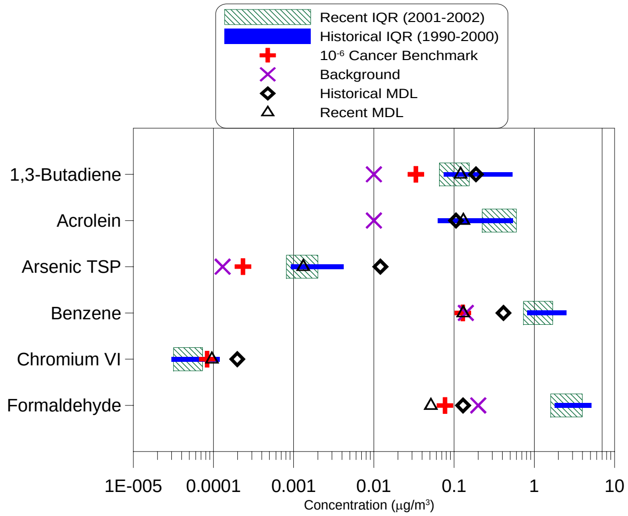
What Are Air Toxics Concentrations Nationally and Locally?

A summary of historical (1990-2000) and recent (2001-2002) concentrations, MDLs, background levels, and cancer benchmarks are provided in the figure below for six air toxics. 1,3-butadiene, acrolein, benzene, arsenic, chromium VI, and formaldehyde are of national concern for their potential health risk.



A summary of concentration ranges, background concentrations, cancer benchmarks, and MDLs for six air toxics.

Concentrations for many species are comparable on a national scale, although some local variation may exist. In many cities, typical regional profiles for air toxics are dominated by mobile source-related species. In some industrial areas, however, high local concentrations of individual species can occur near major point sources. Air toxics also vary temporally: by season (e.g., acetaldehyde and formaldehyde are higher in summer, and benzene is higher in winter); by day-of-week (e.g., diesel particulate-related compounds are lower on weekends); and by hour of day (e.g., formaldehyde is higher midday).

What Are Air Toxics?

Air toxics, or hazardous air pollutants (HAPs), are pollutants known or suspected to cause cancer or other serious health effects, or to cause adverse environmental effects. There are currently 188 HAPs, consisting of various gases and metals, regulated under the Clean Air Act. From a national perspective, six HAPs appear to pose the greatest threat to public health (i.e., biggest risk drivers): benzene, which is found in gasoline; formaldehyde, which is both emitted from automobiles and formed through chemical reactions in the atmosphere; 1,3-butadiene, which is found in motor vehicle exhaust; arsenic and hexavalent chromium (chromium VI), which are emitted by certain industrial sources, and acrolein, which is both emitted by power plants and formed through atmospheric chemical reactions. In addition, diesel particulate matter (DPM) is identified as being likely to present the highest risk to human health and welfare from on-highway motor vehicle emissions.

For More Information on Air Toxics, Visit the Following Web Sites:

Technical reports, workshop presentations, and a data analysis workbook
http://www.ladco.org/toxics.html

Information on EPA's air toxics program
http://www.epa.gov/air/toxicair/index.html
http://www.epa.gov/ttn/atw/
http://www.epa.gov/ttn/amtic/airtoxpg.html

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Lessons Learned From Analyzing Air Toxics Monitoring Data: A National Perspective

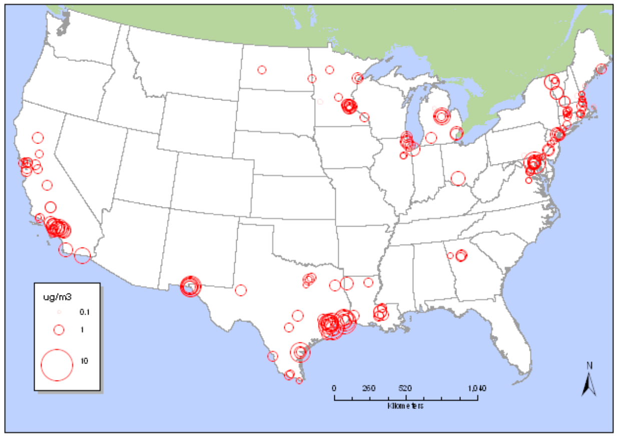
Prepared for air quality scientists and managers

How Good Are the Data?

The availability of air toxics monitoring data varies significantly by species (e.g., many samples of lead, few samples of acrolein) and by location (i.e., most sites are in urban areas, and large portions of the country are not represented for some species).

Confidence in the data varies by pollutant, with high confidence for species with median concentrations well above minimum detection limits (MDLs) such as acetaldehyde, benzene, formaldehyde, lead, manganese, methylene chloride, and nickel, and low confidence for those with median concentrations close to MDLs such as acrolein, 1,3-butadiene, beryllium, chromium VI, and vinyl chloride (improved measurement methods are needed to increase the data quality for these species).

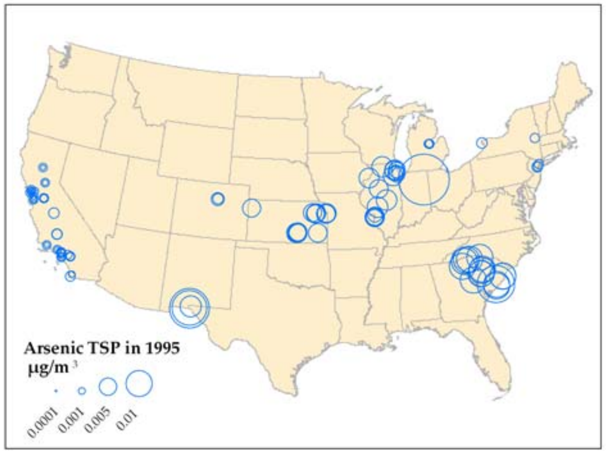
Typical concentrations compared with cancer benchmarks indicate benzene, arsenic, formaldehyde, acrolein, 1,3-butadiene, and chromium VI are important contributors to health risks associated with lifetime exposures to these compounds (i.e., “risk drivers”); however, uncertainty in the historical measurements undermines assessment of risks from exposure to acrolein, 1,3-butadiene, and chromium VI .



Summer Average Benzene Concentrations (1999).

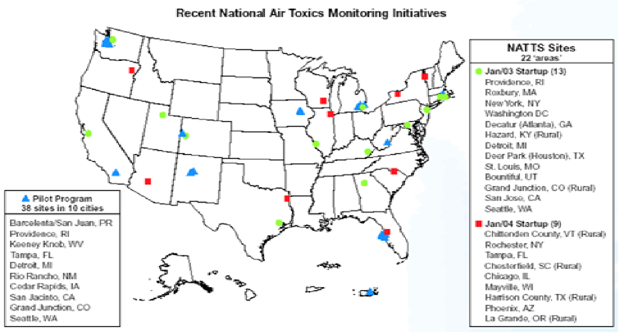
Where Do We Measure Air Toxics?

Air toxics concentrations have been measured at several hundred sites by state, local, and tribal air pollution control agencies for many years. The maps show locations where benzene (lower left) and arsenic (below) were measured.



Annual Average Arsenic TSP Concentrations (1995).

Recently, USEPA and states have worked together to establish a national air toxics monitoring program, consisting of 22 national air toxics trends sites (NATTS)—see figure below, and numerous community-scale monitoring studies.

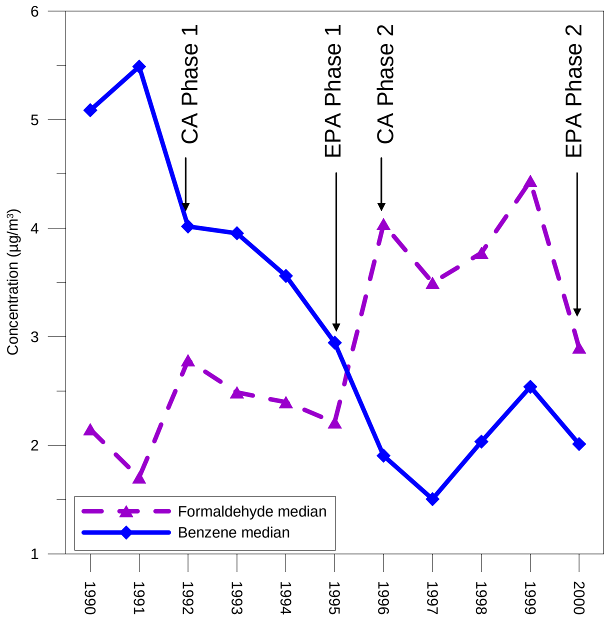


National Air Toxics Trends Sites (NATTS).

What Do Air Toxics Data Say About the Effectiveness of Control Programs?

Most air toxics originate from manmade sources including mobile sources (e.g., cars, buses, trucks) and stationary sources (e.g., factories, refineries, power plants). However, some air toxics are released in major amounts from natural sources such as forest fires.

Air quality improvements due to emission reductions have been measured. For example, benzene and 1,3-butadiene concentrations have declined through the use of reformulated gasoline (RFG), but formaldehyde concentrations have increased.



Seasonal average benzene (blue) and formaldehyde (purple) concentrations (µg/m^3) at all sites in California. RFG formulation changes are noted.