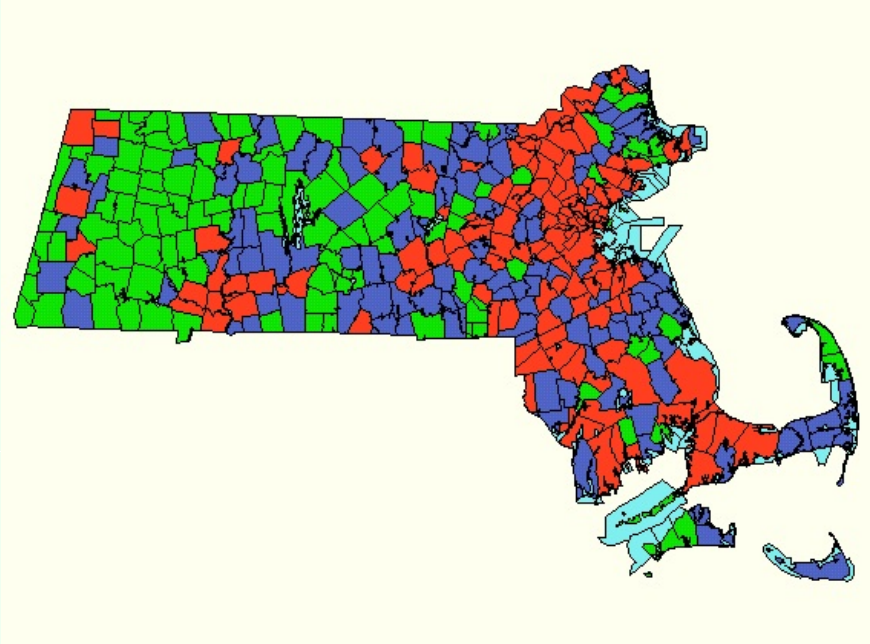
# *THE PROPOSED BROCKTON POWER PLANT:*
## *ENVIRONMENTAL DISPARITIES in BROCKTON, MA*




**Prepared by:**

**Daniel R. Faber**
**Associate Professor of Sociology**
**509 Holmes Hall**
**Northeastern University**
**360 Huntington Avenue**
**Boston, MA 02115**
**(617) 373-2686**
**d.faber@neu.edu**


**March 27th, 2008**

# THE PROPOSED BROCKTON POWER PLANT:
## ENVIRONMENTAL DISPARITIES in BROCKTON, MA

This report is in response to the petition by the Brockton Power Company LLC (an affiliate of Advanced Power Services (NA) LLC to construct a 350 MW Combined Cycle Power Plant in the Oak Hill Industrial Park in the City of Brockton, Massachusetts. The projected emissions from the proposed project are: 85 tons per year (tpy) of particulate matter (PM); 109 tpy of Carbon Monoxide (CO); 7 tpy of Sulfur dioxide ($SO_2$); 31 tpy of Volatile Organic Compounds (VOC); 107 tpy of Oxides of Nitrogen (NOx); 7.247 typy of Hazardous Air Pollutants (HAPS); and 1.134 million tpy of Carbon Dioxide ($CO_2$). The proposed power plant is to be located within five miles of Environmental Justice (EJ) population.

Upon my review, I have concluded that the Energy Facilities Siting Board should reject this proposal as the proposed site is not suitable location. Siting the power plant in Brockton would result in an undue concentration of environmentally hazardous sites and facilities in the City of Brockton (an EJ community). The environmental justice criteria I consider relevant to this case are based upon both demographic and community specific environmental considerations.

As seen in Table 1 on the demographic profile of Brockton, the community is a low-income, community of color. In this respect, utilizing standard demographic characteristics, the town of Brockton itself qualifies as an environmental justice (EJ) community.

### Table 1

**Demographic Profile of Brockton**
**(2000 Census)**

| Town | Income Status of Town | Racial Status of Town | Total Population | Total Area |
|---|---|---|---|---|
| **Brockton** | low income ($39,507) | high minority (38.5%) | 94,034 | 21.6 |

In addition to the demographic profile provided above, I believe the power plant proposal should receive special environmental justice considerations based on the clear evidence that Brockton possesses an undue concentration of environmentally hazardous industrial facilities and sites relative to other communities in the state. Environmental injustices are borne when low-income communities and/or communities of color are specifically targeted for the siting of environmentally hazardous sites and facilities because of discrimination and other factors related to their lack of political-economic resources. But environmental injustices can also be considered to occur when specific communities – regardless of their racial, ethnic, and/or class-

based demographic profile – are overburdened by the presence of environmentally hazardous sites and facilities relative to other communities in the state. In this respect, Brockton is one of the most environmentally overburdened communities in the state.

## Demographic Definitions of Environmental Justice Communities

For the purposes of this report, the term ***lower*** *income communities* will refer to the combination of both low income and medium-low income communities. The term ***higher*** *income communities* refers to the combination of medium-high and high income communities. Although these lower income classifications may appear to be inflated, the reality is that Massachusetts is a very expensive place to live. In fact, the Greater Boston area is the most expensive metropolitan area in the United States. It now costs a family of four $64,656 to pay for basic necessities in Greater Boston ($6000 more than in New York).[1] Similarly, the National Low Income Housing Coalition ranked Massachusetts the least affordable state in the country for residential rents in 2003. As a result, traditional measures like the 2003 federal poverty level of $18,400 (for a family of four ) do not reflect the actual high cost of living in the Bay State. High rents and housing costs create a number of severe economic hardships for poor residents and the underemployed (between 1992-2002, the total number of manufacturing jobs in the state decreased by 20 percent).[2] More than 25 percent of Massachusetts workers have low-wage jobs that pay less than $8.84 per hour, or $18,387 per year working full-time. It is generally accepted that people should strive to spend no more than one-third of their income on rent or mortgage payments. In Massachusetts over three-quarters of low-wage working families spend more than one-third of their income on housing. Under the Massachusetts Family Economic Self-Sufficiency Standard – a measure of the real income needed to meet the basic housing, health care, child care, food, and transportation needs of different types of families in specific regions – 25 percent of all families in the state (and nearly 50 percent of all urban families) did not earn enough to meet their basic needs in 1998. In Worcester, the self-sufficiency standard for 1 adult and 2 children is $40,598, while in Boston this figure rises to $51,284.[3] As a result of these considerations, my lower income classifications should actually be considered conservative.

---

[1] See Bonnie Heudorfer and Barry Bluestone, *The Greater Boston Housing Report Card 2004: An Assessment of Progress on Housing in the Greater Boston Area* (a report prepared by: The Center for Urban and Regional Policy, Northeastern University for the Boston Foundation and Ctizens' Housing and Planning Association, September 2005).

[2] See Robert Vinson and Navjeet Singh, "Manufacturing: Losses and Gains," (Boston: Commonwealth Corporation, 2003), p.1.

[3] The real cost of living in Massachusetts has gone up 17-35 percent in regions across the state between 1998 and 2003, as low-wage working families faced severe job losses and stagnant wages. As a result, it is likely that more than 25 percent of Massachusetts families now earn less than the income needed to meet their basic needs without public or private supports. For a full discussion, see Hanna Bailey Boyle, Sheelah A. Feinberg, and Martin Liebowitz, *Investing in Massachusetts Working Families: A Framework for Economic Prosperity* (Boston, MA: A Report by The Women's Union, April 2004), pp.5-11, 39.

**Class Status of Massachusetts Communities: Median Household Income**

| Class Status of Town | 1990 Median Household Income | 2000 Median Household Income (adjusted for CPI rate of inflation) | Number of Towns | Percentage of all Towns | Cumulative Percentage of all Towns |
|---|---|---|---|---|---|
| low income | $0 to 29,999 | $0 to 39,524 | 37 | 10.2 | 10.2 |
| medium-low | $30,000 to 39,999 | $39,525 to 52,700 | 133 | 36.7 | 47.0 |
| medium-high | $40,000 to 49,999 | $52,701 to 65,875 | 106 | 29.3 | 76.2 |
| high income | $50,000 or more | $65,876 or more | 86 | 23.8 | 100 |
| totals | | | 362 | 100 | |

The racial composition of a community is determined by the percentage of nonwhites in the general population: (1) *low minority*: less than 5% people of color; (2) *moderately-low minority*: 5 to 14.99%; (3) *moderately-high minority*: 15 to 24.99%; and (4) *high minority*: 25% and greater. These categories were decided upon on the basis of what are considered reasonable increases in the size of a community's nonwhite population. The vast majority of towns in Massachusetts have very small minority populations of "less than 5%." However, when the remaining towns are analyzed, 10% increases in population proportions seemed logical for generating relatively acceptable frequencies in each category.

**Racial Status of Massachusetts Communities: Percentage of Population that is Non-White**

| Racial Status of Town | Percentage of Town that is Non-White | Number of Towns | Percentage of all Towns | Cumulative Percentage of all Towns |
|---|---|---|---|---|
| low minority | less than 5% | 231 | 63.8 | 63.8 |
| moderately-low | 5 to 14.99% | 97 | 26.8 | 90.6 |
| moderately-high | 15 to 24.99% | 14 | 3.9 | 94.5 |
| high minority | 25% or more | 20 | 5.5 | 100 |
| totals | | 362 | 100 | |

There are only fourteen communities in the state where 15 to 24.99% of the population consists of people of color (moderately-high minority); and twenty communities where 25% or more of the population consists of people of color (high minority). Brockton is one of these communties.

For the purposes of this report, the term *communities of color* will refer to the combination of moderately-high minority and high minority communities. The term *white communities* will refer to the combination of low minority and moderately-low minority communities. According to the report *Unequal Exposure to Ecological Hazards 2005: Environmental Injustices in the Commonwealth of Massachusetts,*[4] low income communities in the Bay State face a cumulative exposure rate to environmentally hazardous facilities and sites which is four times greater than high income communities. In addition, high minority communities face a cumulative exposure rate to environmentally hazardous facilities and sites which is over twenty times greater than low minority communities. As the report demonstrates, not all communities in Massachusetts are polluted equally. Environmentally hazardous sites and facilities of all kinds are disproportionately located in working class towns and communities of color. But environmental injustices can also be considered to occur when specific communities – regardless of their racial, ethnic, and/or class-based demographic profile – are overburdened by the presence of environmentally hazardous sites and facilities relative to other communities in the state.

## Unequal Exposure to Hazardous Waste Sites

In thousands of communities across the United States, billions of pounds of highly toxic chemicals including mercury, dioxin, PCBs, arsenic, lead, and heavy metals such as chromium have been dumped in the midst of unsuspecting neighborhoods. These sites poison the land, contaminate drinking water, and potentially cause cancer, birth defects, nerve and liver damage, and other illnesses. The worst of these are called National Priority List (NPL) or Superfund sites, named after the 1980 law to clean up the nation's most dangerous toxic dumps. In a 1991 study, the National Research Council found that there were over 41 million people who lived within four miles of at least one of the nation's roughly 1,500 Superfund waste sites.[5] It is estimated that groundwater contamination is a problem at over 85 percent of the nation's Superfund sites -- a particularly alarming statistic given that over 50 percent of the American people rely upon groundwater sources for drinking. Although these dumps are the worst of the worst, the Office of Technology Assessment recently estimated that there are as many as 439,000 other illegal hazardous waste sites in the country. [6]

In Massachusetts, there are 31 Sites on the EPA's National Priorities List, located [totally or partially] in 42 towns. The *Fort Devens Site* encompasses parts of the towns of Ayer, Shirley, Lancaster, Harvard. The *Fort Devens-Sudbury Training Annex Site* encompasses parts of the

---

[4] See Daniel Faber and Eric Krieg, *Unequal Exposure to Ecological Hazards 2005: Environmental Injustices in the Commonwealth of Massachusetts*, a report by the Philanthropy and Environmental Justice Research Project, Northeastern University, October 12, 2005.

[5] See National Research Council, *Environmental Epidemiology: Public Health and Hazardous Wastes* (Washington, DC: National Academy Press, 1991).

[6] For a review, see Environmental Research Foundation, *Rachel's Hazardous Waste News*, No.332, April 8, 1993, pp.1-2.

towns of Sudbury, Maynard, Hudson, and Stow. The *Hanscom Field/Hanscom Air Force Base Site* encompasses parts of Bedford, Concord, Lexington, and Lincoln. The *Otis Air National Guard/Camp Edwards Site* encompasses parts of Falmouth, Bourne, Sandwich, and Mashpee. The *South Weymouth Naval Air Station Site* encompasses parts of Weymouth, Abington, and Rockland. The *W.R. Grace & Company, Inc., Site* encompasses parts of Acton and Concord. The remaining 25 sites are located in single towns.[7] These towns are home to more than one million residents, including well over 100,000 people of color.[8] In addition to these Superfund sites, there are over 30,578 state Department of Environmental Protection (DEP) hazardous waste sites in the Commonwealth. Some 3,741 of these sites (which include EPA Superfund sites) are considered serious Tier I or II sites.

For residents living near Superfund waste sites, the National Research Council has found a disturbing pattern of elevated health problems, including heart disease, spontaneous abortions and genital malformations, and death rates, while infants and children are found to suffer a higher incidence of cardiac abnormalities, leukemia, kidney-urinary tract infections, seizures, learning disabilities, hyperactivity, skin disorders, reduced weight, central nervous system damage, and Hodgkin's disease.[9] Exposure to industrial chemicals is also believed by scientists to be contributing to the dramatic increases since the 1950s in cancer of the testis, prostate gland, kidney, breast, skin, and lung, as well as malignant myeloma, non-Hodgkin's lymphoma, and numerous childhood cancers[10] – a cancer epidemic that kills half-a-million Americans each year. In fact, cancer now kills more American children than any other single disease for the first time in history. In Massachusetts, elevated rates of leukemia (especially among children) has been linked to the industrial chemical trichloroethylene found in the town of Woburn's drinking water,

---

[7] United States Environmental Protection Agency, Superfund Remedial Sites, National Priorities List, April 11, 2000.

[8] The General Electric-Housatonic River site is still as the proposal stage, and has yet to be officially listed.

[9] Numerous other studies have documented similar health impacts as the NRC report. See Dean B. Baker, et.al., "A Health Study of Two Communities [sic] Near the Stringfellow Waste Disposal Site," *Archives of Environmental Health*, Vol.43 (Sept./Oct., 1988: 325-334); Sandra A. Geschwind, et.al., "Risk of Congenital Malformations Associated with Proximity to Hazardous Waste Sites," *American Journal of Epidemiology*, vol.135 (1992: 1197-1207); Stanley J. Goldberg, "An Association of Human Congenital Cardiac Malformations and Drinking Water Contaminants," *Journal of the American College of Cardiology*, Vol.16, No.1 (July, 1990: 155-164); Robert Hoover and Joseph F. Fraumeni, Jr., "Cancer Mortality in U.S. Counties with Chemical Industries," *Environmental Research*, Vol.9 (1975: 196-207); Beverly Paigen, et.al., "Prevalence of health Problems in Children Living Near Love Canal," *Hazardous Waste & Hazardous Materials*, Vol.2, No.1 (1985: 23-43); and J.B. Andelman and D.W. Underhill, (eds.), *Health Effects from Hazardous Waste Sites* (Chelsea, MI: Lewis, 1987)..

[10] For a discussion of the environmental impacts on cancer rates, see Eric J. Krieg, "Toxic Wastes, Race, and Class: A Historical Interpretation of Greater Boston" (Ph.D. Dissertation, Northeastern University, 1995), pp.1-26; Sandra Steingraber, *Living Downstream: An Ecologist Looks at Cancer and the Environment* (New York: Addison-Wesley, 1997); and Richard W. Clapp, "The Decline in U.S. Cancer Mortality From 1991-1995: What's Behind the Numbers?," *New Solutions: A Journal of Environmental and Occupational Health Policy*, Vol.7, No.4 (Summer 1997: 30-34).

as well as tetrachloroethylene in drinking water on the Upper Cape.[11] Massachusetts now has one of the highest rates of breast cancer in the country -- some 4,400 women are diagnosed and 1,000 women die each year. Women living on Cape Cod are particular vulnerable, having a 20 percent higher rate of breast cancer than women living elsewhere in the state.[12]

As is evident from the proliferation of toxic waste sites, many current policy initiatives are actually intensifying problems they were designed to cure. Most environmental laws require businesses to *contain* pollution sources for more proper treatment and disposal (in contrast to the previous practice of dumping onsite or into nearby commons). Once the pollution is "trapped," the manufacturing industry pays the state or a private company for its treatment and disposal. The waste, now commodified, becomes mobile, crossing local, state, and even national borders in search of "efficient" (i.e., low-cost and politically feasible) areas for treatment, incineration, and/or disposal. More often than not, the waste sites and facilities are themselves hazardous and located in poor working class neighborhoods and communities of color.[13] In this respect, an environmental issue impacting the general population has been addressed in a manner which displaces the problem in a new form onto more politically marginalized sectors of the population.

Hazardous waste sites nationwide are among the more concentrated environmental hazards confronting low income neighborhoods and communities of color. According to a 1987 report by the United Church of Christ's Commission on Racial Justice, three out of five African Americans and Latinos nationwide live in communities that have illegal or abandoned toxic dumps. Communities with one hazardous waste facility have twice the percentage of people of color as those with none, while the percentage triples in communities with two or most waste

---

[11] See J.J. Cutler, G.S. Parker, S. Rosen, B. Prenney, R. Healey, and G.G. Caldwell, "Childhood Leukemia in Woburn, Massachusetts," *Public Health Reports*, Vol.101, No.2 (1986: 201-205); S.W. Lagakos, B.J. Wessen, and M. Zelen, "An Analysis of Contaminated Well Water and Health Effects in Woburn, Massachusets," *Journal of the American Statistical Association*, Vol.81 (1986: 583-614); and Ann Aschengrau, David Ozonoff, Chris Paulu, Patricia Coogan, R. Vezina, Timothy Heeren, and Yuqing Zhang, "Cancer Risk and Tetrachloroethylene-Contaminated Drinking Water in Massachusetts," *Archives of Environmental Health*, Vol.48, No.5 (1993: 284-292).

[12] The Silent Spring Institute is conducting an extensive investigation of the possible environmental causes of the breast cancer epidemic on Cape Cod. See *The Cape Code Breast Cancer and Environment Study: Results of the First Three Years of Study* (Newton: Silent Spring Institute, 1998).

[13] For studies which examine the inequitable distribution of hazardous waste facilities in specific regions of the country, see Robert D. Bullard*, Dumping in Dixie: Race, Class, and Environmental Quality* (Boulder, CO: Westview Press, 1990); Robert D. Bullard, (ed.), *Unequal Protection: Environmental Justice and Communities of Color* (San Francisco: Sierra Club Books, 1994); Bunyan Bryant and Paul Mohai, (eds.), *Race and the Incidence of Environmental Hazards: A Time for Discourse* (Boulder, CO: Westview Press, 1992); and Daniel R. Faber, (ed.), *The Struggle for Ecological Democracy: Environmental Justice Movements in the United States* (New York: Guilford Press, 1998).

sites.[14] A subsequent follow-up study conducted in 1994 has now found the risks for people of color to be even greater than in 1987, as they are 47 percent more likely than whites to live near these potentially health-threatening facilities.[15] In short, race and poverty are the two most critical demographic factors for determining where commercial hazardous waste facilities are located in the United States (including hazardous waste generators of all sizes across the Commonwealth of Massachusetts).[16] That the "disempowered" of American society should serve as the dumping ground for American business is often blatantly stated by industry itself. A 1984 report by Cerrell Associates for the California Waste Management Board, for instance, openly recommended that polluting industries and the state locate hazardous waste facilities in "lower socio-economic neighborhoods" because those communities had a much lower likelihood of offering political opposition.[17]

Federal governmental enforcement actions also appear to be uneven with regard to the class and racial composition of the impacted community. According to a 1992 nationwide study which appeared in the *National Law Journal*, Superfund toxic waste sites in communities of color are likely to be cleaned 12 to 42 percent *later* than sites in white communities. Communities of color also witness government penalties for violations of hazardous waste laws which are on average only one-sixth ($55,318) of the average penalty in predominantly white communities ($335,566). The study also concluded that it takes an average of 20 percent longer for the government to place toxic waste dumps in minority communities on the National Priorities List (NPL), or Superfund list, for cleanup than sites in white areas.[18] A more recent 2005 study confirms that a site in a low income or high minority area is less likely to make the Superfund list, and takes significantly longer to reach the NPL if it is listed. So, despite their over-representation in proximity to environmental hazards, communities of color are under-

---

[14] See Benjamin F. Chavis, Jr., and Charles Lee, *Toxic Wastes and Race in the United States: A National Report on the Racial and Socioeconomic Characteristics of Communities Surrounding Hazardous Waste Sites* (New York: United Church of Christ Commission for Racial Justice, 1987). This study analyzed data on the number and type of hazardous waste facilities in the approximately 35,5000 residential zip codes of the United States, along with data on percent minority population, mean household income, mean home value, number of uncontrolled toxic waste sites per 1000 persons, and pounds of hazardous waste generated per person.

[15] See Benjamin Goldman and L. Fitton, *Toxic Waste and Race Revisited: An Update of the 1987 Report on the Racial and Socioeconomic Characteristics of Communities with Hazardous Waste Sites* (Washington, DC: Center for Alternatives, the National Association for the Advancement of Colored People, and the United Church of Christ Commission for Racial Justice, 1994).

[16] See Lisa Spence, *Race, Class, and Environmental Hazards: A Study of Socio-Economic Association with Hazardous Waste Generators and Treatment/Storage/Disposal Facilities in Massachusetts* (Master's Thesis, Civil and Environmental Engineering, Tufts University, Medford, MA, 1995).

[17] See Julie Roque, "Review of EPA Report: 'Environmental Equity: Reducing Risk for All Communities'," *Environment*, Vol.35, No.5 (June 1993: 25-28).

[18] See Marianne Lavelle and Marcia Coyle, "Unequal Protection: The Racial Divide in Environmental Law," *National Law Journal*, September 21, 1992, pp.2-12.

represented in environmental cleanup programs (such as the EPA Superfund program).[19]

## Table 2
### Hazardous Waste Sites in Brockton

| Type of Hazardous Waste Site (DEP, 2005) | Average Number of Waste Sites per Town in MA | Total Number of Waste Sites in Brockton | Average Number of Sites per Square Mile in MA Towns | Total Sites Per Square Mile in Brockton |
|---|---|---|---|---|
| | 84 | **347** | 7.3 | 16.06 |

In Massachusetts, there are currently over 30,578 hazardous waste sites, including 3,741 more serious Tier I-II sites, according to October 2004 DEP data. There is an average of 84 hazardous waste sites per town in the Commonwealth of Massachusetts. As indicated in Table 2 on "Hazardous Waste Sites in Brockton," there appears to be a significant concentration of hazardous waste sites (347). Sixty of these sites are the more serious (Tiered) waste sites. Brockton has an average of over 16 hazardous waste sites per square mile, which is more than double the statewide average of 7.3 waste sites per square mile.

### Polluting Industrial Facilities in Brockton

In Massachusetts, poor air quality poses a serious threat to public health. According to data provided by the EPA's Cumulative Exposure Project (CEP), every county in Massachusetts has levels of key air-borne toxic chemicals in the form of volatile organic compounds (VOCs) that exceed health-based state levels. There are at least 16 toxic compounds which exceed the acceptable levels of concentration set by both federal regulatory agencies and the MA Allowable Ambient Limits (AAL) of the Department of Environmental Protection (DEP).[20] For instance,

---

[19] See Sandra George O'Neil, "Environmental Justice in the Superfund Clean-Up Process." Ph.D. Dissertation (Boston College, Department of Sociology, April 2005).

[20] In Massachusetts, *mobile sources* (primarily motor vehicles) are responsible for 42 percent of the total HAP emissions in the state. *Area Sources*, which are smaller air sources that release less than 10 tons per year of any individual HAP and less than 24 tons per year of combined HAPs, emit 51 percent of all HAPs in the state. Examples include gas stations, dry cleaners, and small print shops. *Point sources* are stationary facilities that emits

concentrations of benzene, 1,3-butadiene, formaldehyde and acrolein -- chemicals which are known to cause numerous adverse health effects, including neurological disorders, birth defects, reproductive disorders and respiratory diseases -- exceed the AAL health-based risk standards in all counties *by up to 80 times*. Nearly 1,300 deaths are caused by particulate air pollution in Massachusetts each year.[21] Another three quarters of a million Massachusetts residents are put at risk each summer from high smog levels, which is particularly harmful to children, the elderly, and those with respiratory problems. Some 8,000 of these people will end up in the hospital, and over 24,000 will visit emergency rooms. Cancer rates in the state currently exceed the national average, and toxic air pollutants are believed to be a major contributor to the problem. The Natural Resources Defense Council (NRDC) estimates that nearly 1,500 people die prematurely every year in the New England region from problems aggravated by air pollution.[22]

In recent years a number of studies have been conducted on the unequal exposure to air pollution and other environmental hazards. The findings of these studies point to a consistent pattern of racial and class-based ecological injustices.[23] Within America's urban areas, for instance, lower-income people (particularly those living below the poverty level) are found to be more greatly exposed to combined concentrations of air pollutants than higher-income populations. Similarly, people of color are consistently exposed to significantly more air pollution nationwide than whites (with the race gap being wider and more consistent than the income gap).[24] According to the EPA, 57 percent of all whites nationwide live in areas with poor air quality, compared to 80

---

(or has the potential to emit) 10 tons or more per year of any one of the listed HAPS, or 25 tons or more per year of combined HAPs, emit 7 percent of the total HAPs in the state. Examples of point sources include chemical plants, paper mills, power plants, and waste incinerators. See Michelle Toering and Rob Sargent, *Every Breath We Take: How Motor Vehicles Contribute to High Levels of Toxic Air Pollution in Massachusetts* (Boston: A Report for the MASSPIRG Education Fund, July 8th, 1999), pp.1-32.

[21] See Richard Wiles, Jacqueline Savitz, and Brian A. Cohen, *Particulate Air Pollution in Boston: Human Mortality, Pollution Sources and the Case for Tougher Clean Air Standards*, a report by the Environmental Working Group (Washington, DC: 1997), pp.1-2.

[22] See Natural Resources Defense Council (NRDC), *Breathtaking: Premature Mortality Due to Particulate Air Pollution in 239 American Cities* (Washington D.C.: May 1996).

[23] For a concise summary of these studies, see Paul Mohai and Bunyan Bryant, "Demographic Studies Reveal a Pattern of Environmental Injustice," pp.10-24 in Jonathan S. Petrikin (ed.), *Environmental Justice* (San Diego: Greenhaven Press, 1995).

[24] See Michael Gelobter, "Toward a Model of 'Environmental Discrimination'," in Paul Mohai and Bunyan Bryant, (eds.), *Race and the Incidence of Environmental Hazards: A Time for Discourse* (Boulder, CO: Westview Press, 1992), pp.64-81; and L. Gianessi, H.M. Peskin, and E. Wolff, "The Distributional Effects of Uniform Air Pollution Policy in the U.S.," *Quarterly Journal of Economics* (May 1979: 281-301).

percent of all Latinos.[25] In Los Angeles, it is estimated that 71 percent of the city's African Americans and 50 percent of the Latinos live in what are categorized as the most polluted areas, compared to only 34 percent of whites.[26] Unequal exposure to air pollutants for lower-income families and people of color is further aggravated by substandard housing; inadequate health care; a lack of public parks and safe spaces; a lack of social services; and so forth.

In a previous study, Nancy Maxwell explored whether polluting industrial land uses were differentially distributed with respect to the racial (percent of minority population) and class (median family income and percent living in poverty) compositions of 351 cities and towns in Massachusetts. She also examined whether higher intensities of polluting land uses were associated with increased incidence of certain cancers. The study used demographic and land use data from three time points spanning the 35-year period from 1950-85, as well as historical data on industry.[27] The study sought to answer two questions: (1) are there inequities in the social distribution of polluting land uses across Massachusetts communities?; and (2) are higher intensities of polluting land uses associated with increased cancer in Massachusetts communities? This study found that traditional manufacturing industries (associated with the "old" economy) inequitably burdened lower-income, higher-poverty, and higher-minority populated communities. The results of the regression analyses of land use and cancer also suggested that higher intensities of total manufacturing and industrial/commercial land uses were associated with a higher incidence of lung cancer (and probably also bladder cancer and non-Hodgkin's lymphoma).[28]

A 1993 study of Essex, Hampden, Middlesex, Norfolk, Suffolk, and Worcester counties in Massachusetts between 1987 and 1992 utilizing Resource Conservation and Recovery Act

---

[25] See D.R. Wernete and L.A. Nieves, "Breathing Polluted Air: Minorities are Disproportionately Exposed," *EPA Journal*, March/April 1992, p.16.

[26] See Eric Mann, *L.A.'s Lethal Air: New Strategies for Policy, Organizing, and Action* (Los Angeles: Labor/Community Strategy Center, 1991).

[27] Demographic data came from the U.S. Census; land use data are from a series of statewide aerial surveys, supplemented by U.S. and Massachusetts Census of Manufactures data on manufacturing industry. Cancer incidence data from 1982-1990 came from the Massachusetts Cancer Registry. The cancers of concern, selected on the basis of confirmed or tentative links to agricultural or industrial chemicals, are non-Hodgkin's lymphoma (NHL), leukemia, multiple myeloma, soft tissue sarcoma, and cancers of the brain, stomach, prostate, bladder, kidney, lung, and breast. See Nancy Irwin Maxwell, "Land Use, Demographics, and Cancer Incidence in Massachusetts Communities," (Ph.D. Dissertation: Boston University School of Public Heath, 1996).

[28] The incidence of lung cancer was associated with industrial/commercial land use, but only in specific years which suggests that the high-tech industries disproportionately hosted by well-to-do suburbs do not carry the same lung cancer risk as traditional, high air-pollution manufacturing.

(RCRA) found that the vast majority of people of color are concentrated in the counties where 82.7 percent of the state's *large quantity generators* (LQG) of toxic materials and all commercial hazardous waste *treatment, storage, and disposal* (TSD) facilities are located.

In this section of the report, I summarize information from the state's Large Quantity Toxics Users who reported to the Massachusetts Toxics Use Reduction Act (TURA) Program from 1990-2002. As required under TURA, manufacturers meeting certain thresholds must report to the public the quantity and types of toxic chemicals they use. A company must report under TURA if is annually manufactures, processes, or uses 10,000 pounds of toxic chemicals or more. These toxic chemicals pose a threat to nearby residents, workers, and the environment from potential accidents, releases on-site into the immediate environment, worker handling, waste disposal, toxins in the product, and product disposal.

Between 1990-2002, some 1,298 distinct TURA-covered industrial facilities utilized nearly 14.228 billion pounds of toxic chemicals in production (does not include quantities for chemicals considered trade secret). During this same time frame, these facilities released on-site some 204,302,113 million pounds of chemical waste byproduct directly into the environment (discharged into the air, ground, underground, or adjacent bodies of water) of the communities in which they were located. This is an amount of pollution equivalent to 2,554 tractor-trailer trucks each loaded with 80,000 pounds of toxic waste.[29] Low income communities ($39,524 or less median household income) and medium-low income communities ($39,525-52,700) together comprise 47 percent of all communities in Massachusetts, but are home to 58.5 percent of all TURA facilities and 79.4 percent of all chemicals used by TURA facilities. More importantly, *these lower income communities received 74.6 percent of all chemical releases into the local environment by TURA facilities during this time*. While higher income communities ($52,701 or more median household income) represent over half of all communities in the state (53.7%), they house 41.5 percent of all TURA facilities and just 20.6 percent of all chemicals used by TURA facilities. More importantly, only 25.4 percent of all chemical *releases* into the local environment from 1990-2002 occurred in these higher income communities.[30]

---

[29] The Toxics Use Reduction Act (TURA) was enacted in 1989, and had a stated 10-year goal of reducing the generation of toxic waste by 50% from the base year of 1987 to 1997. From 1990, the first reporting year, to 1998, there was a 48% reduction production adjusted byproduct. Using the same adjustment method, TURA filers were equally successful in reducing their releases of TRI reported on-site chemicals by 83%. See Massachusetts Department of Environmental Protection, Bureau of Waste Prevention, *1998 Toxics Use Reduction Information Release,* A Report Developed in Conjunction with the Office of Technical Assistance for Toxics Use Reduction, the Toxics Use Reduction Institute, and the Executive Office of Environmental Affair (Spring 2000: 1-34).

[30] A *release* is defined by the Toxics Use Reduction Institute (TURI) as a "discharge of a toxic chemical to the environment. This includes releases to the air, either as a stack or fugitive emission, discharges to bodies of water such as streams or lakes, or discharges to the ground or underground. In contrast, *emission(s)* are a release of

As seen in Table 3 below, Brockton exceeded the mean statewide average of 12,656 pounds of industrial releases per square mile in high income communities.

## Table 3

### Industrial Chemical Emissions in Brockton (1990-2002)

| Town | Average Total Chemical Releases in High Income Towns | Total Chemical Releases (lbs.) in Brockton | Chemical Releases Per Square Mile in High Income Towns | Chemical Releases Per Square Mile in Brockton |
|---|---|---|---|---|
| **Brockton** | 246,428 | 341,090 | 12,656 | 15,791 |

toxic or hazardous substance to the environment or a transfer of a toxic or hazardous substance in waste to an off-site location.

## Incinerators, Trash Transfer Stations, and Landfill-Type Operations in Brockton

**L**andfills can also pose health hazards to communities. Seven former Massachusetts landfills are now federal Superfund sites, and even newer ones, which are lined with plastic, will eventually leak, and could threaten underground water supplies. There are a total of 980 different landfill-type operations (including transfer stations and incinerators) in the Commonwealth. Tables 4 & 5 provide data on six different types of landfills: incinerator ash landfills (18); demolition landfills (46); illegal sites (15); sludge landfills (15); tire piles (1); and municipal solid waste landfills or garbage dumps (599). Data is also included for two types of related facilities: trash transfer stations (262); and inactive municipal incinerators (24).

As outlined in Table 4, the state's demolition landfills, illegal sites, and sludge landfills are relatively more heavily concentrated in lower income communities. For instance, low income communities make up 10.2 percent of all towns in the state, but are home to 17.4 percent of all demolition landfills, 26.7 percent of all illegal sites, and 20 percent of all sludge landfills. To explore these disparities in more detail, it is important to control for the size of the community by calculating the number of these kinds of sites and facilities per square mile. This allows us to reveal a more accurate exposure rate. As shown in Table 4, low income communities have a higher number of landfill-types per town and per square mile, although the differences are not extreme. This is explained by the equal distribution of a large number of solid waste landfills in all kinds of towns in Massachusetts. Still, total landfills are more concentrated in low income communities, averaging .22 per square mile, in comparison to .13 to .17 psm for all other communities. The Thatcher Landfill in Brockton, for instance, is about 1.5 miles from the proposed power plant site.

In terms of potential racial disparities, Table 5 reveals that demolition landfills and illegal sites are disproportionately located in communities of color. However, when controlling for the size of the community by calculating the number of these kinds of sites and facilities per square mile, we find broader racial disparities. In comparison to low minority communities, which average .12 of all landfill types per square mile, high minority communities average .35 of these facilities per square mile, *a rate over three times higher.* As seen in the previous tables, our category of landfill-type operations include facilities such as transfer stations . Brockton (6) exceeds the statewide average of 2.7 landfill-type operations. Brockton (.28) also exceeds the statewide average of .15 landfill-type operations per square mile.

## Table 4: Class-Based Disparities in the Location of All Landfill-Types

| **Median Household Income** 2000 U.S. Census Expressed in 1990 Dollars N=Number of Towns (Percent of all Towns) | | Number of Incinerator Ash Landfills | Number of Demolition Landfills | Number of Illegal Sites | Number of Sludge Landfills | Number of Tire Piles | Number of Municipal Solid Waste Landfills | Number of Transfer Stations | Number of Inactive Municipal Incinerators | Average Number of all Landfill - Types per Town | Average Number of all Landfill-Types per Square Mile |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **$0 to 39,524 (Low Income)** N=37 (10.2%) | Count | 2 | 8 | 4 | 3 | 0 | 66 | 26 | 7 | 3.1 | .22 |
| | Percent | 11.1% | 17.4% | 26.7% | 20.0% | 0% | 11.0% | 9.9% | 29.2% | | |
| **$39,525 to 52,700 (Med. – Low)** N=133 (36.7%) | Count | 5 | 22 | 2 | 8 | 1 | 198 | 126 | 3 | 2.7 | .13 |
| | Percent | 27.8% | 47.8% | 13.3% | 53.3% | 100% | 33.1% | 48.1% | 12.5% | | |
| **$52,701 to 65,875 (Med. - High)** N=106 (29.9%) | Count | 9 | 10 | 7 | 3 | 0 | 197 | 64 | 6 | 2.8 | .17 |
| | Percent | 50.0% | 21.7% | 46.7% | 20.0% | 0% | 32.9% | 24.4% | 25.0% | | |
| **$65,876 and greater (High Income)** N=86 (23.8%) | Count | 2 | 6 | 2 | 1 | 0 | 138 | 46 | 8 | 2.3 | .15 |
| | Percent | 11.1% | 13.0% | 13.3% | 6.7% | 0% | 23.0% | 17.6% | 33.3% | | |
| Totals N=362 (100%) | | 18 100% | 46 100% | 15 100% | 15 100% | 1 100% | 599 100% | 262 100% | 24 100% | 2.7 | .15 |

## Table 5: Racially-Based Disparities in the Location of All Landfill-Types

| **Non-White Population** 2000 U.S. Census N=Number of Towns (Percent of all Towns) | | Number of Incinerator Ash Landfills | Number of Demolition Landfills | Number of Illegal Sites | Number of Sludge Landfills | Number of Tire Piles | Number of Municipal Solid Waste Landfills | Number of Transfer Stations | Number of Inactive Municipal Incinerators | Average Number of all Landfill-Types per Town | Average Number of all Landfill-Types per Square Mile |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Less than 5% (Low Minority)** N=231 (63.8%) | Count | 7 | 28 | 6 | 12 | 1 | 356 | 168 | 2 | 2.5 | .12 |
| | Percent | 38.9% | 60.9% | 40.0% | 80.0% | 100% | 59.4% | 64.1% | 8.3% | | |
| **5 to 14.99% (Low - Moderate)** N=97 (26.8%) | Count | 6 | 12 | 3 | 2 | 0 | 185 | 73 | 11 | 3.0 | .18 |
| | Percent | 33.3% | 26.1% | 20.0% | 13.3% | 0% | 30.9% | 27.9% | 45.8% | | |
| **15 to 24.99% (Moderate - High)** N=14 (3.9%) | Count | 4 | 1 | 2 | 0 | 0 | 29 | 12 | 7 | 3.7 | .27 |
| | Percent | 22.2% | 2.2% | 13.3% | 0% | 0% | 4.8% | 4.6% | 29.2% | | |
| **25% and greater (High Minority)** N=20 (5.5%) | Count | 1 | 5 | 4 | 1 | 0 | 29 | 12 | 4 | 2.8 | .35 |
| | Percent | 5.6% | 10.9% | 27.7% | 6.7% | 0% | 4.8% | 4.6% | 16.7% | | |
| Totals N=362 (100%) | | 18 100% | 46 100% | 15 100% | 15 100% | 1 100% | 599 100% | 262 100% | 24 100% | 2.7 | .15 |

## Exposure to Cumulative Environmental Hazards in Brockton

Many past studies on the disproportionate exposure of low income communities and communities of color have focused on single indicators of environmental hazards. This study provides a composite measure to assess community exposure rates which includes all hazardous facilities and sites. We have developed a point system which weighs the average risks of each various type of hazardous facility/site to arrive at a cumulative measure of community exposure to all potential hazards. The point system is shown in Table 6.

**Table 6: Environmental Hazard Point System for 2005**

| Type of Hazardous Facility or Site | Points for Rating Severity of Each Facility or Site |
|---|---|
| **Sites and Releases** | |
| EPA National Priority List Site | 25 |
| DEP TIER 1A Site | 10 |
| DEP TIER 1B | 8 |
| DEP TIER 1D (Formerly defaulted to TIER 1B) | 8 |
| DEP TIER 1C | 6 |
| DEP TIER 2 | 4 |
| DEP Other Sites | 1 |
| **Landfill Types (O – Operating, NO – Not Operating)** | |
| Ash Landfill (O) | 6 |
| Ash Landfill (NO) | 3 |
| Demolition Landfill (O) | 6 |
| Demolition Landfill (NO) | 3 |
| Illegal Site (O) | 6 |
| Illegal Site (NO) | 3 |
| Municipal Incinerator (O) | 10 |
| Municipal Incinerator (NO) | 3 |
| Recycling Facility (O) | 4 |

| Type of Hazardous Facility or Site | Points for Rating Severity of Each Facility or Site |
|---|---|
| **Sites and Releases** | |
| Recycling Facility (NO) | 2 |
| Resource Recovery Facility (O) | 10 |
| Resource Recovery Facility (NO) | 3 |
| Municipal Solid Waste Landfill (O) | 6 |
| Municipal Solid Waste Landfill (NO) | 3 |
| Sludge Landfill (O) | 6 |
| Sludge Landfill (NO) | 3 |
| Transfer Station (O) | 6 |
| Transfer Station (NO) | 3 |
| Tire Pile (All tire piles) | 6 |
| **Industrial Facilities** | |
| TURA Facilities | 5 |

To determine the cumulative exposure to environmentally hazardous facilities and sites, we totaled the points for each hazardous facility and site in each community. Since geographically larger communities could have more facilities and sites, it is necessary to control for the spacial size of each community. This can be done by calculating the average number of hazard points per square mile. This results in a more valid measure of exposure rate. When this is done we find gross imbalances in average hazard point totals for lower income communities and communities of color

As indicated in Table 7, "Unequal Exposure to All-types of Hazardous Facilities/Sites Combined," low minority communities (less than 5% people of color) average only 4.3 points per square mile, compared to 87.7 points per square mile for high minority communities. In other words, *high minority communities face a cumulative exposure rate to environmentally hazardous facilities and sites which is over twenty times greater than low minority communities*. In fact, there is consistently sharp increase in the cumulative exposure rate to these hazardous facilities/sites which directly corresponds to increases in the size of the minority population in all communities.

As indicated in Table 7, low income communities ($39,525<) average 35.3 environmental hazard points per square mile. This rate stands in dramatic contrast to the exposure rates for all other communities (where median household income is $39,525 or greater), which ranges from 8.5 to 14.3 points per square mile. As a result, *low income communities face a cumulative exposure rate to environmentally hazardous facilities and sites which is two-and-a-half to four times greater than all other communities in the state*. As is the case with communities of color, low income communities are disproportionately exposed to environmental hazards of all kinds. The data indicates that racial and class-based environmental injustices appear to be profound in the Commonwealth of Massachusetts.

**Table 7: Unequal Exposure to All-Types of Hazardous Facilities/Sites Combined**

| **Non-White Population**<br>2000 U.S. Census<br>N=Number of Towns<br>(Percent of all Towns) | Average Number of Hazard Points per Square Mile | **Median Household Income**<br>2000 U.S. Census<br>N=Number of Towns<br>(Percent of all Towns) | Average Number of Hazard Points per Square Mile |
|---|---|---|---|
| **Less than 5%**<br>**(Low Minority)**<br>N=231<br>(63.8%) | 4.3 | **$0 to 39,524**<br>**(Low Income)**<br>N=37<br>(10.2%) | 35.3 |
| **5 to 14.99%**<br>**(Low - Moderate)**<br>N=97<br>(26.8%) | 15.7 | **$39,525 to 52,700**<br>**(Med. – Low Income)**<br>N=133<br>(37.7%) | 14.3 |
| **15 to 24.99%**<br>**(Moderate - High)**<br>N=14<br>(3.9%) | 54.9 | **$52,701to 65,875**<br>**(Med. – High Income)**<br>N=106<br>(29.9%) | 10.3 |
| **25% and greater**<br>**(High Minority)**<br>N=20<br>(5.5%) | 87.7 | **$65,876 and greater**<br>**(High Income)**<br>N=86<br>(23.8%) | 8.5 |
| Totals<br>N=362<br>(100%) | 13.9 | Totals<br>N=362<br>(100%) | 13.9 |

This claim is confirmed in Table 8, "Most Extensively Overburdened Communities in Massachusetts: Total Environmental Hazard Points per Town," which analyzes the twenty communities with the greatest number of environmentally hazardous industrial facilities and sites. Utilizing a method whereby the point totals for all hazards present in the community are added together, the table reveals that seventeen of the twenty most extensively overburdened towns in Massachusetts are of lower income status. *In fact, 10 of the worse 20 towns are classified as low income communities, where the median household income is less than $39,525.* In terms of racial disparities, we similarly find that *14 of the 20 most extensively overburdened towns in the state are communities of color.* This is significant in light of the fact that there are only 34 communities in the entire state where 15 percent or more of the population are people of color. *In fact, seven of the top ten most extensively overburdened communities are high minority communities (where 25 percent of the community are made up of people of color)!* Again, high minority communities comprise only 5.5 percent of all towns in the state, yet they comprise 80 percent of the ten most extensively overburdened towns.

These disparities are further explored in Table 9, "Most Intensively Overburdened Communities in Massachusetts: Total Hazard Points per Square Mile." This table calculates the point totals for all hazards present in the community divided by the total area of the town. This controls for the size of a community, and paints a more accurate portrayal of the density of environmental hazards. *As seen in the table, 17 of the 20 most intensively overburdened towns in Massachusetts are of lower income status (median household income of less than $52,701). Likewise, 16 of these 20 intensively overburdened towns in the state are communities of color.* As previously mentioned, this is significant in light of the fact that there are only 34 communities of color out of 362 communities in the entire state. *In fact, 12 of the 20 most intensively overburdened towns are of high minority status (25% or more people of color). Again, there are only twenty high minority communities in the state, and more than half appear on this list of the worst twenty rankings.*

In Table 10, "Environmental Rankings of Low Income Communities in Massachusetts," we have listed all 37 low income towns in the state. These rankings include "most extensively overburdened" (most hazard points per town) and "most intensively overburdened" (most total points per square mile). Fifteen of these low income communities are among the thirty most extensively overburdened communities in the state. In addition, thirteen of these low income communities are among the thirty most intensively overburdened communities in the state. Hence, it would appear that the class standing of a community is a major factor in determining the total environmental burden of a community. However, on closer inspection, there are two

findings that should be noted. First, all thirteen of the low income communities that are among the most intensively overburdened are communities of color. In addition, twelve of the 15 low income communities that make the list of the most extensively overburdened towns are also communities of color. Hence, race may be trumping class in determining these rankings. Secondly, a number of these low income communities (Gosnold, Monroe, Sunderland, Plainfield, and Hawley) are among the *least burdened* communities in the state.

In Table 11, "Environmental Rankings of Communities of Color in Massachusetts," we have listed all 34 communities of color in Massachusetts. These rankings also include the state's most extensively overburdened communities (most hazard points per town) and most intensively overburdened communities (most hazard points per square mile). The findings are rather remarkable. As indicated in Table 11, communities of color make up 19 (or 63%) of the 30 most extensively overburdened communities in the state. Similarly, *communities of color comprise 24 (or 80%) of the 30 most intensively overburdened communities – what we consider to be the most environmentally hazardous towns in the state*. These findings are significant. Again, communities of color comprise only 10% (or 34) of all 362 towns in the study. If the numbers were egalitarian, you would expect only three communities of color to make the list of the most hazardous towns.

**Table 8: Most Extensively Overburdened Communities in Massachusetts (Based on Total Environmental Hazard Points)**

| Rank | Town Name | Total Points | Class Status of Town * | Racial Status of Town** |
|---|---|---|---|---|
| 1 | Worcester | 1,698 | Low Income ($35,623) | Moderately-High Minority Pop. (22.9%) |
| 2 | Boston - Downtown | 1,449 | Medium-Low Income ($45,053) | High Minority Pop. (29.9%) |
| 3 | Springfield | 1,222 | Low Income ($30,417) | High Minority Pop. (43.9%) |
| 4 | Cambridge | 1,191 | Medium-Low Income ($47,979) | High Minority Pop (31.9%) |
| 5 | New Bedford | 964 | Low Income ($27,569) | Moderately-High Minority Pop. (21.1%) |
| 6 | Lowell | 807 | Low Income ($39,192) | High Minority Pop. (31.4%) |
| 7 | Boston – East Boston | 781 | Low Income ($31,310) | High Minority Pop. (32.2%) |
| 8 | Boston – Dorchester | 770 | Low Income ($37,890) | High Minority Pop. (65.8%) |
| **9** | **Brockton** | **709** | **Low Income ($39,507)** | **High Minority Pop. (38.5%)** |
| 10 | Boston – South Boston | 661 | Medium-Low Income ($40,311) | Moderately-Low Minority Pop. (13.0%) |
| 11 | Fall River | 658 | Low Income ($29,014) | Moderately-Low Minority Pop. (8.8%) |
| 12 | Framingham | 654 | Medium-High Income ($54,288) | Moderately-High Minority Pop. (20.2%) |
| 13 | Everett | 606 | Medium-Low Income ($40,661) | Moderately-High Minority Pop. (20.3%) |
| 14 | Waltham | 598 | Medium-High Income ($54,010) | Moderately-High Minority Pop. (17.0%) |
| 15 | Pittsfield | 596 | Low Income ($35,655) | Moderately-Low Minority Pop. (7.4%) |
| 16 | Somerville | 589 | Medium-Low Income ($46,315) | Moderately-High Minority Pop. (23.0%) |
| 17 | Woburn | 589 | Medium-High Income ($54,897) | Moderately-Low Minority Pop. (9.4%) |
| 18 | Quincy | 578 | Medium-Low Income ($47,121) | Moderately-High Minority Pop. (20.4%) |
| 19 | Lynn | 576 | Low Income ($37,364) | High Minority Pop. (32.1%) |
| 20 | Salem | 560 | Medium-Low Income ($44,033) | Moderately-Low Minority Pop. (14.6%) |

**Table 9: Most Intensively Overburdened Communities in Massachusetts (Total Environmental Hazard Points per Square Mile)**

| Rank | Town Name | Points per Square Mile | Class Status of Town | Racial Status of Town |
|---|---|---|---|---|
| 1 | Boston – Downtown | 321.2 | Medium-Low Income $45,053 | High Minority (29.9%) |
| 2 | Boston – South Boston | 211.2 | Medium-Low Income $40,311 | Moderately-Low Minority (13.0%) |
| 3 | Chelsea | 187.9 | Low Income $30,161 | High Minority (42.1%) |
| 4 | Boston - Charlestown | 183.2 | Medium-High Income $56,110 | Moderately-High Minority (17.7%) |
| 5 | Boston – East Boston | 173.2 | Low Income $31,310 | High Minority (32.2%) |
| 6 | Cambridge | 167.1 | Medium-Low Income $47,979 | High Minority (31.9%) |
| 7 | Everett | 165.5 | Medium-Low Income $40,661 | Moderately-High Minority (20.3%) |
| 8 | Somerville | 139.6 | Medium-Low Income $46,315 | Moderately-High Minority (23.0%) |
| 9 | Boston - Dorchester | 127.7 | Low Income $37,890 | High Minority (65.8%) |
| 10 | Boston - Roxbury | 123.9 | Low Income $27,133 | High Minority (89.9%) |
| 11 | Boston – Allston/Brighton | 107.3 | Low Income $38,941 | High Minority (26.5%) |
| 12 | Watertown | 91.6 | Medium-High Income $59,764 | Moderately-Low Minority (8.6%) |
| 13 | Malden | 75.6 | Medium-Low Income $45,654 | High Minority (27.9%) |
| 14 | Lawrence | 74.4 | Low Income $27,983 | High Minority (51.4%) |
| 15 | Boston – Jamaica Plain | 72.0 | Medium-Low Income $41,524 | High Minority (41.0%) |
| 16 | Lowell | 55.5 | Low Income $39,192 | High Minority (31.4%) |
| 17 | Boston – Hyde Park | 46.2 | Medium-Low Income $44,704 | High Minority (52.7%) |
| 18 | Woburn | 45.7 | Medium-High Income $54,897 | Moderately-Low Minority (9.4%) |
| 19 | Medford | 44.8 | Medium-Low Income $52,476 | Moderately-Low Minority (13.6%) |
| 20 | Worcester | 44.0 | Low Income $35,623 | Moderately-High Minority (22.9%) |

## Table 10: Environmental Rankings of Low Income Communities (37 Total)

| Town | Income | Total Points | State Ranking by Total Points | Points per Square Mile | State Ranking by Points per Square Mile |
|---|---|---|---|---|---|
| GOSNOLD | $22,344 | 13 | 338 | 0.1 | 362 |
| MONROE | $25,500 | 17 | 322 | 1.6 | 281 |
| BOSTON - ROXBURY (minority) | $27,133 | 488 | 25 | 123.9 | 10 |
| NEW BEDFORD (minority) | $27,569 | 964 | 5 | 40.1 | 23 |
| NORTH ADAMS | $27,601 | 197 | 96 | 9.6 | 110 |
| LAWRENCE (minority) | $27,983 | 552 | 22 | 74.4 | 14 |
| FALL RIVER | $29,014 | 658 | 11 | 17.2 | 64 |
| CHELSEA (minority) | $30,161 | 466 | 30 | 187.9 | 3 |
| SPRINGFIELD (minority) | $30,417 | 1222 | 3 | 36.8 | 28 |
| HOLYOKE (minority) | $30,441 | 445 | 35 | 19.5 | 57 |
| BOSTON - EAST BOSTON (minority) | $31,310 | 781 | 7 | 173.2 | 5 |
| ADAMS | $32,161 | 116 | 159 | 5.1 | 166 |
| PROVINCETOWN | $32,716 | 85 | 199 | 4.9 | 170 |
| BOSTON - MATTAPAN (minority) | $32,748 | 107 | 169 | 38.1 | 26 |
| GREENFIELD | $33,110 | 259 | 64 | 11.8 | 96 |
| ATHOL | $33,475 | 145 | 131 | 4.3 | 177 |
| MONTAGUE | $33,750 | 46 | 259 | 1.5 | 284 |
| SOUTHBRIDGE | $33,913 | 198 | 95 | 9.6 | 109 |
| WARREN | $34,583 | 86 | 197 | 3.1 | 213 |
| WORCESTER (minority) | $35,623 | 1698 | 1 | 44.0 | 20 |
| PITTSFIELD | $35,655 | 596 | 15 | 14.1 | 82 |
| CHICOPEE | $35,672 | 502 | 24 | 21.0 | 50 |
| ORANGE | $36,849 | 113 | 161 | 3.1 | 212 |
| WARE | $36,875 | 91 | 186 | 2.3 | 244 |
| FITCHBURG (minority) | $37,004 | 454 | 32 | 16.2 | 73 |
| TISBURY | $37,041 | 74 | 210 | 9.2 | 111 |
| REVERE (minority) | $37,067 | 402 | 37 | 40.1 | 24 |
| SUNDERLAND | $37,147 | 19 | 318 | 1.3 | 286 |
| PLAINFIELD | $37,250 | 14 | 334 | 0.7 | 326 |
| GARDNER | $37,334 | 266 | 62 | 11.6 | 97 |
| LYNN (minority) | $37,364 | 576 | 19 | 42.7 | 22 |
| BOSTON - DORCHESTER (minority) | $37,890 | 770 | 8 | 127.7 | 9 |
| HAWLEY | $38,125 | 9 | 354 | 0.3 | 354 |
| WEBSTER | $38,169 | 208 | 89 | 14.3 | 80 |
| BOST.-ALLSTON/BRIGHT. (minority) | $38,941 | 468 | 29 | 107.3 | 11 |
| LOWELL (minority) | $39,192 | 807 | 6 | 55.5 | 16 |
| **BROCKTON (minority)** | **$39,507** | **709** | **9** | **32.8** | **32** |

## Table 11: Environmental Rankings of Communities of Color (34 Total)

| Town | Percent of Population that is Non-White | Total Points | State Rank by Total Points | Total Points per Square Mile | State Rank by Total Points per Square Mile |
|---|---|---|---|---|---|
| BOSTON - MATTAPAN | 94.3 | 107 | 169 | 38.1 | 26 |
| BOSTON - ROXBURY | 89.9 | 488 | 25 | 123.9 | 10 |
| BOSTON - DORCHESTER | 65.8 | 770 | 8 | 127.7 | 9 |
| BOSTON - HYDE PARK | 52.7 | 202 | 92 | 46.2 | 17 |
| LAWRENCE | 51.4 | 552 | 22 | 74.4 | 14 |
| AQUINNAH | 46.5 | 13 | 338 | 0.3 | 351 |
| SPRINGFIELD | 43.9 | 1222 | 3 | 36.8 | 28 |
| CHELSEA | 42.1 | 466 | 30 | 187.9 | 3 |
| BOSTON - JAMAICA PLAIN | 41.0 | 221 | 84 | 72.0 | 15 |
| **BROCKTON** | **38.5** | **709** | **9** | **32.8** | **32** |
| BOSTON - ROSLINDALE | 37.6 | 128 | 148 | 34.4 | 29 |
| RANDOLPH | 37.2 | 180 | 104 | 17.1 | 66 |
| HOLYOKE | 34.2 | 445 | 35 | 19.5 | 57 |
| BOSTON - EAST BOSTON | 32.2 | 781 | 7 | 173.2 | 5 |
| LYNN | 32.1 | 576 | 19 | 42.7 | 22 |
| CAMBRIDGE | 31.9 | 1191 | 4 | 167.1 | 6 |
| LOWELL | 31.4 | 807 | 6 | 55.5 | 16 |
| BOSTON - DOWNTOWN | 29.9 | 1449 | 2 | 321.2 | 1 |
| MALDEN | 27.9 | 387 | 39 | 75.6 | 13 |
| BOSTON - ALLSTON/BRIGHTON | 26.5 | 468 | 29 | 107.3 | 11 |
| SOMERVILLE | 23.0 | 589 | 16 | 139.6 | 8 |
| WORCESTER | 22.9 | 1698 | 1 | 44.0 | 20 |
| NEW BEDFORD | 21.1 | 964 | 5 | 40.1 | 23 |
| AMHERST | 20.7 | 135 | 142 | 4.9 | 171 |
| QUINCY | 20.4 | 578 | 18 | 21.5 | 49 |
| EVERETT | 20.3 | 606 | 13 | 165.5 | 7 |
| FRAMINGHAM | 20.2 | 654 | 12 | 24.7 | 44 |
| BROOKLINE | 18.9 | 267 | 61 | 39.2 | 25 |
| FITCHBURG | 18.1 | 454 | 32 | 16.2 | 73 |
| BOSTON - CHARLESTOWN | 17.7 | 251 | 68 | 183.2 | 4 |
| WALTHAM | 17.0 | 598 | 14 | 43.9 | 21 |
| SHIRLEY | 16.1 | 39 | 274 | 2.5 | 240 |
| REVERE | 15.7 | 402 | 37 | 40.1 | 24 |
| LANCASTER | 15.5 | 91 | 186 | 3.2 | 207 |

Put another way, if you live in a white community, then you have a 1.8 percent chance of living in the most environmentally hazardous communities in the state.. However, if you live in a community of color, then there is a 70.6 percent chance that you live in one of the most hazardous towns. In short, if you live in a community of color, you are thirty-nine times more likely to live in one of the most environmentally hazardous communities in Massachusetts. The conclusion to be drawn from this analysis is that the communities most heavily burdened with environmentally hazardous industrial facilities and sites are overwhelmingly low income towns and/or communities of color. Clearly, not all Massachusetts residents are polluted equally – working class families and people of color are disproportionately impacted. Action is urgently required by the Energy Facilities Siting Board to address these disparities.

As seen in Table 11 above, Brockton (9th) ranks in the top 10 most extensively environmentally overburdened communities in Massachusetts (out of a total of 362 communities). Put another way, Brockton (709 points) exceeds the statewide average of 166 environmental hazard points per community.

**Table 12**
**Total Environmental Hazard Points Per Town in Brockton**

| | Hazard Points Per Square Mile in Brockton | Average Hazard Points for All MA Towns | Brockton's Total Environmental Hazard Points | Overall State Ranking (with 1 being the worse) |
|---|---|---|---|---|
| Brockton | 32.8 | 166 | 709 | 9 |

Note: Communities ranking in the top 25% of all overburdened towns are highlighted in red.

## UNEQUAL EXPOSURE TO POWER PLANTS

The electric power industry is one of the most polluting industries in New England and the entire country. Power plants emit 67 percent of the sulfur dioxide (SO2) in the U.S., a noxious gas that irritates the lungs and worsens asthma and causes significant respiratory problems. Power plants also produce over one-third of all mercury pollution, and 23 percent of nitrogen oxides (NOx) emissions, a major contributor to the formation of smog.[31] Smog, also called ground-level

[31] See Martha H. Keating and Felicia Davis, *Air of Injustice: African Americans & Power Plant Pollution*, a report by the Black Leadership Forum; Clear the Air; Georgia Coalition for Peoples' Agenda; and The Southern Organizing Committee for Economic and Social Justice (October 2002), pp.4.

ozone, is formed when nitrogen oxides, emitted as a byproduct of burning fossil fuels at electric power plants and in automobiles, mix with volatile organic compounds in the presence of sunlight. Smog is a major trigger of asthma, increased lung inflammation, coughing, and emergency hospitalization due to respiratory distress. The unhealthiest levels of smog are generally recorded during the summer. A recent nationwide study estimated that smog pollution in the summer of 1997 was responsible for more than 6 million asthma attacks, 159,000 emergency room visits and 53,000 hospitalizations (nearly 1,500 people die prematurely every year in New England from problems aggravated by air pollution).[32] Nationwide, sixty-eight percent of African Americans live within 30 miles of a coal-fired power plant. This is the distance within which the maximum effect of the smokestack plume are expected to occur.[33] This is believed to be a contributing factor to a death rate from asthma for African Americans that is twice that of whites (38.7 vs. 14.2 deaths per million population).[34] Power plants also account for 38 percent of carbon dioxide emissions – a greenhouse-causing gas – from the burning of fossil fuel. In addition, electric utilities are the leading source sulfuric acid and hydrochloric acid emissions in many states.[35]

Coal and oil-burning power plants, specifically those plants built prior to 1977, are a major source of air pollution in the state. In fact, utilities in Massachusetts are responsible for over 60 percent of the state's soot-forming sulfur dioxide emissions, 15 percent of the state's smog-causing nitrogen oxide emissions and 30 percent of the state's heat-trapping carbon dioxide emissions. Sulfur dioxide (SO2) emissions are the main precursor to the creation of soot -- tiny particles which penetrate deep into the throat and lungs (and causes an estimated 1,500 premature deaths each year in the northeastern region of the U.S., according to the American Lung Association). In Massachusetts, nearly 1,300 Massachusetts residents die each year from particulate air pollution.[36] Each summer, three quarters of a million Massachusetts residents are

---

[32] See Natural Resources Defense Council (NRDC), *Breathtaking: Premature Mortality Due to Particulate Air Pollution in 239 American Cities* (Washington D.C.: May 1996).

[33] See Martha H. Keating and Felicia Davis, *Air of Injustice: African Americans & Power Plant Pollution*, a report by the Black Leadership Forum; Clear the Air; Georgia Coalition for Peoples' Agenda; and The Southern Organizing Committee for Economic and Social Justice (October 2002), pp.1-15.

[34] See *Minority Lung Disease Data 2000*, American Lung Association, October 2000, available at www.lungusa.org.

[35] For the first time, electric utilities and mining facilities were included in the Environmental Protection Agency's annual toxic inventory report, which reviewed seven industrial sectors. See "EPA names leading toxic polluters," *The Boston Globe* (Friday, May 12, 2000), p.A21.

[36] See Richard Wiles, Jacqueline Savitz, and Brian A. Cohen, *Particulate Air Pollution in Boston: Human Mortality, Pollution Sources and the Case for Tougher Clean Air Standards*, a report by the Environmental Working

put at risk from high smog levels. Some 8,000 of these people will end up in the hospital, and over 24,000 will visit emergency rooms. The people currently most vulnerable to the effects of breathing smoggy air are children, the elderly and people with asthma or other respiratory diseases.[37] In the case of the Brockton power plant, the proposed project site is less than 1.5 miles from five schools: (1) Brockton Christian School; (2) Edgar B. Davis K-8 School; (3) South Junior High; (4) Gilmore Academy; and (5) Huntington Elementary School. The proposed site is also less than two miles from Campello Hi-Rise, a senior housing community, and 2,200 feet from Westbridge Landing, a 55 years and over community and home to the West Bridgewater intervenors.

**Table 13: Racial and Class-Based Disparities in the Location of Power Plants**

| **Non-White Population** 2000 U.S. Census N=Number of Towns (Percent of all Towns) | | Number of DEP Active Power Plants (2005) | Tons of $SO_2$, NOx, VOCs Released (2005) | **Median Household Income** 2000 U.S. Census N=Number of Towns (Percent of all Towns) | | Number of DEP Active Power Plants (2005) | Tons of $SO_2$, NOx, VOCs Released (2005) |
|---|---|---|---|---|---|---|---|
| **Less than 5% (Low Minority)** N=231 (63.8%) | Count | 11 | 81,002 | **$0 to 39,524 (Low Income)** N=37 (10.2%) | Count | 3 | 7,121 |
| | Percent | 40.7% | 70.7% | | Percent | 11.1% | 6.2% |
| **5 to 14.99% (Moderately-Low)** N=97 (26.8%) | Count | 8 | 16,747 | **$39,525 to 52,700 (Med. - Low)** N=133 (37.7%) | Count | 15 | 77,212 |
| | Percent | 29.6% | 14.6% | | Percent | 55.6% | 67.4% |
| **15 to 24.99% (Moderately-High)** N=14 (3.9%) | Count | 2 | 7,348 | **$52,701to 65,875 (Med. - High)** N=106 (29.9%)) | Count | 8 | 29,968 |
| | Percent | 7.4% | 6.4% | | Percent | 29.6% | 26.2% |
| **25% and greater (High Minority)** N=20 (5.5%) | Count | 6 | 9,448 | **$65,876 and greater (High Income)** N=86 (23.8%) | Count | 1 | 244 |
| | Percent | 22.2% | 8.2% | | Percent | 3.7% | 0.2% |
| Totals N=362 (100%) | | 27 100% | 114,545 100% | Totals N=362 (100%) | | 27 100% | 114,545 100% |

Group (Washington, DC: 1997), pp.1-2.

[37] See Becky Stanfield, Angie Farleigh and Gina Porreco, *Danger in the Air: Unhealthy Smog Days in 1999* (Washington, D.C.: A Report by the Clean Air Network and U.S. Public Interest Research Group Education Fund, January 2000), p.2.

As indicated in Table 13, "Racial and Class-Based Disparities in the Location of Power Plants", the state's power plants are disproportionately located in communities of color and lower income communities. Although communities of color comprise just 9.4 percent of all communities in the state, they are home to 29.6 percent of all active power plants. However, they receive only 14.6% of power plant releases of sulfur dioxide, nitrogen oxide, and volatile organic compounds. Likewise, while low and medium-low income communities together comprise 47.9 percent of all towns in the state, they are home to 66.7 percent of all power plants. In fact, medium-low income communities make up 37.7 percent of all communities but see 67.4 percent of all power plant emissions. In contrast, high income communities comprise 23.8 percent of all communities in the state but are home to only one power plant, and 0.2 percent emissions.

Large power plants pose significant health threats to nearby residents. As shown in Table 14, "Unequal Exposure to the Top Six Power Plant Polluters in Massachusetts," five of these six large plants are located in low- to medium-low income communities (two plants are in Somerset); indicating a class-bias in the location of the worst polluting power plants in the state. In terms of racial bias, both the Mount Tom (Holyoke) and Mystic (Everett) facilities are located in communities of color. If the numbers were representative, only one (or less) power plants would be located in a community of color. The remaining four power plants are located in low- to moderately-low minority communities. As a result, lower income communities and communities of color are disproportionately burdened by the some of the worst polluting power plants in all of New England.

Again, the potential health impacts for residents living in close proximity to these facilities are severe. Five of these dirtiest power plants in the state – the Canal, Brayton Point, Salem Harbor, Mount Tom, and Mystic plants – have emitted pollutants in recent years at a rate that is from 2.9 to 4.0 times the emission rate of plants built after 1977. The five plants are responsible for 89 percent of sulfur dioxide emissions and 57 percent of nitrous oxide emissions from all stationary sources in Massachusetts (the Brayton Point plant is the largest, most polluting power plant in all of New England). In fact, these five plants are responsible for more than 50 percent of the power plant pollution in all of New England.[38]

---

[38] Data for the first half of 1999 shows significant increases in nitrogen oxide and carbon dioxide, and slight decreases for sulfur dioxide (with the exception of the Brayton Point and Canal plants, which showed considerable gains). However, it should be noted that the overall reductions in sulfur dioxide recorded during that time frame stemmed from the fact that many units were shut down for repairs or maintenance – and not from improvement in air pollution control technologies. "Reports show that the Salem Harbor Plant in Salem was in fact shut down for good amount of time due to a fire at the plant, thus resulting in lower emission outputs. Even taking this into account, the emission rate of sulfur dioxide at Salem was still four times the emission rate of new coal-fire plants. The average emission rate of sulfur dioxide for all of Massachusetts was 1.04 lbs/mmBTU, 3.46 times the 0.3 lbs/mmBTU rate for newer, cleaner coal plants. See Michelle Toering, with Rob Sargent and Cindy Luppi, *Pollution Rising: New England Power Plants Emissions Trends 1st Half 1998 vs. 1st Half 1999* (Boston: A Report

**Table 14: Location of Large Power Plant Polluters in Massachusetts (2003)**

| Facility Name and Town | Emissions of $SO_2$ (tons) | Emissions of NOx (tons) | Emissions of $CO_2$ (tons) | Emissions of Mercury (lbs.) | Class Status of Town | Racial Status of Town |
|---|---|---|---|---|---|---|
| Brayton Point in Somerset | 35,888 | 10,847 | 7,023,893 | 180 | Medium-Low Income | Low Minority |
| Canal Station in Sandwich | 23,471 | 4,890 | 4,019,279 | 23 | Medium-High Income | Low Minority |
| Salem Harbor in Salem | 11,338 | 3,310 | 2,474,075 | 6 | Medium-Low Income | Moderately-Low Minority |
| Mystic River in Everett | 5,837 | 1,343 | 3,933,468 | N/A | Medium-Low Income | Moderately-High Minority |
| Mount Tom in Holyoke | 4,790 | 1,700 | 1,140,057 | 8 | Low Income | High Minority |
| Somerset Operations in Somerset | 3,175 | 968 | 624,276 | 17 | Medium-Low Income | Low Minority |

According to a 2000 report by the Harvard School of Public Health, current emissions from the 805 megawatt Salem Harbor (Salem) and 1611 megawatt Brayton Point (Somerset) coal-fired power plants alone can be linked to 43,300 asthma attacks and nearly 300,000 daily incidents of upper respiratory symptoms per year among the 32 million people residing in New England, eastern New York, and New Jersey. An additional 159 premature deaths can be attributed to this

for the Campaign to Clean Up Polluting Power Plants, 1999), pp.2-4.

pollution each year. However, the health risks are greatest for those living in communities adjacent to these plants. Twenty percent of the total health impact occurs in the 8 percent of the population that lives within 30 miles of the facilities.[39] Again, four of the six worst power plants are located in lower income communities, where the median household income is less than $52,700, while two of the plants are located in communities of color.

## Summary

There is currently a undue concentration of environmentally hazardous industrial facilities, landfill-type operations (transfer stations, landfills), and hazardous waste sites in Brockton. As a result, Brockton (709 hazard points) grossly exceeds the statewide average of 166 environmental hazard points per community. As a low-income community of color that ranks as the 9th most extensively environmentally overburdened community in Massachusetts, the residents of Brockton should receive special consideration based upon environmental justice criteria. The Brockton power plant would further contribute to the undue concentration of environmentally hazardous sites and facilities in Brockton, and would bring additional pollution burdens. Given the undue concentration of such facilities, the siting of a power plant in Brockton would further threaten the environmental quality of the community.

Moreover, people of color have fewer opportunities than white residents to escape industrial zones and polluted areas in Brockton for other neighborhoods or communities. According to the Metro Boston Equity Initiative of the Civil Rights Project at Harvard University, poor Massachusetts residents of color are twice as likely to live in high poverty neighborhoods (where over 20 percent of residents are poor) and three times as likely to live in severely distressed neighborhoods than are poor whites. In fact, African-American and Latino households with incomes over $50,000 are more likely to live in high poverty neighborhoods than are white households with incomes under $20,000. As a result, racial segregation in Metro Boston is far more intense than income differences would produce. As identified by the Civil Rights Project, much of the problem lies with the differential treatment people of color receive in the mortgage market.[40]

---

[39] See Jonathan Levy, John D. Spengler, Dennis Hlinka, and David Sullivan, *Estimated Public Health Impacts of Criteria Pollutant Air Emissions from the Salem Harbor and Brayton Point Power Plants*, A report commissioned by the Clean Air Task Force (Harvard School of Public Health and Sullivant Environmental Consulting, May, 2000).

[40] See Jim Campen, "The Color of Money in Greater Boston: Patterns of Mortgage Lending and Residential Segregation at the Beginning of the New Century," Prepared for the Metro Boston Equity Initiative of the Harvard Civil Rights Project (January 2004), pp.3-8.

There is a disturbing pattern of mortgage lending in Massachusetts that serves to reproduce highly-segregated patterns of residential location by race/ethnicity. Just a handful of town and cities – typically the most polluted and environmental degraded communities in the Bay State – account of the majority of loans given to African-Americans and Latinos. For instance, just four communities (Brockton, Randolph, Lynn, and Lowell) typically receive more than half of all home-purchase loans to African-Americans, while five other communities (Lawrence, Lynn, Chelsea, Brockton, and Revere) receive more than half of all home-purchase loans to Latinos.[41] With the exception of Randolph, every one of these communities is ranked as among the most environmentally contaminated communities in Massachusetts. In addition, African Americans and Latinos *at all income levels* are more than twice as likely to be rejected for a home-purchase mortgage loan than are white applicants *at the same income levels*.[42] Racial discrimination of this sort has severely restricted home-ownership opportunities for people of color – opportunities that have facilitated large-scale class/geographic mobility for more affluent white residents out of the more polluted and distressed areas, including Brockton.[43] More than two-thirds (67.8% of the housing units in the city of Boston are rental units (rather than owner-occupied): with home ownership rates for Latinos only one-third those of whites (21.7% vs. 65.8%). For African-Americans, ownership rates (31.5%) are half those of whites.[44] The tracking of people of color into the more environmentally overburdened communities such as Brockton is yet another dimension of environmental injustice in Massachusetts.

---

[41] Campen, 2004, *op.cit.*, p.3-8.

[42] Campen, 2004, *op.cit.*, p.3.

[43] See Melvin L. Oliver and Thomas A. Shapiro, *Black Wealth/White Wealth: A New Perspective on Racial Inequality* (New York, NY: Routledge, 1995).

[44] See Campen, 2004, *op.cit.,* p.9-18.