Air Quality Baseline Topic Report

April 19, 2013

Joann Held
Air Toxics Analysis Services
PO Box 920
Pennington, NJ 08534
e: JoannHeld@comcast.net
p: 609-737-0867

INTERIM WORK PRODUCT: DRAFT FOR DISCUSSION ONLY

This interim work product is not intended for broad circulation. This document is intended for members of the Together North Jersey Standing Committees and others as appropriate for review and comment. It is anticipated that these reports posted may be significantly revised to address reviewer comments.

At this time, these reports have not been approved or endorsed by the Together North Jersey Steering Committee or its individual members. The work that provided the basis for these reports was supported by funding under an award with the U.S. Department of Housing and Urban Development. The substance and findings of the work are dedicated to the public. The authors of the reports are solely responsible for the accuracy of the data, statements and interpretations contained in the documents. Such interpretations do not necessarily reflect the views the Together North Jersey Steering Committee or its individual members or any other agency of instrumentality of Government.

TABLE OF CONTENTS

ACRONYMS

COH: Coefficient of Haze
EPA: US Environmental Protection Agency
HAPs: Hazardous Air Pollutants
MACT: Maximum Achievable Control Technology

NATA: National-scale Air Toxics Assessment
NJDEP: NJ Department of Environmental Protection
NOx: Oxides of Nitrogen

PM2.5: Fine Particulate Matter
SEP: Supplemental Environmental Project
SO_2: Sulfur Dioxide
TCM: Transportation Control Measures
ug/m^3: micrograms per cubic meter
VMT: vehicle miles traveled

ALA: American Lung Association
DPM: Diesel Particulate Matter
GACT: Generally Achievable Control Technology
HUD: US Department of Housing and Urban Development
NAAQS: National Ambient Air Quality Standards
NEDC: Northeast Diesel Collaborative

NJTPA: North Jersey Transportation Planning Authority
OTC: Ozone Transport Commission
ppm: parts per million
SIP: State Implementation Plan
SOTA: State of the Art
TNJ: TOGETHER North Jersey
US DOT: US Department of Transportation
VOC: Volatile Organic Compounds

1 Introduction

This report is one of a series of baseline reports that seek to characterize existing conditions, regional needs, patterns, trends, challenges and opportunities with respect to a particular issue in the thirteen-county northern New Jersey region.

This particular report will provide an overview of air quality in the region and focus on ways that it can be improved through the TOGETHER North Jersey (TNJ) planning process. TNJ will be analyzing the way development patterns and transportation investments affect the way people and goods move through the region, and their ability to reduce Vehicle Miles Travelled (VMT) and thus mobile source emissions. Since motor vehicles (cars, trucks, buses, etc.) are a critical source of air pollution in the region, the overall result of implementing TNJ should be an improvement in regional air quality as a whole. Other strategies for improving air quality are also described in this report, such as clean diesel programs and green infrastructure techniques, that are good policies to pursue in development projects and that can supplement VMT reduction strategies.

Care must also be taken to avoid reducing pollution in one part of the region at the expense of another part. To help avoid this scenario, this report will also identify specific locations that suffer from unhealthy air quality and, therefore, are limited in their ability to absorb new growth unless air quality is improved there. Some of the supplemental strategies mentioned above may help in this regard. In addition, tools for assessing cumulative impacts are summarized here.

Other baseline reports in this series will address additional aspects of air quality such as reducing vehicle miles traveled (see Transportation), carbon emissions from mobile sources and the advantages of green buildings (see Energy and Climate), and air quality in low- and very-low income communities (see Healthy Communities).

1.1 Organization of the Report

This report is presented in four sections. The first section is an introduction to existing regulatory structures, written for those who are not familiar with air quality management issues.

The second section describes existing conditions and key trends with respect to four principle pollutants or groups of pollutants: ozone, fine particulate matter, air toxics, and diesel particulate matter. It provides an overview of the levels of these pollutants with respect to standards and benchmarks, and a brief discussion of the health effects of these pollutants of concern. A summary of the types of sources that emit these pollutants is provided. Finally, there is a discussion of the difficulties of assessing the impact of multiple pollutants; and several neighborhoods with especially high exposures to multiple pollutants are identified.

The third section focuses on the policy, planning and implementation context that surrounds these pollutants of concern. The section sketches out the federal, state and regional programs that are in place to move toward reduced exposure to air pollutants, and then identifies several new or voluntary initiatives that are being explored by various entities to further reduce emissions from mobile sources and/or further reduce exposure to the pollutants of concern.

The final section identifies desirable outcomes that relate to improved air quality. It then proposes indicators that may be used going forward to determine how, and to what extent, those outcomes are actually occurring.

I would like to thank Chris Sturm (NJ Future) for her guidance in preparing this report and helping to shape it into a useful tool for TNJ. I also received considerable help from Peg Hanna (NJDEP) in scoping out the issues related to diesel vehicle emissions and from Carrie Sargeant (The Trust for Public Land) in creating a framework for discussing green infrastructure strategies. Members of the NESCAUM Air Toxics and Public Health Committee provided a helpful forum for discussing ways to present the air toxics information provided here. I am also grateful to Chris Salmi, Tonalee Key, Olga Boyko and Paul Romano (all with NJDEP) for their final review and helpful comments.

I hope that this report will be of value as TOGETHER North Jersey moves ahead with its planning and implementation efforts while constantly making the region a healthier place to live.

1.2 Key Findings

This report is focused on four principle pollutants or groups of pollutants: ozone, fine particulate matter, air toxics (benzene, 1.3-butadiene, ethylbenzene and formaldehyde), and diesel particulate matter. Mobile sources (cars, trucks, buses, etc.) are major contributors to the emission of these pollutants to the air in the region.

Health Effects: These air pollutants can adversely affect every part of the respiratory system, from nose to lungs and everywhere in between. These pollutants can also cause damage beyond the respiratory system. In the form of gases or fine particulates, pollutants can move from the lungs into the bloodstream and then travel to other organs, such as the brain or liver. So the array of adverse effects from exposure to air pollutants is very broad, ranging from asthma to cancer to brain damage and birth defects. Of particular concern is a growing body of evidence linking asthma, low birth weight, and other adverse health effects to exposure to motor vehicle exhaust by those who live near heavily traveled roadways.

Existing Conditions & Trends: Tremendous improvements in the last 20 years have led to comfortably attaining the standards (NAAQS) for four of the six criteria pollutants, and compliance with the NAAQS for PM2.5 should be officially approved soon. The state is still making progress toward meeting the NAAQS for ozone, with a goal of 2015. However, there is still work to be done.

Although the state has met or may soon meet the NAAQS for PM2.5 and ozone, respectively, the safe thresholds for these pollutants have not yet been identified, and future tightening of these NAAQS should be expected. And, as global warming drives up summer temperatures in the region, ozone levels may increase causing potential setbacks in attainment.

Risks posed by air toxic emissions remain quite high in the NJTPA region. County-average cancer risk predictions are generally greater than the health benchmark (set at a one in a million cancer risk level) for air toxics commonly found in vehicle exhaust and as high as 45 times the health benchmark (or 45 in a million risk) for formaldehyde.

Diesel emissions continue to pose a serious health risk in many urban areas even though the primary pollutant categories that they contribute to, such as fine particulate, appear to be meeting NAAQS. The NJDEP analysis of the NATA results for 2005 at the county level show extremely high cancer risk for diesel particulate matter, ranging from 62 to 925 times the health benchmark (or just short of one in a thousand cancer risk).

Finally, there are a number of neighborhoods in the older urban core that suffer from elevated air toxics exposures compared to the rest of the region. Thirty census tracts in 12 municipalities are identified by NATA as having cancer risks greater than 100 in a million. In these overburdened neighborhoods, exposures are the result of multiple sources emitting a wide range of air toxics, including a significant proportion from onroad mobile sources.

Existing regulatory structures: The New Jersey Air Quality Management programs includes such fundamental components as the State Implementation Plan (SIP), Transportation Conformity, and an Air Toxics program. The SIP describes the strategies and control measures that will be adopted in order to meet the National Ambient Air Quality Standards (NAAQS) for ozone and fine particulate matter. Transportation Conformity, the link between air quality and transportation planning, is the process that ensures transportation investments are consistent with air quality goals in areas where concentrations of pollutants exceed (or have exceeded) the NAAQS. The Air Toxics Program relies on a combination of risk assessment and control technology requirements to address the vast array of air pollutants that do not have any ambient air quality standards. Finally, the Mobile Source program has a suite of strategies in place to reduce emissions from diesel engines, including inspection and maintenance, idling restrictions, and retrofits.

Challenges: The State Implementation Plan, Transportation Conformity Requirements and Air Toxics and Mobile Source Programs described above have resulted in steady improvements in air quality over the past four decades. But they fall short when it comes to addressing the cumulative impact of multiple sources on specific neighborhoods, or when trying to balance regional air quality or economic improvements that have simultaneous adverse impacts on overburdened communities. This report briefly describes two examples, one related to raising the Bayonne Bridge and the second related to switching from coal combustion to natural gas.

Opportunities: Innovative programs that complement the existing regulatory structure are also discussed briefly in this report. They include approaches to assessing cumulative impacts; using green infrastructure to improve air quality in urban areas; a wide array of clean diesel programs; using supplemental environmental projects as conditions for settling enforcement actions; and tapping into plans being developed by local Green Teams as part of the Sustainable Jersey program.

Indicators: Environmental indicators that can be used to track progress toward the four TNJ long-term outcomes related to air quality are identified. They use information routinely reported by NJDEP, EPA and the American Lung Association. These indicators will allow TNJ to track progress toward their goals of fewer unhealthy days, attainment of the NAAQS, and meeting the health benchmarks for air toxics in the region.

2 Introduction to Existing Regulatory Structure

The purpose of this section is to describe regulatory programs that are in place to guide state officials as they develop and implement strategies to improve air quality in New Jersey. It is written at a fairly rudimenary level for those who are not familiar with the Air Quality Management Program that is in place in New Jersey.

The Federal Clean Air Act (CAA) has established a regulatory framework for identifying air quality problems and addressing them. The focus of this law is "ambient air" which is considered to be outdoors in areas that are generally accessible to the public. The framework addresses air pollutants in two different ways. For a small number of pollutants, known as Criteria Pollutants, National Ambient Air Quality Standards (NAAQS) are set by the U.S. Environmental Protection Agency (EPA) and states are delegated the responsibility of assessing compliance with the standards (through air quality monitoring). States then define attainment and non-attainment areas, and for those areas that do not meet the standards (i.e. non-attainment areas) the states establish a State Implementation Plan (SIP), describing the strategies and control measures that will be adopted in order to meet the standards.

The Clean Air Act also identifies a list of about 187 pollutants that are Hazardous Air Pollutants (HAPs). For this set of pollutants the Clean Air Act directs EPA to set technology and work practice standards for reducing air emissions and to delegate responsibility to states to enforce these standards. In addition, the State of New Jersey has regulations and permitting practices that help to minimize emissions of Toxic Air Contaminants (or Air Toxics), a category of pollutants that generally (but not completely) coincides with the national HAP list.

2.1 Criteria Pollutants

The EPA has set NAAQS for 6 pollutants. They are: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. For these six "criteria pollutants" there are federal processes and requirements that guide state, regional and local agencies to identify problem pollutants and solutions for addressing them. The most significant requirements are addressed in State Implementation Plans and Transportation Conformity Plans.

2.1.1 State Implementation Plan Basics

Once a NAAQS has been adopted, air monitoring will be done by state agencies (for at least 3 years) to determine which parts of their jurisdiction meet the standards (known as "Attainment Areas") and which areas do not meet the standards (known as "Non-Attainment Areas"). States must then develop State Implementation Plans (SIPs) that will eventually lead to meeting the relevant standard in the Non-Attainment Areas. The length of time allowed by the Clean Air Act for meeting the standard varies from pollutant to pollutant.

A SIP can include a wide variety of strategies. The New Jersey SIP to meet the ozone standard, for example, includes programs to reduce emissions from traditional industrial sources, power plants, private automobiles, household cleaning products, and many other sources. Each strategy must be adopted in regulations and the state agency must have the resources and authority to enforce the regulations. (EPA 2013e)

Once a state attains (or meets) a standard it is required to include a Maintenance Plan in its SIP that will be followed in order to ensure that the former nonattainment area of the state continues to meet the NAAQS. This plan will include a continued commitment to air quality monitoring, plus stategies to ensure that any significant increases in emissions (for example, from a new factory or power plant or the increase in emissions due to growth) will not result in significant deterioration in the good air quality levels that have been reached.

Estimates of current and future emissions are an important part of the SIP development process. Compilations of air emissions are generally known as "emission inventories." Emission Inventories help to identify the most significant sources so that they can be targeted for controls; and inventories are used to ascertain whether a selected set of control strategies will be sufficient to finally meet the standard and to maintain attainment.

Finally, it should be noted that the Clean Air Act requires EPA to re-evaluate each NAAQS at 5-year intervals. The NAAQS may be changed during this evaluation as a result of new health effects data that have been gathered. When this happens, states must submit revisions to their SIPs to demonstrate attainment and maintenance of those new or revised NAAQS and to meet other statutory requirements.

2.1.2 Transportation Conformity Basics

Transportation Conformity is the link between air quality and transportation planning. It is the process, established by the US Department of Transportation (DOT) and EPA, that ensures transportation investments are consistent with air quality goals in areas where concentrations of pollutants exceed the NAAQS. Nonattainment areas must ensure that their transportation plans, programs, and projects conform to the SIP by showing that the mobile source emissions produced do not exceed transportation emission budgets. This means that transportation projects must not worsen air quality, or interfere with progress toward attaining the NAAQS. Transportation Conformity planning is also an important part of a maintenance plan for those pollutants that meet the standard and are directly or indirectly emitted by motor vehicles. (see Federal Highway Administration 2013)

2.2 Air Toxics Program

To address the vast array of air pollutants that are not among the criteria pollutants, state and federal agencies have developed air toxics programs. Toxic Air Contaminants (or Air Toxics) is a general term that can be applied to all of the non-criteria pollutants. The federal program developed by EPA is focused on a list of about 187 Hazardous Air Pollutants (HAPs) that were designated by the Clean Air Act Amendments of 1990. For these pollutants the EPA has identified the source categories that account for the majority of the nation's HAP emissions, and for these source categories the EPA has established Maximum Achievable Control Technology (MACT) standards and Generally Available Control Technology (GACT) standards, which lay out ways to reduce the emission of HAPs using add-on controls and best management practices. (see EPA 2013a) NJDEP has accepted delegation for most of the federal HAP program.

The NJDEP Air Quality Permitting Program also has a control technology component to address both criteria pollutants and HAPs known as State of the Art (SOTA) controls. In addition, there is a risk assessment/risk management process that considers the health impact of air toxic exposure to determine if the control techniques that are being proposed are adequate. (NJDEP 2013a)

Missing from the federal HAPs list is diesel engine exhaust. Emissions from diesel engines are a complex mixture of dozens of chemicals, many of which are found among the criteria pollutants or on the list of HAPs. A large proportion of the individual pollutants found in diesel exhaust are known to cause adverse health effects. A subset of the components of diesel exhaust is diesel particulate matter (DPM). As a group, DPM has been found likely to pose a lung cancer hazard, as well as causing damage to both the circulatory and respiratory systems, especially the heart and lungs. (EPA 2002)

NJDEP has an important component of its mobile source program focused on reducing diesel emissions in the state. It includes a wide array of regulatory and voluntary programs including motor vehicle inspections, idling restrictions, and retrofitting older diesel engines with emission control devices. (NJDEP 2013b)

2.3 Cumulative Impact Analysis

The State Implementation Plan, Transportation Conformity Requirements and Air Toxics Programs described above are not sufficient to address the cumulative impact of multiple small sources on specific neighborhoods. In a 2009 report, the New Jersey Environmental Justice Advisory Council (EJAC 2009) described this shortcoming in detail, and looked at how other states and municipalities were addressing the problem. They also recommended actions to identify vulnerable and burdened communities, perform additional analysis in these neighborhoods, and reduce or eliminate excessive exposures. This issue is not yet being addressed by NJDEP in any comprehensive manner.

3 Existing Conditions and Trends

This report describes existing conditions and trends in the region for the pollutants covered in the NAAQS and for air toxics and diesel particulate matter. The report explains why emissions from mobile sources can be a greater concern than emissions from stationary sources. The report also identifies locations within the region that suffer from elevated air pollution exposures where greater efforts to proactively improve air quality are needed, especially when those areas are forecast or planned for major development.

3.1 Types of Available Data

When discussing baseline air quality, two groups of pollutants are generally considered. The first group are the six criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

For particulate matter, the size of the particle is a critical factor in determining health effects. EPA is conerned about particles that are 10 micrometers in diameter or smaller, because these particles are small enough to be inhaled. Smaller particles (less than 2.5 micrometers in diameter) can cause even more severe heatlh effects since they can travel deeper into the lungs. EPA has established two sets of NAAQS for particulate matter – one for particles less than 10 micrometers in diamter (PM10) and one for particles less than 2.5 micrometers in diameter (fine particulate or PM2.5).

The second group of pollutants is much larger and is commonly referred to as Air Toxics or Hazardous Air Pollutants. The air toxics of particular concern in this report are those that are emitted by motor vehicles, especially: benzene, 1,3-butadiene, ethylbenzene, formaldehyde and diesel particulate matter (EPA 2013h).

Air Quality Monitoring Stations have been operated throught the State for over four decades in order to establish whether areas meet the NAAQS for the criteria pollutants. The sites for these monitoring stations are chosen to fulfill a number of different objectives including: 1) to measure maximum pollutant concentrations; 2) to assess general population exposure; 3) to determine the impact of major pollution sources; 4) to measure background levels; and 5) to determine the extent of regional pollutant transport. (NJDEP 2011) At present there are 21 monitoring sites in the NJTPA region that measure one or more of the pollutants of interest in this report (see Table 1). The PM2.5 monitor in Fort Lee, sited near the entrance to the George Washington Bridge, is an example of a monitor placed to characterize high exposure. Other sites, such as those measuring ozone in Bayonne and Leonia, are intended to represent the exposures to this pollutant that are common throughout the region (or county) in order to get a sense of what the general population is experiencing. There is also one background site in the region, which is located in Chester. This site is located away from populated areas and significant local sources in order to measure the baseline levels of air pollution that local sources would be adding to.

For three of the criteria pollutants – carbon monoxide, lead and nitrogen dioxide -- the monitoring network has been used to show that the state has been meeting the NAAQS for decades. This is also the case for sulfur dioxide, with the exception of a small area in western Warren County that is not meeting the sulfur dioxide standard due to emissions of a Pennsylvania power plant. For the other two pollutants – ozone and fine particulate matter – an ongoing effort is necessary to move closer to and ultimately meet the air quality standards.

Air quality levels for the criteria pollutants can be expressed in a number of ways. The data collected from the air quality monitors are expressed as concentrations in units of either micrograms per cubic meter (ug/m^3) or parts per million (ppm). The concentrations measured at a given site are generally averaged over 1-hour, 8-hours, 24-hours or 1-year timeframes, and then the averaged concentrations are compared to the NAAQS. For example, the NAAQS for carbon monoxide has two concentration levels: a 1-hour average of 35 ppm and an 8-hour average of 9 ppm (EPA 2013c). If data from a monitor exceeds either of these concentration levels more than once in a year, then the area represented by the monitor may be considered to be out of attainment.

The EPA has developed an Air Quality Index (AQI) which is used by states to alert the public to potentially unhealthy levels of pollution (AQI 2011). It is also a convenient way to summarize the Air Quality status of an area. Instead of reporting a confusing array of concentrations in ug/m^3 and ppm over various averaging times and pollutants, the index characterizes the air quality as "good", "moderate", or "unhealthy" "for sensitive groups", and "unhealthy" (for the general population) for each county on each day of the year.

An AQI value of 100 generally corresponds to a concentration that is right at the standard (NAAQS), and a value of 50 is at half of the standard. When the AQI is 50 or less, the air quality is considered to be "Good." When the AQI is between 51 and 100 (i.e. between 51% and 100% of the standard), the air quality is considered to be "Moderate" or generally acceptable. When the index value is between 101 and 150, the air quality is considered "Unhealthy for Sensitive Groups." In this range the general public is unlikely to be affected, but members of sensitive groups may experience adverse health effects. Children, older adults, and people with respiratory or heart conditions are likely to be in a sensitive group depending on the pollutant. An AQI greater than 151 is considered to by "Unhealthy" for the general population.

For ozone, EPA describes sensitive groups in this way (EPA 2008):

- People with lung disease, such as asthma
- Children and older adults
- People who are active outdoors

For PM2.5, sensitive groups include (EPA 2003a):

- People with heart or lung disease
- Children and older adults

Air quality monitoring data for air toxics is scarce. There are four stations in the NJDEP network that routinely measure air toxics. Three are located in the NJTPA Region in Elizabeth, New Brunswick and Chester. These sites have been operating since 2001. All three sites have been measuring four of our toxics of concern: benzene, 1,3-butadiene, ethylbenzene and formaldehyde.

Measuring DPM in ambient air is problematic, since it is difficult to distinguish the particulate from diesel engines from particulate emitted by other sources in the samples that are collected. Sometimes Elemental Carbon is used as an indicator or tracer for diesel emissions, but it is not possible to convert elemental carbon measurements into estimates of DPM unless other emission sources of elemental carbon in a given area are also known. (NJDEP 2013e, Schauer 2003) For this reason, no DPM concentrations are reported here.

In the absence of extensive monitoring data, modeling techniques are often used to estimate exposure to air toxics. The National-scale Air Toxics Assessment (NATA) is a comprehensive modeling effort carried out by the EPA (EPA 2013d). Since a 1996 baseline analysis, EPA has been preparing this assessment for air toxic emissions from large and small stationary sources, and onroad and nonroad mobile sources at 3-year intervals. The purpose of the assessment is to better understand the risks posed by air toxics exposure across the country as a whole so that air pollution specialists can focus their limited resources on the areas at greatest risk and on the source types that are of greatest concern. The NATA modeling results will be used here to supplement the rather limited air toxics monitoring data.

3.2 Health Effects of Air Pollutants

It is not surprising that air pollutants can adversely affect every part of the respiratory system. From nose to lungs and everywhere in between, when air pollutants come into contact with the tissues of the body they can cause damage. The type and severity of the damage will depend on the quantity of a pollutant that a person is exposed to (concentration) and how long the exposure persists. Short exposures to high concentrations are called acute, while long term (occuring over a year or more) exposures to typically lower concentrations are called chronic. Many air quality standards reflect this time difference by setting limits linked to a specific time frame.

Air pollutants can also cause damage beyond the respiratory system. In the form of gases or fine particulates, pollutants can move from the lungs into the bloodstream and then travel to other organs, such as the brain or liver. So the array of adverse effects from exposure to air pollutants is very broad, ranging from asthma to cancer to brain damage and birth defects. Table 2 summarizes the primary health endpoints for the air pollutants of greatest concern in this region – ozone, particulate matter, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, and diesel particulate matter. The information in this table is gathered from an extensive list of on-line sources that can be accessed for more details about what is known of the specific effects of each pollutant.

There is a growing body of evidence linking asthma, low birth weight, and other adverse health effects to exposure to motor vehicle exhaust by those who live near heavily traveled roadways. One example recently appeared in Environmental Health Perspectives (Perez et al. 2012). Their study in Los Angeles reached the same conclusion found elsewhere in the country: that there are large public health consequences associated with exposure to air pollution in metropolitan areas with dense traffic corridors.

3.3 Baseline Air Quality and Trends

3.3.1 Ozone

Ozone is a gas that occurs both in the Earth's upper atmosphere and at ground level. Ozone can be good or bad for people's health depending on its location in the atmosphere. Of course, it is the ground level that is of concern here because that is where breathing ozone can have adverse effects on health.

Ozone is not usually emitted directly into the air, but is created by chemical reactions involving oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. These compounds - NOx and VOCs - are commonly called precursors. NOx is primarily emitted by motor vehicles, power plants and other sources of combustion. VOCs are emitted from a wide array of sources including motor vehicles, industrial facilities, consumer and commercial products (such as paints and coatings), natural sources such as trees, and many many more. Ozone and its precursors can also be carried into New Jersey from upwind areas. As a result, controlling ozone pollution requires a broad range of measures to reduce sources of precursors both in New Jersey and in upwind regions. Ozone control efforts have involved discussions with more than 37 states covering most of the eastern half of the country. For more information about ozone, see the Environmental Trends Report prepared by NJDEP and reproduced in Appendix A (NJDEP 2013c).

NAAQS for ozone have been in place since 1979, and have been updated several times. The most recent change came in March 2008, when the NAAQS was tightened to a maximum 8-hour average concentration of 0.075 ppm. The Clean Air Act requires that the EPA revisit each NAAQS five years after adoption, so the ozone NAAQS is currently under review. The review is scheduled for completion at the end of 2013. At that time the EPA could decide to maintain the current standard of 0.075 ppm or to lower the standard, making it more stringent. Because the safe threshold for ozone has not yet been identified, future tightening in 2013 or during a subsequent review should be expected. In the meantime, a new SIP for ozone is in preparation. It is expected show attainment of the current standard (set in 2008) by the year 2015.

The entire state has been designated as not attaining the 8-hour ozone standard that was adopted in 2008. However, there has been significant progress toward reducing ozone concentrations over the decades. The analysis by NJDEP that is presented in Appendix A shows that the maximum concentrations of ozone (observed at any site in the state) have fallen dramatically since 1984, from a high of about 0.250 ppm (1-hour average) to less than 0.150 ppm in recent years. Eight-hour averages, which NJDEP began reporting in 1998, are somewhat lower.

Another way to assess progress toward meeting the standard, is to record "site days" above the standard. To calculate this metric, every site that exceeds the standard on a given day is counted as one ozone exceedance "site day." Thus, if 10 sites exceed the standard on one day, the result is expressed as 10 site days. The total number of site days that the eight-hour ozone standard was exceeded in New Jersy has decreased significantly over the last decade (again, see Appendix A), from a high of about 375 sites days in 2002 to a value just over 100 site days in 2010.

One can also assess air quality monitoring data by using the Air Quality Index (AQI) to group days above the standard into an aggregate measure. The American Lung Association (ALA) prepares an annual report that characterizes air quality at the county level by focusing on the number of days when the AQI is high for ozone or particulate matter. They look at 3-year increments (to make variations in weather a less prominent factor) and develop a weighted average metric that makes it easier to look at local data rather than statewide statistics. The most recent report (ALA 2012) uses data through 2010. Table 3 compiles the AQI results for ozone in the 13 counties of the study region. It shows that, of the eight counties with complete data in the region, the number of days that were "unhealthy for sensitive groups" ranged from 8 to 31, and two counties – Hudson and Ocean – each had one day that was "unhealthy" for the general population during the period 2008-2010. The weighted average shown in Table 3 is calculated by giving days that are unhealthy a weight of 1.5, and days that are unhealthy for sensitive groups a weight of 1.0. Using this method for the period 2008-2010, the counties in the study region had weighted averages from 2.7 to 10.8. Unfortunately, there are no AQI statistics for 5 of the study region counties. Three have no ozone monitors (Somerset, Sussex and Union), one has incomplete data (Essex), and the other (Warren) has a monitoring site that is too new to be covered by this time period.

The ALA summaries can also be used to assess trends. Figure 1, for example, presents the weighted averages for three adjacent 3-year periods in the seven counties that have ozone monitors Even with this 3-year smoothing, there is a lot of spiking in the recent data. This may be related to the adoption of a new standard in 2008, which resulted in a change in the concentration levels deemed unhealthy and unhealthy for sensitive groups. However, the sensitivity to new information about unhealthy levels of ozone will make this tool useful in tracking future ozone trends and assessing whether the region is approaching a goal of fewer unhealthy days.

3.3.2 Fine Particulate Matter (PM2.5)

Particulate matter consists of both solid particles and liquid droplets. Particles are either directly emitted into the air or formed during atmospheric reactions between substances such as sulfur dioxide (SO_2) and oxides of nitrogen (NOx). Most forms of combustion emit all three of these pollutants (particulate matter, SO_2 and NOx). Ammonia and Volatile Organic Compounds (VOCs) are also important precursor pollutants for fine particulate matter (PM2.5). Large particles are produced by many types of manufacturing, grinding and processing operations; but the fine particulate matter that we are concerned about here is not generally associated with that type of activity. For more information about particulates, see the Environmental Trends Report prepared by NJDEP and reproduced in Appendix B (NJDEP 2013c).

NAAQS for particulate matter have been in place since 1971 when the focus was on Total Suspended Particulate (i.e. particles of all sizes). In 1987, a NAAQS was set for inhalable particulates (known as PM10) which applied to smaller particles with an aerodynamic diameter of 10 micrometers or less. In 1997, additional NAAQS were set for even smaller particles with an aerodynamic diameter of 2.5 micrometers (PM2.5). Revisions were made to the PM2.5 NAAQS in 2006 and 2012. The current levels are set at 35 ug/m^3 for 24-hours and 12.0 ug/m^3 for an annual average.

At the end of 2012, NJDEP submitted an attainment demontration to EPA (NJDEP 2012) as one of the last steps toward declaring the entire state to be meeting the PM2.5 standards that were adopted in 2006. The Clean Air Act requires that the EPA revisit each NAAQS five years after adoption, and so it happened that about the same time that the SIP document was being submitted by NJDEP, a new more stringent NAAQS was set for PM2.5. It is expected that the state will be able to demonstrate attainment with this new NAAQS as well. However, because the safe threshold for fine particulate matter has not yet been identified, future tightening during a subsequent review should be expected.

The change in the form of particulate that is covered by the NAAQS can make it difficult to look at long term trends, since different monitoring techniques are used to measure Total Suspended Particulate, inhalable particulate and fine particulate. One measurement that has been fairly constant over the decades, however, is the measurement of Smoke Shade. The NJDEP trends analysis in the 2011 Air Quality Report (NJDEP 2013e) includes a graph in the "Particulate Summary" section that is based on this parameter. Smoke Shade is measured in units known as coefficient of haze (COH) that indicate how much ight is transmitted through the air or, conversely, is blocked by particulate in the air. In 1967 the maximum smoke shade reading in the state exceeded 2.5 COH. Since the mid-1990s, however, the levels have been consistently below 0.4 COH. This is evidence that overall particulate matter in the air has been declining, but it cannot be directly translated into progress toward lower levels of PM2.5.

The NJDEP currently measures fine particulate matter at 14 sites in the project area using instruments that produce data that can be directly compared to the NAAQS. On December 26, 2012, the NJDEP submitted a redesignation request to EPA (NJDEP 2012) showing that concentrations at all of these monitors are meeting the NAAQS that was in place earlier in 2012. The monitors show that these areas also meet the new NAAQS that were established by EPA at the end of 2012. However, there does not appear to be a level below which there are no adverse health impacts from PM2.5, so the standard may be tightened even more in future years.

Particulate samples to demonstrate compliance with the NAAQS are generally collected with filter-based monitors. The monitors run for 24-hours and then the samples are taken to a lab for analysis and an air concentration is calculated. This method does not lend itself to the timely reporting that is needed to determine the same-day Air Quality Index. Therefore, NJDEP uses the smoke shade monitors to report if daily air quality is unhealthful or unhealthful for sensitive groups. However, American Lung Association annual reports that were described above as part of the ozone discussion (ALA 2012) are able to use actual particulate sample data since their reports are prepared after all the data are available. Table 4 compiles the AQI results for particulate matter in the 13 counties of the study region. It shows that of the nine counties in the region where monitors are located, the number of days that were "unhealthy for sensitive groups" ranged from 0 to 6, and none of the counties had any days that were "unhealthy" for the general population during the period 2008-2010. Based on these results, the counties in the study region had weighted averages from 0 to 2.0. Unfortunately, there are no AQI statistics for four of the study region counties (Hunterdon, Monmouth, Somerset and Sussex) due to the lack of particulate monitors.

The ALA summaries can also be used to assess trends. Figure 2, for example, presents the weighted averages for three adjacent 3-year periods in the nine counties that have particulate monitors. Similar to ozone, data weighted averages show an uptick in poor air quality during the 2005-2007 period. This way of evaluating the air monitoring data is sensitivite to new information about unhealthy levels of particulate matter (as may be reflected future changes to the NAAQS). It will be a useful tool in tracking particulate trends and assessing whether the region is approaching a goal of fewer days that are "unhealthy for sensitive groups."

3.3.3 Air Toxics

Air toxics are air pollutants that have the potential to cause adverse health effects, and that are not regulated through a NAAQS. There are hundreds of air toxics and they are emitted by a vast array of activities, usually divided into four categories: point sources, area (or nonpoint) sources, onroad mobile sources, and nonroad mobile sources (see Section 3.4 for more discussion of emission source categories).

In the absence of air quality standards, health benchmarks are often employed as a way to evaluate whether the concentration of an air toxic is cause for concern. Health benchmarks rely on chemical evaluations carried out by EPA, the California Air Resources Board, and other government agencies. As illustrated in Table 2, the air toxics of concern in this report can cause cancer and many other illnesses. For noncancer effects, health agencies identify Reference Concentrations, or concentrations that a person could be exposed to without experiencing negative health effects. A noncancer health benchmark can then be set at the Reference Concentration to assess whether the observed or predicted level might cause any harm.

For carcinogens, assessing the possibility of harm is more complex because for most carcinogens there is no known absolutely safe level. So for carcinogens, health agencies develop risk factors that can be applied to estimate the probability or risk of developing cancer as the result of a given exposure. These risk factors can be used to calculate the concentration that could result in a one in a million increase in the risk of getting cancer if a person inhaled that concentration over a whole lifetime. NJDEP generally sets the cancer health benchmark at this one in a million risk level. For a more complete description of how health benchmarks are set and used by the NJDEP Air Program see NJDEP 2013d.

About 180 individual air toxics were included in the 2005 NATA assessment. Of these, only two-thirds have toxicity values that can be used to establish health benchmarks. Using these health benchmarks, NJDEP evaluated the NATA results for the state and identified 22 air toxics that had predicted NATA concentrations exceeding health benchmarks (NJDEP 2013f). Most of this set of 22 air toxics are emitted by stationary sources (both large and small) or are at high background levels throughout the entire country. Five of these air toxics, however, have significant contributions from mobile source emissions. This report will focus on that subset of air toxics since they are the most likely to be impacted by decisions made in TNJ development plans. These pollutants are Benzene, 1,3-Butadiene, Ethylbenzene, Formaldehyde and Diesel Particulate Matter. For more information about air toxics, including those from other source categories, see the Environmental Trends Report prepared by NJDEP and reproduced in Appendix C (NJDEP 2013c).

For those air toxics which are carcinogens but also have noncancer health risks, the cancer health benchmarks are generally much more stringent than the noncancer benchmarks. For example, the cancer health benchmark for benzene is 0.13 ug/m^3 and the noncancer health benchmark is 30 ug/m^3. Clearly if exposures are below the cancer benchmark for benzene, they are also far below the noncancer benchmark. This is the case for all of the air toxics that are being reviewed in this report, so the following discussion will focus only on cancer risk.

Monitoring and modeling results can be compared to these benchmarks to ascertain whether any of these pollutants may be posing a health problem. The three air toxics monitoring sites in the state show that air toxics of concern here are likely well above their respective health benchmarks throughout the region. The modeling results from the NATA can be used to get a better estimate of how widespread the risks might be and also to try to ascertain what portion of the exposures might be associated with emissions from onroad mobile sources.

Air monitoring results for 2011 from the three air toxics monitoring sites (in Chester, Elizabeth and New Brunswick) are reported below to establish baseline levels using the cancer health benchmarks for comparison. Air monitoring at these sites shows some improvement in observed concentrations for benzene, 1,3-butadiene, ethlybenzene and formaldehyde over the past decade, although the concentrations have mostly leveled off in the past few years (NJDEP 2013e). County average concentrations predicted by the NATA modeling effort for 2005 are also reported below NJDEP 2013f).

Benzene: There is a 20-year record of benzene monitoring data in Camden, showing significant reductions in concentration over that time period. Reports from monitors in Chester, Elizabeth and New Brunswick also show improvements since they began operation in 2001. However, concentrations at Chester and New Brunswick appear to have leveled off since 2007.

Monitored levels of benzene in 2011 were 4 to 8 times the health benchmark in the region. NATA 2005 predicts county average concentrations of benzene to be 5 to 18 times the benchmark, with the lowest levels in Sussex County and the highest in Hudson.

1,3-Butadiene: Measurements of 1,3-butadiene began in Chester, Elizabeth and New Brunswick in 2001. Concentrations in Elizabeth dropped dramatically in the first few years and then leveled off. Concentrations in New Brunswick also fell in the first years (although not as much as Elizabeth), but have been nearly flat since 2005. In Chester, concentrations showed some increases over the period.

Monitored levels of 1,3-butadiene in 2011 were slightly below the health benchmark in Chester, but were 2 to 4 times above the benchmark in New Brunswick and Elizabeth, respectively.
NATA 2005 predicts county average concentrations of 1,3-butadiene to be at the benchmark in Sussex County and 2 to 5 times higher in the other study area counties.

Ethlybenzene: Concentrations of ethylbenzene measured at the three air toxics sites in the region are lower now than they were at the beginning of monitoring over a decade ago. However, year-to-year variations do not show a discernable trend in the past few years.

Monitored levels of ethlybenzene in 2011 were slightly below the health benchmark in Chester, and slightly above the benchmark in New Brunswick and Elizabeth. NATA 2005 predicts county average concentrations of ethlybenzene to be near or well below the benchmark in all counties except Hudson where it is almost 3 times higher than the benchmark.

Formaldehyde: Formaldehyde concentrations have been decreasing at air toxics monitoring sites in Chester and New Brunswick since the sites were established. At the Elizabeth monitor there is no discernable trend.

Monitored levels of formaldehyde in 2011 were 30 to 45 times the benchmark, with the highest concentrations being observed in Elizabeth. NATA 2005 predicts county average concentrations of formaldehyde to be 19 to 40 times higher than the benchmark. Although most of the formaldehyde concentrations in the NATA study are the result of atmospheric formation and transport and cannot be directly attributable to local vehicles, for six counties (Bergen, Essex, Hudson, Middlesex, Passaic and Union) it is estimated that 10-12% of the formaldehyde is directly emitted by onroad mobile sources.

Diesel Particulate Matter: As discussed above, measuring DPM in ambient air is problematic, since it is difficult to distinguish the particulate from diesel engines from particulate emitted by other sources in the samples that are collected. So there are no monitoring data to examine for trends. NATA evaluations for years prior to 2005 used different means for estimating the geographic distribution of diesel engines, so comparisons to prior years can be misleading. Therefore, we must rely on modeling estimates to establish a baseline level of the risk from exposure to DPM and then look to future analysis for possible trends.

NATA 2005 predicts county average concentrations of diesel particulate matter to be 62 to 925 times higher than the health benchmark. (Figure 4a provides a geographic representation of how the risk estimates vary by county.) This is by far the most serious cancer risk predicted for any of the pollutants included in NATA, with the highest levels expected to be in Hudson County. Onroad mobile sources are expected to contribute about half of the diesel emissions in most of the counties in the study region.

3.3.4 Regional Haze

An additional reason to be concerned about the levels of PM2.5, NOx and other pollutants in Northern New Jersey is their effect on visibility. The Clean Air Act authorizes EPA to protect visibility in certain national parks and wilderness areas known as Class I areas. There is one Class I area in New Jersey – the Brigantine Wilderness Area in the Edwin Forsythe National Wildlife Refuge, located just a few miles north of Atlantic City. NJDEP submitted a SIP to address visibility problems at Brigantine in 2009.

The same pollutants that cause visibility problems at Brigantine can also obscure the New York City skyline when viewed from New Jersey. The pollutants scatter and absorb light, limiting the distance that one can see and also obscuring color and clarity. NJDEP operates a camera that takes real time pictures documenting visibility from Newark looking toward New York City. Landmarks between the camera and lower Manhattan are used to establish the limits to visibility at any given time. (NJDEP 2013j)

3.4 Sources of Air Emissions

Air pollutants come from a wide variety of sources that can be generally classified into four categories: point sources, area (or nonpoint) sources, onroad mobile and nonroad mobile.

> **Point Sources** are stationary facilities or processes whose locations can easily be identified. Point sources include large facilities that emit a significant amount of air pollution during manufacturing, power generation, heating, incineration, or other such activity.
>
> **Area (or Nonpoint) Sources** are small stationary sources of air pollution that by themselves may not emit very much, but when their emissions are added together, they account for a significant portion of total air emissions. They are generally too small or too numerous to be listed individually. They include gas stations, residential heating, dry cleaners, and a multitude of other

sources.

Onroad mobile sources are vehicles found on roads and highways, including cars, trucks, buses, and motorcycles.

Nonroad mobile sources include aircraft, trains, boats, lawnmowers, leaf blowers, and construction vehicles.

NJDEP routinely updates the state emission inventories which compile information about the type and amount of pollutants discharged into the air in New Jersey within a specified time span, usually a calendar year. The information can be grouped into the source categories described above. This helps regulators to identify the most effective strategies for reducing critical emissions. A fifth category – biogenic emissions – is sometimes shown in the inventory. Biogenic emissions come from biological materials and other natural processes.

A recent breakdown of emissions into these categories can be found in the PM2.5 SIP that was submitted to EPA in December 2012 (NJDEP 2012). The emission pie charts from that document can be found in Figures 3a to 3e. The signficance of emissions from onroad vehicles is clear from these figures. Onroad mobile sources are responsible for about 11% of direct emissions of PM2.5 and 6 to 58% of emissions of pollutants that lead to the formation of PM2.5 (i.e. sulfur dioxide, volatile organic compounds, ammonia and nitrogen oxides). For ozone, which is not directly emitted, the fraction of precursors from onroad mobile sources is 23% and 58% for VOCs and NOx, respectively.

For Air Toxics, onroad mobile sources directly emit a substantial portion of four of the pollutants of concern in this report, with the contributions estimated to be about 30%, 40%, and 45% of total statewide emissions of benzene, 1.3-butadiene, and ethlybenzene, respectively (NJDEP 2013g). Diesel particulate matter is almost exclusively emitted from mobile sources, with about 47% coming from onroad vehicles and 53% from nonroad mobile sources on average statewide. The contribution of onroad mobile sources to formaldehyde concentrations in the state are harder to estimate, because so much of the formaldehyde that is present in the air is the result of secondary formation. Although only 9% of the formaldehyde in New Jersey's air is likely to be directly emitted by onroad mobile sources, about 82% of the ambient formaldehyde is the result of secondary formation from pollutants that may largely be coming from motor vehicles.

3.5 Assessing Multiple Pollutants

3.5.1 Cumulative Impact Analysis

Simply knowing if each individual pollutant in the air is below the NAAQS or below a health benchmark may not be enough to determine if air quality is healthy. For example, simply measuring particulate matter concentrations in the air does not account for the toxicity of individual components that are present in the mass of particulate matter. Assessing pollutants one by one also does not account for possible synergistic effects among pollutants. In addition, the existing programs described in Section 2 are primarily aimed at assessing large-scale air quality status at the municipal, county, or regional level and can easily miss local neighborhood hotspots.

Another shortcoming of existing programs is that they are not comprehensive in their identification of air pollution sources. Many small sources are below the size threshold that would require air permits, so these sources are not documented on an individual source basis in the traditional air emissions inventories. When efforts are made to assess the impact of multiple sources in a focused area such as a neighborhood, information about these smaller sources is most often missing.

Finally, planning and zoning decisions at the local level are generally not organized in such a way as to allow the consideration of the combined impact of multiple sources in the course of making land-use decisions. Municipal and county governments oversee significant land use and development plans, and their decisions can exacerbate cumulative impacts. The report on Cumulative Impacts prepared by the NJ Environmental Justice Advisory Council (EJAC 2009) suggests ways to improve this process.

3.5.2 Neighborhood Level Air Quality

There are locations within the NJTPA region that suffer from elevated air pollution exposures where greater efforts to proactively improve air quality are needed, especially when those areas are forecast or planned for major development. Some neighborhoods suffer from a multitude of environmental stressors from air pollution to water pollution, contaminated sites, odors and noise. EPA summarized the issues related to this type of multiple exposures a decade ago in the report “Framework for Cumulative Risk Assessment” (EPA 2003b). Efforts are underway at the federal, state and municipal level to develop tools to consider cumulative impacts in the most vulnerable neighborhoods. Some of these tools, including, EJView, C-FERST and a Cumulative Impact Model Ordinance, are described in Section 4.2.3.

Of particular interest in this report, are neighborhoods where multiple sources of air pollution - large and small, permitted and unregulated, from all the source categories (point, area, onroad and nonroad mobile) - are impacting the residents. Some researchers call these areas “hotspots” indicating that they have higher air concentrations of pollutants than the general population in New Jersey. NJDEP refers to these neighborhoods as “overburdened” (NJDEP 2013i), meaning that these areas may be suffering from environmental health problems due to multiple environmental stressors. NJDEP is developing a screening method to estimate cumulative environmental impacts (NJDEP 2013k) that can be used to identify these overburdened communities. When this tool is available, it may be possible to use it in conjunction with new tools coming from EPA to identify strategies tailored to the community for reducing those environmental burdens.

NATA results for 2005 (from a modeling analysis to estimate exposure to air toxics described in section 3.1) have been made available by EPA at the census tract level using Google Earth (EPA 2013i), making it possible to explore the cumulative air toxics impacts in the NJTPA region at a neighborhood level scale. Although the NATA analysis does not address all possible air pollutant exposures (it does not include the criteria pollutants, for example) and it may be subject to some data error (especially considering the enormity of the project), it still is a useful tool to identify neighborhoods that may be overburdened by air toxics exposures at the very least. A summary of the NATA results at the census tract level shows that noncancer risks are predicted to be low in the NJTPA region. Cumulative cancer risks (i.e. for all of the HAPs from all of the source categories) are generally in the range of 30 to 50 in a million (or 30 to 50 times higher than the health benchmark) in all 13 counties. In eight counties (Bergen, Essex, Hudson, Middlesex, Morris, Passaic, Somerset and Union) there are many census tracts with predicted risks in the 50 to 90 in a million range. And in five of these counties (Bergen, Essex, Hudson, Passaic and Union), there are several census tracts with predicted risks greater than 100 in a million. Screen shots from Google Maps showing the census tract level results from NATA can be found in Appendix D. The highest predicted risks appear as dark brown areas in those maps. Thirty census tracts in 12 municipalities are identified on these maps as having cancer risks greater than 100 in a million. The 12 municipalities with these high predicted cumulative cancer risks are listed below, with the number of high risk census tracts noted in parenthesis.

Bergen County:	Fort Lee (4)
	Palisades Park (1)
Essex County:	East Orange (2)
	Irvington (1)
	Newark (2)
Hudson County:	Bayonne (1)
	Jersey City (7)
	Hoboken (6)
	North Bergen (1)
	Union City (3)
Passaic County:	Paterson (1)
Union County:	Elizabeth (1)

The highest predicted risk is 131 in a million in Fort Lee near the entrance to the George Washington Bridge. Note that these risk estimates do not include exposure to Diesel Particulate Matter, which was not handled as a carcinogen in the EPA analysis of the NATA predictions. If the analysis of the DPM exposures were available at the census tract level, these predicted risks would all be significantly higher.

The contribution that each source category makes to the cumulative risk can be found by clicking on a census tract in the Google Earth maps. An examination of the maps shows that the contribution from all of the HAPs that are emitted by onroad mobile sources are substantial, ranging from 11 to 59% of the total predicted cancer risk in these 30 census tracts. The four air toxics that are the focus in this report account for most of this risk.

3.6 Summary

Tremendous improvements in the last 20 years have led to comfortably attaining the standards (NAAQS) for four of the six criteria pollutants, and compliance with the NAAQS for PM2.5 should be officially approved soon. The state is still making progress toward meeting the NAAQS for ozone, with a goal of 2015. However, there is still work to be done.

Although the state has met or may soon meet the NAAQS for PM2.5 and ozone, respectively, the safe thresholds for these pollutants have not yet been identified, and future tightening of these NAAQS should be expected. And, as global warming drives up summer temperatures in the region, ozone levels may increase causing potential setbacks in attainment .

Risks posed by air toxic emissions remain quite high in the NJTPA region. County-average cancer risk predictions are generally greater than the health benchmark (set at a one in a million cancer risk level) for air toxics commonly found in vehicle exhaust and as high as 45 times the health benchmark (or 45 in a million risk) for formaldehyde.

Diesel emissions continue to pose a serious health risk in many urban areas even though the primary pollutant categories that they contribute to, such as fine particulate, appear to be meeting NAAQS. The NJDEP analysis of the NATA results for 2005 at the county level show extremely high cancer risk for diesel particulate matter, ranging from 62 to 925 times the health benchmark (or just short of one in a thousand cancer risk).

Finally, there are within the region a number of neighborhoods in the older urban core that suffer from elevated air toxics exposures compared to the rest of the region. Thirty census tracts in 12 municipalities are identified by NATA as having cancer risks greater than 100 in a million. In these overburdened neighborhoods, exposures are the result of multiple sources emitting a wide range of air toxics, including a significant proportion from onroad mobile sources.

4 Planning, Policy and Implementation Context

This section will review some of the programs and policies that are already in place to help the state of New Jersey to improve air quality and move toward the long-term goals of meeting all of the NAAQS for the criteria pollutants and health benchmarks for air toxics. In addition, several concepts and approaches are highlighted that may complement the current programs, especially in the context of development plans that affect housing and transit. This section is organized to flow from federal to state, local and voluntary programs, first addressing the criteria pollutants and then air toxics (including DPM).

4.1 Federal, State and Regional Programs Already in Place

4.1.1. State Implementation Plan

The State Implementation Plan (SIP), as described in Section 2.1.1, is a compilation of all the actions that the state is committed to take in order to move toward attainment of an air quality standard or in order to maintain compliance with the standard. The effort to meet the standards for ozone and fine particulate matter (PM2.5) has been ongoing for decades, with dozens of actions already in place. Still, more needs to be done. The latest SIPs (NJDEP 2007; NJDEP 2012) for these two pollutants have long lists of actions that address air pollution sources from every category - point, area, onroad and nonroad. Tables 5a and 5b provide a glimpse of the type of actions that are in place or being planned.

Nine counties in the NJTPA Region had been designated as not having attained the NAAQS for PM2.5. However, on December 26, 2012, the NJDEP submitted a redesignation request to EPA (NJDEP 2012). If it is accepted by EPA, then the area will be in attainment and the state will be in a maintenance program for both the 24-hour and annual PM2.5 NAAQS, which had been set at 35 ug/m^3 and 15 ug/m^3, respectively, at the time that the request was being prepared (EPA 2013c). It is expected that the measures in this SIP will also be sufficient to show attainment for the newest PM2.5 standard of 12 ug/m^3 (annual average) that was set on December 14, 2012. However, a new designation process will be necessary to demonstrate attainment with the 12 ug/m^3 NAAQS.

The PM2.5 redesignation SIP package (NJDEP 2012) includes the following material:

1. air quality monitoring data that shows compliance with the NAAQS;

2. a summary of control measures that New Jersey has implemented to bring the State into attainment;
3. a maintenance plan that demonstrates a projected continuing downward trend in emissions through 2025;
4. a contingency plan that would be implemented should the air quality violate the NAAQS in the future; and
5. transportation conformity budgets; and other information that supports the request for redesignation.

Among the strategies contained in the SIP are Transportation Control Measures (TCMs). These are specific programs designed to reduce emissions from transportation sources by reducing vehicle use or changing traffic flow or congestion. Examples include improving public transit and developing high occupancy vehicle (HOV) lanes.

For PM2.5, completing these actions may be enough to maintain state and regional compliance with the NAAQS, but pockets of noncompliance may exist that will be difficult to identify with the limited network of air quality monitors. Additional reductions may be necessary to address these "hotspots" as well as to show compliance with future changes to the standards, which are to be reviewed every five years.

NJDEP submitted an Ozone SIP to EPA in October 2007. This SIP was to show attainment of the 8-hour ozone NAAQS at the time (0.8 ppm) by June 2010. Since that time, the 8-hour ozone NAAQS has been tightened to 0.075 ppm, and New Jersey's attainment date is 2015.

In the case of ozone, ultimately meeting the NAAQS will depend a great deal on the success of programs taking place outside the state (see section 4.1.4, below), since ozone is a "secondary" pollutant formed by the reaction of other pollutants (VOCs and NOx) after traveling sometimes hundreds of miles. As with PM2.5, future changes to the standard may require still more actions. Going beyond the current plans may also be necessary to address the effects of increasing temperatures which could lead to greater conversion of precursor emissions into ozone.

4.1.2 Transportation Conformity

Transportation Conformity, as described in Section 2.1.2, is the process established by US DOT and EPA to ensure that transportation investments will contribute to improving air quality in areas where concentrations of pollutants exceed NAAQS. Through inventory and modeling efforts, transportation conformity confirms that traffic and transit projects are consistent with the transportation emission budgets set forth in the SIP, especially with respect to decreased emissions from onroad mobile sources.

For the NJTPA region, Transportation Conformity applies to three criteria pollutants: ozone, carbon monoxide (CO) and fine particulate matter (PM2.5). Therefore, budgets for emissions from onroad vehicles are necessary for volatile organic compounds (ozone precursors), nitrogen oxides (ozone and PM2.5 precursors) , CO and PM2.5. (Note that a maintenance program is still required for CO even though the state reached attainment of that NAAQS in 1995.) The budgets come from an analysis of state and federally funded projects and programs intended to rebuild, improve and maintain the State's roadway and transit systems. The projects are contained in Metropolitan Planning Organization Transportation Improvement Plans (TIPs).

Transportation Improvement Plans
The TIP for the NJTPA region is updated annually with a 4-year time horizon. The current TIP for FY2012-2015 became effective October 1, 2011 (NJTPA 2011). This TIP covers all the maintenance and repair of roads and bridges that are state and federally funded. It also includes many projects that have the potential to reduce VMT and/or emissions from onroad vehicles. These projects include walkways and bike paths, streetscape improvements, ferry service, variable message signage, circle elimination, and ramp improvements. The NJTPA Project Development Work Program is a way to feed projects into the TIP. At the conclusion of project level work, projects become candidates for inclusion in the TIP (NJTPA 2013).

4.1.3 Air Toxics Program

The New Jersey Air Toxics Program, described in Section 2.2, began officially in 1979 with the adoption of a state regulation – Control and Prohibition of Air Pollution by Toxic Substances (N.J.A.C. 7:27-17). This rule required additional scrutiny of sources emitting any of 11 toxic substances. Over the years, the program expanded to include more air toxics and to use innovative screening tools to identify sources that needed additional controls or improved operations in order to reduce exposures in the neighboring areas.

The New Jersey Air Toxics program is primarily implemented by the Air Quality Permitting Program using its authority to require that both criteria pollutants and HAPs use State of the Art (SOTA) controls. In addition, there is a risk assessment/risk management process that considers the health impact of air toxic exposure to determine if the control techniques that are being proposed are adequate. (NJDEP 2013a)

In 1990, the federal Clean Air Act was amended to include an extensive program to address air toxics nationally. The federal program is focused on a list of about 187 Hazardous Air Pollutants (HAPs). For these pollutants the EPA has identified the source categories that account for the majority of the nation's HAP emissions, and for these source categories the EPA has established Maximum Achievable Control Technology (MACT) standards and Generally Available Control Technology (GACT) standards, which lay out ways to reduce the emission of HAPs using add-on controls and best management practices. (see EPA 2013a) NJDEP has accepted delegation for most of the federal HAP program.

4.1.4 Diesel Program

An important part of the Mobile Source Program in the NJDEP is the focusing on reducing emissions from diesel vehicles (especially diesel trucks and buses). The efforts include both regulatory and voluntary activities (NJDEP 2013b). The regulatory efforts are described here, and some of the innovative new and voluntary programs are described in 4.2.1.

Diesel Inspection and Maintenance Program: Inspections of heavy-duty diesel vehicles (trucks, school buses and commercial buses) are performed at licensed Diesel Private Inspection Centers and randomly at several roadside locations by teams comprised of State Police and Motor Vehicle Commission staff. The focus of the program is on reducing smoke emissions from these vehicles. In 2008, the smoke standards were tightened for heavy-duty diesel engines. Rules are being considered to incorporate lighter weight diesel vehicles (less than 8,500 pounds) into the emissions inspection program.

Mandatory Retrofit Program: Since heavy-duty diesel engines have such a long service life, it takes an extraordinarily long time for new engine emission standards (such as those adopted at the federal level) to significantly lower emissions. To address the legacy fleets, the New Jersey Legislature adopted the Diesel Retrofit Law in 2005. The law requires that certain classes of diesel vehicles be retrofitted with tailpipe or engine controls to reduce particulate emissions, and a dedicated fund has been established to support the program. The first classes of vehicles to be targeted by this program are publicly owned solid waste vehicles, privately owned solid waste vehicles used in a public contract, and publicly and privately owned school buses.

Idling Restrictions: Idling cars, trucks, school buses, public and private transportation buses, and off-road construction vehicles/equipment all contribute to the degradation of local air quality. NJDEP regulations limit engine idling for both diesel and gasoline vehicles to three minutes with limited exceptions. Working with County Health Departments, NJDEP has enforced these restrictions in critical locations. The Mobile Sources Program also offers for sale No-Idling Zone signs suitable for installing on buildings, parking lots or anywhere that idling is a problem, adding a compliance assistance component to the overall effort.

Even with these efforts in place to lower emissions from diesel vehicles, the estimated diesel particulate risk in New Jersey is expected to remain high for the foreseeable future. Figure 4a compares the risk associated with emissions of onroad diesel vehicles as estimated by NATA 2005 to the expected risk in 2020 with significant fleet turnover in place and the use of cleaner diesel fuels that are mandated by the federal government. Even with these two major initiatives, the risk is projected to be well above the DPM health benchmarks throughout the NJTPA Region in 2020, and still over 100 in a million cancer risk in some parts of Bergen, Essex, Hudson, Middlesex, Passaic and Union counties (NJDEP 2013h). Even more significant are the risks from nonroad diesel engines, which are primarily construction equipment in this part of the state (see Figure 4b).

4.1.5 Regional Programs

Because ozone is formed in the atmosphere from pollutants that may have been emitted hundreds of miles away, it is essential that states work together on some aspects of their Ozone SIPs in order to address regional transport. The Ozone Transport Commission (OTC) has been established by the Clean Air Act for this purpose. The OTC is a multi-state organization that is responsible for advising EPA on transport issues and for developing and implementing regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions. New Jersey is an active member of the OTC. Two especially important aspects of their work are coordinated regional modeling and the development of model rules. For example, in 2012 the OTC prepared model rules addressing solvent degreasing, consumer products and idling by nonroad diesel engines. (OTC, 2013)

Visibility is also an issue that warrants regional cooperation. As an offshoot of OTC, the Mid-Atlantic/Northeast Visibility Union (MANE-VU) was formed by the Mid-Atlantic and Northeastern states, tribes, and federal agencies to coordinate regional haze planning activities for the region. MANE-VU (2013) enables a coordinated approach to meeting the requirements of EPAs regional haze rules and reducing visibility impairment in major national parks and wilderness areas in the Northeast and Mid-Atlantic region, by providing technical assessments and assistance. These regional efforts will also help to improve visibility in Northern New Jersey where the same pollutants that cause visibility problems in wilderness areas can also obscure the New York City skyline when viewed from New Jersey.

4.2 Innovative New and Voluntary Programs

In addition to the regulatory programs that are in place, there are several concepts and approaches that may complement the current programs, especially in the context of development plans that affect housing and transit. Some of these programs are discussed briefly below.

4.2.1 Clean Diesel Programs

The NJDEP Mobile Sources Program provides guidance and technical assistance to many entities who undertake efforts to retrofit or otherwise reduce engine emissions above and beyond regulatory requirements.

Reduce Vehicle Emissions from Construction Projects: As discussed above, there is a significant risk associated with the operation of offroad diesel engines (Figure 4b). In the NJTPA region these engines are mostly used in construction projects. A potentially powerful strategy for reducing exposure to DPM is to encourage the use of vehicles with newer engines or that are retrofitted with fine particulate controls at constructions sites for publically financed projects. An Executive Order signed by Governor Christie in 2011 (EO60 2011) targets air pollution caused by diesel engines used on major transportation construction projects in New Jersey. It calls on NJDEP and NJDOT to create a diesel emission retrofit Pilot Program for construction equipment with the ultimate goal of improving air quality for those living near urban construction sites. This pilot program could be a good model for future activities in the NJTPA region.

Restricting idling at construction sites can also be an effective tool. Specifications for operating cleaner diesel equipment have become more prevalent as states, local governments, public agencies, and private entities have begun to require that clean diesel construction technologies and strategies be used on their sites. The Northeast Diesel Collaborative (NEDC 2013) has developed equipment specifications and other best practices to minimize diesel emissions from construction. Clean diesel engines and a no idling commitment should be considered for construction of housing, businesses, schools, local roads, etc., especially those that are closest to existing residential areas and schools.

Goods Movement: With the presence of the Port of Newark and Elizabeth and many other intensive truck operations in the NJTPA region, there is the potential to greatly reduce DPM emissions by following the NJ Clean Freight Program recommendations when building or renewing facilities such as a warehouse or logistics center. (See flyer in Appendix D for details.) Recommendations include:

- Make Your Facility a No Idling Zone
- Provide Electric Plug-ins for Trucks and Containers
- Provide Essential Services for Drivers
- Encourage Truck Drivers to Follow Local Truck Routes
- Schedule Pickups and Dropoffs to Reduce Waiting Times
- Encourage the Use of Clean Trucks (2007 or Newer Engines)
- Maintain Communication with Neighboring Communities
- Encourage Shipping and Logistics Companies to join USEPA's Smartway Program

Voluntary Retrofits: For the next several years, while the diesel engine fleet slowly turns over, voluntary retrofit programs will continue to be an important part of reducing DPM emissions. The NJDEP Diesel Program has managed voluntary demonstration projects with millions of dollars of federal grants, Congestion Mitigation and Air Quality (CMAQ) funds, and enforcement settlement funds. Some of these projects have included retrofits of trucks and port equipment in Camden, Newark and Elizabeth Opportunities continue to become available, especially with assistance from NJDEP and from the NEDC (NJDEP 2013b).

4.2.2 Education and Outreach for Clean Driving Programs

No matter how successful the TNJ program is at reducing VMTs in the region, there will still be millions of cars on the road. Education and outreach efforts to encourage motorists to "drive clean" will help to move the region toward more healthy air quality.

Promote the use of Clean Vehicles and Alternative Fuels: The New Jersey Clean Cities coalition works with vehicle fleets, fuel providers, community leaders, and other stakeholders to reduce petroleum use in transportation. Their programs focus on alternative fuel vehicles, idling reductions, fuel economy improvements, and much more (DOE 2013). The New Jersey Clean Vehicles Website (NJDEP 2013l) also offers information on how to purchase a clean vehicle and tips on how to maintain a vehicle so that it continues to be as clean as possible.

No Idling Pledge: The NJDEP Mobile Source Program encourages emission reductions from all types of vehicles through their voluntary No Idling Pledge program. Their extensive public information (NJDEP 2013b) trumpets the message that only 10 seconds of idling uses more fuel than turning an engine off and on.

4.2.3 Cumulative Impact Assessment

Overall reduction in exposure to air toxics will result from the decrease in VMTs throughout the region, but local areas with high impacts need to be addressed specifically, using tools that result in wise zoning and siting decisions, and tools that will identify effective risk reduction strategies. These decisions will be critical in the context of residential and transit development in the NJTPA region.

EJView: EPA has developed a tool that can map the locations of discharges or contaminated sites that are reported to EPA. The tool allows a specific area to be selected and specific types of sites to be chosen. The NATA cancer risk predictions can then be overlayed on the area. (EPA 2013g) The maps produced in this way can identify local sources and may help to identify risk reduction strategies….

C-FERST: This Community-Focused Exposure and Risk Screening Tool is still in development by EPA. A beta version is being tested by Community Action for Renewed Environment (CARE) grant recipients. The goal is to develop a user-friendly tool that can be used by communities to generate maps of sources, concentrations, human exposures, and cumulative risks, with overlays about EJ factors or health outcomes, and also compare information across communities (Zartarian et al 2011).

Reduce Near-Roadway Exposures: There is a growing body of evidence linking asthma, low birth weight, and other adverse health effects to exposure to motor vehicle exhaust by those who live near heavily traveled roadways. One example recently appeared in Environmental Health Perspectives (Perez et al. 2012). This study in Los Angeles reached the same conclusion found elsewhere in the country:

that there are large public health consequences associated with exposure to air pollution in metropolitan areas with dense traffic corridors. The conclusions of Perez et al support compact urban development strategies coupled with policies to reduce near-roadway pollution exposure, such as ensuring that housing and schools are sufficiently separated from heavily traveled roads. Just how far away from a heavily traveled roadway is sufficient is still being debated, but a 75 to 100 meter minimum is often suggested.

Cumulative Impact Model Ordinance: The NJ Environmental Justice Alliance has developed a model ordinance that could be adopted by municipalities seeking to consider the environmental impact of new developments or other projects in the context of all existing environmental exposures. The model ordinance (TESC 2013) would require the preparation of an Environmental Impact Statement that provides:

> "a detailed statement and analysis of the environmental and public health impacts of the proposed development, in comparison to a "baseline" of such information describing current conditions of the site, and including: (1) both positive and negative impacts, and (2) any cumulative impacts which, when viewed in isolation, may be considered insignificant but when viewed in combination with prior or planned development and ongoing activities or reasonably foreseeable activities, may prove to be detrimental; (3) any adverse effects which cannot reasonably be avoided should the proposed application or project be approved as filed, taking into account practicable and feasible mitigation measures, including mitigation that may offset existing impacts through a "net impact" assessment…"

The basic idea is to flag potentially harmful projects before they receive local siting approvals, and to ensure that their impacts are considered in the context of all existing environmental impacts in the same neighborhood. This model ordinance is currently being considered by the City of Newark.

4.2.4 Green Infrastructure

While waiting for more complex emission reduction strategies to be put into place, green infrastructure projects can begin to improve air quality almost immediately. Green infrastructure includes a host of techniques which depend on the planting of trees, shrubs, vines and rain garden plants. Short-term reductions in exposure to air pollutants could be quickly gained from landscaping techniques such as tree planting, berms, and green walls. The types of projects described here have added benefits beyond direct air quality improvements. For example, trees and shrubs are well established as a means to moderate the heat island effect observed in urban areas. Lower urban temperatures can attenuate the speed of formation of ozone in these areas. Trees have also been shown to have socioeconomic benefits (Kuo 2003, SCI 2013) and are a good return on investment over time.

With respect to air quality, trees are first and foremost among green infrastructure techniques. Their ability to capture particulate matter from the air is well documented (Nowak et al 2006).
Two other green landscaping techniques have the potential to be especially effective in overburdened communities: berms and green walls. Berms have been used to establish a buffer between industrial and residential areas. (Note that in overburdened areas, these two types of land use are typically intermingled.) In addition to interrupting air flow between use areas, the vegetation on a berm can be useful in capturing particulates. Berms also act as a wind break, reducing wind speeds. This is important in many overburdened communities where wind-blown fugitive dust can be a significant problem.

Green walls have been established as an effective way to increase the surface area of green plants for pollutant removal. A green wall (usually a type of vine or climbing species such as wisteria, honeysuckle, etc.) provides vegetation on vertical surfaces to maximize plantings. Recent work by Pugh et al (2012) indicates that this type of green infrastructure may be much more effective than previously thought at removing pollutants from the air in urban areas, especially in street canyons.

4.3 Opportunities and Challenges

This section explores a sample of opportunities for improving air quality that are present to those who are preparing and implementing the Regional Plan for Sustainable Development. Examples of some challenges are also given.

4.3.1 Supplemental Environmental Projects

Funding to address a variety of environmental issues through pilot projects, infrastructure improvements, and other means may sometimes be available through Supplemental Environmental Projects (SEPs). A SEP is an environmentally beneficial project that a company voluntarily agrees to perform as a condition of settling an enforcement action. A SEP is an activity that the violator would not otherwise have been required to perform, and in which the public or the environment is the primary beneficiary (NJDEP 2013m). SEPs have been successfully used to fund diesel retrofit programs and to clean up a closed gas station so that it could be used for a pocket park.

4.3.2 Sustainable Jersey Plans

Tapping into plans being developed by local Green Teams as part of the Sustainable Jersey program (Sustainable Jersey 2013), could provide opportunities to collaborate with local governments in their efforts to improve local air quality. Sustainable Jersey is a certification program for New Jersey municipalities wanting to foster choices that have a lower adverse impact on the environment. To date, 384 municipalities in the state have registered with the program. Many, such as Newark, are developing local municipal sustainability plans. The Newark plan includes a set of Priority Action Items to improve air quality (Sustainable Newark 2013). Some of these Actions Items are:

- Convene an air quality taskforce to identify, monitor and address health-harmful local sources of air pollution
- Strengthen partnerships and advocacy work on major emission sources
- Phase out use of Number 6 and Number 4 heating oil in building boilers.

4.3.3 Raising the Bayonne Bridge

The proposal to raise the Bayonne Bridge is an example of a project that makes sense from a certain economic perspective, but may have unintended adverse environmental impacts that must be addressed as part of the project, or that could ultimately outweigh the economic benefits. The “Raise the Roadway” project would raise the bridge 64 feet to make room for the new generation of supersized Panamax ships. Project proponents claim it will be a tremendous economic achievement. However, environmental organizations and local community groups have raised a number of concerns, especially with respect to the increased truck traffic that will result at the Port of Newark and Elizabeth. Neighborhoods adjacent to the Port are already overburdened communities, and can ill-afford exposure to additional diesel particulate matter. (Clean Water Action 2013)

4.3.4 Natural Gas Usage

Historically there has been a preference for natural gas combustion in New Jersey because of the stringent sulfur in fuel regulations that are in place in this state. In recent years new natural gas power plants have been recommended to replace existing coal and fuel oil plants. However, they are being proposed for areas that already have high cumulative air impacts. So, even though natural gas combustion to produce energy is cleaner than fuel oil or coal combustion, the suggested projects may still be a problem. Principles for identifying appropriate locations for new energy production may be a useful part of an overall development plan.

5 Desired Long Term Outcomes

The HUD Partnership for Sustainable Communities has established six livability principles that act as a foundation for interagency coordination. Among these is a commitment to enhance the unique characteristics of all communities and invest in healthy, safe, and walkable neighborhoods (Livability Principle 6). This commitment to healthy neighborhoods makes it essential that jurisdictions adopt comprehensive integrated water, air and land use plans. Air quality impacts, therefore, must be considered as part of the TNJ development plan.

Five outcomes that should be evident if TNJ is successful in improving and protecting air quality in the region are:

- **Fewer Days with Poor Air Quality:** The region and its municipalities, neighborhoods and business districts enjoy healthy air quality with fewer days not meeting air quality standards and more areas meeting health benchmarks.

- **Attainment of Air Quality Standards:** The region moves towards attainment of the National Ambient Air Quality Standards and makes continued reductions in emissions even where the standards have already been met.

- **Reduced Exposures in Vulnerable Neighborhoods**: Low- and very low-income communities enjoy cleaner air and reduced exposure to air pollutants.

- **Meeting Health Benchmarks for Air Toxics in the Entire Region:** All areas of the region are meeting the health benchmarks for diesel particulate matter and other air toxics.

- **Lower Emissions from Onroad Mobile Sources:** Continuous reduction of direct emissions and precursor emissions from onroad mobile sources. Also, ozone precursor emission reductions are adequate to overcome likely future increases caused by rising temperatures.

The relationship between the fifth outcome and future increases in the rate of ozone formation that may result from rising temperatures due to global warming will be discussed in the Climate Change report.

5.1 Measuring Progress

Indicators are tools to measure progress toward achieving long-term outcomes. Useful indicators are objective and easy to collect. The source of the data found in quantitative indicators should be consistent and likely to be available in future years. Environmental indicators that can be used to track progress toward the four direct outcomes listed above have been identified and are discussed in this section.

While indicators related to health outcomes, such as asthma rates, would be of interest with respect to the overall goal of healthy communities, these health endpoints are affected by many factors beyond changes in air quality, making interpretation of health statistics difficult and often misleading if they are being evaluated as a measure of progress toward the goal of healthy communities. The New Jersey Environmental and Public Health Tracking system (NJDHSS 2013) is attempting to combine measures of air quality and disease prevalence in a meaningful way. In the future, that system may be able to provide more robust indicators that can measure progress toward the ultimate goal. For now, we are recommending the collection of the following group of indicators that rely only on existing environmental data to assess progress toward achieving long-term desired outcomes. These indicators are summarized in Table 6.

5.1.1 Fewer Days with Poor Air Quality

The region and its municipalities, neighborhoods and business districts enjoy healthy air quality with fewer days not meeting air quality standards.

- Number of days that are unhealthy or unhealthy for sensitive groups, measured by the Air Quality Index for the region as a whole and for the 11 counties with ozone and PM2.5 monitoring stations.

5.1.2 Attainment of Air Quality Standards

The region moves towards attainment of the National Ambient Air Quality Standards and makes continued reductions in emissions even where the standards have already been met.

- Current nonattainment & maintenance areas for NAAQS pollutants by type, by county, showing the portion of the region meeting the standards for ozone and PM2.5. This information is routinely available from NJDEP

5.1.3 Reduced Exposures in Overburdened Neighborhoods

Low- and very low-income communities enjoy cleaner air and reduced exposure to air pollutants.

- Decrease in the number of census tracts predicted to be above 100 in a million cumulative cancer risk as found in future NATA analyses.

5.1.4 Meeting Health Benchmarks for Air Toxics in the Entire Region

All areas of the region are meeting the health benchmarks for diesel particulate matter and other air toxics.

- Decreased cancer risk posed by mobile source emissions in each of the 13 counties. Results should be available from future NATA analyses.

5.1.5 Lower Emissions from Onroad Mobile Sources

Continuous reduction of direct emissions and precursor emissions from onroad mobile sources.

- Emission inventories prepared by NJDEP for criteria pollutants and by EPA for air toxics show reduced tonnage from the onroad mobile source category.

6 References

ALA (2006). American Lung Association Publications: State of the Air Report 2006. Retrieved April 2, 2013 from: http://www.lung.org/about-us/publications/

ALA (2009). American Lung Association Publications: State of the Air Report 2009. Retrieved April 2, 2013 from: http://www.lung.org/about-us/publications/

ALA (2012). American Lung Association: State of the Air Report 2012. Retrieved April 2, 2013 from: http://www.stateoftheair.org

AQI (2011). Air Quality Index (AQI) - A Guide to Air Quality and Your Health. Retrieved February 28, 2013 from: http://airnow.gov/index.cfm?action=aqibasics.aqi

ATSDR (2013). Agency for Toxic Substances and Disease Registry: Toxic Substances Portal. Retrieved April 1, 2013 from: http://www.atsdr.cdc.gov/toxprofiles/index.asp#D

CARB (2013). California Air Resources Board: Consolidated Table of OEHHA / ARB Approved Risk Assessment Health Values. Retrieved April 1, 2013 from: http://www.arb.ca.gov/toxics/healthval/healthval.htm

Clean Water Action (2013). "Raise the Roadway" Bayonne Bridge Project. Retrieved May 2, 2013 from: http://www.cleanwateraction.org/publication/raise-roadway-bayonne-bridge-project

DOE (2013). US Department of Energy. NJ Clean Cities Coalition. Retrieved April 5, 2013 from: http://www.afdc.energy.gov/cleancities/coalition/new-jersey

EJAC (2009). Strategies for Addressing Cumulative Impacts in Environmental Justice Communities. Report to NJDEP, March 2009.

EO60 (2011) Executive Order No. 60. Retrieved May 1, 2013 from: http://www.state.nj.us/transportation/about/press/2011/documents/EO-60.pdf

EPA (2002). Health Assessment Document for Diesel Engine Exhaust. EPA/600/8-90/057F. Report issued by the National Center for Environmental Assessment, Washington DC, May 2002.

EPA (2003a). Air Quality Guide for Particle Pollution. Retrieved April 1, 2013 from: http://www.airnow.gov/index.cfm?action=pubs.aqguidepart

EPA (2003b). Framework for Cumulative Risk Assessment. EPA/630/P-02/001F. Report issued by the Risk Assessment Forum, Washington DC, May 2003.

EPA (2008). Air Quality Guide for Ozone. EPA-456/F-08-001. Report issued by Office of Air Quality and Radiation, Washington DC, March 2008.

EPA (2013a). About Air Toxics. Retrieved April 1, 2013, from: http://epa.gov/ttn/atw/allabout.html

EPA (2013b). Integrated Risk Information System (IRIS). Retrieved April 1, 2013 from: http://www.epa.gov/iris/index.html

EPA (2013c). National Ambient Air Quality Standards (NAAQS). Retrieved April 1, 2013 from: http://www.epa.gov/air/criteria.html

EPA (2013d). National Air Toxics Assessments. Retrieved April 1, 2013 from: http://www.epa.gov/nata

EPA (2013e). State Implementation Plan Status and Information. Retrieved April 5, 2013 from: http://www.epa.gov/air/urbanair/sipstatus/

EPA (2013f). Health Effects Notebook for Hazardous Air Pollutants. Retrieved April 1, 2013 from: http://www.epa.gov/ttn/atw/hlthef/hapindex.html

EPA (2013g). EJView. Retrieved April 20, 2013 from: http://epamap14.epa.gov/ejmap/entry.html

EPA (2013h). Mobile Source Air Toxics. Retrieved April 29, 2013 from: http://www.epa.gov/oms/toxics.htm

EPA (2013i). NATA Informational video – October, 2011: Utilizing Interactive Maps. Retrieved April 30, 2013 from: http://www.epa.gov/apti/video/NATAVideo1011.html

Federal Highway Administration (2013). Air Quality Transformation Conformity. Retrieved April 1, 2013 from: http://www.fhwa.dot.gov/environment/air_quality/conformity/reference/reference_guide/sectionb.cfm

Kuo, F.E. (2003). The role of arboriculture in a healthy social ecology: Invited review article for a Special Section. Journal of Arboriculture 29: 148-155.

MANE-VU (2013). MANE-VU: Regional Planning for Improved Visibility. Retrieved May 1, 2013 from: www.otcair.org/manevu

NEDC (2013). Northeast Diesel Collaborative: Best Practices for Clean Diesel Construction. Retrieved April 5, 2013 from: http://www.northeastdiesel.org/pdf/BestPractices4CleanDieselConstructionAug2012.pdf

NJDEP (2007). 8 Hour Ozone SIP. Retrieved April 5, 2013 from: http://www.nj.gov/dep/baqp/8hrsip/8hrsip.html#final

NJDEP (2011). Ambient Air Monitoring Network Plan 2011. Retrieved March1, 2013 from: http://www.njaqinow.net on February 28, 2013.

NJDEP (2012). State Implementation Plan Revision for the Attainment and Maintenance of the Fine Particulate Matter (PM2.5) National Ambient Air Quality Standards: Final Redesignation Request and Maintenance Plan for Annual 15 ug/m^3 and Daily 35 ug/m^3 PM2.5 National Ambient Air Quality Standards. Retrieved February 28, 2013 from: http://www.state.nj.us/dep/baqp/sip/siprevs.htm

NJDEP (2013a). Air Toxics In New Jersey. Retrieved April 1, 2013 from: www.nj.gov/dep/airtoxics

NJDEP (2013b). Bureau of Mobile Sources. Retrieved April 1, 2013 from: http://www.nj.gov/dep/stopthesoot/index.htm

NJDEP (2013c). Office of Science: Environmental Trends. Retrieved April 2, 2013 from: http://www.state.nj.us/dep/dsr/trends/

NJDEP (2013d). Air Toxics in New Jersey: How we estimate risk from air toxics. Retrieved April 4, 2013 from: http://www.nj.gov/dep/airtoxics/atrisk.htm

NJDEP (2013e). Welcome to New Jersey's Air Monitoring Website: Publications: Annual Reports: 2011 Air Quality Report. Retrieved April 4, 2013 from: http://www.njaqinow.net/

NJDEP (2013f). Air Toxics in New Jersey: 2005 Risk Results for New Jersey. Retrieved, April 4, 2013 from: http://www.nj.gov/dep/airtoxics/nataest05.htm

NJDEP (2013g). Air Toxics in New Jersey: 2005 Risk Results for New Jersey: County Risk Ratio Tables. Retrieved April 5, 2013 from: http://wwwnj.gov/dep/airtoxics/njavg05.htm

NJDEP (2013h). Bureau of Mobile Sources: General Information: Maps of Estimated Diesel Particulate Risk (powerpoint presentation). Retrieved April 5, 2013 from: http://www.nj.gov/dep/stopthesoot/sts-facts.htm

NJDEP (2013i). The Next Generation of Environmental Management. Retrieved April 7, 2013 from: http://www.nj.gov/dep/docs/depgoals.pdf

NJDEP (2013j). Camnet: Realtime Air Pollution and Visibility Monitoring. Retrieved April 8, 2013 from: http://www.hazecam.net

NJDEP (2013k). A Preliminary Screening Method to Estimate Cumulative Environmental Impacts. Retrieved April 20, 2013 from: http://www.nj.gov/dep/ej/docs/ejc_screeningmethods20091222.pdf

NJDEP (2013l). Clean Vehicles…You can help reduce air pollution. Retrieved May 1, 2013 from: http://www.nj.gov/dep/cleanvehicles/

NJDEP (2013m). Supplemental Environmental Projects. Retrieved May 1, 2013 from: http://www.nj.gov/dep/enforcement/seps.html

NJDHSS (2013). New Jersey Environmental Public Health Tracking. Retrieved May 2, 2013 from: http://www.state.nj.us/health/epht/index.shtml

NJTPA (2011). The Northern New Jersey Air Quality Conformity Determination on the Amended Regional Transportation Plan and the FY 2012-2015 Transportation Improvement Program, August 29, 2011.

NJTPA (2013). Project Development Work Program. Retrieved April 5, 2013 from: http://www.njtpa.org/project/Devel/PDWP/default.aspx

Nowak, DJ, Crane, DE, and Stevens, JC (2006). Air pollution removal by urban trees and shrubs in the United States. Urban Forestry & Urban Greening, 4:115-123.

OEHHA (2013). Office of Environmental Health Hazard Assessments: Air Toxicology and Epidemiology. Retrieved April 1, 2013 from: http://www.oehha.ca.gov/air/chronic_rels/index.html

OTC (2013) Ozone Transport Commission. Retrieved March 25, 2013 at http://www.otcair.org

Perez, L., Lurmann, F., Wilson, J., Pastor, M., Brandt, S., Kunzli, N. and McConnell, R. (2012). Near-Roadway Pollution and Childhood Asthma: Implications for Developing “Win–Win” Compact Urban Development and Clean Vehicle Strategies. Environmental Health Perspectives, 120:1619-1626.

Pugh, TAM, MacKenzie, AR, Whyatt, JD and Hewitt, CN. (2012) Effectiveness of Green Infrastructure for Improvement of Air Quality in Urban Street Canyons. Environmental Science and Technology, 46:7692-7699.

SCI (2013). Sustainable Cities Institute: Benefits of Trees & the Urban Forest. Retrieved April 7, 2013 from: http://www.sustainablecitiesinstitute.org/view/page.basic/class/feature.class/Lesson_Benefits_Urb_Forest_Trees

Schauer, JJ (2003). Evaluation of elemental carbon as a marker for diesel particulate matter. Journal of Exposure Analysis and Environmental Epidemiology, 13:443-453.

Sustainable Jersey (2013). Sustainable Jersey. Retrieved May 1, 2013 from: http://www.sustainablejersey.com

Sustainable Newark (2013). City of Newark Office of Sustainability. Retrieved May 1, 2013 from: http://www.sustainablenwk.org/

TESC (2013). NJ Environmental Justice Alliance Model Cumulative Impact Ordinance. Retrieved April 5, 2013 from: http://www.tesc.edu/watson/institute/documents/muni_ord_110318a.pdf
Zartarian,VG, Schultz,BD, Barzyk,TM, Smuts,M, Hammond,DM, Medina-Vera,M, Geller,AM (2011). The EPA's Community-Focused Exposure and Risk Screening Tool (C-FERST) and Its Potential Use for Environmental Justice Efforts. American Journal of Public Health, 101 (S1): S286-S294.

Tables/Figures/Appendices

Table 1: Air Monitoring Sites in the NJTPA Region

Air Quality Monitoring Sites in NJTPA Region

County	Ozone Monitors	PM2.5 Monitors	Air Toxics Monitors
Bergen	Leonia	Fort Lee	--
Essex	Newark	Newark	--
Hudson	Bayonne	Jersey City & Union City	--
Hunterdon	Flemington	--	--
Middlesex	Rutgers Univ	New Brunswick	New Brunswick
Monmouth	Monmouth Univ	--	--
Morris	Chester	Chester & Morristown	Chester
Ocean	Colliers Mills	Toms River	--
Passaic	Ramapo	Paterson	--
Somerset	--	--	--
Sussex	--	--	--
Union	--	Elizabeth (2 sites) & Rahway	Elizabeth
Warren	Columbia	Columbia & Phillipsburg	--

SOURCE: Ambient Air Monitoring Network Plan (NJDEP 2011)

Table 2: Health Effects from Inhalation of Air Pollutants

Pollutant	Acute Effects	Chronic Noncancer Effects	Cancer Risk
Ozone ()	Chest pain, cough, throat irritation, congestion; aggravation of bronchitis, emphysema, asthma	Lung damage	None
Fine Particulate (PM2.5)	Heart attack; Asthma symptoms	Hospitalization and death for cardiopulmonary diseases; lung damage	None
Benzene	Irritation of skin, eyes & upper respiratory tract; drowsiness, dizziness, headaches	Blood disorders; immune system damage	Known human carcinogen; causes leukemia
1,3-Butadiene	Irritation of eyes, nose, throat and lungs	Reproductive and developmental effects	Known human carcinogen
Ethlybenzene	Throat irritation and chest constriction	Developmental effects	Possible human carcinogen
Formaldehyde	Irritation of eyes, nose and throat.	Respiratory Symptoms	Probable human carcinogen; lung cancer
Diesel Particulate Matter (DPM)	Irritation of eyes, nose, throat and lung; coughs, headaches, lightheadedness and nausea	Lung inflammation	Probable human carcinogen

Information gathered from the following sources:

ATSDR (2013). Agency for Toxic Substances and Disease Registry: Toxic Substances Portal. Retrieved April 1, 2013 from: http://www.atsdr.cdc.gov/toxprofiles/index.asp#D

CARB (2013). California Air Resources Board: Consolidated Table of OEHHA / ARB Approved Risk Assessment Health Values. Retrieved April 1, 2013 from: http://www.arb.ca.gov/toxics/healthval/healthval.htm

EPA (2002). Health Assessment Document for Diesel Engine Exhaust. EPA/600/8-90/057F. Report issued by the National Center for Environmental Assessment, Washington DC, May 2002.

EPA (2003a). Air Quality Guide for Particle Pollution. Retrieved April 1, 2013 from: http://www.airnow.gov/index.cfm?action=pubs.aqguidepart

EPA (2008). Air Quality Guide for Ozone. EPA-456/F-08-001. Report issued by Office of Air Quality and Radiation, Washington DC, March 2008.

EPA (2013b). Integrated Risk Information System (IRIS). Retrieved April 1, 2013 from: http://www.epa.gov/iris/index.html

EPA (2013f). Health Effects Notebook for Hazardous Air Pollutants. Retrieved April 1, 2013 from: http://www.epa.gov/ttn/atw/hlthef/hapindex.html

OEHHA (2013). Office of Environmental Health Hazard Assessments: Air Toxicology and Epidemiology. Retrieved April 1, 2013 from: http://www.oehha.ca.gov/air/chronic_rels/index.html

Table 3: Trends in High Ozone Days

High Ozone Days In Northern New Jersey Using the Air Quality Index									
	Unhealthy for Sensitive Groups			Unhealthy			Weighted Average		
County	2002-2004	2005-2007	2008-2010	2002-2004	2005-2007	2008-2010	2002-2004	2005-2007	2008-2010
Bergen	22	INC	13	2	INC	0	8.3	INC	4.3
Essex	INC	INC	INC	INC	INC	INC	INC	INC	INC
Hudson	9	33	12	0	1	1	3.0	11.5	4.5
Hunterdon	27	50	23	4	2	0	11.0	17.7	7.7
Middlesex	28	52	28	4	6	0	11.3	20.3	9.3
Monmouth	23	37	18	3	2	0	10.5	13.3	6.0
Morris	25	55	14	5	4	0	11.5	20.3	4.7
Ocean	35	51	31	7	7	1	17.8	20.5	10.8
Passaic	16	29	8	1	0	0	5.8	9.7	2.7
Somerset	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Sussex	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Union	DNC	INC	DNC	DNC	INC	DNC	DNC	INC	DNC
Warren	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

INC: Incomplete monitoring data for the three year period
DNC: Ozone data not collected in the county

SOURCE: State of the Air 2006 (ALA 2006) for period 2002-2004
State of the Air 2009 (ALA 2009) for period 2005-2007
State of the Air 2012 (ALA 2012) for period 2008-2010

Table 4: Trends in High Particle Days

High Particulate Days In Northern New Jersey Using the Air Quality Index									
	Unhealthy for Sensitive Groups			Unhealthy			Weighted Average		
County	2002-2004	2005-2007	2008-2010	2002-2004	2005-2007	2008-2010	2002-2004	2005-2007	2008-2010
Bergen	2	11	3	1	0	0	1.2	3.7	1.0
Essex	3	10	0	1	0	0	1.5	3.3	0.0
Hudson	5	19	6	1	0	0	2.2	6.3	2.0
Hunterdon	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Middlesex	3	3	0	1	0	0	1.5	1.0	0.0
Monmouth	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Morris	3	4	1	1	0	0	1.5	1.3	0.3
Ocean	3	5	3	1	0	0	1.5	1.7	1.0
Passaic	3	9	2	1	0	0	1.5	3.0	0.7
Somerset	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Sussex	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Union	25	36	6	1	0	0	8.8	12.0	2.0
Warren	3	5	2	1	0	0	1.5	1.7	0.7

DNC: Particulate data not collected in the county

SOURCE: State of the Air 2006 (ALA 2006) for period 2002-2004
State of the Air 2009 (ALA 2009) for period 2005-2007
State of the Air 2012 (ALA 2012) for period 2008-2010

Table 5 a-b: Sample of Sources and Programs Addressed in SIPs

Table 5a: Sample of Source Types Addressed by the Ozone and PM2.5 SIPs

Adhesives and Sealants
Architectural Coatings
Asphalt Production and Paving
Autobody Refinishing
Consumer Products
Diesel Vehicles
Electrical Generation
Gasoline Refueling
Glass Manufacturing
Industrial/Commercial/Institutional Boilers, Turbines and Engines
Limits on Sulfur in Fuel
Municipal Waste Combustion
Petroleum Storage Tanks
Portable Fuel Containers
Refineries
Sewage and Sludge Incineration
Solvent Cleaning

Table 5b: Sample of Programs Contained in the Ozone and PM2.5 SIPs that Address Mobile Sources

Diesel Retrofit Programs
Inspection and Maintenance
Low Emission Vehicle Programs
Smoke Regulations
Vehicle Idling Limits

SOURCE: Ozone State Implementation Plan (NJDEP 2007)
PM2.5 State Implementation Plan (NJDEP 2012)

Table 6: Desired Long Term Outcomes and Associated Indicators

DESIRED LONG TERM OUTCOMES:	Fewer days with poor air quality	Attainment of air quality standards	Reduced exposure in overburdened neighborhoods	Meeting health benchmarks for air toxics in the entire region	Lower emissions from onroad mobile sources
Measurable Outcomes	Fewer unhealthy days	Portion of region meeting the NAAQS for ozone	Exposure to mobile source emissions reduced, as measured by predicted cancer risk	Decreased risk from mobile source emissions in each of the 13 Counties	Direct emissions of PM2.5, ozone and Air Toxics
	Fewer days unhealthy for sensitive groups	Portion of region meeting the NAAQS for PM2.5			Emissions of VOCs, NOx, SO_2 and Ammonia
Indicator	Air Quality Index	Attainment Status	Cancer risk in census tracts	Cancer risk for 5 mobile source air toxics : benzene, 1,3 butadiene, ethylbenzene, formaldehyde and diesel particulate matter	Reduction in tons/year of onroad mobile sources
Source	NJDEP, ALA	SIPS submitted by NJDEP and approved by EPA	NATA	NATA	NJDEP, EPA
Scale at which Available	County	Air Quality Control Regions	County and Census Tract	County averages	Statewide and County
Time Period for which Available	Annual reports	Following schedules set by EPA	Every 3 years	Every 3 years	Every 3 years
Data Limitations	Changes in NAAQS result in changes in definition of unhealthy days	Changes in NAAQS result in changes in definition of attainment	Changes in modeling and inventory methods	Changes in modeling and inventory methods	Changes in inventory methods

Figure 1: Trends in High Ozone Days: Weighted Average Based on the AQI

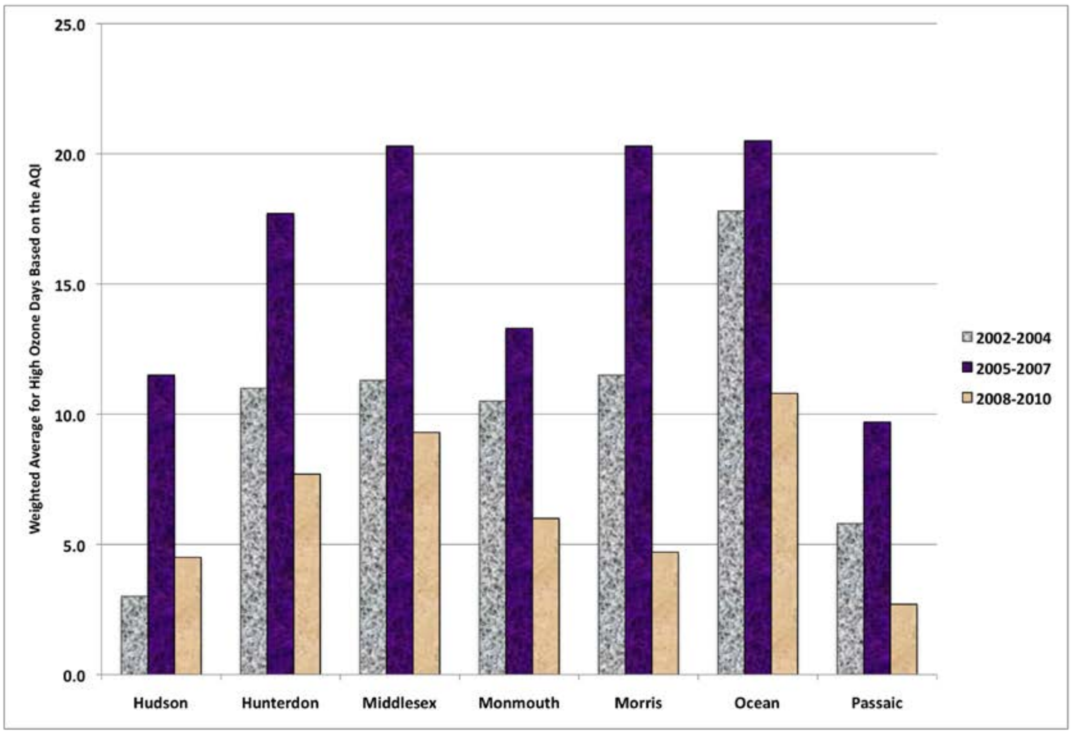


Figure 2: Trends in High Particle Days: Weighted Average Based on the AQI

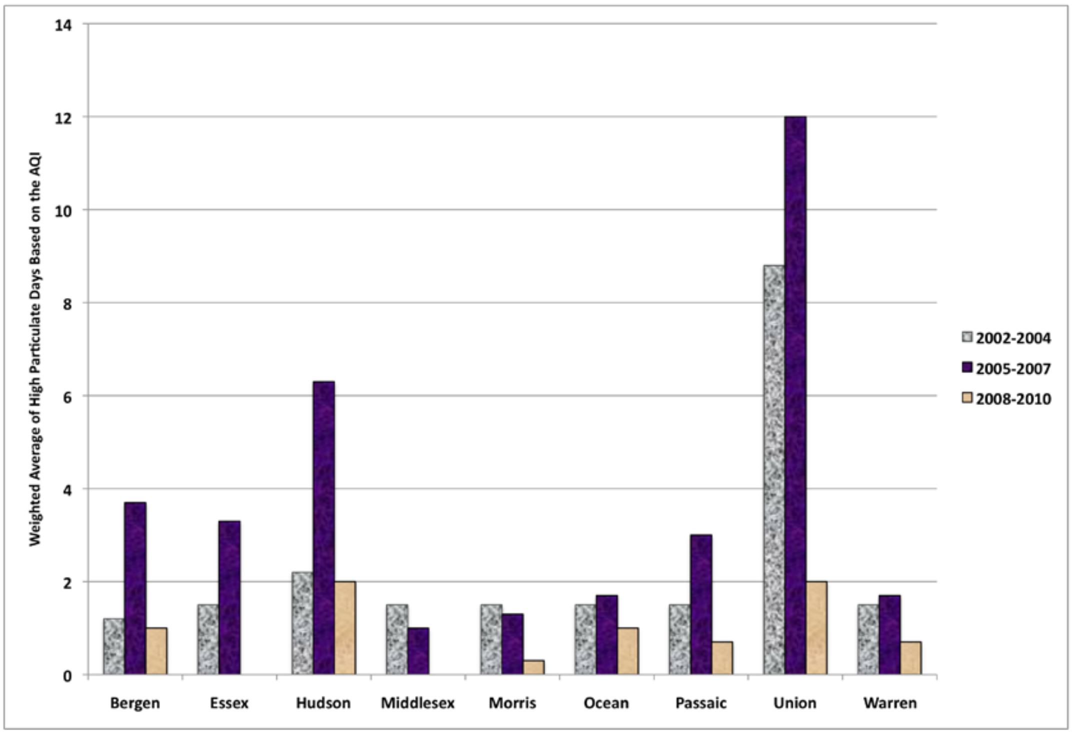


Figure 3 a-f: New Jersey Emission Inventory Summaries by Source Category

Fig 3a) 2002 PM2.5 Emissions - 30,381 Tons/Year

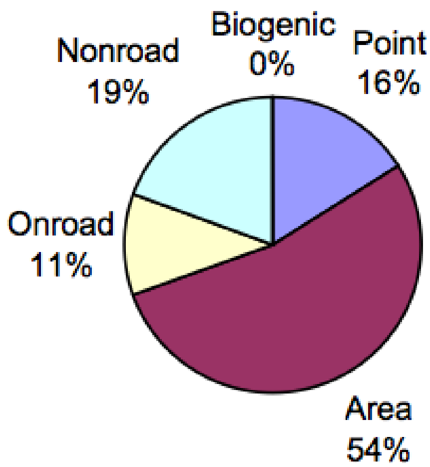


Fig 3b) 2002 VOC Emissions – 470,689 Tons/Year

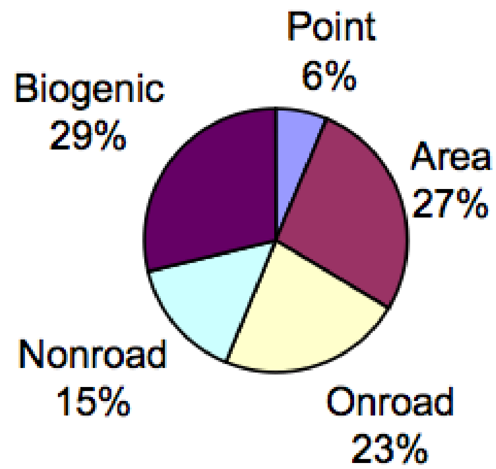


Fig 3c) 2002 NOx Emissions – 352,968 Tons/Year

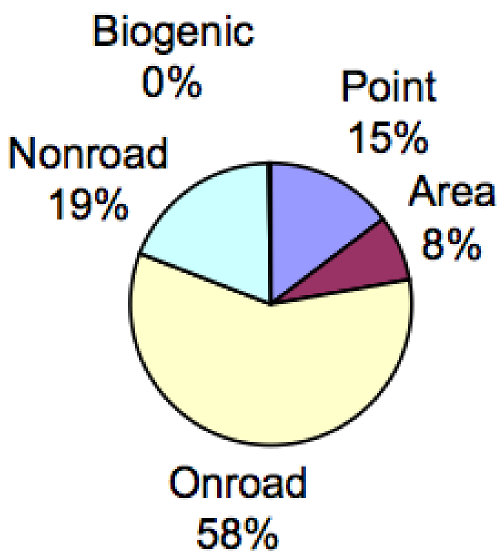


Fig 3d) 2002 SO2 Emissions – 94,672 Tons/Year

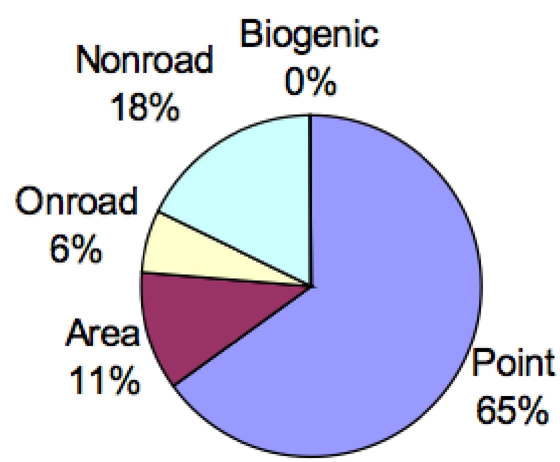


Fig 3e) 2002 Ammonia Emissions – 25,514 Tons/Yea

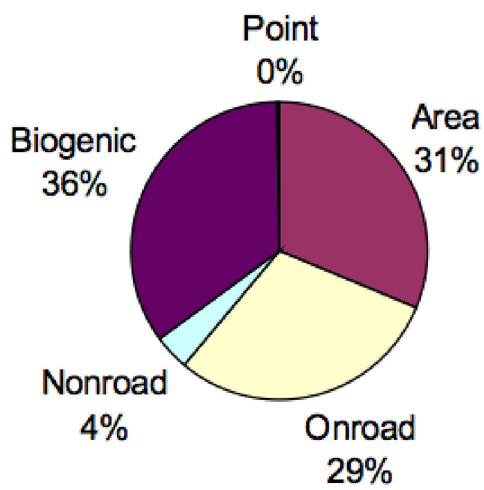


Fig 3f) 2005 Air Toxic Emissions – 67,370 Tons/Year

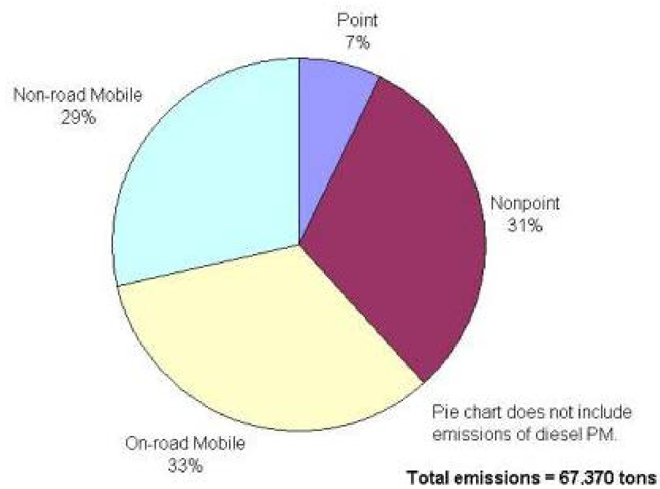


Figure 4 a-b: Estimated Diesel Particulate Risk in New Jersey from Mobile Sources

Fig 4a: Onroad Mobile Sources

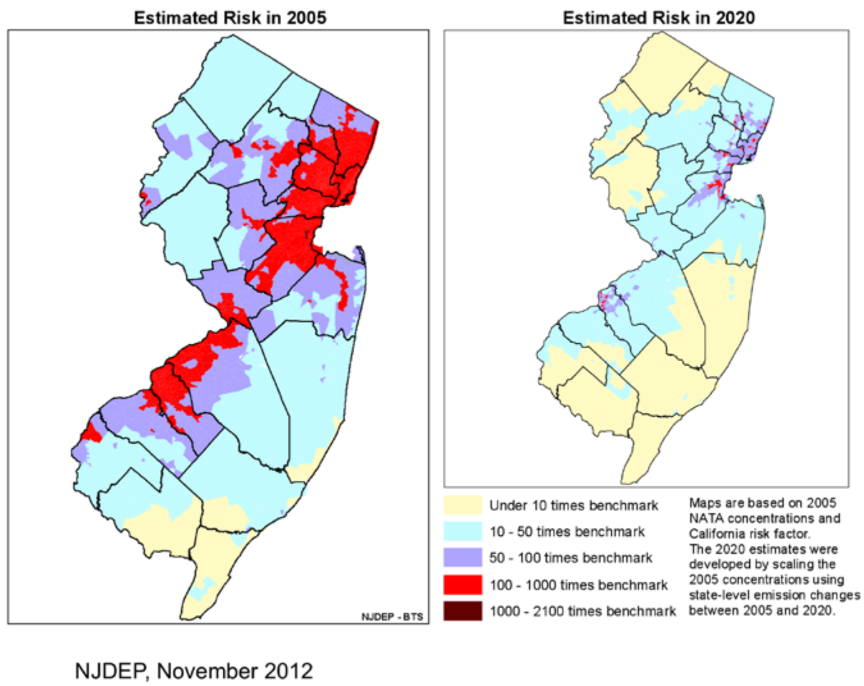
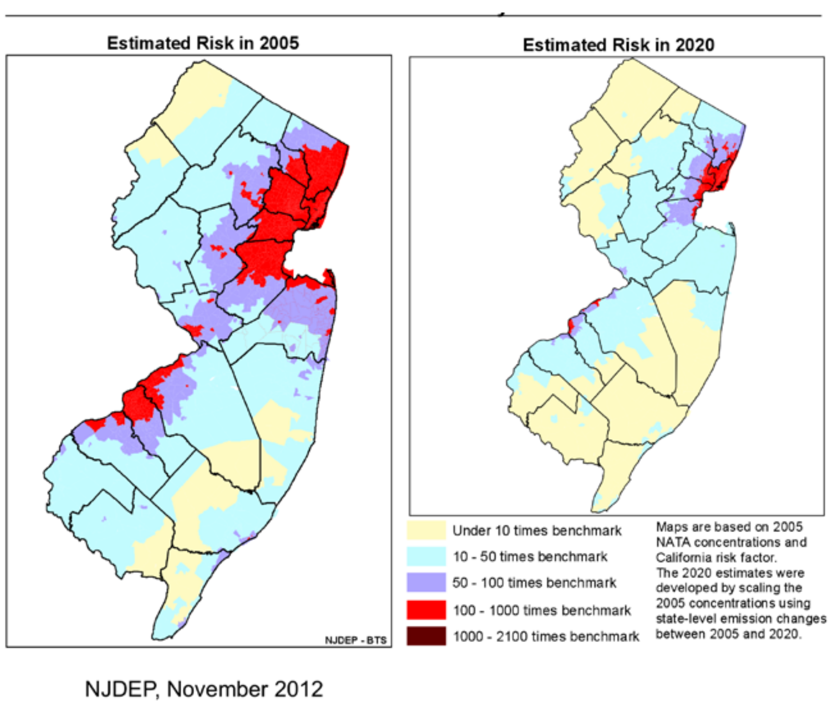


Fig 4b: Nonroad Mobile Sources



Appendix A: Environmental Trends Report: Ozone

Ozone

Background

Ozone (O_3) is a gas composed of three oxygen atoms; when found at ground level, it can be harmful to human health and the environment. It is not usually emitted directly into the air, but is created by chemical reactions involving oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Its impacts on human health range from eye irritation to severe respiratory distress that can lead to chronic illness and premature death. Ozone can have a deleterious effect on the environment, particularly plant life, resulting in crop and forestry losses. In addition, ozone has the ability to break down the basic components of everyday products that we rely on for shelter, mobility and aesthetics. It produces cracks in rubber and destroys exterior paint on buildings, motor vehicles and boats. The effects of ozone result from it being a strong oxidant. Ozone is especially reactive with molecules containing double carbon bonds. Such molecules are abundant in rubber, the photosynthetic apparatus of green plants, and the membranes lining the lung's air passages.[1]

Unlike many other air pollutants, ozone found in the lower atmosphere is not emitted directly but forms from other chemicals in the air that react together on hot, sunny days. The primary ozone precursors are volatile organic compounds (VOCs) and nitrogen oxides (NO_x). NO_x is primarily emitted by motor vehicles, power plants and other sources of combustion. VOCs are emitted from sources such as motor vehicles, industrial facilities, consumer and commercial products such as paints and coatings, and natural sources such as trees. VOCs emitted from trees are part of the ecological cycle and alone would not be likely to result in harmful levels of ozone. However, these emissions, when added to those from many anthropogenic sources, have the potential to exacerbate the creation of ozone in some regions. Ozone and its precursors also can be carried into New Jersey from upwind areas. As a result, controlling ozone pollution requires a broad range of measures to reduce sources of precursors both in New Jersey and in upwind regions. Ozone control efforts have involved discussions with more than 37 states covering most of the eastern half of the country.

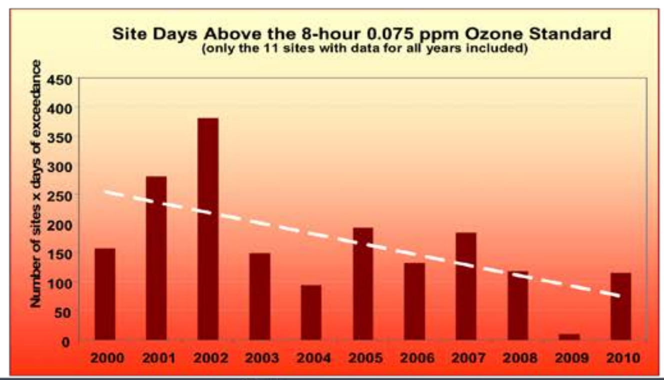
Ground-level ozone formation is mainly a daytime problem during the summer months because it is greatly increased by warm temperatures and abundant sunlight. Weather patterns have a significant effect on ozone formation and hot, dry summers will result in more ozone than cool, wet ones. In New Jersey, the ozone season runs from April 1 to October 31.

Goals

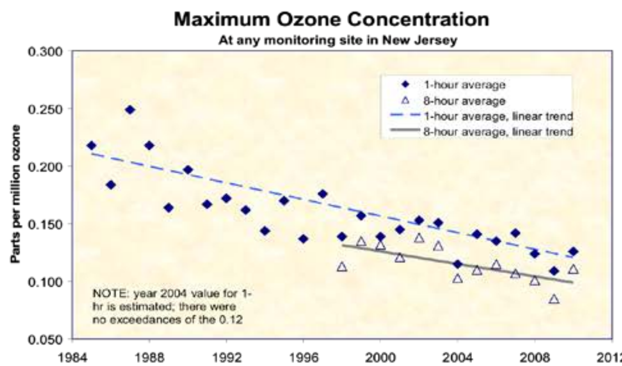
National and state air quality standards have been established for ground-level ozone. The national health standard for ground level ozone was revised in 1997. It was changed from a maximum 1-hour concentration of 0.12 parts per million (ppm), the "one-hour standard" to a maximum 8-hour concentration of 0.08 ppm, the "eight-hour standard." The standard was changed again, effective May 27, 2008, to a maximum 8-hour average concentration of 0.075 ppm. To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average concentration measured within an area must not exceed 0.075 ppm.[2]

Status and Trends

Ozone as measured by site days above the 8-hour standard shows a decrease in the range of 50 percent during the last decade, although there is much year-to-year variation due primarily to weather. Normally the Department continuously measures ozone concentrations at 14 sites in New Jersey during the ozone season. Every site that exceeds the standard on a given day is counted as one ozone exceedance site day. Thus, if all 14 sites exceed the standard on one day, it counts as 14 site days. The total number of site days the eight-hour ozone standard was exceeded for all New Jersey sites is determined each year. Total site days above the 0.075 ppm standard from 2000 through 2009 for 11 sites with data for the entire period are shown in the chart, *Site Days Above the 8-hour 0.075 ppm Ozone Standard*. A linear regression analysis of these data shows a significant decline (p value = 0.0483).



A decrease of 30 to 40 percent in the yearly maximum ozone concentration, as measured both over 1-hour and 8-hour periods, is also evident over time. Linear regression analyses of these data indicate that the 1-hour average data show an extremely significant decline (p value < 0.0001) in recent years, and the 8-hour average data show a very significant decline (p value $= 0.0095$). (See the chart *Maximum Ozone Concentration*).



Outlook and Implications

Trends in ground level ozone are influenced by many factors including weather conditions, economic activity, and changes brought about by regulatory control measures. Of these factors, weather probably has the most profound effect on year-to-year variations in ozone levels while longer term trends are more likely due to control efforts. Methods to compare ozone concentrations to weather are being explored. One simple approach looks at the number of days each year the temperature was above a certain threshold (e.g. 90 degrees F) compared to the number of days exceeding the ozone standard. Use of this approach supports the conclusion that high ozone concentrations are less common now than they were prior to around 1990.[3]

So far, however, using these approaches has not definitively answered the question of whether or not ozone concentrations have stabilized in recent years. This question is important because the answer will determine whether existing control measures are leading to improvements or whether more stringent approaches will be necessary to bring New Jersey into consistent compliance with air-quality standards.

Initially, reducing emissions of VOCs was the primary means of lowering concentrations of ground-level ozone in New Jersey. Several important changes were instituted in 1988 and 1989, all of which were intended to reduce VOCs. These included reductions in the volatility of gasoline, the installation of Stage II vapor recovery[4] systems at gasoline stations, and the implementation of regulations to reduce the volatility of architectural coatings. Studies have shown that such an approach should lower peak ozone concentrations and it does appear to have been effective in achieving that goal.[5] Maximum one-hour concentrations have not exceeded 0.200 ppm since 1988, and the last time levels above 0.180 ppm were recorded was in 1990. (See the chart Maximum Ozone Concentration above.) But improvements may have leveled off in recent years, especially with respect to maximum eight-hour average concentrations. Significant further improvements will require reductions in both VOCs and NO_x. The NO_x reductions will have to be achieved over a very large region of the country because levels in New Jersey are dependent on emissions from upwind sources.[6] Significant efforts to reduce NOx over this area were initiated in 2003, and they appear to be effective in achieving lower ozone levels, although more data will needed to verify this effect.

More Information

See the DEP Bureau of Air Monitoring Web site, http://www.njaqinow.net/Default.aspx, and the site developed by EPA, NOAA, and other entities at http://airnow.gov/ .

References

[1] Spiro, Thomas, and William Stigliani, 2003, *Chemistry of the Environment, 2nd Edition*, Prentice Hall, Upper Saddle River, NJ 07458, page 226.
[2] http://www.epa.gov/ozonepollution/standards.html, July 8. 2010.
[3] NJDEP, 2003, 2002 Air Quality Report, 2002 Ozone Summary, page 12, NJ Department of Environmental Protection, Bureau of Air Monitoring, Trenton, NJ, http://www.state.nj.us/dep/airmon/02rpt.htm, 12/23/04.
[4] Stage II vapor recovery is the system used to control releases of gasoline vapors when motor vehicles are refueled. A specially designed fuel nozzle is used at the pump to collect vapors from a vehicle's gasoline tank that are expelled as fuel enters. The vapors are returned to the gasoline station's storage tanks.
[5] NJDEP, 2003.
[6] NJDEP, 2003.

Appendix B: Environmental Trends Report: PM2.5

$PM_{2.5}$

Background

Particulate matter (PM) consists of both solid particles and liquid droplets, and is generally categorized according to the size of the particles. Particles that are approximately 10 micrometers (μm) or larger in diameter usually are trapped along a person's respiratory tract before reaching the lungs. Particles less than 10 μm can reach the lungs. Of greatest concern are particles less than 2.5 μm in diameter – referred to as fine particles or particulate matter ($PM_{2.5}$) – which can lodge deep inside the lungs.

Particles are either directly emitted into the air or formed during atmospheric reactions between substances such as sulfur dioxide (SO_2) and oxides of nitrogen (NO_x). Manmade sources of $PM_{2.5}$ include various combustion processes and sources such as motor vehicle engines. Fine particles can also be produced naturally from gases released by plants and other organisms.

A number of studies have shown an association between concentrations of PM in the air and increased respiratory and cardiovascular health problems and mortality.[1] Groups that appear to be at the greatest risk from PM include children, the elderly, and individuals with heart and lung diseases, such as asthma.[2] Particles in diesel exhaust appear to be especially problematic, and are the target of a special DEP risk reduction program.[3] In addition to health effects, PM is a major cause of reduced visibility in many parts of the United States. It can also affect vegetation and aquatic ecosystems and can damage buildings and materials.

Because fine particles have a significant impact on human health, they have received more attention recently from the EPA and the DEP. Standards are expressed as levels that should not be exceeded, averaged over specific time periods of either a year (annual standards) or a day (24-hour standards). The 24-hour standard is higher, because unusual conditions could cause a short-term spike in concentrations.

Pursuant to the Clean Air Act, EPA has issued National Ambient Air Quality Standards (NAAQS) for $PM_{2.5}$. In September 2006, the Agency revised standards that apply to two categories of particle pollution: fine particles ($PM_{2.5}$), and inhalable coarse particles (PM_{10}). Fine particles ($PM_{2.5}$) are those that are 2.5 micrometers in diameter and smaller. Inhalable coarse particles (PM_{10}) are those that are smaller than 10 micrometers and larger than 2.5 micrometers. The 2006 standards tighten the 24-hour fine particle standard from 65 micrograms per cubic meter (μg/m³) to 35 μg/m³, and retain the current annual fine particle standard of 15 μg/m³. EPA retained the existing 24-hour PM_{10} standard of 150 μg/m³. And, due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the Agency revoked the annual PM_{10} standard.[4]

The DEP is responsible for implementing actions to achieve these standards and for prescribing these actions in a State Implementation Plan (SIP). In March, 2009, the DEP issued a revised SIP to demonstrate that New Jersey's two (2) associated multi-state nonattainment areas will attain the 1997 PM2.5 annual NAAQS by the attainment date, April 5, 2010. The SIP revision also addresses the other mandatory SIP elements associated with the 1997 PM2.5 NAAQS.[1] The state is committed to meeting the revised 2006 standards. On January 15, 2010, DEP issued a final Certification of Infrastructure Requirements, which addresses requirements under 42 U.S.C. § 7410(a)(1) and (2) (Sections 110(a)(1) and (2) of the Clean Air Act) for the 35 μg/m³ 24-hour PM2.5 health-based standards of 2006. New Jersey certifies compliance with these elements through its existing SIP, and as described in this Certification. Additional actions will be forthcoming.

In addition to controlling fine particulate matter to reduce health impacts, the State is working to lower airborne particle levels to improve visibility. Without the effects of pollution, the visual range in the Eastern United States under good weather conditions would be about 90 miles; but, due to the presence of fine particles, the current range is only an average of 14-24 miles.[2]

In April 1999, the federal Regional Haze Rule was promulgated. This rule calls for state and federal agencies to work together to improve visibility in 156 national parks and wilderness areas, including the Edwin B. Forsythe National Wildlife Refuge in Oceanville. The Interagency Monitoring of Protected Visual Environments (IMPROVE) program, the cooperative measurement effort managed by representatives from federal and regional-state organizations that was established in 1985, has been working on implementing the Regional Haze Rule. Each state must develop coordinated strategies and implement programs to reduce manmade emissions that contribute to haze. The goals are designed to reach natural conditions in 60 years.

Status and Trends

Monitoring

NJDEP monitors $PM_{2.5}$ at 19 sites statewide with filter-based samplers that routinely collect 24-hour samples. At 10 sites, concentrations are measured every minute and made available at the DEP's public website.[7] DEP monitors smoke shade at 7 sites. Smoke shade is an indirect measure of particle concentrations.

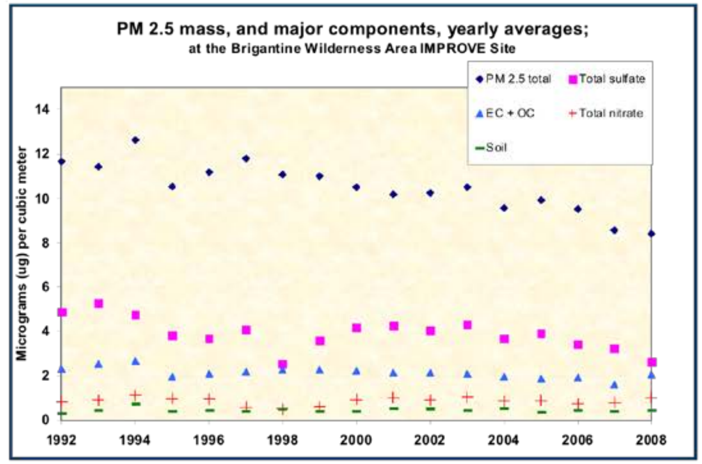
In 2009, the annual average concentration of $PM_{2.5}$ at 19 monitoring sites ranged from 7.1 µg/m³ to 11.6 µg/m³. No sites exceeded the 24-hour standard of 35 ug/m3.

The monitoring of smoke shade since 1970 provides evidence of a consistent decline in particle concentrations in the state. In the early 1970s, the state's smoke shade reading was in the range of 1.2 coefficient of haze (COH), a measurement that is based on how much light transmits through the air. Since the mid-1990s, however, it has consistently remained below 0.4 COH. Readings above 2.0 COH are considered unhealthy for sensitive groups according to DEP's Web-based Air Quality Index.[8] However, it must be noted that smoke shade and $PM_{2.5}$, while related, are not the same thing, and so declines in smoke shade do not by themselves indicate a decline in $PM_{2.5}$.

In addition to monitoring $PM_{2.5}$ concentrations, the DEP also measures chemical composition of fine particles at four sites. In 2008 organic carbon and sulfate combined made up more than 65 percent of the total mass of fine particles in the air.

IMPROVE program monitoring

One long-term record of $PM_{2.5}$ data provides some evidence of improvement. The data are collected through the IMPROVE program. The IMPROVE data provide a relatively long-term record of particle concentrations and particle chemical composition at the Brigantine Wilderness Area, where DEP is working with federal and regional partners to improve visibility (See figures below).

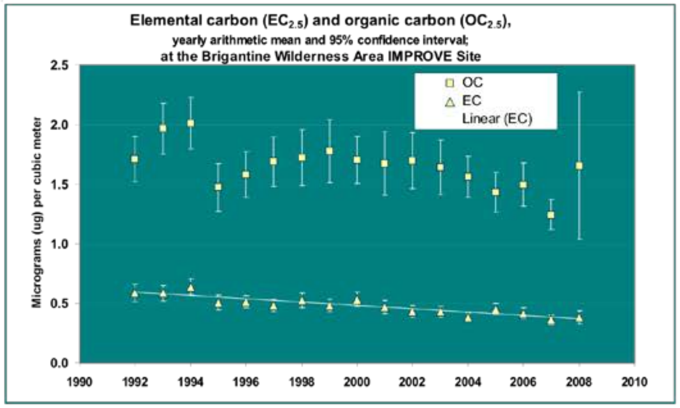


Although annual averages such as these can mask important seasonal characteristics and changes, they are of some value in identifying possible trends. Another approach to summarizing these data, the comparison of median values of the 1992 through 2000 period with the median values of the 2001 through 2008 period, shows evidence of improvement. This comparison reveals lower median values of total $PM_{2.5}$, elemental carbon, organic carbon, and total sulfate in the more recent period. A statistical test indicates that each of these differences is extremely significant, with a P value of < 0.0001.[9]

Particle type	Median, 1992 through 2000 µg/m³	Median, 2001 through 2008 µg/m³
Total $PM_{2.5}$	9.52	8.00
Elemental carbon	0.50	0.38
Organic carbon	1.50	1.28
Total sulfate	3.19	2.68

(See table, Comparison of Median Values, 1992 – 2000 vs. 2001 – 2008.) Differences of total nitrate and soil particles in the two periods were not significant.

The data for elemental carbon (EC) and organic carbon (OC) are shown separately in the figure "Elemental carbon and organic carbon…" below. Elemental carbon shows an improving linear trend that is statistically significant.



Outlook and Implications

A full three years of data are required to determine compliance with the national standard for $PM_{2.5}$. DEP will continue evaluating $PM_{2.5}$ data it collects to determine whether the air quality standards are being met.

There is indication, based on the long-term downward trend in fine particle mass, smoke shade readings and in the IMPROVE data, that fine particle levels are improving in New Jersey. However, these trends do not provide assurance that the standards will be achieved in all areas of the state. Further, levels at Brigantine are still high enough to degrade visibility. Fine particle levels in the air have a strong seasonal component; future efforts at long-term trend monitoring should take possible seasonal effects and weather variations into consideration.

There does not appear to be a level below which there are no adverse health impacts from $PM_{2.5}$. Therefore, it is important to reduce $PM_{2.5}$ emission sources and concentrations. New Jersey is determined to implement additional measures statewide as necessary.

More Information

For more information, visit http://www.njaqinow.net/Default.htm http://www.epa.gov/oar/particlepollution/naaqsrev2006.html or www.hazecam.net. Information on the IMPROVE program is available at http://vista.cira.colostate.edu/improve/.

References

[1] PM – How Particulate Matter Affects the Way We Live and Breathe, USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC November 2000, URL: www.epa.gov/air/urbanair/pm/index.html
[2] Environmental Health Threats to Children, USEPA, Office of the Administrator, EPA-176/F-96-001, September 1996.
[3] http://www.state.nj.us/dep/stopthesoot/
[4] http://www.epa.gov/oar/particlepollution/naaqsrev2006.html
[5] http://www.state.nj.us/dep/baqp/sip/siprevs.htm
[6] http://vista.cira.colostate.edu/improve/
[7] www.state.nj.us/dep/airmon
[8] http://www.njaqinow.net/Default.htm
[9] As determined by the statistical program inStat, using a Mann-Whitney test and a two-tailed P value.

Appendix C: Environmental Trends Report: Air Toxics

Air Toxics

Background

Air toxics are air pollutants that have the potential to cause adverse health effects, and that are not regulated through a National Ambient Air Quality Standard. Although there are no ambient standards for these pollutants, under the Clean Air Act Amendments of 1990 the U.S. Congress directed the EPA to reduce emissions of almost 200 air toxics by developing control technology standards for specific industries. These particular air toxics are listed in the amendments and are known as Hazardous Air Pollutants (HAPs).

Some of the adverse health effects that can occur from exposure to air toxics include lung irritation, birth defects and cancer. In New Jersey, exposure to air toxics is a problem that occurs throughout the entire state as a result of emissions from many types of sources, generally categorized as point, area, and mobile sources.

A point source is a stationary facility or process that emits a significant amount of air pollution during manufacturing, power generation, heating, incineration, or other such activity. Point sources include power plants, refineries, municipal waste incinerators, and other industrial sources that are regulated under state and federal programs.

Area, or nonpoint, sources are defined as small sources of air pollution which by themselves may not emit very much but, when added together, account for a significant portion of emissions. These include small industrial sources that are often too numerous to be inventoried individually, such as autobody shops, gas stations, electroplaters, and dry cleaners. This category also includes smaller institutional/commercial heating, pesticide application, and population-related emissions from consumer product usage and residential heating.

Mobile sources are divided into two categories, on-road and non-road. On-road mobile sources are those found on roadways, including cars, trucks, buses and motorcycles. The non-road mobile category includes such sources as aircraft, trains, lawnmowers, boats, and construction and farm vehicles and equipment.

There are some pollutants that are present in the air originating from sources other than point, area, or mobile sources. These air toxics concentrations are attributable to long-range transport, unidentified emission sources, previous emissions of long-lived contaminants, secondary atmospheric formation, or natural emission sources.

Exposure to air toxics can be estimated from their actual measurement in ambient air or from predictive computer models that simulate dispersion of emissions from various sources. In order to determine the potential health effects of these monitored or modeled air levels, "health benchmarks," based on chemical-specific toxicity values developed by USEPA, California, and other government agency scientists are utilized. For non-cancer health effects, the benchmark is called a reference concentration, and it indicates the level to which someone can be exposed without detriment. For chemicals suspected of causing cancer (carcinogens), the health benchmark is based on a unit risk factor, which is derived from the chemical's potency and the estimated likelihood of contracting cancer over a lifetime of exposure. The carcinogenic benchmark is the concentration that would potentially cause no more than a one-in- a-million incremental increase in the risk of developing cancer.

A number of the air contaminant concentration graphs below include the chemical's health benchmark.

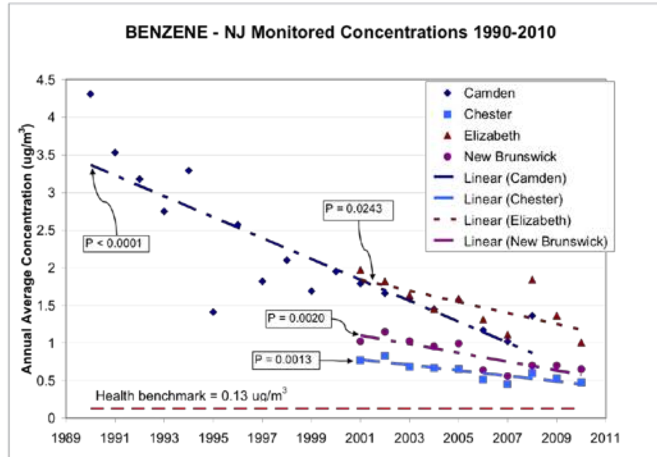
Status and Trends

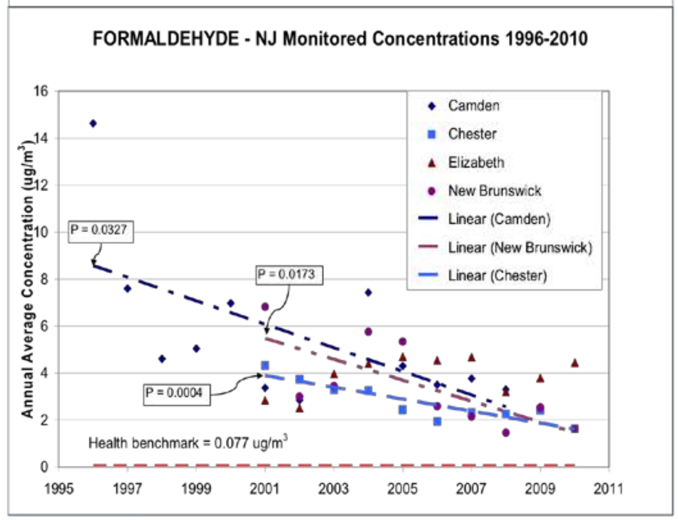
NJDEP has been measuring levels of toxic volatile organic compounds (VOCs) since 1989, when a monitor was set up in Camden as part of USEPA's Urban Air Toxics Monitoring Program. Additional monitors were established in Elizabeth (Union County) in 2000, and in Chester (Morris County) and New Brunswick (Middlesex County) in 2001. Also in 2001, NJDEP began measuring toxic metals at these four sites.

The Camden monitoring station was shut down in 2008 when DEP lost access to the site. It is expected to be replaced by another site in Camden sometime in the future.

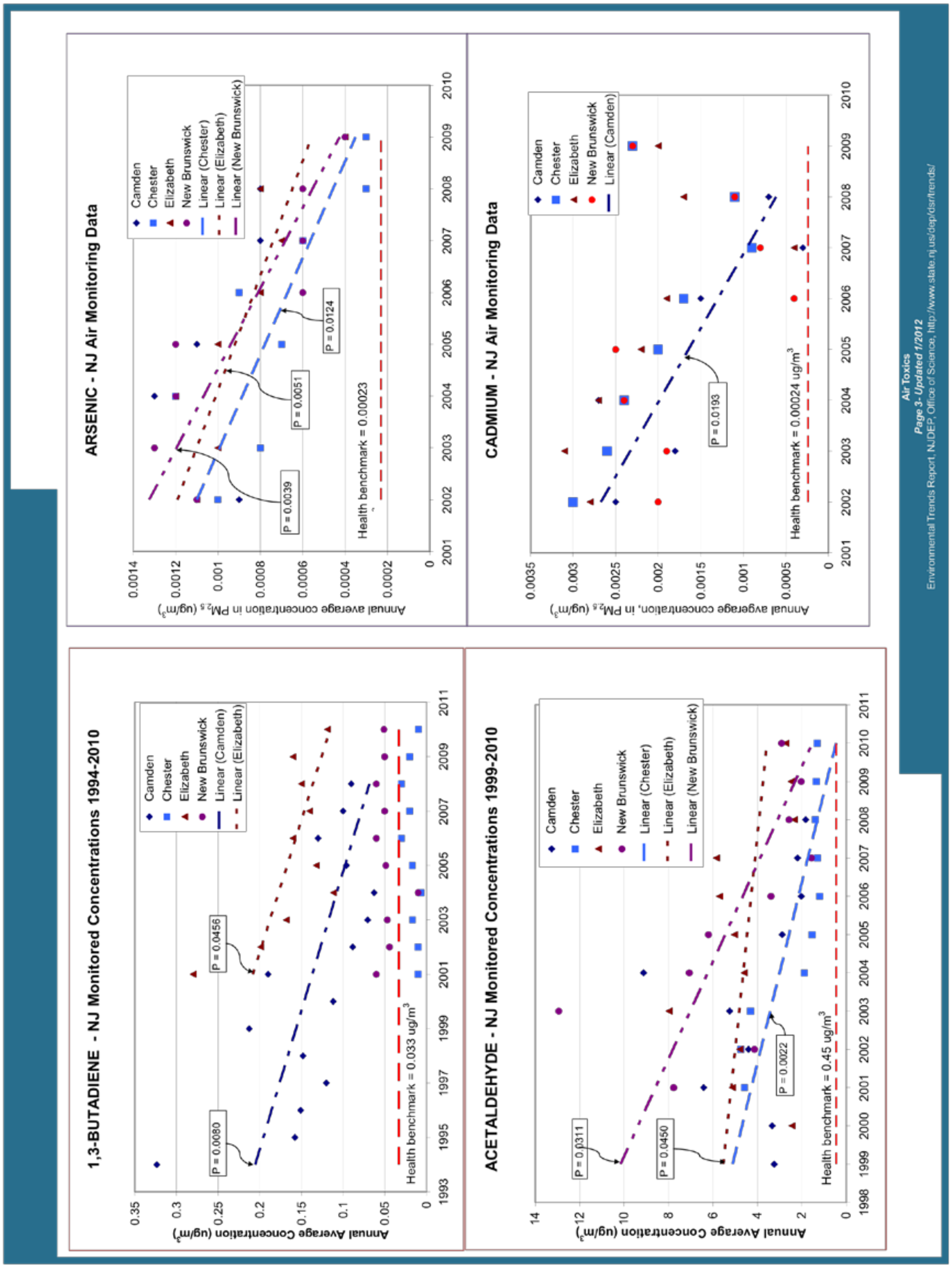
DEP compiles annual reports summarizing monitoring results for air toxic VOCs and other compounds such as metals. These are available on the Bureau of Air Monitoring's web site (see the More Information and References section, below). The graphs below show some of the historic data. Trend lines are shown where a linear regression was found to be significantly different from zero. The P value, which represents the probability that the slope of the line could in fact be zero, is shown for each regression line; the smaller the value, the more likely it is that the slope is not due to chance. The VOC values shown, for benzene, formaldehyde, 1,3-butadiene, and acetaldehyde, represent gaseous concentrations. The concentrations of the metals shown represent the mass of that metal within the fine particle fraction, i.e. particles less than or equal to 2.5 micrometers in diameter, per cubic meter. The two metals shown, arsenic and cadmium, are present at concentrations that exceed the health benchmark by a higher margin than other metals measured in NJ. Benzene, formaldehyde, 1,3-butadiene, and acetaldehyde are all present at concentrations that are higher than their health benchmark concentrations. Several other contaminants, including carbon tetrachloride, acrolein, and acrylonitrile, although not presented graphically here, are also found at relatively high concentrations. Carbon tetrachloride is a global contaminant that is regulated by international agreement and has no known currently active NJ sources. Acrolein and acrylonitrile, though found at relatively high concentrations, are subject to question due to methodological issues.

The primary source of the VOCs shown is motor vehicles, and the declining trends reflect improvements in automotive technology and the more stringent emissions standards of recent years, although reductions in emissions from industrial and area sources have also played a role. Sources of atmospheric emissions of arsenic include waste incineration and the metallurgical industry. The main sources of cadmium in the air are the burning of fossil fuels, such as coal and oil, and the incineration of municipal waste. The cadmium emission level from these sources also has been reduced in recent years due to more stringent air emissions regulations.





Air Toxics
Page 2- Updated 1/2012
Environmental Trends Report, NJDEP, Office of Science, http://www.state.nj.us/dep/dsr/trends/

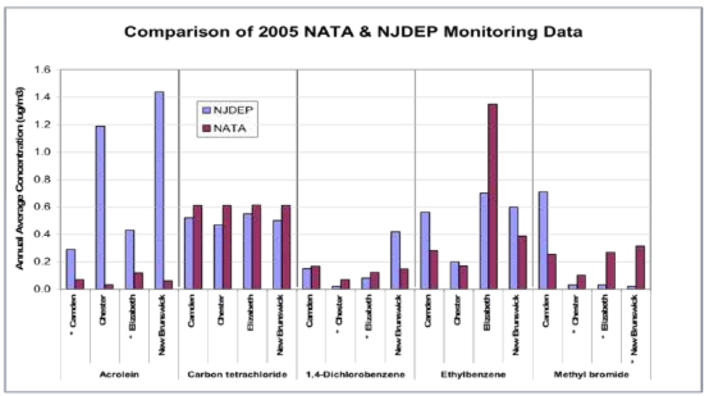

ARSENIC - NJ Air Monitoring Data
CADMIUM - NJ Air Monitoring Data
1,3-BUTADIENE - NJ Monitored Concentrations 1994-2010
ACETALDEHYDE - NJ Monitored Concentrations 1999-2010
Annual average concentration in PM2.5 (ug/m3)
Annual Average Concentration (ug/m3)
Camden
Chester
Elizabeth
New Brunswick
Linear (Chester)
Linear (Elizabeth)
Linear (New Brunswick)
Linear (Camden)
P = 0.0039
P = 0.0051
P = 0.0124
P = 0.0193
P = 0.0080
P = 0.0456
P = 0.0311
P = 0.0450
P = 0.0022
Health benchmark = 0.00023
Health benchmark = 0.00024 ug/m3
Health benchmark = 0.033 ug/m3
Health benchmark = 0.45 ug/m3
Air Toxics
Page 3- Updated 1/2012
Environmental Trends Report, NJDEP, Office of Science, http://www.state.nj.us/dep/dsr/trends/

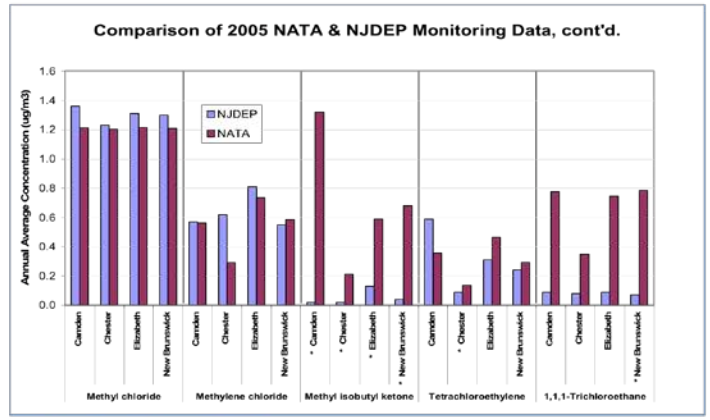
EPA's National-Scale Air Toxics Assessment

To assess the scope of exposure to and risk from air toxics in the U.S., EPA developed the National-Scale Air Toxics Assessment (NATA). NATA provides gap filling information on ambient air toxics levels around the country, particularly since monitoring is limited. Compiled on a three-year cycle, NATA gives a snapshot of outdoor air quality, and its associated risk to human health. NATA is a screening tool used to identify and prioritize air toxics, emission sources, and locations that are of greatest potential concern in terms of contributing to population risk.

The foundation of NATA is a national inventory of air toxics emissions from all types of outdoor sources, compiled by EPA with input from the states. NATA utilizes dispersion modeling, which estimates air toxics concentrations around the country at the census tract level. Assessments have so far been done for 1996, 1999, 2002, and 2005. The 2005 NATA provides information on 177 of the 187 HAPS listed in the Clean Air Act Amendments plus diesel particulate matter.

The graphs below compare 2005 NATA estimates with actual 2005 monitoring data for a number of air toxics in New Jersey.





Outlook and Implications

NJDEP is continuing with numerous efforts to reduce emissions of air toxics from all types of sources.

Major point source emissions have been decreasing since the federal 1990 Clean Air Act Amendments imposed Maximum Achievable Control Technology (MACT) standards on specific industries.

The Air Quality Permitting Program combines control technology (mostly based on EPA's MACT requirements) and risk assessment to address emissions of air toxics from stationary sources, including certain types of industrial and commercial area sources.

The Dry Cleaner Equipment Replacement Reimbursement Program has recently provided grants for small businesses to replace older perchloroethylene dry cleaning machines with less toxic dry cleaning chemicals and processes, such as wet-cleaning systems.

Regulations are in place that limit concentrations of toxic VOCs in consumer products, architectural coatings, adhesives and sealants, and portable fuel containers.

For mobile sources, the Motor Vehicle Inspection and Maintenance Program makes sure that vehicles are operating with the proper emission controls. The Diesel Risk Reduction Program has been mandating and funding retrofits for school buses, solid waste trucks, municipal buses, and construction equipment. Anti-idling rules for diesel and gasoline vehicles restrict idling to no more than three consecutive minutes if the vehicle is not in motion.

More Information

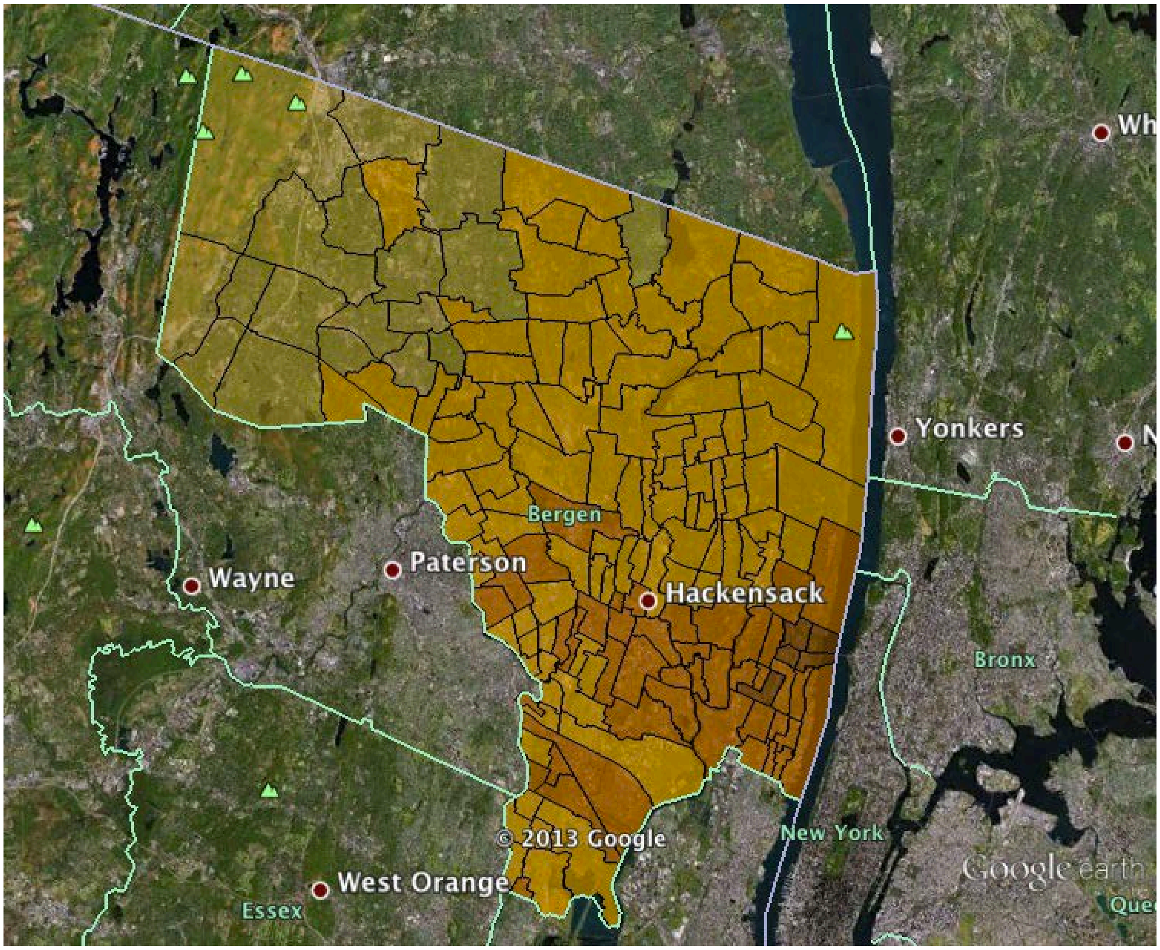
The data and information in this chapter have been provided by NJDEP Bureau of Air Monitoring and the NJDEP Bureau of Technical Services. More information is available at the following web sites:

NJDEP Web Sites:
Air Toxics in New Jersey: www.nj.gov/dep/airtoxics
Air Monitoring Web Site: www.njaqinow.net/Default.htm
Environmental Justice Program: www.nj.gov/dep/ej/
Diesel Initiative: www.stopthesoot.org/
Air Regulations: www.state.nj.us/dep/aqm
Permitting Program : www.nj.gov/dep/aqpp
Community-Based Projects:
Camden Waterfront South Air Toxics Pilot Project: www.nj.gov/dep/ej/camden
Urban Community Air Toxics Monitoring Project, Paterson:
www.state.nj.us/dep/dsr/paterson

USEPA Web Sites:
NATA: www.epa.gov/ttn/atw/nata2005/index.html
USEPA Hazardous Air Pollutants (HAPs): www.epa.gov/ttn/atw/index.html

Appendix D: NATA 2005 Cumulative Risk Maps from Google Earth (EPA 2013d)

NATA 2005 Cumulative Risk Map: Bergen County (Google Earth 4/7/2013)

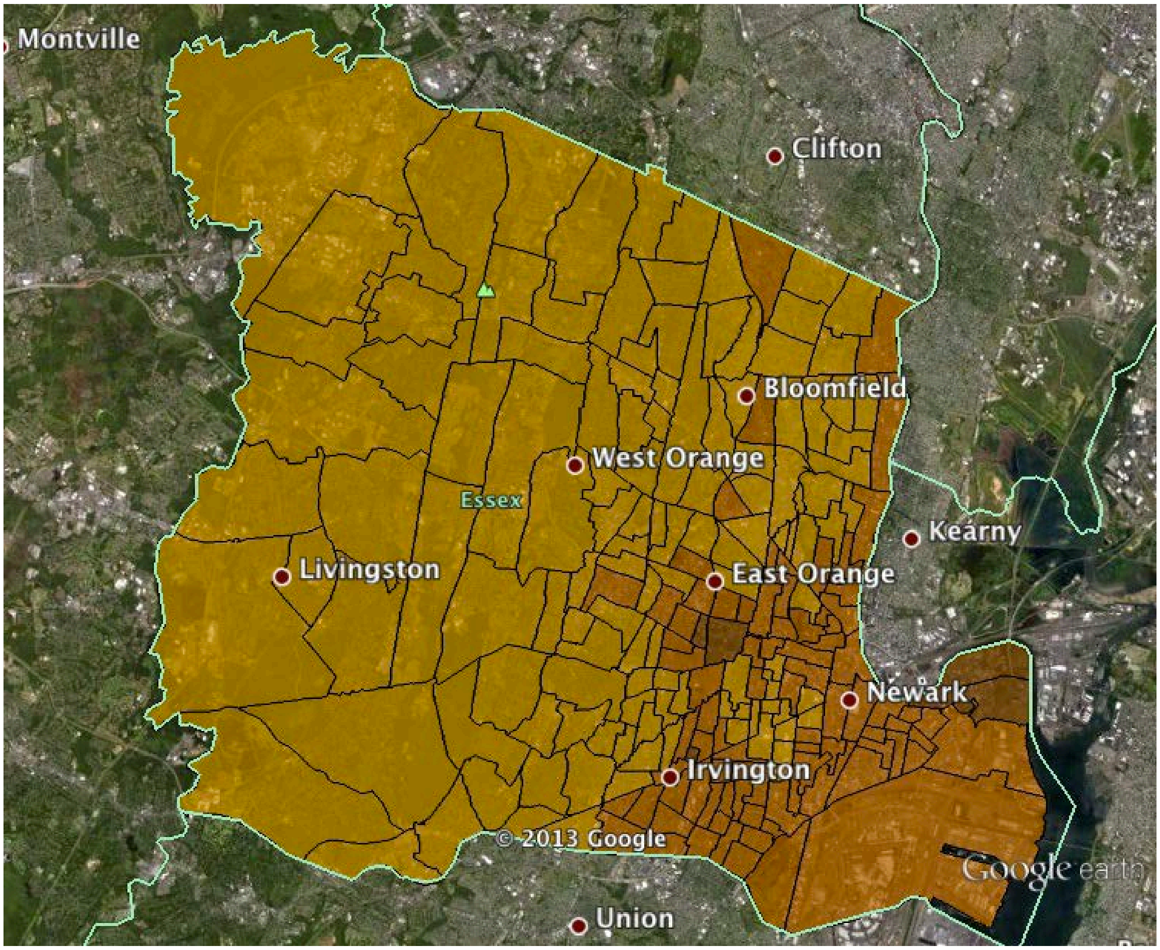


Color Scales on Map

Cancer Risks

- No risk (tract unpopulated)
- <25 in a million
- 25-50 in a million
- 50-75 in a million
- 75-100 in a million
- >100 in a million

NATA 2005 Cumulative Risk Map: Essex County (Google Earth 4/7/2013)



Color Scales on Map

Cancer Risks

No risk (tract unpopulated)

<25 in a million

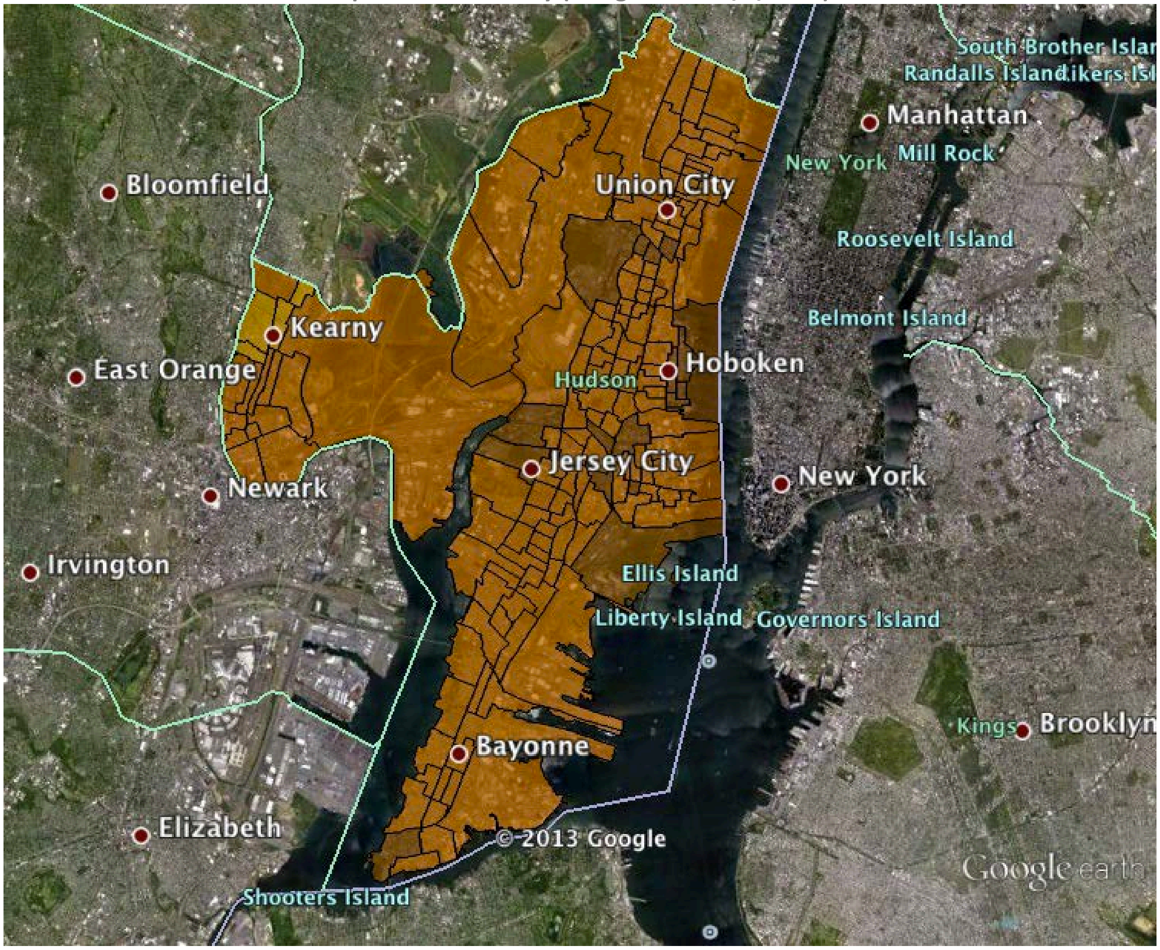
25-50 in a million

50-75 in a million

75-100 in a million

>100 in a million

NATA 2005 Cumulative Risk Map: Hudson County (Google Earth 4/7/2013)

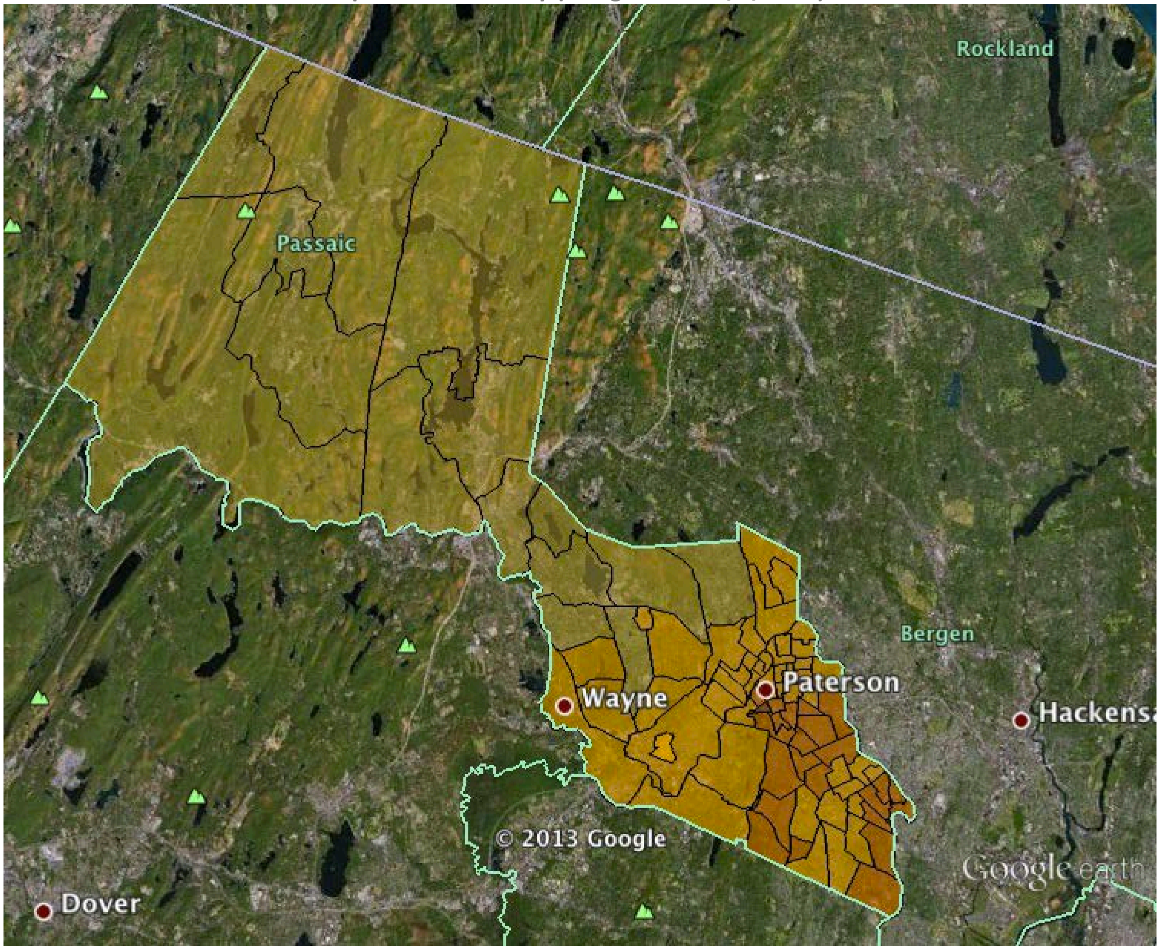


Color Scales on Map

Cancer Risks

- No risk (tract unpopulated)
- <25 in a million
- 25-50 in a million
- 50-75 in a million
- 75-100 in a million
- >100 in a million

NATA 2005 Cumulative Risk Map: Passaic County (Google Earth 4/7/2013)



Color Scales on Map

Cancer Risks

No risk (tract unpopulated)

<25 in a million

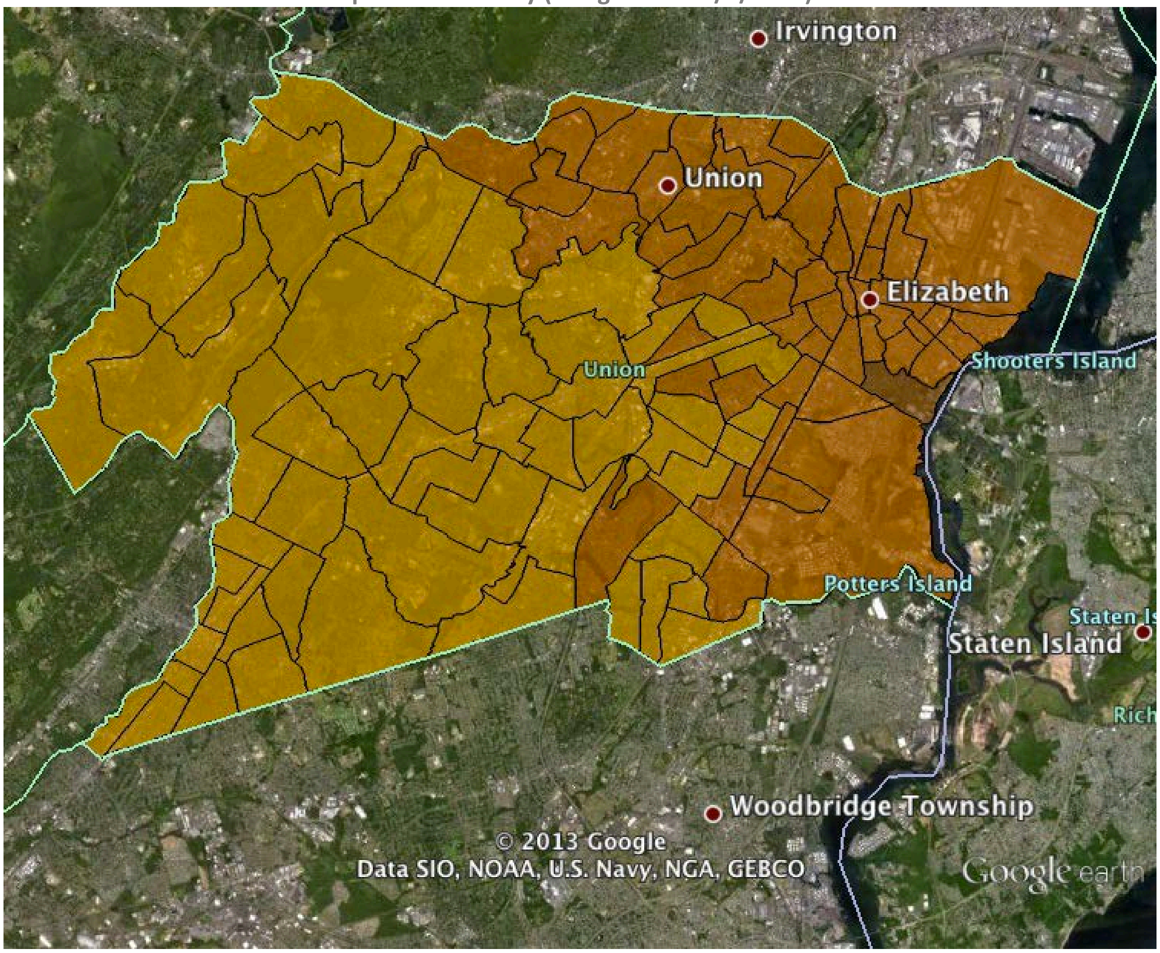
25-50 in a million

50-75 in a million

75-100 in a million

>100 in a million

NATA 2005 Cumulative Risk Map: Union County (Google Earth 4/7/2013)



Color Scales on Map

Cancer Risks

No risk (tract unpopulated)

<25 in a million

25-50 in a million

50-75 in a million

75-100 in a million

>100 in a million

Appendix E: NJ Clean Freight: Moving Freight With the Speed of Green

- **Are you considering the development of a new warehouse or logistics center?**
- **Do you own an existing warehouse complex that can be made state-of-the-art?**

New Jersey is one of the top 3 states in moving freight in the U.S. Being located between the large metropolitan complexes of New York and Philadelphia, and being home to the second largest port in the U.S. make NJ a hub of freight movement. New Jersey is also a center for multi-modal transport, with an array of major roads and railways that move freight up and down the east coast and to points in the Midwest and Canada.

By joining NJ Clean Freight, your company will implement several best management practices to reduce emissions and make you the best neighbor possible. As the most densely populated state in the country, the residents of New Jersey expect our businesses to be as green as possible and to reduce mobile sources of pollution. This guidance will identify the green practices to make that goal a reality.

New Jersey Department of Environmental Protection

Bureau of Mobile Sources
PO Box 420 / Mail Code 401-02E
401 E. State Street
Trenton, NJ 08625

Phone: 609-292-7953
Fax: 609-777-1330

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

We're on the web!
www.StopTheSoot.org

Page 2 NJ Clean Freight: Moving Freight With the Speed of Green

Make Your Facility a No Idling Zone

It is against the law to idle any vehicle for more than 3 minutes in NJ, so it is important to remind truck drivers that unnecessary idling will not be allowed on your property. Overnight idling is also prohibited unless a truck has a 2007 or newer engine, or uses an Auxiliary Power Unit (APU). As a property owner, you are also liable for a penalty if drivers are caught idling. There are several proven practices to reduce idling:

- Install No Idling Zone signs, available at www.StopTheSoot.org
- Encourage facility staff to warn drivers to shut off engines
- Install alternatives to idling, such as electric plug-ins for both trucks and refrigerated containers that may need power during an extended stay (see below)
- Provide a "break room" or area for drivers with essential services including a restroom, air conditioning, vending machines and wifi services.

Provide Electric Plug-ins for Trucks and Containers

While a majority of long-haul trucks are now equipped with APUs, those that are not may need to plug in to power for driver comfort during extended stays. There are several causes of delays, including waiting to pick up a load, waiting to sign up for a new load after drop-off, arriving before or after warehouse business hours, etc. While you may think that driver needs are not your problem, the business of moving freight requires qualified and competent drivers, who need basic human services. The community expects business practices that discourage illegal activities. It is in everyone's interest to provide these services for drivers.

In addition, refrigerated containers or "reefers" may need to plug in to keep shipments from becoming damaged.

Provide Essential Services for Drivers

Even though truck drivers spend much of their lives on the road and may even consider their truck to be their home, it is important to provide them with basic services while they are at your facility.

These include rest rooms, a place to sit and relax while waiting for cargo pick up or delivery (preferably air-conditioned), and wifi service so that they can conduct business, keep in touch with their families, and unwind. It is also desirable to provide vending machines or some kind of food service that drivers can take advantage of during their layover.

Encourage Truck Drivers to Follow Local Truck Routes

Local truck routes have been developed across the State for several reasons. They help drivers follow the most direct and efficient routes through areas to facilitate the movement of goods, allowing drivers to stay on main roads for most of their trip. They also help local communities maintain secondary roadways and improve public safety.

Schedule Pickups and Dropoffs to Reduce Waiting Times

Warehouse and logistics companies should make every effort to communicate and schedule pickup and drop-off times to avoid congestion, long waits for drivers, and inefficiency in the system.

Studies have shown that these waiting times are the single biggest factor in lost time and revenue. Companies should encourage the use of extended hours beyond the usual 9-5pm, if allowed by local zoning laws. If a driver must wait for more than a few minutes, a waiting room should be provided to eliminate excess idling.

Encourage the Use of Clean Trucks (2007 or Newer Engines)

As trucks age, they present a growing number of challenges to their owners and the communities they serve. There is an increase in pollution and vehicle maintenance costs, as well as a decrease in reliability. Beginning in 2007, heavy duty trucks were sold with diesel particulate filters as original equipment. By upgrading to a 2007 or newer vehicle, all of these challenges can be overcome as well as increasing fuel economy.

There are several ways to encourage this transition.

1. Providing on-site incentives such as priority pickups or parking to newer trucks.
2. Funding a cost-share or low-interest loan will help those who cannot afford to replace their older vehicle make the switch.
3. Securing Federal funding for similar programs, or investigating engine repower options, might help this switch as well.

Maintain Communication with Neighboring Communities

New Jersey is the most densely populated state in the country, and is home to many "mixed use" neighborhoods where residents and commercial businesses share space. Fostering a good working relationship with neighbors and building a communication system is important to meeting everyone's needs. This can be done by regular meetings with mayors, council members or citizen advisory groups, or by informal means such as regular updates via email with affected neighbors. For example, if something happens and trucks are forced to wait for several hours, neighbors might like to know that the delay will only last a short time.

Encourage Shipping and Logistics Companies to join USEPA's Smartway Program

SmartWay is a public/private collaboration between the USEPA and the freight transportation industry that helps freight shippers, carriers, and logistics companies improve fuel-efficiency, save money, increase environmental performance, and increase supply chain sustainability.

SmartWay partners agree to:

- Assess freight operations;
- Calculate fuel consumption and carbon footprint; and
- Track fuel-efficiency and emission reductions annually.

In exchange, EPA ranks and publicizes partners performance on the SmartWay Partner List.

Superior performers earn the SmartWay Partner logo.

Since 2004, SmartWay partners have reduced fuel use, money and emissions by 16.7 million tons.

SmartWay℠ Transport Partner