

Lead Emissions

Q: What are the trends in outdoor air quality and their effects on human health and the environment?

The above question pertains to all 'Outdoor Air' Indicators, however, the information on these pages (overview, graphics, references and metadata) relates specifically to "Lead Emissions". Use the right side drop list to view the other related indicators on this question.

Introduction

Lead is a naturally occurring metal found in small amounts in rock and soil. Lead has been used industrially in the production of gasoline, ceramic products, paints, metal alloys, batteries, and solder. In the past, automotive sources were the major contributors of lead emissions to the atmosphere. After leaded motor vehicle fuels were phased out in 1995, the contribution of air emissions of lead from the transportation sector, and particularly the automotive sector, greatly declined. Today, industrial processes, primarily metals processing, account for a large portion of lead emissions to the atmosphere and the highest levels of airborne lead are usually found near industrial operations that process materials containing lead, such as smelters (U.S. EPA, 2003). Exposure to lead occurs mainly through inhalation of air and ingestion of lead in food, water, soil, or dust. The [Lead Concentrations indicator](#) describes health hazards associated with lead exposures.

This indicator presents lead emissions from traditionally inventoried anthropogenic source categories: (1) "Fuel combustion," which includes emissions from coal-, gas-, and oil-fired power plants and industrial, commercial, and institutional sources, as well as residential heaters and boilers; (2) "Other sources," which includes chemical production and petroleum refining; (3) "On-road vehicles," which includes cars, trucks, buses, and motorcycles; (4) "Nonroad vehicles and engines," (i.e., piston-engine aircraft in the case of lead but other nonroad sources typically inventoried include farm and construction equipment, lawnmowers, chainsaws, boats, ships, snowmobiles and others); and (5) "Metals industrial processing." Since metals processing is one of the largest sources of lead emissions, the indicator includes a metals source category in addition to the four categories presented in the other emissions indicators.

For the years 1970 through 1985, the primary source for lead emissions data was the National Emissions Data System (NEDS) archives. Since 1990, lead emissions data have been tracked by the National Emissions Inventory (NEI). The NEI is a composite of data from many different sources, including industry and numerous state, tribal, and local agencies. Different data sources use different data collection methods, and many of the emissions data are based on estimates rather than actual measurements. For most industrial processes and fuel combustion sources, emissions are estimated using emission factors. Emissions from on-road and nonroad sources were estimated using EPA-approved modeling approaches (U.S. EPA, 2008).

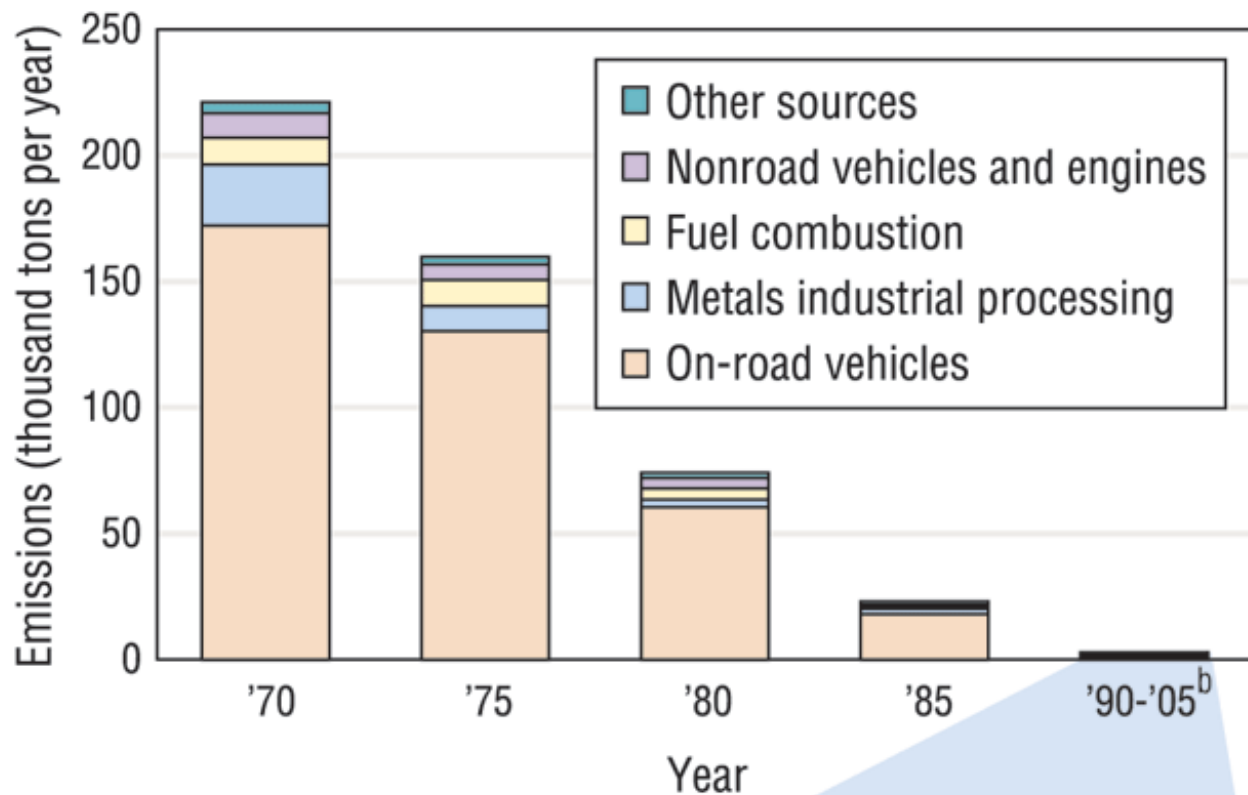
Data for lead emissions cover all 50 states and their counties, D.C., the U.S. territories of Puerto Rico and Virgin Islands, and some of the territories of federally recognized American Indian nations.

What The Data Show

Between 1970 and 2005, estimated nationwide lead emissions decreased by 99 percent (220,000 tons), mostly due to elimination of lead from gasoline for on-road vehicles (Exhibit 2-5). Since 1990, further declines in lead emissions occurred until 1996 at which time lead was no longer added

to fuel for on-road vehicles. Sharp declines in nationwide air concentrations of lead between 1980 and 1990 paralleled the emissions reductions (the [Lead Concentrations indicator](#)).

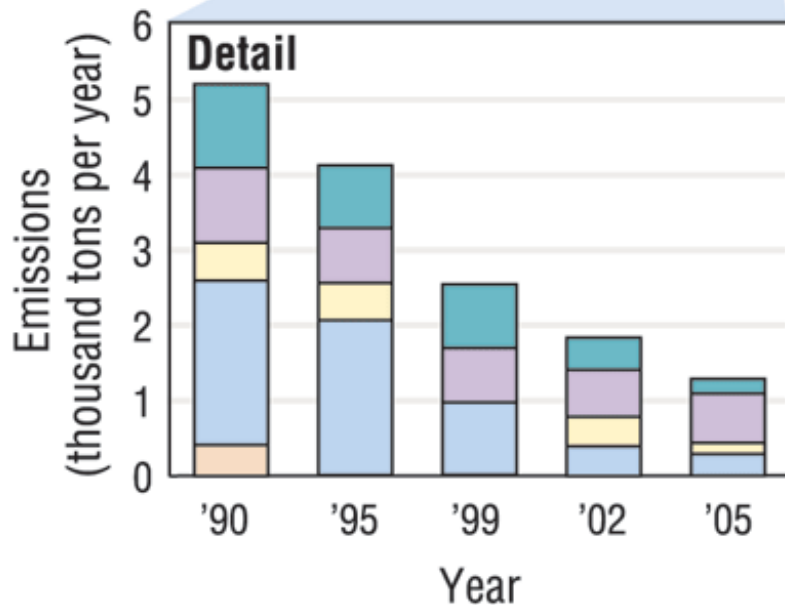
Exhibit 2-5. Lead emissions in the U.S. by source category, 1970-2005^a



^aEmissions inventory data are presented for years that allow reliable estimation of long-term trends.

^bData for 1990-2005 are calculated as the average annual emissions (thousand tons per year) for the inventory years 1990,

1995, 1999, 2002, and 2005 and are therefore comparable to the



annual emissions shown for the earlier years.

Data source: U.S. EPA, 2001, 2009

Limitations

- Although lead emissions trends have been generated using well-established estimation methods, the data reflect estimates based on empirical and engineering models and not actual measurement of lead emissions. These estimates have uncertainties inherent in the emission factors and emissions models used to represent sources for which emissions have not been directly measured.
- The method for estimating lead emissions for fuel combustion and industrial sources changed in 1999 to reduce uncertainties inherent in the previous method (U.S. EPA, 2003). Despite the change in methodology, the long-term trend is still reliable.
- Not all states and local agencies provide the same data or level of detail for a given year.

Data Sources

Summary data in this indicator were provided by EPA's Office of Air Quality Planning and Standards, based on biogenic and anthropogenic lead emissions data in the NEI. The most recent data are taken from Version 2.0 of the 2005 NEI (U.S. EPA, 2009). These and earlier emissions data can be accessed from EPA's emission inventory Web site (<http://www.epa.gov/ttn/chief/eiinformation.html>). The method used to calculate annual inventories for lead emissions from piston-engine aircraft are available at <http://www.epa.gov/otaq/aviation.htm>. This indicator aggregates NEI data by source type (anthropogenic or biogenic), source category, and EPA Region.

References

U.S. EPA (United States Environmental Protection Agency). 2009. Data from the National Emissions Inventory, Version 2.0. Accessed 2009 <http://www.epa.gov/ttn/chief/eiinformation.html>

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