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Incineration and environmental justice : the case of communities around Connecticut resource recovery facilities

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ABSTRACT

INCINERATION AND ENVIRONMENTAL JUSTICE: THE CASE OF COMMUNITIES AROUND CONNECTICUT RESOURCE RECOVERY FACILITES

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The current depleting landfill capacity in Connecticut means that resource recovery facilities will be relied on heavily to meet the States' waste disposal needs. This heavy reliance on these facilities will place greater burdens on the host communities of these waste facilities. Therefore it is important to examine the citing of these facilities to determine if these sitings unfairly targeted a particular segment of the population.

To determine if siting has been unjust in Connecticut, this study uses a geographic information system (GIS) to analyze demographic data surrounding each facility in a comparison of demographic data from 1990 and 2000 was preformed to determine if sitings targeted minorities, low income communities, or predominantly rental communities. Results indicate that resource recovery facilities were located in predominantly rental communities. Rental communities were examined as a proxy for income level, due to the absence of census tract income data.

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INCINERATION AND ENVIRONMENTAL JUSTICE :THE CASE OF COMMUNITIES AROUND CONNECTICUT RESOURCE RECOVERY FACILITES

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To my friends and family and my beloved State of Connecticut

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LIST OF ACRONYMS

BRRFOC	Bristol Resource Recovery Facility Operating Committee
BWVRF	Bulky Waste Volume Reduction Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CRRA	Connecticut Resource Recovery Authority
CTDEP	Connecticut Department of Environmental Protection
DPFP	Demonstration Phase Funding Project
EJ	Environmental Justice
EPA	Environmental Protection Agency
GAO	General Accounting Office
GIS	Geographic Information System
HUD	Department of Housing and Urban Development
LULU	Local Unwanted Land Use
MSW	Municipal Solid Waste
MSWRTF	Municipal Solid Waste Recycling Trust Fund
RCRA	Resource Conservation and Recovery Act
RRF	Resource Recovery Facility
TDP	Tons Per Day
TRI	Toxic Release Inventory
TSDF	Treatment, Storage and Disposal Facility
VRF	Volume Reduction Facilities
WTE	Waste-to-Energy Facility

CHAPTER 1

INTRODUCTION

1.1 Introduction

Waste-to-energy, or resource recovery, refers to the incineration of trash. This disposal method, which has been around for centuries, burns the garbage and reduces its material volume. This feature of combustion becomes particularly desirable method when space for disposal is at a premium. However, the incineration of trash has been associated with various health and environmental problems and this has meant that the technology is simultaneously sought after and loathed.

States that have landfill crises are turning to waste-to-energy (WTE) or exporting their waste to fill the gap left by closing landfills. Florida, New York, Virginia, and Massachusetts all have numerous WTE faculties. Connecticut also has a large number of WTE facilities in operation; otherwise know in the State as resource recovery facilities (RRF). Connecticut does not have the most capacity or the most facilities when compared to other states. However, it uses its RRFs for most of its municipal solid waste disposal needs (MSW). This reliance on RRFs for its primary MSW disposal needs is unique in the United States. The concern is that these facilities may be sited in a way that discriminates against a particular group of people in the State, this means environmental injustice may be occurring.

For this study, environmental justice (EJ) takes a front role. Some of Connecticut's RRF are placed in some of Connecticut's poorest and most impoverished cities. The two largest RRFs are in areas that have large minority populations.

However, the other four RRFs are in areas that have smaller minority populations. Now the question is are Connecticut's waste disposal facilities located by racial or economic means? Where the minority groups or low income residents there before the facility was sited or did the faculties draw these groups to the area? To understand environmental justice, the history, controversies, and theories have to be examined.

1.2 History of Environmental Justice

Environmental justice is an issue that has been steadily growing into a key facet of the environmental movement. This term has been given many names such as environmental racism or environmental equity, though environmental justice has become the most widely utilized nomenclature. Today, the movement is still being defined and re-defined, as evidenced by a shift in focus from solely racial bias to income bias.

The history of environmental justice is a long one. This history starts in the 1960s when the Civil Rights movement began to wind down after passage of the 1964 Civil Rights Act and the 1965 Voting Rights Act. Many political activists then turned to environmental issues. The movement started with a few books that have been given a lot of credit in sparking the environmental movement. These are Rachel Carson's *Silent Spring* (1962), Stewart Udall's *The Quiet Crisis* (1963), and Paul Ehrilch *The Population Bomb* (1968) (Visgilio and Whitelaw, 2003). The Environmental Protection Agency (EPA) was born in 1972. Early on, the Council on Environmental Quality (CEQ) commissioned a study on the environment in the inner cities. However, after its completion the results of the study were largely ignored because the mainstream

environmental movement tended to focus its attention on energy conservation and the preservation of pristine nature during that time period (Visgilio and Whitelaw, 2003).

This orientation of the mainstream environmental groups toward energy and conservation led to a separation within the environmental movement. The African-American population tended to be more concerned with poor housing, high crime rates, poor health, and inadequate education while the mainstream environmentalist looked to preserve wild nature (Visgilio and Whitelaw, 2003). The mainstream environmental groups did not interpret the concerns expressed by African-Americans as appropriate for their agenda—they saw them more as social justice problems than environmental problems. The result was that the civil rights and the environmental movements proceeded on parallel courses and sought to ameliorate different issues.

Work progressed in these parallel tracks until the Warren County (1978) incident triggered the modern environmental justice movement (Brown, 1995). This incident was caused by the illegal dumping of PCBs along 280 miles of road in North Carolina. The governor had to find a site for the disposal of the contaminated soil and the selection process eventually identified Warren County, which was 75 percent African-American and was one of the poorest counties in the nation as the disposal site. It also had a high water table, a geophysical feature that made the area potentially dangerous to dispose of toxic chemicals. The benefits of the site were that there was an existing landfill. Depositing the waste at this disposal facility was cost effective and the landfill was still receiving toxic waste from forty-eight states and three foreign countries, and the additional PCBs were thought to be an inconsequential in comparison to what already existed. The disposal facility also paid for half of the counties taxes, supplied good jobs

for the community, and donated money to the local church (Visgilio and Whitelaw, 2003).

Warren County became the Alamo of the environmental justice movement. Leaders of the nascent environmental justice movement flocked to protest the dumping of the contaminated soil, and even Congressman Walter Fauntroy from the District of Columbia was arrested during one of the many protests. This event helped to focus the movement against hazardous waste disposal in poor and minority communities. Studies were preformed by the General Accounting Office (1983) and by the United Church of Christ Commission (1987) to determine if African-American communities were being disproportionately burdened by these facilities. Conferences were held on the environmental justice problem. Despite these efforts and vibrant opposition to the decision of the disposal site, the contaminated soil was sent to the Warren County landfill (Visgilio and Whitelaw, 2003).

In the 1990s, events following the Warren County incident led President Clinton to sign Executive Order 12898 requiring each federal agency to incorporate environmental justice into its mission. This action prompted the EPA to create its environmental justice division. It also directed each agency to look at how its policies, programs, and activities affect the health and environmental conditions in poor or minority communities (Visgilio and Whitelaw, 2003).

In the realm of public debate, multiple conferences took place on environmental justice in the 1990s. The United Church of Christ held a conference in 1991 called the "First National People of Color Environmental Leadership Summit." The document, entitled *17 Principles of Environmental Justice* was created as an organizing tool for the

emerging movement (Visgilio and Whitelaw, 2003). This set of principles contends, in part, that that all species have the right to be free from ecological destruction and that public policy respect all people's right to be viewed equally and to be free from discrimination or bias (CAER, 2003). In 1994, the EPA and other government agencies held a conference called "Health Research and Needs to Ensure Environmental Justice." Representatives at this conference became confrontational with various groups over the need for more studies. In the end, the conference recommended the funding of community-based research projects, the promotion of disease and pollution prevention programs, the launching of community outreach, and other progressive initiatives (Visgilio and Whitelaw, 2003).

These conferences helped environmental justice develop into what it is today. Nonetheless, there is doubt about the effectiveness both of these conferences and Executive Order 12898. Very few government organizations have incorporated environmental justice into their missions and most do not even consider it when reviewing their programs or conducting their activities.

The U.S. Commission on Civil Rights Draft Report on environmental justice described three distinct achievements since the Executive Order, the symbolic value of the executive order itself, growing community activism in environmental justice in opposing LULUs, and increased use of available judicial and administrative laws and rules to oppose LULUs. However, the failures of these agencies far outweigh the modest achievements they have achieved (U.S. CCR, 2003).

The report studied four agencies in determining the success of the executive order—the Environmental Protection Agency (EPA), the Department of Housing and

Urban Development (HUD), the Department of the Interior, and the Department of Transportation. The EPA is by far the agency that has incorporated environmental justice most effectively. The EPA has crafted a formal policy on environmental justice, created a presumption that exposure to multiple hazardous materials or facilities has adverse health impacts, and established measurable goals. Other agencies in this study lacked measurable targets for their environmental justice programs.

All agencies, according to the study, lack critical assessment programs to monitor how their respective efforts were doing and displayed insufficient leadership at the topmost administrative levels. In the EPA's case, the agency's administrators supported environmental justice, but have yet to change their institutional focus to fully incorporate it. These environmental justice divisions also tended to be under-funded and had a lack of staff to implement the Executive Order (U.S. CCR, 2003).

With all these problems, environmental justice implementation in the government has been slow. However, this should be expected in a government bureaucracy where reacting to change is not a fast process. In addition, the backlash from industry has slowed the pace of initiatives designed to advance the case of environmental justice. Industries have stated that these new guidelines to protect people have raised costs and most employers have tried to pit jobs versus the environment. This has been successful in some instances. However, the jobs versus the environment theory have been shown to be an unfounded fear. Germany and Japan, two countries with very stringent environmental standards, also have robust economies. The U.S. has had strong economic conditions even with increased environmental standards. Nonetheless, industrial interests continue to oppose new environmental standards (Visgilio and Whitelaw, 2003).

Despite all the set backs environmental justice has evolved from a largely ignored concern of poor and minority communities to an important objective of the larger environmental movement. It is likely that it will grow as land becomes scarcer and population increases. People will want to protect the natural environment and their urban environment from devastation.

1.3 Incineration and Environmental Justice

Incinerators have been a target of opposition even before the environmental justice movement began. In 1895, New York built an incinerator on Governors Island. The incinerator was a solution for cities that needed a proximate waste disposal facility, but were unable to create a landfill or dump. These incinerators fell out of favor because they could not handle the wet waste that comprised a significant share of the American disposal stream.[1] Over time, newer incinerators were developed to handle the wet waste. However, neither of these incineration construction booms replaced landfills as the primary disposal method for communities. Landfills were cheap to operate relative to the state-of-the art incinerators, and municipal dumps remained the primary waste disposal method for the next several decades (Walsh et al., 1997).

In studies conducted during the 1960s, the U.S. Bureau of Solid Waste Management found that 94 percent of all landfills in the country and 75 percent of all incinerators were environmentally inadequate.[2] In part as a result of these investigations, the Solid Waste Disposal Act (1965) established standards for sanitary landfills, and led to the creation of two more legislative initiatives: the Air Quality Act (1967) and the

Resource Recovery Act (1970). These laws require incinerators to add pollution controls, and shifted from waste disposal to recycling emphases (Walsh et al., 1997).

These laws prompted the shutdown of many incinerators. However, as also tends to be the case, industrial firms were at the same time encouraged to design better incinerators that were less environmentally problematic and were capable of producing energy at the same time. These types of incinerators took on the new name of waste-to-energy (WTE) facilities or resource recovery facilities (RRF). They were seen as one solution to wean the country off its dependence on oil in the early 1980s (Walsh et al., 1997).

Despite progress, this revolution in WTE technology still had many of the same problems. For instance, New York City had a bad experience with incinerators. The facilities continued to be extremely dirty, produced odors, and contributed a lot of pollution to the immediate environment. As a result, there remains in the city today powerful opposition to any new WTE facility and environmental organizations have used this disposition to positive political effect in opposing the siting of WTE facilities (Walsh et al., 1997).

These unwanted facilities had another strike against them. They tended to be (or at the very least gave the appearance of being) located in poor and especially minority communities. This came to a head when the Cerrell Report came to light (Curlee et al., 1995).[3] The Cerrell report was produced by a California consulting firm, and it was intended to give strategies and tactics to overcome grassroots opposition to the siting of these facilities. This report suggested targeting people that might lead opposition, and include them in a public participation program. Moreover, the industry should promote

the risks associated with landfills and the added benefit of reducing the nation's dependence on oil. The industry found that cities and towns with certain demographic characteristics were more favorably disposed to site these facilities. More specifically, these jurisdictions were likely to include communities with under 25,000 people, rural locations, towns that could reap a significant economic benefit from the facility, politically conservative communities with a majority of residents above middle age, and locales with average education achievement of high school or less (Walsh et al., 1997). They also noted some mild indicators like a Republican voting record, employment in a business or technology related occupation, lower income, religious affiliation, and lack of involvement in the community were indicative of greater support for a WTE project.

Environmental and anti-incineration groups obtained this document. The unflattering observations of citizens that fell into these categories, allowed these groups to target the candidate towns and acquire support for opposition to the WTE projects.

The main reason for the opposition to incineration today is air pollution and ash creation. There is a perception that both issues pose significant problems and medical consequences. Communities do not want to bear these consequences. It is up to the interested parties to win over the skeptical public. At the same time, newer plants have a lot going for them. They have reduced toxic air emissions, integrated recycling into the facility functions, are more aesthetically pleasing, and are in some cases a boon to the local economy. With all of these advances, they still face tough opposition from both the EJ movement and local residents.

1.4 Specific Pollutants and Effects

The air factor is one of the most highly contested problems. Early models of waste incinerators emitted dangerous levels of pollutants. Today, modern rules and regulations mandate pollution control devices, mostly in the form of scrubbers (Walsh et al., 1997).[4] Also, the industry has improved pollution control in facilities. The industry did this first to comply with new environmental regulations and additionally to ward off public fears about pollution coming from the facility.

Air pollution commonly associated with WTE is generally considered carcinogenic (Curlee et al., 1995). Toxins such as particulate matter, dioxins, mercury, lead, and furans are some of the waste products from WTE facilities that can cause harm to people. Consequences of exposure to these chemicals are birth defects, learning disabilities, cancer, asthma, and other adverse health problems. Some of these toxins like lead and mercury can get into water supplies. These materials can travel great distances and affect communities far beyond the emission source (Brown, 1995).

Most of today's facilities have pollution controls that mitigate these airborne pollutants. U.S. plants have pollution controls that collect particulate matter, acid gases, dioxins, and mercury. The main tools used to collect these particulates are fabric filters or electrostatic precipitators (NRS, 2000). Current facilities emit less than one percent of the total mercury released by human-made sources (Curlee et al., 1995).

Another source of air emissions from a WTE is the vehicular traffic that goes to and from the facility. These trucks can cause increases in levels of greenhouse gasses, carbon dioxide, particulate matter, and other pollution that is associated with the internal combustion engine. This is a major problem for communities. The trucks not only

produce unwanted air emissions, but also generate noise and traffic that can be a nuisance for a community.

Ash disposal is the second major drawback for WTE facilities. These plants normally reduce the volume of waste by 80 to 90 percent. The ash generation comes in two forms, bottom ash and fly ash. Fly ash is residue that rises into the air, and is collected in a baghouse or by other collection methods.[5] Fly ash is the more toxic of the two. This ash is comprised of charred paper, soot, and cinders. It normally accounts for 10 percent of the total amount of ash produced. It is more toxic than bottom ash because heavy metals and dioxons are attracted to and condense on the smaller particles of fly ash (Tammemagi, 1999). Bottom ash is ash that falls to the bottom of the incinerator or WTE facility. It is normally made up of metals and other non-combustibles. This ash has to be cooled in water and thus gets most of it weight from the water.

Managing bottom and fly ash properly is important because the waste is in a more mobile and bioavailible form than when it was in a solid ground-based form. This combination of material contains cadmium, lead, mercury, arsenic, beryllium, zinc, and copper. This ash can easily be dispersed into the environment by wind or can be picked up by water (Tammemagi, 1999). One of the major arguments against incinerators is that the waste going in is less hazardous than the waste that is produced (Tammemagi, 1999). In the U.S., the EPA has deemed ash as non-hazardous. When fly ash and bottom ash is combined it passes the EPA standards, however fly ash alone often fails (Curlee et al., 1995). Now the question is should WTE operators be allowed to mix ash or not? Environmentalists view mixing as a way of diluting ash to achieve permissible levels, while it still remains toxic. The tests that the EPA employs on the diluted ash shows that

the leaching rate is either below, or just under, the safe limit depending on the ash make up (Curlee et al., 1995). Connecticut treats all ash as toxic waste (CTDEP, 1999a).[6]

Most of the ash in the U.S. is landfilled. In the US about 47 percent of the ash is sent to sanitary landfills, and 53 percent is sent to monofills designed to handle just ash (Curlee et al., 1995).[7] The main fear with landfilling is that the landfills may leak and the leaching may be hazardous to the surrounding public (CTDEP, 1999a).

Some options other than landfilling is turning the ash into littlercrete. Littlercrete is basically a form of pavement or concrete. It is made up of 89 percent ash, 9 percent asphalt, and 2 percent lime. In Texas, tests have shown that the material exceeds performance standards for roads. In Europe this form of ash recycling has been used for marine piers, seawalls, and other structures (Tammemagi, 1999). However, this ash recycling is still being researched in the U.S. because leaching from this recycled material could cause more health problems.

1.5 Siting of Incineration Facilities

The previous section discussed the dangers, problems, and effects of combustion. These factors along with others to be discussed in this section are important determinates of WTE facilities sitings. First, WTE facilities need roads to transport waste, a constant flow of material, and an area willing to agree to accept the plant. These facilities can generate jobs, taxes, and commerce that can be locally beneficial. Some of the drawbacks can be increased traffic, noise, and pollution in the air, water, and soil.

There have been multiple theories on how to successfully site a WTE facility. Traditionally, when siting a LULU most people think of a facility being located in a

minority neighborhood. The biased practices that guide the siting of locally unwanted land uses (LULUs) are a foremost point of criticism of the environmental justice movement. When LULUs are being sited, the health impacts of the community have to be taken into account and can be a major factor in the siting process. Robert Bullard documented this phenomenon in his study of landfills and other hazardous waste facilities in his book *Dumping in Dixie*. He cited the GAO study of hazardous-waste landfill siting in the region. He found that African-American communities suffered disproportionably in comparison to other communities when these facilities are sited. Beyond Bullard, other studies have shown that race and class are important determinates of environmental exposure and environmental health impacts of siting these facilities (Brown, 1995). In a 1990 study of the twenty-one commercial hazardous waste sites in Michigan, sixteen of them were located in three counties in the Detroit area. These three counties all had a high percentage of minority residents. The study also found that the closer one lived to the facility, the greater the likelihood the resident to be a minority (Brown, 1995).

Another study in Louisiana in 1992 compared zip codes with the highest minority populations with zip codes with the highest Caucasian population, and found that the minority areas had more facilities per person than the white areas. The study also looked at how hazardous material was distributed among these areas. In the study, one percent of all hazardous material went to predominantly Caucasian zip codes and 99 percent of the hazardous material was received by processing facilities located in the predominantly minority zip codes. Another study looking at national trends found that areas with treatment, storage, and disposal facilities (TSDFs) had more African-Americans and

Hispanics living within proximate distance. More people near the facilities were on welfare and were living below the poverty level in these areas as well (Brown, 1995).

A third study used the EPA's toxic release inventory (TRI), and found that when African-Americans and Hispanics were combined, they made up 55 percent of the population in tracts that had emission releases. In areas without releases, African-Americans and Hispanics only made up 43 percent of the population (Brown, 1995). The TRI data study show that a LULU, which includes WTE facilities, was placed in minority communities.

These studies indicate that if a facility is hard to site, there is a notable tendency to place it in a minority neighborhood. This is supported by the Cerrell Associates, Inc. report that recommends that industries and government place waste sites in neighborhoods with residents of lower socio-economic standing since they are less likely to organize (Brown, 1995).

A study in Chicago found that minority neighborhoods were disproportionably located near solid waste sites. However, only Hispanic neighborhoods were located near industrial sites, the Comprehensive Environmental Response, Composition, and Liability Act (CERCLA) sites, and Resource Conservation and Recovery Act (RCRA) sites. These were shown to be sites that historically had toxic land uses associated with them. Given the fact that minority move-in was not calculated, the Hispanic populations may have moved into the area after the hazardous waste sites were established. The study showed that both African-American and Hispanic neighborhoods are located near historic waste sites more often than in Caucasian neighborhoods (Baden and Coursey, 2002).[8]

There are reasons for this apparent search for minority and lower socio-economic neighborhoods. First, in these less affluent communities, land tends to be cheaper. Second, there is also an inexpensive labor pool from which to draw. Third, political power in a poor or minority community can be limited (Reams and Templet 1996). This lack of political power can stem from multiple reasons. These communities can be non-politically active due to lack of education and community cohesion. Lack of political power can be from a deficiency in the number of permanent residents and an abundance of renters who are more likely to move more frequently. Renters can be less inclined to invest or participate in a community if they do not see benefits for doing so. Ethnic churning, or movement of ethnic groups in an out of an area, can also cause a lack of cohesion in an area. Various minority groups that move in and out of the area may cause tensions among the groups. This can erode the community cohesion and leave it venerable to LULUs (Pastor et al., 2001).

Communities can lack knowledge about the proposed facilities' environmental effects, health effects, and other negative damages that can cause a facility to be sited near minorities or lower socio-economic neighborhoods (Brown, 1995). It has been stated that most residents living near facilities lack the information about the effects of a facility (Bickerstaff and Walker, 2001). Most of the residents' knowledge comes from physical observation, such as odors, dirt, and poor air quality (Bickerstaff and Walker, 2001). This lack of knowledge may be influential in determining where these facilities get sited. However, when a community does have an information source and an active group of residents, evidence suggests that it can have influence over siting (or at the very least keep the polluter in check) (Wakefield et al., 2001).

Another reason is the short-term gains for a community that agrees to host unwanted facilities. Some of these short-term gains are financial in nature. They may receive an increase in tax revenue, an influx of new jobs in the community, and economic development (Reams and Templet, 1996). This can influence a community decision to agree to WTE facilities sitings if residents are suffering from low employment or financial problems. In addition to inexpensive land an influential government officials in the community can aid in successfully siting a WTE facility, especially if they have a powerful influence in the community. Projects that are championed by local political figures can set the tone of the debate. However, when the champion is in a pluralistic political setting, they may lack the influence needed to successfully site a facility (Walsh et al., 1997). Walsh (1997) examined eight potential waste incinerators, and found three were successfully sited. Of those three, two of them had influential political champions. Of the five that were not sited, two of them lost due to a more pluralistic political structure.

Housing market values are another major reason for siting an unwanted facility. As stated previously, these faculties look for inexpensive land on which to build. Most inexpensive land is located in low income and minority communities. With the addition of LULUs in a community relatively wealthier buyers become hesitant to acquire land to develop for homes or industries which are not as polluting. These developments make the pool of potential buyers smaller for these areas, which allow LULUs to purchase cheap land in these communities. This causes property values to be depressed to a point where it is inexpensive for a company or the government to site a noxious facility (Reams and Templet, 1996). It was found that housing appreciation rates were affected by the

presence of incinerators.[9] Moving away from the incinerator increases housing values increase. In one study the housing rates did not fully adjust to the prior incinerator appreciation rates even after the incinerator had been operating for seven years (Kiel and McClain, 1995). Lower rents and lower property values may also encourage low-income people to move into the area due to the lower cost of housing (Reams and Templet, 1996).

The final reason is how the EPA enforces environmental laws. It was found that the EPA was lax in their monitoring and enforcement in poor or minority areas. A 1992 study of the EPA by the National Law Journal reported that it took 20 percent longer for the EPA to put abandoned hazardous waste facilities on the National Priority List if they were located in a minority community over a Caucasian community. The EPA was 12-42 percent slower to clean up a hazardous waste site in minority communities than they were in majority Caucasian areas. In areas that were cleaned up, the EPA tended to opt for a containment method rather than treatment of the site in minority neighborhoods (Carr, 1996).[10] The EPA also levies lower fines on facilities in minority areas. Fines in white areas were about five times higher than those in minority areas (Brown, 1995).[11]

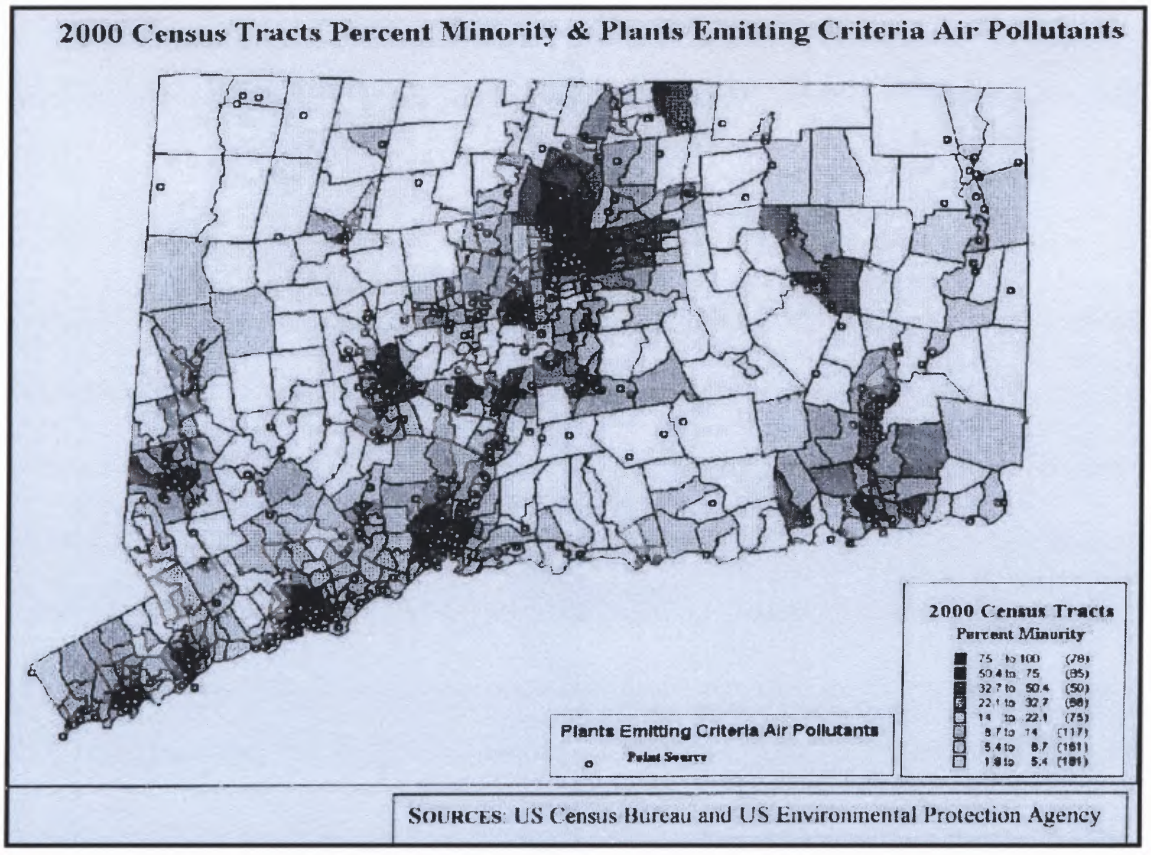

Figure 1.1. Minority populations in Connecticut by census tracts.

Source: ***Our Backyard: A Quest for Environmental Justice***

In Connecticut, there is a direct correlation between the of percentage minorities in a community and the location of environmental hazards. It has been found that race is a greater indicator than income of the likelihood of having an environmentally hazardous facility in an area (Visgilio and Whitelaw, 2003). Figure 1.1 depicts point source emission sources in Connecticut and indicates that the vast majority of these facilities are located in minority communities. For example, three thousand tons of point source emissions are generated in Hartford, a predominantly African American/Hispanic city. More than half of this amount comes from the operation of the local RRF. If businesses that support the RRF were included in the figure, the point source percentage would grow

to 90 percent of all emissions in the city. Similarly, in Bridgeport and New Haven the vast majority of emissions are produced from power generation and regional trash incineration. Also, the state's two largest RRFs are located in Hartford and Bridgeport—cities that have some of the largest minority communities in the state (Visgilio and Whitelaw, 2003).

However, other studies have contradicted the contention that minority and low-income areas invite unwanted facilities. For example, the authors of *Waste-to-Energy in the United States* report how the sites for two incinerators they studied were moved due to the concerns about placing a heavier burden on the minority populations in those communities.[12] Successful siting was justified by the solid waste management needs of the community, the potential probability of the facility being sited, community compensation, and the willingness of a community to accept a waste-to-energy facility (Curlee et al., 1995).

The Cerrell Report of 1984 found that the least resistant communities to incinerators were more rural communities with majority white populations. Specifically, those towns that were populated with older, Catholic residents that had lower incomes, minimal education were likely to evince less resistance (Walsh et al., 1997). These characteristics do not contrast favorably with more urban communities. However, since this report was published in 1984 communities that do fit this description have used the information to defeat these projects.

The Walsh and colleagues study of eight counties that were considering siting WTE facilities included only one facility that was sited in a predominantly minority county. The other two communities that sited WTE facilities had small minority

populations within three miles of the facility. Even though the county with the largest minority community did build the WTE facility, the next two counties with the large minority population did not successfully site their proposed facilities (Walsh et al., 1997). It was found that a facility is more likely to be sited in an area that did not form an opposition movement and had strong governmental sponsorship. In areas where opposition can be organized or there is political opposition, a WTE facility had more difficulties being sited (Walsh et al., 1997).

A more recent study looking at minority move-in found that TSDFs led to some minority move-in, but it was not statistically significant (Pastor et al., 2001). However, they did find that communities that experienced high ethic churning rates during the period prior to the facility being sited were prime candidates for a facility. This meant communities with a notable level of internal movement tended to attract the siting of a TSDF. Once the facility was placed, the ethic churning slowed and the community stabilized. This may have been due to the political weakness of the community during the churning period making it a susceptible target for a LULU. This political weakness could be due to a lack of community leadership and residents who were not firmly established in the community (Pastor et al., 2001).

None of these reasons eliminates environmental racism as an explanation for biased siting outcomes, but it does cast doubt on the legitimacy of a waste facility being placed in an area due only to this consideration. Other reasons may be the instability of the community, a strong political power that championed the facility, or economic needs of the community. It could even be argued that the best communities (in the sense of

ease to site) might not even be in minority areas, but in predominantly blue-collar white areas.

1.6 Motivation for Support or Opposition of RRF Siting

A discussion of RRF siting would be incomplete without the question why do people stay in areas where these polluting facilities are located? The assumption is that individuals do measure the risk associated with a WTE facility or any other LULU. It would be customary to presume that people would migrate away from these areas to escape the health risks associated with these facilities. This is not always the case. Some individuals may see benefits, or at least some type of advantage to living near these facilities such as lower cost of rental unites or inexpensive houses.

Individuals might accept health and environmental risks if the exposure is voluntary, if the individual is compensated for the exposure, and if the risk is deemed to be of low importance (Reams and Templet, 1996). These circumstances may arise when individuals are in need of low-cost housing, or simply become accustomed to the facility being there. Either way, people do live near these facilities either by economic necessity or because they enjoy the area and have become familiar with the presence of the facility.

There are typically two types of residents that reside near theses facilities—people who are involved in the community and those that are not involved in the community. This simple difference will cause one person to oppose or monitor a LULUs and the other will not actively oppose it. The happiness of a person within a community and his/her investment within the community affects the level of understanding. A residential

assessment of the risk benefit tradeoff affects their decision to support or oppose the siting of an RRF.

People who are actively involved in a community near a LULU have some key traits that motivate them to become involved in a movement to oppose an unwanted facility. Residents who take action in their community have an attachment to the neighborhood and are more involved socially and politically (Wakefield, 2001). To be part of a group will cause people to do things they would not ordinarily do on their own. Groups also can obtain and distribute information on pollutants more easily than a single individual is able to do. These groups also promote a feeling of belonging and can increase a person's attachment to an area (Szersynski, 2002). Furthermore, people that are not satisfied with their local environment are more likely to note air pollution and rate it as a serious local problem (Bickerstaff and Walker, 2001). In summary, people with an attachment to the community, who participate in a group within the community, and are not happy with the environment are more likely to take action against the LULU.

Residents who do not take action against environmental pollutants in their neighborhood can also be categorized by a number of key traits. These people may have an attachment to the area and do not wish to leave regardless of the circumstances. They also tend not to be actively involved in community organizations (Wakefield, 2001). These residents may not have access to information on pollutants and pollution sources. Their main information comes from sensory perception. This can be from olfactory sources, visual evidence, health effects, and even taste (Bickerstaff and Walker, 2001). [13] Yet they may still not take action due to a reluctance to admit to high levels of pollution to their residential area. People will attribute pollution more readily to areas where they

do not reside and are less likely to admit to living in a heavily polluted neighborhood. Physical appearance is also a factor. The more degraded an area is the more likely it is perceived to be polluted. If their environment is not degraded they may tend to believe it is unpolluted (Bickerstaff and Walker, 2001).

Lack of involvement in a community or neighborhood may also stem from a sense that there are more important things to do than involve oneself in a community group. People may also feel powerless against a problem as large as air pollution or other types of pollutants that are in their community. People that were not active in the community experience a lack of power from not being able to resolve other local problems and to address the stigma that has been attached to the community. This can be in the form of a high crime rate, ongoing environmental problems, and town repairs not being done in the area (Wakefield, 2001). An example of this is the extended time that it takes for the EPA to respond to violations in poor or minority communities (Brown, 1995). Lastly, the lack of information on environmental problems and how to deal with them, as well as little experience with whom to contact, is attributable to a low level of community involvement. This paucity of information on how to solve the problem can lead to a sense of the issue being too large for any one person or group to be able to find a solution (Wakefield, 2001).

Another reason for non-participation in a community is residential churning. Since these lower income jurisdictions tend to have higher percentages of renters as opposed to homeowners, the renting residents are less likely to involve themselves in efforts to address local problems. This lack of involvement can arise from the fact that renters have a higher likelihood of moving than homeowners. This can lead to political

and community weakness in siting a LULU. Renters also do not get hurt financially from the development of a LULU in the area since they do not own the property that is being affected.[14] If a LULU is placed within a renting community, it may drive down renting cost and bring more people of lower social economic status. They may find it beneficial to trade off deteriorated environmental conditions with lower living costs that may become available under such circumstances.

1.7 Siting RRF Facilities in Connecticut

It is unclear as to how Connecticut's RRFs were sited. Two RRFs are in minority areas however, the other four RRFs are in less racially defined communities. This study will research what types of communities these facilities are located in. The study will explore where these facilities are located, how much pollution they cause, how much waste they process, and how the community is affected. Also the study will examine whether residential churning or minority move-in is a factor in having minority population surrounding them.

To gain an understanding of how Connecticut's RRFs were sited the study must first investigate how the State compares to other states in the incineration of trash by either using RRFs or WTE facilities. This will be discussed in the subsequent chapter. The study will examine the amount of waste disposed of by various methods in the U.S. It will also examine Connecticut in comparison with other states and how the state's self-imposed requirements affect how the handling of municipal solid waste in the State. This section will also examine the complex hierarchy of the States MSW disposal system and

why the State have chosen this system. This will also explain Connecticut preference for incineration as the dominate disposal method.

The third chapter employs a geographic information system (GIS) to determine the social-demographic and socioeconomic characteristics of the people living in close proximity to each of Connecticut's resource recovery facilities. More specifically, that chapter examines the variables of race, income, and residential status (owner or renter). Census data from 1990 and 2000 are contrasted to determine if any significant changes have resulted from the placement of the resource recovery facilities.

By combining all aspects of how these facilities were sited and who they affect, this thesis will determine if environmental injustice has taken place. If it is true that environmental injustice has taken place, then a specific demographic segment of the state's population will be affected. If this is not the case, then no single group will be located in close proximity to the facility. It is possible that a segment of the population may chose to reside near these facilities. This thesis identifies the groups, if any, that are disproportionately affected by these facilities.

CHAPTER 2

THE STATE OF WASTE IN CONNECTICUT

2.1 Connecticut Solid Waste Disposal Methods

To provide an understanding of resource recovery siting in Connecticut it is necessary to examine the issue on the national, regional, state, and local levels. This section will highlight the main factors in waste disposal policy. By analyzing the national and regional levels this study will discuss the criteria that are used in making decisions regarding various waste disposal methods. By looking at how the various states manage their solid waste, it will be possible to demonstrate how Connecticut compares. Particularly of interest will be the extent to which a state's waste management policies are geared toward recycling versus say, landfilling.

The disposal of waste is an issue for all communities, towns, states, and even the federal government. Municipal solid waste (MSW) is a particularly interesting problem. Since the era of the earliest human settlements, waste had to be disposed of in some way. Cities, both ancient and new, have had to remove it from their streets and homes. Yet, no one wants to deal with it. No one wants to see it. Everyone wants the discarded material to vanish after it has served its intended purpose. The largest issue is that no one wants it in his or her backyard.

The states that have chosen combustion are mainly in the northeastern and southern parts of the country. The southern region has high water tables and this can prevent the effective operation of landfills (Newsday, 1989). The implementation of necessary safeguards to protect the water supply from leachate from the landfill has also

increased cost (Tammemagi, 1999). The south has also turned to combustion to help offset the declining landfill space. Today, the southern states have the greatest incineration capacity per person in the country (MSW in the U.S., 2000).

The northeastern states have turned to combustion largely because they are running out of landfill space. Space for landfills is hard to find in areas where land is expensive and where dense populations can restrict the size of a disposal facility. Also the large numbers of people packed into a small space makes siting a landfill difficult. Establishment of a large landfill now requires a very large site, odor prevention, environmental protections, and various other costs and agreements with a community. As a result, in the northeast the primary options for waste disposal have been to increase recycling, to develop waste-to-energy (WTE) facilities, or to rely on waste export. Most of the northeastern states have opted for a multiple method disposal process, often with one predominate strategy. Today, the northeastern states have the largest number of WTE facilities in operation (MSW in the U.S., 2000).

In the late 1980s, many states rapidly created new WTE facilities (EIA 2000). Just a few years later, some of these plants were closed due to public opposition, flow control problems, or technical difficulties. For example, the Hartford WTE facility had an explosion after two days of operation that caused major damage (Newsday, 1989). This plant did not shut down permanently, but this event highlights some of the problems associated with WTE facilities.

As indicated in Table 2.1, Connecticut has the highest rate of MSW combustion in the country. The only other state with a comparable rate of combustion is Florida that incinerates 58 percent of its MSW. Other states rely more heavily on landfilling. This is

especially true of the western states that have more open space to site disposal facilities. Comprehensive data are not available, but the general trend of waste disposal can be deduced. In the various state waste reports, most states have focused more on recycling than combustion and all state documents report that landfill space was evaporating and alternatives to landfilling would have to be found.

Table 2.1 State Waste Data From all Fifty States Along with Disposal Method by Percentage of Use

States	Year of Data	Total Generation TPY	Landfill Percentage	Recycling Percentage	Combustion Percentage	Export Percentage
Alabama†	N/D	N/D	N/D	N/D	N/D	N/D
Alaska†	N/D	N/D	N/D	N/D	N/D	N/D
Arizona	2000	5,610,000	91	9	0	0
Arkansas†	N/D	N/D	N/D	N/D	N/D	N/D
California	2000	67,435,385	56	41	1	1
Colorado‡	2002	7,673,778	N/D	N/D	N/D	N/D
Connecticut	1998	3,179,900	4	24	62	9
Delaware	2002	2,747,205	31	69	0	0
Florida	2000	25,750,000	15	27	58	0
Georgia	2000	12,400,000	95	N/D	N/D	N/D
Hawaii	2000	1,873,111	46	24	30	0
Idaho†	N/D	N/D	N/D	N/D	N/D	N/D
Illinois	2002	21,300,000	74	33	0	N/D
Indiana	2002	16,000,000	50	39	11	0
Iowa‡	2002	2,647,378	100	N/D	0	4
Kansas	2000	3,175,000	98	1	2	1
Kentucky†	N/D	N/D	N/D	N/D	N/D	N/D
Louisiana†	N/D	N/D	N/D	N/D	N/D	N/D
Maine	1997	1,635,136	10	41	40	8
Maryland	2002	11,482,972	28	42	12	17
Massachusetts	2000	7,990,000	13	34	38	15
Michigan	2002	57,540,922	63	20	11	0
Minnesota†	N/D	N/D	N/D	N/D	N/D	N/D
Mississippi‡	2002	5,349,615	100	N/D	0	0
Missouri	1999	7,900,000	70	30	0	0
Montana†	N/D	N/D	N/D	N/D	N/D	N/D
Nebraska‡	2002	1,800,000	N/D	N/D	N/D	N/D
Nevada	2003	3,506,259	87	13	0	0
New Hampshire	1999	1,326,000	50	27	23	6

Table 2.1 State Waste Data From all Fifty States Along with Disposal Method by Percentage of Use (Continued)

States	Year of Data	Total Generation TPY	Landfill Percentage	Recycling Percentage	Combustion Percentage	Export Percentage
New Jersey	2000	17,700,000	23	53	9	15
New Mexico	2000	3,037,416	98	9.5	0	0
New York	1998	2,9700,000	32	42	13	13
North Carolina	1998	9,415,924	76	10	1	13
North Dakota†	N/D	N/D	N/D	11	N/D	N/D
Ohio	2000	33,100,000	59	38	0	0
Oklahoma†	N/D	N/D	N/D	N/D	N/D	N/D
Oregon	2002	4,772,537	50	35	8	7
Pennsylvania	2000	30,740,309	78	13	10	0
Rhode Island‡	2000	1,195,424	89	N/D	0	11
South Carolina	2002	11,450,000	40	43	2	1
South Dakota†	N/D	N/D	N/D	N/D	N/D	N/D
Tennessee†	N/D	N/D	N/D	N/D	N/D	N/D
Texas	1998	36,400,668	63	35	0	1
Utah	2001	2,792,976	77	5	18	0
Vermont	1999	517239	53	30	0	17
Virginia	2002	14,856,276	84	3	11	0
Washington	2001	7,287,025	38	37	7	17
West Virginia†	N/D	N/D	N/D	N/D	N/D	N/D
Wisconsin	2001	4,700,000	60	36	4	0
Wyoming†	N/D	N/D	N/D	N/D	N/D	N/D

Data obtained from respective websites, solid waste management plans, and personal contacts with agency representatives.
Accuracy of data from each state may vary from the availability and amount of data each state provided.
Data may vary from the EPA figures due to variations in calculation measures.
All states with † have no data available from their websites.
All state with ‡ are missing some data.
Combustion is the same as WTE or RRF. This was used since some states use incarnation facilities that do not generate electricity.

Many of the New England states have experienced difficulties disposing of their MSW. Connecticut, Massachusetts, and New York are facing a landfill crisis as capacity in these disposal facilities is running out. Each of these states has taken a different path to deal with this situation. New York currently has the second largest combustion capacity in the United States, second only to Florida (EIA, 2000). However, in addition to combustion, New York (and especially New York City) exports a large amount of its MSW out of state for final disposal. The state uses combustion for 30 percent of its

The trend in Massachusetts is somewhat different. In 2000, the state only disposed of 24 percent of its MSW in the seven State operated WTE facilities and exported 1.77 million tons (13 percent of the total) of its solid waste. However, this export proportion grew by 33 percent over the previous year with only one percent growth in the state's overall waste generation (Massachusetts Solid Waste Master Plan, 2000).

Connecticut has taken a different approach from Massachusetts and New York. The Nutmeg State also has a large waste combustion capacity that is used to dispose of 62 percent of its MSW (CTDEP, 1999a). Only 12 percent of the state's MSW is shipped out of state (234,032 tons in 1999). It should also be noted that in 1999 Connecticut's waste exports actually decreased from the previous year (CTDEP, 1999a). The differences among the various New England States raise a question about Connecticut's methods of waste disposal. Why has Connecticut decided to combust so much more MSW than other states?

The answer lies in Connecticut's history of waste disposal. Connecticut has always had a policy of handling waste within the state before it had a waste disposal crisis, and officials made a conscious decision to continue to maintain statewide self-sufficiency in waste management. Massachusetts, however, disposed of the same percentage of its MSW at out of state facilities, but uses combustion less in its overall portfolio of disposal practices. It should also be noted that both Massachusetts and New York have higher recycling rates than Connecticut. This could also show that Connecticut's apparent preference for relying on WTE facilities has diverted attention away from recycling.

To understand Connecticut's strategy of relying so heavily on RRF facilities over other options the next section provides a general overview at waste management policy in the state. The historical context is described, as well as the state's institutional structure for handling waste issues and its administrative organization.

2.2 Overview of Solid Waste Management in Connecticut

Connecticut's population of 3,425,074 generated 3,179,900 tons of MSW in 1998. For a State with only 4,845 square miles of territory and a population density of 703 people per square mile, there is not a lot of space to dispose of waste material (U.S. Census, 2004). This situation is further complicated by the fact that no one wants waste deposited in his or her backyard.

To achieve its waste disposal goals, Connecticut has implemented a complex statewide waste management scheme. Under a decision in the mid-1980s, state officials decided to handle the vast majority of waste production by in-state means. This idea of state self-sufficiency in waste management has posed a dilemma. Due to its small size, dense population, and public opposition to new landfills, Connecticut finds itself in a situation in which most of its existing landfills are almost at full capacity. The objective of keeping waste generated by the state in the state, coupled with the lack of space for new landfills, has driven officials to develop the waste management hierarchy that is in place today. This waste management hierarchy is as follows: source reduction, recycling, composting of yard waste and vegetable matter, bulky waste recycling, resource recovery or waste-to-energy facilities, incineration, and landfilling (CTDEP, 1999a). To date this

plan has been working well. Only a small percentage of the total waste production in Connecticut goes to out-of-state-disposal.

The Connecticut waste management hierarchy established the basis for local policymaking and the preferred methods of disposal for the towns. The towns that have followed the plan have surpassed its recommendations on recycling and most towns have developed programs for collecting recyclable material such as plastics (which are not formally required under the hierarchy). Local communities have also initiated composting facilities to deal with biodegradable solid waste in response to the directive (CTDEP, 1999a).

There are over 100 recycling collection facilities in the state, 94 leaf composting sites (as of 1998), and 15 registered farms have agricultural waste management plans for animal manure, vegetable waste, non-recyclable paper, and other products. The recyclable products mandated by the state are glass food containers, metal food containers, office paper (non-residential generators only), corrugated cardboard, leaves, used motor oil, lead acid batteries, and scrap metal. With these required materials, communities have opted to expand recyclable collection to some plastics (PET numbers 1 and 2), anti-freeze, textiles, and magazines (CTDEP, 1999a).

Currently, recycling and composting are the preferred methods of waste disposal in Connecticut, and constitute the first phase of the state's waste management hierarchy. The State had an overall recycling rate of 24 percent in 1998. With additional national estimates for material such as bottles and cans recycled through the container deposit system and corrugated cardboard from businesses, Connecticut's recycling rate was 29 percent (CTDEP, 1999a). In an interview with an official from the CTDEP it was

disclosed that the current statewide recycling rate is not likely to improve significantly from its current level without new legislation. This forecast is based on the lack of growth in the amount of material recycled in Connecticut between 1992 and 1999. Between 1992 and 1994, Connecticut's recycling growth rate was four percent, growing from 19 percent to 23 percent. Between 1994 and 1999, the growth of recycling was only one percent. It should be noted that recycling rates as calculated by CTDEP and the federal Environmental Protection Agency (EPA) differ due to different methodologies for making this calculation (Franklin Associates, 2000).[15]

Connecticut's recycling rate is higher than the national average under the EPA's calculation method. The EPA determined that Connecticut's recycling rate in 1998 was 30.9 percent. The national average was 28.2 percent. On this comparative basis, Connecticut appears to be doing fairly well. However, the EPA's calculation can be considered high due to the types of estimations used in calculating statewide recycling rates (Franklin Associates, 2000).

Bulky waste and RRF/WTE plants are the next phase in the state's solid waste management hierarchy. For bulky waste, Connecticut strongly encourages the reuse of certain items such as wood and rock into landscaping material through either shredding or salvage. If recovery of these materials is not practical then they are to be separated, and sent to bulky waste volume reduction facilities (BWVRF). There are 16 volume reduction facilities (VRF) around the state.[16] These VRF's are responsible for sorting construction material and demolition waste, processing it for recycling, and reducing its volume for transport to other facilities to be reused or for final disposal. Some of this material can be handled at RRFs for incineration (CTDEP, 1999a).

The third stage of the hierarchy calls for the use of RRFs for MSW. This is by far the most widely used form of waste disposal in Connecticut. These installations are used for both WTE and recycling. In 1999, 82 percent of MSW in Connecticut was disposed of in six RFFs. These facilities currently have enough capacity to deal with all of Connecticut's MSW disposal needs. This conclusion was reached by taking the three million tons that was generated in the state in 1997 and subtracting the amount recycled (700,000 tons); the remaining waste was roughly equivalent to statewide RRF capacity. Over a five-year annual average, all six of Connecticut's RRFs processed about 2.2 million tons of MSW a year (CTDEP, 1999a). These facilities use combustion to generate electricity from burnable waste left over after the recycling process and the sorting of non-burnable materials. This energy produced from the combustion of waste is then put back into the electrical grid. There are no municipal incineration plants in use in Connecticut, only WTE plants. Incinerators were phased out in 1995 due to their older designs, their lack of modern environmental controls, and their tendency to be too small to properly accommodate local needs. The new WTE plants addressed the shortcomings of past facilities.

The WTE facilities reduce waste to ash which in terms of volume is roughly 26 percent of the amount of waste that went into the RRF facility. This ash then goes into an ash landfill for final disposal (CTDEP, 1999a). This is the only major shortcomings of the modern WTE facility. In Connecticut today, the ash residue landfills in Hartford and Putnam are expected to meet the state's needs for the next 19 years. However, this timeframe is subject to downward adjustment if the overall volume of combustion increases, thus increasing the amount of ash generated (CTDEP, 1999a)

Landfilling of raw trash is the final option for managing MSW in Connecticut. This is problematic because most landfills in the state have been closed. In 2003, Connecticut had only three operating landfills: Manchester, Windsor, and Hartford. A fourth landfill in Glastonbury only takes bulky waste from the town in which it is situated. These remaining landfills are quickly being filled to capacity. The Hartford landfill lifespan is assessed to be less than two years, the Manchester Landfill has a five-year life span remaining, and the Windsor landfill has a life span of four to ten years (CTDEP, 1999a). Some of these landfills may see extended use if vertical expansion is allowed.[17]

2.3 History of Connecticut Waste Solutions

Connecticut has historically used landfilling as its primary disposal method. The vast majority of towns had their own local landfills or they sent their waste to regional facilities. In 1975, only twenty of the state's 169 towns sent their MSW out of state. Connecticut, for the most part, handled the trash it produced, though the preferred alternative was for each town to handle its MSW on an individual basis (Shaw, 2000). [18]

In 1973, the state government created the Connecticut Resource Recovery Authority (CRRA) to help organize towns to deal more effectively with their waste disposal needs. CRRA was developed to provide the structure of a conventional county government (Shaw, 2000).[19] This authority built incinerators and assumed responsibility for operating regional landfills. As the state's landfill capacity shrank, disposal costs increased and towns started to experience a steep rise in cost. Towns that had never even considered their cost of waste disposal were now treating it as a major budgetary item by

1986. The cost for disposal at that time was typically around $25 per ton, but by the mid-1980s some towns were paying upwards of $50 per ton (CTDEP, 1986b).

During this period, CTDEP estimated that the state's landfill capacity would be exhausted by 1989. This was evident in the fact that the remaining landfills were measuring available space in cubic yards rather than acre-feet. To combat the pending landfill crisis the towns turned to incineration as a solution. Towns either built their own incinerators or contracted with other towns for space in their facilities. These incinerators tended to be more expensive and the pollutants that they generated eventually became unacceptable. This led to a shift from incinerators to WTE facilities in 1986. During the transition period beginning in 1986, 108 municipalities contracted with WTE facilities or incinerators in and out of the state to dispose of their MSW. This represented two-thirds of Connecticut's population at that time and a large amount of its daily MSW (CTDEP, 1986b).

At the start of 1986, only one WTE plant was operating in Connecticut—a modular facility in Windham. This facility had a total daily capacity of 108 tons per day (TPD) with no recycling provision. This small capacity mainly handled the town's trash and was inefficient for power generation (CTDEP, 1986b). On the drawing board of Connecticut's long-term waste management plan were three plants that were under construction and a further five facilities awaiting approval. Not all of these anticipated facilities came into being due to their anticipated lack of profitability, community opposition, and unstable waste streams. Additionally, some communities collaborated on other projects or were too small to accommodate the planned facility. To make the RRF facilities profitable, communities joined together to provide a guaranteed waste flow to

the WTE plant. By the time the next waste management plan was issued in 1990, there were six operational facilities. Later, the Windham plant was closed and replaced by a facility in Lisbon. Four of these new facilities were operated under CRRA. Two of them, one in Bristol and one in Lisbon, are not under CRRA control. The original plan called for six regional RRFs under the control of CRRA with areas devoted or signed onto one WTE facility. This plan was changed to four RRFs under CRRA control, one town cooperative, and one private RRF.[20] The CRRA facilities consisted of joint WTE plants and recycling centers.

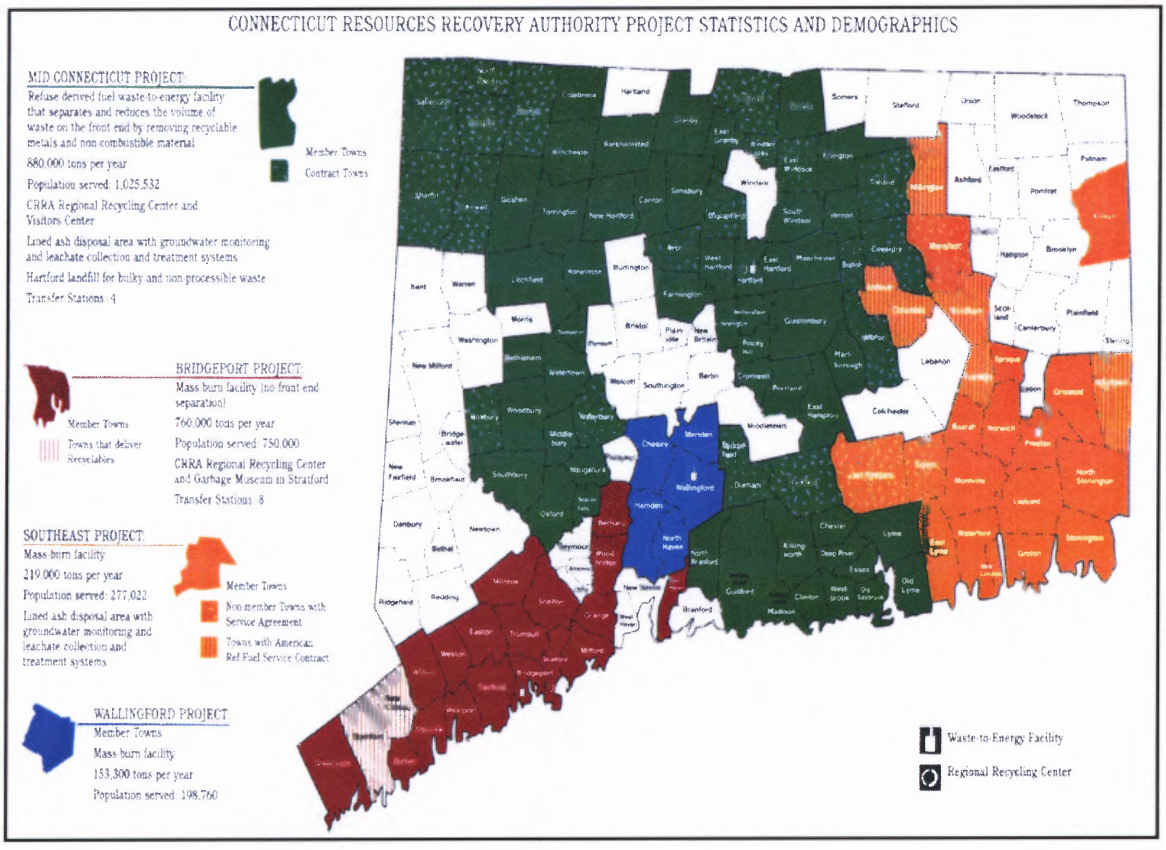

Figure 2.1 Connecticut's Resource Recovery Authority Four RRF Projects,
Source: http://www.crra.org, April 2004

Two principal sources of funding made these projects possible: the so-called Demonstration Phase Funding Project (DPFP) and the Municipal Solid Waste Recycling Trust Fund (MSWRTF). The DPFP initiative provided money for initial recycling programs throughout the state. The program used Three million dollar of an Exxon restitution payment to offset the cost of these programs.[21] The MSWRTF was a ten million dollar program that encouraged regional MSW programs and reviewed contracts with WTE facilities.[22] This made it more economical for towns to contract into large groups since the state funded a large part of the bill. Connecticut Resource Recovery Authority was designed to address the challenges of developing a regional system of MSW disposal in Connecticut. CRRA was successful largely because of two factors. First, CRRA already had regional systems in place and secondly they could override local zoning rules to site facilities. Not all towns participate in the CRRA system. Some towns have chosen to create their own organizations to consolidate their waste streams. This organization is called the Bristol Resource Recovery Facility Operating Committee, or BRRFOC (BRRFOC, 2002). Towns that are not part of CRRA or BRRFOC must pay spot market costs for their waste management needs. These towns have the ability to go to the cheapest waste facility that they can find, but are also subject to fluctuations in regional waste tipping fees (CTDEP, 1999a).

By the late 1990s, Connecticut's statewide recycling rate had increased form 19 percent to 24 percent. The six RRFs disposed of 62 percent of the state's MSW. These facilities both recycle and use the incineration of trash to produce electricity with roughly 62 percent of the waste being used for resource recovery (the rest is either landfilled in the few remaining landfills or disposed of out of state) (CTDEP, 1999a).

2.4 Organization of the Two Waste Coalitions in Connecticut

As mentioned previously, CRRA and BRRFOC are independent organizations. The boards of directors for both organizations are appointed by various state officials. The CRRA board is made up of thirteen full members and eight ad-hoc members. The governor appoints three members and the leadership in the general assembly appoints another eight. The Senate Pro Tempore, Senate Minority Leader, Speaker of the House, and House Minority Leader each appoints two members to the board. One of the board members appointed by the legislative leadership must be a municipal official. The last two members are the state treasurer and the secretary of the Office of Policy and Budget, a position appointed by the Governor. The Governor also selects the Chairman of the Board (CRRA, 2003).

It is obvious who has the most influence on the composition of the board of directors and, by extension, the most power on these bodies. The Governor appoints half of the members of the board of directors, while the other positions are divided among various legislative leaders. Even with this lopsided power structure, it does allow all parties involved to direct how the organization will develop its waste policy. The municipalities have a voice in CRRA policy making because they have two municipal members appointed from each of the CRRA projects (CRRA, 2003). The state authorities involved can also drive state policy in waste management.

Towns are not required to join CRRA, but many have decided that this is the best way to deal with their local waste needs. The four projects that are controlled by CRRA are the Hartford Mid-Connecticut Project, the Bridgeport Project, the Southeast Project, and the Wallingford project. The Hartford Mid-Connecticut project is by far the largest

facility and handles 880,000 tons of waste each year and serves a total population of more than one million people. The plant receives waste from 70 towns. The smallest incinerator in the state is in Wallingford and only five towns send their MSW to this site (CRRA, 2003). All of the participating towns sign agreements for five years (or in some cases longer) guaranteeing that they will deliver a minimum amount of waste. If a town does not fulfill its minimum requirement, it still needs to pay for its undelivered commitment. This arrangement promotes a type of voluntary flow control by the towns to the various RRF facilities. The facility is then ensured a stable income from these contract towns. Each RFF reserves a small amount of its daily capacity for the spot market. Towns looking for the lowest cost waste facility will buy space from the facility for the waste they need to dispose of with no long-term cost. For example, at the Lisbon facility 200 tons per day is reserved for the spot market (CTDEP, 1999a).[23]

In contrast to CRRA, the BRRFOC has a different selection process for the board of directors, but similar criteria concerning its member towns. Instead of being run by the state government, this organization is completely controlled by its member towns. Most of the sixteen participating localities have two members on the board of directors. The first board member of a town is the town manager, mayor, first selectman, or other top local official. The second appointed member of the board is either the public works director or some town equivalent to that position. Bristol and New Britain have three members on the board. Three of the smaller towns (Hartland, Southington, and Warren) have only one member. There is a small permanent staff made up of an executive and assistant director, waste analysis, administrative secretary, and a bookkeeper (BRRFOC, 2002).

The agreements these towns sign are similar in nature to the CRRA system of shipping a minimum amount of waste to the facility. The only difference between the two arrangements is that CRRA is controlled for the most part by the state and the member towns govern BRRFOC.

2.5 Resource Recovery Facilities

There are six facilities in Connecticut for managing MSW. They are located in Bridgeport, Bristol (BRRFOC-facility), Hartford (Mid-Connecticut Facility), Lisbon, Preston (Southeast Project), and Wallingford. The Hartford, Bridgeport, and Bristol facilities were built in 1988 and the other three plants were constructed in 1989 (Wallingford), 1992 (Preston), and 1995 (Lisbon). As discussed above, the Windham facility was shut down in 1994 and is no longer used. All MSW incinerators were closed by 1995 and none are in use today. All RRF facilities are now WTE plants (CTDEP, 1999a).

Most of these facilities use mass burn for waste combustion and do not sort the waste before it is burned. However, metal is retrieved after the combustion process. The only exception to this is the Hartford Refuse-Derived fuel facility (RDF) (also called the Mid-Connecticut Facility). This plant sorts out non-combustible and recyclable material before combustion and the leftover MSW is pulverized and mixed with coal to produce electricity. The heat the plants produce generates between 10 to 70 megawatts depending on the size of the facilities. The largest producers of electricity are the Hartford and Bridgeport plants (CTDEP, 1999a).

The various installations also vary in size. The Bridgeport WTE plant is the largest with 2,250 TPD, closely followed by the Hartford facility with a 2,000 TPD capacity. Preston and Bristol have, respectively, 600 and 650 TPD capacities, with Lisbon and Wallingford having 500 and 420 TPD processing ability (CTDEP, 1999a).

As of October 2002, these six facilities averaged 90.56 percent of their capacity used for the year (CTDEP, 1999a). This means they were almost always running at full capacity. The previous year they were operating at about the same volume. The two facilities that fell below the average were Bridgeport and Bristol, which were both in the 80 percent range when all the others were in the 90 percent range (CTDEP, 1999a).

Table 2.2 Connecticut's Resource Recovery Facilities Part 1

Connecticut RRF	Bridgeport	Bristol	Hartford (Mid-CT)
Organization	CRRA	BRRFOC	CRRA
Permittee	Bridgeport Resco L.P.	Odgen Martin Systems of Bristol	CRRA
Start Of Operation	Jul-88	May-88	Sep-96
System Type	Mass burn	Mass burn	RDF + Coal
Tipping Fee (Per Ton)	$69	$61	$57
Tons Per Day (TDY)	2250	650	2027
Tons Per Year (TDY)	663137	201663	765000
5 year Avg. Quantity Burn	7596000	188000	180600
Ash Residue in Tons a year 1999	187389	39169	53417
% Ash Generated in 1998	25%	22%	30%
Electrical Generation (MW)	60	16.3	68.5
Special Waste Plan	Y	Y	N

Source: Data from the Connecticut Department of Environmental Protection

Table 2.3 Connecticut's Resource Recovery Facilities Part 2

Connecticut RRF	Wallingford	Preston (Southern Project)	Lisbon
Organization	CRRA	CRRA	Private
Permit	CRRA& Convanta Projects	American Ref-Fuel of S-E Connecticut	Wheelabator Lisbon Inc. (WEI)
Start Of Operation	Temporary 10/87	Temporary 12/91	Temporary 12/88
System Type	Mass burn	Mass burn	Mass burn
Tipping Fee (Per Ton)	$55	$57	N/D
Tons Per Day (TDY)	420	689	500
Tons Per Year (TDY)	125216	179580	155125
5 year Avg. Quantity Burn	676200	248300	140400
Ash Residue in Tons a year 1999	157587	69545	40519
% Ash Generated in 1998	23%	28%	27%
Electrical Generation (MW)	10	14.5	15
Special Waste Plan	Y	Y	Y

Source: Data from the Connecticut Department of Environmental Protection

Tipping fees at the CRRA faculties were $55-$70 per ton during this period. The highest priced facility was Bridgeport at $69 per ton. Only four years earlier, this facility was charging $89 per ton.[24] The other RRF plants were mainly charging between $55-$57 per ton (CRRA, 2003). This may change in the future due to the recent bankruptcy of Enron. Connecticut Resource Recovery Authority lost millions of dollars in the financial fiasco and may have to pass the cost along to the towns (Jackson, 2001).

To understand the various facilities and the details of their locations, an observation of each facility was conducted. They are all generally situated in industrial areas or hidden behind buffer zones of about one-half mile. Each of the plants is located near major roadways and waterways (in some cases they were adjacent to rivers). Each facility is unique in the method it employed to mask itself from the surrounding community.

2.5.1 Hartford RRF

Hartford RRF: March 2004, Photo by Michael Bilheimer

First, the Hartford facility is located next to I-91, the Connecticut River, and Charter Oak Landing.[25] I-91 and Charter Oak Landing run just north of the plant, and the Connecticut River borders it to the east. The interstate highway serves as a buffer zone between the residential/park section and the industrial area. The facility is mostly surrounded by industrial activities, warehouses, and businesses. Yet, on the opposite side of the highway a small apartment complex is less than one-half mile away. This complex is only one of a handful of buildings in a mostly industrial area. It bordered a major park with a football field, a boat launch, and other playing fields.

2.5.2 Bristol RRF

Bristol RRF: March 2004, Photo by Michael Bilheimer

Second, the Bristol facility is located in an industrial park adjacent to State Highway 229. Most of the industrial park is comprised of businesses and warehouses. There is also a hotel situated close to the entrance of the facility. The RRF plant is on the edge of this industrial park. There is a wooded area surrounding it, as well as what seems to be a capped landfill next to the facility. Outside the industrial park, State Highway 229 is lined with houses and businesses. The observation of this plant noticed more homes on this road. These homes are less than one mile from the facility.

2.5.3 Lisbon RRF

Lisbon RRF: March 2004, Photo by Michael Bilheimer

Third, the Lisbon facility is also well hidden from the road. Woodlands surround the site and it appears that the area may have been a small quarry at one time. There is a boat launch coming into the facility, a feature that suggests this area is also used for light recreation. The facility is located near I-395. The Shetucket River runs between I-395 and the waste facility. The road approaching the facility has a few houses situated on sizable lots and the density was very low. About a mile down the road is the center of Taftsville. This is a small subsection of a community that was once a factory town. This appears to have been the case due to the winding streets and the large warehouse located on the river. It is directly south of the RRF.

2.5.4 Preston RRF

Preston RRF: March 2004, Photo by Michael Bilheimer

Fourth, the Preston RRF is not far from the Lisbon plant. It is also located on a river and a major highway. Unlike the other facilities, it lacked a large buffer zone and was not located in an industrial area. Directly across the street was a residential area and next to the facility there is a small convenience store and other shops. The main highway is less than a half-mile up the road. The only thing shielding the facility was a dense wooded area separating it from the main road; the access road to the facility is curved to hide it from the convenience store. Even with a smaller buffer zone, the only object visible from the road is the large smoke stack. Also notable is that the Mohegan Sun Casino is less than seven miles from the facility and can be seen from the entrance of the highway. The casino is expected to create more development in the area by bringing

people in to gamble. The casino has already begun to contribute to this effect in other nearby towns.

2.5.5 Wallingford RRF

Wallingford RRF: March 2004, Photo by Michael Bilheimer

Fifth, the Wallingford facility is located off of Route 5, a four-lane road. This plant is situated in an industrial park that boarders a dense residential area. There is also a power plant less than a mile from the RRF. Route 5 mainly has commercial businesses situated on it; however, behind it is another densely populated residential area. To the north and east of the RRF there are densely populated residential areas. To the west and south are more industrial buildings with open fields extending beyond. The town itself is an older community with narrow streets and older houses.

2.5.6 Bridgeport RRF

Bridgeport RRF: March 2004, Photo by Michael Bilheimer

Finally, the area in which the Bridgeport facility is located is remarkable since it is much grittier than the districts surrounding the other facilities. It is situated directly off I-95 in an old industrial area and the adjoining roads are generally filled with parked trucks. The waste facility was more modern than most of the other buildings around it and the observation witnessed a heavier volume of traffic at this facility than at other plants. The highway and other industrial buildings extend to the east and north of the facility. To the south is Long Island Sound and Captains Cove. To the east of the facility is something that was not observed at any of the other facilities–an apartment complex less than 100 yards away. The only thing separating facilities from this residential area was a road and a small playground. Most of the residents of the apartment complex

appeared to be low income and members of minority groups. At the time I visited, the local school was also letting out and I noticed that there was a large number of children disembarking from the bus. The apartment complex was of a newer design and could not have been more than ten years old.

2.6 Summary of Connecticut's RRF Facilities

Connecticut's RRF plants combust 62 percent of the state's MSW. New York State, which has a larger combustion capacity than Connecticut, only disposes of 30 percent of its MSW in WTE facilities. Massachusetts also burns less of its MSW in WTE facilities than Connecticut. However, both New York and Massachusetts have higher recycling rates than Connecticut. This could be because more waste material is required to be recycled than in Connecticut and these states may be doing a more effective job at encouraging public recycling, or their calculation methods may differ. Either way, Connecticut has decided to use combustion for it waste disposal needs.

Connecticut's WTE capacity is currently equal to its total waste generation. However, assuming the size of the state's waste flow increases in the future, new capacity will be needed. At the same time, the likelihood that a new facility will be built during the next ten years is slim. The most probable outcome is that the Lisbon plant will be expanded because it has sufficient space for three units, but only two have thus far been installed.

Because of its historic commitment to managing MSW on an in-state basis, Connecticut's municipalities will likely rely more heavily on RRFs to accommodate the expanding waste stream that is expected to occur as the state's population increases and

as per capita waste generation grows. Unless recycling improves beyond the current rate of 24 percent, it will be difficult to avoid new combustion capacity. If combustion capacity does increase, the state will have to find new monofills to dispose of the ash produced from these RRFs or it will have to consider recycling the ash which it currently does not due because of leaching concerns.[26] The only other option for the state would be the export of its waste to other states.

CHAPTER 3

CONNECTICUT'S RESOURCE RECOVERY FACILITIES

3.1 Connecticut's Resource Recovery Facilities Introduction

Resource recovery facilities can be both a burden and a benefit to a community. They can increase employment, expand the customer base to nearby stores, and bring in extra taxes for a community. These facilities can also impose burdens on a community. As previously stated, these facilities can increase local pollution, intensify traffic, create toxic ash, and potentially produce odors if the facility is not operating properly.

Given this study's concern with environmental justice it is only natural to ask the question what are the characteristics of the communities in Connecticut that have received RRFs? The six RRFs in Connecticut are located generally in the areas of the state that have over the years experienced the most growth, namely the middle valley of the state and its coastline. All of these MSW RRFs were built in the late 1980s and early to mid-1990s. To determine if a particular subset of the population has been unfairly targeted this study will examine the demographics structure of the area around these facilities.

The demographics that the study has chosen to examine are the percentage of minority groups in these communities (African-American and Hispanic), the percentage of residents renting property in the area, and the respective towns' median household income levels from both 1990 and 2000. This data is assembled into a geographic information system (GIS) program to assess the socio-demographic characteristics of the residents that live in the area surrounding each of the facilities. The study looks at both a

one and three mile radius around each plant as it is within this distance that residents should be most affected by the emissions from the facilities and the vehicular traffic that they generate. The census tract data used in the study lacks the median household income for each tract. However, the town data in these categories will provide a good idea of the economic status of these areas close to the various facilities.

3.2 GIS Metadata

The data was obtained from the U.S. Census and the Connecticut Department of Environmental Protection (CTDEP). State, town, and road layers are from the CTDEP.[27] Layers for census tracts for both 1990 and 2000 were obtained from the U.S. Census website. Also, all tables for median household income, race, and renters were attained from the U.S. Census data sets. [28]

3.3 State Data

In 2000, Connecticut had 3,405,565 people residing in the state. This was an increase of 120,000 people from the 1990 Census, or a growth rate of 3.6 percent (Comptrollers Report, 2001). Of the 3.4 million people, only 9.1 percent of them are African-American and 9.4 percent are Hispanic (as of 2000). Hispanics are by far the fastest growing population with an increase of 31 percent between the 1990 census and the 2000 census. African-Americans experienced a 9.5 percent increase during this time period (Comptrollers Report 2001). The state's Caucasian population decreased by 2.2 percent from 1990 to 1999. However, in the 2000 census this demographic group still accounted for 81.6 percent of Connecticut's population.

Compared to the national average in 2000 Connecticut had a higher percentage of Caucasians living in the state than the national average (75.1 percent) and a lower percentage of minorities than the national average in all racial categories. For example, the national average for African-Americans is 12.3 percent and 12.5 percent for Hispanics compared with Connecticut's 9.1 percent for African-Americans and 9.4 percent for Hispanics. This indicates that Connecticut is growing in diversity, but would be hard pressed to be called a mixed or pluralistic state in racial terms.

3.4 Minority Dispersal In Connecticut

Now the question is how these populations are dispersed through out the state. Figures 4.1 and 4.2 show the geographic movement of Connecticut's African-American population between 1990 to 2000. There were some minor shifts among this demographic group, but no major changes. As the pattern shows, African-Americans tend to concentrate in the center of the state and in its southeastern and southwestern corner. The RRF facilities also tend to be distributed in a similar fashion. The two largest facilities, the one in Hartford and the one in Bridgeport, are located in areas of the state where there are large populations of African-Americans.

The other RRF facilities are located in areas where the African-American population is below the state mean, but nonetheless they are located in towns that have the largest proportion of African-Americans in Connecticut. The areas with virtually no African-American presence did not host MSW RRFs.

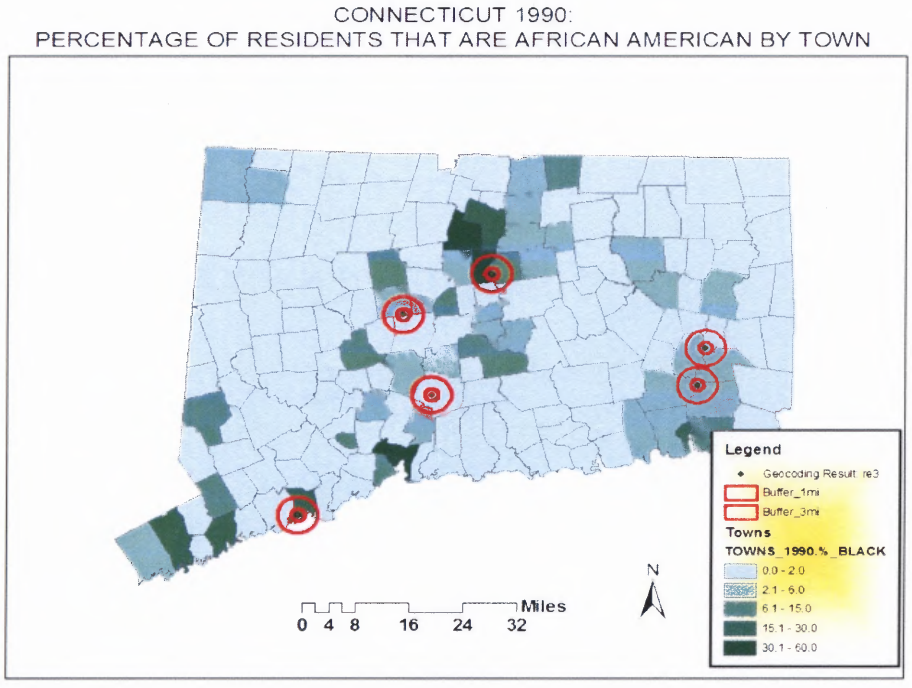

Figure 3.1. 1990 Percentage of residents in Connecticut that are African-American.

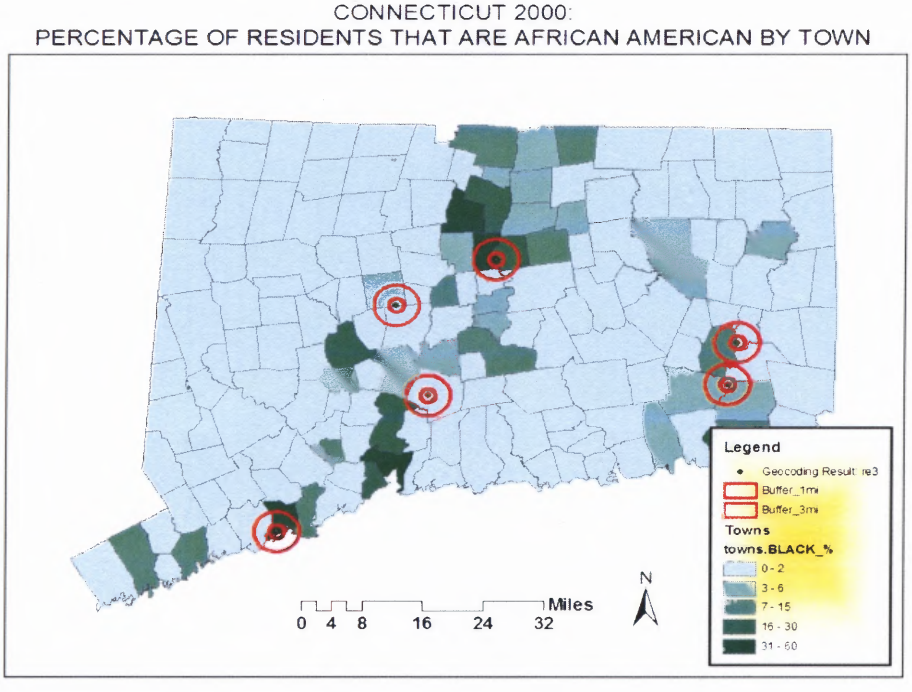

Figure 3.2 2000 Percentage of residents in Connecticut that are African-American.

Connecticut's Hispanic population evinced similar patterns during the 1990s, but it is more extensively distributed among the various towns by the 2000 Census. This segment of the population is one of the fastest growing with an increase of 30 percent during this timeframe. In the overall population, Hispanics have grown from 6.4 percent of the statewide total to 9.4 percent in only ten years. This growth in the Hispanic population is especially notable in comparison to the changes experienced by the African-American population.

In Figures 3.3 and 3.4 the changes that have taken place within the Hispanic population is displayed (which are quite similar to the pattern for African-Americans). Large Hispanic enclaves are largely coterminous with the location of the RRFs. The two largest RRFs are located in towns with the largest Hispanic populations.

Comparing these two racial categories, it seems that even though these facilities were sited in communities with sizeable minority populations, African-Americans have continued to live near these facilities, while Hispanics have dispersed from these areas. Nonetheless, the towns that historically had large percentages of Hispanics still have large populations of this demographic group. The change in the data can then be attributed to new residents moving into state. It may be the case that Hispanics that move into Connecticut do not wish to live in these communities and have the means to relocate to other places. At the same time, new Hispanic residents may replace those individuals that have moved away from communities that host the RFFs.

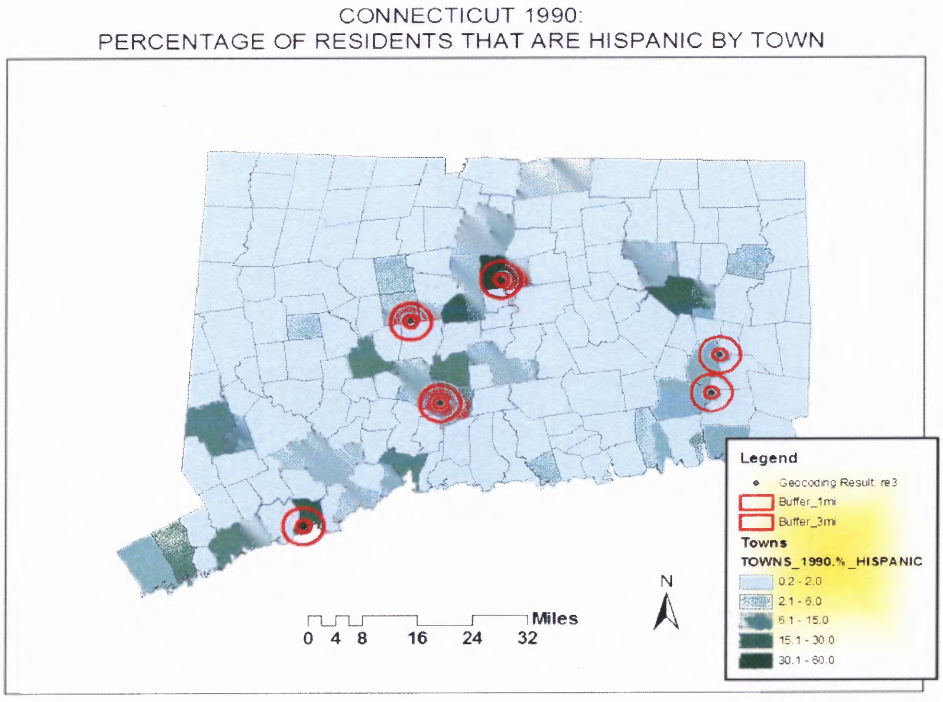

Figure 3.3 1990 Percentage of residents in Connecticut that are Hispanics.

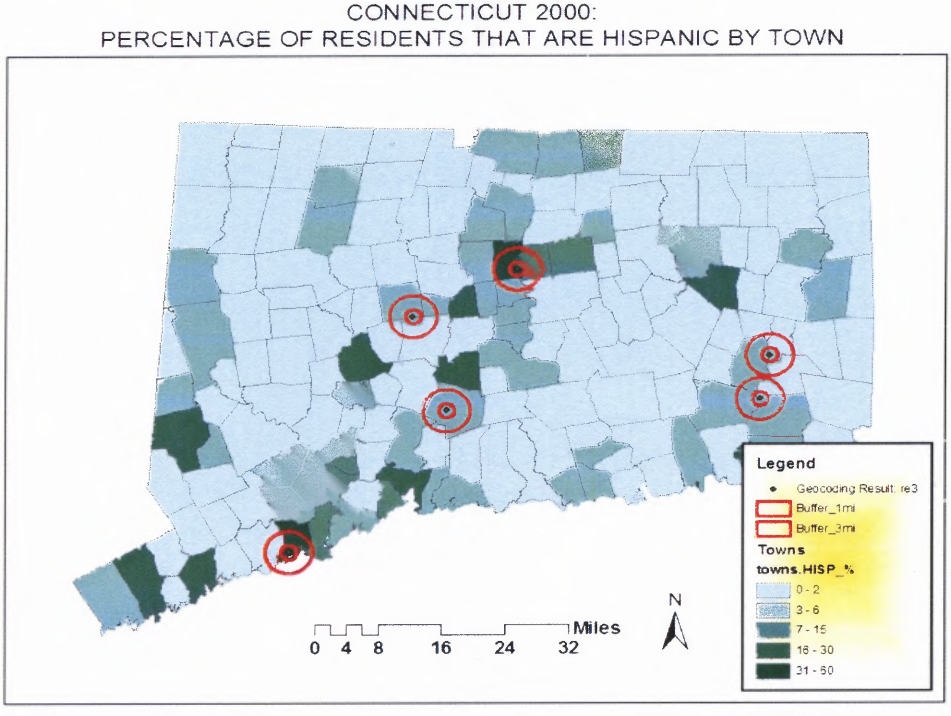

Figure 3.4. 2000 Percentage of residents in Connecticut that are Hispanics.

Currently, the racial mix in general in Connecticut has been adjusting and changing. The Hispanic population increased in all towns except Lisbon and Preston. These two towns evinced decreases of 30 to 45 percent. However, in the overall population of these towns the Hispanic population comprised only 0.7 percent (in Lisbon) and 1.8 percent (in Preston) in 1990. Accordingly, the out-migration of a few individuals greatly affected the Hispanic population in these two towns. The communities with the largest Hispanic influx were Wallingford and Bristol. Wallingford had a 47 percent increase, but this is misleading since Hispanics accounted for only 4.5 percent of the total population in 2000. Bristol had a 91 percent increase in its Hispanic population, but like Wallingford it only went from 2.7 percent to 5.3 percent of the total population of the town. Hartford had a more significant rise even though the Hispanic population only grew by 11 percent. In the total population, Hispanics went from 31 percent to 40.5 percent. There is a similar trend in Bridgeport with the Hispanic increasing from 26.5 percent in 1990 to 32 percent in 2000.

In summary, even though Hispanics are moving into some towns, they still comprise a minority of the population in these communities. Hartford and Bridgeport, where the two largest RRFs are located, are increasing rapidly in their Hispanic population.

The African-American population in the state is more stable. Both Lisbon and Preston both had large drops in this demographic group, but African-Americans made up a small percentage of the total populations in both towns. Even Hartford had a slight decrease in its African-American population. Hartford went from 38.9 percent to 38.1 percent. The towns that did have increases in this racial category were Bridgeport and

Bristol. Bristol only had a slight gain with African-Americans accounting for 2.7 percent, up from 2.1 percent of the total population. Bridgeport had another slight gain, increasing from 26.6 percent to 30.8 percent of the total population. Wallingford showed a slight gain in the number of African-Americans, but this increase did not affect the total population with African-Americans only accounting for 1 percent of the total population for both years.

These two groups are the two largest minority populations in the state and they are the ones with the largest potential to be adversely affected by a waste facility because of proximity. From an environmental justice standpoint, these groups evinced higher exposure when these facilities were first sited. From the maps it is obvious that the state's RFFs are in areas that have higher minority populations, but four of the six facilities have such a small percentage of minorities that it would be hard to justify race being the predominate factor in the siting decisions for these facilities. Again, the two largest facilities are in towns with the largest minority populations in the state.

With this information it seems unlikely that race is the most important factor in choosing the facilities' locations. Following an environmental justice definition these areas then must be communities that are of lower socio-economic status.

3.5 Wealth of Towns

This evaluation uses median household income from both the 1990 and 2000 census and compares the towns that host RRFs to examine if they are less affluent than the state average. In Connecticut, the median household income in 2000 is $53,935. The median household income is substantially above the national income level of $21,857. Also, as a

proportion of statewide population, Connecticut has fewer families that are below the federally-determined poverty level. The state's poverty level is 5.6 percent, which is less than the national average of 9.2 percent. This disparity can be deceiving since Connecticut has some extremely poor communities and some extremely wealthy communities that in combination create a misleading statistical profile.

The RRFs are located in some of the poorer communities in Connecticut. There is a trend in the data that indicates that these facilities were built in low income areas. The Bridgeport, Bristol, and Hartford plants came online in 1988, and the Wallingford facility began operating during the following year. The Preston facility was commissioned in 1992 and Lisbon started up in 1995. All of these facilities began operations very close to the census year. All but two of them are situated in communities that are under the median household income for the state. Hartford and Bridgeport community incomes were well below the state average as were Lisbon and Bristol. Only Preston and Wallingford were above the state level, but only slightly.

This means at the time of their siting that these were some of the poorest communities in the state. This also suggests that the state may have selected poorer communities to host these facilities. Another interesting fact is that the two largest facilities were placed in the two poorest towns in Connecticut.

By 2000, three of the towns remained under the median household income for the state. Only Lisbon was able to rise above the state level. This could indicate that the RRF was affecting property values negatively and was discouraging wealthier residents from moving in. Lisbon and Preston may be making gains in income level due to their locations within proximate distance of Connecticut's two Indian Casinos.

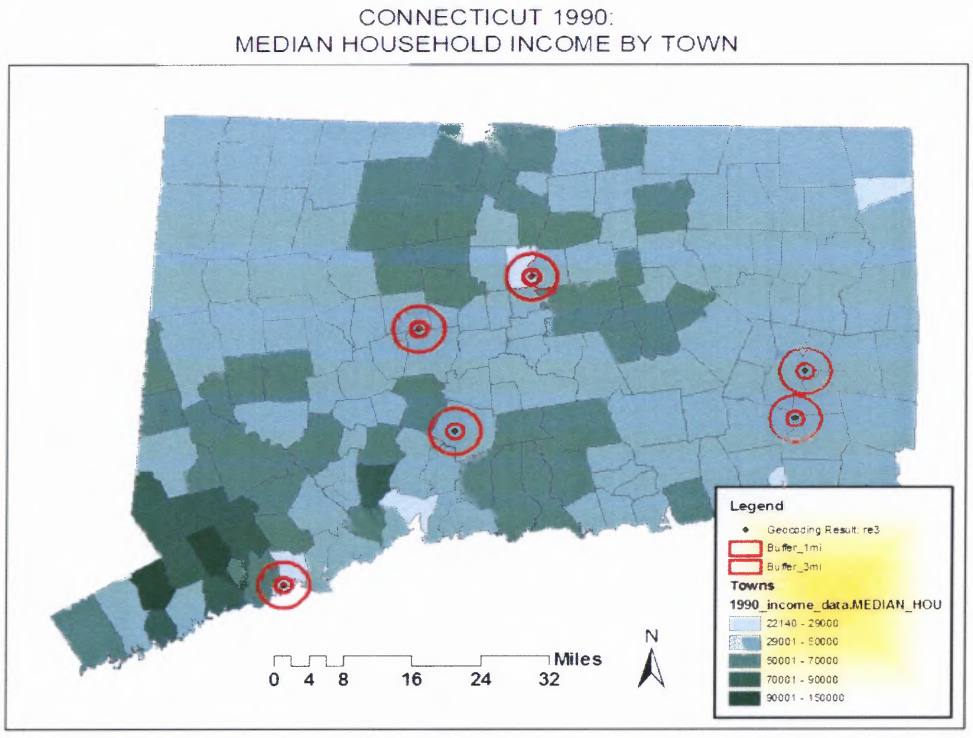

Figure 3.5 1990 Median household income.

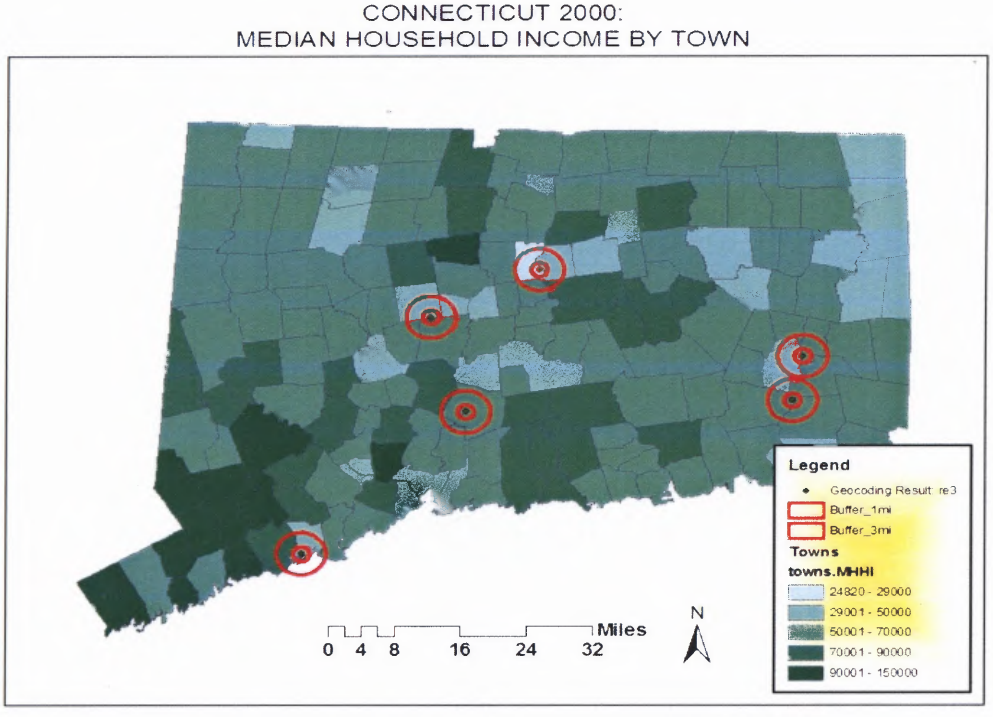

Figure 3.6 1990 Median household income.

3.6 Targeting Renting Residents

Previously, it was discussed that renting residents may be targeted to host hazardous facilities since they may be less inclined to oppose the siting of a LULU. At least in theory, renters have the potential to let a LULU go unopposed when it is being sited. Renting residents may take less active interest in community affairs, feel they do not have time to participate in local organizations, move frequently, lack information on the subject, or face more pressing issues. These factors may lead to a lack of public participation and a lack of opposition to these facilities.

In Connecticut, the rental population constituted 33 percent of the statewide population in 2000. This percentage of renters has not changed much from the 1990 data which indicate that the proportion of the state's population living in rental housing was 34 percent. The national average in 2000 was also 33 percent making Connecticut comparable with the rest of the nation.

The distribution of renters in Connecticut, however, is not uniform. Rather, there are clusters of renting towns and non-renting towns. This can be seen in Figures 4.7 and 4.8. These maps show towns that have dense populations with high proportions of the population living in rental housing. Again, the two largest RRFs are located in areas with more than 70 percent of the population renting living space. This is in contrast to the Lisbon and Preston facilities that boarder towns with higher rental rates, but the host town has a small rental population. The Wallingford and Bristol RRFs are in towns that reflect more closely the state average. Since the Preston and Lisbon RRFs are located in communities with rental populations that are close to the state average it could mean that

these facilities were placed on the boarder to deflect possible opposition from home owners in the community.

According to the 2000 Census, the only major increase of renters during the preceding decade is in Preston which experienced an increase in its renting population (refer to Figure 4.8). This can be an anomaly since Connecticut's Indian Casinos are within close proximity to these facilities. The casinos could have drawn in more people looking to rent apartments or houses rather than own homes. Hartford, on the other hand, had a slight rise in homeownership. This can be attributed to three reasons: the redevelopment efforts in Hartford, the low cost of homes, and low interest rates. First Hartford redevelopment has multiple projects including the redevelopment of Adriaen's Landing. This development is a combination of a convention center, hotels, retail, and residential units. Also brownfield redevelopments have also begun to revitalize the city. Houses within the city are inexpensive compared to the rest of the state. They range from $165,000-$185,000 (Home Ownership Opportunities, 2004). Finally, long and short term interest rates are some of the lowest since 1960 (Baum, 2004). These factors combined to have started the city on a path to revitalize its communities

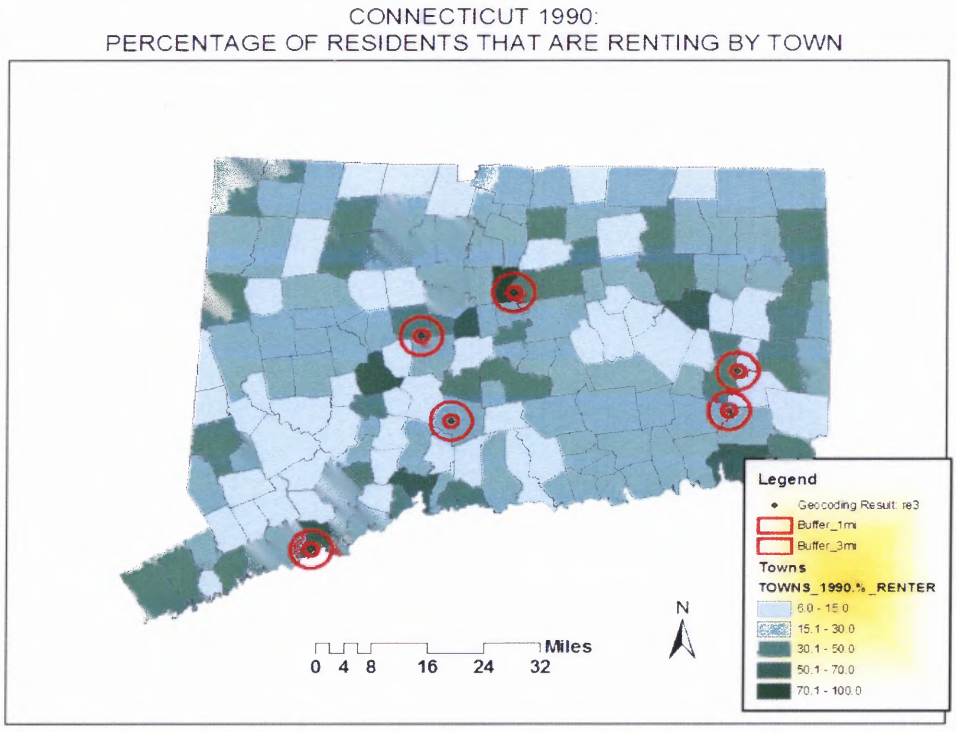

Figure 3.7 1990 Percentage of renting residents.

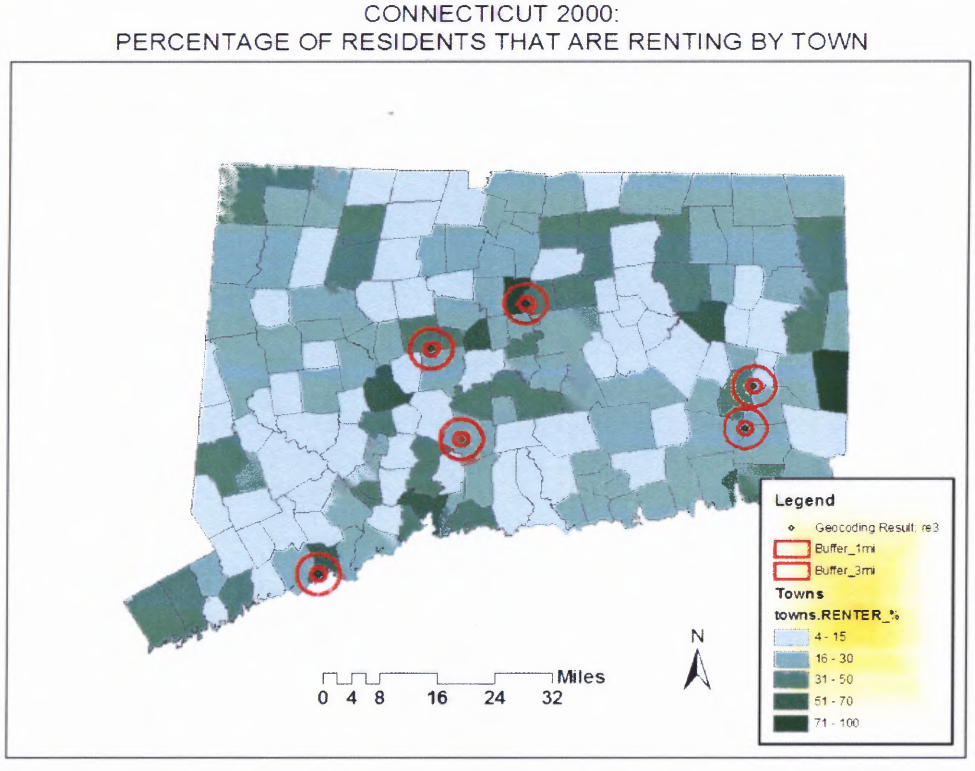

Figure 3.8 1990 Percentage of renting residents.

Other reasons for the siting of these faculties relate to the geographic configuration of the state's road transport system, namely that all of these facilities are located immediately off of major highways. This locational pattern enables haulers to deliver the trash to the RRFs without using smaller roads. Furthermore, these facilities receive waste from other states as well, and transport efficiency is essential to the successful operation of these facilities.

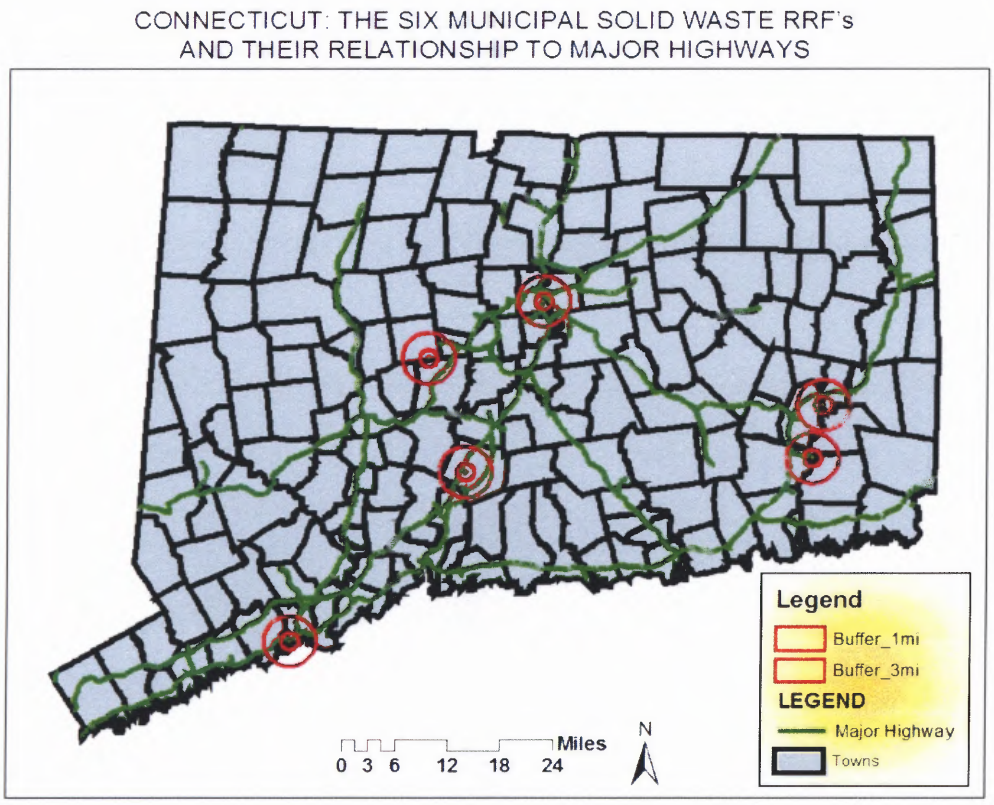

Figure 3.9 Major highways in Connecticut.

Another reason for this locational pattern is that the population centers produce most of the trash. Having these facilities close to the state's major cites cuts down on transportation cost.

As can be seen from the following figures, population in Connecticut follows a line along the shore and up the middle of the state. These corridors generally are aligned along the two main highways in the state, I-95 and I-91. Accordingly, most of the state's waste is generated along these routes. Figure 4.12 shows how the population has moved in the period between the 1990 and 2000 censuses. The blue coloring corresponds to areas that have experienced negative growth. The areas with negative growth are in the same towns as the RRF facilities. The one town that had positive growth during this period was Wallingford. The areas with the most growth were those that did not have RRF facilities. This trend can be attributed to several reasons. First, this outcome could be the result of people seeking a more country lifestyle or a means to get away from larger city environments. Second, this phenomenon could be caused by the towns becoming too crowded or lower taxes and better schools in other communities. Finally, people may also be seeking to get away from pollution and find a better environment in which to live.

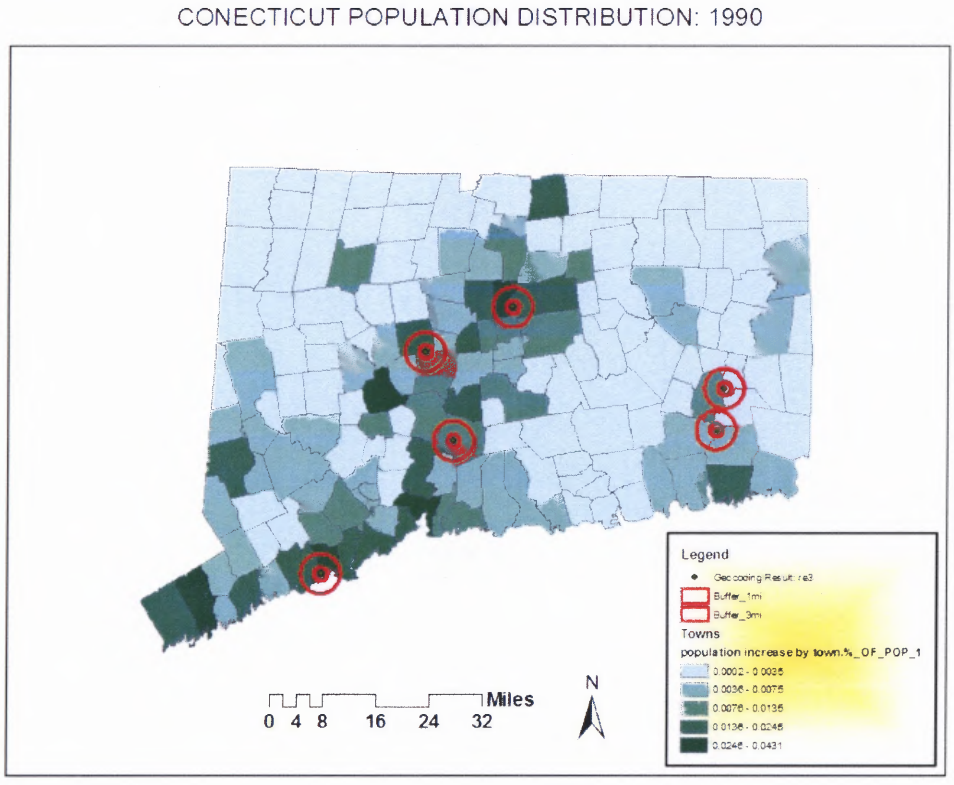

Figure 3.10 1990 Connecticut population distribution.

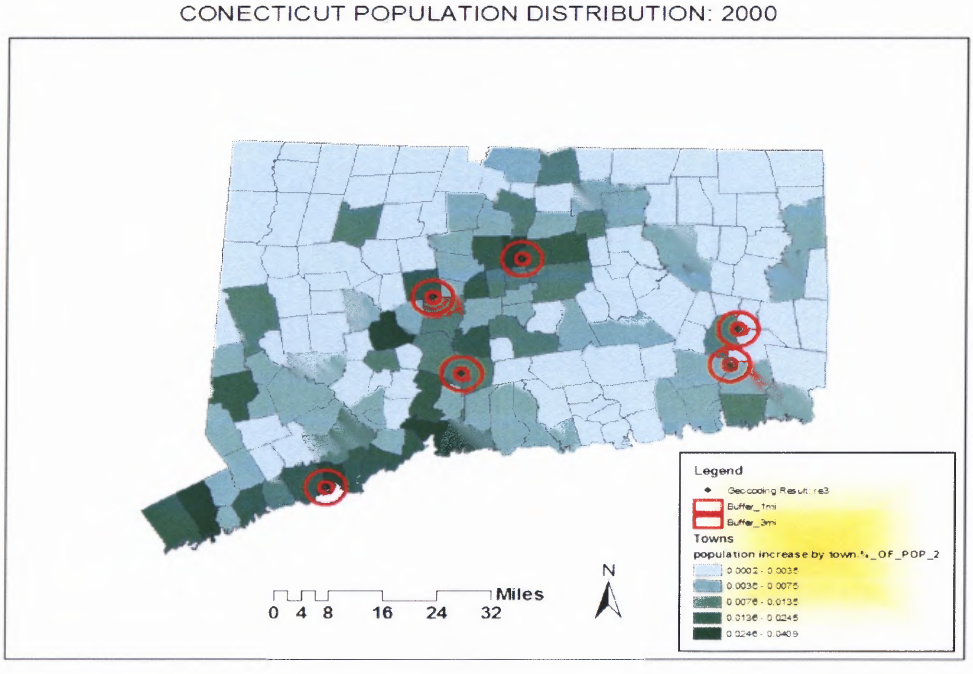

Figure 3.11 2000 Connecticut population distribution.

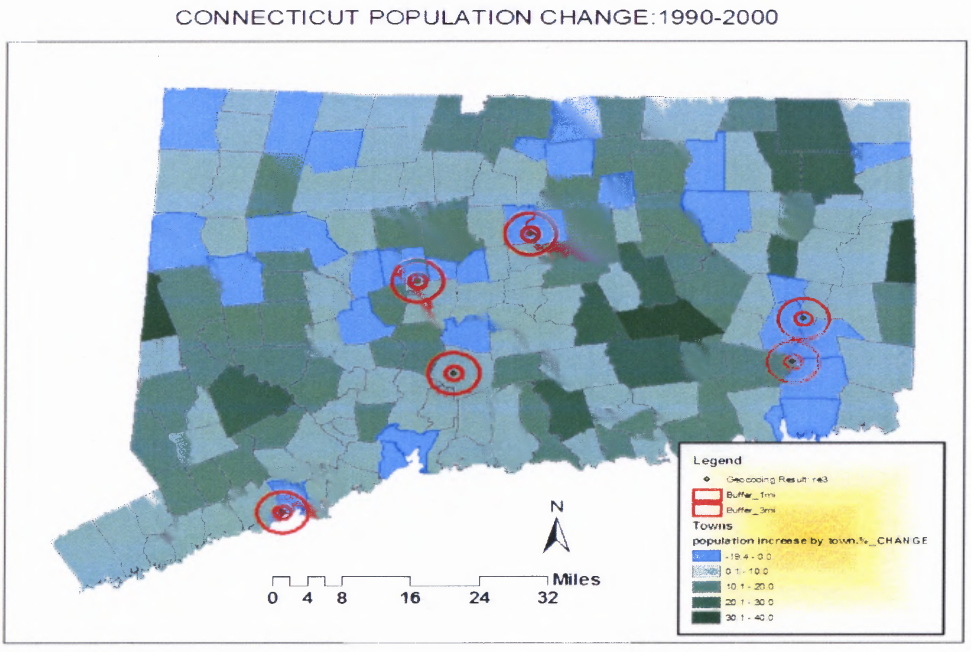

Figure 3.12 1990-2000 population change.

3.7 Populations Within Three Miles of the RRF

There are some common features of the towns that host Connecticut RRFs and the study looks at the census tracts that are within a three-mile radius of each of the facilities. Town data can be deceptive due to intra-jurisdictional segregation that leads to one section of the town being populated by a particular demographic group. This study provides a comparison between the town statistics and what is really happening near each of the RRF facilities.

3.7.1 Hartford Mid-Connecticut RRF

The Hartford facility is located in one of Connecticut's most impoverished towns. The average household income is $24,824 in contrast to a statewide average of $53,935. This amount is substantially less than Connecticut's average and slightly above the national median household income of $21,857. African-Americans make up 38 percent of the population and Hispanics make up 40 percent of the city's population. In Hartford, 75 percent of the residents rent their housing.

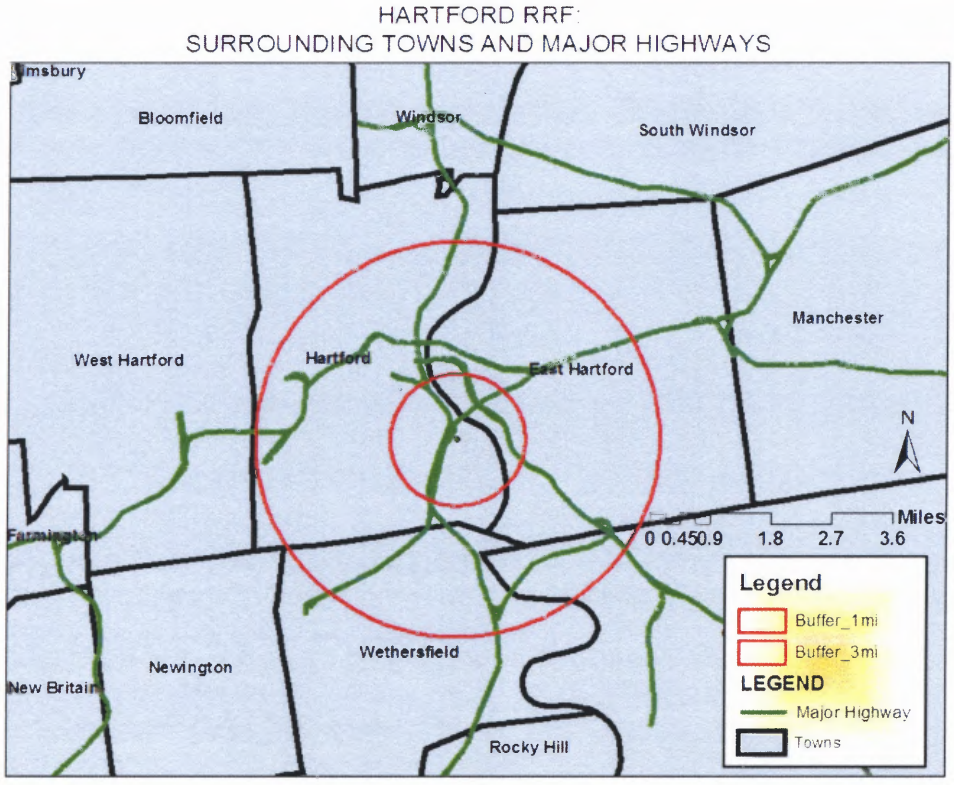

Figure 3.13 Major highways and boarding towns near the Hartford RRF.

The RRF facility in Hartford is located in the city's southeast corner and borders East Hartford. The following figures will give an idea of what the population is like within a three-mile radius of the facility. These maps provide a profile of the area in both 1990 and 2000. They also give an idea of how the area has changed since the construction of the facility.

There was a high concentration of African-American living in the northwest corner of the three-mile study area in both 1990 and 2000. The main change is that more African-Americans have moved into areas that previously had few or no African-Americans. Some of this migration is occurring in Hartford, but this trend is evident in every tract near the RRF in West Hartford. Interestingly, this pattern is not evident in towns south of the facility.

The Hispanic population experienced a different trend. Almost all of the areas that had a dense Hispanic population tended to decline in density by the 2000 Census. At the same time, those areas in 1990 that did not have large populations of Hispanics increased slightly. The Hispanic population had migrated to other tracts or had moved out of the area.

This migration is evident among the African-American and, to a larger extent, the Hispanic populations. However, both of these demographic groups continue to comprise a large proportion of the population still living near the facility.

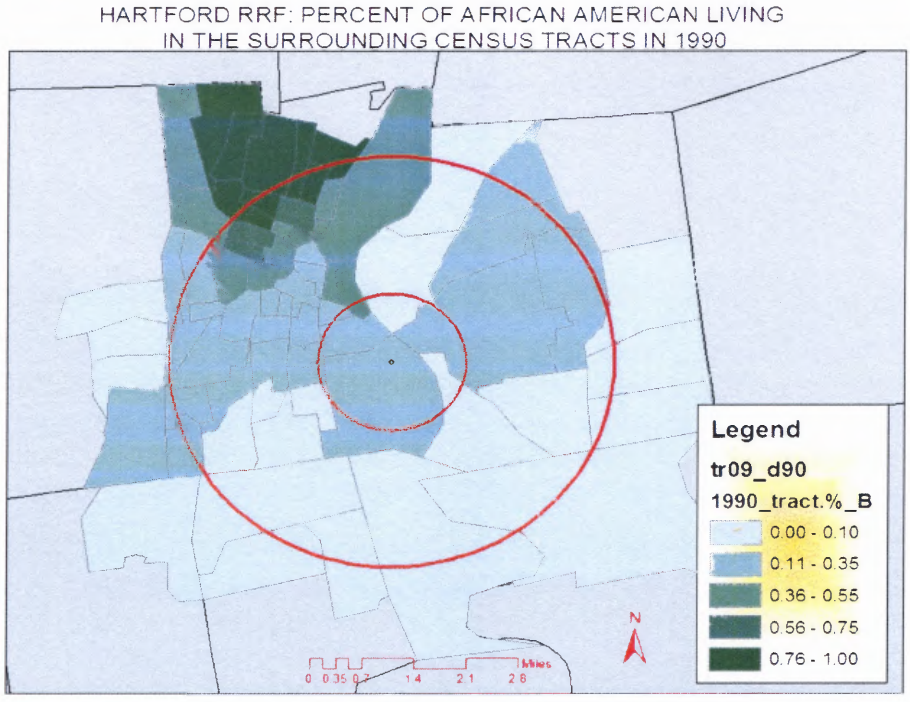

Figure 3.14 1990 Percent of African-Americans near the Hartford RRF.

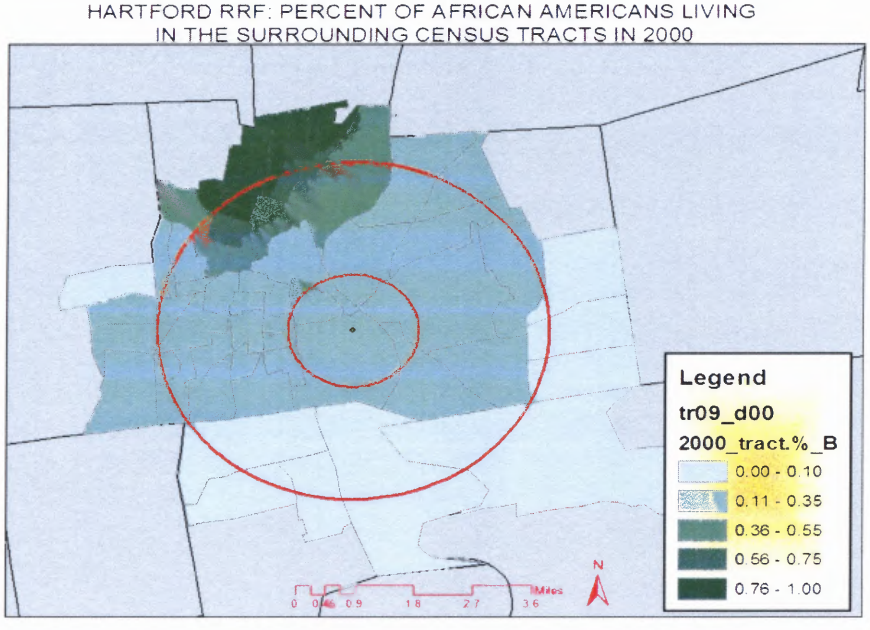

Figure 3.15 2000 Percent of African-Americans near the Hartford RRF.

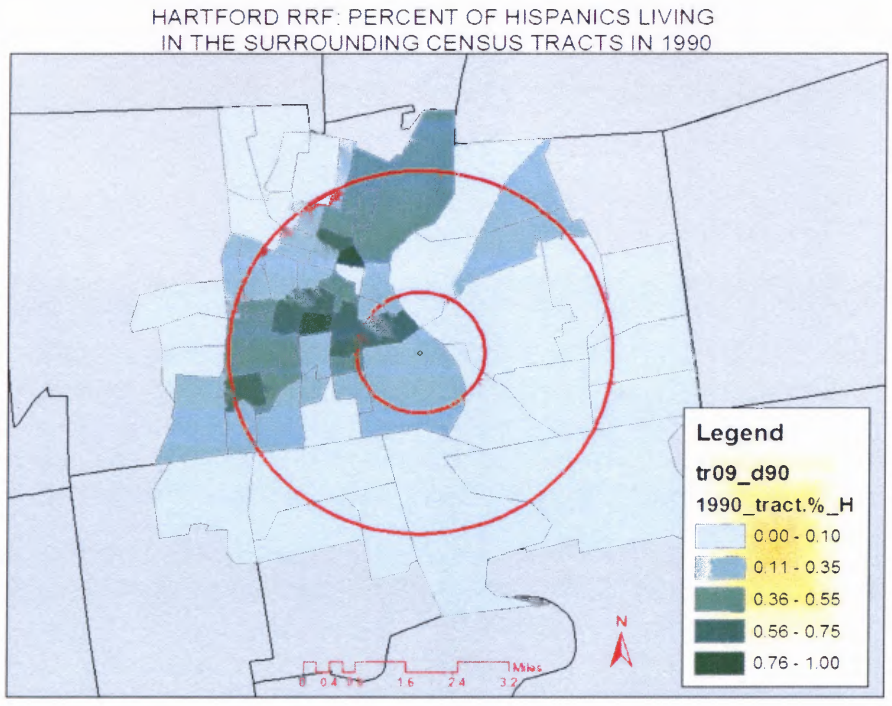

Figure 3.16 1990 Percent of Hispanics near the Hartford RRF.

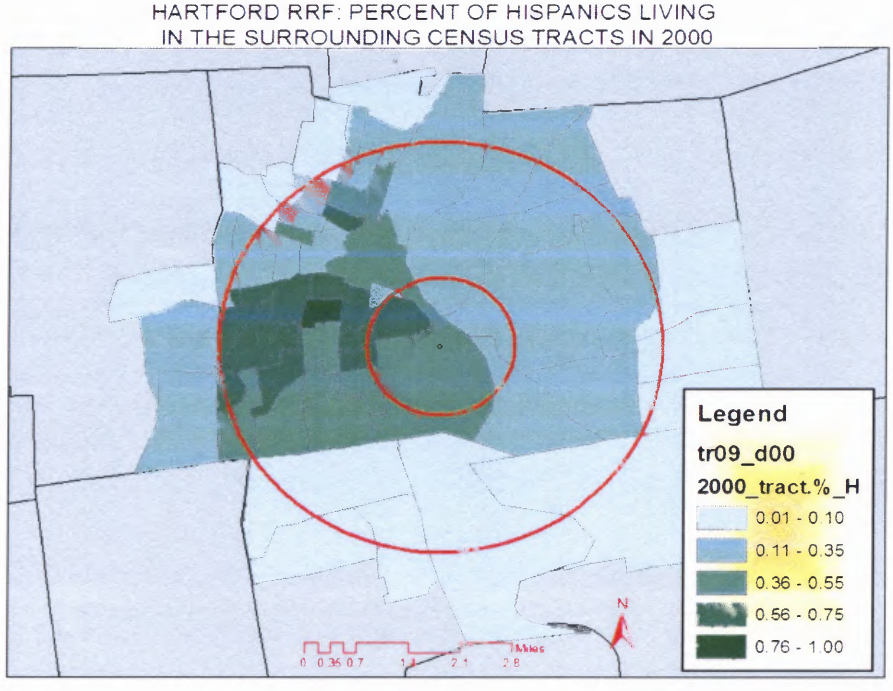

Figure 3.17 2000 Percent of Hispanics near the Hartford RRF.

Since the boundaries of the tracts used for the 1990 and 2000 censuses do not match, it may be the case that no shift has occurred and only the sample has changed. This could be true, but the tracts that did have the same boundaries evinced changes. Also, since Hartford is losing population, and the area around this facility is mostly industrial, there may have been a decline in the availability of rental apartments. This could be because warehouses or factories have been built to replace homes that were previously there. In other words, the population percentages remained unchanged, but the population density may have dropped.

Since data for income were not available, the study has used the population renting housing to determine if the siting of these facilities was motivated by income-based criteria. As can be seen, there was some growth in the rental population in Hartford, but mostly the rental population remained the same. This lack of change mirrors the stability in the level of homeownership at the state level. In Hartford, there was no increase in the proportion of the population renting homes. This was also an area where people rented homes before the RRF was sited. It may have been the case that when sitting the RRF planners looked for communities that were politically weak or had poorly developed community organizations, which is typical of rental communities.

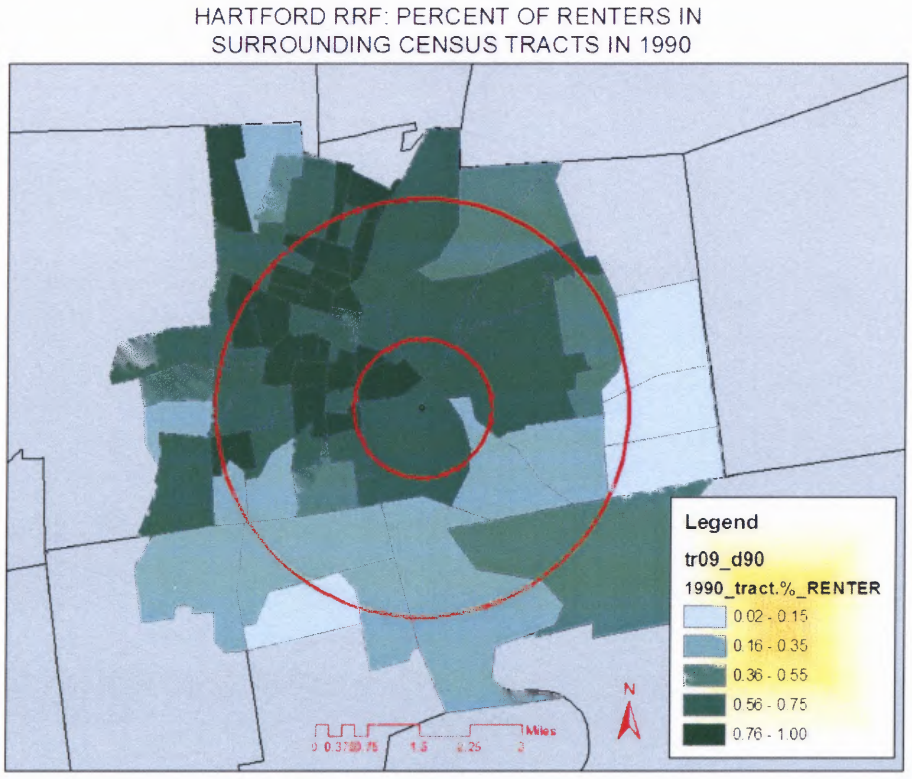

Figure 3.18 1990 Percent of renters near the Hartford RRF.

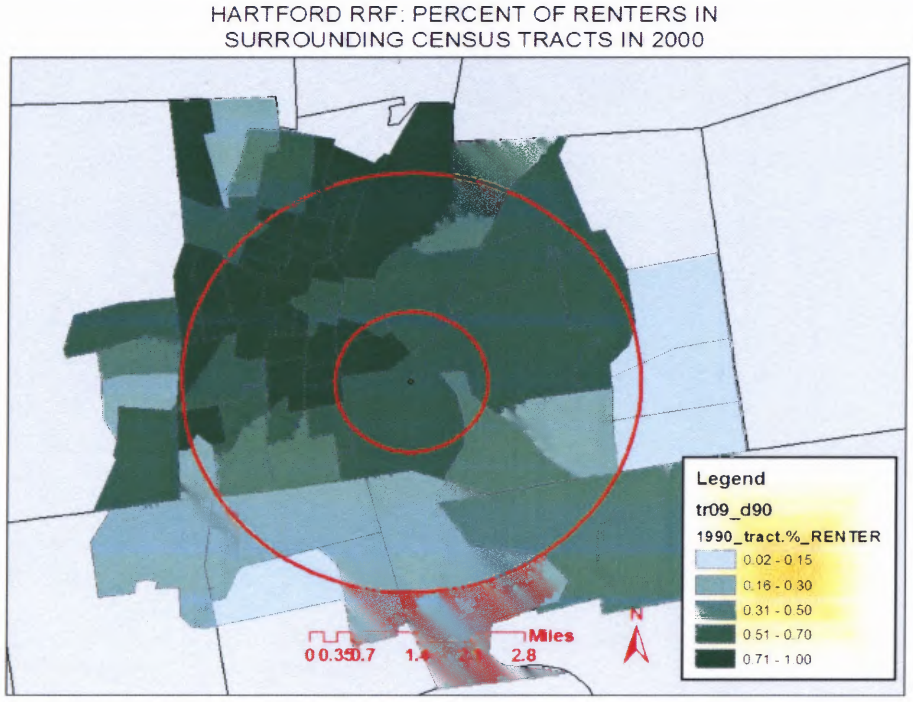

Figure 3.19 2000 Percent of renters near the Hartford RRF.

3.7.2 Bridgeport RRF

Bridgeport is similar to Hartford in all of the study's categories. This is a case of another large RRF located in a poor minority area with a large proportion of the population comprised of renters. Bridgeport is 31 percent African-American and 32 percent Hispanic in 2000. The average household income is $34,658. This amount is significantly below the state's median household income. The percentage of renters in the total city's population is also higher than the state average with 57 percent of Bridgeport's residents living in rental housing.

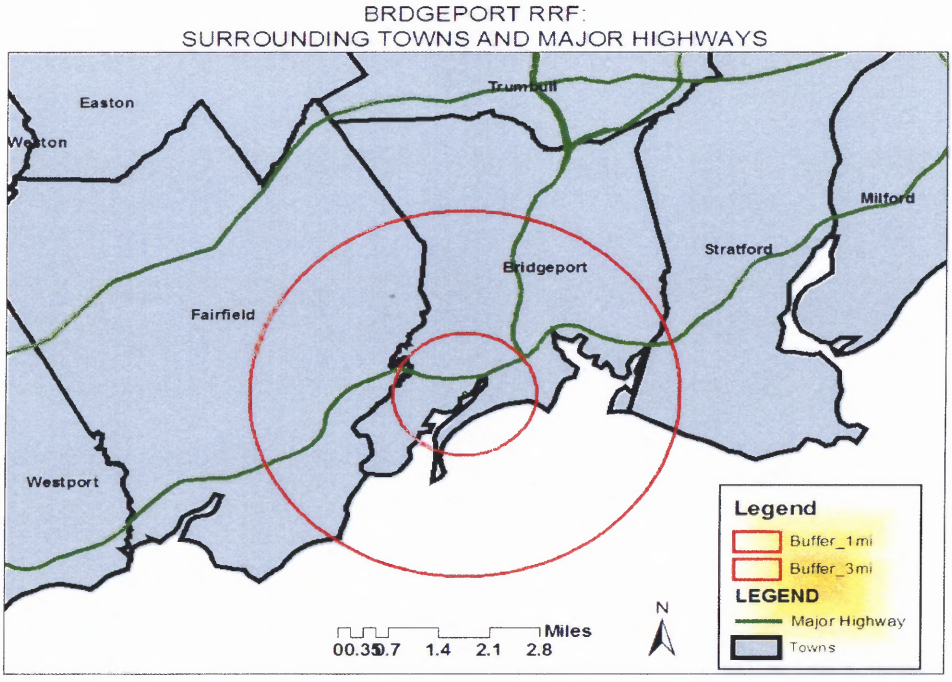

Figure 3.20 Major highways and boarding towns near the Bridgeport RRF.

In comparing the 1990 census data within a three-mile radius of the facility there was a decrease in the proportion of the population that is African-American. The most

sizable population of African-Americans was in the southeast corner of the study area. This area experienced a decline in its African-American population between 1990 and 2000. The Hispanic population in the study area was consistent from the 1990 census to the 2000 census. This part of the population resided mainly in the northeastern section of the study area. There was almost no change or shift in the population after the facility came online. It is possible to conclude that, if anything, the residents either accepted the RRF or, as appears to have been the case for the African-American population, evinced a small exodus from the area surrounding the facility.

Renting however increased within three miles of the facility. This outcome may be the result of devaluation of property and an inability to sell real estate within a short distance of the RFF. As stated previously, this area is characterized by the presence of warehouses and other industrial land uses, and this feature could have contributed to the number of renters in the area. Jobs would be close and the rent would be low, though these apparent advantages would be at the expense of residents' environmental quality.

This part of Connecticut has been a heavily developed area for some time due to its proximity to New York City and the major highways that travel through it. The facility itself is located close to I-95 and this puts it in an excellent location to receive waste from a high concentration of Connecticut's residents, as well as from New York City.

The concern, however, is that because this is a predominantly minority community and it has very low income levels that these considerations were critical in determining the placement of the facility. This facility is the largest processor of MSW by an RRF in the state. Its low income levels, sharply contrasting with higher income

levels in burdening towns, raises the specter of environmental injustice in the siting of this facility. The location of this RFF may also be due to opposition in other nearby towns that have wealthier and more organized residents that opposed it.

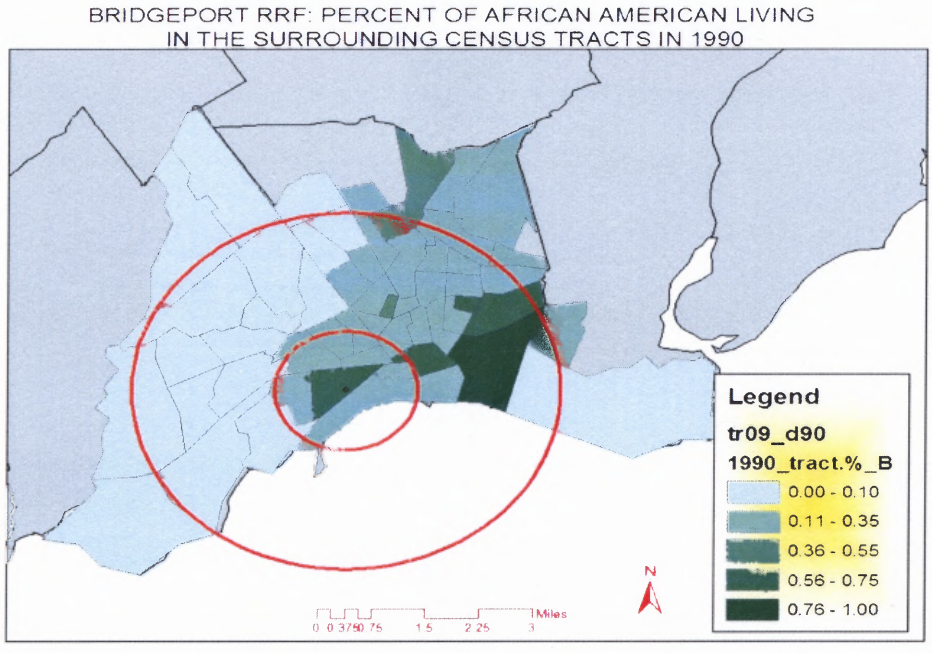

Figure 3.21 1990 Percent of African-Americans near the Bridgeport RRF.

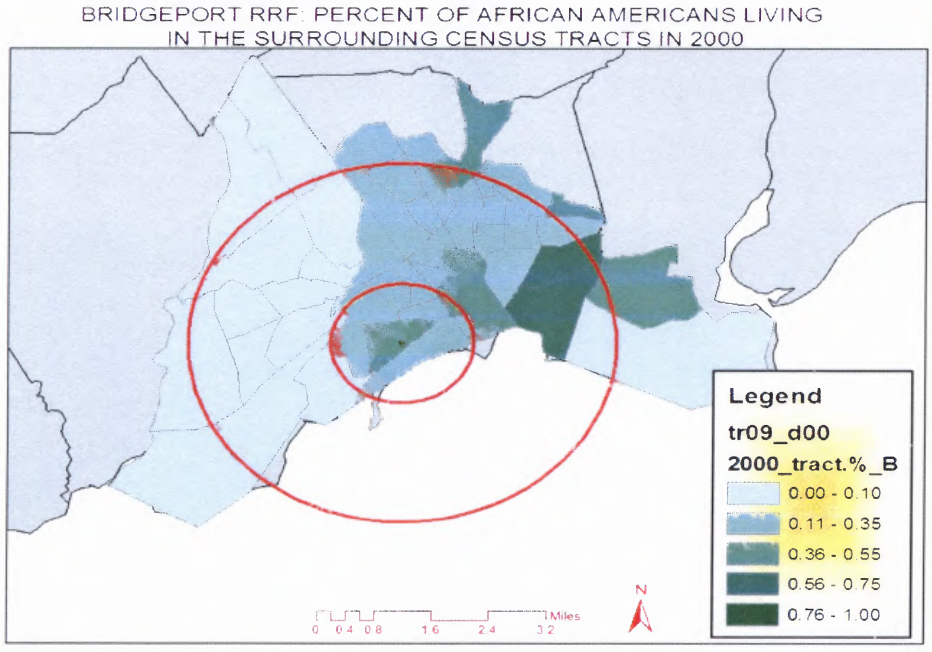

Figure 3.22 2000 Percent of African-Americans near the Bridgeport RRF.

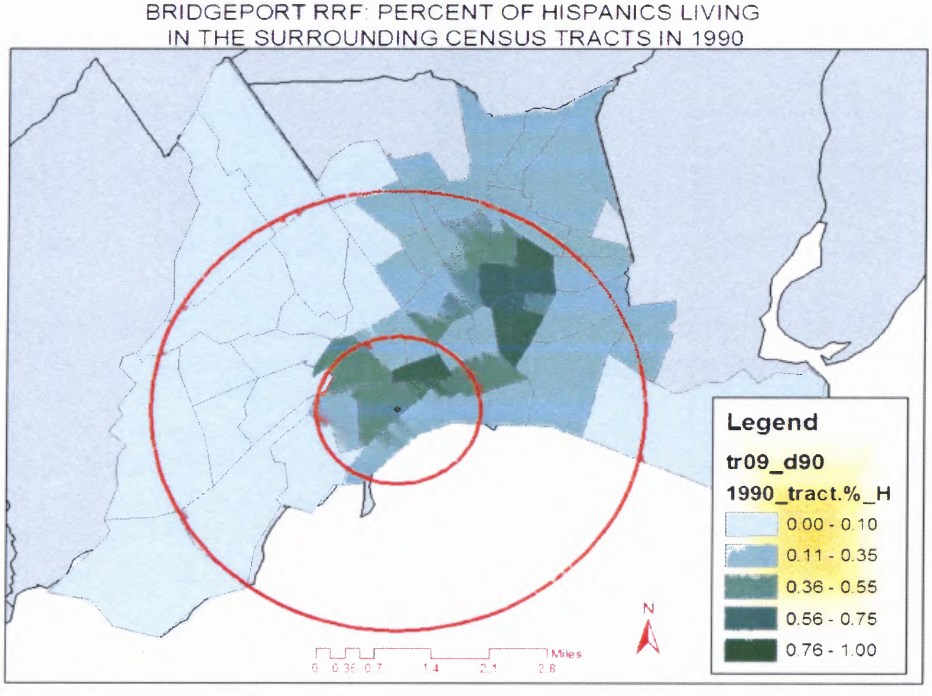

Figure 3.23 2000 Percent of Hispanics near the Bridgeport RRF.

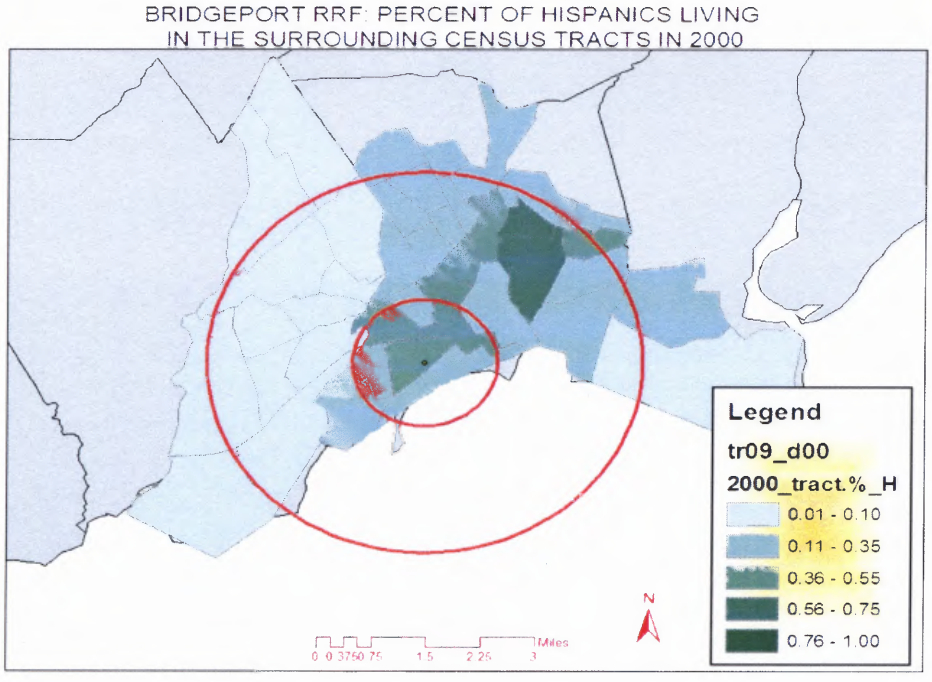

Figure 3.24 2000 Percent of Hispanics near the Bridgeport RRF.

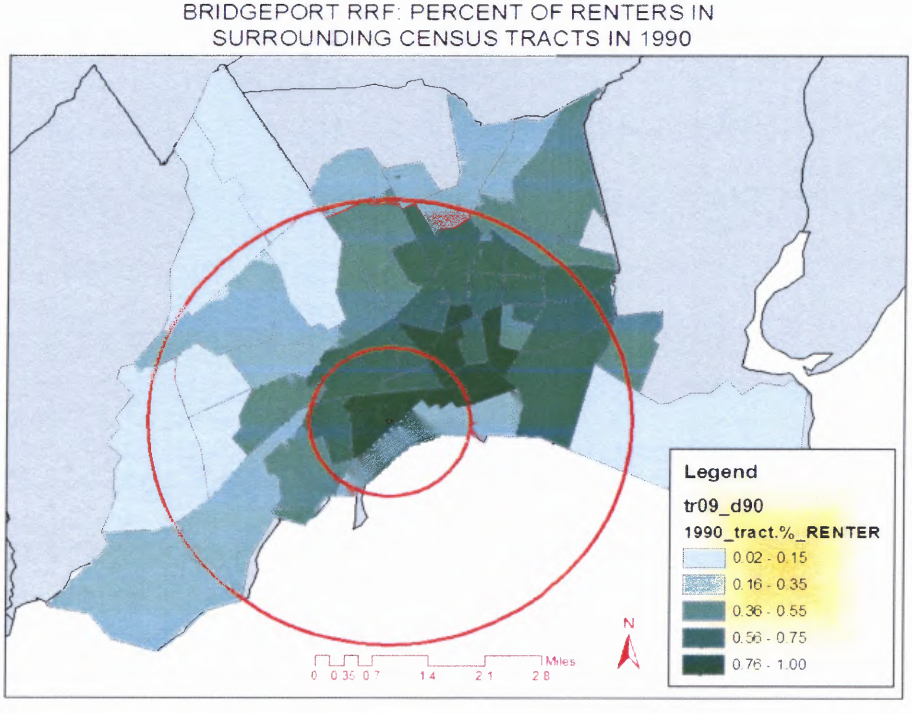

Figure 3.25 1990 Percent of renters near the Bridgeport RRF.

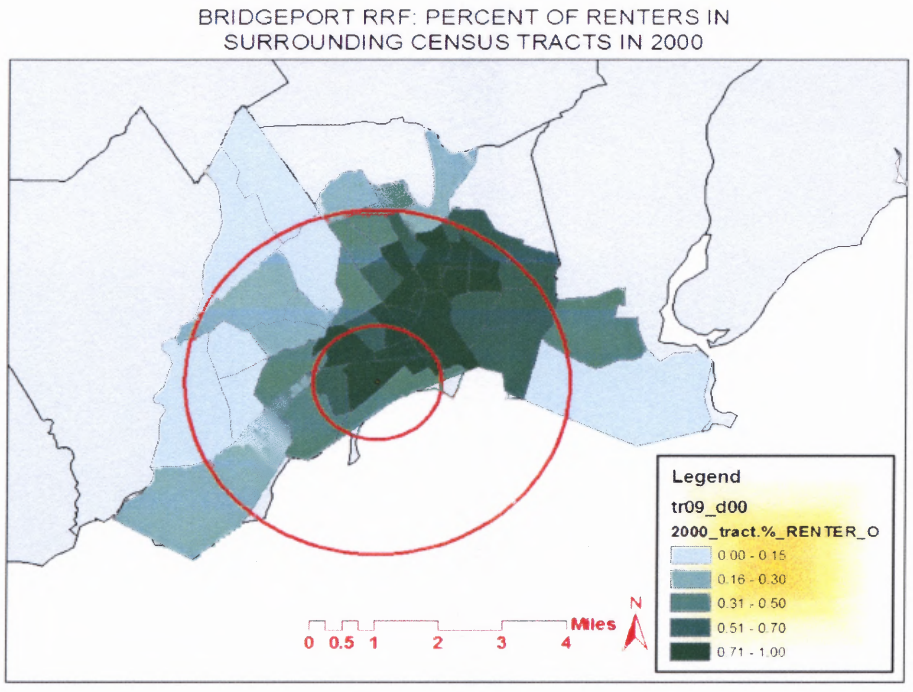

Figure 3.26 2000 Percent of renters near the Bridgeport RRF.

3.7.3 Bristol RRF

Bristol is a little different from the Bridgeport and Hartford cases. This facility does not have a large minority community surrounding it. In 2000, the town's population was only 2.7 percent African-American and 5.3 percent Hispanic. Both of these minority populations have grown since the 1990 census, but they still make up a small percentage of the population. This is in marked contrast to the large minority populations in Hartford and Bridgeport. This facility is also smaller than these other RFFs.

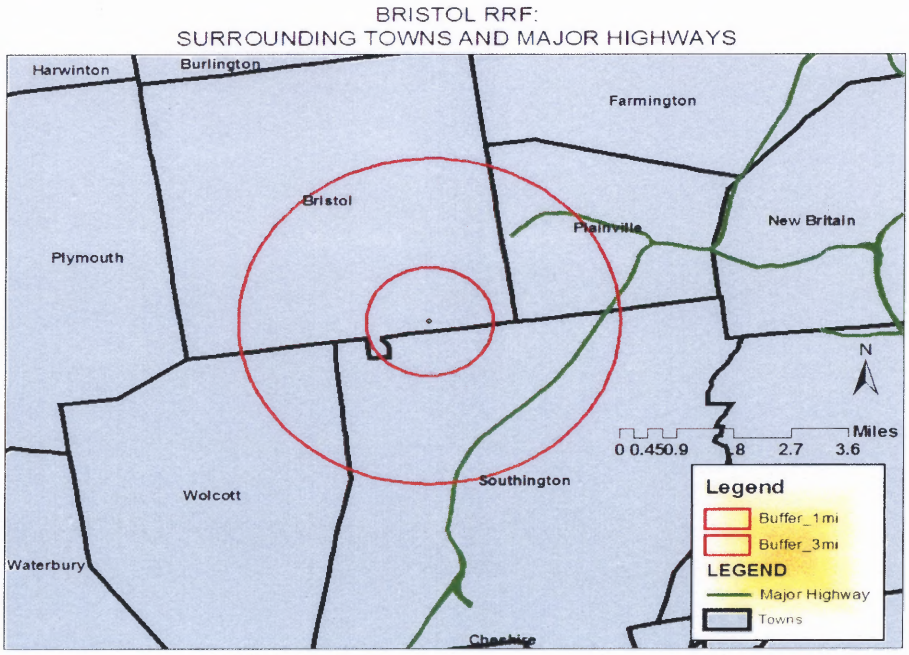

Figure 3.27 Major highways and boarding towns near the Bristol RRF.

In terms of household income, Bristol is lower than the state average. The town's median household income is $47,422 and the state median household income is $53,935 as stated in the 2000 census. In 1990, the town displayed a similar pattern with its median household income below the state level.

As for the number of people renting in the community, Bristol was 5 percent above the state average of 33 percent. As can be seen from the Figures 4.31 and 4.32, there was a slight increase in the number of renters within the three-mile study area.

The town itself is located at the end of a major highway. It is a little more remote than the two facilities previously discussed. However, there is good access to the facility from smaller state highways. This RRF is also located on the southeastern point of the town and borders Southington. Southington has a small minority population and has a slightly higher median household income than the overall state does.

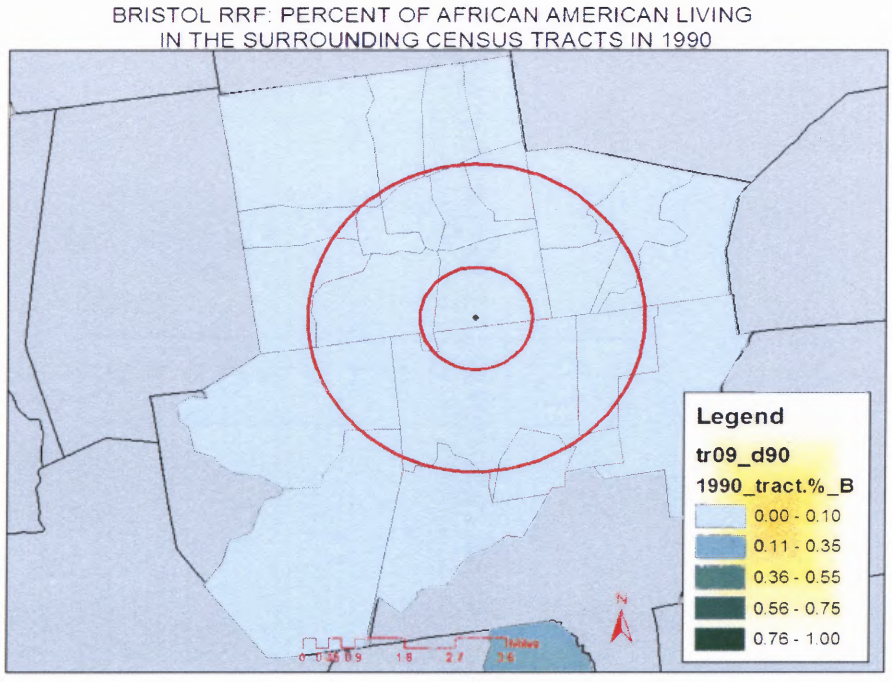

Figure 3.28 1990 Percent of African-Americans near the Bristol RRF.

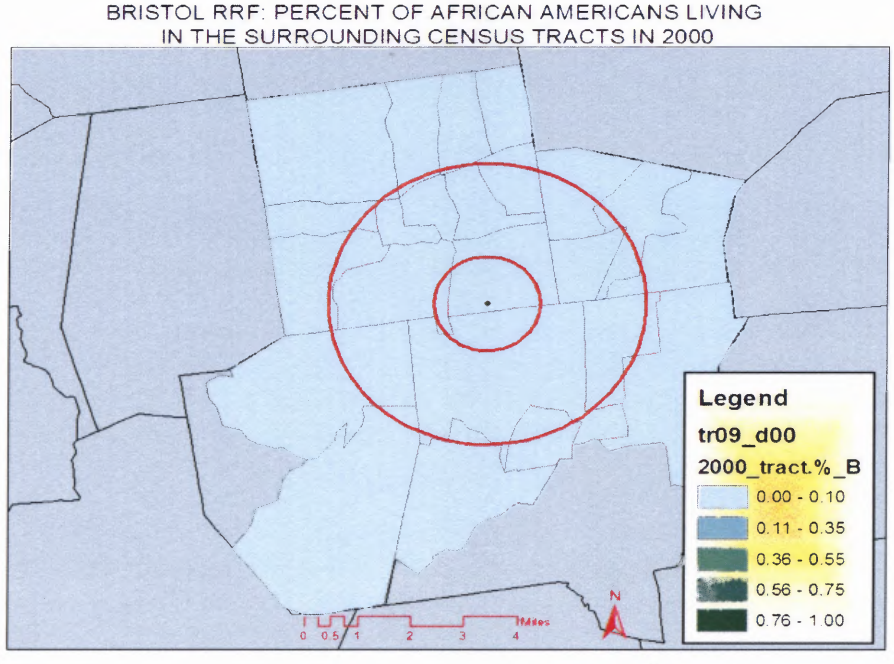

Figure 3.29 2000 Percent of African-Americans near the Bristol RRF.

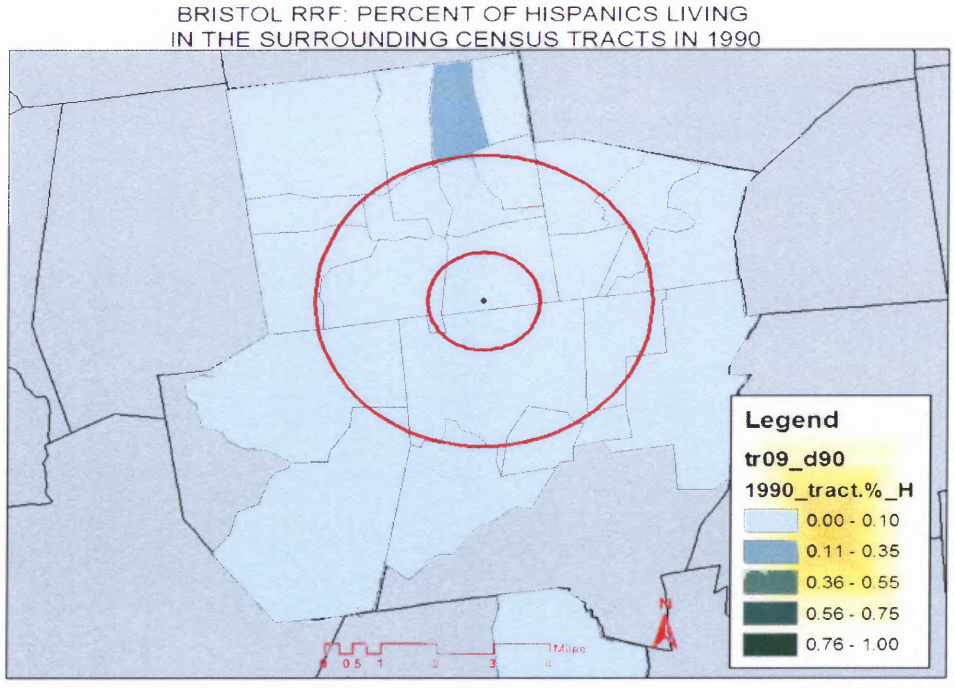

Figure 3.30 1990 Percent of Hispanics near the Bristol RRF.

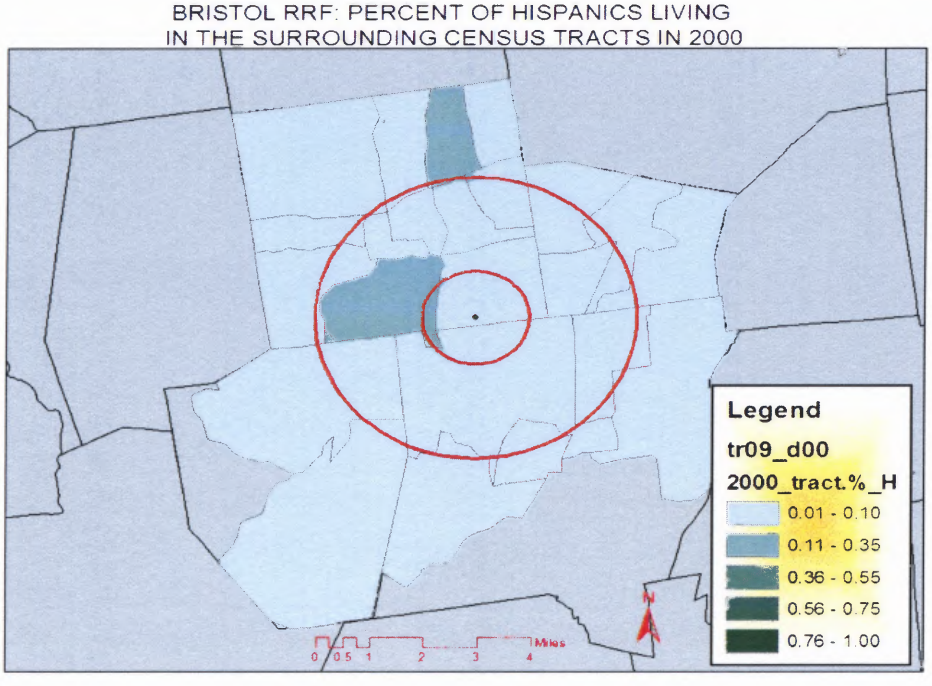

Figure 3.31 2000 Percent of Hispanics near the Bristol RRF.

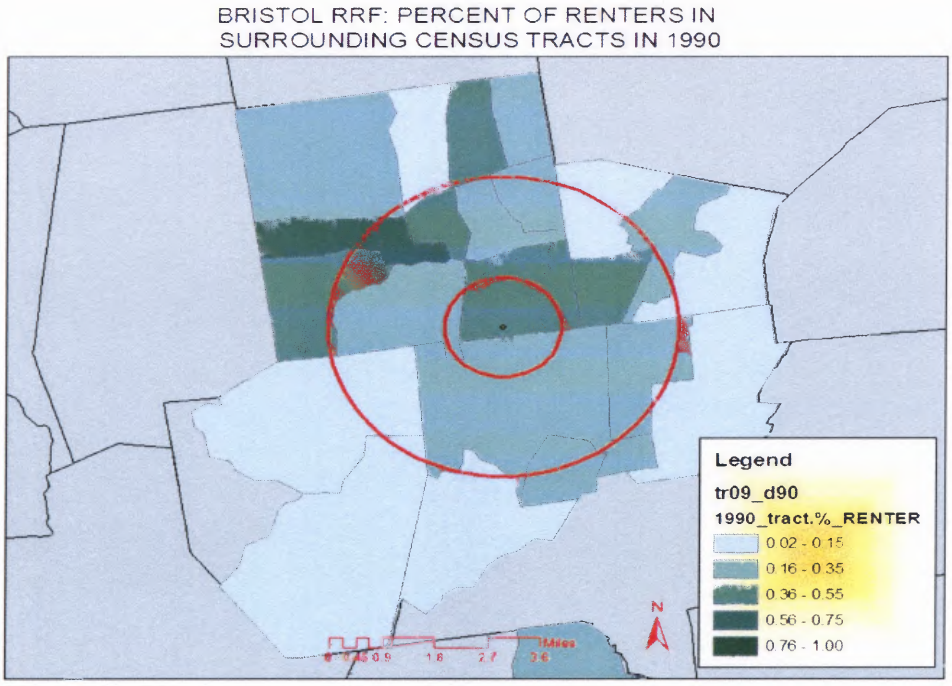

Figure 3.32 1990 Percent of renters near the Bristol RRF.

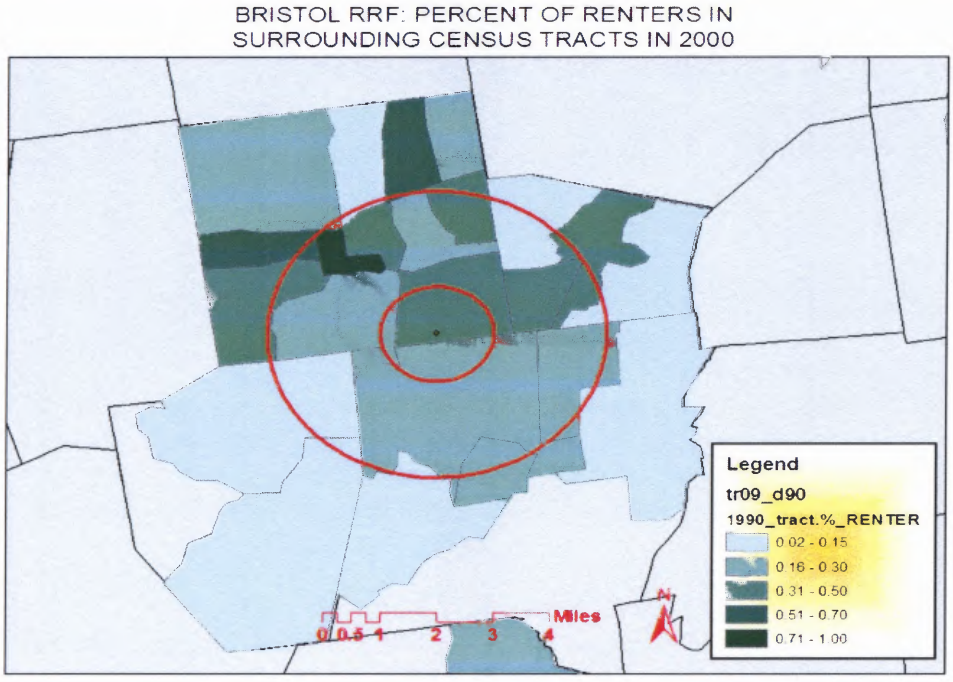

Figure 3.33 2000 Percent of renters near the Bristol RRF.

3.7.2 Wallingford RRF

Wallingford is similar to Bristol in the sense that it, too, has virtually no minority population. African-Americans comprise only one percent of the population of the town and Hispanics make up 4.5 percent. Wallingford did account for 1.2 percent of the total population in the state and had positive population growth from 1990 to 2000. This 1.2 percent of the population is high for a town since the largest town in Connecticut, Bridgeport only accounted for 4 percent of the population.

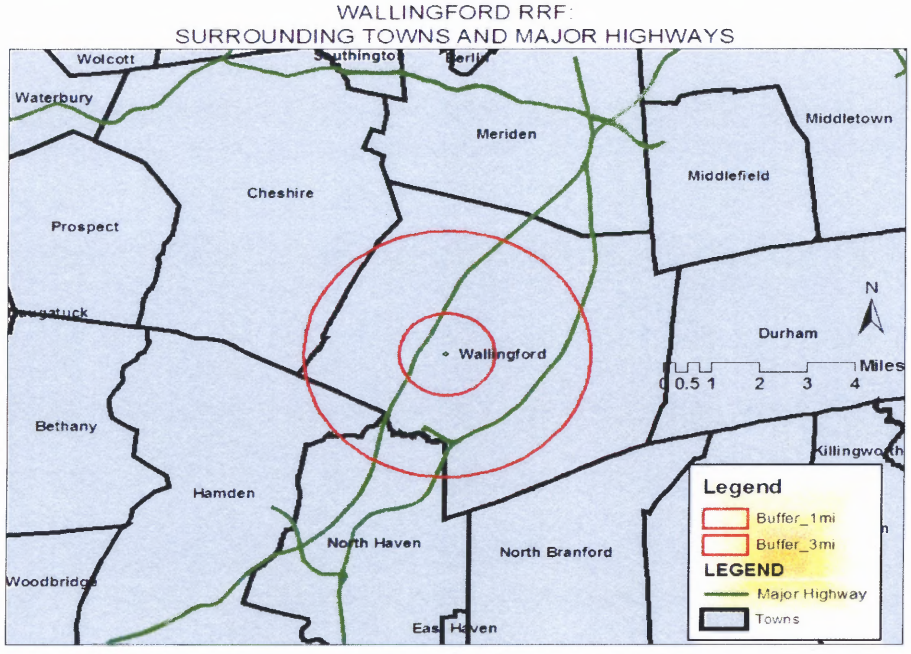

Figure 3.34 Major highways and boarding towns near the Wallingford RRF.

Income for Wallingford in the 2000 census was slightly above the state median household income level. The median household income was $57,308 compared to the state's $53,935.

The renting population in Wallingford is 27 percent of the town's population. This is slightly under the 33 percent of the state that is renting. The population that is renting did increase near the RRF. This increase occurred within one mile of the facility and within the same census tract. Houses in this area may have declined in value or they may be hard to sell due to their proximity to multiple pollution sources (including the RRF). All other tracts had no growth in their rental populations. This indicates that due to the siting of this facility it attracted people looking for low rent apartments or houses.

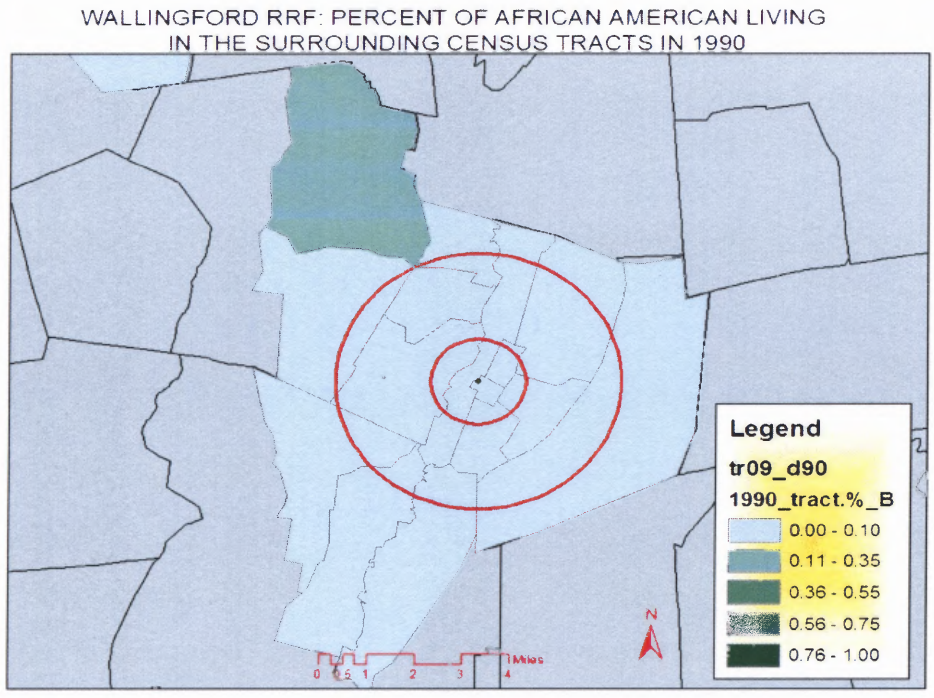

Figure 3.35 1990 Percent of African-Americans near the Wallingford RRF.

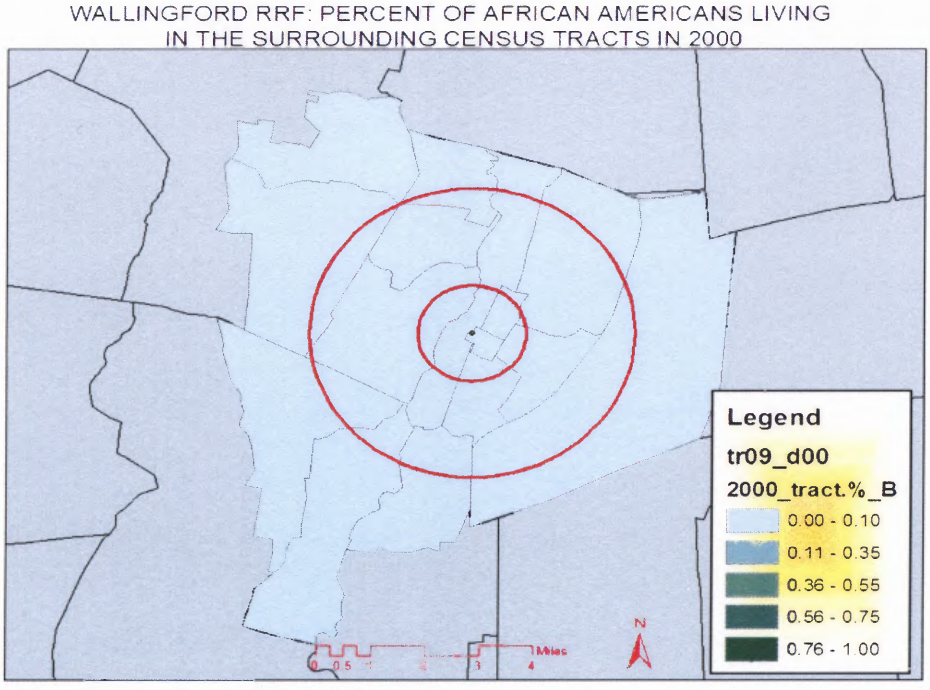

Figure 3.36 2000 Percent of African-Americans near the Wallingford RRF.

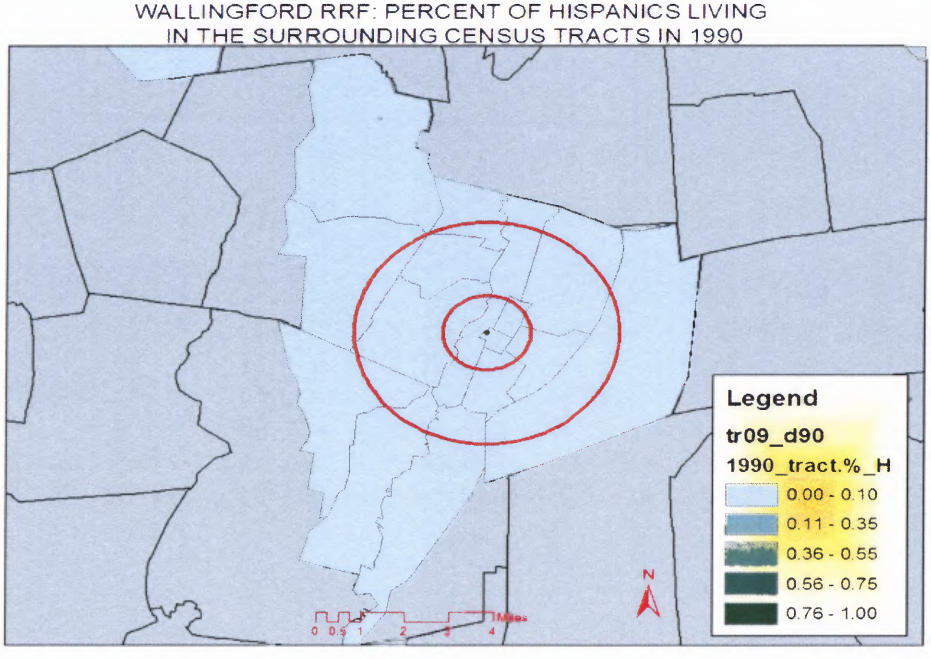

Figure 3.37 1990 Percent of Hispanics near the Wallingford RRF.

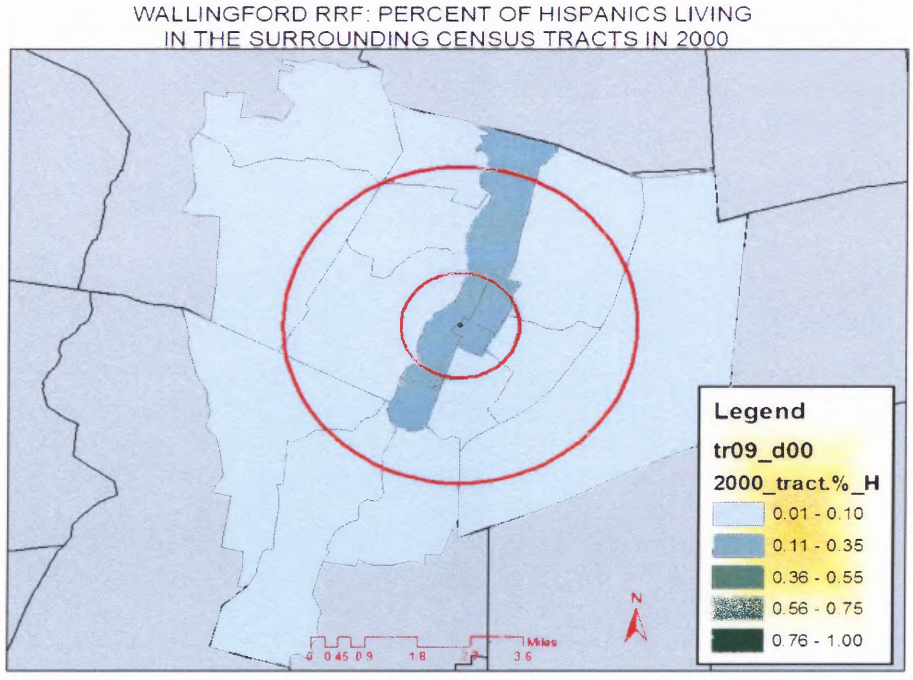

Figure 3.38 2000 Percent of Hispanics near the Wallingford RRF.

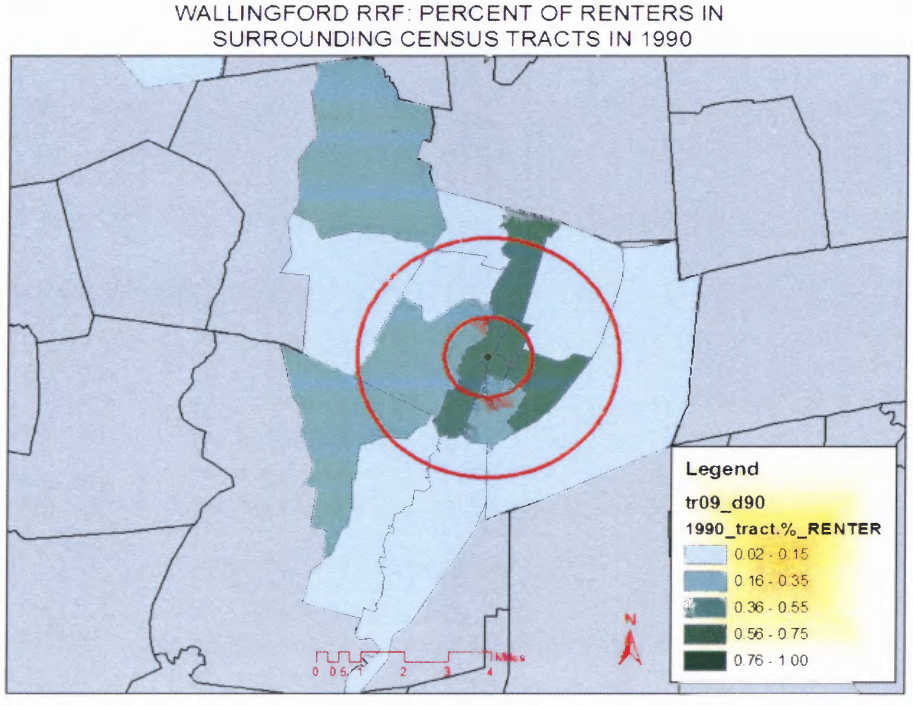

Figure 3.39 1990 Percent of renters near the Wallingford RRF.

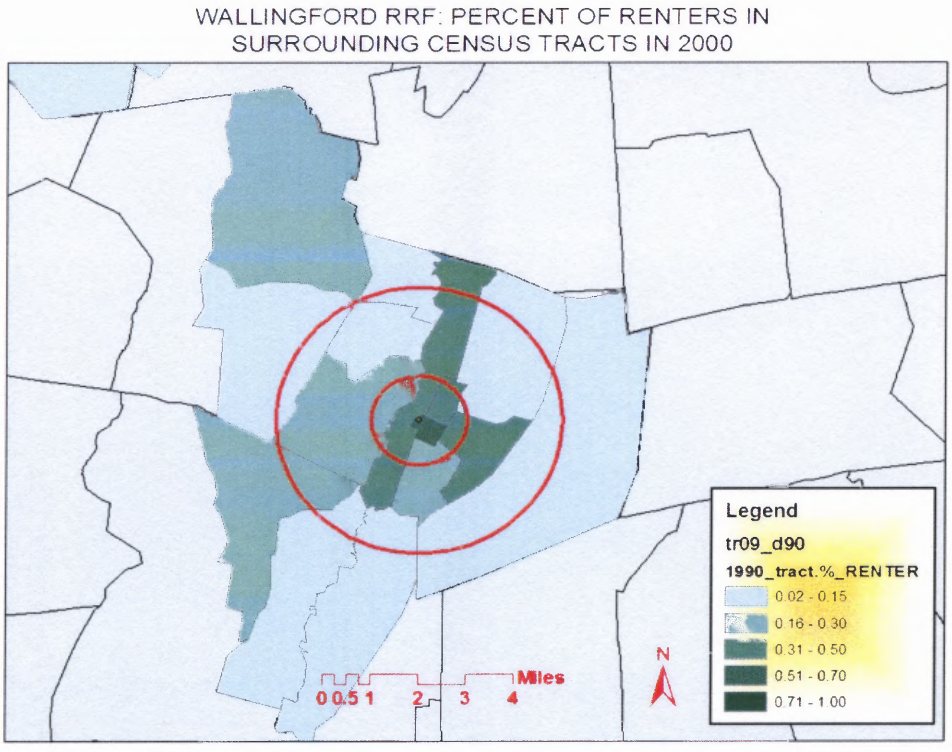

Figure 3.40 2000 Percent of renters near the Wallingford RRF.

3.7.5 Lisbon and Preston RRF

Lisbon and Preston are located in close proximity to one another. They are accessible via several major highways: I-395 (running north to south), Route 2, and I-95. They are also within a short distance of Providence, RI and Boston, MA. This area of the state is experiencing fast growth because of the two Indian casinos situated nearby. These RRFs are located near the less affluent town of Norwich. Its median household income is less than the state's average and it has higher concentrations of minority residents. African-Americans make up 6.8 percent of the town's population and Hispanics comprise a further 6.1 percent. Norwich is lower than the state average in these two racial populations, but it has higher populations of both minorities than the other towns surrounding it. Montville and Ledyard has larger proportions of Hispanics and African-

Americans than does Preston. However, their rental population is below the state average and the median household income for both towns was above the state average. The minority populations for the surrounding towns are still below the state average.

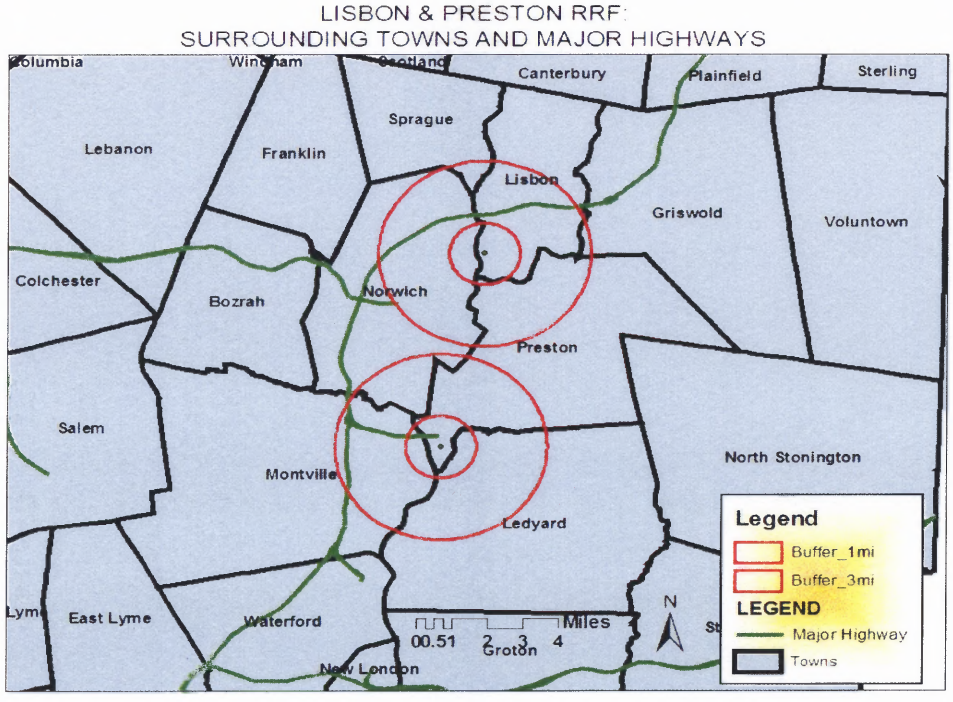

Figure 3.41 Major highways and boarding towns near the Lisbon and Preston RRF.

Lisbon, the northern facility, is located in a community that has almost no minority population. It is 96.7 percent Caucasian. African-Americans make up only 0.3 percent of the population and Hispanics are only 0.6 percent. The town has a small rental population that accounts for only 11 percent of the total. These small numbers of minorities and renters are not in line with the demographics of the other RRF locations. The town also has a higher household income than the state average. This makes the town different from the other RRF because of its wealthier, majority Caucasian population.

Preston is similar to Lisbon with small populations of both African-American (0.7 percent) and Hispanics (1.4 percent). The proportion of renting residents is slightly higher than it is for Lisbon (17 percent), but still under the state's average of 33 percent. Median household income was also higher in Preston than the state average at $54,942.

In areas that are in relatively close proximity to the facility, the racial categories are not significant. In the African-American category, Lisbon had almost none around the RRF and Preston had a few pockets in the area immediately to the north. The Preston facility even showed that African-Americans moved away from the facility from 1990 to 2000. These trends can be deceiving, however, because the geographic boundaries of the tracts were modified from the 1990 to the 2000 censuses and this change could be attributable to this adjustment. The Lisbon facility had no change between 1990 and 2000.

Hispanics displayed a similar trend as they made up less than 10 percent of the population within a three-mile radius of the facility. The only sizable Hispanic population lies outside the three-mile radius of both plants. This population resided between the two RRF plants.

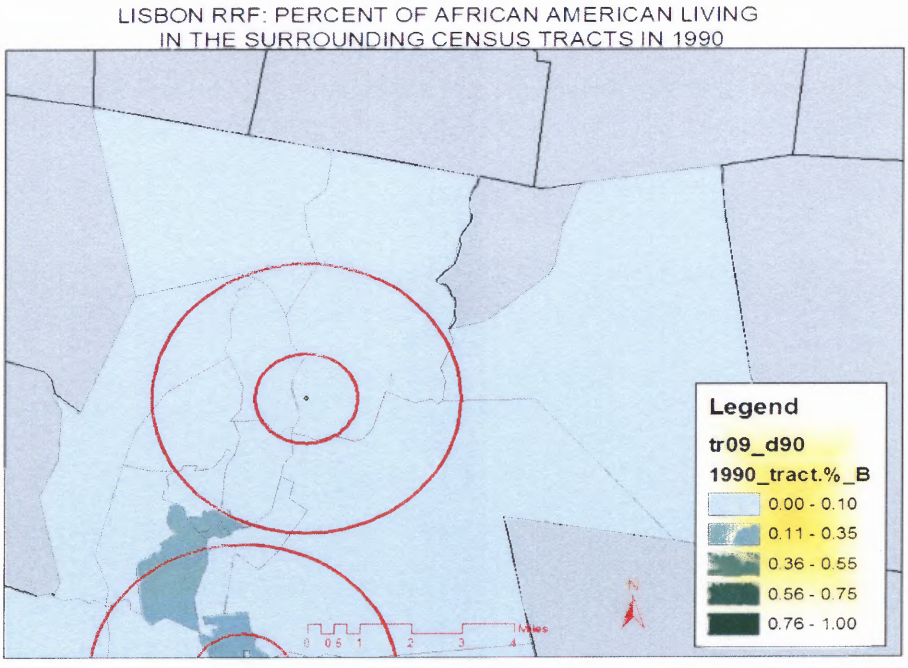

Figure 3.42 1990 Percent of African-Americans near the Lisbon RRF.

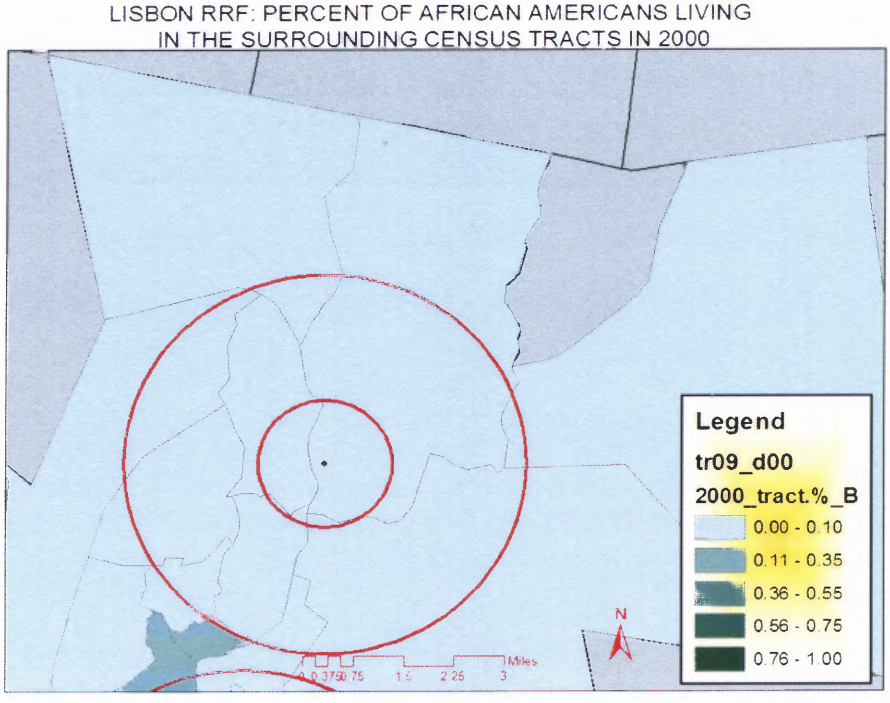

Figure 3.43 2000 Percent of African-Americans near the Lisbon RRF.

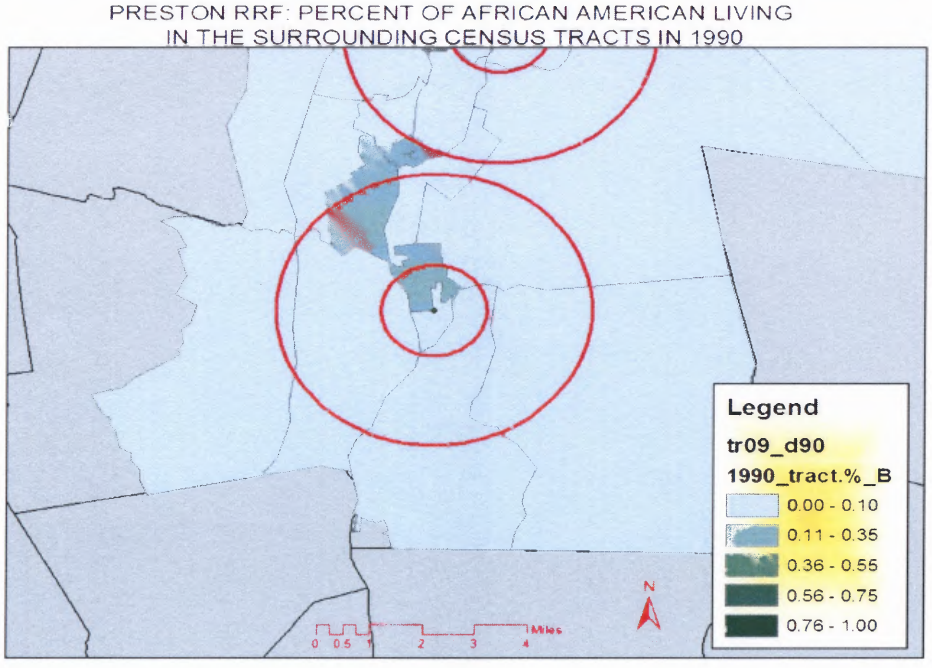

Figure 3.44 1990 Percent of African-Americans near the Preston RRF.

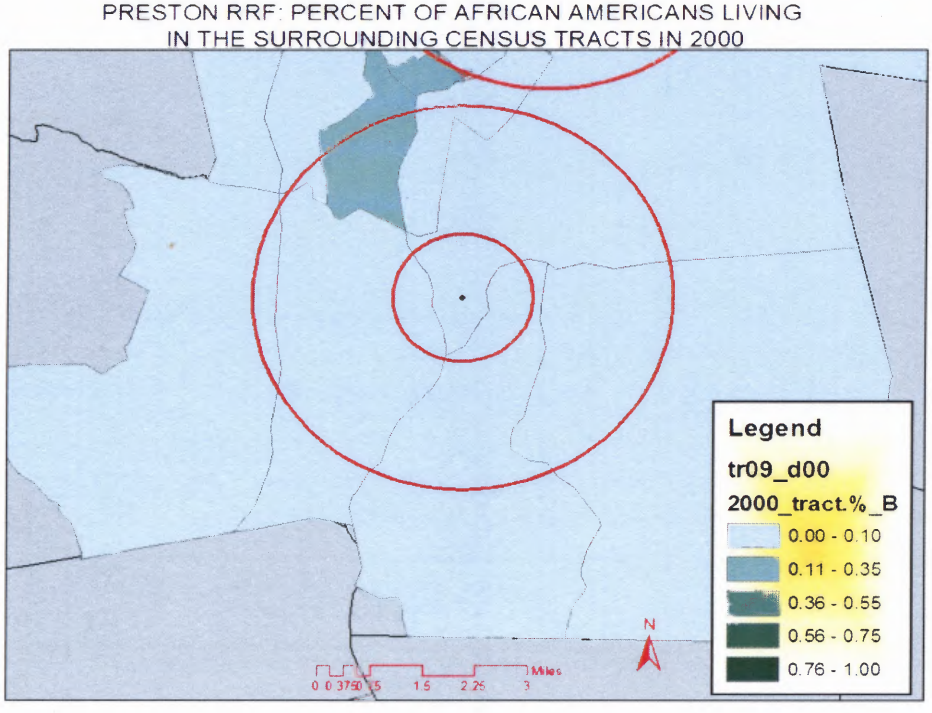

Figure 3.45 2000 Percent of African-Americans near the Preston RRF.

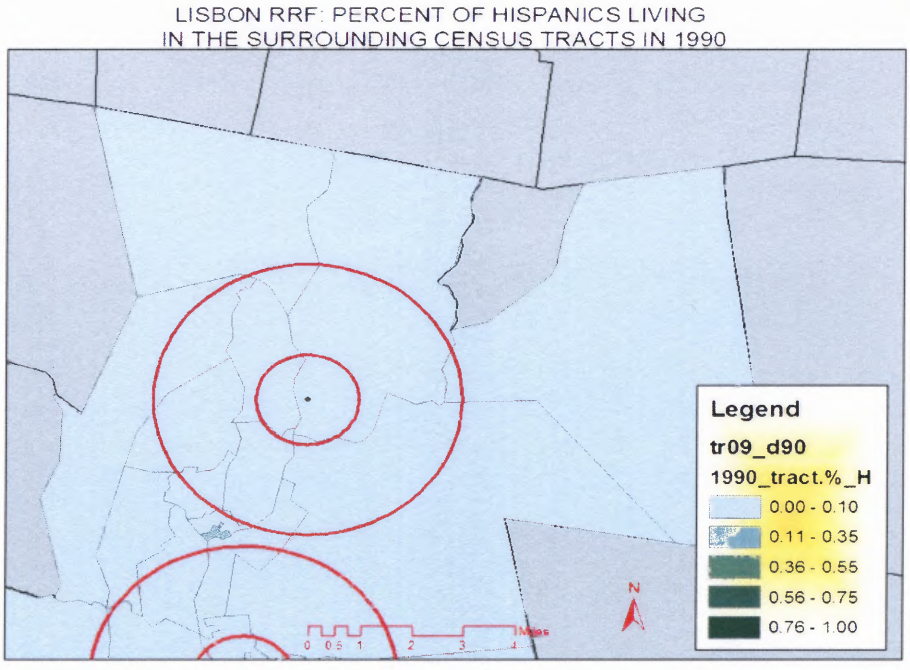

Figure 3.46 1990 Percent of Hispanics near the Lisbon RRF.

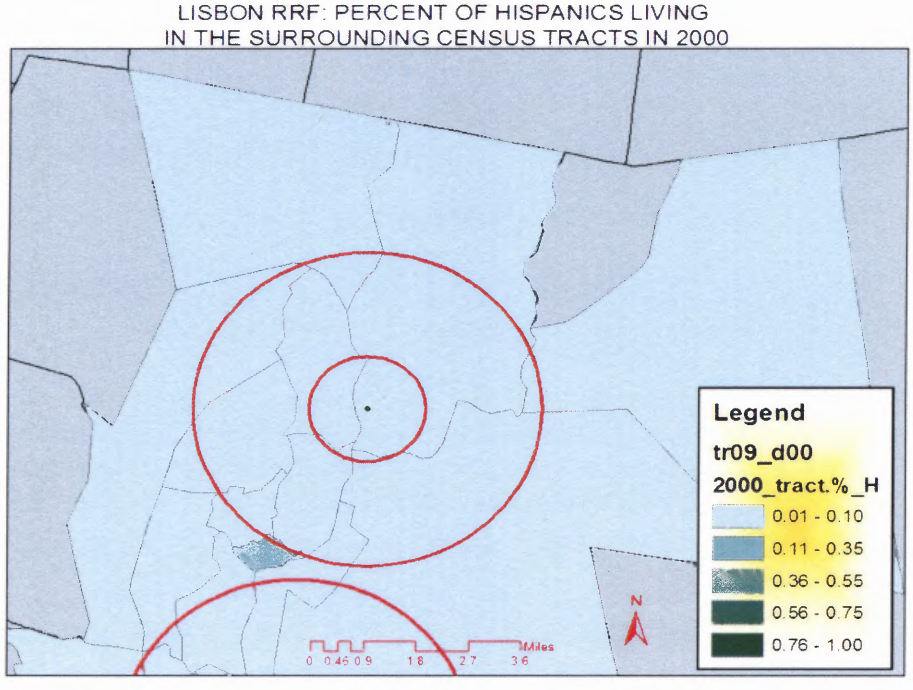

Figure 3.47 2000 Percent of Hispanics near the Lisbon RRF.

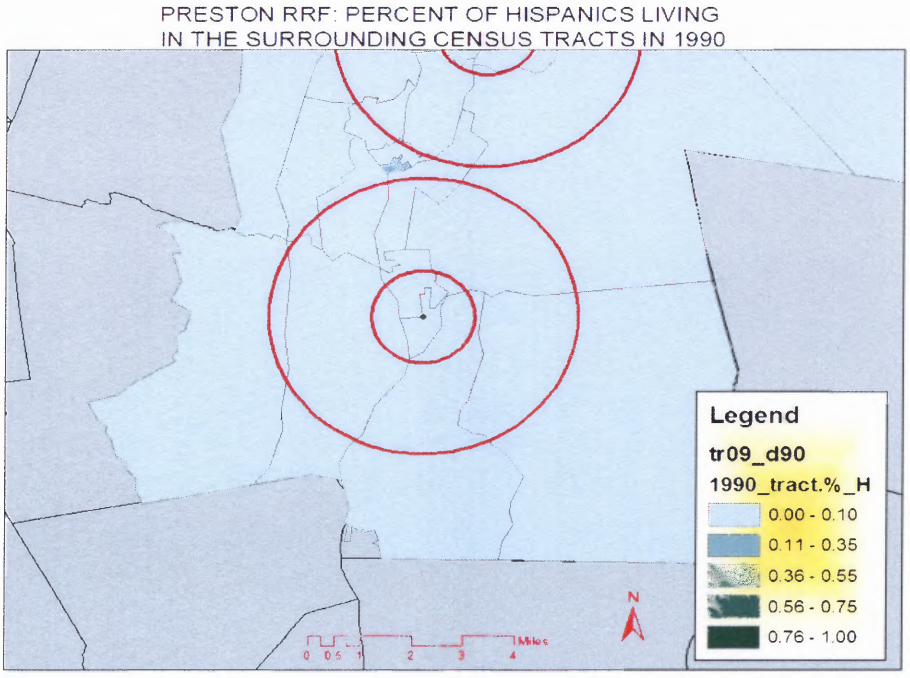

Figure 3.48 1990 Percent of Hispanics near the Preston RRF.

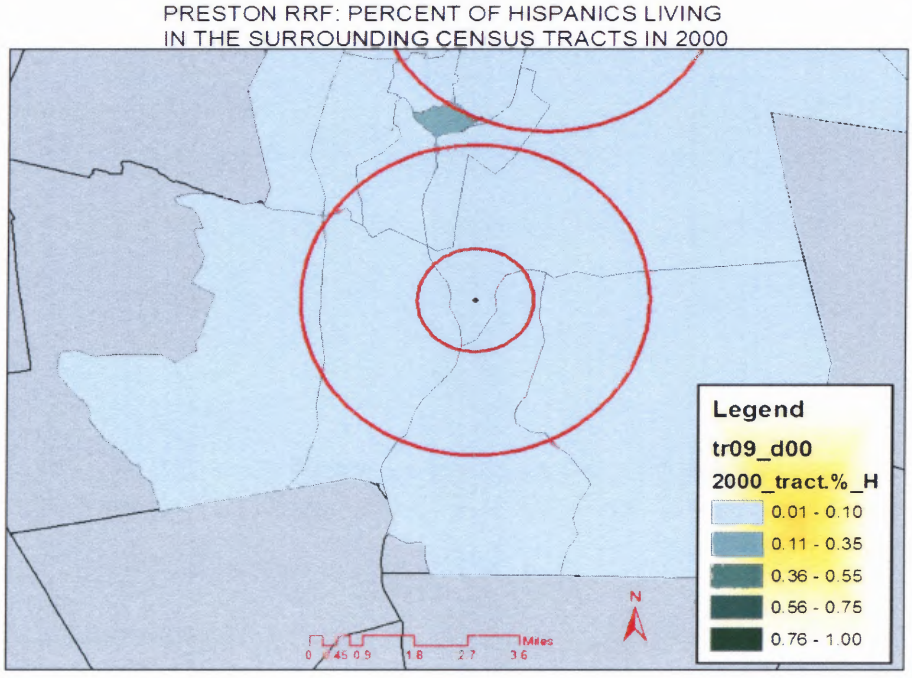

Figure 3.49 2000 Percent of Hispanics near the Preston RRF.

In the two cases both racial populations made up no more than 10 percent of the population in most of the surrounding census tracts. Only the African-American population around the Preston RRF was above 10 percent. Since both of these populations make up only a small portion of the residents around both RRF plants, race was not a significant factor in determining the siting of either facility.

The rental population was somewhat different. In both towns, rental populations were small. Lisbon has 11 percent and Preston has 17 percent. Near the RRF plants the populations of renters were higher. Both facilities bordered on higher rental census tracts. Preston is situated near a census tract with over 70 percent renters and Lisbon is located near an area that has more than 36 percent of its population designated as renters. In both areas the renter population grew from 1990 to 2000.

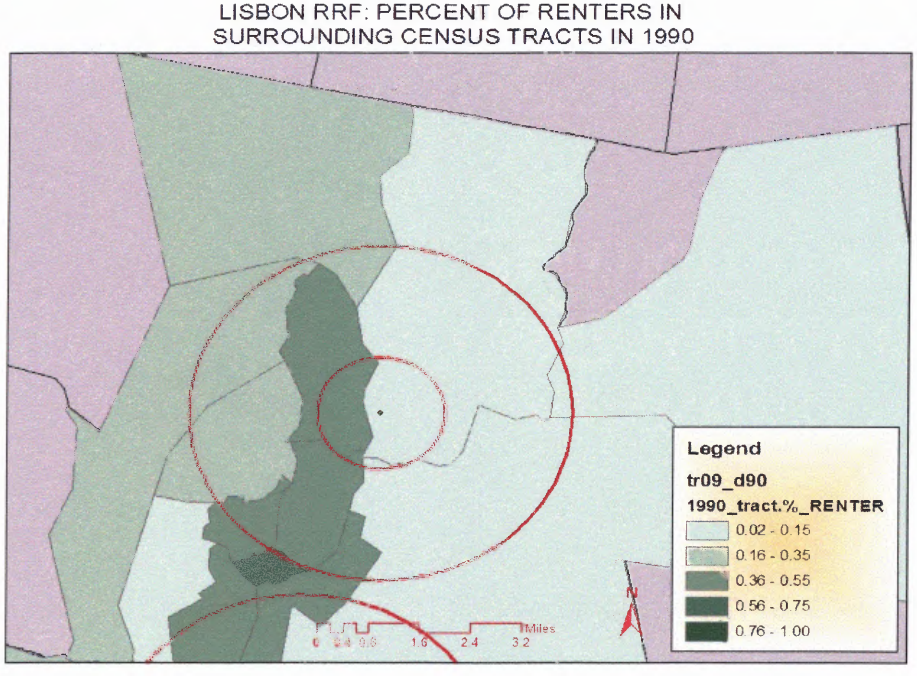

Figure 3.50 1990 Percent of renters near the Lisbon RRF.

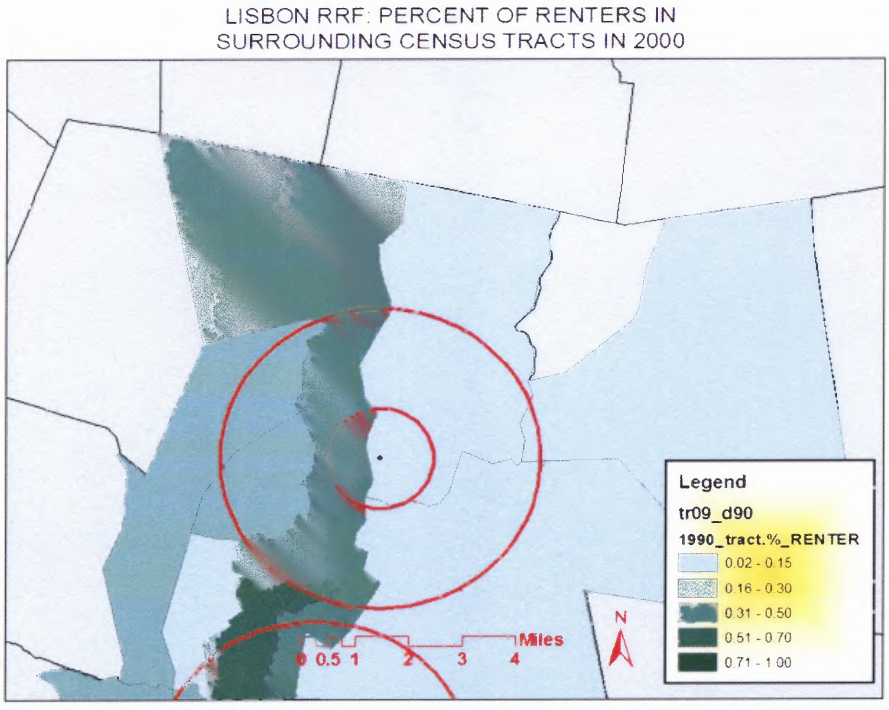

Figure 3.51 2000 Percent of renters near the Lisbon RRF.

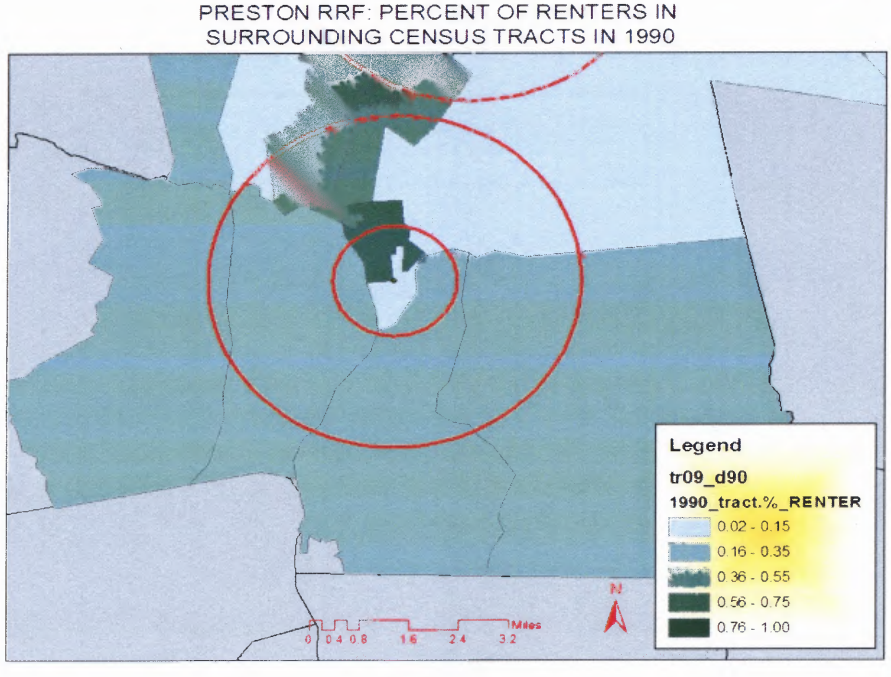

Figure 3.52 1990 Percent of renters near the Preston RRF.

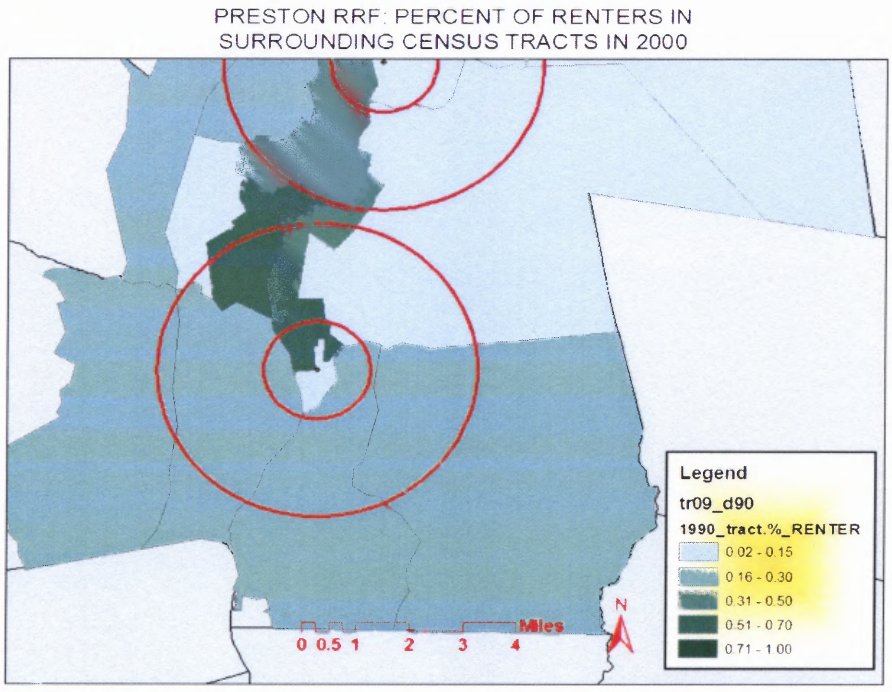

Figure 3.53 2000 Percent of renters near the Preston RRF.

CHAPTER 4

CONCLUSION OF SITING OF RRF IN CONNECTICUT

There is insufficient evidence to conclude that overall Connecticut RRFs have been sited a racially discriminatory manner. The state could, however, be guilty of discrimination in the way that it located facilities near large rental populations. Only two of the plants are located in areas with large minority populations. Since these are two of the largest facilities, it could be said that these RRFs represent cases of environmental injustice. It is not a clear case. Both of these cities (Hartford and Bridgeport) are two of the largest population centers in the state and this means that these facilities are located in close proximity to the generators of most of the state's MSW. These cities are also located close to major highways and this provides for efficient access. Another reason for the geographic position of these RRFs could be the low cost of property in both instances and the proximity of a large workforce. These reasons can indicate that there were other legitimate reasons for placing the two largest facilities in these cities.

The other facilities fall within the range of the normal characteristics of the state. All four of the other host communities have small minority populations. Some of them do have higher concentrations around the RRFs, but the evidence suggests that the size of the minority groups living nearby have either stayed the same or there has been a departure of these groups from the immediately surrounding areas. This phenomenon could be due to the fact that most of these facilities were built after the two

larger plants. The timing of their construction and changes in the siting process justify further investigation.

Income level could be a factor. Again, the two largest facilities fell into areas where household income is well below the state median. However, the other four plants were slightly under this level and, even one (Lisbon) was above the statewide median household income. Lisbon was the last facility to be constructed and the only private operation to be sited. This difference may have played a roll in the choice of the town, but is unknown at this time.

The number of renters in the area did seem to play more of a role than any other factor. Bridgeport and Hartford had large renting populations when the RRFs were sited and this continues to be the case today. The Bristol and Wallingford RRFs had slightly lower proportions of renters, but the figure is still around the state average. Lisbon and Preston evince very low rental populations. However, in all four instances, there were large rental populations living within three miles of the facility. This was especially true in Preston and Lisbon where some tracts adjacent to the plant had more than 30 percent of the population in rental housing.

Earlier in this study, it was stated that communities with higher renting populations were likely to have a more difficult time organizing and to display less political power in opposing a decision to site a locally unwanted land uses. This type of political weakness may have enabled planners to place the facilities in closer proximity to areas with higher rental populations. This situation raises the prospect that in such communities the proposed plant will be sited more rapidly and opposition will be minimal. Most renters may not even know that this facility exists near them, especially

in communities such as Preston, Bristol, Lisbon, and Wallingford. The RRFs are hidden behind buffer zones of industries and wooded areas. Because the plants in Hartford and Bridgeport are not as concealed from the public, they tend to draw more criticism. This difference in political agitation may also be a result of the fact that these areas have stronger organizations due to the presence of numerous other environmental hazards. For example, elevated rates of asthma and the numerous polluting industries that are located within a confined area have prompted residents to create opposition groups.

Other factors relevant in the siting of these facilities include transport access and the efficiency of the waste flow into the facilities. All six of Connecticut's RRFs were placed immediately off major highways. They were also situated in areas with large populations that feed the waste flow needs of the RRF. The Lisbon and Preston facilities are in areas that are not as heavily populated as their western counterparts, but growth in there locations is expected. These areas also have experienced rapid growth due to the two nearby Indian casinos.

Some of the factors that this study did not investigate, but that should be considered in the future, include the political party affiliation of residents living within proximity of the RRFs, the number of other polluting industries in the area, the origins of the waste that the respective RRFs process, the propensity of residents to be politically engaged, and the income level of residents living near the facilities. These factors may point to other influences that shaped the geography of RRF distribution in Connecticut.

Due to the considerable volume of criticism that is leveled at the RRFs operating in Hartford and Bridgeport, there is an impression in Connecticut that the distribution of incineration facilities in the state is racially biased. From this study's findings it is the

path of least resistance and the potential waste production in an area that dictates where a facility will be sited. As other studies have shown, variables such political orientation, age, and the presence of a political champion may have more of an impact than race on the siting of RRFs or LULUs. Property value is still a factor, along with the political process which can slow implementation even with out opposition. The main determinates of whether a RRF will be sited are lack of opposition, supply of trash, highway access, and cost of property.

This study only investigates the siting of RRFs in Connecticut and does not indicate that other methods of waste deposal or LULUs use similar methods in how they are sited. Other polluting facilities may employ different criteria to be successfully sited. However, with growing environmental standards the path of least resistance, cost, and profitability will trump race in being the leading indicators of where LULUs will be sited.

END NOTES

[1]Wet waste is waste with a lot of moisture. US waste streams tend to be wetter than European waste streams. This happens due to types of foods that are thrown away (Fruits and vegetables to climate (rainfall and humidity). The wetter waste takes more energy to burn, thus reducing the efficiency of the incinerator. This problem has been overcome by newer designs.

[2]This judgment was based on three criteria: air-water pollution, insect-rodent problems, and physical appearance.

[3]The original report was entitled "Political Difficulties Facing Waste-to-Energy Conversion Plant Siting" authored by Cerrell Associates, Inc."

[4]A method of pollution control that reduces the emission of acid gasses and cool flue gases.

[5]A baghouse is a series of large, porous bags that do not allow particulates to pass though, but does allow gases though.

[6]The two tests that are used are the USEPA Toxic Characteristic Leaching Procedure (TCLP) and a more restrictive drinking water standard. Ash toxicity normally is lower in the TCLP test than it is in drinking water tests.

[7]Monofills are landfills that only take one type of waste such as ash or hazardous waste.

[8]This study also found that some old hazardous waste sites were being redeveloped into high-income apartments.

[9]Rumors of the siting of an incinerator in the subject towns did not affect housing appreciation rates.

[10]Treatment is the legally preferable method for cleaning a Superfund site. Containment is the walling off of a hazardous site and treatment is the permanent removal of the toxins from the area.

[11]From 1995 to 1991 the average fine for a polluter under RCRA was $335,566 in a majority white community and $55,318 in a majority African-American community.

[12]The two communities that had minority populations in the study were Oakland, MI and Knox, TN. The incinerator proposed for Knox was not successfully sited, but the Oakland WTE facility was commissioned. This outcome was achieved only after a decision was made to move the facility away from the majority African-American community. It also should be noted that there were four waste-to-energy facilities being investigated in this study.

[13]According to Bickerstaff and Walker (2001), residents use the following sensory and informational sources to apprehend the environmental quality of their home areas: health effects 22 percent of the time; visible indicators 13.5 percent of the time, olfactory indicators 13 percent of the time, taste 2.6 percent of the time, weather 5.8 percent of the time, and the media 3.4 percent of the time.

[14]Renters may be adversely affected financially if their health expenses increase due to pollutants.

[15]The CTDEP's recycling rate differs from the EPA's recycling rate since the EPA estimates the rates of private companies that are not required to report to the state on their recycling programs. The CTDEP does not estimate those recycling rates, and this accounts for a 6.7 percent variation between the two calculations. The EPA reported that Connecticut had a 30.9 percent recycling rate in 1998 while the CTDEP stated that the recycling rate was only 24.2 percent.

[16]BWVRF and VRF are the same facilities.

[17]Vertical expansion is allowing the waste at a landfill to be piled higher than what the original ground height was or past the permitted height of the landfill to increase the amount of waste an area can hold.

[18]Connecticut is divided into eight counties; however, these are mainly for geographic distinctions. The counties do not provide any public services and have no governance responsibilities. The topmost tier of government in Connecticut is at the state level and beneath this is 169 town governments.

[20]The Lisbon facility, the one private RRF in the State, does not publish the names of the towns that have contracted with the plant for waste disposal. This facility could operate on an on demand basis for towns seeking to dispose of their waste.

[21]A US District Court decision in 1983 found Exxon Corporation liable for overcharging for domestic crude oil. After three years of litigation, the company paid $2.1 billion to the Department of Energy in 1986 that was then distributed to the various states. Under the agreement, the restitution payment could only be used for projects that were authorized under the agreement.

[22]The State Legislature established this $10 million fund in June 1986. It stipulated that the Commissioner of the Department of Environmental Protection, along with a legislative task force, should develop a plan for a MSW recycling program that would be consistent with the statewide solid waste management plan. It empowered towns to create regional approaches to recycling, established recycling standards to maximize recycling efforts, and allowed for a review of existing contracts between towns and RRFs.

[23]The spot market is the ability for the RRF to take in customers that are not a part of its contracted cliental. These customers are subject to fluctuations in disposal prices and fees for daily operations and the demand for the disposal of MSW. Each RRF is allocated a preset number of tons that they can use in the spot market.

[24]The previous fee was $89.50, a price that drove MSW away from the facility. This was due to lack of waste volume entering the facility. To combat the higher prices the facility refinanced its bonds and restored deliveries with the help of local elected officials and municipal representatives on the Project's Solid Waste Advisory Board.

[25]Charter Oak Landing is a State Park in Connecticut.

[26]Connecticut only uses monofills to dispose of ash that is created by RRFs.

[27]In geocoding the various facilities, one facility had to be modified to be located in its approximate position. The address of Preston RRF had to be changed from 135 Military Highway to 100 Military Highway. This was due to errors in the road layers. All other sites geocoded without difficulty.

[28]Household income is the sum of money income received in calendar year 1999 by all household members 15 years old and over, including household members not related to the householder, people living alone, and other non-family household members. Included are in the total are amounts reported separately for wage or salary income; net self-employment income; interest, dividends, or net rental or royalty income or income from estates and trusts; Social Security or Railroad Retirement income; Supplemental Security Income (SSI); public assistance or welfare payments; retirement, survivor, or disability pensions; and all other income.

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