Toxic Air Pollutants

Trends in Toxic Air Pollutant Concentrations

Under the Clean Air Act, EPA regulates 187 toxic air pollutants. Toxicity levels, or the potential for adverse effects on human health and the environment, vary from pollutant to pollutant. For example, a few pounds of a relatively toxic pollutant may have a greater health effect than several tons of emissions of a less toxic pollutant. EPA recommends a set of benchmark toxicity levels for estimating the effects of exposure to individual toxic air pollutants. For more information, visit http://www.epa.gov/ttn/atw/toxsource/table1.pdf.

EPA frequently relies on modeling studies to supplement air toxic monitoring data and to better define trends in toxic air pollutants. One such modeling study, the National-Scale Air Toxic Assessment (NATA), is a nationwide study of ambient levels, inhalation exposures, and health risks associated with emissions of 177 toxic air pollutants plus diesel particulate (assessed for noncancer only). NATA examines individual pollutant effects as well as cumulative effects on human health.

Figure 22 shows the estimated lifetime cancer risk across the continental U.S. by census tract based on 2005 NATA model estimates. The national average cancer risk level in 2005 is 50 in a million. Many urban areas as well as transportation corridors show a risk above the national average. From a national perspective, formaldehyde and benzene are the most significant toxic air pollutants for which EPA could estimate cancer risk. These toxic air pollutants contributed nearly 60 percent of the average individual cancer risk identified in the 2005 assessment. In addition to the census tract level ambient concentrations predicted by the NATA 2005, EPA also used the model to compare with monitored air toxics concentrations at over 1000 locations. When comparing modeling results to monitored data, a model-to-monitor ratio close to 1 for a particular toxic pollutant at a monitoring site indicates a high level of confidence in the modeling results for that toxic pollutant and monitoring site. Good agreement was seen between the model and monitors for the following pollutants: acetaldehyde, arsenic ($PM_{2.5}$), benzene, carbon tetrachloride, formaldehyde, methyl chloride and toluene. Results

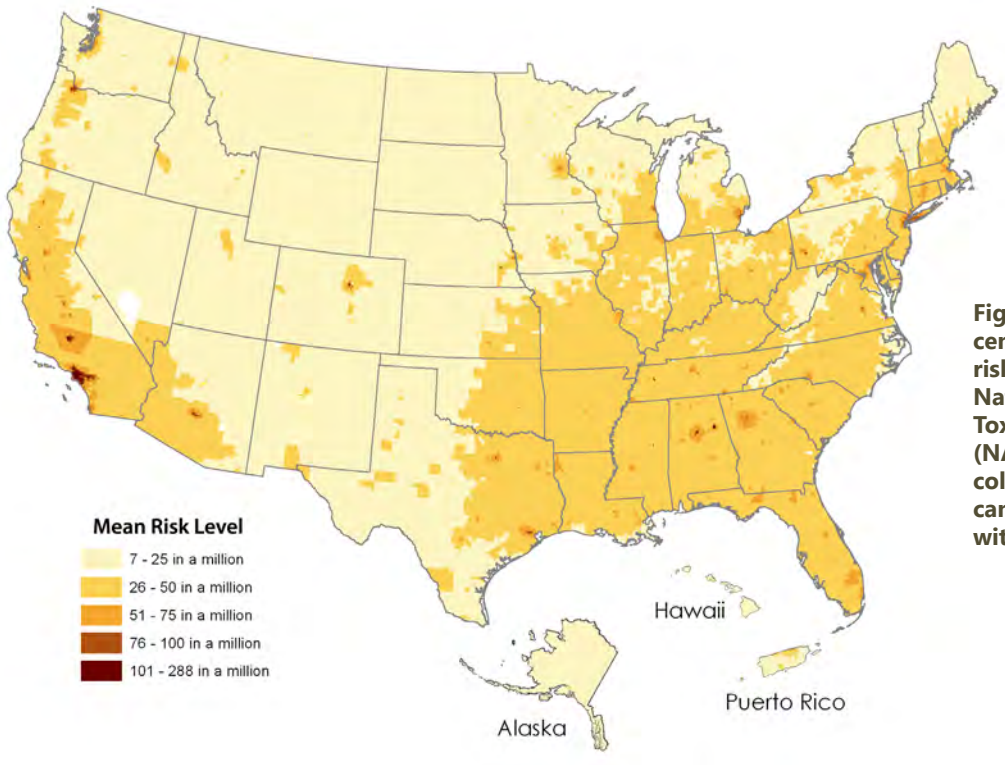

Figure 22. Estimated census-tract cancer risk from the 2005 National-Scale Air Toxics Assessment (NATA2005). Darker colors show greater cancer risk associated with toxic air pollutants.

of this model-to-monitor comparison can be found at http://www.epa.gov/ttn/atw/nata2005/compare.html.

Though not included in the figure below, exposure to diesel exhaust is also widespread. EPA has not adopted specific risk estimates for diesel exhaust but 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 to human health. For more information on NATA visit http://www.epa.gov/ttn/atw/natamain.

Since 2003, EPA, working with state and local partners, has nationally monitored air toxic pollutants through the National Air Toxics Trends Station (NATTS) program. The principal objective of the NATTS network is to provide long-term monitoring data across representative areas of the country for NATA priority pollutants (e.g., benzene, formaldehyde, 1,3-butadiene, hexavalent chromium, and polycyclic aromatic hydrocarbons [PAHs] such as napthalene) in order to establish overall trends. During 2010, data were collected every one in six days at 27 NATTS sites as shown in Figure 23 (20 urban and 7 rural) for PM10 metals, VOCs, carbonyls, hexavalent chromium, and PAHs. In addition to the NATTS program, about 300 monitoring sites—operated by state, local, and tribal agencies—are currently collecting data to help track toxic air pollutant levels across the country. For more information on NATTS visit http://www.epa.gov/ttn/amtic/natts.html.

Figure 24 shows the trends from 2003 to 2010 in ambient monitoring levels for some of the important air toxic air pollutants. When the median percent change per year (marked by an x for each pollutant shown) is below zero, the majority of sites in the U.S. show a decrease in concentrations. Ambient monitoring data show that some of the toxic air pollutants of greatest widespread concern to public health, such as benzene, 1,3-butadiene, formaldehyde and several metals, are declining at most sites. Monitoring data shown in Figure 24 represent compilation of data from monitoring sites nationwide including data from the NATTS sites. Pollutants represented have at least a minimum of 40 valid trends sites with 35 percent of the data being measured at levels above monitor detection limits. Some pollutants which are more widely monitored such as lead and manganese may include data from several hundred sites which meet the 35 percent criteria. Some pollutants such as methyl

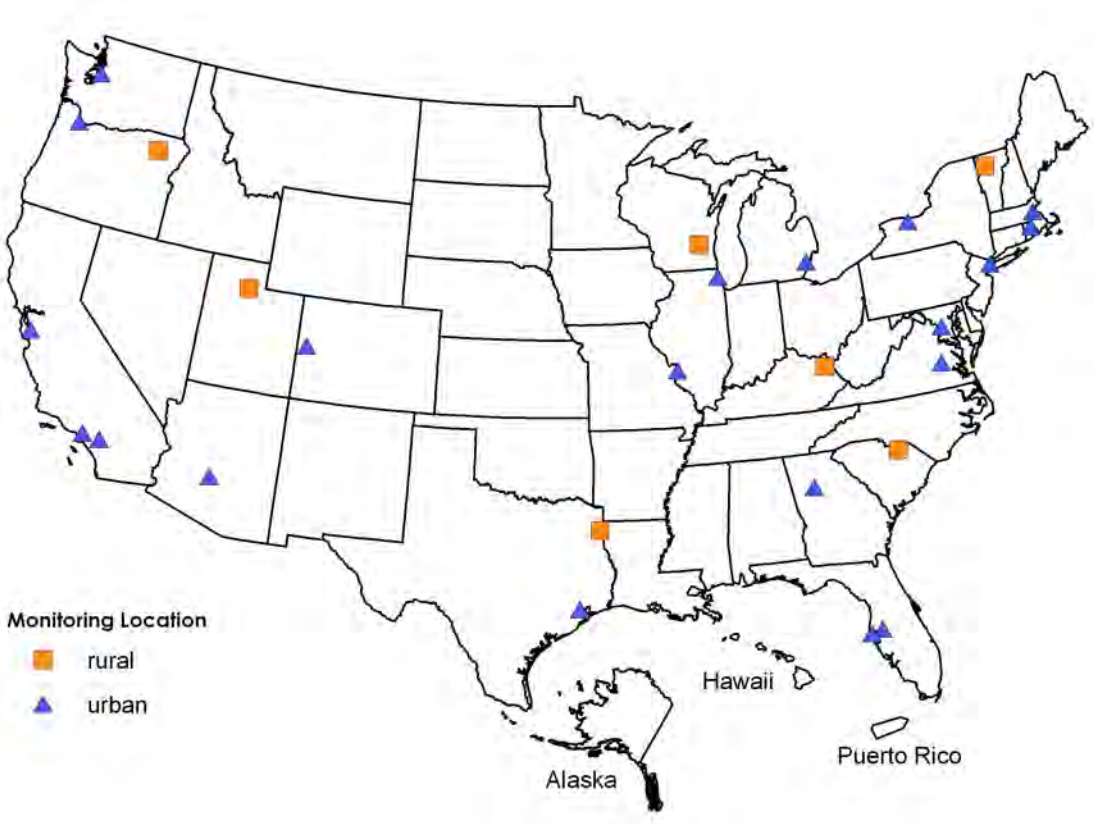

Figure 23. National Air Toxics Trends Sites (NATTS)

tert-butyl ether (MTBE) whose use was discontinued after 2006 are no longer being measured at ambient monitoring sites as the levels are very low. There are two chlorinated VOCs which appear to have increased slightly, dichloromethane (methylene chloride) which is commonly used as a solvent, and chloromethane which was once used as a refrigerant and is also naturally formed in the oceans.

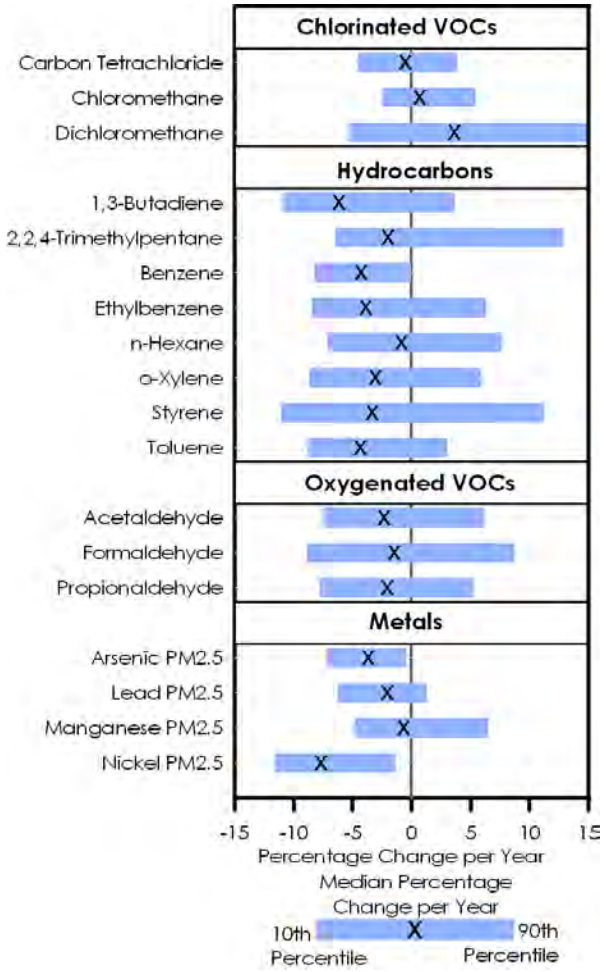

Figure 24. Distribution of changes in ambient concentrations at U.S. toxic air pollutant monitoring sites, 2003-2010 (percent change in annual average concentrations).

Assessing Outdoor Air Near Schools

In March 2009, EPA released a list of schools that would be part of an initiative to understand whether outdoor toxic air pollution poses health concerns to schoolchildren. The monitoring took place at 65 schools in 22 states and 2 tribal areas. EPA selected the schools using a number of factors, including results from computer modeling analyses – the 2002 NATA, results presented in a newspaper series on air toxics at schools, and in consultation with state and local air agencies. The pollutants monitored varied by school. EPA identified pollutants to measure at each school based on the best available information about the pollution sources, potential air concentrations, and risk in each area. Initial monitoring was completed for all schools in May 2010. EPA posted monitoring results after data was quality-assured and intends to post final reports for each monitoring location as the information is analyzed. For the majority of schools, monitored concentrations have been lower than EPA's models predicted. However, additional monitoring will be conducted for a few schools for various reasons. As a follow on to the schools program, EPA issued a request in 2011 for proposals for grants for community-scale air toxics ambient monitoring projects. Through these grants, local air toxics concerns will be investigated by state and local agencies. For more information, visit http://www.epa.gov/schoolair/.