NPL sites in each state is influenced by certain committee assignments. Findings reveal a strong relationship between the number of NPL sites in each state and key subcommittee assignments. Hird also finds that Senate authorizing and house appropriations committees reduce the amount of time from proposal to finalization status of NPL sites but does not influence any other part of the remediation process such as money spent on each site and pace of cleanup after finalization.<sup>9</sup> Senate appropriations subcommittee was associated with having a removal action occur at a site but was not related to any other aspects of site remediation. House authorizing committees were not related to any aspects of cleanup. Hird finds that HRS scores, state priority status, and federal fund lead sites predict sites receiving greater attention from EPA, consequently receiving more money spent on site cleanup and a quicker pace of cleanup. Thus, it is possible that programmatic pork-barrel politics is at work though the influence of being prioritized by a state.

Hird’s analysis suggests that allocating money to cleanup sites is a political process. Yet the politics behind resource allocation to both EPA regions and individual sites is a relatively unexplored process that warrants further attention. If equity is a problem in the implementation of Superfund then exploring the politics of resource allocation can perhaps shed light on factors correlated with such problems. In the next

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<sup>9</sup> I provide more information on Hird’s study and methodology in Chapter 3.

section I suggest that Superfund community involvement is perhaps an additional important, but overlooked, political factor in influencing the allocation of resources.

### **Superfund: A Commitment to Community Involvement**

From the inception of the Superfund, community involvement has been an important part and requirement of the CERCLA legislation. In fact, Hird (1994) argues that the EPA's emphasis on community involvement and input in Superfund ushered in the contemporary prevalence of grassroots environmentalism. Community involvement in Superfund is an equitable response to decades of inequitable proximity to hazardous waste that Superfund is designed to cleanup. Thus, from its origins Superfund was viewed as a community based response to environmental inequity. Despite Superfund's emphasis on community involvement is has been an overlooked factor in how it influences the allocation of Superfund resources. Quite possibly, public participation serves as a political measure as well as a means of distributing equity to underprivileged communities that typically do not have the resources to lobby for their interests outside tactics of grassroots activism. In this section, I describe EPA's commitment to community participation.

All Records of Decision (RODs) are required to provide a community responsiveness summary, highlighting community involvement and key concerns of the community. Additionally, a public hearing or comment period is required which also requires a public meeting. The typical public comment period lasts 30 days and is usually announced in the local newspaper(s). Written comments to the EPA regarding the selected alternative are allowed during this time and the comment period can be extended

by an additional 30 days if requested by community members or the PRP. At the public meeting, community members are invited to listen to the EPA's proposed alternative and then ask questions and provide feedback to EPA on the chosen remedy. Amendments to a decision, or smaller changes to a remedial action (known as an explanation of significant difference) also require a public meeting, although if one is not requested EPA may forgo the meeting. For each ROD, the requirements for public involvement are the same, thus sites with multiple Operable Units (OUs) have multiple RODs and the public is invited to comment on, and ask questions, regarding EPA's selected remedy. The public meetings are usually attended by local media, representatives for EPA including a public liaisons coordinator, representatives from State agencies, concerned citizens, and the PRP if there is one.

According to EPA (2004) "the goals of EPA's commitment to community involvement include: Keeping the community well informed of ongoing and planned activities, encouraging and enabling community members to get involved, listening carefully to what the community is saying, taking the time needed to deal with community concerns, changing planned actions where community comments or concerns have merit and explaining to the community what EPA has done and why. The goal of Superfund community involvement is to advocate and strengthen early and meaningful community participation during Superfund cleanups." Since 2000, EPA has awarded a Citizen's Excellence in Community Involvement Award to encourage community participation. Nominations for this award by EPA are based on an individuals or a community group's "constructive participation and exceptional dedication and compassion in working with EPA to cleanup a Superfund site, and leadership skills,

creativity and a results orientation in identifying and helping to implement actions to reduce threats posed by hazardous materials to human health and the environment” (EPA 2004). In addition, EPA offers brochures on community involvement.

Consistent with the principle of active community involvement, EPA has established a Technical Assistance Grant (TAG) program to help facilitate and improve community involvement. According to EPA (2003), TAGs provide money to community groups to pay for technical advisors to interpret and explain technical reports, site conditions, and EPA’s proposed cleanup proposals and decisions at Superfund sites. An initial TAG of up to \$50,000 is available for any Superfund site that is on the EPA's National Priorities List (NPL) or proposed for listing on the NPL where a response action has begun. EPA requires that all communities be informed of the TAG program.

Each Superfund site is allowed one TAG and the money is granted to an already existing community group or a group that has formed in response to having a Superfund site in their community. Eligibility criteria for a TAG require that members of the group: (1) live near and may be affected by one of sites on the NPL or by a site that is proposed for listing on the NPL (the response action at the site must be underway); (2) the group is representative of the affected community; and (3) the group is nonprofit and incorporated (made into a legal corporation in the state) or in the process of incorporating. Ineligible groups are those that are: 1) a PRP for the contamination at the site, represent a PRP, or receive money or services from a PRP; (2) not incorporated (or willing to incorporate) for the specific purpose of representing affected people; (3) an academic institution; (4) a political subdivision (e.g. township or municipality); or (5) affiliated with a national

organization that has direct or indirect control over your group. There are currently 120 TAGs in existence, 18 (15%) of which are granted in Region IV.<sup>10</sup>

The majority of TAG funds are allocated for hiring an independent technical advisor to help interpret and comment on documents related to the site. A technical advisor can assist by (1) reviewing preliminary site assessment/site investigation data and other site-specific technical documents; (2) participating in public meetings to help clarify information about site conditions; and (3) visiting the site vicinity periodically during cleanup to observe progress and provide technical updates. In addition, the technical advisor can be used to interpret site information related to public health, redevelopment, or relocation (EPA 2003).<sup>11</sup>

## **Summary**

In sum, this chapter delineates the rather complex process of site remediation as well as provides a brief historical overview of the Superfund program. In addition, this chapter provides a descriptive picture of the geographic distribution of Superfund sites and the status of sites in Region IV. I have also emphasized areas where Region IV is

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<sup>10</sup> Region IV has the third largest percentage of TAGs. Region I contains 17.5% of TAGs, Region II contains 12.5%, Region III contains 6.6%, Region V contains 10%, Region VI contains 7%, Region VII contains 1.6%, Region VIII contains 15.8%, Region IX contains 9.2% and Region X contains 4.2%.

<sup>11</sup> TAG funds cannot be used for: (1) lawsuits or other legal actions, such as paying for attorney fees for advice tied to any kind of legal action or any activities that would result in an attorney/client relationship; (2) political activity and lobbying; (3) social, ceremonial and amusement activities and related costs, including meals, lodging, rentals, transportation, and tips; (4) group members' training and travel; (5) generation of new primary data such as sampling and well drilling and testing; (5) reopening final EPA decisions such as the Record of Decision; (6) resolving disputes with EPA; or (7) epidemiological or health studies, such as urine or blood testing (EPA 2003).

unique relative to some of the other EPA regions, particularly in terms of their remediation style which is characterized by their speediness in getting remediation started with EPA acting as the Fund lead and then retroactively seeking to locate PRPs. The Superfund resource allocation process is also reviewed as well as some political theories for exploring different outcomes in the site remediation process. Finally, I explored EPA's commitment to community activism in the site remediation process, arguing it is an overlooked potential political factor in the site remediation process that should be further explored. In the next Chapter I review literature related to environmental justice and issues of racial/ethnic and socioeconomic equity in the implementation of Superfund. This chapter provides an overview of research in the field noting limitations of studies, inconsistencies in findings and directions for future research.

## CHAPTER 3

### ENVIRONMENTAL RACISM AND SUPERFUND

There's a black man with a black cat living in a  
black neighborhood. He's got an interstate  
running through his front yard and he thinks he  
got it good. But ain't that America?

John Cougar Mellencamp "Little Pink Houses"

#### **A decade of environmental justice research in the United States: An Overview**

The above lyrics from a popular John Cougar Mellencamp song in the 1980s reflect the singer-songwriter's observations of environmental injustice. The residentially segregated black man may indeed have it good by the fact that an interstate running through his front yard may not be as bad as living in the mostly black Cancer Alley, or drinking carcinogenic groundwater. These are just a few of the types of safety and health issues that the environmental justice movement has addressed. It is safe to say, however, that many of these communities are not sitting passively by letting their homes, neighborhoods and loved ones be destroyed by environmental contaminants. Since the 1980s, lower income minority communities as well as some white communities have joined together in what has arguably been among the most successful grassroots social movement of the past two decades. It is now generally accepted that low income and minority communities tend to be disproportionately burdened with unwanted land uses and environmental obtrusions.



This includes, but is not limited to, the siting of hazardous waste treatment, storage and disposal facilities (Anderton, Anderson, Oakes and Fraser 1994; Bullard 1990; Boer, Pastor, Sadd and Snyder 1997), air pollution (McCaul 1976) construction of interstates through communities (Steinhart 1991) the location of prisons within communities (Fitchen 1991; Steinhart 1991) and lead paint in housing (Phoenix 1993) to name just a few. In this chapter I present a review of the current literature on environmental justice. I explore the origins of the environmental justice movement in the United States, current conceptual and methodological debates that have emerged within this field of research, and policy implications of environmental justice. I conclude by discussing directions for future research on environmental justice and Superfund.

### **The emergence of the environmental justice movement and the development of environmental justice as a social problem**

The environmental justice movement has been described as a synthesis of social justice movements of the 1960s and the environmental movement (Bullard 1993; Cole and Foster 2001). The origins of the environmental justice movement, however, reflect larger processes related to the development of issues as social problems that demand reconciliation; namely, mass media attention and validation of the problem through expert opinion (Loseke 1999). The materialization of environmental justice as a legitimate social problem emerged through the mass media attention given to the Love Canal debacle and the Warren County protests both of which occurred in the early 1980s. The production of technical and scholarly reports in the late 1980s clearly demonstrated a link between race, class and environmental outcomes. This provided validation of

environmental justice through expert opinion and further solidified its place as a social problem. Environmental racism proved to be a genuine social problem, widespread and changeable through human effort and social policy (Loseke 1999).

The policy success of declaring environmental justice a social problem was realized in February of 1994 when Clinton signed Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The order, which gave national priority to environmental justice, requires all federal agencies that pertain to public health and the environment to make environmental justice part of their missions. They must develop strategies to assure that federal programs, policies, and activities do not produce disproportionate adverse impact on underrepresented communities as well as to determine whether federal policies and regulations adversely affect the poor and people of color (Gaylord and Bell 2001). The executive order holds federal agencies, and particularly the EPA, responsible for developing a plan for environmental justice reform from one year of the signing of the order, although this was later extended by two months to April 11, 1995. By effectively declaring environmental justice a social problem the stage was set for a widespread grassroots social movement.

The first development in the origins of the environmental justice movement is based on the emergence of an anti-toxics discourse and consequently a consciousness of “contaminated communities”, most notably due to the mass media attention given to two incidents of environmental degradation, the Love Canal debacle in New York and the Warren County protests in North Carolina (Buell 1998; Capek 1993). The second seminal occurrence in development of the environmental justice movement was the

publication of two technical reports. The U.S. General Accounting Office (USGAO) released the first report in 1983. The second was released by the United Church of Christ's Commission for Racial Justice (UCC-CR) in 1987 that brought the issue of race and class to the forefront of research on the distribution of locally unwanted land uses (LULUs) and other environmental obtrusions (Cutter 1995).

#### Mass Media Attention: Love Canal and Warren County

Arguably, an anti-toxics discourse and consciousness were emerging well before the Love Canal spectacle, such as in the publication of Carson's groundbreaking 1962 book *Silent Spring*. However, the media attention given to the protests of the predominantly white lower-middleclass mothers and housewives concerned for the health of their families sparked an unprecedented wave of concern across the US regarding toxics and the possibility that people were living in contaminated communities (Buell 1998; Szasz 1994). At the very least, Love Canal was among the first toxic tragedies to receive mass news coverage and make toxic waste a household word (Szasz 1994).

The story of Love Canal began when Hooker Chemical Company dumped thousands of drums of toxic waste into Love Canal in the Niagara Falls area of New York. The canal was closed in the early 1950s and was sold to the Niagara Falls Board of Education. Developers built a school and residential homes on the land. In the 1970s the toxic chemical waste seeped into residents' yards and basements as well as the schoolyard. The deleterious health impact appeared in the unusually high numbers of birth defects, miscarriages as well as cancer and liver disease (Szasz 1994).

The spectacle of Love Canal began what has been referred to as "ecopopulism". Ecopopulism is characterized as movement based on a more radical critique of society

and more democratic participation in decision-making. Szasz (1994) discusses ecopopulism as underling the transition from a simple Not in My Backyard (NIMBY) rhetoric to based on a radical critique of society, or in other words Not in Anyone's Backyard (NIABY). The environmental justice movement transitioned from a discourse based on "hazardous waste" to one based on "toxics". This issue expansion and the large growth of activist organizations were accompanied by a change in ideology. Initially based on a more limited NIMBY rhetoric, the movement grew to develop a set of beliefs and language that was based on NIABY. This more radial rhetoric promotes a critique of *all* toxics emissions and sitings. The new toxics discourse is more inclusive and invokes greater political efficacy and participation than the traditional mainstream environmental movement, which has it roots in resource conservation and wildlife preservation (Bullard 1990).

Public outcry over Love Canal also generated a response from the federal government. In 1980 the Superfund program was approved and the multibillion dollar program was among the first government efforts to legitimate the public's fear of contaminated communities. The Superfund project was developed to cleanup America's most toxic and hazardous abandoned waste sites. Love Canal was among the first sites to be remediated through the Superfund program (Hird 1994).

In the fall of 1982 a second decisive media event occurred which culminated in what some have argued is the more accurate birthplace of the environmental justice movement (Chavis 1993; Cutter 1995; McGurtry 1999). Following in the wake of Love Canal, a rural and predominantly poor African American community in Warren County North Carolina was targeted for the construction of a landfill for the storage of 30,000

cubic yards of soil contaminated with polychlorinated biphenyls (PCBs) (Cutter 1995). Over 500 people in the community protested the construction of the hazardous waste landfill over a six-week period. Although their protests were unsuccessful in that the landfill and the PCBs went in as scheduled, they were successful in garnering mass media attention and in sparking a transformative event in modern environmentalism (McGurtry 1999). It is argued that the Warren County protests were the first predominantly African American protests to fall under the rubric of environmental racism (Bullard 1993; Cutter 1995; Di Chiro 1996; McGurtry 1999). Unlike the Love Canal episode, the Warren County protests racialized the anti-toxics agenda forging a connection between race, poverty and the environmental consequences of the production of industrial waste (Di Chiro 1996: 303). From this perspective, the events at Warren County add an element of identity politics, which are characteristic of new social movements, to ecopopulism and the anti-toxics movement. Identity politics thus helped to further politicize the agenda of environmental justice.

#### Expert opinion

The second major event in the genesis of the environmental justice movement was the publication of two technical reports, and to a lesser extent a follow up book, all of which argued that based on scientific evidence, racial minorities in the U.S. were disproportionately burdened with unwanted land uses (Cutter 1995; Di Chiro 1996). The United States General Accounting Office (USGAO) published the first report in 1983. The report, spawned partly in reaction to the 1982 Warren County protests, examined the distribution of hazardous waste landfills in the EPA's Region IV (eight states that comprise the South). The results indicated a strong relationship between race,

socioeconomic status of communities and having a hazardous waste landfill sited in the community (Bullard 1990).

The United Church of Christ's Commission for Racial Justice (UCC-CRJ) published the second influential technical report *Toxic Waste and Race* in 1987. Organized by the Reverend Benjamin Chavis, who also had taken part in organizing the Warren County protests and who coined the term environmental racism, the report quantitatively examined the distribution of hazardous landfills in the South. In sum, sixty-three percent (63%) of the South's total hazardous waste resides in four landfills that are in predominantly poor black communities while blacks comprise 20% of the South's population. The report concluded that race was the most important predictor of living with a LULU and was an even more important predictor than class.

The publication of Bullard's pivotal book *Dumping in Dixie* provided further empirical support for the claims of environmental racism. The book set precedent in identifying core themes surrounding issues related to race, class and toxic waste. *Dumping in Dixie* remains a classic text for students of environmental justice. Bullard (1990) conducted five case studies of southern communities, all predominantly poor and black, engaged in grassroots environmental struggles against environmental hazards. The racial composition of these communities ranged from a low of 69% black to a high of 98.9% black, well above the 20% average of black Americans residing in the South. The segregation of these communities and the distribution of unwanted environmental obtrusions seemed to blatantly point to environmental racism. For example, in Houston all five of the city-owned landfills were found in predominantly black neighborhoods, four of five large garbage incinerators were found in black neighborhoods while the fifth

was located in a Hispanic neighborhood. Black neighborhoods compose a little over 1/4<sup>th</sup> of the city's population, while more than 3/4<sup>th</sup>s of the city's solid-waste facilities were located in black neighborhoods. Bullard also emphasized the importance of race over class. In the next section I discuss methodological debates that have emerged in the field since the publication of these early works.

### **Conceptual and Methodological Debates: What is Environmental Justice and How Do We Measure it?**

Academics and other analysts of environmental justice have yet to reach consensus about clear definitions regarding terms surrounding environmental justice research. Debates over terminology include those of justice, racism, equality and the environment. Academics, for example, disagree as to whether links between geographic location and unwanted environmental obtrusions constitute evidence of inequity, injustice or racism (Holifield 2001). Additionally, how one defines the "environment" also has lead to contention among academics. On the one hand, environmental justice activists can be viewed as broadening the scope of the traditional environmental movement by incorporating the concepts of race, class and gender. On the other hand, it has been argued that the movements' emphasis on human and social justice concerns over traditional concerns such as ecological preservation limits the scope of the movement (Holifield 2001). What issues are included in environmental justice are also debated. For example, Bullard (1990) and Barkenbus, Peretz and Rubin (1996) argue that environmental justice is more than just waste facility siting. Locally unwanted land uses (LULUs) are comprised of more than just waste facilities and include such unwanted land

uses as prisons, airports and sewage treatment plants. Health and workplace safety have also been included under the rubric of environmental justice.

The term environmental racism has been among the more contentious concepts in the environmental justice literature. Environmental racism has been defined as links between environmental outcomes and race (Hamilton 1995) and as “any policy, practice or directive that differentially affects or disadvantages (whether intended or unintended) individuals, groups, or communities based on race or color (Bullard 1990: 98).

Conceptually, however, the terms environmental racism and environmental justice have not achieved clear consensus (Holifield 2001; Cutter 1995). More specifically, terms such as environmental *racism* and environmental (*in*) *equity* are juxtaposed with the debatably more inclusive term environmental *justice*.

Cutter (1995) argues that the term environmental racism is too restrictive for the current movement and instead advocates the use of the broader term environmental justice, which she argues is more inclusive for the movement and includes all marginalized groups. Additionally, environmental justice is more preferable to the term environmental equity, which is argued to distort the *politicized* agenda of the environmental justice movement. How one defines environmental justice may very well speak to whether one conceives the Love Canal debacle or the Warren County protests as the origin of the environmental justice movement. The choice of terminology thus speaks to larger issues of race and class in the environmental justice discourse as well as social science research.



## Environmental Racism or Environmental Classism? The Race vs. Class Debate

The race versus class debate that has surrounded much of the social science discourse for the past two decades (e.g. Feagin 1999; Thomas and Hughes 1986; Wilson 1980; 1987) has also impacted research on environmental justice. Social scientists, and particularly sociologists and human geographers, have engaged in debate regarding the significance of which variable is the best predictor of living in a community with a locally unwanted land use (LULU): race or class? In addition, other questions have emerged such as what role do market factors play in the race versus class debate? Methodologically, what is the most appropriate way to measure environmental inequity? This latter question addresses issues pertaining to questions of geographic scale or the appropriate spatial unit of analysis in defining affected communities as well as the integration of historical research into current studies.

Beginning with the race versus class debate, analysts have engaged in numerous quantitative studies seeking to determine if one predictor is better than the other. Race has been represented in previous studies as percent minority and/or percent White, percent Black, percent Hispanic, percent Asian, concentration (density) of minority population, nonwhite population, and minority proportion of the total population. Some measures of class in previous studies have included per capita income, median household income, median value of owner occupied housing, median gross rent, percent with less than 12 years of education, and percent with a college degree. Other variables that have been included in these studies include population density, percent manufacturing, percent laborers, and percent unemployed (see McMaster, Leitner and Sheppard 1997 for a review of these studies).

Based on previous studies (Boer, Pastor, Sadd and Snyder 1997; Hamilton 1995; Ringquist 1997) it is also clear that siting decisions are not made exclusively based on the race or class composition of a community. Studies find that race and income are often among the lesser explanatory variables when controlling for other factors, although arguably some of the other factors are related to race and class. For example, research suggests that facilities often try to locate in areas where they will be met with the least resistance (Hamilton 1995). Bullard (1990) also argues that, historically, poor and black communities have been disproportionately burdened with toxic waste because industries have followed the “path of least resistant” (1990: 3). Boer, Pastor, Sadd and Snyder (1997) report that manufacturing employment, percent residential and industrial land use as well as median house value and rental price also explain variation in facility location. Facilities are likely to face less resistance in areas where people rent their homes as oppose to own them due to the potential for declining property values. Consequently, facilities are more likely to be located in smaller percentage residential tracts. Ringquist (1997) shows location in urban areas to be a more explanatory factor than race or class as well as other variables such as home ownership, median age of housing, and percent manufacturing employment.

An additional component to the race versus class debate regards market dynamics. Been (1994) argues that in order to understand better the race versus class debate one must consider the potential role market forces play. In sum, it is argued that one must explore the demographics of a community at the time of the initial siting of the facility. Market forces, such as the lowering of property values, may result in a demographic change in a community after the time of the facility siting. Consequently, a community

with a LULU that is predominantly minority may not have been so at the time of the facility siting. Thus, in order to claim environmental racism her research suggests that one must explore which came first: the LULU or the minority population?

Been reexamines the U.S. General Accounting Office study and Bullard's (1990) case studies, both discussed earlier, exploring the demographics of communities at the time of the LULU siting and after the LULU siting. The market dynamics thesis received mixed support. The re-analysis of the GOA study showed that communities at the time of the siting were disproportionately poor and minority and that there was no significant depreciation of housing values. In fact, there was an increase in housing values. In the re-analysis of Bullard's (1990) study, however, changes occur in the composition of the neighborhood after the time of the facility siting. While it appears that disproportionate siting was prevalent, it also appears that poverty and declining housing values contributed to, and exacerbated, the impact the facility had on the present demographics of neighborhoods.

### Defining Community

Research regarding race and class has also shed light on methodological issues regarding how we study environmental justice and what spatial or areal units are used as units of analysis (see Anderton 1996; Barkenbaus, Peretz and Rubin 1996; Bullard 1996; Yandle and Burton 1996a; 1996b; Downey 2000; Bowen and Haynes 2000). Depending on the size of the spatial unit examined, studies find different results in which variables are better predictors of being burdened with an unwanted environmental intrusion, especially regarding race and class variables. This makes comparisons across studies difficult as well as statistically problematic for assessing the strength of relationships

among variables; a problem known in geography as the modifiable area unit problem (McMaster, Leitner and Sheppard 1997; Cutter, Holm and Clark 1996; Cutter 1996). For example, Cutter, Holm and Clark (1996) statistically examine Toxic Release Inventory sites (TRI), Treatment, Storage and Disposal sites and inactive hazardous waste sites (from CERCLA) in South Carolina at three different spatial scales: counties, census tracts and census block groups. Demographic predictors, including race and class, vary by spatial units and present an inconsistent picture of populations living with a LULU depending on the size of the residual spatial unit of analysis. Using correlations and difference of means tests, their results find that race is a significant predictor of having a site at the county level, although it is white populations and not minority populations that are associated with having a LULU. No racial difference emerges at the census tract and block group level. Class differences emerged at both the tract and block group level but were slightly more pronounced in the latter smaller spatial scale.

A study by Yandle and Burton (1996a) of the demographic characteristics of communities surrounding hazardous waste sites in metropolitan Texas found that race was not a significant predictor of facility location. This particular study resulted in a slew of critical commentary among which the chosen geographic level of analysis sparked a number of critiques. Their choice of using census tract level data was criticized by Anderton (1996), who suggests smaller units of analysis. Bullard (1996) suggests that block level data would be preferred to tract level data, as it would be smaller and more precise. Mohai (1996) argues that using zip codes as a unit of analysis is no less superior to census tracts and further argues that Yandle and Burton's claims of the superior nature of tract level data due to their smaller nature are unsubstantiated, as there is no evidence

presented demonstrating this. In fact, Mohai (1995) reported no difference regarding the race and class characteristics of communities with environmental obtrusions when comparing multivariate models with zip code data and census tract level data.

Yandle and Burton (1996b) defend their choice of using census tract level data, however, arguing that block level data would be at the expense of gaining detailed important demographic data. They maintain that census tracts are smaller and thus more precise regarding spatial distributions of residential homes and environmental obtrusions than using zip codes as the unit of analysis. Furthermore, they argue that census tracts are designed to result in more homogenous populations and are thus more ideally suited for their analysis.

Other studies have also found discrepancies in the determinants of hazardous facilities due to the geographic area of analysis. Downey (1998) for example, examined TRI emissions for the entire state of Michigan, urban areas and the Detroit metropolitan area. At the state level race was a stronger predictor than class while at the smaller levels of analysis, urban areas and the Detroit Metropolitan area, class emerges as more significant than race. Similarly, Bowen and Hayes (1995) found race to be a better predictor of TRI emissions in the state of Ohio, but at the smaller census tract level the racial finding was negated.<sup>12</sup>

There is little consensus regarding appropriate spatial units of scale such as state, region or metropolitan area and smaller residual units such as counties and zip codes or even smaller units such as census tracts and census blocks (McMaster, Leitner and Sheppard 1997). Additionally, geographers have utilized techniques such as Geographic

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<sup>12</sup> TRI data is maintained by the EPA and provides information on industries and the pollutants released by them.

Information System (GIS) technology to map more precise spatial units such as mileage to a LULU. This too, however, presents problems of defining an impacted community. How many miles account for proximity to a LULU? Moreover, demographic information may be difficult to obtain for such precise areas since the Census Bureau has clearly defined spatial levels of data collection. Additionally, units of scale and residual units may depend on other factors such as water supplies which affect an entire county (Hird 1994) or examining daytime populations which may spend more time in close proximity to an environmental hazard as opposed to the nighttime population of a community which is what Census data represents (McMaster, Leitner and Sheppard 1997).

#### Further Examining the Relationship between Race and Class

In addition to studies regarding race versus class demographics and market dynamics, researchers have advocated exploring structural and historical connections between places and racial formations. Their argument is that the race versus class debate and the debate surrounding market dynamics, or which came first the LULU or the minority population, cannot be understood without placing these questions into a historical and structural context. Bullard (1992), for example, argues that class alone cannot explain the differential land use. Poor blacks do not have the same resources and political power to “vote with their feet” as do poor whites. Environmental racism is tied to the social structure where racism is institutionalized with cumulative effects. Racial barriers to housing, education, and employment leave racial minorities, of all classes, at a distinct disadvantage. For instance, racial minorities may be more susceptible to “job blackmail” where siting companies promise jobs and economic growth for their

communities. Residential segregation further limits racial and ethnic minorities in their choices for residence and employment. Succinctly, minorities simply do not have the same spatial mobility options as whites.

Utilizing structural concepts, such as institutionalized racism, it is feasible to make a connection regarding how minority populations are disproportionately associated with other explanatory factors or predictors of living near a LULU, such as percent manufacturing and percent industrial land use as well as residing in an urban location. Examining historical and structural factors may also deem the market dynamics thesis as less of an important distinction if minority populations are disproportionately affected by market forces due to historical patterns of racial subjugation and contemporary institutionalized forms of subjugation that render minorities more susceptible to living in a community with a LULU.

Following this line of reasoning, Pulido (2000) argues that current conceptions of racism in the environmental justice literature have been conceptually narrow and restrictive. Pulido advocates for a broader conception of racism to include how multiple forms of racism contribute to environmental injustice. She argues that environmental justice scholars need to examine white privilege as a structural, and deeply historicized, form of racism and how this relates to spatial forms of racism. Limiting conceptions of racism to malicious intent or blatant discriminatory acts mask the larger structural forms of institutionalized patterns of racism. Her case study of southern California explored the historical and structural processes that result in current manifestations of environmental racism. Through historical research the study demonstrates how patterns of racial formation and a diversity of racisms resulted in patterns of spatial segregation that

restricted minorities' mobility and left them susceptible to living in heavily industrialized areas with a plethora of environmental intrusions. Whites, on the other hand, were able to relocate to the less noxious suburbs.<sup>13</sup>

Likewise, Pulido, Sidawi and Vos (1996) analyze the social relations and processes in the history of environmental racism in Los Angeles. As opposed to conceptualizing race and class as static entities they argue race and class comprise social relations grounded in the history of places. Racial and class relations are historically and geographically specific social relations that are spatially constituted. Their analysis treats race and class as fluent social constructions noting qualitative differences regarding group identities. They explore race as an ideological and material concept not a static category. Their research uncovers the development of the racialization of places, examining economic factors, employment factors, as well as land use and development. The historical focus on these social relations and social variables tells a story of racism and class relations that lead to current forms of disparate impact.

Similarly, Szasz and Meuser (2000) argue that social scientists need to expand their research agendas to explore how inequalities in areas are generated over time. Researchers need to examine environmental inequality *formation* as opposed to documenting unequal proximity to risk at a single point in time. Using a case study of Santa Clara County, CA they demonstrate it is possible to explore intended as well as unintended patterns of environmental discrimination by examining historical patterns of

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<sup>13</sup> This similarly speaks to what Bullard (1990) argues reflects institutionalized racism. Minority populations simply have less resources than whites to “vote with their feet” and move to a less noxious area. It also addresses the market dynamic thesis which posits that lower income people may move to a noxious neighborhood once white people move out because of declining property values that the environmental degradation produces. Consequently, this devaluation makes it affordable for those with less income and wealth.



land use. Patterns of residential, economic and demographic development that result in the formation of new social geographies that are linked to historical and structural patterns of development are equally important to consider.

In sum, we must broaden our conception of racism to include institutionalized patterns of racism and white privilege such as redlining and residential segregation as well as the ways in which race has been historically and presently linked to class.

Arguably, we can see how discriminatory intent and the race versus class debate are still linked to broader, more structural and more covert patterns of racism (Pulido 2000; Pulido, Sidawi and Vos 1996). While many scholars allude to interactions between race and class, none have yet to quantitatively assess such factors in their work.

### **Policy Implications: Distributive versus Procedural Equity**

Policy implications have revolved around the discussion of two types of equity, *procedural* and *distributive*. Procedural or process equity refers to the extent to which governmental rules and regulations, enforcement and international treaties and sanctions are applied in a nondiscriminatory way (Cutter 1995: 12). Procedural equity addresses the underlying causes of environmental inequities such as cleanup, siting decisions, and differential enforcement of laws and regulations. Distributive or outcome equity focuses on the demographics of who gets burdened with unwanted environmental hazards and land uses (Cutter 1995).

It has been argued that the equity emphasis in environmental justice research has disproportionately focused on distributive equity at the expense of focusing on the processes producing these outcomes. Furthermore, procedural equity research has been

trumped in that it has focused on participation in decisions in how environmental problems should be distributed (Lake 1996). Thus, the goal of eliminating the production of pollution is circumvented. Alternatively, Lake (1996) argues that procedural equity must come from a larger more structural critique of the production conditions that allow for the degradation of the environment and for domination. Thus, people involved in the movement for environmental justice must engage in full democratic participation, complete self determination regarding not just distributive outcomes but decisions regarding the production of environmental problems (Lake 1996).

Focusing on the distributional problem, while necessary, may not be sufficient on its own for producing environmental equity. Furthermore, limiting procedural equity research to decision-making regarding the distribution of environmental problems constrains the movement from realizing its larger goals of not locating pollution in Anybody's Back Yard (NIABY). Lake (1996) contends we must prioritize procedural restructuring over the redistribution of outcomes.

This critique of procedural and distributive equity speaks to larger ideological issues established at the First National People of Color Environmental Leadership Summit in October of 1991, where basic principles of the environmental justice movement were documented. Many of these original principles focus on eliminating all forms of pollution and all forms of domination, and thus proffer an ideological critique of capitalism as a mode of production (Di Chiro 1996). For example, some of the principles of environmental justice that speak to these issues include:

(Principle no. 1): Environmental justice affirms the sacredness of mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction

(Principle no. 5): Environmental justice affirms the fundamental right to political, economic, cultural and environmental self-determination of all peoples.

(Principle no. 6): Environmental justice demands the cessation of the production of all toxins, hazardous waste and radioactive materials; and that all past and current producers be held strictly accountable to the people for detoxification and the containment at the point of production.

(Principle no. 7): Environmental justice demands the right to participate as equal partners at every level of decision-making including needs assessment, planning, implementation, enforcement and evaluation.

(Principle no. 12): Environmental justice affirms the need for urban and rural ecological policies to cleanup and rebuild our cities and rural areas in balance with nature, honoring the cultural integrity of all our communities and providing fair access for all to the full range of resources.

(Principle no. 14): Environmental justice opposes the destructive operations of multinational corporations.

(Principle no. 15): Environmental justice opposes military occupation, repression and exploitation of lands, people and cultures, and other life forms.

(Principle no. 17): Environmental justice requires that we, as individuals, make personal and consumer choices to consume as little of Mother Earth's resources and to produce as little waste as possible and make the conscious decision to challenge and re-prioritize our lifestyles to insure the health of the natural world for present and future generations.

The preceding initial principles of environmental justice suggest that a focus on distributive outcomes is not sufficient to realize the larger goals of the environmental justice movement. Moreover, a radical critique of procedural equity and the processes of the production of environmental problems, as well as a critique of our current political economy, is called for in the above outlined principles. While these principles reflect an ideal type of relationship between humans and the environment, namely the end to all

forms of human domination including that of the environment, it does not address the present problem of the past production of extreme forms of toxic waste.<sup>14</sup> In the next section I review studies that have explicitly explored procedural equity in the remediation of Superfund sites, which are among the most extreme forms of the past production of toxic waste.

**Previous studies on the distribution of Superfund sites and the allocation of resources to sites: Where are Superfund sites located, who benefits from the cleanup of Superfund sites, and is this equitable?**

To date, three studies have been conducted that explore procedural equity in the distribution of Superfund sites with the most recent study being published in 1995. Additionally, one comprehensive study has used Superfund sites to study the demographic distribution of counties with at least one Superfund site, or distributive equity related to Superfund. Previous studies utilizing Superfund sites as the unit of analysis have focused on the geographic and demographic distribution of National Priority List sites (NPL), determinants of NPL sites including race and SES variables, length of time involved in the remediation of sites and progressing through the stages prior to site remediation, target risk levels at cleanup sites, allocation of funds to site cleanup and the method of cleanup chosen at sites.

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<sup>14</sup> Arguably, the principles of the environmental justice movement blend Marxist critiques of domination and exploitation with the ecological philosophy of deep ecology, which opposes human-centered or anthropomorphic conceptions of the human-environment (nature) relationship. This blending similarly reflects Szasz's (1994) conception of "ecopopulism".

Gupta, Van Houtven and Cropper (1995), using zip code level demographic data, employ multivariate analyses on 110 wood-preserving and PCB contaminated Superfund sites in which cleanup decisions had been made by the end of fiscal year 1991. They examine target risk levels, or the post-cleanup lifetime cancer risk attributable to a site and/or the target concentrations of pollutants at a site.<sup>15</sup> They also examine the type of cleanup method chosen at the site, which includes whether soil was excavated and whether soil was treated. This classification scheme yielded six possible categories for a site to fall in:

- 1) On site treatment of soil that has been excavated (on site treatment)
- 2) Off site treatment of soil that has been excavated (off-site treatment)
- 3) Disposal of excavated but untreated soil in a landfill at the site (on-site landfill)
- 4) Disposal of excavated but untreated soil in a landfill off the site (off-site landfill)
- 5) Containment of soil that has been neither excavated nor treated (containment)
- 6) On site treatment of soil that has not been excavated (in-situ treatment).

Their findings for target risk levels for the wood preserving sites show no evidence of race and/or class based discrimination. Median household income fails to emerge as significant while percent nonwhite emerges as weakly significant but with a negative coefficient indicating that target risks are actually lower in minority communities. Increases in percent urban and having a PRP as the fund lead result in significantly higher target risk levels. At sites with higher HRS scores, EPA was significantly more likely to chose a more through method of cleanup. The analysis of PCB sites finds no relationship between race and class characteristics of communities and

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<sup>15</sup> Due to missing cases, their final analysis resulted in an analysis of 24 wood preserving sites and an analysis of 37 PCB sites.

also fails to show evidence that lead type or urban location influenced the target risk levels. Time, however, was associated with target risk variables, with earlier sites (defined by when the ROD was signed) having higher target risk levels.

In the analyses of choice of cleanup method chosen, findings reveal that EPA is less likely to choose more costly cleanup technologies. In the analysis of wood preserving sites, EPA demonstrates a preference for onsite excavation and treatment. The effect of costs of treatment mattered less over time, which the authors suggest is a function of the SARA amendments because SARA indicated a preference for more permanent cleanup remedies more than concerns over costs of remedies. In the analysis of PCB sites, they find the opposite effect; costs played a significant role in the selection of cleanup technologies with higher cost treatment being less likely to be selected. They find no evidence in either the wood preserving analysis or the PCB analysis that race and SES influence choice of cleanup technologies. There is evidence that a higher HRS score results in choosing onsite treatment, while a higher per capital income results in choosing off site treatment although these coefficients are marginally significant. They conclude that “to the extent that the racial composition of the zip code in which a site is located captures racial composition near the site, fears of racial discrimination in choice of cleanup goals are not confirmed by these results” (pg. 106).

Hird (1993; 1994 hereafter Hird), using county level 1980 Census data of NPL site listings as of December 31, 1988, conducted the most extensive analyses to date regarding distributive and procedural equity in Superfund sites. Utilizing tobit multivariate statistical techniques in analyses of the 799 finalized NPL sites and 3139 counties, Hird found that wealthier counties, and counties with a greater percentage of

non-whites, were significantly more likely to have greater numbers of NPL sites. Overall, larger numbers of NPL sites were associated with a lower percentage of county residents living below the poverty line, a higher percentage of nonwhites in the county, a higher percentage of college-educated residents, a lower percentage of new homes, a lower percentage of owner occupied housing, and a higher percentage of manufacturing industries. There was no relationship found in regard to the percentage of unemployed residents, quantity of hazardous waste production in each state as of 1985, or population density.<sup>16</sup>

A second aspect of Superfund site implementation revolves around the pace of cleanup during the remediation process, or in other words, the length of time it takes from the initial site listing on the NPL to final remediation of the site. The pace of cleanup can last years and varies substantially by sites. Hird analyzed two aspects of the pace of cleanup in the progression of stages a site must go through before being remediated. First, Hird analyzed length of time from proposal status to final NPL status using OLS regression. Second, using probit analyses, he analyzed three stages of the cleanup process in a composite variable. First, whether a site started the Remedial Investigation and Feasibility Study (RI/FS) process, which analyzes the consequences of alternative

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<sup>16</sup> Hird reexamines these findings using subsets of counties and a more simple method of bivariate tobit analyses. For the most part, these findings sustain the previous findings of the multivariate tobit analysis although some discrepancies occur. Counties that were over-represented by poor, unemployed and nonwhites had an average number of NPL sites below the national average. When re-examining subsets of counties by number of NPL sites in each county, Hird finds that the thirteen counties with ten or more NPL sites had demographic characteristics that were significantly below the national averages of poverty and unemployment rates, as well as below the national average for non-whites. Median housing values were higher than the national average in these counties. These findings suggest that the EPA may privilege wealthier counties by their prioritization of getting a hazardous site listed on the NPL.

strategies. Second, whether the Record of Decision (ROD) that outlines and defends the EPA's choice of clean-up remedy, was signed. Third, whether the actual cleanup or remediation itself has started. Pace of cleanup was coded as ranging from 0 to 3, 0 if none of the stages were completed and 3 if all three stages were completed.

Findings from the probit analysis indicate that racial and socioeconomic characteristics of counties did not significantly influence the pace of cleanup. Predictors of a more rapid pace of cleanup included a higher hazardous ranking score, and whether the site was a fund lead, which means the EPA has earmarked federal money for its cleanup as opposed to relying principally on the primary responsible party (PRP). A significantly longer pace of cleanup was associated with a site being federally owned, being located in a county with more long-term residents, and the year it was listed on the NPL, with earlier listings being less likely to have reached more stages in the remediation process.

Finally, Hird examines funds allocated to site remediation. Hird finds mixed evidence that EPA spends less money on sites located in areas where the residents are of a lower socioeconomic status. Specifically, as percent below poverty increases, and as percent with a college education increases, expenditures by EPA decrease. In examining planned future financial obligations (e.g. operation and maintenance costs), Hird reports that as percent with a college education increases planned obligations decrease although percent below poverty failed to emerge as significant. In both OLS regressions of financial expenditures, the racial composition of the community fails to emerge as significant.



A second study that examines environmental equity in the implementation of Superfund sites presents much gloomier results. Sponsored by the National Law Journal Lavelle and Coyle (1993) examine the racial and socioeconomic characteristics of communities, based on zip codes, of 1,177 Superfund sites. Pace of cleanup is analyzed by length of time to achieve NPL status and length of time to start cleanup at a Superfund site. Desirability of the method of cleanup chosen at NPL sites is also examined.<sup>17</sup>

Using rather simplistic statistical methods, primarily measures of central tendency and cross-tabulations, their findings reveal inequities in the implementation of Superfund. They find that in more than half of the ten regions that administer EPA programs, action on cleanup at Superfund sites begins from twelve percent to forty-two percent later in minority areas than at white sites. In addition, hazardous waste sites in minority areas took twenty percent longer to be placed on the NPL than those in white areas. Furthermore, in areas with the greatest minority population the EPA chooses the least desirable method of cleanup, the containment method of capping a hazardous site, seven percent more frequently than the preferred method of cleanup. Permanent treatment, which eliminates the waste or rids it of its toxins, was chosen at white sites twenty-two percent more often than the less desirable method of capping. Capping is considered the least desirable method of cleanup because the hazard is abated only for the life of the cap, or containment liner, which may be as little as twenty years. At that point, the community is once again exposed to the hazard.

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<sup>17</sup> The Lavelle and Coyle study has been criticized for lack of methodological rigor. Based on simple correlations, the study fails to control for or hold constant other variables that might influence the remediation process of Superfund sites (Gupta, Van Houten and Cropper 1995). Their findings of race and class differences thus may reflect other processes that influence the remediation process.

## **The future of environmental justice research: What have we learned and where do we go from here?**

The review of literature indicates numerous directions for the future of environmental justice research. Methodologically, the insights garnered from the progression of the race versus class debate suggest that quantitative researchers need to examine more closely the statistical interaction between race and class. Additionally, researchers will continue to need to examine multiple spatial units of analysis, or in other words devote attention to issues of geographic scale. More research needs to be conducted to further decipher what approximates a community and an impact area and how we can most appropriately measure these.

Furthermore, qualitative research needs to further explore how racial formations develop in areas and how these developments are linked spatially to one's current proximity to environmental hazards. The historical processes related to current spatial relationships of race, class and unwanted environmental obtrusions also warrant further scholarly attention. Cutter (1995) suggests that the next step in research must address appropriate spatial units, time frames and what thresholds constitute an equity problem; the research by Pulido, Sidawi and Vos (1996) and Pulido (2000) suggests we also need to incorporate how racism is conceptualized in the research we design and how this informs and guides the discourse on environmental justice, as well as the potential policy implications that develop from our research. Additionally, students of environmental justice need to think beyond the current, and arguably limiting, conceptions of discriminatory *intent* and race *versus* class debates to explore qualitatively how historical relations of subjugation are manifest in the present. This allows for a broader

understanding of racism, as well as sheds light on the interactions between race and class. Furthermore, future research needs to combine methods of analysis as well as utilize multiple spatial units of analysis. Keeping these insights in mind, the use of methodological triangulation of historical, qualitative and quantitative research will facilitate pursuits to better understand the environmental justice movement.

Finally, policy evaluations need to place more emphasis on procedural equity and decision-making processes. The radical critique of capitalism that the environmental justice movement offers may be prescient of what is to come in the future. By expanding the conceptual focus of procedural equity to include critiques of production decisions, we can bring the environmental justice movement closer to realizing its larger goals. In the meantime, however, distributive outcomes and procedural equity regarding the implementation of environmental regulations should continue to be explored as long as we do not lose sight of the larger social, political and structural factors that influence distributive outcomes. Procedural equity, or the extent to which rules, regulations, evaluation criteria and enforcement are applied in a nondiscriminatory manner (Bullard 1990: 116) warrants further attention from students of environmental justice. While scholars should be cognizant of macro-level structural factors, such as the production processes, we need to continue to evaluate procedural equity in our current government implemented, and government enforced environmental policies and practices. As Lake (1996) suggests, we need to continue our current pursuits while not losing sight of larger issues of production decisions and true democratic participation to achieve self-determination.

Procedural equity is especially important to consider in light of the 1994 Executive Order, which speaks almost exclusively to the process of implementing of environmental cleanup. To date, there have been no studies that have explored changes in procedural equity based on the Executive Order, and consequently little information exists regarding how environmental justice is being implemented (Bullard 1994). This is a particularly glaring gap in our current research. Procedural equity research is especially insightful regarding the Superfund project, which is targeted at the most toxic and hazardous abandoned waste sites in the US and is among the most expensive, and consequently contentious, environmental programs the EPA oversees.

Although Superfund has been criticized for being implemented in a discriminatory manner (Lavelle and Coyle 1992) there is contradictory evidence (Hird 1994; Gupta, Van Houtven and Cropper 1995) that the quality and pace of cleanup of Superfund sites, proxies for procedural equity, bear no relationship to the racial and socioeconomic composition of communities burdened with a Superfund site. A focus on procedural equity in the implementation of Superfund does not speak to the larger critique provided by some environmental justice advocates of the production of pollution and degradation of the environment. It is, however, an important and necessary step to correct the production of past environmental hazards, e.g. abandoned toxic waste sites, which now threaten the health of communities.

While the present study cannot address all of the suggested recommendations for the enhancement of research on environmental justice, it does incorporate many of these suggestions. For example, the present study incorporates Cutters (1995) emphasis for a

need to further addresses spatial units and appropriate time frames.<sup>18</sup> The present study also heeds the advice that students of environmental justice pay attention to the processes of democratic decision-making, by including an analysis of actual community participation in the remediation process. In many other ways, the present study also significantly improves upon past quantitative research on equity in Superfund, that while important and insightful, have limitations and all tell a rather different story. For example, McMaster, Leitner and Sheppard (1997) argue that previous quantitative studies fail to employ appropriate statistical techniques warranted by equity studies in environmental justice. They argue “rigorous statistical analyses should employ such methods as log linear models or categorical regression techniques, appropriately specified for auto correlated data, in order to provide statistically defensible equity analyses” (pg. 178). By using more suitable statistical techniques, and exploring the interactive effects of race and class, this study significantly improves upon the methodology of previous studies. Before delving into the methodology of the current study it is first necessary to offer a few hypotheses, which guide the study’s research questions.

## **Hypotheses**

The hypotheses I develop for the current study on racial and class equity in Superfund are based on themes that developed through the literature on environmental justice and previous studies on equity in Superfund. Because there is mixed evidence of

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<sup>18</sup> Many of the recommendations for future research are arguably best addressed using qualitative case study methodology as opposed to quantitative methods. For example, Lake’s (1994) recommendation that we address the larger issue of production decisions, which produce environmental degradation and distributive inequity, is not within the scope of this study. Where suggestions can be met using quantitative methods I have attempted to do so.

inequity in Superfund, I limit my hypotheses to factors associated with inequity if it is found. Inequity in the present study is conceptualized as having a longer remediation process, and having a lower quality remediation, measured by the amount of money spent at the site and the type of remedy selected at the site. I do not conjecture as to whether inequity exists in site remediation.

**Hypothesis 1:** If race and/or class inequity is found it is hypothesized that an interaction effect between race and class exists.

**Hypothesis 2:** If race and/or class inequity is found it is hypothesized that such inequity will be more pronounced at the smaller, and arguably more precise, spatial area of census block groups than the larger area of census tracts.

**Hypothesis 3:** If race and/or class inequity is found it is hypothesized that community involvement, a political proxy for democratic decision-making, will be inversely related to inequity.

The next chapter outlines the methodology used in this study to further explore the question of whether the EPA treats communities with a Superfund site in an equitable way, regardless of the demographic composition of the communities. It provides an overview of the variables used in the analyses as well as descriptive statistics for these variables.

## CHAPTER 4

### DATA SOURCES, SAMPLE, AND METHODOLOGY

In this chapter I present the data and methods used for the quantitative portion of the analysis. I also provide a description of the sample and how variables are coded. To briefly review, I seek to address such questions as: What community and Superfund site factors predict the pace of site remediation in EPA Region IV? What factors determine the amount of money spent on site remediation? What factors predict whether a more permanent and thus more desirable type of remedy was chosen or a less permanent, and consequently less preferred, remedy was chosen? Finally, does how we spatially define community such as by smaller census blocks or by a geographically larger area such as census tracts influence the statistical findings?

#### **Data**

In order to assess what factors predict the pace of site remediation, amount of money spent on site remediation, and whether the site had a more permanent or less permanent type of cleanup, data are drawn from three main sources. First, I gathered site information from EPA's CERCLIS database.<sup>19</sup> Second, I gathered data from EPA's Record of Decision (ROD) database, which provides the text of the actual RODs for each

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<sup>19</sup> CERCLIS stands for Comprehensive Environmental Response, Compensation and Liability Information System.

operable unit. Third, I gathered demographic information from the U.S. Census Bureau. I describe each data source in turn below.

The CERCLIS database is managed by EPA and is available online. The database provides a variety of site specific information such as the HRS score, the latitude and longitude coordinate of the site, whether the site is a federal site, and types of contaminants at the site. RODs are also available online through the EPA website, or on request EPA will provide a CD-ROM format of them. A ROD includes highlights of community participation and the community responsiveness summary. RODs also address community and state acceptance of alternatives, but usually an emphasis is just placed on acceptance of EPA's selected alternative. State and community acceptance of the alternative is required by EPA, but a perusal of RODs suggest that acceptance can take the form of degrees, as there are some instances where, in general, the community and or/state do not accept the selected alternative, usually demonstrating preference for another alternative that was not selected.<sup>20</sup>

Finally, Census data are drawn from the 1980, 1990 and 2000 Censuses. Because of the problem of demographic neighborhood transition, or the extent to which demographics of communities change due to environmental contamination and the lowering of property values, which consequently may attract lower income residents, I chose to use the census demographics of the closest Census year when the site was proposed for the NPL. Thus, if a site was proposed before or on June 15th of 1985, I use

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<sup>20</sup> As Hird notes (1994: 142-143) there is a fair amount of ambiguity in many of the requirements that SARA necessitates EPA to consider in site remediation. For example, Hird argues that protection of human health and environment is ambiguous in that it does not clearly state how much risk is acceptable. Similarly, cost-effectiveness of a remedy is defined as if "costs are proportional too overall effectiveness" while there is no clear definition of what is proportional (pg. 143).



1980 Census data. If a site was proposed between June 15, 1985 and June 15, 1995, I use 1990 Census data. For sites proposed after June 15, 1995, Census data from 2000 is used. Census data was collected from Summary II tape files as well as from the Landview IV and Landview V Census data programs. Census data for 1980 was collected using the 1970-2000 Neighborhood Change database and 1980 Census Summary III tape files.

In order to make geographic comparisons by spatial unit, census tract level data was gathered for all sites in the study. Census block group data was gathered from the 1990 and 2000 Census sites. The US Bureau of the Census did not implement block groups until after 1980 and thus comparisons before then are not possible. The census tracts and block groups were gathered by using the latitude and longitude coordinate of each site, provided by EPA. American Fact Finder, a web based program sponsored by the US Census Bureau, was used to gather the census tracts and block groups for 1990 and 2000 Census sites. The 1970-2000 Neighborhood Change database was used to locate the census tract location of the 1980 sites since American Fact Finder, which feeds into U.S. Census Bureau data including the Tiger Mapping System, only includes 1990 and 2000 Census years. Since census tracts can change every 10 years, it was necessary to use an alternative software program for locating 1980 census tracts. Additionally, not all sites were “tracked” by 1980 in such cases the nearest census tract was used.<sup>21</sup> The following section provides a description of the variables used in the multivariate analyses.

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<sup>21</sup> In a small number of cases this resulted in a fairly large distance between the latitude and longitude coordinate of the site and the nearest census tract because neighboring areas also were not tracked. In the majority of cases, there was a census track less than a mile away.

### **Dependent Variables: Hazard, Cost of Remediation and Quality of Cleanup**

Three dependent variables are used in the analyses that conceptually represent two areas where procedural equity has been shown to be of concern: pace of site remediation and quality of site remediation. Pace of site remediation is assessed by examining factors associated with the number of days it takes a site to achieve final NPL status from the date of proposal status and the number of days it takes from achieving final NPL status to having construction completed at the site. There are not enough sites that have been officially deleted from the NPL in Region IV to conduct meaningful analyses of the length of time it takes a site to achieve deletion status from construction completion or to analyze the time it takes from proposal status to achieve NPL deletion status. As will be addressed in the methodology section later in this chapter, I perform statistical analyses that assess the “risk” or “hazard” of a site achieving a construction completion.

The second dependent variable is the total present worth, in dollars, of the site remediation, a proxy measure of the quality of site cleanup. The total present worth values include the capital costs, which typically represent the construction costs, and the operation and maintenance costs. Operation and maintenance (O&M) costs are the costs per year it takes to maintain the selected alternative. Sites usually have O&M costs ranging from 1 year up to 30 years and vary by each operable unit. The present worth cost is an estimate of the entire cost of the remediation and is thus a better measure of the overall quality of cleanup, as capital costs for one site may be small but the site may have a large O&M cost for an extended period of time perhaps reflecting a more desirable

alternative.<sup>22</sup> Capital construction costs simply do not reflect the total monetary value of site remediation.

The third dependent variable is also a measure of the quality of cleanup. It measures the permanence of the selected remedy by assessing whether a cap or cover was chosen at one of the OUs at the site. Capping is a less desirable method of cleanup because it does not permanently remove the contaminant from the site but simply covers or contains it. In time, however, buried toxins can permeate the cap. This can occur in a span of as little as 20 years. The toxins then pose a threat to human health and the environment and must once again be cleaned up. This variable is represented as a dummy variable and coded as 1 if any of the OUs at the site had capping as a selected remedy.

### **Independent Variables**

The independent variables consist of demographic variables and site-specific variables. The demographic variables include percent below poverty, percent minority, percent urban and percent renting. The coding of the demographics is fairly straightforward. Percent below poverty is the percentage of the total population living below the poverty level. Percent minority is the percentage of the nonwhite population, including Hispanic whites. Percent urban is the percentage of the total population living within an urbanized area within the tract or block group. Percentage renting is the percentage of occupied housing units that are rented as opposed to owned. Site-specific variables include whether the site is a federal site, represented as a dummy variable with

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<sup>22</sup> It is important to note that these are estimates given by EPA. Many times ranges were given which had rather large intervals in the estimated lowest present worth cost to the highest. In these cases, I took the median value of the estimate given.

Federal=1, the Hazardous Ranking System (HRS) score, which ranges from 29-71, and the number of Operable Units (OUs) at each site. Community involvement at each site is also included as an independent variable.

Federal sites in Region IV tend to be larger sites, in terms of being identified as a “mega” site and having a higher number of operable units. It is perhaps likely that EPA prioritizes federal sites due to their own federal funding as a government agency and the fact that EPA does not have to negotiate with outside primary responsible parties since the federal government is responsible.<sup>23</sup> It is also possible, though, that since Region IV is known for their “let’s get moving approach” and expedient cleanups, usually through the use of emergency removals to get the toxics off the ground, that federal status may be less of a determining factor in pace of cleanup in Region IV relative to other regions.

EPA claims HRS scores are used only in determining whether a site is eligible for Superfund status and is not further considered at any stage in the remediation process. It makes intuitive sense, however, that sites with higher HRS scores are more severely contaminated and may take longer to cleanup as well as may require greater financial expenditures on the part of EPA. This supposition is confirmed by Hird’s (1994) study, which found that HRS scores did influence the pace of cleanup, although his findings indicate the opposite effect in terms of pace of cleanup with higher scores indicating a more rapid cleanup of the site, or an increased likelihood of reaching cleanup stage, through the Superfund process. Hird (1994) reports similar results when examining HRS scores and capital costs and present worth values with higher HRS scores resulting in greater financial expenditures.

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<sup>23</sup> Mega sites are sites with removal and remedial action costs over \$50 million (Probst et. al 2001).

The number of site operable units is also important to consider, although previous quantitative studies on equity in Superfund have failed to do so. Probst et al. (2001) argue that an increase in the number of site OUs produces an effect they term “OU lag”. OU lag refers to the time between the start of a remedial action at one operable unit and the time it takes to start remediation at successive operable units. In addition to lengthening the site remediation process, the number of operable units is also likely to reflect the amount of money spent on a site, with more operable units increasing the site remediation cost. Also, because the capping variable includes capping at any operable unit, the more operable units a site has the more opportunities that site has to have a cap at one of them. Moreover, it is likely that if a large site requires multiple cleanups then capping for one or more operable units may become a more desirable alternative if large sums of money are being spent on more desirable alternatives at other site operable units.

Finally, community involvement is a proxy for political pressure. Communities that are more actively involved in the site remediation may influence the remediation process by quickening EPA response time to the stages of remediation. This is equally true for the quality of site remediation such as spending more money on more desirable alternatives and being less likely to use capping as a selected alternative. Community involvement is also fruitful to consider given the emphasis EPA has placed on involving community members as well as reflects the emphasis on democratic decision-making reflected in ecopopulism and the environmental justice movement. To date there have been no studies that have explored how such involvement influences site remediation.

Community involvement is represented by an ordinal scale ranging from 1 to 3, with 1= Low involvement, 2=Medium involvement and 3=High involvement. These

codes were derived from a content analysis of the responsiveness summaries and community participation highlights provided in the RODs. RODs for each operable unit were coded. Coding took the form of analyzing public attendance at the public meeting, the number of oral comments at the meeting, the number of written responses from the public during the 30-day comment period and whether a community action group, environmental group, civic association or neighborhood association was involved with EPA.

Sites were coded as low if there was no indication of any form of public involvement. This would mean that no members of the public attended the public hearing and no written comments were submitted during the public comment period. A site was coded as medium if there is evidence of some public involvement in the site remediation decision process. This would entail at least 1 written letter by a citizen during the public comment period and/or some form of attendance at the public meeting. Attendance at the public meeting was measured by if the ROD stated the attendance and/or by the number of verbal questions received at the meeting. The community participation highlights, and the responsiveness summaries in the RODs, are not completely standardized across RODs, so while it would have been ideal to simply use the number of public citizens in attendance at the meeting as a measure of community involvement, few RODs actually give the number of citizens in attendance. Some RODS give overall numbers in attendance which would include EPA officials, State officials, PRPs, media, and concerned citizens but do not say specifically how many citizens were present. The majority of RODs do not provide the number of people in attendance at the public meeting. A code of high community involvement was reserved for sites that had

an organized community group involved with the remediation process. This could range from an already existing group such as a neighborhood association, a local environmental group or a national environmental group to a newly created organization formed specifically in response to the Superfund site.

Descriptive statistics for the variables used are presented in Table 5 (See the Appendix for correlations of the variables). The descriptive statistics are presented for the entire sample that uses census tract level data from 1980, 1990 and 2000 Censuses and for the smaller sample used to compare census tract level data and census block group level data for sites that fell within the range of the 1990 and 2000 Census data. The descriptive statistics for variables are also based on all sites having a value on all of the census variables, the federal status variable, and having a value on the HRS score. Ideally, it would be more appropriate to present the descriptive statistics of variables used in each analysis but because each analysis has a different sample size, depending on the dependent variables and the geographic level of analysis, I believe this is the best way to present the descriptive statistics for the latter way would result in numerous tables for each variable. The census demographic statistics, HRS score and federal status are used in all of the regression analyses.

Regarding the dependent variables, frequencies for the variables used in the census tract analysis of 1980-2000 sites reveal that forty percent of sites received capping as part of the cleanup remedy, the average number of days from NPL proposal to finalization was approximately 435 days, and the average amount of money spent at each site was \$11,000,000.0.

**Table 5.** Descriptive Statistics for Variables in the Analysis

<b>Census Tract 1980-2000</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>SD</b>
<i>Dependent Variables</i>				
Cap (1=Yes)	1	0	.40	.49
Present Worth Value (in dollars) (N=166)	22500.0	37000000.0	11000000.0	31000000.0
Days between Proposal and Finalization Status (N=191)	77	3392	434.48	355.32
<i>Census Demographics (N=192)</i>				
Percent Minority	0	99.30	28.36	27.12
Percent Urban	0	100	57.0	43.49
Percent Renting	6.10	99.70	32.97	21.30
Percent Below Poverty	1.70	59.70	16.33	10.05
<i>EPA Site Specific Variables</i>				
Federal (n=192)	1	0	.09	.28
HRS (N=192)	29.0	71.0	42.92	9.48
Community Involvement (N=175)	1	3	2.15	.57
Operable Units (N=176)	1	26	1.77	2.40

<b>Census Tract 1990-2000</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>SD</b>
<i>Independent Variables</i>				
Percent Minority	0	99.3	30.31	27.62
Percent Urban	0	100.0	60.69	41.37
Percent Renting	6.40	99.7	36.42	23.53
Percent Below Poverty	1.90	59.70	16.36	10.51

<b>Census Block 1990-2000</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>SD</b>
<i>Independent Variables (N=108)</i>				
Percent Minority	0	99.8	30.82	28.88
Percent Urban	0	100	58.60	44.24
Percent Renting	6.20	99.70	37.78	26.72
Percent Below Poverty	0	86.60	16.86	13.78



Regarding the census demographics, on average, 57% of sites are located in urban areas, 33% of residents rent as oppose to own their home, about 28% of community members are nonwhite and 16% live below poverty level. The average HRS score is 42 and the average number of operable units is slightly less then 2. Approximately 9% of sites are federal sites.

The demographic descriptive statistics for the 1990-2000 sites by census tract and block group levels do not substantively vary from the statistics in the full 1980-2000 sample. The fact that the census tract and the block group level data are similar suggests that the multivariate comparisons by region may not significantly vary in their findings.

### **Methods: Multivariate Analyses**

Three types of multivariate statistical analyses are employed to address my research questions, including logistic regression, ordinary least squares regression, and event history analyses. I will address each of these in turn. First logistic regression is used to assess the odds of whether capping was used at a site. Second, ordinary least squares regression is used for the dependent variables pace of cleanup and present worth value of the site remediation. Ordinary least squares (OLS) regression is ideally suited to address interval level dependent variables. OLS regression will allow us to predict how much each independent variable increases or decreases the dependent variable in the metric of the dependent variable. In this case it will allow us to assess how much a unit increase in an independent variable increases or decreases the amount of money spent on each site, and the number of days between proposal status to finalization status. OLS regression, however, will only examine sites that have reached one of these stages of completion. This is not a problem for the length of time in days for proposal to

finalization status as the majority of sites in Region IV have achieved this stage. It is more problematic, however, for examining the length of time from finalization status to construction completion because by excluding cases that have not reached this stage, the issue of equity becomes confounded.

Sites that are taking longer to achieve the construction stage, and in fact have not yet achieved that stage, will be excluded from the analysis if using general linear regression. For example, a site that was finalized in June of 1993 and still does not have construction completion indicates a longer pace of cleanup than a site that was finalized in June of 1993 but had construction completion a year later. OLS regression, however, will not capture that discrepancy as the site that is still under the construction phase of remediation is excluded from the analysis.

In sum, we lose valuable information about cases that have not yet achieved the event, which can severely bias our findings. Thus it is more appropriate to treat the data as event history data and explore factors associated with whether a site reaches a stage within a specified period of time. This leads us to the third form of multivariate analyses, event history analysis.

Event history analysis is well suited for this investigation because it handles the problem of censoring, or cases that did not achieve the event during the specified time period and are usually dropped from other forms of multivariate analyses such as OLS regression. Event history data is longitudinal data that tracks cases over time to assess when an event occurred, in our case when a site reached the construction stage of remediation (Allison 1984). Event history analysis allows us to follow cases for a specified time period and predict the odds or hazard of a site achieving the event over that

time period. This is referred to as the hazard rate and represents the probability that an event will occur at a particular time for a particular case given that the case is at risk for the event to occur, meaning it has not already achieved the event (Allison 1984: 16). Thus, event history analysis takes into account the extent to which sites achieve an event earlier or later than others during the specified time period. It also takes into account how the hazard rate varies or depends on the explanatory variables. In sum, it is more appropriate than simply dichotomizing the dependent variable as to whether the site achieved the event or not.

In this analysis sites were followed from the date they were finalized on the NPL to December 31, 2003. Missing data for all of the analyses are handled via listwise deletion, a standard and stringent method of handling missing cases. Listwise deletion removes cases from the regression equation that do not have a valid value on all of the variables in the regression equation. In the next chapter, I present the results from the OLS regression on length of cleanup from NPL proposal and the Cox regression of NPL finalization to construction completion.

## CHAPTER 5

### RESULTS: PACE OF CLEANUP

This chapter presents the results of the multivariate analyses, which seek to shed light on procedural equity defined in terms of the pace of cleanup of Region IV Superfund sites. The multivariate analyses illustrate which site specific factors and community specific factors predict Superfund outcomes with respect to how long the site process takes for a site to advance to a certain stage. More specifically, the analyses explore the number of days it takes to move NPL proposal to finalization status and the odds of achieving construction completion since being finalized on the NPL. In addition, comparisons are made for sites using the 1990 and 2000 Census data to assess if how we spatially define community influences the statistical outcomes. As noted previously, the Census Bureau did not start collecting block group level data until the 1990 Census, which is why sites proposed prior to June 15, 1985 are excluded from analyses using geographic comparisons.

Table 6 presents the results of the linear regression of the number of days from site proposal to finalization from sites on EPA site characteristics and census tract level demographics of the Superfund communities. Community involvement and the number of operable site units are excluded from these analyses because the RODs are not developed until the site has been finalized. There is no means to measure community involvement at this stage. Nonetheless, EPA's emphasis on community involvement does not begin until a site has been officially listed on the NPL. The number of operable

site units is also not established until after a site has been listed as an official NPL site and the site has begun the remedial design stage. Thus these variables are not included in the analyses.

Model I includes the HRS score and whether the site was a federal site, neither of which emerge as significantly influencing the number of day between proposal and finalization status. Model II enters the demographic variables of percentage renting, percent urban, and percentage minority into the regression equation. It is noteworthy that the coefficient for percent minority is negative but fails to emerge as significant.

**Table 6.** OLS Regression of Length of Time (in Days) between NPL Proposal and NPL Finalization on Demographic Characteristics of Census Tracts 1980-2000 (N=191)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>
HRS	-3.97 (2.73)	-4.24 (2.78)	-5.123# (2.71)	-4.58# (2.47)
Federal Site	35.07 (90.91)	64.01 (104.68)	163.09 (105.82)	163.09 (105.82)
% Urban		.113 (.708)	.835 (.720)	-.292 (.679)
% Renting		-.979 (1.72)	-1.80 (1.69)	.609 (1.58)
% Minority		.858 (1.06)	-2.103 (1.34)	-14.22*** (2.82)
% Below Poverty			12.35*** (3.61)	-11.85* (5.06)
% Minority * % Below Poverty				.527*** (.084)
Constant	601.78 (119.32)	611.97 (125.57)	509.04 (125.74)	880.77 (128.70)
Adjusted R Square	.001	-.011	.044	.210

Notes:\*\*\*p $\leq$ .001 \*\*p $\leq$ .01 \*p $\leq$ .05 #p $\leq$ .10, two-tailed tests of significance

Model III enters percent below poverty into the regression equation. Percent below poverty emerges as significantly increasing the number of days between NPL proposal and finalization, net of controls for site specific variables, with a one percent increase in percent poverty resulting in an increase of 12.35 days. Importantly, the sign for the percent minority coefficient changes from negative to positive, suggesting a statistical interaction effect between the two variables. It was argued earlier that race and class interaction effects have failed to receive enough attention from quantitative researchers in the field of environmental justice. These statistical findings support theoretical arguments that the interactive effects of race and class need further exploration.

Model V, the full model, tests for a race and class interaction effect. The percent minority times percent below poverty interaction terms emerges as significant ( $p < .001$ ). Thus, we can conclude that the effect of race and poverty are conditioned by each other. The analysis reveals that communities with less than 27% of residents living below poverty level, a net race effect is significant and is inversely related to length of time between NPL proposal and finalization status. When the number of residents living below the poverty level is greater than 27% the effect is reversed with minority residents experiencing an increase in the length of time from NPL proposal to finalization. When the percentage living below poverty level is equal to 27% there is no significant race effect. Thus racial and ethnic minorities experience discrimination only when there are at least 28% of residents living in poverty. More simply, the effect of race on the number of days between proposal and finalization status is conditioned by percent below poverty. Thus, poor minority neighborhoods are the most vulnerable to waiting longer for their

sites to be finalized on the NPL. Minority neighborhoods with fewer residents living below poverty are less likely to be as vulnerable. Similarly, when exploring the net effect of percent below poverty as condition by percentage minority, in communities with fewer than 23% of minority residents the poverty effect is negative, indicating a decrease in waiting time from NPL proposal to NPL finalization. When the percentage of minority residents is greater than 23%, the effect of poverty increases the length of time between proposal and finalization status (See Figure 1 and Figure 2). It is also fruitful to note that the race and class product term considerably increases the variance explained in the model from approximately 4% to 21%.

Tables 7 and 8 present the same analysis as Table 6 but with census tract and block group level data respectively for sites using 1990 and 2000 Census data. Findings for each of the analyses are similar to those presented in Table 6 but some discrepancies do emerge. When comparing the full models in Table 7 and Table 8, we see that federal sites at the census tract level move from proposal to finalization more quickly than nonfederal sites but this finding is not sustained when examining the smaller block group level data.

Table 7 shows, when controlling for all demographics and Superfund variables, federal sites achieve NPL status about 268 days more quickly than non-federal sites. As seen in Table 8, net of the effects all other variables, federal sites do not emerge as significantly influencing the pace of cleanup. Another discrepancy that emerges when comparing census tract level community demographics with those at the block group level is that percent renting emerges as weakly significant in the full model in Table 7, indicating a one percent increase in percentage renting results in a 4 day increase in length of time from proposal to finalization status. To the contrary, the full model in

Table 8 shows that percent renting fails to emerge as significantly influencing the number of days from proposal status to NPL finalization. A final noteworthy difference in the two analyses is that the analysis by census tracts explains more variance than the analysis by block groups, 40% and 27% respectively.

**Table 7.** OLS Regression of Length of Time (in Days) between NPL Proposal and NPL Finalization on Demographic Characteristics of Census Tracts 1990-2000 (N=113)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>
HRS	-4.07 (3.95)	-4.15 (4.01)	-6.72 (3.93)	-8.00* (3.19)
Federal Site	-243.48* (121.68)	-255.09# (151.06)	-99.21** (152.79)	-261.72* (125.73)
% Urban		-.565 (1.24)	.686 (1.26)	-.838 (1.04)
% Renting		-.628 (2.52)	-.628 (2.52)	4.03# (2.13)
% Minority		1.52 (1.62)	-2.71 (2.04)	-22.65*** (3.13)
% Below Poverty			16.14** (5.11)	-17.93** (6.17)
% Minority * % Below Poverty				.801*** (.107)
Constant	663.07*** (168.72)	633.77*** (168.72)	551.32** (171.83)	1172.21*** (162.01)
Adjusted R Square	.032	.016	.095	.405

Notes:\*\*\*p<.001 \*\*p<.01 \*p<.05 #p<.10, two-tailed tests of significance

Regarding the two variables, race and class, which spawned the scientific debate over what geographic areas are best representative of an impacted community, the findings from the two analyses are comparable. Both analyses show a race and class interaction effect as was hypothesized (see Figure 3 through Figure 6).



**Table 8.** OLS Regression of Length of Time (in Days) between NPL Proposal and NPL Finalization on Demographic Characteristics of Census Block Groups 1990-2000 (N=108)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>
HRS	-3.36 (4.10)	-3.31 (4.12)	-4.58 (3.96)	-6.35# (3.60)
Federal Site	-259.31* (123.81)	-366.14* (151.06)	-172.79 (151.44)	-144.89 (137.09)
% Urban		-.995 (1.20)	-.320 (1.17)	-.404 (1.06)
% Renting		3.48 (2.32)	1.74 (2.28)	1.09 (2.07)
% Minority		-.043 (1.60)	-2.47 (1.70)	-8.98*** (5.42)
% Below Poverty			11.42** (3.52)	-9.81# (5.42)
% Minority * % Below Poverty				.358*** (.07)
Constant	646.45*** (174.58)	585.44*** (182.79)	527.45** (175.73)	924.60*** (178.85)
Adjusted R Square	.033	.029	.112	.273

Notes:\*\*\*p≤.001 \*\*p≤.01 \*p≤.05 #p≤.10, two-tailed tests of significance

The results of the analysis of the length of time from NPL finalization to construction of the site remedy completion are presented in Table 9. Cox regression, a form of event history analysis (also known as survival analysis) was used to regress the length of time in days from NPL finalization to construction completion. Because these analyses span three decades of Superfund, I also included dummy variables to control for period effects.

Figure 1. Net Effect of Percent Minority on Length of Time (Model IV, Table 6)

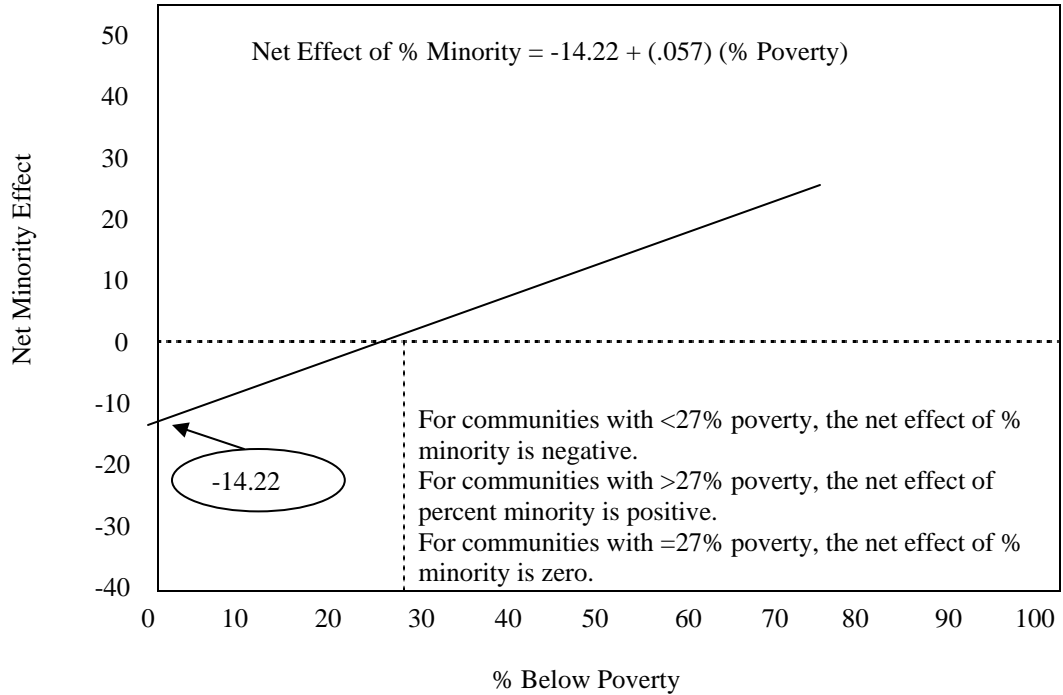


Figure 2. Net Effect of Percent Poverty on Length of Time (Model IV, Table 6)

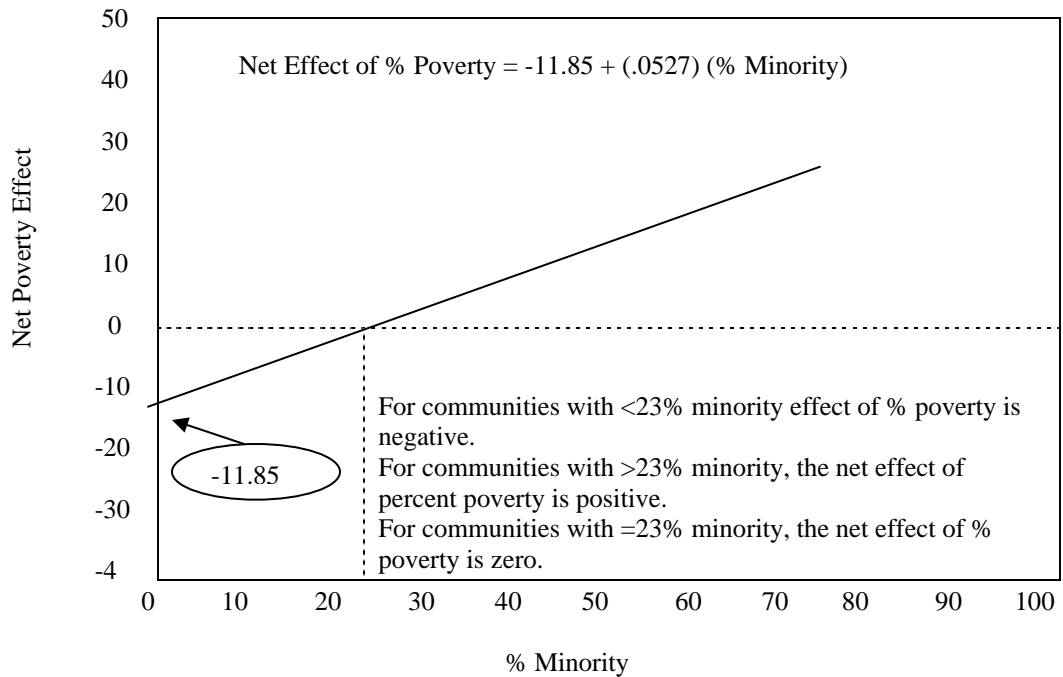


Figure 3. Net Effect of Percent Minority on Length of Time (Model IV, Table

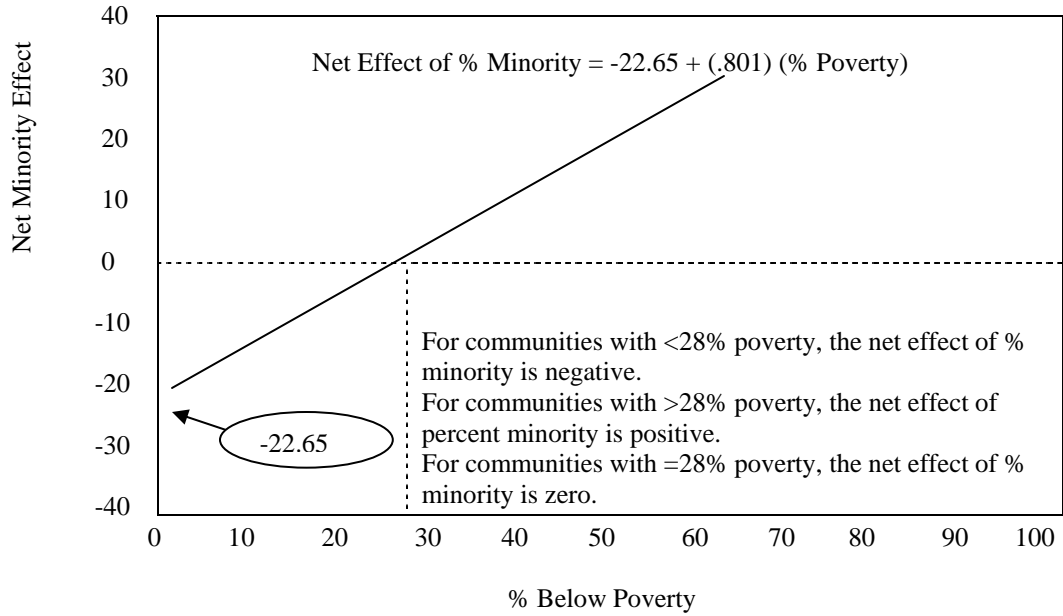


Figure 4. Net Effect of Percent Poverty on Length of Time (Model IV, Table 7)

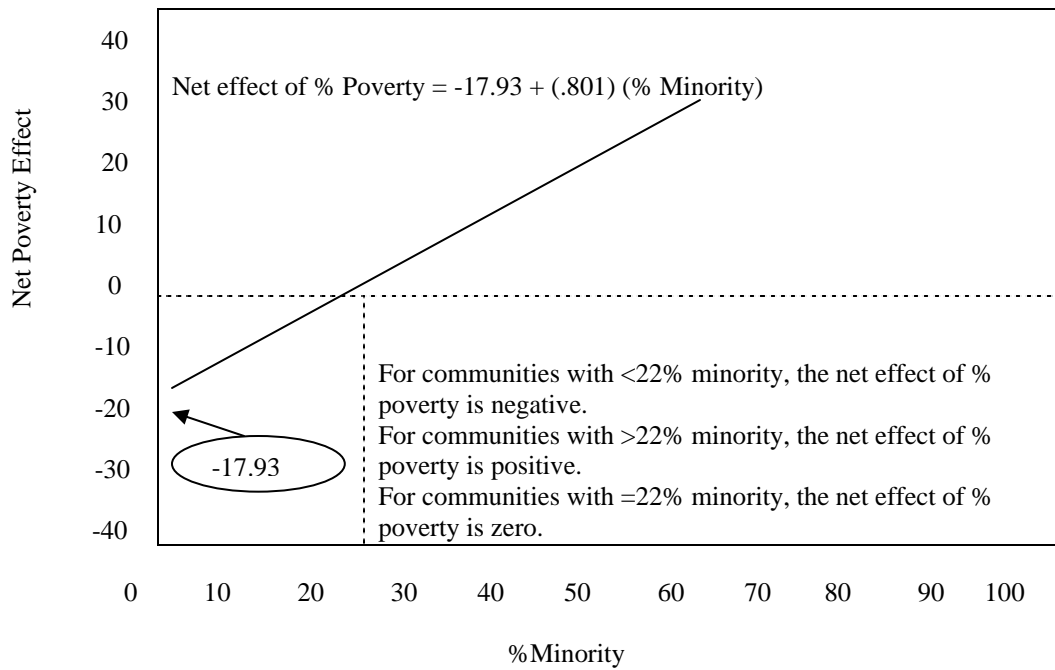


Figure 5. Net Effect of Percent Minority on Length of Time (Model IV, Table 8)

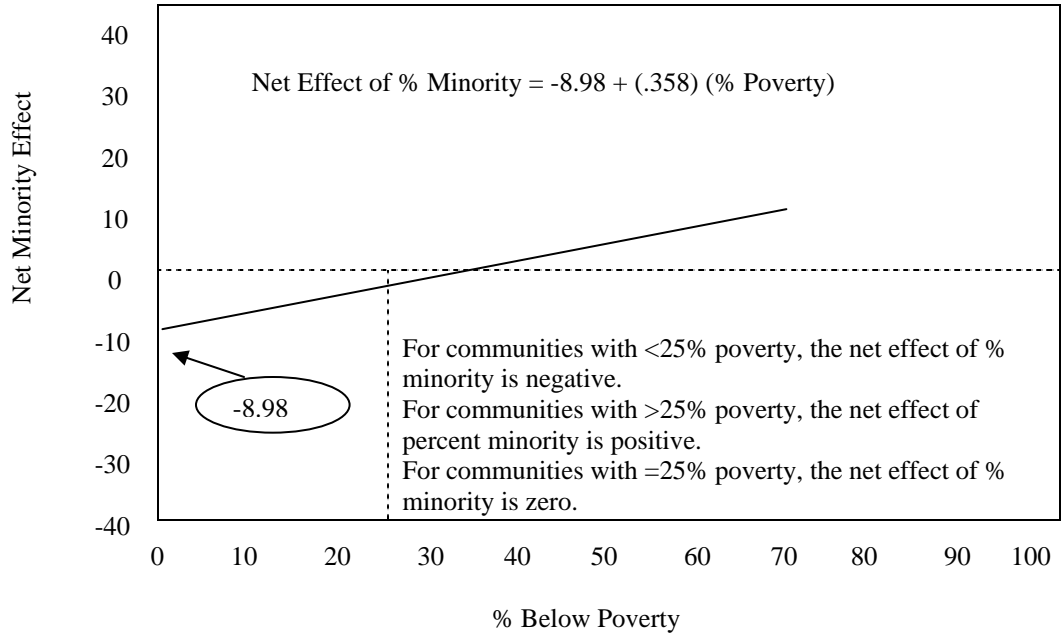
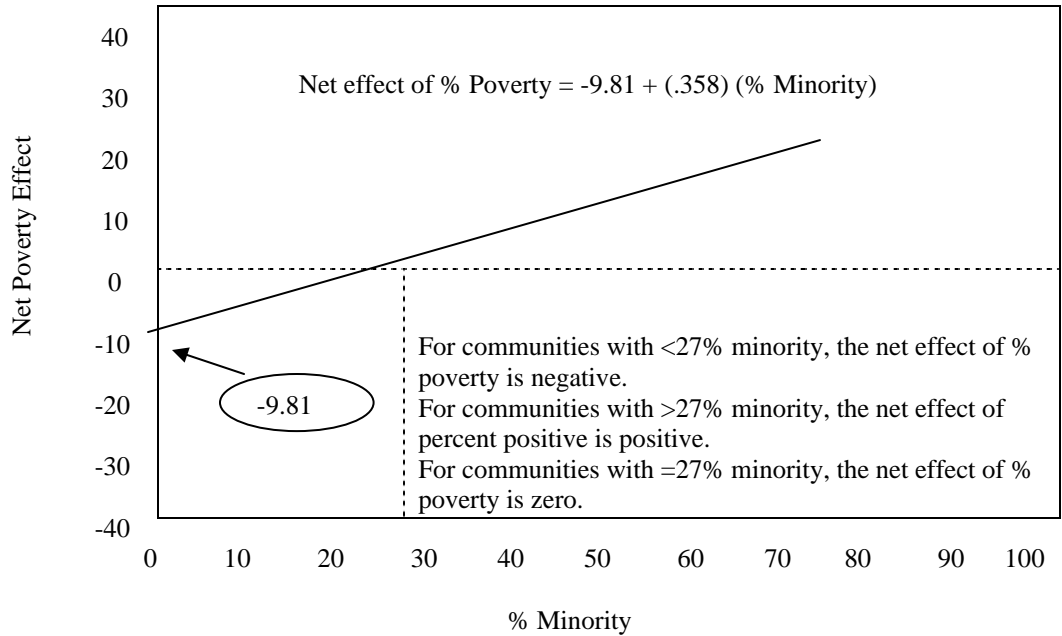


Figure 6. Net Effect of Percent Minority on Length of Time (Model IV, Table 8)



Three dummy variables were constructed to represent three main historical periods in the life of Superfund. The first period, which runs from the inception of Superfund through 1985 is the early period. The second period, which runs from 1986 through 1992, represents the Amendment period, or the period of the Superfund Reauthorization Act (SARA). The last period represents the environmental justice period, which includes 1993 to 2003. Environmental justice became an important political agenda to EPA in 1993 when EPA's new administrator outlined EPA's goals and commitment to environmental justice, which was subsequently followed by Clinton's Executive Order in February of 1994. Today, environmental justice remains an important agenda for EPA. The latter environmental justice period variable is used as the omitted reference or comparison category in the analysis.

During Superfund's early period heavy criticism emerged regarding the length of time of site remediation. More sites were being added yet there did not seem to be any conclusive evidence that the expensive program was actually working. The amendment period that followed, which is represented here by the implementation of the Superfund Amendment and Reauthorization Act (SARA) in the mid 1980s, was partially meant to address such criticism (Goldfarb 2001). Thus, it is anticipated that sites finalized in the early period take significantly longer to reach construction completion than later periods.

Model I of the Cox regression analysis shows that an increase in both the hazardous ranking score and community activism significantly decrease the odds (and thus reduces the risk) of achieving construction completion. Sites finalized in the early period of Superfund decreases the odds of achieving the hazard by 66.4% ( $\text{Exp}(b) = .336$ ) compared to the later period of environmental justice reform. The number of site operable

units is entered into the equation in Model II. Not surprisingly, an increase in site operable units decreases the odds of achieving construction completion by 38.8% ( $\text{Exp}(b)=.612$ ). The early Superfund period retains its significant effect relative to the environmental justice period. The census demographics are entered into the equation in Model III. The percent minority variable fails to emerge as significant, while community involvement and NPL finalization in the early period remain significant net predictors of decreasing the likelihood of achieving construction completion. Percent living below poverty is entered into the equation in Model IV and similar to the percent minority variable does not emerge as significant. Model V tests for an interaction effect between percent minority and percent living below poverty which also fails to emerge as significant. Finalization in the early period, number of site operable units and community involvement remain significant net of the effects of other variables. Community involvement decreases the odds of achieving the event by 34.6% ( $\text{Exp}(b)=.654$ ). A unit increase in site operable units results in a decrease in the likelihood of achieving construction completion by 42.3% ( $\text{Exp}(b)=.577$ ). Relative to the environmental justice period, the early period decreases the likelihood of achieving construction completion by 60.3% ( $\text{Exp}(b)=.397$ ).

## **Summary**

In sum, the quantitative analyses of pace of cleanup demonstrate inequity in certain aspects of the implementation of Superfund in Region IV. Communities with a larger composition of racial and ethnic minorities take longer to reach NPL finalization from NPL proposal but this is contingent upon the percentage of residents living below poverty and the percentage of racial and ethnic minorities in the community.

**Table 9.** Cox Regression of Length of Time from NPL Finalization to Construction Completion (N=173)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>	<b>Model V b</b>
HRS	-.022# (.013)	-.008 (.014)	-.008 (.014)	-.007 (.014)	-.007 (.014)
Federal Site	-14.416 (301.603)	-13.195 (285.243)	-13.445 (253.951)	-13.307 (253.681)	-13.353 (254.477)
Community Activism	-.433** (.166)	-.386* (.168)	-.385* (.169)	-.417* (.173)	-.425** (.173)
Early Period	-1.09* (.469)	-1.005* (.472)	-.892# (.484)	-.887# (.484)	-.923# (.488)
SARA Period	-.756 (.484)	-.534 (.499)	-.439 (.508)	-.420 (.510)	-.437 (.510)
EJ Period	Reference	Reference	Reference	Reference	Reference
No. OUs		-4.90** (.166)	-.546** (.177)	-.549** (.177)	-.549** (.177)
% Urban			-.002 (.002)	-.001 (.003)	-.001 (.003)
% Renting			.011 (.008)	.009 (.008)	.010 (.008)
% Minority			.000 (.004)	-.003 (.005)	-.010 (.010)
% Below Poverty				.012 (.015)	.002 (.020)
% Minority * % Below Poverty					.000 (.000)
-2 Log Likelihood	1001.809	991.312	988.835	988.125	987.528

Notes:\*\*\*p $\leq$ .001 \*\*p $\leq$ .01 \*p $\leq$ .05 #p $\leq$ .10, two-tailed tests of significance

Importantly, there is a strong and significant race and class interaction effect, which indicates the overlap between living in poverty and being a racial and ethnic minority condition each other to affect equity for both groups. Arguably, the debate over which is the better predictor of inequity is less important when we consider the value of examining the combined effects of race and class and acknowledge the large overlap between the two which can result in inequity. The event history analysis, however,

shows no significant race or class effect in examining the time from NPL finalization to NPL construction completion. Thus equity appears to be somewhat of a problem in the early stages of site remediation (proposal to finalization) but not in later stages.

Additionally, when examining the period effects that emerge as significant in the event history analysis, there is evidence that progression to the stage of construction completion is occurring more quickly. Compared to the omitted reference category of the environmental justice period, sites finalized in the early stages of Superfund have significantly lower odds of achieving the hazard, or in this case of achieving construction completion when accounting for duration from NPL finalization. On the one hand, this could be a result of the emphasis on environmental justice. On the other hand, it could perhaps reflect more efficient time management of the site remediation process for all communities especially since the implementation of Superfund was highly criticized for its slow remediation by EPA or what has been referred to by critics as “foot-dragging” which was consequently partially responsible for the amendment period (SARA) which followed (Goldfarb 2001: 239).



## CHAPTER 6

### RESULTS: QUALITY OF SITE CLEANUP

In this chapter we turn to the quality of site cleanup, specifically the amount of money spent on each site and the desirability of the type of remedy chosen in terms of the remedy's permanence. More specifically, this chapter examines the amount of money spent at each site, which includes the capital construction costs as well as the operation and maintenance costs for the life of the remedy.

Table 10, Table 11 and Table 12 present the results of the OLS regression of present worth costs on the demographic and site-specific variables. Table 10 presents the results of the analyses for sites using 1980-2000 level census tract level data. Model I includes federal status, HRS score and community involvement in the regression equation. HRS emerges as weakly significant with a one point increase in the HRS score resulting in a \$417,495.60 increase in present worth costs, while federal sites have a large difference of \$2,883,768.0 more money allocated to cleanup than non-federal sites. A one-unit increase on the community involvement scale results in a \$9,584,273.80 increase in the amount of money spent on each site.

Model II enters the number of operable site units into the regression equation. A one-unit increase in the number of operable units produces a large increase of \$12,946,091.0 spent on each site. Importantly, the amount of variance explained in Model I, approximately 11%, increases to 68% when adding operable units to the analysis. The changing of the federal status coefficient from positive to negative suggests

that the positive effect of federal status is really a consequence of federal sites having more OUs. In turn, this has a positive effect on the amount of money spent.

Model III tests for an interaction effect between federal status and the number of operable units. Controlling for community involvement, HRS score, and the component parts federal status and operable units, the product term coefficient of \$5,842,795.60 emerges as significant ( $p < .01$ ). This indicates that the number of operable units conditions the effect of federal status. Similarly, the effect of operable units is conditioned by whether the site is a federal site. In this model, the main effect of operable units is \$6,926,201.8 when sites are not federal sites. Thus among nonfederal sites each additional operable unit increases the amount spent by \$6,926,201.8. The product term coefficient of \$5,847,295.6 is the additional monetary increase of operable units when the site is a federal site. Thus for federal sites the effect of each additional operable unit results in an increase of \$12,773,497.4 ( $\$6,926,201.8 + \$5,847,295.6$ ) spent at each site. Likewise, we can interpret how the effect of federal status varies by operable units. The coefficient, or main effect, for federal status indicates that when there are zero operable units federal sites have \$47,684,981.0 less spent on site remediation than nonfederal sites. Of course no sites in this sample have zero operable units. A more meaningful interpretation is that federal sites with two operable units produce a difference of  $-47,684,981.0 + 2(5,847,295.6)$  or  $-35,990,389.8$ . In other words, federal sites with two operable units have \$35,990,389.8 less spent on site remediation than nonfederal sites with two operable units.

Model IV enters the demographic variables into the regression equation. Percent minority fails to achieve statistical significance while percent renting emerges as significance, with a one percent increase in renting resulting in a \$368,134.20 decrease in the present worth costs. The numbers of operable units and federal status of a site, as well as their product term, remain significant net predictors of present worth cost. The HRS score maintains its significant effect of a \$374,364.65 increase in the present worth cost for a one unit an increase in the HRS score.

Model V, the full model, shows the effect of percent below poverty status is statistically significant. A one percent increase in poverty status increases the present worth costs by \$388,879.35. This suggests that EPA actually favors lower income communities in the allocation of money to the site remediation process. Although not shown here, I also tested for an interaction effect between race and class while including the variables in the full model. The interaction effect failed to emerge as significant. Model V also shows that the interaction term between federal status and operable units retains its significant effect. Thus when controlling for all variables, or net of the effects of all other variables in the regression equation, the main effect of operable units is \$8,116,461.7 (when sites are not federal sites) and the main effect for federal sites is \$-33,550,349.0 (when sites have zero operable units). The product term of \$4,693,778.1 represents the additional effect of operable units for federal sites. Each additional operable unit results in \$12,810,239.8 more money being spent for site cleanup (\$8,116,461.7 + \$4,693,778.1). Alternatively, a federal site with two operable units has \$24,162,798.2 less [-33,550,349.0 + 2(4,693,778)] spent on remediation than nonfederal sites with two operable units.

Tables 11 and 12 present the results of the ordinary least squares regression of present worth costs on the predictor variables for the comparison of geographic areas for 1990 and 2000 Census data sites. In examining these tables, the results do not vary substantively from the results presented in the analyses in Table 10.

**Table 10.** OLS Regression of Length of Present Worth Costs (in Dollars) on Demographic Characteristics of Census Tracts 1980-2000 (N=165)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>	<b>Model V b</b>
HRS	417495.6# (2520417.4)	315515.3* (150696.9)	413705.5** (152416.6)	374364.6** (145978.8)	354101.3* (144878.3)
Federal Site	2883768*** (8306503.4)	-35586845*** (6286192.3)	-47684981*** (7658574.8)	-35327574*** (7785625.7)	-33550349*** (7758042.5)
Community Activism	9584273.8* (4235788)	3492224.2 (2572389.4)	4178139.8 (2537723.5)	3539865.1 (2413103.7)	2811201.2 (2415976.8)
No. OU		12095100*** (716086.5)	6926201.8*** (2062172.6)	8038455.5*** (1970619.9)	8116461.7*** (1951506.9)
Federal * OU			5847295.6** (2191480.6)	4641537.4* (2106768.3)	4693778.1* (2086089.7)
% Urban				12428.7 (34946.1)	36245 (36530.2)
% Renting				-361384.2*** (85107.4)	-400133.2*** (85723.3)
% Minority				71705.1 (53969.7)	-10777.7 (67095.7)
% Below Poverty					388879.3* (191303.6)
Constant	-30086919* (14114287)	-29096275*** (8487120.1)	-27634531*** (8347634)	-17879816* (8222036.9)	-20009404* (8207848.9)
Adjusted R Square	.107	.677	.689	.725	.730

Notes:\*\*\*p $\leq$ .001 \*\*p $\leq$ .01 \*p $\leq$ .05 #p $\leq$ .10, two-tailed tests of significance

Furthermore, no significant differences emerge between the analyses regarding census tract and block group level data. Unlike the geographic comparisons presented in Tables 7 and 8 regarding the length of day from proposal to finalization status, the smaller block group level data does not explain significantly more variance in the regression than the census tract level data.

**Table 11.** OLS Regression of Length of Present Worth Costs (in Dollars) on Demographic Characteristics of Census Tracts 1990-2000 (N=90)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>	<b>Model V b</b>
HRS	527905.18 (426267.49)	568418.71* (235762.19)	700091.1** (227872.4)	709341.6*** (196622.2)	647902.5** (197994)
Federal Site	35649529.0** (12658854)	-46063230.0*** (9113067.3)	-65464474*** (10596674)	-37209137*** (10469222)	-33716727** (10567890)
Community Activism	14293132.0# (7841275.5)	1106989.1 (4437580.3)	4119726.8 (4322815.6)	2286568.3 (3833436.8)	945592.4 (3877172.6)
No. OUs		12873545.0*** (919123.8)	3019851.9 (3221406.9)	6629009.6* (2823111.5)	7216480.5** (2815120.5)
Federal * OU			10543369** (3317726.6)	6512086.2* (2947074.5)	6046264.7* (2928923.5)
% Urban				74416.6 (59298.1)	104585.8 (61404.8)
% Renting				-649312.6 (117210.8)	-692922.7 (118884.3)
% Minority				164418.4* (74845.5)	71188.9 (92879.7)
% Below Poverty					418570.4 (251751.1)
Constant	-44860819* (22839113.0)	-35024279** (12650531.0)	-33751725** (12030024)	-23093059* (10954649)	-23072242* (10837263)
Adjusted R Square	.125	.732	.758	.826	.829

Notes:\*\*\*p<.001 \*\*p<.01 \*p<.05 #p<.10, two-tailed tests of significance

**Table 12.** OLS Regression of Present Worth Costs on Demographic Characteristics of Census Block Groups 1990-2000 (N=85)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III</b>	<b>Model IV b</b>	<b>Model V b</b>
HRS	569596.75 (440510.61)	596781.75* (241686.65)	737573.89** (233651.21)	760467.23*** (207046.34)	723046.20*** (207046.34)
Federal Site	35580306** (12984898)	-46028801*** (9271965.3)	-65595730*** (10779272)	-44115914*** (10557798)	-40970423*** (11228010)
Community Activism	16271633* (8276621.2)	2506968.2 (4649839.6)	5630768.2 (4522452.9)	1893563.1 (4143399)	1146929.4 (4246615.3)
No. OUs		12843881*** (933995.9)	2849369.3* (3302832.1)	6708755.3* (3017711.1)	6801362.1* (3025736.3)
Federal * OU			10674874** (3398319.8)	6702552.1* (3110180)	6573366.7* (3120189.5)
% Urban				57989.78 (58225.3)	67506.7 (59441.3)
% Renting				-505269.1*** (107879.1)	-531567.7*** (112578.2)
% Minority				110723.23 (76480.9)	74998.7 (87742.7)
% Below Poverty					171481.6 (205128)
Constant	-51184914* (24260279)	-39300931** (13338010)	-38448572** (12657995)	-24772619* (11890384)	-24560211* (11916721)
Adjusted R Square	.132	.739	.765	.817	.816

Notes:\*\*\*p<.001 \*\*p<.01 \*p<.05 #p<.10, two-tailed tests of significance

One noticeable difference from the larger analyses presented in Table 10 emerges in the effects of the race and class variables. In Table 11, Model IV shows that the percent minority variable emerges as significant, indicating a percent increase in the nonwhite population results in an increase of \$164,418.49 in present worth costs. When adding percent below poverty to the regression equation, as shown in Model IV, the percent minority variable fails to remain a net predictor of present worth costs. The

percent below poverty level variable fails to achieve significance as it did in the larger analysis presented in Table 10. I again tested for an interaction effect between race and class which fails to attain statistical significance (not shown here). In the block group level data (Table 12) the race and class variables, as well as their product term, fail to achieve statistical significance in these analyses.

Tables 13, 14 and 15 present the results of the logistic regression of capping on the demographic community composition variables and the EPA site-specific variables. Table 13 presents the results of the full sample using the census tract level data. As seen in Model I, a unit increase in the community involvement scale increases the logged odds of achieving a cap by .761 ( $p < .05$ ). The exponentiated coefficient ( $\text{Exp}(b) = 2.14$ ) indicates that the odds of having a cap are 2.14 times larger for a one-unit increase in community involvement. Model II introduces the number of operable units into the regression equation although this fails to significantly influence the likelihood of having a cap at the site. This is an unexpected finding given that it was speculated that the more operable units there are at a site the more remedies selected and thus the more likely a site is to have a cap as one of these remedies.

Model III adds the demographic variables into the regression equation. Percent minority fails to emerge as significant, while community involvement remains significant net of the effects of other variables in the model. Model IV enters percent below poverty into the regression equation, which also fails to emerge as significant. Not shown here I also tested for a race and class interaction effect which failed to emerge as significant.

**Table 13.** Logistic Regression of Capping on Demographic Characteristics of Census Tracts 1980-2000 (N=170)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>
HRS	.028 (.017)	.028 (.017)	.029 (.018)	.029 (.018)
Federal Site	.587 (.581)	.261 (.755)	.463 (.814)	.439 (.819)
Community Activism	.761* (.304)	.734* (.306)	.712* (.310)	.721* (.313)
No. OUs		.068 (.108)	.084 (.125)	.081 (.125)
% Urban			.001 (.004)	.001 (.005)
% Renting			-.008 (.011)	-.008 (.011)
% Minority			-.004 (.007)	-.003 (.009)
Percent Below Poverty				-.006 (.025)
Constant	-3.327*** (1.013)	-3.344*** (1.015)	-3.064** (1.051)	-3.029* (1.063)
-2 log likelihood	217.461	216.997	215.524	215.474

Notes:\*\*\*p<.001 \*\*p<.01 \*p<.05 #p<.10, two-tailed tests of significance

Tables 14 and 15 present the results of the logistic regression of capping on the independent variables. The findings by census tract and census block group levels are comparable to each other as well as to the results presented in the larger analyses in Table 13. One notable exception, however, appears in the smaller analyses of block groups where federal status also emerges as significant.



**Table 14.** Logistic Regression of Capping on Demographic Characteristics of Census Tracts 1990-2000 (N=95)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>
HRS	-.008 (.026)	-.008 (.026)	-.008 (.026)	-.008 (.027)
Federal Site	1.233# (.713)	1.305 (.936)	1.552 (1.103)	1.578 (1.126)
Community Activism	1.097* (.464)	1.110* (.477)	1.102* (.499)	1.094* (.503)
No. OUs		-.012 (.098)	-.014 (.107)	-.012 (.108)
% Urban			.001 (.008)	.001 (.008)
% Renting			-.007 (.015)	-.007 (.016)
% Minority			.001 (.010)	.000 (.013)
% Below Poverty				.004 (.033)
Constant	-2.976* (1.348)	-2.984* (1.352)	-2.825# (1.434)	-2.829# (1.434)
-2 log likelihood	110.419	110.405	110.165	110.151

Notes:\*\*\*p $\leq$ .001 \*\*p $\leq$ .01 \*p $\leq$ .05 #p $\leq$ .10, two-tailed tests of significance

Model I of Table 14, which includes HRS score, federal status and community involvement, shows that federal sites are 3.43 times (Exp(b)=3.43) more likely to have a cap than nonfederal sites. A unit increase on the community involvement scale increases the likelihood or odds of having a cap by 2.99 times (Exp(b)=2.99). When controlling for the demographic and site specific factors (Model IV), unit increase on the community involvement scale increases the logged odds of having a cap by 1.12 (p<.05).

Alternatively, we could say the likelihood of having a cap increases by 3.25 times

(Exp(b)=3.25) for a unit increase in community involvement. Not shown here I also ran an additional model, which tested for a race and class interaction effect. In this full model community involvement remained the only significant net predictor of capping while the interaction term failed to emerge as significant.

**Table 15.** Logistic Regression of Capping on Demographic Characteristics of Census Block Groups 1990-2000 (N=90)

	<b>Model I b</b>	<b>Model II b</b>	<b>Model III b</b>	<b>Model IV b</b>
HRS	-.003 (.026)	-.003 (.026)	-.005 (.028)	-.005 (.028)
Federal Site	1.287# (.725)	1.400 (.957)	2.216# (1.201)	2.364# (1.327)
Community Activism	1.341** (.491)	1.362** (.506)	1.522** (.561)	1.501** (.566)
No. OUs		-.018 (.100)	-.059 (.120)	-.061 (.121)
% Urban			.005 (.008)	.006 (.008)
% Renting			-.012 (.015)	-.014 (.016)
% Minority			-.019 (.012)	-.020 (.013)
% Below Poverty				.008 (.028)
Constant	-3.789* (1.437)	-3.807** (1.442)	-3.490* (1.571)	-3.502* (1.571)
-2 log likelihood	101.118	101.085	96.772	96.695

Notes:\*\*\*p≤.001 \*\*p≤.01 \*p≤.05 #p≤.10, two-tailed tests of significance

Table 15 shows similar results for the analyses by block group level. Model 1V of Table 15 shows that federal sites have logged odds of having a cap that are 2.4 times higher than nonfederal sites ( $p < .10$ ). The logistic regression coefficient of 1.50 for community involvement indicates that a unit increase in the community involvement scale increases the logged odds of having a cap at the site by 1.50 ( $p < .01$ ). No race and class interaction effect was found in this analysis.

### **Ancillary Analyses**

In additional analyses not shown here, I investigated two other possibilities for exploring race and class differences in procedural equity. First, using ordinary least squares regression, I explored whether there was a race and/or class difference in the HRS score. Despite the fact that EPA claims the HRS score is only used to determine NPL eligibility, it is correlated with many equity outcomes in Superfund. Intuitively, it makes sense that a more toxic site would have a higher HRS score, would take longer to cleanup and would have more money spent on site remediation. In the present study the HRS score is found to influence the length of time from proposal to finalization status, and also results in more money being spent on each site. Thus communities with a higher HRS score may endure a longer remediation process but also a higher quality cleanup. Since we are interested in examining equity, it is arguably fruitful to observe correlates of attaining a higher or lower score on the hazardous ranking system particularly in regards to demographics of communities.

Model I of the regression on the HRS score contained percent minority, percent below poverty, percent renting, percent urban, and federal status ( $N=192$ ). Model II, the full model, added a race and class interaction product term. Community involvement and

the number of operable units were not included because assigning the HRS score precedes these stages since it is used to assess whether a site is sufficiently contaminated to be on the NPL. The only variables to achieve statistical significance were percent urban ( $p < .10$ ) and federal status ( $p < .05$ ). The coefficient for federal status indicated that federal sites had a higher HRS score by 5.51. A percentage increase in percentage urban resulted in an increase in the HRS score by .035. The product race and class term failed to emerge as significant in the full model. Thus, we can conclude there are not problems with equity in the process of assigning the HRS score, which could later have consequential effects in the implementation process. This finding also suggests that equity does not appear to be a problem in having a CERCLIS site achieve NPL or Superfund status since the HRS score is the primary mechanism used to have CERCLIS sites considered for Superfund status. This is interesting to note given that Hird (1994) found that NPL sites were disproportionately found in white neighborhoods, and given that this study shows the percentage of CERCLIS sites in Region IV to achieve Superfund status is relatively low compared to other regions.

Second, I considered factors associated with predicting scores on the community involvement scale. Since community involvement was coded from 1 to 3, I use ordinal logistic regression. It was anticipated that lower socioeconomic communities and communities with a higher percentage of racial and ethnic minorities would be higher on the community involvement scale since it is an assessable means of political empowerment that does not rely on financial resources. I also suspected that federal sites would be inversely related to community involvement, while the number of operable units would be positively associated with community involvement since the more

operable units a site has the greater the number of opportunities a community has to participate in the remediation process. The opposite could also be true, however, in that a site with many operable units and consequently more public meetings could perhaps be overwhelming for community members' time to participate and follow all of the decisions which tend to be very technical. Finally, I anticipated that percent renting would be inversely related to community involvement since those who rent as oppose to own their homes are perhaps less concerned with the lowering of property values and/or feel their stay in the community may be more temporary than permanent.

Model I contained the HRS score, Federal status, the number of operable units and the Census site demographics while Model II, the full model, tested for a race and class interaction effect (N=175). In the first model, the number of operable units emerged as significant ( $p < .05$ ) with a one site increase in operable site units increasing the odds of being in a higher category on the community involvement scale by 30.4% ( $\text{Exp}(b)=1.304$ ). A one percent increase in percentage below poverty increased the likelihood of being in a higher category on the community involvement scale by 4.5% ( $\text{Exp}(b)=1.045$ ) ( $p < .10$ ). The primary other demographic variable of interest, percent minority, emerged as significant but the coefficient is not in the anticipated direction. Instead of increasing community involvement, a one percent increase in percent minority decreases the likelihood of being on a higher category of the community involvement scale ( $\text{Exp}(b)=.985$ ) ( $p < .10$ ). The percent renting variable failed to achieve statistical significance, which indicates that renters as opposed to homeowners are not less likely to participate in the remediation process. This is a bit surprising since we might speculate that renters are less tied to the property in terms of property values and less interested in

the outcomes since renters may reside there only temporarily. The full model included the race and class product interaction term, which failed to emerge as significantly influencing community involvement.

## **Summary**

In sum, the results of the analyses of equity in the quality of cleanup show no evidence of race and class differences in the quality of site remediation. In fact, the opposite is true in the linear regression of present worth cost where percent below poverty emerges as significantly increasing the amount of money spent on site remediation, net of the effects of other demographic and site specific variables in the analysis. No additional race and class effects emerge as significant in the analyses. Community involvement is a previously unexplored variable that was used as a proxy for political pressure to achieve desirable site outcomes. The regression of present worth costs reveals that, as hypothesized, community involvement significantly increases the amount of money spent at each site.

The logistic regression of capping on the community demographic and site specific variables shows that community involvement is the only predictor of capping net of the effects of the other variables. It was anticipated that community involvement would decrease the likelihood of achieving a cap as part of the site selected remedy, especially since EPA uses community involvement heavily in their implementation of environmental justice. These analyses, however, indicate that larger the amount of community involvement the more likely a site is to have a cap. Thus, overall the hypotheses regarding community involvement receive mixed support. On the one hand,

community involvement increases the amount of money spent on site remediation, while on the other hand community involvement also increases the likelihood of having a cap as part of the selected remedy. Since sites often have multiple remedies due to a variety of different contaminations, perhaps there is a trade off during the remediation process. Perhaps, more money will be spent on certain desirable cleanup methods that the community advocates for while at the same time they must settle for a less desirable method in turn for another preferred remedy at the site. The number of operable site units was included to control for the fact that more OUs results in more remedies which could increase the likelihood of a site having a cap but this fails to emerge as significant, as do the other demographic variables.

Overall, the analyses presented here provide no evidence of racial and/or class inequity in the quality of site selected remedies. The analyses also fail to demonstrate consistent support for the role of community involvement in site remediation. Furthermore, the ancillary analyses show that the race and class composition of communities only weakly predicts community involvement, which is somewhat surprising since EPA places a large emphasis on community involvement.

In addition, the effect of race is in the opposite direction that was anticipated, actually indicating a slight decrease in the odds of being in a higher category on the community involvement scale as the percentage of minority residents increases. This is surprising since we would suspect that communities with a higher percentage of racial and ethnic minorities would be much more likely to get involved in grassroots activism. These groups often have limited political and financial resources which render them more likely to participate politically at the grassroots level. It is also a particularly surprising

finding since grassroots activism has been an important part of the environmental justice movement. This history of grassroots activism and environmental justice will be elaborated on in the next chapter.

The next chapter further explores community involvement in Region IV by presenting a case study of a community action organization that works with EPA in cleaning up unwanted and toxic land uses in their community and has been through the Superfund remediation process. This case study seeks to uncover the nuances of the organizational structure of the grassroots group as well as seek explanations as to why racial and ethnic groups may be less willing to pursue relationships with the EPA and other federal government organizations. Consequently, perhaps we can gain a better understanding as to why these quantitative analyses reveal that racial and ethnic minorities are actually slightly less likely to work with EPA in the remediation process.

Grassroots activism has been such an important part of the environmental justice movement that the lack of participation on part of racial and ethnic minorities in the Superfund process is completely unexpected and at odds with the core thrust of the environmental justice movement. It is equally at odds with the heavy emphasis on community participation in the Superfund remediation process. The significant lack of community participation by minorities in the Superfund remediation process indicates that more qualitative in-depth studies of environmental justice organizations are necessary. In truth, scholars know very little about these organizations that are considered to be responsible for the legitimation of environmental justice as a social movement and are arguably at the heart of the environmental justice movement. For example, who joins these organizations? What is their relationship with other grassroots



organizations? What is their relationship with EPA? How are these grassroots groups formed? What is their organizational structure like? How do they decide on what issues to devote time and resources to? How is power distributed within these organizations? How do they garner resources? These are just a few questions that social scientists have yet to explore and yet they are important questions if we are to learn more about the nuances of community involvement in the environmental justice movement and community involvement with the EPA.

The following case study sheds light on some nuances of the organization but of course the findings are not generalizable to all grassroots environmental justice organizations. Since we know so little about them, however, a case study is well suited for this exploratory analysis that may provide direction for future research on these grassroots organizations, particularly in terms of the structure of these organizations and potential reasons why members are reluctant to work with the EPA during the remediation process. This can perhaps lead to larger future studies of grassroots environmental justice organizations that can provide some guidelines to how EPA can increase community involvement among communities with larger populations of racial and ethnic minorities.

CHAPTER 7  
COMMUNITY INVOLVEMENT IN REGION IV: AN ORGANIZATIONAL CASE  
STUDY

At the core of the environmental justice movement is community participation. As noted earlier, it is also a heavily emphasized aspect of the Superfund program. Yet outside of the present study it remains an unexplored factor in examining correlates of procedural equity in the Superfund site remediation process. Additionally, despite the emphasis placed on community activism within the environmental justice movement there have been but a handful of studies that have explored community involvement in depth.

Previous research suggests that grassroots mobilization is an influential resource in social justice causes in general, and environmental justice causes in particular. The importance of grassroots organizations as resources in the social justice movements of the 1960s has been well documented (Morris 1981; Morris 1984; Jenkins and Eckert 1986). Similarly, grassroots community activism has been an influential tool for combating environmental racism. For example, Bullard and Wright (1992) demonstrate in case studies of five communities engaged in combating environmental racism the importance of preexisting grassroots and social justice organizations in providing leadership and in

mobilizing communities experiencing environmental degradation.<sup>24</sup> Cole and Foster (2001) similarly suggest that grassroots activism is an important component to the environmental justice movement.

In this chapter I present a case study of an environmental justice organization located in the Southeast that currently is working with EPA to cleanup their contaminated community. This community is a former Region IV Superfund community that is currently besieged by numerous other toxic threats. Despite the fact that grassroots mobilization has proven to be influential in the movement for environmental justice there has been a paucity of research that has explored the organizational characteristics or organizational forms of environmental justice groups. Furthermore, there is very little research on the working relationship between EPA and grassroots environmental justice groups. This case study attempts to fill in some of these gaps in the literature by presenting a descriptive picture of the structure and culture of the organization as well as explore their relationship with EPA.

### **Grassroots Organizing and Resource Mobilization**

Mobilization of grassroots environmental justice groups has primarily taken place outside the mainstream environmental movements and has instead relied on indigenous leadership within the community. This includes black church officials and social action groups oriented towards social justice projects; although some minimal alliances with predominantly white mainstream environmental organizations has occurred (Bullard

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<sup>24</sup> Women of color, who are often concerned about the health and safety of their families, have played especially influential roles in organizing grassroots activism (Kaplan 1996; Krauss 1993).

1993). The institutional centrality of organizations in mobilization can be seen in the context of the broader literature on collective action. The resource mobilization paradigm has dominated the collective action literature since the mass emergence of social movements in the 1960s. This paradigm focuses on the resources groups have to successfully foster social change, which include financial resources, political resources, social networks and organizations (Gamson 1975; McCarthy and Zald 1977; Snow, Zurcher and Ekland-Olsen 1980; Morris 1981; Morris and Mueller 1992). Given that communities of color often lack political and financial resources and generally lack power to promote change, grassroots organizations have been crucial in providing financial resources and important social networks to help organize grassroots activism (Bullard 1993; Morris 1981).

While the importance of organizations as a part of resource mobilization has been established (Gamson 1975; Buechler 1993; McCarthy and Wolfson 1996) and especially their importance to social justice groups (Bullard 1993; Bullard and Wright 1992; Morris 1981), there have been few studies to date on the environmental justice organizations that have sprung up across the United States (See Cole and Foster 2001; Bullard 1990 for exceptions). It is in light of this dearth of research that I focus on organizational characteristics of Columbus Heights Neighborhood Improvement Association in addition to their relationship with EPA.

The Columbus Heights Neighborhood Improvement Association (hereafter Columbus Heights) is a grassroots environmental justice organization located in a medium sized city in Region IV.<sup>25</sup> The community has been actively involved with the EPA in a Superfund site remediation as well as remediation of other environmental hazards. The Columbus Heights Neighborhood Improvement Association was founded in 1968 in response to the fact that the community had no running water, paved streets, streetlights or appropriate sewerage disposals. The organization was incorporated within a year and was governed by the residents. With the help of a local church, Columbus Heights secured paved streets, city water, street lights, a community center as well as other neighborhood necessities (Columbus Heights Web Site, 2002).

Columbus Heights is a predominantly poor and African American neighborhood located in a city with a population of 195,182 of which over half (51.4%) is African American (U.S. Bureau of the Census 2000). The community has been involved in numerous struggles with toxic waste companies but most residents lack the resources to move out of their poisoned community. In 1980 a local wood preserving factory, Southeastern Wood, was found to be leaking the toxic chemical creosote. The company was eventually closed by the EPA and turned into a Superfund site. Southeastern Wood was located across the street from an elementary school and the children in Columbus Heights have higher rates of learning disabilities, asthma, and allergies. Residents of Columbus Heights and other surrounding areas have cancer, skin disease and other serious illnesses due to exposure to the toxic chemicals. The link between the high rates of disease in Columbus Heights and exposure from Southeastern Wood's toxic chemicals

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<sup>25</sup> In order to protect anonymity, all names and locations are pseudonyms with the exception of federal government organizations.

has been substantiated by numerous scientific and health reports. Adding to the environmental burden of the community, Columbus Heights is surrounded by seven other factories and toxic waste sites. The EPA recently concluded that at one of these sites the company leaked *arsenic* in the local soil. For the past ten years, Columbus Heights has been involved in fighting ECC, a toxic chemical company which has been leaking toxins into the soil and ground water. The Columbus Height's neighborhood improvement association's main task is to fight environmental racism and "improve the quality of life of residents living in and around these areas" (Bullard 2000).

## **Methods**

In order to explore the organizational characteristics of Columbus Heights and aspects of their community involvement, I conducted a forty-minute telephone interview with the President of the organization, Reverend Chase. I also gathered information from the organization's website as well from the People of Color Environmental Groups Directory (Bullard 2000). The interview questionnaire was based on semi-structured questions, which allowed me to probe for further information. The agenda that guided my telephone interview was to paint a primarily descriptive picture of the characteristics of the organization including the structure of the organization, the distribution of power and authority, the organizational culture, decision-making processes, and the inter-organizational environment. I also sought to assess other nuances of community involvement and the organization's relationship to the EPA.

## **Organizational Forms: Bureaucracy Vs. Network**

Weber's (1978, hereafter Weber) conceptualization of the increasingly bureaucratic organization of modern society set precedent with the regard to the study of organizational forms. The ideal type or pure form of bureaucracy delineates an organization that is hierarchical, involves clear lines of authority and departmental boundaries, and has an emphasis on accountability through written documentation (Powell 1990).

Based on my interview data, the organizational structure of Columbus Heights does not fit well onto Weber's ideal type of bureaucracy. While Columbus Heights demonstrates some hierarchy of offices, which consists of a Board of Directors made up of twelve members of the community, it fails to meet the other principles outlined by Weber. Moreover, outside of the 12 member Board, there is no further hierarchy of offices or titles of vocations. All staff members of the organization are volunteers without any designated titles. Approximately 15 to 20 volunteers work for the organization. Although the organization contains a formal mission statement, there is no evidence of further rules or written statements governing the organization and the volunteer staff members.

Furthermore, the distribution of power and authority in the organization deviates from the modern bureaucratic form in the sense that there are no superordinates and subordinates. Instead, Columbus Heights is characterized by a philosophy and practice of democracy and equality of participation and decision-making. This emphasis on democratic decision-making and equality of participation is quite similar to EPA's own philosophy of community involvement in the Superfund site remediation process. It also

reflects ecopopulism which is prevalent in the environmental justice movement.

Reverend Chase further describes decision-making in Columbus Heights as “majority consensus, majority rule”. Reverend Chase contends that all meetings are open to the public and anyone who wants to attend is welcome and encouraged to do so.

The democratic philosophy of “majority consensus/majority rule” also regulates Board meetings and Board decisions. Reverend Chase emphasized that the organization is a “community action driven” organization, which is there to serve the needs and interests of the community. Therefore, the board bases all decisions on what the majority of the community wants. When asked what the role of the Board was in the decision-making process, Reverend Chase informed me that the Board was there to simply present ideas and issues to the community and then to let them vote on how they would like the Board to act.

While the democratic nature of the organization is a point of pride among Reverend Chase, it arguably masks the differential power structures that do exist in the organization. Because the Board makes the decisions on what ideas and issues to present to the community and how to present them, the organization’s members actually have limited input into which issues will be considered important to the community and placed on the organization’s agenda. This speaks to the constraints on rationality within the organization.

Intended rationality, according to March and Simon (as cited in Perrow 1986), means individuals attempt to be rational but their limited capacities and those of the organization prevent complete rationality. Individuals do not have complete knowledge of the consequences of their acts, they do not have complete knowledge of alternative



courses of action, and when individuals have several alternatives of action available to them they are unable to accurately rank them in terms of preferences. Nor can individuals with several alternatives be sure which is the most and least desirable course of action (pg. 121).

Furthermore, individuals have decisions made subject to the influence of that organization, through the division of labor, standardized practices, authority systems, channels of communication, training, and indoctrination. Although not all of these practices appear to apply to Columbus Heights, it is clear that the Board demonstrates a form of power as an authority system and to some extent controls channels of communication through their hegemony over the presentation of the organizational agenda.

Cognitive limits to rationality, I argue, can be a function of the ability of organizations to create an internal environment that limits the viewpoint of individual members, or sets the premises of decision-making, although organizations also have bounded forms of rationality within them as do their leaders (Vaughan 1999). Members are seen as existing and thinking inside the parameters of rationality that is defined and socially constructed by the organization in order to mold behavior and demonstrate power over individuals while organizations are molded by their external environments (Perrow 1986).

It is also clear that the Board has set priorities regarding issues that they would like the community to support and makes an effort to persuade the community to see their perspective. For example, when asked about what factors influenced participation in the organization by community members, or alternatively the lack thereof, Reverend Chase

responded that issues that people had an individual stake in influenced turnout. He elaborated that health issues and the current lawsuit that the organization is involved in are the main issues that community members are interested in:

“turnout depends on the issues...it is good for issues that deal with them...especially the lawsuit and health issues...we have had 286 known deaths in a community of 2000 from carcinogenic and respiratory problems and we’re involved in a 700 million dollar lawsuit with the company...they’ll come out to hear what is going on with the lawsuit”.

The power of the organization in influencing the agenda and seeking to persuade members of what the board considers important emerges in his response to the same question and speaks to the extent that members have a bounded sense of rationality. For instance, the Board has been trying to get the community involved in a plutonium project at a nearby river site that is run by the Government. People in the Columbus Heights are afraid of the site, which they frequently refer to as the “bomb plant”:

“for the past 45 to 50 years they were taught not to talk about it...even workers there were told to never discuss anything about the plant. Community members feel like they should not bother with the government...[they are] scared to get involved with the government regarding this...they’re scared of the government- those types of issues are tough ones ...there’s a lot of fear and mistrust...but were trying to get them involved with it”

Although Reverend Chase informed me “the Board is made up of a broad spectrum of people and is open to everyone’s issues or problems” my data indicate they have the authority to present issues to the community that they feel are important and to try to persuade the community to support their agenda. In sum, the Board is able to influence the premise setting among Columbus Heights’ residents in the decision-making process.

While legitimacy in the organization may come from the bottom up, in that the Board must have the backing of the community in order to be effective and to justify its existence, there does appear to be a subtle form of top down authority. Perrow argues that “the people at the top are in the position to win most of the battles and to shape the nature of the contest that goes on below them” (pg. 136). The Board, to some extent, shapes the nature of the contest by shaping the agenda and knowledge of the community members through their organizational authority and influence. The democratic philosophy of decision-making by consensus arguably helps to provide legitimacy to the Board among community members while concurrently masking the authoritative influence of the Board.

#### Formal Versus Substantive Rationality

Deviation from the Weberian ideal type of bureaucracy is also seen in the form of rationality demonstrated in the Columbus Heights organization. Weber argues that Western Society is increasingly represented by formal rationality, which is manifest in the increasingly bureaucratic organization of society’s institutions and infrastructure. Formal rationality is predicated on precise calculations in order to obtain the most efficient means to the ends. Values and ethical considerations are irrelevant and

superceded by the practice and ideology of obtaining the most precise and calculated means of achieving efficient organizational goals. Alternatively, substantive rationality is characterized as being antithetical to formal rationality and the growth of the bureaucratic form.

Succinctly, substantive rationality is characterized by an emphasis on values and ethics. Principles of equality and social justice are given priority over the direct achievement of goals in the most efficient and precise manner. Biggart (1989) elaborates on Weber's notion of substantive rationality: "Value rationality is a belief not in efficiency or profitability, but in a substantive ideal or goal such as 'duty, honor, ...or the importance of some cause no matter in what it consists.' Organizations based on values exist to enact further a systematized set of norms or an ideology" (pg. 101). The value rationality of Columbus Heights may be best summarized by their mission statement :

"The mission of Columbus Heights is to improve the quality of life of the residents living in and around these areas. Columbus Heights believes that the knowledge of environmental awareness and protection is the duty of everyone in our society. We further assert that it is our duty to help create, promote, and preserve a clean drug-free society where all children can grow up to their fullest potential. Columbus Heights is committed to helping every man, woman and child in our community to their right to experience the American Dream" (Bullard 2000).

Since formal rationality characterizes Weber's modern bureaucratic form, and because the organization of Columbus Heights deviates considerably from this form, it is not surprising that the rationality that characterizes the organization Columbus Heights is not formal rationality but substantive rationality.

Authority within the organization may also deviate from Weber's rational/legal authority, which he argued predominated in modern bureaucracy. Rational/legal authority is based on the legitimization of domination through rules enacted by due process and legal doctrine. A second type of authority, charismatic authority, is based on people's beliefs that the leader has special gifts of a divine and special nature that others do not have. A final form of authority, traditional authority, is based on a system of legitimization of authority by custom or tradition, which reflects the form of authority in the Columbus Heights organization. Reverend Chase's mother founded the organization in 1968. The legitimization of authority in Columbus Heights is based on a more traditional authority than the rational/legal authority that one would expect to find in modern bureaucracy. Nepotism, of any sort, is uncharacteristic of the modern bureaucratic form.

In light of the fact that I have argued that the organizational structure of Columbus Heights is a poor fit for the bureaucratic model, it is now necessary to explore alternative forms of organizational structures. Although Columbus Heights also demonstrates some characteristics of a Neo-Weberian paradigm, the Neo-Weberian model fails to examine the influence and interdependence of the external environment of organizations (Perrow 1986). My interview with Reverend Chase provides evidence that Columbus Heights fits into an *informal and loosely coupled* network form of organization

based on the strong coalitions it has developed with other grassroots environmental justice groups across the country. I elaborate on this by discussing network forms of organization.

### Network Forms of Organization

Network forms of organization place inter-organizational environments at the center of the organizational structure. Powell (1990) argues that an atmosphere of reciprocity, reliance and interdependence characterizes a network form of organization. Relationships among people in networks are of crucial importance and as people work together, trust and rapport are established. Persons with similar backgrounds and interests typically form networks. Dependence on one another is a function of relationships among organizations in the network, leading them to become mutually supportive, sharing the costs and benefits of endeavors. The network model operates under the ontological assumption that one party is dependent on the resources controlled by another.

This research indicates the Columbus Heights has an active inter-organizational environment, involving relationships with academics at local schools, attorneys, and environmental justice groups across the country. Columbus Heights is involved with environmentalists and sociologists at three local colleges and universities. At one historically black college the organization is involved in holding workshops and educating students about environmental racism and environmental justice. They recently organized a meeting among students from fourteen historically black colleges and universities. At another public state university, the organization works with sociologists, one of whom is a former Board member, that “conduct surveys, so you know ..that we

have validity.”<sup>26</sup> A common theme that emerged in my interview with Reverend Chase is the centrality of coalitions to Columbus Heights. He spoke of frequently traveling across the country, including Georgia, California, Alabama and Washington DC, to meet with other grassroots environmental justice organizations. When asked about the nature of these relationships with other organizations Reverend Chase stated:

“With coalition building it’s about... not being in the struggle by yourself, you are not alone. Look how far we’ve come, look how far you have come...way to get together the masses of the people...More community involvement and building awareness of environmental justice. (Me- what about resources?) We combine resources, well, we share people resources...We talk about what works and what we’re doing...”

These coalitions are based on the sharing of ideas, information and tactics as well as boosting morale and providing social support. Unlike organizations that are more heavily involved in the market economy, there appears to be no economic interdependence among these organizations. For example, Columbus Heights does not charge a membership fee, therefore money comes from fundraising, which Reverend Chase informed me “is always a problem”. Fundraising tactics are a common issue shared among grassroots environmental justice organizations:

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<sup>26</sup> This quote further demonstrates the importance of expert opinion in social problem construction that was discussed in Chapter 3.

“The Keller foundation sends memos to environmental justice organizations...a group of us just met on Lee Island,...they will teach us how to raise funds and talk with others...they assist us in how to apply to companies for funding...funding is always a problem”.

In sum, I argue that these are *loosely coupled* networks because there is not one dominant organization that influences the outcomes of all other organizations. Participation in the network is voluntary and done so under the terms of each organization. In other words, there is no domino effect in that the decisions of one organization will have ramifications for other organizations in the network. At the present, there is no evidence that these organizations compete with each other for funding, although future research will need to further explore conflict within and between environmental justice organizations. This loose coupling and sense of voluntary participation undermines, however, the basic assumption of the network model that one party is dependent on another for resources which is why I suggest this is an informal prototype of the network model.

In addition to coalitions, I asked about other aspects of the inter-organizational environment, and specifically government environmental agencies. Columbus Heights frequently works with the EPA and Reverend Chase takes a sympathetic stance toward this agency. He elaborates on Columbus Heights’ relationship with EPA:



“We meet with EPA, work with them, do presentations...we teach the EPA how to work with communities and have better relationships...we also work with the EPD...identifying and being accepted into communities, trying to get more positive outlook from community to those organizations (Me- What’s the EPD?) oh that’s the states’ environmental agency....”

The difficulty government organizations have in gaining access and cooperation from communities speaks to the earlier theme of the mistrust and fear of the government, which Reverend Chase also seems to be aware of and seeks to improve upon. Columbus Heights has also developed a strong political coalition with other neighborhoods within the city:

“there is a neighborhood alliance association...open to all neighborhoods in the city, they have monthly meetings to keep neighborhood members abreast of the progress...ranges from everything from garbage pick up to any other issue the neighborhood is struggling with...these meetings are heavily political... a lot of influence for local politics...neighborhood members share information on which city officials are doing what, they are powerful as a group in that way...all the neighborhoods come together and back each other at city hall”.

Arguably, these political alliances give Columbus Heights some control over their external local political environment as well as providing a sense of political efficacy. In the next section I discuss the organizational culture of Columbus Heights.

The culture of the organization resembles that of an indigenous culture. This is consistent with the environmental justice literature that argues that the grassroots environmental justice movement is couched in a similar context to the Civil Rights movements of the 1960s, Columbus's Heights' philosophy of "community action driven" suggests there is a carry over of cultural tactics of mobilization and activism from the 1960s. The broader organizational culture consists of shared knowledge, which is manifest in the informal network of grassroots environmental justice organizations. This research suggests there is a common indigenous culture among the *network* of environmental justice groups.

Finally, I asked Reverend Chase what he believed the greatest successes or strengths of the organization are and the areas where the organization would like to improve. The growth of the organization was considered the main success:

"You know my Mother founded the organization in 1968 in order to get running water... just to have life there...[I am] proud of the extent to which the organization has grown... we now deal with a variety of Environmental Justice issues and in educating the community...we're proud of our recent accomplishment with the brownfields, do you know what brownfields are? (Me-um, redevelopment on tainted land) yes,...we're the only community to write up a brownfield proposal and get it approved...we introduced the concept of brownfield to the city."

The weaknesses identified by Reverend Chase focus on keeping the community members motivated to stay involved:

“trying to keep motivation up...these people have been down for so many years, they get discouraged it is hard for us to you know trying to get them to see the light at the end of the tunnel...[we]had a major court case defeated, people got real discouraged, the court decided that in the one neighborhood there had been too many companies there to decide who should be held responsible. But I later found out that the judge was on the board of the company, so I try to explain that to them that they should not give up and get discouraged...it’s always a struggle to get them to not give up and stay motivated, a lot of them are ready to throw in the towel.”

In summation, this small case study illustrates EPA’s commitment to environmental justice and community involvement but also illustrates difficulty the EPA faces in gaining trust from community members. Additionally, it provides insight into the organizational structure of one grassroots environmental justice organization that has arguably achieved much success. Although the community continues to struggle with environmental degradation, they are actively working with EPA to provide a safer and better quality of living for residents. The organization’s leadership has a positive relationship with the EPA and given the organizational structure of Columbus Heights, leadership has the ability to try to persuade community activists to view the EPA in the same positive light through premise setting. Years of distrust and feelings of betrayal, however, have left community members reluctant to accept a trusting and fruitful relationship with government agencies and particularly the EPA.

The organizational structure of Columbus Heights is similar to the structure and indigenous culture of other grassroots organizations as is the members' expressions of mistrust of government agencies (See Cole and Foster 2001). Most likely the EPA has gained some credibility in the community by gaining Reverend Chase's confidence, although work gaining the rest of the community's confidence remains warranted. Reluctance from the community to accept the EPA with open arms could be a roadblock to EPA's emphasis on community involvement and democratic participation in their implementation of environmental justice reform. Columbus Height's strong alliances with other grassroots groups suggest that collectively these groups can have a political impact on environmental policy and the implementation process. If EPA seeks to increase community involvement in communities with existing grassroots organizations, working through organizational leadership is likely to be the most successful avenue since leadership controls the premise setting within the organization.

## CHAPTER 8

### DISCUSSION AND CONCLUSIONS

The general research question that guided this project asked if equity is a problem in the way that the Superfund program is implemented by the EPA. The results of this study indicate that the answer to this question is yes and no. In regard to how long it takes for site remediation to occur, this study shows some problems with equity in the process of a site moving from NPL proposal to NPL finalization. Importantly, there is a significant race and class interaction effect, which suggests that students of environmental justice need not be overly concerned with the issue of environmental racism or environmental classism. Or in other words, the race versus class debate that has overshadowed much of the environmental justice literature may not be as important to focus on if we recognize that race and class are intricately connected. This study demonstrates that racial discrimination is linked with poverty or more specifically there are thresholds in which race is conditioned by poverty and vice versa. Likewise, when communities have a certain lower amount of poverty, the percentage of minority residents actually decreases the length of time a site takes to reach NPL finalization status.

In sum, minorities living in areas that tend to be more middle-class are apt to receive more favorable treatment in terms of the length of time it takes for the site in their community to be finalized on the NPL. Racial and ethnic minorities living in communities with more poverty tend to have less favorable outcomes. It is necessary to

emphasize, however, that there are thresholds of poverty levels that influence whether living in a larger percentage minority neighborhood will have an effect on the length of time it takes to move to NPL finalization. In other words, racial discrimination depends of the amount of poverty in the community. It is not clear as to why communities with a higher percentage of racial and ethnic minorities but a lower percentage of those living below poverty level fare better than other communities in terms of the pace of moving to NPL finalization. Additionally, racial and class equity is not shown to be a problem in having a site move from NPL finalization to construction completion nor is there evidence that more middle class communities comprised of more racial and ethnic minorities receive more favorable treatment during this process. Regarding quality of cleanup there is no evidence of racial and class inequity. Communities with higher percentages of racial and ethnic minorities and/or communities with a higher percentage of residents living below poverty level do not have significantly less money spent on site cleanup nor are they more likely to have a less permanent, and consequently less desirable, remedy chosen.

A second research question addressed is the role of community involvement in the site remediation process. No studies to date have explored how community involvement influences Superfund outcomes regarding the quality and pace of cleanup. This is a particularly glaring gap in research that explores procedural equity in Superfund since community involvement is a cornerstone to the remediation process. EPA has developed a variety of methods for increasing community involvement such as dispensing technical assistance grants to select community organizations to assist in participation in the remediation process and granting awards of recognition for especially involved

community members. Despite the fact that there is a large emphasis on community involvement in the Superfund program, this study demonstrates mixed evidence that such involvement really benefits the community. For example, the event history analysis demonstrates that increases in community involvement actually decrease the odds of a site achieving construction completion. It could be that working with a very active community simply prolongs the process of cleanup. Community involvement is also found to increase the amount of money spent on site remediation which reflects a more desirable clean up but this effect is negated when controlling of other site related factors such as the number of operable site units. Net of the influence of other site variables, community participation also increases the likelihood of achieving a cap at a site, which reflects a less desirable solution, and consequently a poorer quality of site cleanup.

Auxiliary analyses reveal that race differences were weakly significant in predicting *lower* levels of community involvement while communities with a greater percentage of residents living below poverty level were slightly more likely to participate in community involvement. The negative race effect and the positive class effect were both relatively small. No significant interaction between race and class emerge in the analysis predicting community involvement.

In sum, it was anticipated that community involvement would result in quicker site remediation, more money spent on each site and fewer sites with capping as a selected remedy. The majority of these expectations receive the opposite support. Not only is this surprising but it goes against much research that suggests community involvement is an important tool for achieving desired environmental outcomes, especially for grassroots environmental justice groups. Arguably, the benefits from the

intrinsic rewards associated with community involvement and participation may outweigh some costs of such participation. Clearly, the findings from this study indicate that the role of community involvement warrants further scholarly attention.

The case study data supplements our information on community involvement by providing a brief description of an environmental justice organization in Region IV. Like the EPA, this organization takes pride in their democratic model of participation. Leadership in the organization is also actively working with EPA. The case study also demonstrates, however, challenges EPA faces when seeking to work with marginalized groups. In sum, members of the community were mistrustful of the EPA who they viewed as another government agency that has failed them in the past. This could partially explain why members of minority racial and ethnic groups, who we would think would actively participate at the grassroots level, are not significantly more likely to be involved in the Superfund process and are actually significantly less likely to have higher levels of community involvement as demonstrated in the ancillary analyses.

Finally, I was also interested in exploring if how community is spatially defined influences statistical findings, especially regarding race and class differences. The answer to this question is a resounding no. The analyses by census tracts and block groups revealed little difference in findings. One notable difference of these comparison analyses reveal that analyses at the census tract level explain a larger amount of variance in pace to NPL finalization than analyses at the block level. While previous studies show discrepancies in findings, particularly as they pertain to race and class, when comparing larger areas such as counties with census tracts, this study suggests that comparing smaller areas does not reveal such differences in findings.



## **Superfund: Hope for the Future**

Superfund has been one of the most heavily criticized and expensive government programs. Implementation of the program has been among the more contentious issues regarding Superfund, especially during the early period when EPA was not only criticized for engaging in political improprieties (see Goldfarb 2001; and Szasz 1994) but also foot-dragging and wasting money. One large early criticism revolved around the fact that only 20% of the original Superfund budget actually went to site cleanup costs prior to the SARA amendment. In 1999 87% of the fiscal budget was spent on actual site remediation. Compared to the 1980s, the 1990s also saw a 70% increase in removal actions (Probst et al. 2001). This study provides additional evidence that Superfund is being implemented in a more efficient manner since its inception.

In the early 1990s a second round of criticism emerged regarding implementation of the program. This time the focus was on race and class equity in the cleanup process, which resulted in the program's present era of environmental justice reform. While this study does not provide a cost-benefit analysis of Superfund, it does assess criticisms of foot-dragging and equity in EPA Region IV. In short, this research demonstrates that overtime EPA's Region IV has made much improvement regarding foot-dragging in getting construction completions at sites. The event history analysis illustrates that sites are moving to construction completion in a more timely fashion than in the early period. Furthermore, this study shows that inequity is not a rampant problem in the implementation of the program and in fact emerges in only one aspect of implementation and only under certain conditions or combinations of poverty and percentage of minorities in a community. At the same time, the analyses of present worth costs show

that actually more money is spent at sites with more residents living below poverty level. One possible solution to the existing problem of equity is that EPA use social scientists to examine the race and class composition of communities once a site is proposed for the NPL. Special care should then be taken to assure that sites in communities with larger representations of residents living below the poverty level and/or of racial and ethnic minorities be granted equitable treatment in the site finalization process. At minimum, some sort of progress monitoring should occur at these sites.

Finally, EPA should be conscientious of the fact that the emphasis on community participation is adversely related to some aspects of site remediation such as slowing down the remediation process as well as increasing the likelihood of a site achieving a cap. It is not clear why the latter is occurring. Perhaps sites receiving capping as a solution should be monitored more closely to assess if there is some sort of possible trade off in dealing with community members, in that more money is spent on certain solutions while at the same time capping is chosen to cut down on additional costs. Additionally, EPA should be aware that an emphasis on community involvement does not significantly increase participation of politically and financially marginalized populations. Although there is evidence that as the percentage living below the poverty level increases there is a slight increase in community involvement, there is also evidence that as the percentage of minority residents increases there is a slight decrease in community participation.

Although many have questioned the necessity and practicality of the future of the Superfund program, the need for the cleanup of abandoned hazardous waste remains strong. It is estimated that more than 350,000 hazardous waste sites may need corrective action. The costs of cleanup are estimated to potentially exceed 500 billion dollars and

the United States continues to produce over 275 million tons of waste annually (Goldfarb 2001: 239). The combined future costs of Superfund for fiscal years 2000 to 2009 are estimated to be \$14 billion to \$16.4 billion (Probst et al. 2001). It is clear that in the future there will be a continued need to address human health risks posed by toxic waste.

As EPA continues to cleanup their act in the execution of the Superfund program it is likely that criticism will eventually be quelled. The cost of the program is likely to retain some critics, and issues of who is responsible for bearing the cost of Superfund will also likely continue into the future.<sup>27</sup> What emerges from this study is that progress has occurred, sites are now getting cleaned up and issues of equity are not as severe as some have argued. EPA can arguably manage existing equity problems with continued effort. In sum, the future of Superfund may not be as gloomy as some critics suggest.

### **Linking Distributive Equity Research with Procedural Equity Research**

Finally, the present research suggests to scholars of environmental justice that a focus on process equity leads to quite different conclusions than a focus on distributive equity with regard to the importance of race and class in predicting outcomes. The review of literature on environmental justice research presented in Chapter 3 indicates that the majority of previous research has focused on race and class equity in distributive outcomes. In other words, scholars have disproportionately focused on the *distribution* of unwanted land uses as opposed to the *process* of cleaning up unwanted land uses. Over a

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<sup>27</sup> There has been criticism regarding who is responsible for site remediation. For example, if a PRP dumped at a site before it was illegal to dump there then why should they have to pay the cleanup costs? This form of retroactive responsibility has been a contentious issue in the arena of dealing with liability. Additionally, many sites have had multiple owners and it can be difficult to clearly delineate who exactly is responsible.

decade of environmental justice research has presented striking evidence of a race and class bias in the distribution of unwanted environmental intrusions. The degree to which findings on distributive equity can be generalized to procedural equity, however, is limited. In linking procedural equity research with the larger environmental justice literature on distributive equity, evidence of racial and class discrimination in procedural equity simply does not exist in the same magnitude as that which is demonstrated in distributive equity research.

While there have been only a handful of studies that have explored procedural equity, and to the best of my knowledge all of which have focused on Superfund, the overall picture that is painted with regard to race and class equity is quite different than that of distributive equity studies. When including the present research, the general findings of procedural equity studies indicate that race and class variables are not crucial factors in the remediation process. Perhaps the fact that Superfund has been the sole focus of procedural equity research has limited the picture that has been painted. Perhaps the remediation of smaller and less toxic sites such as CERCLIS sites that are not Superfund sites, tell a different story. It is clear that EPA has made a admirable effort at addressing issues of environmental justice that seem to amount to more than just rhetoric or symbolic gestures but it is not clear as to whether this extends beyond the Superfund program. Since Superfund is the most visible EPA cleanup program it is possible that efforts at environmental justice are more pronounced in this program. This is not to say, however, that future research concerning procedural equity in Superfund is not warranted, as the present study is not without limitations and there is modest evidence presented of some inequity, although not nearly as extreme as some have argued.

## **Study Limitations and Future Research**

Although the present study improves upon past studies of racial and class equity in Superfund, it does have limitations that can be improved upon by future research. The most obvious limitation of this research is that it is constrained to analyses of one EPA region. Future studies would do well to explore the remaining EPA regions with respect to issues of equity. Although the findings from this study reveal that EPA has made considerable progress regarding the pace of cleanup since the inception of the Superfund program, other EPA regions may not be as successful. The same holds true for studying equity. While problems with equity arose in only one area of this study, the same may not be true for other regions. Furthermore, because each of the EPA regions has almost complete autonomy in site remediation with little standardization across regions in how they implement cleanup comparison studies of regions would do well to shed light on what are the most effective remediation strategies in terms of pace and quality of cleanup as well as effective environmental justice reform strategies. For example, it was noted in Chapter 2 that the “publics work style” of cleanup in Region IV may lead to quicker site remediation compared to other EPA regions with different styles of cleanup. Indeed, this study shows improvement in pace of cleanup when comparing the early Superfund era with the present environmental justice era.

Moreover, this study does not follow sites to actual NPL deletion, the stage where sites are completely remediated and deleted from the NPL. This is because there are not enough sites in Region IV that have achieved this stage to run meaningful statistical analyses. Future studies would do well to explore all sites (e.g. including those outside of

Region IV) that have reached this stage to date. This would provide insight into the entire life of a Superfund site.

Lastly, future studies should continue to study the grassroots organizations that provide a voice as well as lobby for the interests of those who many times lack alternative outlets for meaningful political participation. This research suggests that mistrust of government organizations hampers the relationship among racial and ethnic minorities and the EPA. This is a finding that substantiates previous findings in the rather limited body of research that has been conducted on these organizations (Cole and Foster 2001). While this study makes significant contributions to our understanding of equity in Superfund, methodological issues in spatially defining communities, and in understanding the organizational characteristics of grassroots environmental justice groups, there is still much needed work to be done.

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**APPENDIX: Correlation Matrix of Variables by Cnesus Tracts and Census Block Groups**

Correlation Matrix of Variables using Demographic Census Tract Level Data

	<b>HRS Score</b>	<b>Federal</b>	<b>Community Action</b>	<b>OU</b>	<b>Percent Below Poverty</b>	<b>Percent Minority</b>	<b>Percent Renting</b>	<b>Percent Urban</b>	<b>CAP</b>	<b>Proposal to Finalization</b>	<b>Present Worth Cost</b>
<b>HRS Score</b>	----										
<b>Federal</b>	.123	----									
<b>Community Action</b>	.036	.018	----								
<b>OU</b>	.104	.018	.142	----							
<b>Percent Below Poverty</b>	.099	-.174*	.062	-.155*	----						
<b>Percent Minority</b>	.117	.016	-.060	-.031	.669**	----					
<b>Percent Renting</b>	.089	.435**	-.053	.203**	.175*	.669**	----				
<b>Percent Urban</b>	.118	.134	-.035	.108	-.070	.197**	.520**	----			
<b>CAP</b>	.147	.103	.186*	.122	-.029	-.068	-.013	.004	----		
<b>Proposal to Finalization</b>	-.104	.004	.027	-.045	.171*	.032	-.014	-.015	-.078	----	
<b>Present Worth Cost</b>	.148	.286**	.176*	.782**	-.072	-.052	-.083	.008	.141	-.032	----

Notes\*\*\* p≤.001 \*\*p≤.01 \*p≤.05, Two tailed tests of significance, (missing data handled via pairwise deletion)

**APPENDIX (Continued)**

Correlation Matrix of Variables using Demographic Block Group Level Data

	<b>HRS Score</b>	<b>Federal</b>	<b>Community Action</b>	<b>OU</b>	<b>Percent Below Poverty</b>	<b>Percent Minority</b>	<b>Percent Renting</b>	<b>Percent Urban</b>	<b>CAP</b>	<b>Proposal to Finalization</b>	<b>Present Worth Cost</b>
<b>HRS Score</b>	----										
<b>Federal</b>	.123	----									
<b>Community Action</b>	.036	.018	----								
<b>OU</b>	.104	.018	.142	----							
<b>Percent Below Poverty</b>	.048	-.277**	.060	-.167	----						
<b>Percent Minority</b>	.046	.020	-.077	-.057	.519**	----					
<b>Percent Renting</b>	.096	.456**	-.152	.238*	.242*	.436**	----				
<b>Percent Urban</b>	.108	.194*	-.058	.171	.121	.420*	.626**	---			
<b>CAP</b>	.147	.103	.186*	.122	-.094	-.101	-.003	-.053	----		
<b>Proposal to Finalization</b>	-.104	.004	.027	-.045	.338**	.042	.017	-.036	-.078	----	
<b>Present Worth Cost</b>	.148	.286**	.176*	.782**	-.096	-.060	.238	.050	.141	-.032	----

Notes\*\*\* p≤.001 \*\*p≤.01 \*p≤.05, Two tailed tests of significance, (missing data handled via pairwise deletion)