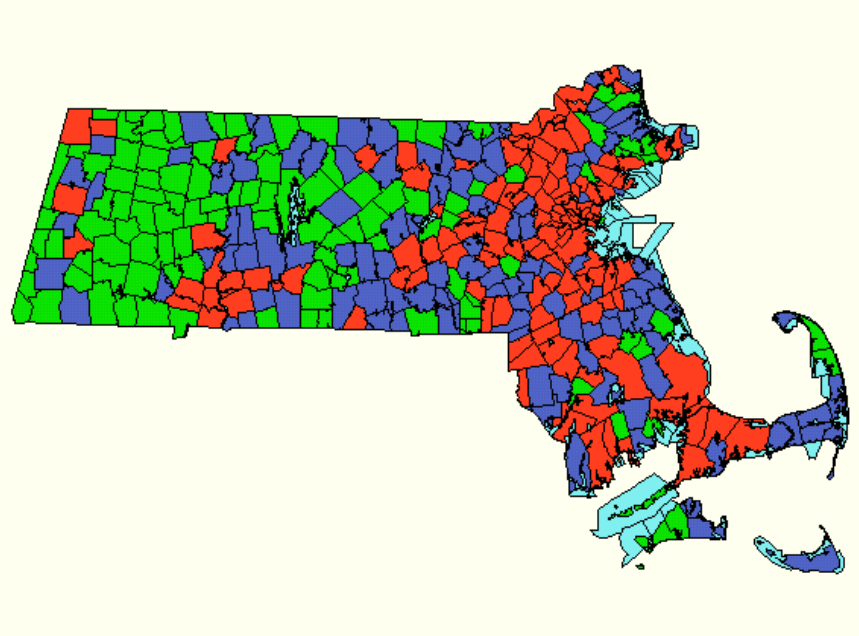
UNEQUAL EXPOSURE TO ECOLOGICAL HAZARDS:
ENVIRONMENTAL INJUSTICES IN THE COMMONWEALTH OF MASSACHUSETTS



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UNEQUAL EXPOSURE TO ECOLOGICAL HAZARDS:
A REPORT ON ENVIRONMENTAL INJUSTICES IN THE COMMONWEALTH OF MASSACHUSETTS

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EXECUTIVE SUMMARY

This report analyzes both income-based and racially-based biases to the geographic distribution of some 17 different types of environmentally hazardous sites and industrial facilities in the Commonwealth of Massachusetts. Our findings indicate that these ecologically hazardous sites and facilities, ranging from highly-polluting power plants to toxic waste dumps, are disproportionately located in communities of color and working class communities. We conclude that striking inequities in the distribution of these sites and facilities are placing lower-income and people of color populations at substantially greater risk of exposure to environmental health hazards. We advocate the adoption of a number of measures, including a comprehensive environmental justice act, to reduce pollution and address unequal exposure to ecological threats.

Summary of Major Findings

Major Findings on Class-Based Unequal Exposure:

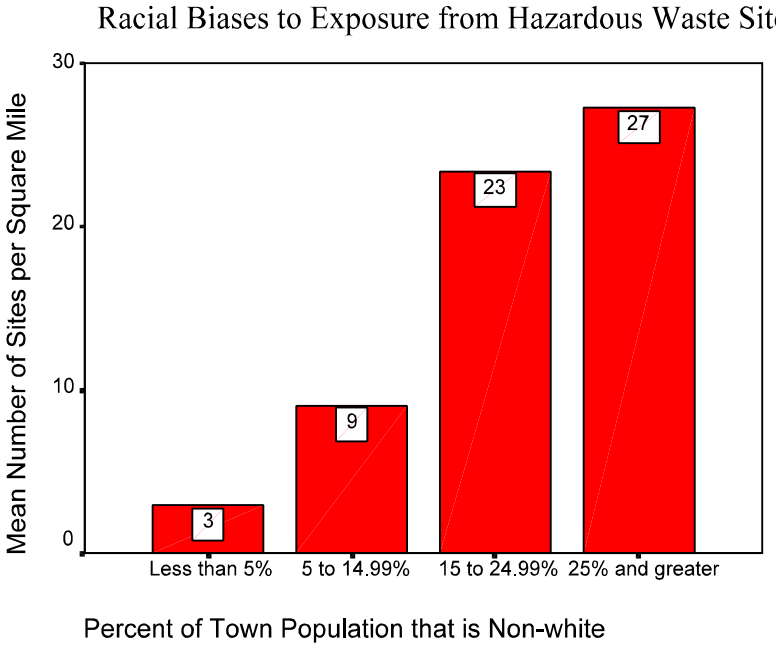
- Communities with median household incomes of less than $30,000 average nearly two-and-a-half times more hazardous waste sites than communities with median household incomes of $40,000 and higher. They also average over four times as many waste sites per square mile.
- Communities with median household incomes of less than $30,000 average nearly seven times as many pounds of chemical emissions from polluting industrial facilities per square mile (during the period 1990-1998) as compared to communities with median household incomes of over $40,000.
- On average, communities with median household incomes of less than $30,000 face a cumulative exposure rate to all environmentally hazardous sites and facilities which is more than 3 times greater than all other communities in the state. In fact, 14 of the 15 most intensively overburdened communities in Massachusetts (measured as density of hazardous facilities and sites) are of lower-income status (median household income of $39,999 or less).

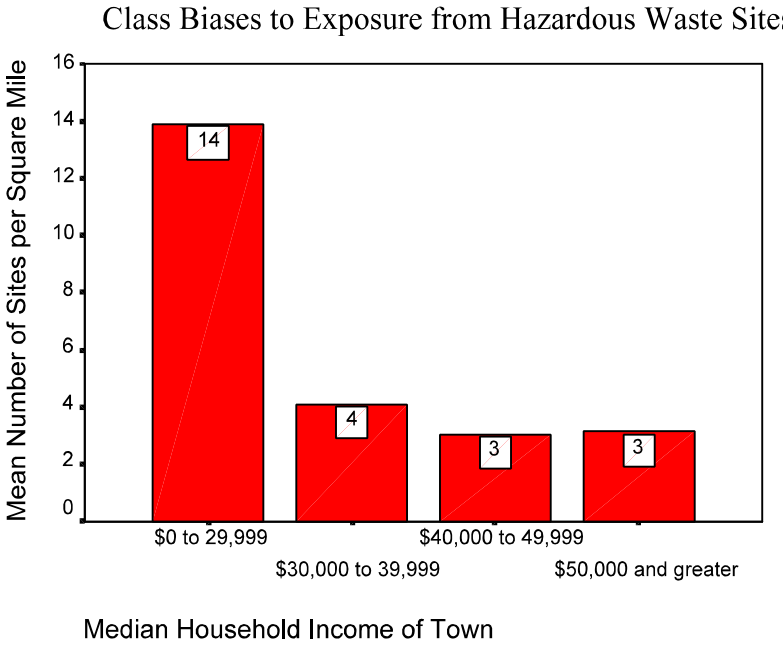
Major Findings on Racially-Based Unequal Exposure:

- Communities where people of color make up 15% or more of the total population average over four times the number of waste sites as communities with less than 5% people of color. Furthermore, communities where people of color make up 25% or more of the total population average nine times more hazardous waste sites per square mile than communities where less than 5% of the population are people of color.
- Communities where people of color make up 25% or more of the total population average nearly 5 times as many pounds of chemical emissions from polluting industrial facilities per square mile as compared to communities where less than 5% of the population are people of color.
- On average, communities where people of color make up 25% or more of the population face a cumulative exposure rate to all environmentally hazardous sites and facilities which is nearly nine times greater than communities where less than 5% of the population are people of color.
- Nine of the 15 most intensively overburdened communities in the state are communities of color (defined as a town with 15%> minority). There are only 20 communities of color in the state.

UNEQUAL EXPOSURE TO HAZARDOUS WASTE SITES

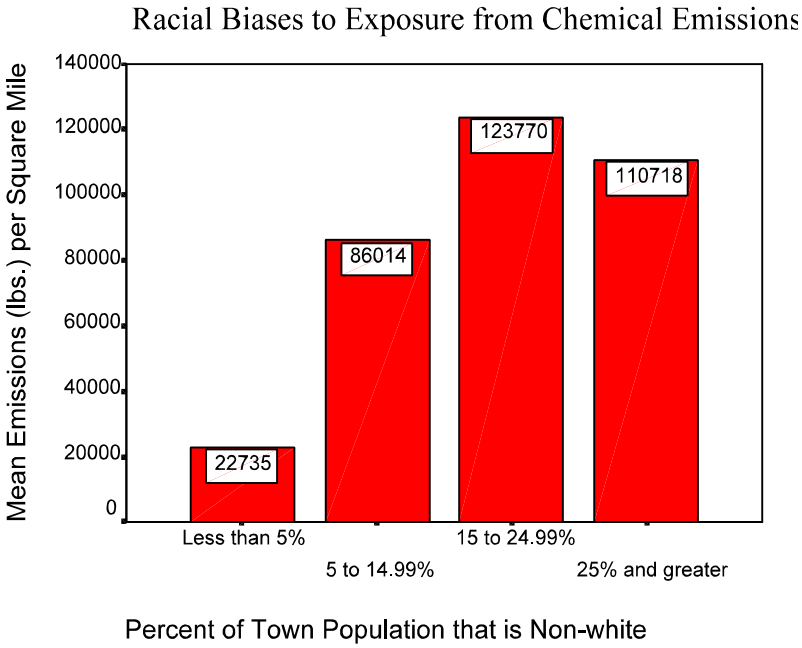
Average of 4.94 Sites Per Square Mile for 368 Massachusetts Communities in the Year 2000

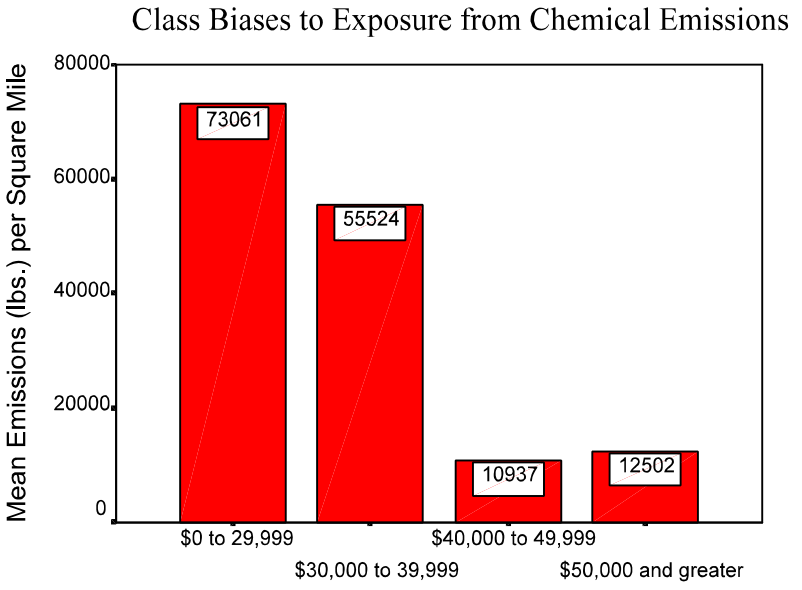




UNEQUAL EXPOSURE TO POLLUTION FROM INDUSTRIAL FACILITIES

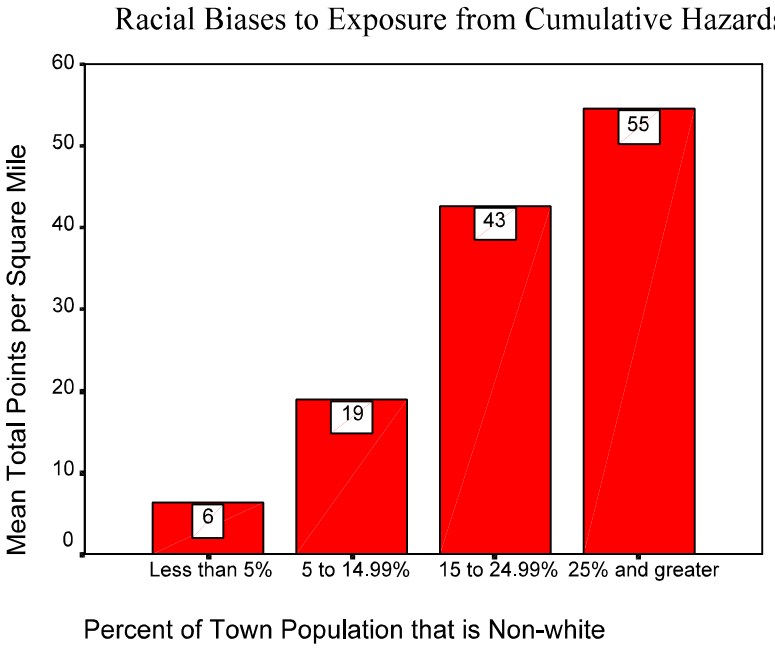
Average of 36,262 lbs. of Chemical Emissions per Square Mile during 1990-98 for 368 Massachusetts Communities

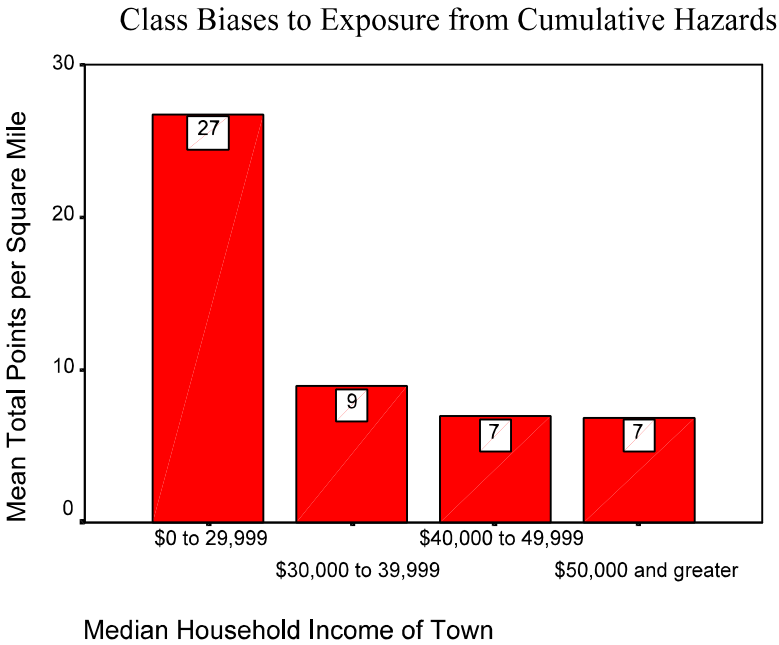




UNEQUAL EXPOSURE TO ALL HAZARDOUS FACILITIES AND SITES COMBINED

Average of 10.4 Points per Square Mile Cumulative Exposure Rate for 368 Massachusetts Communities





Methodology

This report explores whether environmentally hazardous industrial facilities, power plants, municipal solid waste combustors (incinerators), toxic waste sites, landfills of all types, and trash transfer stations are unequally distributed with respect to the income and/or racial composition of a community in the Commonwealth of Massachusetts. Utilizing demographic data from the 1990 Census, as well as data collected in the Spring and Summer months of 2000 from the Massachusetts Department of Environmental Protection (DEP), United States Environmental Protection Agency (EPA), and the Massachusetts Toxics Use Reduction Institute, we analyze the exposure rates of all 351 cities and towns (minor civil divisions, or MCDs) in the state to the environmentally hazardous industrial facilities and sites listed above. In addition to these 351 cities and towns, we also include seven sub-towns or neighborhoods within the larger town of Barnstable: Barnstable; Centerville; Cotuit; Hyannis; Marstons Mills; Osterville; and West Barnstable. We also include twelve sub-towns or neighborhoods within the larger city of Boston: Allston/Brighton; Charlestown; Dorchester; East Boston; Hyde Park; Jamaica Plain; Mattapan; Roslindale; Roxbury; South Boston; West Roxbury; and Downtown Boston (for the purposes of the report, Downtown Boston encompasses Central Boston and Chinatown, Back Bay and Beacon Hill, the South End, and the Fenway/Kenmore neighborhoods). Because these more specific neighborhoods making up all of Boston and Barnstable are included, summary data for all-Boston and all-Barnstable are excluded from the totals. As a result, a total of 368 communities are analyzed in the report (only in Section Eight of the report, where the most overburdened communities in the state are ranked, are Boston and Barnstable as "all neighborhoods combined" reintroduced to create a total of 370 communities).

Each of the 368 communities are classified according by class and racial composition. The class status of a community is determined by median household income: (1) *low income*: $0 to $29,999; (2) *medium-low income*: $30,000-$39,999; (3) *medium-high income*: $40,000-$49,999; and (4) *high income*: $50,000 and greater. These categories reflect reasonable cutoff points in the data for the following reasons: First, no distinct "gaps" in the income distribution of towns exists. Second, the $40,000 cutoff point is used because it divides the lower- and higher-communities into roughly equal sized halves (see table below). Finally, a $10,000 decrease/increase from $40,000 was selected on the basis of generating reasonably sized groups with easily recognizable boundaries.

Median Household Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	$0 to 29,999	50	13.6	13.6	13.6
	$30,000 to 39,999	137	37.2	37.2	50.8
	$40,000 to 49,999	114	31.0	31.0	81.8
	$50,000 and greater	67	18.2	18.2	100.0
	Total	368	100.0	100.0	

The racial composition of a community is determined by the percentage of total population made up of people of color: (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 people of color population. The vast majority of towns in Massachusetts have very small minority populations of "less than 5%." However, when the remaining towns are analyzed (see table below), 10% increases in population proportions seemed logical for generating relatively acceptable frequencies in each category. There are only nine communities in the state where between 15 to 24.99% of the population consists of people of color; and eleven communities where 25% or more of the population consists of people of color.

Percent of Population that is Non-white

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5%	299	81.3	81.3	81.3
	5 to 14.99%	49	13.3	13.3	94.6
	15 to 24.99%	9	2.4	2.4	97.0
	25% and greater	11	3.0	3.0	100.0
	Total	368	100.0	100.0	

Comparisons of low-to-high income communities and low minority-to-high minority status communities are made in terms of exposure rates to environmentally hazardous industrial facilities, waste sites, power plants, incinerators, trash transfer stations, and landfills of all types. As seen in Table 12, a point total is assigned to each facility or site based upon our assessment of the relative risks it typically represents to the community. These point totals are then added for each community, and divided by total area to arrive at a density figure. The density figure provides a more accurate assessment to the environmental hazards confronting a given community because it controls for the size the community and the severity of the facility/site. Among our findings: *low-income communities face a cumulative exposure rate to environmentally hazardous facilities and sites which is 3.13 to 4.04 times greater than all other communities (measured by median household income) in the state.* In addition, *high minority communities face a cumulative exposure rate to environmentally hazardous facilities and sites which is nearly nine times greater than low-minority communities.* Clearly, not all communities in Massachusetts are polluted equally – as lower-income communities and communities of color are disproportionately impacted.

Acknowledgments

For their invaluable research assistance, we would like to thank Kristin Fredricks and Trish Zilliox, as well as Eric Bourgeois and Allison Grossman, all of the Northeastern University. We would also like to extend our gratitude to Heather Tenney at the Toxics Use Reduction Institute, University of Massachusetts at Lowell. Walter Hope, Susan Peck, Sarah Weinstein, Paul Bakely, and many others at the Department of Environmental Protection (DEP) were of great help in the data collection process, as was Paul Hunter at the Massachusetts Department of Public Health. We would like to extend our appreciation to Penn Loh of Alternatives for Community & Environment (ACE); Khalida Smalls of the Greater Boston Environmental Justice Network (GBEJN), Veronica Eady at the Executive Office of Environmental Affairs (EOEA); and Matt Wilson of the Toxics Action Center for their comments on an earlier draft. Deborah George of the Northeast Environmental Justice Network (NEJN) provided information on housing and environmental justice issues for the report. The authors remain solely responsible for the content of this preliminary report

A significant contribution to the study of these problems is the creation of and public access to data sources that less than 15 years ago were often unavailable and/or non-existent. Access to certain types of environmental data was mandated under the Superfund Amendment and Reauthorization Act (1986); however, while some states have adopted aggressive approaches to the collection and distribution to data, not all states have responded equally to the call for environmental monitoring. Massachusetts is a leader among states in the compilation of and provision of public access to environmental data. This study would not be possible without the exemplary work done by the Massachusetts Department of Environmental Protection (DEP) in organizing and making this data available to the public.

SECTION ONE

UNEQUAL EXPOSURE TO ECOLOGICAL HAZARDS: SUMMARY DISCUSSION OF FINDINGS

The Commonwealth of Massachusetts is plagued by a number of significant environmental problems impacting the quality of life of our citizens.

- ❑ There are over 21,030 Department of Environmental Protection (DEP) hazardous waste sites in the state. Some 3,389 of these sites are considered to pose serious environmental and human health threats, and include 32 sites on the Environmental Protection Agency's National Priorities List (NPL) or Superfund list.

- ❑ Between 1990-98, some 1,029 large industrial facilities produced some 164,385,598 pounds of toxic chemical waste which was *released* on-site directly into the environment (discharged into the air, ground, underground, or adjacent bodies of water) of the communities in which they were located -- an amount equivalent to 2,055 tractor-trailer trucks each loaded with 80,000 pounds of toxic waste.

- ❑ Coal and oil-burning power plants, specifically those plants built prior to 1977, are also 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 (SO_2) emissions are the main precursor to the creation of soot -- tiny particles of soot can 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).

- ❑ Fossil-fuel power plants are also responsible for more than 800 pounds of airborne mercury emissions every year. Mercury causes severe damage to the neurological system and has developmental effects on fetuses and small children.

- ❑ Every county in Massachusetts has levels of air-borne toxic chemicals in the form of volatile organic compounds (VOCs) that exceed health-based state levels. 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 health-based risk standards in all counties *by up to 80 times*. As a result, air pollution kills 1,300 people in the state each year.

- ❑ Work-related health and safety tragedies are a daily affair as well. It is estimated that in 1998 and 1999 alone, 132 workers died on the job; over 2,000 more died from occupational diseases; 2,400 workers were diagnosed with cancer caused by their jobs; and over 100,000 workers were seriously injured on the job in the state. During the 13-year period, 1986-2000, 259 out of 351 cities and towns have had a worker killed on the job from acute traumatic injuries – over two-thirds of all the municipalities in Massachusetts. Figures also show that over a two-and-a-quarter year period beginning in 1997, sixty-two workers were killed on the job in the state due to employers' failure to comply with required OSHA regulations.[1]

While the quality of life for all citizens in the Commonwealth is currently compromised by these environmental and human health problems, not all segments of the citizenry are impacted equally. This report documents Massachusetts residents' unequal exposure to environmental hazards. In order to bolster profits and competitiveness, industry typically adopts pollution strategies which are not only more economically efficient but that also offer the path of least political resistance. The less political power a community possesses, the fewer resources a community has to defend itself; the lower the level of community awareness and mobilization against potential ecological threats, the more likely they are to experience arduous environmental and human health problems at the hands of government and industry. And in Massachusetts, lower-income communities and communities of color are unequally exposed to a significantly greater ecological burden.

This is not say that white and middle-to-upper income communities are not also being impacted by industrial pollution in the Commonwealth. But in contrast to the types of economic and social constraints confronting people of color and white working-class families, higher-income salaried and professional workers can often afford access to ecological amenities and a cleaner environment in non-industrial urban, suburban and rural areas. In fact, lower-income families and people of color face a "triple unequal exposure effect" to toxic pollution and other environmental hazards in comparison with higher-income residents. For lower-income communities and communities of color, this takes the form of exposure to: (1) greater concentrations of polluting industrial facilities and power plants; (2) greater concentrations of hazardous waste sites and disposal/treatment facilities, including landfills, incinerators, and trash transfer stations; and (3) higher rates of "on the job" exposure to toxic pollutants inside the factory. Unequal exposure to environmental hazards is thus experienced by lower-income and people of color populations in terms of where they *work, live, and play*.[2]

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[1] It would currently take the Occupational Safety and Health Administration 118 years to inspect each workplace in Massachusetts under their jurisdiction just once, given current budgetary and inspector shortages. See the 1999 and 2000 editions of *Dying for Work in Massachusetts: The Loss of Life and Limb in Massachusetts Workplaces*, A Report by MassCOSH and Western MassCOSH (April 28, 1999-2000), p.ii-13.

[2] See Dana Alston (ed.), *We Speak for Ourselves: Social Justice, Race, and Environment* (Washington, DC: The Panos Institute, 1991).

This report provides evidence to suggest that working class communities and communities of color are disproportionately impacted by toxic waste disposal, incinerators, landfills, trash transfer stations, power plants, and polluting industrial facilities. In some cases, not only are new toxic facilities and dump sites located in poorer communities and communities of color, but as in the case of the public housing development and playgrounds near the Alewife station in Cambridge, housing for people of color and low-income populations is sometimes located on top of pre-existing hazardous waste sites and/or nearby polluting facilities.

In this report, we will document the disproportionate environmental burden borne by these communities in the following areas:

(1) Unequal Exposure to Hazardous Waste Sites:

In Massachusetts, communities of color and low-income communities experience a far more profound exposure rate to Department of Environmental Protection (DEP) hazardous waste sites than do wealthier and/or white communities, indicating that race and class appear to be significant factors in determining the location of both serious (Tier I-II) and less serious (Non-Tier) hazardous waste sites.

- ❑ In Massachusetts, low-income communities, where the average household medium income is less than $30,000, contain an average of 120.9 DEP hazardous waste sites. In contrast, communities where the average income is $30,000 or greater contain averages ranging from 41.9 to 50.2 hazardous waste sites. As a result, *low-income communities average two-to-three times more DEP hazardous waste sites than higher-income communities*.

- ❑ Low-income communities also average nearly 14 hazardous waste sites per square mile. In contrast, higher-income status communities, where the household median income is $30,000 or greater, average 3.1 to 4.1 hazardous waste sites per square mile. As a result, low-income communities have about *three-and-a-half to almost four times* the number of hazardous waste sites per square mile as higher-income communities. These figures remain relatively consistent with comparisons of the more serious Tier I-II hazardous waste sites.

- ❑ Likewise, "low-minority" communities, where less than 5% of the population is made up of people of color, average 41.2 hazardous waste sites. In contrast, "high minority" communities, where 25% or more of the population is made up of people of color, average 162.5 sites. Communities of moderately-high minority", where 15 to 24.99% of the population is made up of people of color, average nearly 190 sites. As a result, *"high-minority" communities, where 15% or more of the population is made up of people of color, average well over four times as many hazardous waste sites per town as "low-minority" communities.*

- ❑ "High-minority" communities also average 27.2 DEP hazardous waste sites per square mile. In contrast, "low-minority" communities average 2.9 hazardous waste sites per square mile. As a result, *"high-minority" communities average more than nine times the number of hazardous waste sites per square mile than "low-minority" communities*. These figures remain consistent with comparisons of the more serious Tier I-II hazardous waste sites.

(2) Unequal Exposure to Landfills and Trash Transfer Stations:

There are a total of 954 different landfill-types in the Commonwealth, of which the majority (566) are garbage dumps. Most of the state's landfills and trash transfer stations are more heavily concentrated in lower-income communities and communities of color.

- ❑ In comparison to "low-minority" communities (where less than 5 percent of the population are people of color), which average .13 of all landfill types per square mile, "high-minority" communities (where 25 percent or more of the community are people of color) average .36 of these facilities per square mile, *a rate nearly three times higher*.

- ❑ In low-income communities (where the median household income is less than $30,000), there are .18 of these landfill-types per square mile, a figure slightly higher than the .13-.15 rates for higher-income communities. However, when municipal solid waste landfills are excluded, it is clear that the lower-income communities (less than $40,000) have a much higher proportion of every other type of landfill than higher-income communities ($40,000 or higher). For instance, while lower-income communities (less than $40,000) make up 50.8 percent of all towns in the state, they are home to 58.9 percent of all incinerator ash landfills, 66.7 percent of all demolition landfills, 71.4 percent of all illegal sites, 74.5 percent of all sludge landfills, 69.5 percent of all tire piles, and 58.9 percent of all transfer stations.

- ❑ Race and class biases are both factors in determining the location of all landfill-types (with the exception of garbage dumps) across communities.

(3) Unequal Exposure to Polluting Industrial Facilities:

In Massachusetts, lower-income communities and communities of color bear a significantly greater portion of the pollution emitted by industrial facilities, and are clearly overburdened.

- ❑ Lower-income communities (average median household income of less than $40,000) comprise 50.8 percent of all communities in Massachusetts, but *received 78.7 percent of all chemical emissions from large-scale industries reporting under the Toxics Use Reduction Act (TURA) between 1990-98.*

- ❑ In fact, low-income communities (with average household median incomes of less than $30,000) average 6.3 TURA industrial facilities per town, some 932, 910 total pounds of chemical emissions released into the environment per town, and some 73,061 total pounds of chemical emissions per square mile for 1990-98. This contrasts sharply in comparison to moderately-high income communities (average household median income of $40-49,999), which have an average of 1.8 TURA polluting facilites per town, an average of 161,028 total pounds of chemical emissions per town, and 10,937 pounds of chemical emissions per square mile.

- ❑ *In comparison to upper-income communities (median household income $40,000 or greater), low-income communities average over three times as many TURA industrial facilities, three times*

as many TURA industrial facilities per square mile, 3.75 to 5.79 times as many pounds of chemical emissions into the environment per town; and roughly seven times as many pounds of chemical emissions per square mile . Thus, it would appear that the class status of a community is a major determinant in the level of exposure to TURA industrial facilities and emissions.

❑ Communities of color are also overburdened. "High-minority" communities (where 25 percent of the population or more are people of color) average 8.8 TURA industrial facilities per town and 1.1 TURA facilities per square mile, compared to an average of just 2 facilities and .12 facilities per square mile for "low-minority" communities (where less than five percent of the population are people of color).

❑ *Thus, "high-minority" communities average over four times as many TURA industrial facilities and over nine times as many TURA industrial facilities per square mile as "low-minority" communities in the Commonwealth.*

❑ Furthermore, higher-minority status communities (where 15 percent or more of the population are people of color) average 1,061,041 to 1,216,360 total pounds of chemical emissions from TURA industrial facilities and from 110,718 to 123,770 pounds of chemical emissions from TURA facilities per square mile for 1990-98, compared to just 342,579 pounds of total chemical emissions and 22,735 pounds of chemical emissions per square mile for "low-minority" communities.

❑ Thus, *in comparison to "low-minority" communities, higher-minority communities average roughly 3 to 3.5 times as many pounds of chemical emissions released into the environment from local TURA facilities; and 4.86 to 5.44 times as many pounds of chemical emissions per square mile. Thus, it would appear that the racial composition of a community is once again a major determinant in the level of exposure to TURA industrial facilities and pollution.*

(4) Unequal Exposure to Power Plants:

In Massachusetts, working class communities are burdened by the some of the worst polluting power plants in all of New England.

❑ Although higher-minority communities (where 15 percent or more of the population are people of color) comprise just 5.4 percent of all communities in the state, they are home to 18.2 percent of all active power plants and 23.4 percent of all proposed power plants in the state.

❑ Likewise, while lower-income communities (where the median household income is less than $40,000) comprise 50.8 percent of all towns in the state, they are home to 65.6 percent of all active power plants and 63 percent of all proposed power plants.

❑ In addition, the four dirtiest power plants in the state – the Brayton Point, Salem Harbor, Mount Tom, and Mystic plants – are all located in low to moderately-low-income communities (the Mount Tom power plant is located in the low-income/ "high-minority" community of Holyoke). Along with the Canal power plant in Sandwich, these plants are the largest industrial sources of greenhouse gasses in the state.

(5) Unequal Exposure to Incinerators:

There are nine municipal solid waste combustors (MSWCs) in operation in Massachusetts, which combust approximately 3.3 million tons of trash each year. Incinerators are implicated in causing massive water and air pollution and related public health problems, and emit more mercury (6,040 pounds) than any other source in the state.

- ❑ Six of these nine incinerators are located in low and medium-low income communities, where the average medium household income is less than $40,000. Only one of the nine incinerators is located in a high-income community, where the average median household income is $50,000 or greater. Thus, *lower-income communities (less than $40,000) have twice the number of incinerators as higher-income communities ($40,000 or more).*

- ❑ While class considerations seem to be of some importance in the siting of these facilities, only one of the nine incinerators is located in a higher-minority status community (where 15% or more of the population are people of color). In fact, this is one of the few hazardous facilities in the Commonwealth where there does not appear to be a racial bias.

(6) Unequal Exposure to Cumulative Environmental Hazards:

Many past studies on the disproportionate exposure of low-income communities and communities of color have focused on a single type of hazardous facility or waste site. This study provides a cumulative method for measuring community exposure rates to all the types of environmentally hazardous facilities and sites listed above. This is accomplished by assigning a point system which weighs the average risks of various hazardous facilities and sites (see Table 12). These points are totaled for each community and then divided by total area to arrive at an exposure rate.

- ❑ According to this cumulative measure, "low-minority" communities (where less than 5% of the population are people of color) average only 6.4 points per square mile, compared to 57 points per square mile for "high-minority" communities (where 25% of the population or more are people of color). In other words, *"high-minority" communities face a cumulative exposure rate to environmentally hazardous facilities and sites of all types which is nearly nine times greater than "low-minority" communities*. In fact, there is a 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. Without question, *it would appear that communities of color are greatly overburdened in comparison with communities of "low-minority," and are disporportionately exposed to environmental hazards of almost every kind.*

- ❑ Likewise, low-income communities (where the median household income is less than $30,000) average an exposure rate of 27.9 points per square mile. This rate stands in dramatic contrast to the exposure rates for all other higher-income communities (where the average median household income is $30,000 or greater), which ranges from 6.9 to 8.9 points per square mile. As a result, *low-income communities face a cumulative exposure rate to environmentally hazardous facilities*

and sites of all types which is 3.13 to 4.04 times greater than all other communities (measured by income) in the state. As is the case with communities of color, *low-income communities are disproportionately exposed to environmental hazards of all kinds. Ecological racism and class-based environmental injustices appear to be profound in the Commonwealth of Massachusetts.*

Given these disparities in the location of hazardous industrial facilities and sites of all kinds, it is almost inevitable that people of color and working-class whites are exposed to significantly greater environmental risks than are wealthier, predominantly white communities in the Commonwealth. Further research is required to deepen our understanding of the role played by racism and class-based discrimination in creating these disparities, particularly in reference to the siting of environmental risks, the promulgation of environmental laws and regulations, the enforcement of environmental laws, and the attention given to the cleanup of polluted areas.[3] There is a complex interplay of systemic economic forces and institutionalized rules, regulations, and policies of government and corporate decisions that result in lower-income neighborhoods and communities of color being targeted for the least desirable land uses, resulting in the disproportionate exposure to environmentally hazardous sites and facilities. To overcome the forms of environmental racism and class-based ecological inequalities documented in this report, it is essential that comprehensive legislation aimed at tackling problems of environmental injustice in the Commonwealth is clearly required.

Massachusetts already has an Areas of Critical Environmental Concern (ACEC) law, which protects natural resources from pollution. Given the disproportionate exposure of lower-income communities and communities of color to ecological hazards, however, further protections are needed. We recommend that adoption of an Environmental Justice Designation Bill which would direct state environmental officials to designate overburdened communities as Areas of Critical Environmental Justice Concern (ACEJC). In addition, governmental policy-makers, Department of Environmental Protection (DEP) personnel, as well as Executive Office of Environmental Affairs (EOEA) officials, need additional resources and tools to begin effectively addressing these issues.

The following sections of this report provide a more elaborate presentation of our findings, as well as in-depth discussion and analysis of the current environmental injustices plaguing lower-income communities and communities of color in the Commonwealth of Massachusetts.

[3] See Luke W. Cole, "Empowerment as the Key to Environmental Protection: The Need for Environmental Poverty Law," *Ecology Law Quarterly*, Vol.19 (1992: 619-630).

SECTION TWO

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.[4] 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. [5]

In Massachusetts, there are 32 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 *Ford Devens-Sudbury Training Annex Site* encompasses parts of the 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 26 sites are located in single towns.[6] These towns are home to more than 1,072,017 residents, including 70,491 people of color. Approximately 61,000 people alone live within a 3-mile radius of the Iron Horse Park Superfund site in North Billerica. In addition to these Superfund sites, there are over 21,000 state Department of Environmental Protection (DEP) hazardous waste sites in the Commonwealth. Some 3,389 of these sites (which include EPA Superfund sites) are considered serious.

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

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

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

For residents living near Superfund and other major toxic waste sites, the National Research Council also 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.[7] 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[8] – 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, as well as tetrachloroethylene in drinking water on the Upper Cape.[9] 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.[10]

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[7] 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)..

[8] 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).

[9] 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).

[10] 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).

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.[11] 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 sites.[12] 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.[13] 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

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[11] 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).

[12] 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.

[13] 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).

Massachusetts).[14] 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.[15]

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.[16]

In Massachusetts, there are currently over 21,038 hazardous waste sites, including 3,389 more serious Tier I-II sites, according to March 2000 DEP data. As required under the Massachusetts Contingency Plan, hazardous waste sites must be ranked according to the severity of their risk to human health and the environment. The DEP has developed a tier classification system for determining the danger level of a hazardous waste site to the public health and the environment. Sites can be classified as Tier IA, IB, IC or II, with Tier IA sites requiring the most stringent oversight and Tier II the least. A *Numerical Ranking Sheet* (NRS) is used to calculate the numerous ecological and public health factors which determine a site's classification. The NRS contains five main sections:[17]

(1) Exposure Pathways evaluate the ways a person can be exposed to toxics, specifically the soil, groundwater, surface water, and air;
(2) Disposal Site Characteristics evaluate the toxicity of the released material(s);
(3) Human Population and Land Uses evaluate the potential risks based on nearby population and land and water uses;

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[14] 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).

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

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

[17] For a discussion, see Eric Weltman, *A Citizen's Guide to the State Superfund: Understanding the Massachusetts Contingency Plan* (Boston: Massachusetts Campaign to Clean Up Hazardous Waste, February 1996).

(4) Ecological Population evaluates the potential risks posed to the environment based on the site's proximity to sensitive areas, such as wetlands and endangered species;

(5) Mitigating Disposal Site Specific Conditions take into account conditions at the site not factored into the NRS.

One of the primary reasons the DEP ranks a large number of the most serious Tier I sites in the suburban versus urban areas such as Boston are related to drinking water issues. The presence of a hazardous waste site in a larger urban area where the drinking water is transported from a distant reservoir may not pose the same threat as in a suburban/rural community dependent upon local groundwater sources.

As indicated in Table 1 on "Class-Based Disparities in the Location of Hazardous Waste Sites" (see following page), there appears to be a significant concentration of both Tier I-II and Non-Tier sites in lower-income communities. In Massachusetts, low-income communities (where median household income is less than $30,000) contain an average of 120.9 DEP hazardous waste

Table 1: Class-Based Disparities in the Location of Hazardous Waste Sites

Median Household Income 1990 U.S. Census N=Number of Towns (Percent of all Towns)		Number of DEP Hazardous Waste Sites	Number of DEP Tier I-II Hazardous Waste Sites	Number of Towns with EPA Superfund Sites	Average Number of DEP Hazardous Waste Sites per Town	Average Number of DEP Hazardous Waste Sites per Square Mile
$0 to 29,999 (Low) N=50 (13.6)	Count Percent Mean	6,044 (28.7) 120.9	987 (29.1) 19.7	5 (10.4) .10	120.9	13.9
$30,000 to 39,999 (Med. - Low) N=137 (37.2)	Count Percent Mean	6,863 (32.6) 50.1	1,101 (32.5) 8.0	14 (29.2) .10	50.1	4.1
$40,000to 49,999 (Med. - High) N=114 (31.0)	Count Percent Mean	4,771 (22.7) 41.9	742 (21.9) 6.5	17 (35.4) .15	41.9	3.1
$50,000 and greater (High) N=67 (18.2)	Count Percent Mean	3,360 (16.0) 50.2	559 (16.5) 8.3	12 (25.0) .18	50.2	3.2
Totals N=368 (100%)		21,038 (100%)	3,389 (100%)	48 (100%)	63.3	5.0

** Information on all hazardous waste sites was provided by the Massachusetts Department of Environmental Protection (DEP) and U.S. Environmental Protection Agency (EPA) databases in March, 2000. All DEP waste site information provided above includes EPA Superfund sites as part of the count.

sites. In contrast, communities where the median household income is $30,000 or greater, contain an average 41.9 to 50.2 hazardous waste sites. As a result, *low-income communities average roughly two-to-three times more DEP hazardous waste sites than higher-income communities*.

However, if lower-income communities are typically larger in size, one would expect to find a higher number of such sites. To control for the size of the community, it is useful to calculate the number of sites per square mile in order to obtain a more accurate exposure rate. When this is done, we find an even more pronounced class bias. In low-income communities, where median household income is less than $30,000, there is an average of nearly 14 DEP hazardous waste sites per square mile. In contrast, higher-income status communities, where median household income is $30,000 or greater, average 3.1 to 4.1 hazardous waste sites per square mile. As a result, low-income communities have about *three-and-a-half to almost four times* the number of hazardous waste sites per square mile as higher-income communities. These figures remain relatively consistent with comparisons of the more serious Tier I-II hazardous waste sites. In short, low-income communities in Massachusetts experience a far more profound exposure rate to DEP hazardous waste sites than higher-income communities.

These disparities seem repeated for communities of color. In Massachusetts, "low-minority" communities (where less than 5% of the population is made up of people of color) average 41.2 DEP hazardous waste sites. In contrast, "high minority" communities (where 25% or more of the population is made up of people of color) average 162.5 sites. Communities considered moderately-high minority (where 15 to 24.99% of the population is made up of people of color) average nearly 190 sites. As a result, *"higher-minority" communities, where 15% or more of the population is made up of people of color, average well over four times as many DEP hazardous waste sites as "low-minority" communities.*

To control for the size of the community, it is useful to calculate the number of sites per square mile in order to obtain a more accurate exposure rate. When this is done, we find an even more pronounced racial bias. In "high-minority" communities (where 25% or more of the population is made up of people of color) there is an average of 27.2 DEP hazardous waste sites per square mile. In contrast, "low-minority" communities (where less than 5% of the population is made up of people of color) there is an average of 2.9 hazardous waste sites per square mile. As a result, *"high-minority" communities have more than nine times the number of hazardous waste sites per square mile than "low-minority" communities*. These figures remain consistent with comparisons of the more serious Tier I-II hazardous waste sites. In short, *communities of color experience a far more profound exposure rate to DEP hazardous waste sites than predominantly white communities, indicating that racial bias appears to be a significant factor in determining the location of Tier and Non-Tier Hazardous waste sites in the Commonwealth of Massachusetts*.

Table 2: Racially-Based Disparities in the Location of Hazardous Waste Sites

Non-White Population 1990 U.S. Census N=Number of Towns (Percent of all Towns)		Number of DEP Hazardous Waste Sites	Number of DEP Tier I-II Hazardous Waste Sites	Number of Towns with EPA Superfund Sites	Average Number of DEP Hazardous Waste Sites per Town	Average Number of DEP Hazardous Waste Sites per Square Mile
Less than 5% (Low) N=299 (81.3)	Count Percent Mean	12,324 (58.6) 41.2	1,969 (58.1) 6.6	29 (60.4) .10	41.2	2.9
5 to 14.99% (Low - Moderate) N=49 (13.3)	Count Percent Mean	5,219 (24.8) 106.5	849 (25.1) 17.3	16 (33.3) .33	106.5	9.0
15 to 24.99% (Moderate - High) N=9 (2.4)	Count Percent Mean	1,708 (8.1) 189.8	257 (7.6) 28.6	3 (6.3) .33	189.8	23.4
25% and greater (High) N=11 (3.0)	Count Percent Mean	1,787 (8.5) 162.5	314 (9.3) 28.6	0 (0.0) 0.00	162.5	27.2
Totals N=368 (100%)		21,038 (100%)	3,389 (100%)	48 (100%)	63.3	5.0

** Information on all hazardous waste sites was provided by the Massachusetts Department of Environmental Protection (DEP) and U.S. Environmental Protection Agency (EPA) databases in March, 2000. All DEP waste site information provided above includes EPA Superfund sites as part of the count.

Only in the case of EPA Superfund sites do the class and racial biases associated with DEP hazardous waste sites disappear, a factor related to the high number of Superfund sites on military facilities located in rural and suburban locales near more affluent communities, particularly on Cape Cod. There are also at least 47 Tier IA sites in Bourne resulting from contamination from the Massachusetts Military Reservation.

SECTION THREE

UNEQUAL EXPOSURE TO LANDFILLS & TRANSFER STATIONS

Landfills can also pose 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. Tables 3 & 4 provide data on seven different types of landfills and related facilities: incinerator ash landfills; demolition landfills; illegal sites; sludge landfills; tire piles; municipal solid waste landfills (garbage dumps); and trash transfer stations. Of these sites, incinerator ash landfills are typically most hazardous, as fly ash wastes produced by incinerators and power plants contain concentrated levels of heavy metals like arsenic, lead and cadmium, radioactive elements, cancer causing organic compounds, and other contaminants.

There are a total of 954 different landfill-types in the Commonwealth, of which the majority (566) are garbage dumps. As outlined in the Tables 3 and 4, the state's landfills and trash transfer stations are relatively more heavily concentrated in lower-income communities and communities of color. In comparison to "low-minority" communities (where less than 5 percent of the population are people of color), which average .13 of all landfill types per square mile, "high-minority" communities (where 25 percent or more of the community are people of color) average .36 of these facilities per square mile, *a rate nearly three times higher*.

In low-income communities (where the median household income is less than $30,000), there are .18 of these landfill-types per square mile, a figure slightly higher than the .13-.15 rates for higher-income communities. However, when municipal solid waste landfills are excluded, it is clear the lower-income communities (less than $40,000) have a much greater proportion of every other type of landfill than higher-income communities ($40,000 or higher). For instance, while lower-income communities (less than $40,000) make up 50.8 percent of all towns in the state, they are home to 58.9 percent of all incinerator ash landfills, 66.7 percent of all demolition landfills, 71.4 percent of all illegal sites, 74.5 percent of all sludge landfills, 69.5 percent of all tire piles, and 58.9 percent of all transfer stations. Clearly, with the exception of garbage dumps, race and class biases to the location of all landfill-types exist.

Table 3: Class-Based Disparities in the Location of All Landfill-Types

Median Household Income 1990 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	Average Number of all Landfill - Types per Town	Average Number of all Landfill-Types per Square Mile
$0 to 29,999 (Low) N=50 (13.6)	Count	2	8	7	12	5	69	33	2.9	.18
	Percent	(11.8)	(20.5)	(33.3)	(20.3)	(21.7)	(12.2)	(14.4)		
$30,000 to 39,999 (Med. - Low) N=137 (37.2)	Count	8	18	8	32	11	203	102	2.8	.13
	Percent	(47.1)	(46.2)	(38.1)	(54.2)	(47.8)	(35.9)	(44.5)		
$40,000to 49,999 (Med. - High) N=114 (31.0)	Count	7	9	5	12	5	185	62	2.5	.15
	Percent	(41.2)	(23.1)	(23.8)	(20.3)	(21.7)	(32.7)	(27.1)		
$50,000 and greater (High) N=67 (18.2)	Count	0	4	1	3	2	109	32	2.3	.14
	Percent	(0.0)	(10.3)	(4.1)	(5.1)	(8.7)	(19.3)	(14.0)		
Totals N=368 (100%)		17 (100%	39 (100%)	21 (100%)	59 (100%)	23 (100%)	566 (100%)	229 (100%)	2.6	.15

** Information on all landfills was provided by the Massachusetts Department of Environmental Protection (DEP) databases in April, 2000.

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

Non-White Population 1990 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	Average Number of all Landfill-Types per Town	Average Number of all Landfill-Types per Square Mile
Less than 5% (Low) N=299 (81.3)	Count	11 (64.7)	30 (76.9)	14 (66.7)	50 (84.7)	21 (91.3)	445 (78.6)	180 (78.6)	2.5	.13
	Percent									
5 to 14.99% (Low - Moderate) N=49 (13.3)	Count	5 (29.4)	4 (10.3)	3 (14.3)	5 (8.5)	2 (8.7)	92 (16.3)	35 (15.3)	3.0	.16
	Percent									
15 to 24.99% (Moderate - High) N=9 (2.4)	Count	0 (0.0)	3 (7.7)	0 (0.0)	4 (6.8)	0 (0.0)	17 (3.0)	8 (3.5)	3.6	.30
	Percent									
25% and greater (High) N=11 (3.0)	Count	1 (5.9)	2 (5.1)	4 (19.0)	0 (0.0)	0 (0.0)	12 (2.1)	6 (2.6)	3.1	.36
	Percent									
Totals N=368 (100%)		17 (100%)	39 (100%)	21 (100%)	59 (100%)	23 (100%)	566 (100%)	229 (100%)	2.6	.15

** Information on all landfills was provided by the Massachusetts Department of Environmental Protection (DEP) databases in April, 2000.

SECTION FOUR

UNEQUAL EXPOSURE TO POLLUTING INDUSTRIAL FACILITIES

American industry produces enormous quantities of pollution and toxic waste each year. According to the EPA's Toxic Release Inventory (TRI) for 1998 -- the most recent year available at this time -- some 23,000 facilities reported a total of 7.3 billion pounds of chemical pollutants released into the nation's air, water, land, and underground. The vast majority of these pollutants – some 93.9 percent (or 6.9 billion pounds) – were released into the environment directly on-site.[18] Thus, citizens who work and reside in the communities in which these facilities are located typically bear much greater exposure rates to industrial pollutants.[19]

Exposure to industrial pollution -- especially air pollution -- is proving deadly to tens of thousands of citizens. Human exposure to hazardous air pollutants (HAPs) can result in both acute and chronic health effects. Short-term, acute effects can include eye irritation, nausea, difficulty breathing, asthma, or even death. Long-term, chronic effects include damage to the respiratory or nervous systems, birth defects and damage to reproductive systems, neurological disorders, as well as cancer. Aggravated by the exhaust from over two-hundred million motor vehicles (particularly in larger metropolitan areas), industrial air pollution kills over 60,000 Americans each year. Half a million people living in the most polluted areas in 151 cities across the country face a risk of death which is some 15 to 17 percent higher than in the least polluted areas.[20] Some 164 million Americans are now at risk for respiratory and other health problems from exposure to excessive air pollution.[21]

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[18] Of these on-site releases, 62.8 percent were to land, 29.9 percent were to air, 3.9 percent were to underground injection, and 3.4 percent were to surface water. There are now nearly 650 toxic chemicals and chemical compounds on the list of chemicals that must be reported to EPA and the States under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), which established the TRI program.

[19] The 1998 Toxic Release Inventory data and background information on the TRI program are available at http://www.epa.gov/tri/tri98/

[20] A study conducted by researchers at the Harvard School of Public Health, Brigham Young University, and the American Cancer Society, which was released on March 10, 1995, and appeared in the *American Journal of Respiratory and Critical Care Medicine*, estimated some 60,000 annual air pollution deaths. Another study by the Natural Resources Defense Council (NRDC) released on May 8, 1996, which analyzed air quality in 239 cities across the country, estimated some 64,000 Americans to be dying each year from air pollution, even at levels which the federal government considers to be safe.

[21] According to a 1993 report by the American Lung Association, some 66 percent of U.S. citizens live in areas that violate standards for ozone (which causes lung tissue to become inflamed and impedes breathing); carbon dioxide (which impedes the blood's ability to carry oxygen to the heart); and lead (which causes brain and organ damage). Because their lungs are particularly sensitive, at highest risk are the 31 million children and 19 million elderly who live in these polluted areas.

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).[22] For instance, 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.[23] 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.[24]

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 environmental racism and class-based ecological injustices.[25] 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

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[22] 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 (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.

[23] 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.

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

[25] 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).

whites (with the race gap being wider and more consistent than the income gap).[26] According to the EPA, 57 percent of all whites nationwide live in areas with poor air quality, compared to 80 percent of all Latinos.[27] 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.[28] 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.[29] 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).[30]

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[26] 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).

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

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

[29] 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).

[30] 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.

A 1993 study of Essex, Hampden, Middlesex, Norfolk, Suffolk, and Worcester counties in Massachusetts between 1987 and 1992 utilizing Resource Conservation and Recovery Act (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. However, a closer analysis of Suffolk County found that 13.2 percent of LQG/ TSD facilities were located in the most-minority communities (census block groups) and that 26.4 percent of the facilities were located in the most-white communities.[31] Thus, it did not appear that in Suffolk County LQG and TSD facilities were concentrated in minority communities. Likewise, the study also found that 34 percent of these facilities were located in the poorest communities (measured by quartiling block groups) – with a median income of $21,615 or less – while 22.6 percent of facilities were found in the wealthiest communities with a median income of $37,452 or higher. Thus, in contrast to many national studies, the investigation concluded that minority communities in Massachusetts do not have a disproportionate share of facilities, suggesting that people of color are more likely to live near a RCRA facility because of their economic status. The study further found that in the six counties 62.7 percent of facilities in the most-minority areas were inspected while 54.9 percent of facilities in the most-white areas were inspected (block group level).[32] The study concluded that there did not appear to be much bias against inspecting facilities located in the most minority areas.[33]

In this section of the report, we summarize information from the state's Large Quantity Toxics Users who reported to the Massachusetts Toxics Use Reduction Act (TURA) Program from 1990-98 (1998 is the most recent year that TURA data is available).[34] As required under TURA,

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[31] One can argue that town are too large for detailed studies of environmental injustice. The size of town can potentially mask racial or economic heterogeneity within the town area. For instance, a town with a 10 percent minority population might be concentrated in a particular portion of the town – the same section of town where polluting industries and facilities may be concentrated. However, analysis at the town level would mask the concentration of hazards in minority neighborhoods.

[32] At the census tract level, 66.7 percent of facilities in the most-minority areas were inspected and 56.9 percent of facilities in the most white areas were inspected. See Michael G. Terner, *A Geographic Information System (GIS) Assisted Approach for Assessing Environmental Equity in the EPA RCRA Program's Site Inspection Selection Process* (Massachusetts Institute of Technology: Master's Thesis, Department of Urban Studies & Planning, May 1993), p. 63.

[33] EPA guidelines demand that each state inspect all land disposal and all commercial hazardous waste treatment, storage or disposal (TSD) facilities every year. Further, 50 percent of the full universe of TSDs in any state must be inspected every year. Thus, every two years, all TSDs should be inspected. Guidelines also require that 8 percent of all large quantity generators (LQGs) in each state must be inspected every year. Theoretically, every 13 years all LQGs will be inspected, at least once. The state has full discretion in selecting which 8 percent of LQG facilities should be inspected.

[34] There are some 520 *Large Quantity Toxics Users* who reported to the Massachusetts Toxics Use Reduction Program (TURA) during the 1998 calendar year (the latest year such data is currently available). These companies reported using over 1.184 billion pounds of chemicals (not including trade secret chemicals), of which over 132.6 million pounds were generated as waste byproduct. Of this byproduct, some 50.5 million pounds of toxic

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, emissions on-site into the immediate environment, worker handling, waste disposal, toxins in the product, and product disposal.

Between 1990-98, some 1,029 distinct TURA facilities – ranging from a high of 727 firms in 1991 to 520 in 1998 – utilized over 9.886 billion pounds of toxic chemicals in production (does not include quantities for chemicals considered trade secret). During this same time frame, these large industrial facilities produced some 370,163,204 pounds of chemical waste byproduct which was *transferred* off-site for recycling, recovery, treatment, and/or disposal. Another 164,385,598 pounds of toxic chemical waste byproduct was *released* on-site directly into the environment (discharged into the air, ground, underground, or adjacent bodies of water) of the communities in which they were located -- an amount equivalent to 2,055 tractor-trailer trucks each loaded with 80,000 pounds of toxic waste.[35] With regard to these on-site releases to the environment, the Electric, Gas and Sanitary Services sector is the largest source of such releases under TURA. In 1998, the 28 firms in this sector accounted for 39 percent of all on-site releases, some 71 percent of which were hydrochloric acid. The Chemical and Allied Products sector, which represents a little over half of total statewide use, accounted for 13 percent of total on-site releases and 31 percent of offsite transfers.

As seen in Table 5 (see p. 22) on "Class-Based Disparities in the Location and Emission Levels of TURA Industrial Facilities (1990-1998)", low-income communities (median household income of less than $30,000) and moderately low-income communities (median household income of $30-39,999) comprise 50.8 percent of all communities in Massachusetts, but are home to 66.2 percent of all TURA facilities and 85.6 percent of all chemicals used by TURA facilities between 1990-98. More importantly, *lower-income communities received 78.7 percent of all chemical emissions into the local environment by TURA facilities during this time*. While upper-income communities (median household income of $40,000 and higher) represent nearly half of all communities in the state (49.2%),

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chemicals were transferred off site (for recycling, recovery, treatment or disposal), while another 12 million pounds were released on-site directly into the environment (discharged into the air, ground, underground, or adjacent bodies of water). When trade secret data is incorporated into the 1998 TURA aggregate quantities, we find that: 1.380 billion pounds of chemicals were used by state industry; 137 million pounds were generated as byproduct; and 64 million pounds of this byproduct was either released on-site into the environment or transferred off-site.

[35] 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 have been equally successful in reducing their releases of TRI reported on-site chemicals by 83% since 1990. 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).

they received only 33.8 percent of all TURA facilities, 14.4 percent of all chemicals used by TURA facilities, and 21.3 percent of all chemical emissions into the local environment from 1990-98.

Table 5: Class-Based Disparities in the Location and Emission Levels of TURA Industrial Facilities (1990-98)

Median Household Income 1990 U.S. Census N=Number of Towns (Percent of all Towns)		TURA Total Chemical Emissions in lbs. (1990-1998)	TURA Total Chemical Transfers in lbs. (1990-1998)	TURA Total Chemical Use in lbs. (1990-1998)	Number of Distinct TURA Facilities (1990-1998)
$0 to 29,999 (Low) N=50 (13.6)	Count	46,645,477	101,318,279	4,476,070,293	317
	Percent	(28.4)	(27.4)	(45.3)	(30.8)
	Mean	932,910	2,026,366	89,521,406	6.3
$30,000 to 39,999 (Med. - Low) N=137 (37.2)	Count	82,734,924	188,923,288	3,981,354,062	364
	Percent	(50.3)	(51.0)	(40.3)	(35.4)
	Mean	603,905	1,379,002	29,060,979	2.7
$40,000to 49,999 (Med. - High) N=114 (31.0)	Count	18,357,199	53,110,764	734,856,631	201
	Percent	(11.2)	(14.3)	(7.4)	(19.5)
	Mean	161,028	465,884	6,446,111	1.8
$50,000 and greater (High) N=67 (18.2)	Count	16,647,998	26,810,873	693,992,469	147
	Percent	(10.1)	(7.2)	(7.0)	(14.3)
	Mean	248,478	400,162	10,358,097	2.2
Totals N=368 (100%)		164,385,598 (100%)	370,163,204 (100%)	9,886,273,455 (100%)	1,029 (100%)

In fact, as seen in Table 6 (see p.23) on "Class-Based Disparities in the Exposure Rate to TURA Industrial Facilities (1990-1998)", low-income communities (median household income of less than $30,000) average 6.3 TURA facilities per town, some 932, 910 total pounds of chemical emissions released into the environment per town, and some 73,061 total pounds of chemical emissions per every square mile of town space for 1990-98. This contrasts sharply in comparison to moderately-high income communities (median household income of $40-49,999), which have an average of 1.8 TURA facilites per town, an average of 161,028 total pounds of chemical emissions per town, and 10,937 pounds of chemical emissions per every square mile of town space. *In comparison to upper-income communities (median household income $40,000 or greater), low-income communities average over three times as many TURA industrial facilities, three times as many TURA industrial facilities per square mile, 3.75 to 5.79 times as many pounds of chemical emissions into the*

environment per town, and roughly seven times as many pounds of chemical emissions per square mile. Thus, it would appear that the class status of a community is a major determinant in the level of exposure to TURA industrial facilities and emissions. The data indicate that lower-income communities bear a greatly disproportionate burden of the pollution emitted by these types of industrial facilities, and are clearly overburdened.

Table 6: Class-Based Disparities in the Exposure Rate to TURA Industrial Facilities (1990-98)

Median Household Income 1990 U.S. Census N=Number of Town (Percent of all Towns)	Average Number of TURA Facilities per Town (1990-98)	Average Number of TURA Facilities per Square Mile (1990-98)	Average Total TURA Chemical Emissions (lbs.) Per Town (1990-98)	Average Total TURA Chemical Emissions (lbs.) per Square Mile (1990-98)
$0 to $29,999 (Low) N=50 (13.6)	6.3	.49	932,910	73,061
$30,000 to $39,999 (Med.-Low) N=137 (37.2)	2.7	.21	603,905	55,524
$40,000 to $49,999 (Med.-High) N=114 (31.0)	1.8	.13	161,028	10,937
$50,000 and greater (High) N=67 (18.2)	2.2	.12	248,478	12,502

The data also show that communities of color are overburdened. Although "low-minority" communities (where less than 15 percent of the population is people of color) account for 86.2 percent of all chemical emissions and 84.1 percent of all TURA facilities, they also account for 94.6 percent of all communities in the state. Although "high-minority" communities (where 15 percent or more of the population is people of color) receive only 13.8 percent of all TURA emissions and house 15.9 of all TURA facilities, they comprise only 5.4 percent of towns in the state.

Table 8, "Racial Disparities in the Exposure Rate to TURA Industrial Facilities", shows that "high-minority" communities (where 25 percent or more of the population is people of color) average 8.8 TURA facilities and 1.1 TURA facilities per square mile, compared to an average of just 2 facilities and .12 facilities per square mile for "low-minority" communities (where less than five percent of the population is people of color). *In short, "high-minority" communities average over four times as many TURA industrial facilities and over nine times as many TURA industrial facilities*

per square mile as "low-minority" communities in the Commonwealth. Furthermore, "higher-minority"communities (where 15 percent or more of the population are people of color) average 1,061,041 to 1,216,360 total pounds of chemical emissions from TURA industrial facilities

Table 7: Racially-Based Disparities in the Location and Emission Levels of TURA Industrial Facilities (1990-98)

Non-White Population 1990 U.S. Census N=Number of Towns (Percent of all Towns)		TURA Total Chemical Emissions in lbs. (1990-1998)	TURA Total Chemical Transfers in lbs. (1990-1998)	TURA Total Chemical Use in lbs. (1990-1998)	Number of Distinct TURA Facilities (1990-1998)
Less than 5% (Low) N=299 (81.3)	Count	102,730,053	219,844,801	5,051,993,299	601
	Percent	(62.5)	(59.4)	(51.1)	(58.4)
	Mean	343,579	735,267	16,896,299	2.0
5 to 14.99% (Low - Moderate) N=49 (13.3)	Count	39,036,778	114,887,155	1,885,264,731	264
	Percent	(23.7)	(31.0)	(19.1)	(25.7)
	Mean	796,669	2,344,636	38,474,790	5.4
15 to 24.99% (Moderate - High) N=9 (2.4)	Count	10,947,318	14,415,034	182,564,805	67
	Percent	(6.7)	(3.9)	(1.8)	(6.5)
	Mean	1,216,369	1,601,670	20,284,978	7.4
25% and greater (High) N=11 (3.0)	Count	11,671,449	21,016,214	2,766,450,620	97
	Percent	(7.1)	(5.7)	(28.0)	(9.4)
	Mean	1,061,041	1,910,565	251,495,511	8.8
Totals N=368 (100%)		164,385,598 (100%)	370,163,204 (100%)	9,886,273,455 (100%)	1,029 (100%)

and from 110,718 to 123,770 pounds of chemical emissions from TURA facilities per square mile for 1990-98, compared to just 342,579 pounds of total chemical emissions and 22,735 pounds of chemical emissions per square mile for "low-minority" communities.

Thus, *in comparison to "low-minority" communities, "high-minority" communities average roughly 3 to 3.5 times as many pounds of chemical emissions into the environment from local TURA facilities; and 4.86 to 5.44 times as many pounds of chemical emissions per square mile.* Thus, it would appear that the racial status of a community is once again a major determinant in the level of exposure to TURA industrial facilities and pollution. The data indicate that communities of color bear a greatly disproportionate burden of the pollution emitted by the types of facilities.

Table 8: Racially-Based Disparities in the Exposure Rate to TURA Industrial Facilities (1990-98)

Non-White Population 1990 U.S. Census N=Number of Town (Percent of all Towns)	Average Number of TURA Facilities per Town (1990-98)	Average Number of TURA Facilities per Square Mile (1990-98)	Average Total TURA Chemical Emissions (lbs.) Per Town (1990-98)	Average Total TURA Chemical Emissions (lbs.) per Square Mile (1990-98)
Less than 5% (Low) N=299 (81.3)	2.0	.12	343,579	22,735
5 to 14.99% (Low-Moderate) N=49 (13.3)	5.4	.40	796,689	86,014
15 to 24.99% (Moderate-High) N=9 (2.4)	7.4	.75	1,216,369	123,770
25% and greater (High) N=11 (3.0)	8.8	1.1	1,061,041	110,718

SECTION FIVE

UNEQUAL EXPOSURE TO POWER PLANTS

The electric power industry is one of the most polluting industries in New England and the entire country. In 1998, electric utilities generated 1.1 billion pounds of toxic chemical emissions nationwide, according to EPA-TRI data. In fact, electric utilities' emissions of sulfuric acid and hydrochloric acid pushed them near the top of the toxic inventory in many states.[36] Power plants are also major contributors to the formation of smog. Smog, also called ground-level 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.[37] Power plants are also major contributors of gases that cause global warming and toxic mercury emissions which seriously threaten public health and environmental quality.

In Massachusetts, nearly 1,300 Massachusetts residents die each year from particulate air pollution.[38] Each summer, three quarters of a million Massachusetts residents are 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. And air quality continues to deteriorate. During the summer of 1999, Massachusetts recorded 21 unhealthy air days, where the ozone level of those days surpassed the allowable limit set by the EPA. The people currently most vulnerable to the effects of breathing smoggy air are children, the elderly and people with asthma or other respiratory diseases.[39] Despite

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[36] 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.

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

[38] 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.

[39] 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.

ongoing efforts to control smog and soot forming pollutants, not enough is being done to address the risk of developing cancer, or reproductive, developmental and neurological disorders due to chemical exposures in the air we breathe.

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). Fossil-fuel power plants are also responsible for more than 800 pounds of airborne mercury emissions every year. Mercury causes severe damage the neurological system and has developmental effects on fetuses and small children.[40] Mercury is so toxic that a mere one-third of a teaspoon is enough to render the fish of a 25 acre lake unsuitable for children and pregnant women to eat. As a result of a loophole in clean air laws, fourteen plants in New England are legally polluting at much higher levels than newer plants built since 1977. Under the 1970 and 1977 amended Clean Air Act, the oldest fossil-fuel power plants – those built before 1977 – are not required to meet the same emissions standards as newer, cleaner plants.[41]

As indicated in Table 9, "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 "higher-minority" communities (where 15 percent or more of the population is people of color) comprise just 5.4 percent of all communities in the state, they are home to 18.2 percent of all active power plants and 23.4 percent of all proposed power plants in the state. Likewise, while lower-income communities (where median household income is less than $40,000) comprise 50.8 percent of all towns in the state, they are home to 65.6 percent of all active power plants and 63 percent of all proposed power plants.

Five of the dirtiest power plants in the state – the Canal, Brayton Point, Salem Harbor, Mount Tom, and Mystic plants – are legally emitting 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

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[40] See Rob Sargent and Michelle Toering, *Dirty Power in the Northeast: A Report on the 1998 Emissions of the Northeast's Dirtiest Power Plants* (Boston: Campaign to Clean Up Polluting Power Plants, 1999).

[41] Older fossil-fuel power plants built during the 1940-60s create the vast majority of power plant air pollution. The 1970 Clean Air Act, amended in 1977 and 1990, electric industry lobbyists successfully persuaded Congress that older plants would soon be retired, and therefore should be exempt from strict, new emission standards. Instead, this loophole has allowed owners of older, more polluting plants exempted from the modern standards to make bigger profits and stay in operation longer vis-a-vis the more expensive, cleaner, and newer power plants.

Table 9: Racial and Class-Based Disparities in the Location of Power Plants

Non-White Population 1990 U.S. Census N=Number of Towns (Percent of all Towns)		Number of DEP Active Power Plants (June 2000)	Number of DEP Proposed Power Plants (June 2000)	**Median Household Income** 1990 U.S. Census N=Number of Towns (Percent of all Towns)		Number of DEP Active Power Plants (June 2000)	Number of DEP Proposed Power Plants (June 2000)
Less than 5% (Low) N=299 (81.3)	Count / Percent	38 (69.1)	10 (58.8)	**$0 to 29,999 (Low)** N=50 (13.6)	Count / Percent	14 (25.5)	2 (11.8)
5 to 14.99% (Low - Moderate) N=49 (13.3)	Count / Percent	7 (12.7)	3 (17.6)	**$30,000 to 39,999 (Med. - Low)** N=137 (37.2)	Count / Percent	22 (40.0)	7 (41.2)
15 to 24.99% (Moderate - High) N=9 (2.4)	Count / Percent	7 (12.7)	3 (17.6)	**$40,000to 49,999 (Med. - High)** N=114 (31.0)	Count / Percent	16 (29.1)	7 (41.2)
25% and greater (High) N=11 (3.0)	Count / Percent	3 (5.5)	1 (5.9)	**$50,000 and greater (High)** N=67 (18.2)	Count / Percent	3 (5.5)	1 (5.9)
Totals N=368 (100%)		55 (100%)	17 (100%)	Totals N=368 (100%)		55 (100%)	17 (100%)

responsible for more than 50 percent of the power plant pollution in all of New England, producing more than 24 million tons of heat-trapping carbon dioxide emissions in 1998. And pollution rates from these power plants have been increasing substantially since 1996.[42] As a result, these five power plants are the largest industrial sources of greenhouse gasses in the state.[43]

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

[43] Although they do not typically produce dangerous air pollution, the state's nuclear power plants continue to pose a threat of accidental radiation releases and are responsible for 99 percent of our high level radioactive waste.

As shown in Table 10, "Unequal Exposure to the Top Five Power Plant Polluters in Massachusetts," four of the five plants are located in low- to moderately-low income communities; indicating a rather strong class-bias in the location of the worst polluting power plants in the state. In terms of racial bias, only the Mount Tom power plant is located in a "high-minority" community (Holyoke); otherwise the remaining four power plants are located in "low- to moderately low" minority communities. Clearly, lower-income working class communities are disproportionately burdened by the some of the worst polluting power plants in all of New England.

Table 10: Unequal Exposure to the Top Five Power Plant (Fossil Fuel) Polluters in Massachusetts

Power Plant	Town	Income Status of Town	Racial Status of Town	SO2 Rate in 1st Half of 1999 (lbs./mmBTU)
Salem Harbor	Salem	medium-low income	moderately-low minority pop.	1.20
Mount Tom	Holyoke	low income	high-minority pop.	1.20
Brayton Point	Somerset	medium-low income	low-minority pop.	1.10
Mystic	Charlestown	medium-low income	moderately-low minority pop.	1.03
Canal	Sandwich	medium-high income	low-minority pop.	0.87

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 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.[44] The four worst of these polluting power plants are all located in lower-income communities, where the median household income is less than $40,000. Thus, it would appear that working class communities once again are unequally exposed to environmental hazards in the Commonwealth.

[44] 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).

SECTION SIX

UNEQUAL EXPOSURE TO INCINERATORS

Municipal Solid Waste Combustors (MSWCs) are facilities that combust (burn) solid waste, in large part derived from household wastes. There are nine MSWCs currently in operation in Massachusetts, which combust approximately 3.3 million tons of trash each year. These incinerators contribute to massive water and air pollution and related public health problems. For instance, garbage incinerators emit more mercury than any other source in the state.[45] Mercury, which is especially toxic to children and pregnant women, has been linked to kidney and nervous system damage, and developmental defects. The Environmental Protection Agency (EPA) has identified these facilities as being a major source of mercury emissions to the environment. The state Department of Environmental Protection (DEP) estimates that these facilities emit approximately 6,040 pounds of mercury into the air each year. DEP testing of in-stack concentrations for mercury emissions from these facilities in 1994 detected averages twice the new EPA limits.[46] In addition to air emissions, mercury may also exit these facilities in the form of ash, especially fly ash. It is estimated that as much as another 6,000 pounds of mercury is captured by the air pollution control devices installed at these facilities.

As indicated in Table 11, "Unequal Exposure to Municipal Solid Waste Combustors" (see following page), six of these nine incinerators are located in low and medium-low income communities, where median household income is less than $40,000. Only one of the nine incinerators is located in a high-income community, where the average median household income is $50,000 or greater. Thus, lower-income communities (less than $40,000) have twice the number of incinerators as higher-income communities ($40,000 or more). While class considerations seem to be of some importance in the siting of these facilities, only one of the nine incinerators is located in a "higher-minority" community (where 15% or more of the population is people of color). In fact, this is one of the few types of environmental hazardous facilities in the Commonwealth for which there does not appear to be a racial bias.

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[45] See "MASSPIRG urges Cut in Solid Waste," in *MASSPIRG*, Vol.17, No. 4 (Winter 2000): 1-3.

[46] The DEP estimate is based on 1991-94 Stack Test Data, and available on-line at www.state.ma.us/dep/files/mercury/hgch3b.htm.

Table 11: Unequal Exposure to Municipal Solid Waste Combustors (MSWCs)

Town	Income Status of Town	Racial Status of Town	Mercury In-Stack EPA Limit80 (ug) (dscm)	Average Annual Amount of Mercury Emitted (Tons/Year)
N. Andover	high-income	low-minority population	297.0	1.11
Lawrence	low-income	high-minority population	276.0	0.41
Millbury	medium-low income	low-minority population	183.0	0.52
Haverhill	medium-low income	mod.-low minority population	163.0	0.35
Agawam	medium-low income	low-minority population	153.1	0.08
Pittsfield	low income	low-minority population	61.4	0.01
Rochester	medium-high income	low-minority population	61.0	0.11
Fall River	low-income	low-minority population	25.6	N/A
Saugus	medium-high income	low-minority population	17.0	0.4
9 Towns	6 of 9 towns are lower-income	1 of 9 towns are higher-minority	160.0	3.02 (6,040 lbs.)

Note: There are also some 117 medical waste incinerators listed in the DEPs Division of Air Quality Control Stationary Source Enforcement Inventory System (SSEIS).[47]

[47] Since 1960, approximately 216 incinerators have been approved to burn medical and related wastes and other biological materials in Massachusetts (these include hospitals, health care centers, certain laboratories, and some veterinary clinics and crematoria). Nearly 100 of these incinerators are no longer operating. Of the 117 incinerators currently in operation, 53 are located in hospitals and other health care related facilities; 22 are located in university, laboratory, and commercial facilities; and 24 are located in veterinary and related facilities. But because most medical waste incinerators are small units located at hospitals and other health care facilities, EPA regulations do not require emissions testing for mercury. However, some limited DEP testing has indicated that medical incinerators emit an average of 780.3 pounds of mercury into the air each year. For additional mercury data, see Massachusetts Department of Environmental Protection, *Mercury in Massachusetts: An Evaluation of Sources, Emissions, Impacts and Controls* (Boston: June, 1996), available at www.state.ma.us/dep/files/mercury/hgtoc.htm.

SECTION SEVEN

UNEQUAL COMMUNITY EXPOSURE TO CUMULATIVE ENVIRONMENTAL HAZARDS

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 12.

Table 12: Environmental Hazard Point System

Type of Hazardous Facility or Site	Points for Rating Severity of Each Facility or Site
DEP Hazardous Waste Site (general)	1
DEP Hazardous Waste Site (Tier I-II)	5
EPA-NPL (Superfund) Waste Site	25
Large Power Plant – top five polluter	25
Small Power Plant	10
Proposed Power Plant	5
TURA Industrial Facility	5
Municipal Incinerator	20
Resource Recovery Facility	10
Incinerator Ash Landfill	5
Demolition Landfill	3
Illegal Site	5
Sludge Landfill	5
Tire Pile	5
Municipal Solid Waste Landfill	5
Trash Transfer Station	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 point totals for lower-income communities and communities of color. As indicated in Table 13, "Unequal Exposure to All-types of Hazardous Facilities/Sites Combined," communities of "low-minority" (where less than 5 percent of the population is people of color) average only 6.4 points per square mile, compared to 57 points per square mile for "high-minority" communities (where 25 percent of the population or more is people of color). In other words, "*high-minority" communities face a cumulative exposure rate to environmentally hazardous facilities and sites which is nearly nine times greater than communities of "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. Without question, it would appear that communities of color are greatly overburdened in comparison to "low-minority" communities, and are unequally exposed to environmental hazards of almost every kind.

Table 13: Unequal Exposure to All-Types of Hazardous Facilities/Sites Combined

Non-White Population 1990 U.S. Census N=Number of Towns (Percent of all Towns)	Average Number of Points per Square Mile	**Median Household Income** 1990 U.S. Census N=Number of Towns (Percent of all Towns)	Average Number of Points per Square Mile
Less than 5% **(Low)** N=299 (81.3)	6.4	**$0 to 29,999** **(Low)** N=50 (13.6)	27.9
5 to 14.99% **(Low - Moderate)** N=49 (13.3)	18.7	**$30,000 to 39,999** **(Med. - Low)** N=137 (37.2)	8.9
15 to 24.99% **(Moderate - High)** N=9 (2.4)	42.7	**$40,000to 49,999** **(Med. - High)** N=114 (31.0)	7.0
25% and greater **(High)** N=11 (3.0)	57.0	**$50,000 and greater** **(High)** N=67 (18.2)	6.9
Totals N=368 (100%)		Totals N=368 (100%)	

Likewise, low-income communities (where median household income is less than $30,000) average an exposure rate of 27.9 points per square mile. This rate stands in dramatic contrast to the exposure rates for all other higher-income communities (where median household income is $30,000

or greater), which ranges from 6.9 to 8.9 points per square mile. As a result, *low-income communities face a cumulative exposure rate to environmentally hazardous facilities and sites which is 3.13 to 4.04 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. Ecological racism and class-based environmental injustices appear to be profound in the Commonwealth of Massachusetts.

This claim is confirmed in Table 14, "Most Intensively Overburdened Communities in Massachusetts: Total Points per Square Mile," which shows the communities that are the most disproportionately impacted by the location of environmentally hazardous industrial facilities and sites (in terms of density). We have constructed an exposure rate utilizing the method described above (whereby the point totals for all hazards present in the community are added together and then divided by the total area). *As seen in the table, 14 of the 15 most intensively overburdened towns in Massachusetts are of lower-income status (median household income of less than $40,000). In fact, 9 of the 15 towns are classified as low-income communities (where median household income is less than $30,000). Likewise, 9 of the 15 most environmentally overburdened towns in the state are of "higher-minority" status (where 15% or more of the population is people of color). And 6 of the 15 towns are of "high-minority" (where 25% or more of the population is people of color).* This is significant in light of the fact that there are only 20 communities in the entire state where 15 percent or more of the population consists of people of color – and nearly half are among the fifteen most intensively overburdened communities.

In Table 15, "Most Extensively Overburdened Communities in Massachusetts: Total Points per Town," we analyze the twenty communities with the greatest number of environmentally hazardous industrial facilities and sites. Utilizing the same method described above (except that we do not control for size of the community or density of hazardous facilities/sites), the table reveals that sixteen of the twenty most extensively overburdened towns in Massachusetts are of lower-income status (median household income of less than $40,000). *In fact, 11 of the worse 15 towns are classified as low-income communities, where median household income is less than $30,000.* In terms of race, we similarly find that *9 of the 15 most extensively overburdened towns in the state are of "higher-minority" status (where 15% or more of the population is people of color).* Again, this is significant in light of the fact that there are only 20 communities in the entire state where 15 percent or more of the population are racial minorities. In fact, when Tables 14 and 15 are combined and overlapping towns eliminated, we find that 13 of the 25 most environmentally overburdened towns in the state are communities of color. As a result, two out of every three communities of color in the state (where 15%> of pop. are minority) are among the twenty-five most environmentally overburdened towns.

The conclusion to be drawn from this preliminary 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 and people of color populations are disproportionately impacted. Governmental action is urgently required to address these disparities. We recommend that an Environmental Justice Designation Bill be adopted to direct state environmental officials to designate overburdened communities as Areas of Critical Environmental Justice Concern (ACEJC).

Table 14: Most Intensively Overburdened Communities in Massachusetts (Total Points per Square Mile)

Rank	Town Name	Points per Square Mile	Class Status of Town	Racial Status of Town
1	Downtown Boston[48]	224.8	Low-Income ($29,468)	High-Minority pop. (31.9%)
2	Charlestown	134.3	Medium-Low ($35,706)	Mod.-Low Minority pop. (5.1%)
3	Chelsea	127.4	Low-Income ($24,144)	High-Minority pop. (30.3%)
4	South Boston	126.2	Low-Income ($25,539)	Low-Minority pop. (4.2%)
5	East Boston	123.3	Low-Income ($22,925)	Mod.-High Minority pop. (23.6%)
6	Cambridge	115.0	Med.-Low Income ($33,140)	Mod.-High Minority pop. (24.9%)
7	Somerville	104.7	Med.-Low Income ($32,455)	Mod.-Low Minority pop. (11.3%)
8	Roxbury	101.3	Low-Income ($20,518)	High-Minority pop. (94.0%)
9	Allston/Brighton	100.0	Low-Income ($25,262)	High-Minority pop. (26.9%)
10	Watertown	98.6	Med.-High Income ($43,490)	Low-Minority pop. (3.8%)
11	Everett	98.1	Med.-Low Income ($30,786)	Mod.-Low Minority pop. (6.0%)
12	Boston (all neighborhoods)	84.0	Low-Income ($29,180)	High-Minority pop. (37%)
13	Dorchester	81.3	Low-Income ($29,468)	High-Minority pop. (50.7%)
14	Lawrence	59.3	Low-Income ($22,183)	High-Minority pop. (34.9%)
15	Malden	57.8	Med.-Low Income ($34,244)	Mod.-Low Minority pop. (10.1%)
Totals	15 Towns		14 of the 15 Most Intensively Overburdened Towns are of Lower-Income Status (less than $40,000)	9 of the 15 Most Intensively Overburdened Towns are of Higher Minority Status (15% or more people of color)

[48] ***DOWNTOWN BOSTON*** encompasses Central Boston and Chinatown, Back Bay and Beacon Hill, the South End, and the Fenway/Kenmore neighborhoods.

Table 15: Most Extensively Overburdened Communities in Massachusetts (Total Points per Town)

	Town	Total Points	Points Per Square Mile	Class Status of Town	Racial Status of Town
1	**Boston (all)**	3972	84	Low-Income ($29,180)	High-Minority (37%)
2	Worcester	1248	32.4	Low-Income ($28,955)	Mod-Low Minority (12.7%)
3	Downtown Boston[49]	1014	224.8	Low-Income ($29,468)	High-Minority (31.9%)
4	Springfield	999	30.1	Low-Income ($25,656)	High-Minority (31.2%)
5	Cambridge	820	115.0	Med.-Low Income ($33,140)	Mod-High Minority (24.9%)
6	New Bedford	619	25.8	Low-Income ($22,647)	Mod-Low Minority (12.2%)
7	Waltham	611	44.9	Med-Low Income ($38,514)	Mod-Low Minority (8.7%)
8	Lowell	611	42.0	Low-Income ($29,351)	Mod-High Minority (18.8%)
9	East Boston	556	123.3	Low-Income ($22,925)	Mod-High Minority (23.6%)
10	Framingham	537	20.3	Med-High Income ($42,948)	Mod-Low Minority (9.6%)
11	Brockton	502	23.2	Med-Low Income ($31,712)	Mod-High Minority (19.6%)
12	Dorchester	490	81.3	Low-Income ($29,468)	High-Minority (50.7%)
13	Pittsfield	490	11.6	Low-Income ($29,987)	Low-Minority (4.6%)
14	Lynn	488	36.2	Low-Income ($28,553)	Mod.-High Minority (17.0%)
15	Fall River	477	12.5	Low-Income ($22,452)	Low-Minority (2.7%)
16	Newton	467	25.6	High-Income ($59,719)	Mod.-Low Minority (7.0%)
17	Woburn	461	35.7	Med-High Income ($42,679)	Low-Minority (3.0%)
18	Chicopee	451	18.9	Low-Income ($28,905)	Low-Minority (4.4%)
19	Natick	443	27.6	Med-High Income ($49,229)	Low-Minority (4.7%)
20	Somerville	442	104.7	Med-Low Income ($32,455)	Mod-Low Minority (11.3%)
	Totals			16 of 20 Towns Most Extensively Overburdened Towns are Lower Income Status ($39,999 or less)	9 of 20 Towns Most Extensively Overburdened are of Higher Minority Status (15% or more)

[49] ***DOWNTOWN BOSTON***: For the purposes of this report, downtown Boston encompasses Central Boston and Chinatown, Back Bay and Beacon Hill, the South End, and the Fenway/Kenmore neighborhoods. Cumulative data on the median household income is not available, but appears to fall below the $29,179 figure for Greater Boston as a whole (a low-income category).

SECTION EIGHT

WHAT CAN BE DONE?: ADDRESSING PROBLEMS OF ENVIRONMENTAL INJUSTICE IN THE COMMONWEALTH

The State should be accountable to all of its residents and strive for equal protection from pollution and other environmental threats. As guaranteed under the Massachusetts Constitution, the public has the right to clean air and water. When any citizen is unwillingly harmed by exposure to industrial toxic pollutants found in the environment, an injustice is being perpetrated. So that no citizen of any community be put at risk, government agencies on all levels must deepen efforts to reduce the overall level of dangerous pollutants currently found in the environment, as well as our schools, homes, and workplaces. In this regard, the Toxic Use Reduction Act (TURA) is a model program which should be expanded. Likewise, the Department of Environmental Protection (DEP) should take steps to reduce the overall waste stream, increase recycling and continue a moratorium on new landfills and incinerators. Similarly, capping the emissions of the older power plants at levels similar to those plants built more recently will reduce emissions in Massachusetts by tens of thousands of tons. It would also ensure that newer, cleaner plants benefit from a level playing field by removing the pollution subsidy these old plants currently enjoy. Major cleanups of these plants can take place without major implications for jobs or energy reliability.

In addition to working for an overall reduction in the amount of pollution, Massachusetts needs to undertake a series of special initiatives to address the profound environmental injustices which exist in the state. As suggested by the evidence presented in this report, all people are not polluted equally in the Commonwealth. Ecologically hazardous industrial facilities and waste sites are instead disproportionately located in communities of color and lower-income communities. As a result, citizens do not share the same access to a healthy environment. The Commonwealth of Massachusetts needs to develop and implement a plan to reduce these disparities for ecologically overburdened communities, beginning with public hearings on environmental injustices so that those who are affected can voice their concerns. As part of these efforts, the state must also begin to more systematically address the environmental injustices documented in this report. This includes the establishment of local, state and federal government programs and policies which insure environmental equity; avoid the siting of future hazardous facilities/sites in already overburdened lower-income communities and communities of color; provide resources to these overburdened communities in order to create environmental amenities which can partly offset other environmental risks; and promote greater citizen participation in the problem-solving and decision-making processes which impact those communities. Elected officials, policy-makers, government agency staff, community activists, and ordinary citizens must work together to overcome the profound environmental injustices which exist in the Commonwealth of Massachusetts. Furthermore, it is important that any strategies simultaneously address environmental injustices in both the racial and class contexts. Otherwise, efforts to redress one type of inequity over the other could serve to foster continued inequity in the other group.

Specific Recommendations for Ensuring Environmental Justice in the Commonwealth of Massachusetts

(1) <u>The State should pass an environmental justice law that will ensure equal protection and additional resources for overburdened areas:</u>

A new environmental justice law should:

- ❑ Make environmental protection a civil right protected under law;
- ❑ Create regulations for Areas of Critical Environmental Justice Concern (ACEJC) that would qualify areas overburdened by pollution, hazardous facilities and sites, and/or suffering from poor health for higher scrutiny in environmental permitting and greater levels of resources for cleanup and remediation. Such an Act could amend the duties and responsibilities of the Executive Office of Environmental Affairs (Chapter 21A, Section 2) and call for the development of statewide policies regarding the protection and use of areas of critical environmental concern to the Commonwealth;
- ❑ Establish toxic-free buffer zones around sensitive receptors such as schools, daycare, and health care facilities;

(2) <u>The Department of Environmental Protection should maintain its moratorium on new landfills and incinerators:</u>

Incinerators and many landfills pose unacceptable health risks to local residents and nearby communities, and should be eliminated. The DEP should maintain a moratorium on new incinerators and hazardous landfills;

(3) <u>The State should incorporate environmental justice into all existing regulations:</u>

Existing state environmental regulations need to be enforced everywhere, especially in lower-income communities and communities of color. In particular, the following policies and regulations need to integrate an environmental justice orientation:

- ❑ Environmental reviews under the Massachusetts Environmental Policy Act (MEPA) should include explicit consideration of disproportionate impact on low-income communities and communities of color;
- ❑ There should be strong oversight and enforcement of regulations for hazardous waste site cleanup (Massachusetts Contingency Plan - 21E). More resources should be granted to the DEP to ensure rapid and thorough cleanups, especially in overburdened areas;

(3) **<u>The State should review, and when necessary, halt the provision of economic development incentives for projects that will contribute more pollution to already overburdened areas:</u>**

Development incentives such as tax credits and low cost loans should not be offered to projects that increase pollution in areas already overburdened with pollution sources.

(4) **<u>The State should track and monitor environmental disparities:</u>**

- ❑ There are a number of factors, such as housing discrimination, bank lending policies, local planning and zoning practices, licensing and permitting processes, and the geographic distribution of public services, transportation networks, and industries, etc., which play some role in creating environmental injustices. The State should undertake and/or sponsor additional investigations to better understand the sources of environmental injustice;

- ❑ The Department of Environmental Protection does an excellent job of making its databases available to the public. These efforts can be further enhanced by keeping track of its progress on reducing environmental disparities. This information should be accessible to the public over the internet. Additionally, more health and environmental monitoring needs to be implemented in areas of high concerns. The State should insure that the DEP receives adequate resources to perform these functions;

(6) **<u>City Officials and Public Health Boards should consider issues of environmental injustice in their decision-making processes:</u>**

Redevelopment agencies and public health boards should have environmental justice as a priority in decision-making around the siting of facilities, including the health impacts of proposed projects.

(7) **<u>The State should adopt the Precautionary Principle over standard risk-assessment procedures when addressing environmental issues in overburdened communities:</u>**

The Precautionary Principle says that if there is a strong possibility of harm (instead of a scientifically proven certainty of harm) to human health or the environment from a substance or activity, precautionary measures should be taken. Given that standard approaches to risk-assessment, environmental policy is oriented to the dispersion of pollution to what are considered safe levels of public exposure. However, if pollution is instead highly concentrated in certain communities, then this approach is inadequate. Overburdened communities must be granted additional protections as offered by the precautionary principle, which includes: promoting additional study of activities of concern; shifting the burden of proof so that a chemical/activity is proven safe; providing incentives for preventive behavior; and/or measures such as bans or phaseouts of substances suspected of causing the harms.

(8) **<u>The State should increase the level of resources for the Department of Environmental Protection and the Executive Office of Environmental Affairs:</u>**

The capacity of the DEP and EOEA to successfully address issues of environmental injustice would require the provision of additional funding, staff, and other resources to adequate levels. Additional responsibilities should not placed on already overburdened State agencies without the necessary funding to successfully perform the work.