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, 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. Toxicity levels can vary by orders of magnitude between pollutants. 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.

Because ambient monitoring data are so limited for toxic air pollutants, EPA frequently relies on ambient modeling studies 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 180 toxic air pollutants (a subset of the Clean Air Act's list of 187 toxic air pollutants and diesel particulate matter). NATA examines individual pollutant effects as well as cumulative effects of many air pollutants on human health.

Figure 28 shows the estimated lifetime cancer risk across the continental U.S. by county based on 2002 NATA model estimates. The national average cancer risk level in 2002 is 36 in a million. Many urban areas as well as transportation corridors show a risk above the national average. From a national perspective, benzene is the most significant toxic air pollutant for which cancer risk could be estimated, contributing over 30 percent of the average individual cancer risk identified in the 2002 assessment. Though not included in the figure, 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.

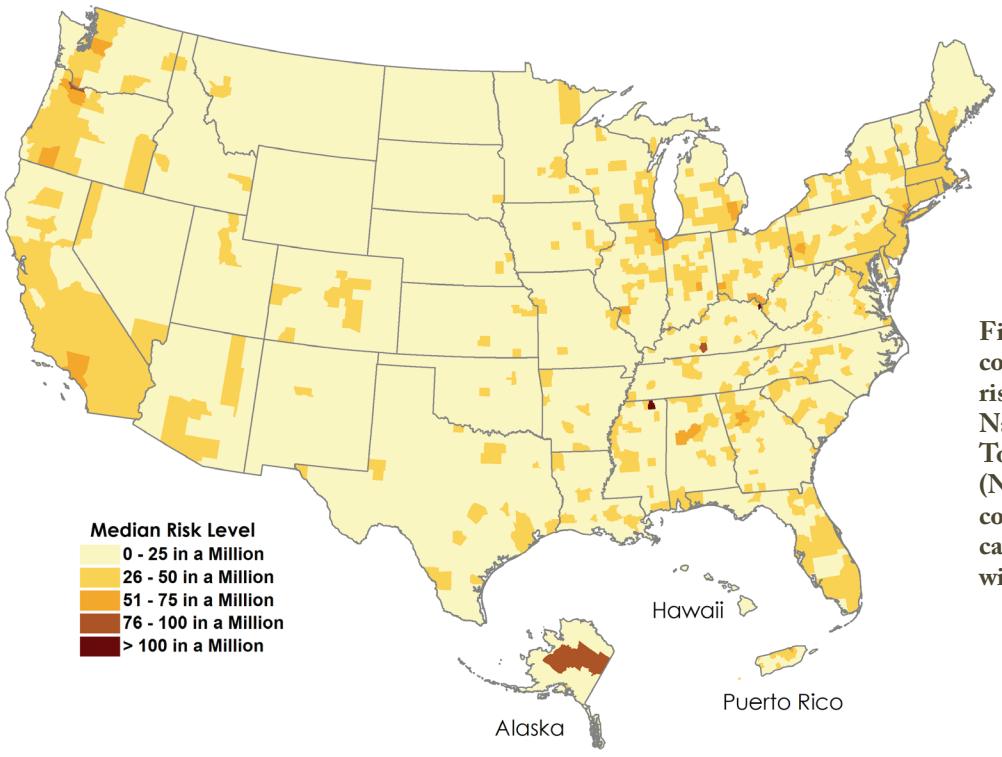

Figure 28. Estimated county-level cancer risk from the 2002 National-Scale Air Toxics Assessment (NATA2002). Darker colors show greater cancer risk associated with toxic air pollutants.

Figure 29 shows the trends in ambient monitoring levels for some of the important toxic air pollutants identified by NATA. 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 for some of the toxic air pollutants of greatest widespread concern to public health (shown in yellow), 1,3-butadiene, benzene, tetrachloroethylene, and 1,4-dichlorobenzene, concentration levels are declining at most sites. Concentrations of volatile organic compounds (VOCs) such as 1,3-butadiene, benzene, styrene, xylenes, and toluene decreased by approximately 5 percent or more per year at more than half of all monitoring sites. Concentrations of carbonyls such as formaldehyde, acetaldehyde, and propionaldehyde were equally likely to have increased or decreased (another carbonyl of interest, acrolein, was not reliably measured in 2000 so no trend is shown for it). Chlorinated VOCs such as tetrachloroethylene, dichloromethane, and methyl chloroform decreased at more than half of all monitoring sites, but decreases among these species were much less consistent from site to site than among the other VOCs shown. Lead particles decreased in concentration at most monitoring sites; trends in other metals are less reliable due to the small number of sampling sites available for analysis.

In 2003, in an effort to improve accuracy and geographic coverage of monitoring, EPA, working with its state and local partners, launched the National Air Toxics Trends Station (NATTS) program, a national monitoring network for toxic air pollutants. 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, acrolein, and hexavalent chromium) in order to establish overall trends. The initial 23 sites were established between 2003 and 2005; two sites were added in 2007 and two more in 2008 for a total of 27 NATTS sites. In addition, the list of pollutants monitored was expanded to include polycyclic aromatic hydrocarbons (PAHs), of which naphthalene is the most prevalent. 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 pollutants levels across the country.

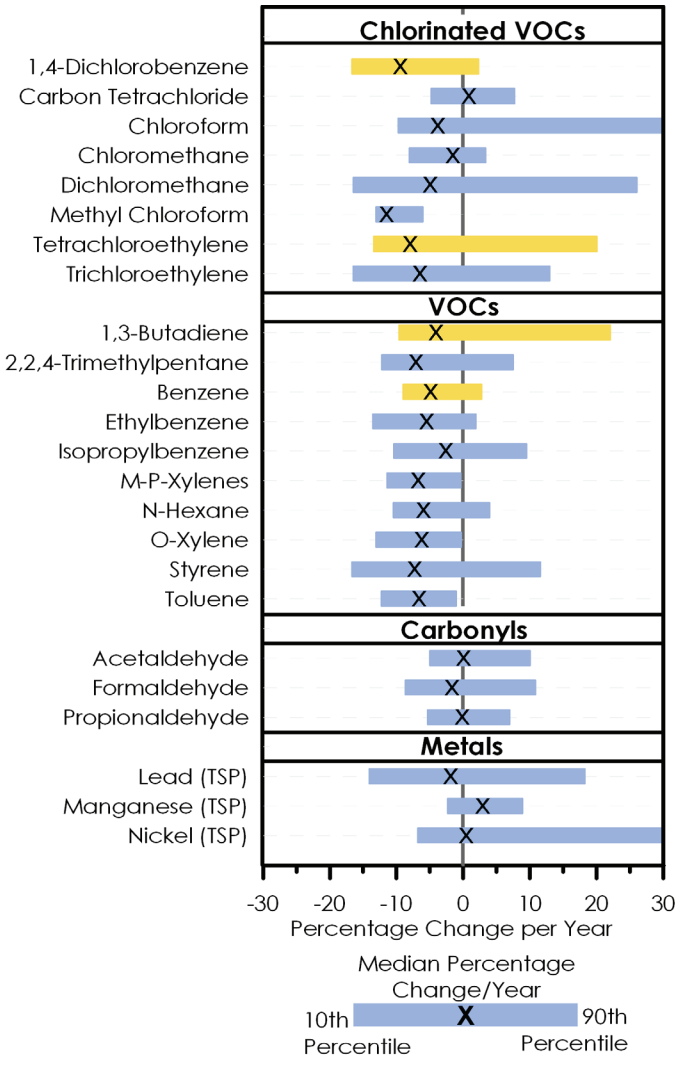

Figure 29. Distribution of changes in ambient concentrations at U.S. toxic air pollutant monitoring sites, 2000-2005 (percent change in annual average concentrations). (Source: McCarthy M.C., Hafner H.R., Chinkin L.R., and Charrier J.G. [2007] Temporal variability of selected air toxics in the United States. *Atmos. Environ.* 41 [34], 7180-7194)

Notes: 10th and 90th percentiles are excluded if fewer than 10 monitoring sites were available for analyses. For chloroform and nickel, the 90th percentile percent changes per year are cut off at 30. TSP = total suspended particulate.