TOXIC AIR POLLUTANTS

NATURE AND SOURCES

Hazardous air pollutants, or air toxics, are emitted from thousands of sources across the nation, or they are formed through atmospheric reactions of directly emitted substances. Most air toxics originate from man-made sources, including mobile sources (e.g., cars, trucks, construction equipment) and stationary sources (e.g., factories, refineries, power plants), as well as indoor sources (e.g., some building materials and cleaning solvents). Some air toxics are also released from natural sources such as volcanic eruptions and forest fires. Examples of toxic air pollutants include benzene, found in gasoline; tetracholorethylene (i.e., perchloroethylene), emitted from some dry cleaning facilities; and dichloromethane (i.e., methylene chloride), used as a solvent by a number of industries. The Clean Air Act regulates 187 air toxics from various sources. EPA has identified 21 pollutants as mobile source air toxics, including diesel particulate matter and diesel exhaust organic gases. In addition, EPA has listed 33 urban hazardous air pollutants that pose the greatest threats to public health in urban areas.

HEALTH AND ENVIRONMENTAL EFFECTS

People exposed to toxic air pollutants at sufficient concentrations may experience various harmful health effects, including cancer and damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, respiratory, and other health problems. In addition to exposure from breathing air toxics, risks are also associated with the deposition of certain toxic pollutants onto soils or surface waters, where they are taken up by plants and ingested by animals and eventually magnified up through the food chain. Like humans, animals and plants may be harmed by air toxics exposure. Air toxics also may cause adverse environmental and ecological effects.

TRENDS IN AIR TOXICS CONCENTRATIONS AND EMISSIONS

The nation's monitoring network for air toxics is not as extensive as that for many of the other pollutants discussed in this report. Figure 30 shows ambient monitoring locations for air toxics sites operating in 2005.

In 2003, working with its state and local partners, EPA launched the implementation of the National Air Toxics Trends Station (NATTS) program, a national monitoring network for toxic air pollutants. The central goal of the NATTS network is to assess trends in high-risk air toxics such as benzene, formaldehyde, 1,3-butadiene, acrolein, and chromium. Fourteen of the 23 sites began operation in 2003 and the remaining nine were established in 2004.

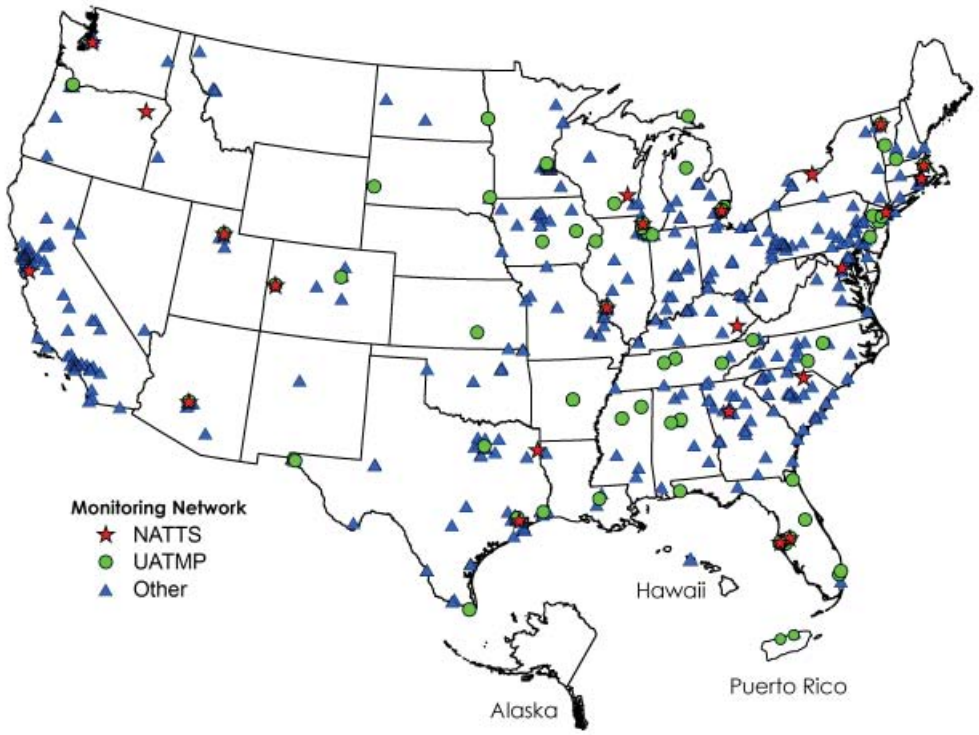

Figure 30. Air toxics monitoring sites operating in 2005 (by monitoring program).

In addition to the NATTS program, about 300 air toxics monitoring sites are currently collecting data to help air pollution control agencies track toxic air pollutant levels in various locations around the country. State and local air quality agencies operate these sites to address specific concerns such as areas of elevated concentrations or "hot spots," environmental justice concerns, and/or public complaints. Some state and local agencies use EPA sampling and analysis support such as the Urban Air Toxics Monitoring Program (UATMP).

Air toxics monitoring is generally most prevalent in California, Texas, and the eastern U.S. and reflects a tendency to monitor in densely populated areas. Most sampling is conducted on a 1-in-6-day schedule for a 24-hour period. For the latest information about national air toxics monitoring, visit http://www.epa.gov/ttn/amtic.

EPA compiles an air toxics inventory as part of the National Emissions Inventory (NEI) to estimate and track national emissions trends for the 187 toxic air pollutants regulated under the Clean Air Act. Figure 31 shows the emissions of toxic air pollutants divided among the four types of sources, based on 2002 estimates (the most recent year of data available).

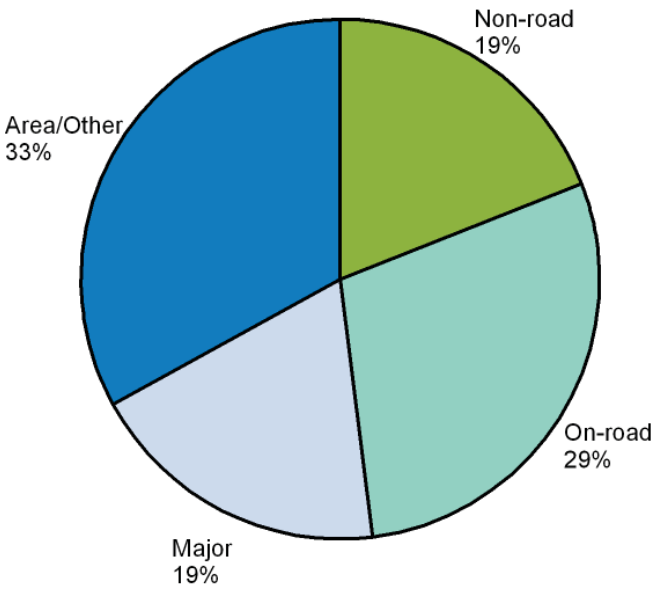

Figure 31. Percent contribution by source sector to national air toxics emissions, 2002.

Note: Emission sectors are (1) major (large industrial) sources; (2) area and other sources, which include smaller industrial sources like small dry cleaners and gasoline stations, as well as natural sources like wildfires; (3) on-road mobile sources, including highway vehicles; and (4) non-road mobile sources, such as aircraft, locomotives, and construction equipment.

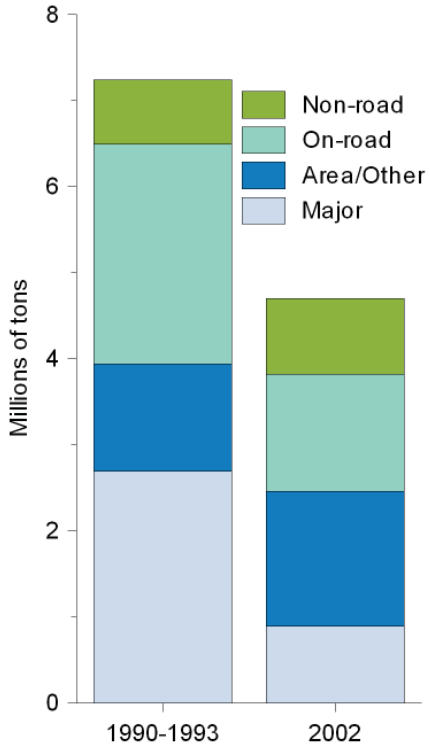

Figure 32. Trends in national air toxics emissions for 1990-1993 vs. 2002.

Nationwide, air toxics emissions decreased approximately 35 percent between the 1990-1993 baseline and 2002 as shown in Figure 32. Major and on-road mobile sources showed the greatest emission reductions (67 and 47 percent, respectively), while emissions from both area and non-road mobile sources increased over this period (26 and 15 percent, respectively).

Although changes in how EPA compiled the national inventory over time may account for some differences, EPA and state regulations, as well as voluntary reductions by industry, have clearly achieved large reductions in total toxic emissions.

Ambient trends in air toxics vary by pollutant. Benzene, one of the most routinely and accurately monitored air toxics, is also estimated to be the most important at a national level with regard to the average individual cancer risk it poses. Figure 33 shows a national average trend in benzene levels at 107 monitoring sites across the country. These sites are generally in urban areas that have higher levels of benzene than other areas of the country. Data from these sites suggest an average improvement of almost 17 percent between 2000 and 2005.

Figure 34 shows the location and change in benzene concentrations at individual sites used to compile the national trend. While some sites show an increase over the time period of interest, no site shows a significant increase, and most sites indicate improvement from 1990 to 2005.

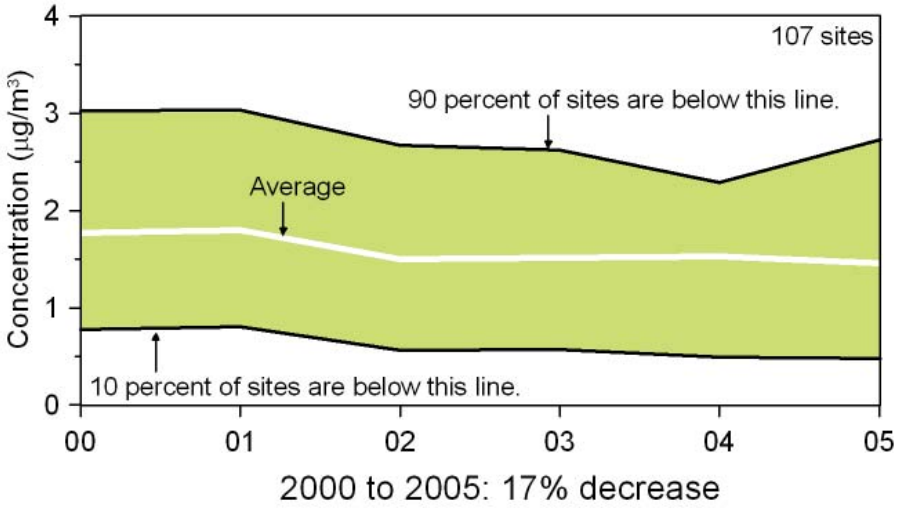

Figure 33. National benzene air quality trend, 2000-2005 (annual average).

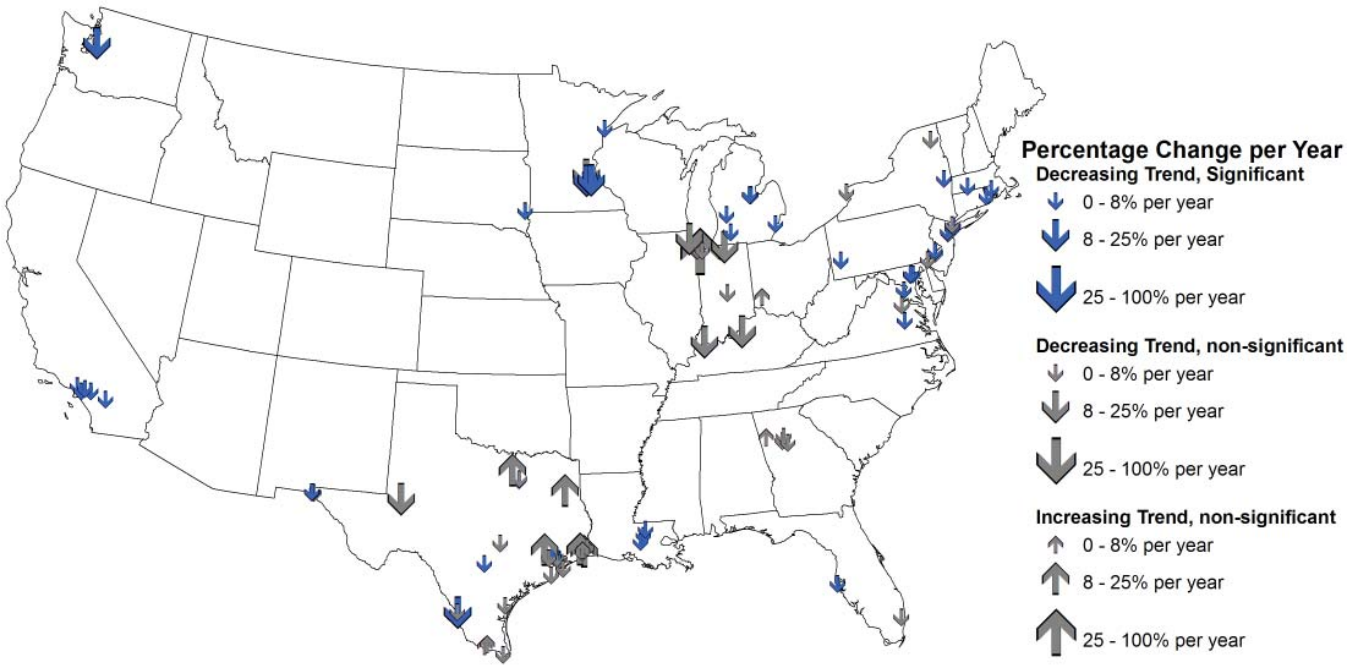

Figure 34. Trends in annual average benzene concentrations at individual sites for any period of at least five years within 1990-2005.

RISK ASSESSMENT

EPA has developed health risk estimates for 177 toxic air pollutants (a subset of the Clean Air Act's list of 187 air toxics plus diesel particulate matter). Figure 35 shows the estimated lifetime cancer risk across the continental U.S. by county based on 1999 model estimates. More than 270 million people live in census tracts for which the lifetime cancer risk from these compounds exceeds a 10-in-one-million risk. From a national perspective, benzene is the most significant air toxic for which cancer risk could be estimated, contributing 25 percent of the average individual cancer risk identified in the 1999 assessment.

Though not included in the figure, exposure to diesel exhaust is widespread. EPA has concluded that diesel exhaust is a likely human carcinogen and ranks with the other substances that the national-scale assessment suggests pose the greatest relative risk. For more information about EPA's National Air Toxics Assessment, visit http://www.epa.gov/ttn/atw/nata1999.

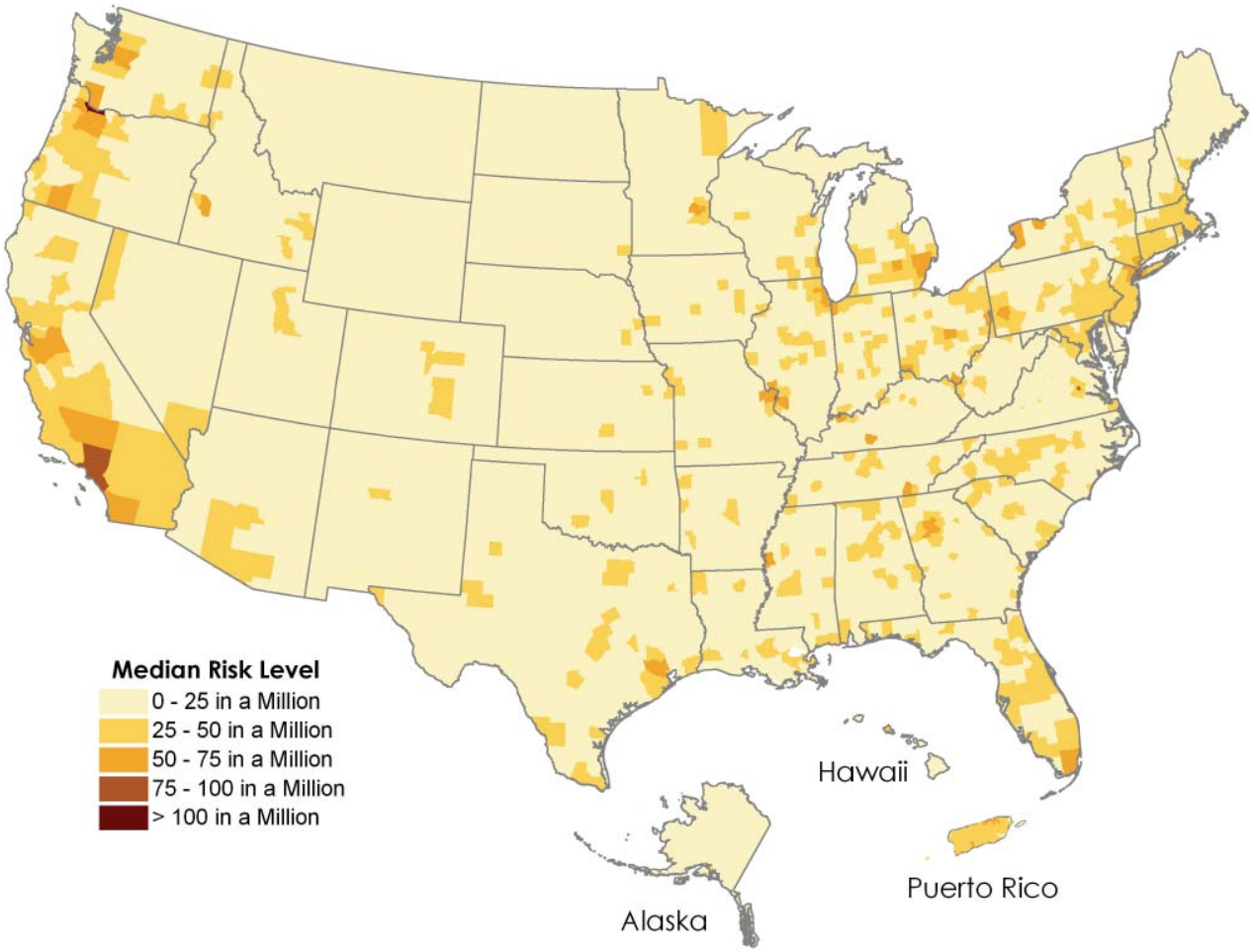

Figure 35. Estimated county-level cancer risk from the 1999 National Air Toxics Assessment (NATA99).