CHAPTER 5

Air Toxics

http://www.epa.gov/oar/airtrends/toxic_mid.html

Nature and Sources of the Problem

Toxic air pollutants, or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects. Air toxics may also cause adverse environmental and ecological effects. Examples of toxic air pollutants include benzene, found in gasoline; perchloroethylene, emitted from some dry cleaning facilities; and methylene chloride, used as a solvent by a number of industries. 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. The Clean Air Act identifies 188 air toxics from industrial sources. EPA has identified 20 of these pollutants that are associated with mobile sources and one additional mobile source air toxic designated "diesel particulate matter and diesel exhaust organic gases."

Health and Environmental Effects

People exposed to toxic air pollutants at sufficient concentrations may experience various health effects, including cancer, 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 also are associated with the deposition of 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 may experience health problems due to air toxics exposure.

Trends in Toxic Air Pollutants

EPA and states do not maintain an extensive nationwide monitoring network for air toxics as they do for many of the other pollutants discussed in this report. While EPA, states, tribes, and local air regulatory agencies collect monitoring data for a number of toxic air pollutants, both the chemicals monitored and the geographic coverage of the monitors vary from state to state. EPA is working with these regulatory partners to build upon the existing monitoring sites to create a national monitoring network for a number of toxic air pollutants. The goal is to ensure that those compounds that pose the greatest risk are measured. The available monitoring data help air pollution control agencies track trends in toxic air pollutants in various locations around the country. EPA began a pilot city monitoring project in 2001 and is scheduled to include at least 12 months of sampling in four urban areas and six small city/rural areas (see Figure 5-1). This program is intended to help answer several important national network design questions (e.g., sampling and analysis precision, sources of variability, and minimal detection levels). In addition, an initial 11-city trends network is being established that will help develop national trends for several pollutants of concern. For the latest information on national air toxics monitoring, see **www.epa.gov/ttn/amtic/airtxfil.html**.

EPA also compiles an air toxics inventory as part of the National Emissions Inventory (NEI, formerly the National Toxics Inventory) to estimate and track national emissions trends for the 188 toxic air pollutants regulated under the Clean Air Act. In the NEI, EPA divides emissions into four types of sectors: (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) onroad mobile sources, including highway vehicles; and (4) nonroad mobile sources like aircraft, locomotives, and construction equipment.

As shown in Figure 5-2, based on 1996 estimates, the most recent year of available data, the emissions of toxic air pollutants are relatively equally divided among the four types of sources. However, this distribution varies from city to city. Based on the data in the NEI (Figure 5-3), estimates of nationwide air toxics emissions have dropped approximately 24 percent between baseline (1990–1993) and 1996. Thirty-three of these air toxics, which pose the greatest threat to public health in urban areas, have similarly dropped 31 percent. 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 overall air toxic emissions. Trends for individual air toxics vary from pollutant to pollutant. Benzene, which is the most widely monitored toxic air pollutant, is emitted from cars, trucks, oil refineries, and chemical processes. Figure 5-4 shows measurements of benzene taken from 95 urban monitoring sites around the country. These urban areas generally have higher levels of benzene than other areas of the country. Measurements taken at these sites show, on average, a 47 percent drop in benzene levels from 1994 to 2000. During this period, EPA phased in new (so-called "tier 1") car emission standards; required many cities to begin using cleaner-burning gasoline; and set standards that required significant reductions in benzene and other pollutants emitted from oil refineries and chemical processes. EPA estimates that, nationwide, benzene emissions from all sources dropped 20 percent from 1990 to 1996.

Figure 5-1. Map of 10 cities in monitoring pilot project.

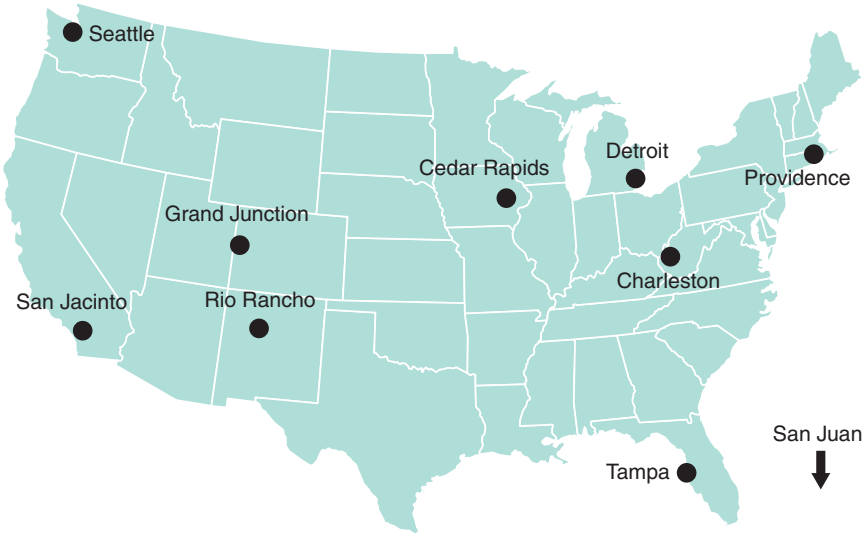

Figure 5-2. National air toxics emissions, 1996.

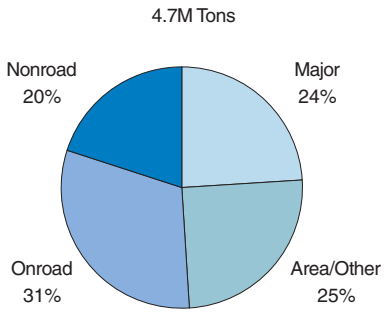

Figure 5-3. National air toxics emissions.

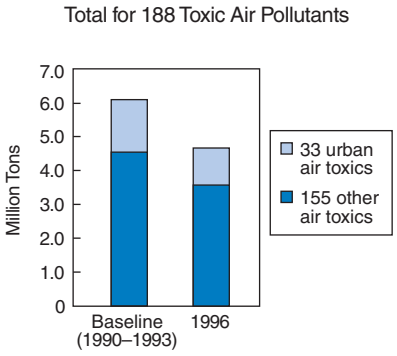

Figure 5-4. Ambient benzene, annual average urban concentrations, nationwide, 1994–2000.