

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.

The air contaminant concentration graphs presented below include the chemical's health benchmark.

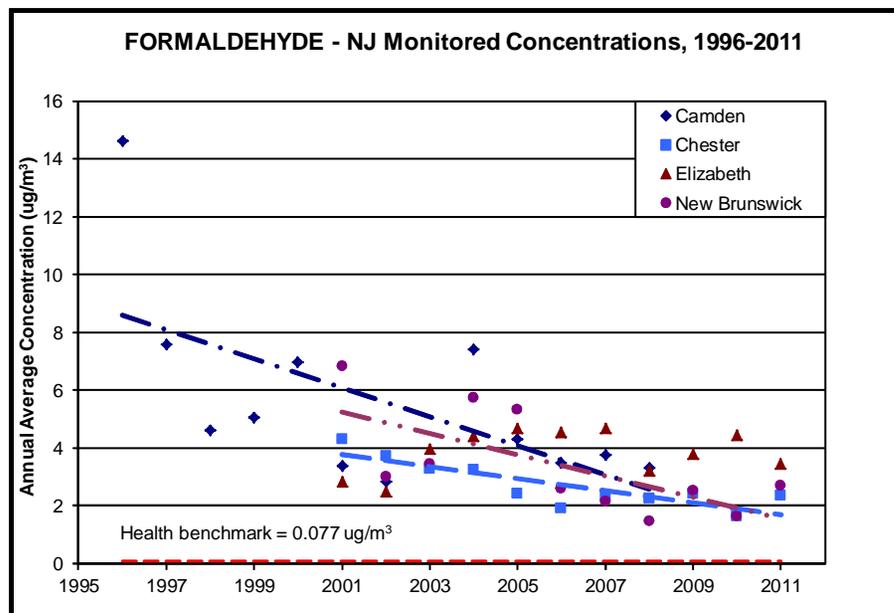
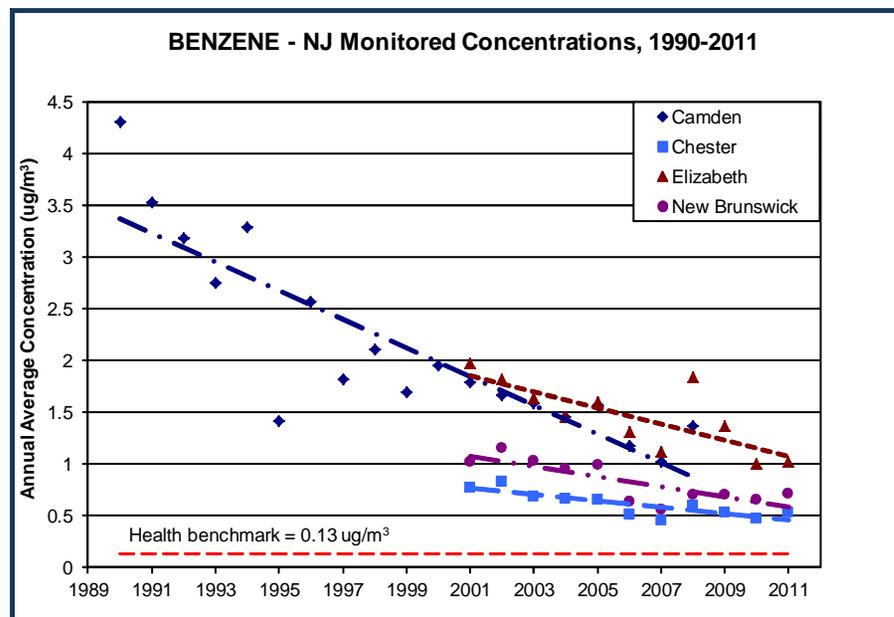
Status and Trends

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.

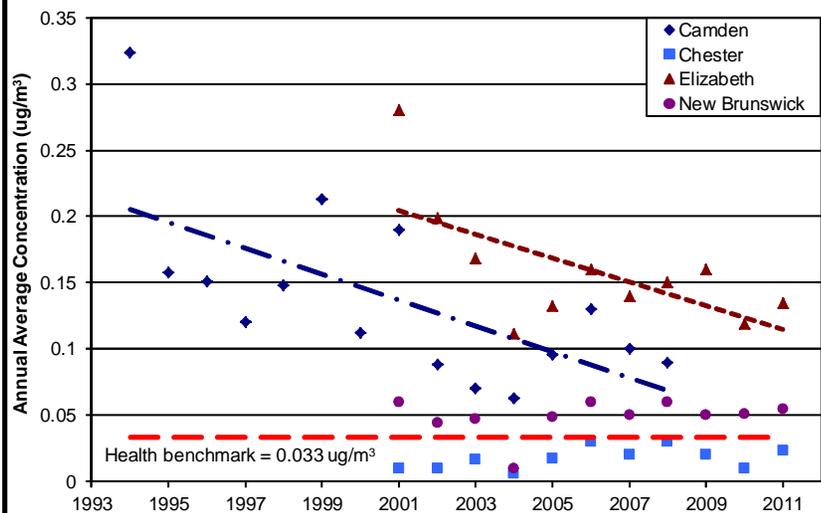
The Camden monitoring station was shut down in 2008 when DEP lost access to the site but a new station was initiated in 2012.

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 on the following page show some of the historic data. Trend lines, developed using linear regression, are shown only for parameters and locations where a linear trend was found to be statistically significant. Locations where a trend is absent indicates either the data is more variable or a 'flat' trend is evident (i.e., no significant change over time). The VOC values shown, for benzene, formaldehyde, 1,3-butadiene, and acetaldehyde, represent gaseous concentrations. The concentration of arsenic shown represents 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. Arsenic is 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. Absolute average values of the contaminants discussed are subject to some error due to the laboratory's procedure of treating non-detects as zero. However, it is not likely that this approach significantly changes the trends picture.

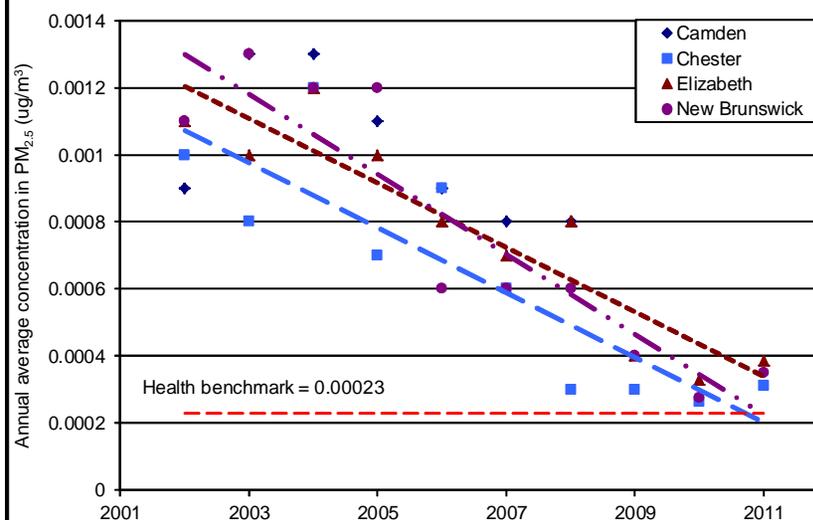
The primary source of the VOCs shown is motor vehicles, and the declining trends reflect improvements in automotive technology and the more stringent emissions standards of recent years, although reductions in emissions from industrial and area sources have also played a role. Sources of atmospheric emissions of arsenic include waste incineration and the metallurgical industry.



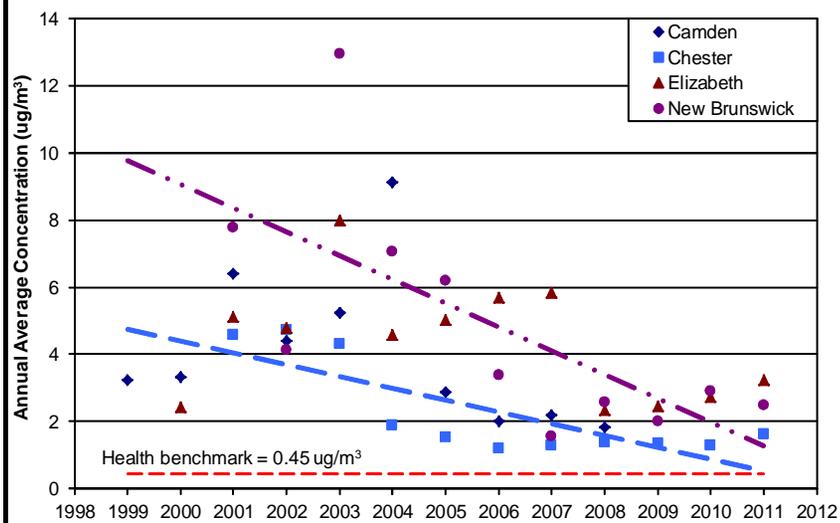
1,3-BUTADIENE - NJ Monitored Concentrations, 1994-2011



ARSENIC - NJ Air Monitoring Data, 2002 - 2011



ACETALDEHYDE - NJ Monitored Concentrations, 1999-2011



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 and References

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.stophesoot.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:

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