

## Report on the Environment

<https://www.epa.gov/report-environment>

### Lead Concentrations

Lead is a naturally occurring metal found in small amounts in rock and soil. Despite steep decreases in emissions since 1970 (the [Lead Emissions indicator](#)), lead remains an important environmental health issue because low lead exposure can have adverse effects on the nervous systems of fetuses and young children (the [Blood Lead indicator](#)) (U.S. EPA, 2013). People can be exposed to lead by inhaling airborne particles that contain lead, drinking contaminated water, eating contaminated food items, or ingesting non-food items that contain lead, such as leaded paint chips and dust (U.S. EPA, 2013).

Lead has been used industrially in the production of gasoline, ceramic products, paints, metal alloys, batteries, and solder. Emissions to ambient air and associated air lead concentrations have declined substantially over the past several decades (U.S. EPA, 2013). The most dramatic reductions in lead emissions occurred prior to 1990 in the transportation sector due to the removal of lead from gasoline used in on-road vehicles (the [Lead Emissions indicator](#)). The majority of lead emissions nationally is associated with combustion of leaded aviation gasoline by piston-driven aircraft. The largest sources on a local scale and the areas of highest concentrations in outdoor air are generally associated with metals industries (U.S. EPA, 2014).

This indicator presents ambient lead concentrations in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) from 2010 to 2021. Trends for this indicator are based on measurements made at 92 monitoring stations in 47 counties nationwide. These trend sites were selected because they are part of the State and Local Air Monitoring Stations network or are special purpose monitors and they have consistently measured ambient air concentrations of lead over the entire period of interest. Reported values are annual maximum 3-month averages. This indicator's exhibits display the 2008 lead National Ambient Air Quality Standard (NAAQS) as a point of reference, but the fact that the average national lead concentrations fall below the standard does not mean that all monitoring sites also are below the standard.

### What the Data Show

Between 2010 and 2021, average lead concentrations decreased 85 percent nationally (Exhibit 1). This decrease occurred mostly from 2010 to 2015, followed by a period of slight reduction from 2015 to 2021. In addition, of the 92 sites used to determine this trend (out of 114 total monitoring sites that were operating in 2021), the number reporting annual maximum 3-month average lead concentrations above the level of the 2008 NAAQS ( $0.15 \mu\text{g}/\text{m}^3$ ) declined from 32 to two between 2010 and 2021 (Exhibit 2).

Also shown in Exhibit 1 are the 90<sup>th</sup> and 10<sup>th</sup> percentiles based on the distribution of annual statistics at the monitoring sites. This provides additional graphical representation of the distribution of measured concentrations across the monitoring sites for a given year. Thus, the exhibit displays the concentration range where 80 percent of measured values occurred for each year.

### Limitations

- The nationwide trends might not accurately reflect conditions outside the immediate areas of the trend monitoring sites. In addition, the 92 trend sites in this indicator are not dispersed uniformly across all states in the EPA Regions. The 92 trend sites are located in 19 states. In the remaining 31 states, there currently are insufficient long-term data from the existing monitoring sites to include in this indicator.
- To ensure that long-term trends are based on a consistent set of monitoring sites, selection criteria were applied to identify the subset of lead monitoring sites with sufficient data to assess trends since 2010. Monitoring sites without sufficient data are not included in the trend analysis. Some excluded monitoring sites reported lead concentrations above the level of the lead standard over the time frame covered by this indicator. In 2021, for example, three monitoring sites measured 3-month average lead concentrations above the level of the 2008 NAAQS: one of these sites is not shown in Exhibit 2 because it did not have sufficient long-term data to be considered a trend site for this indicator.

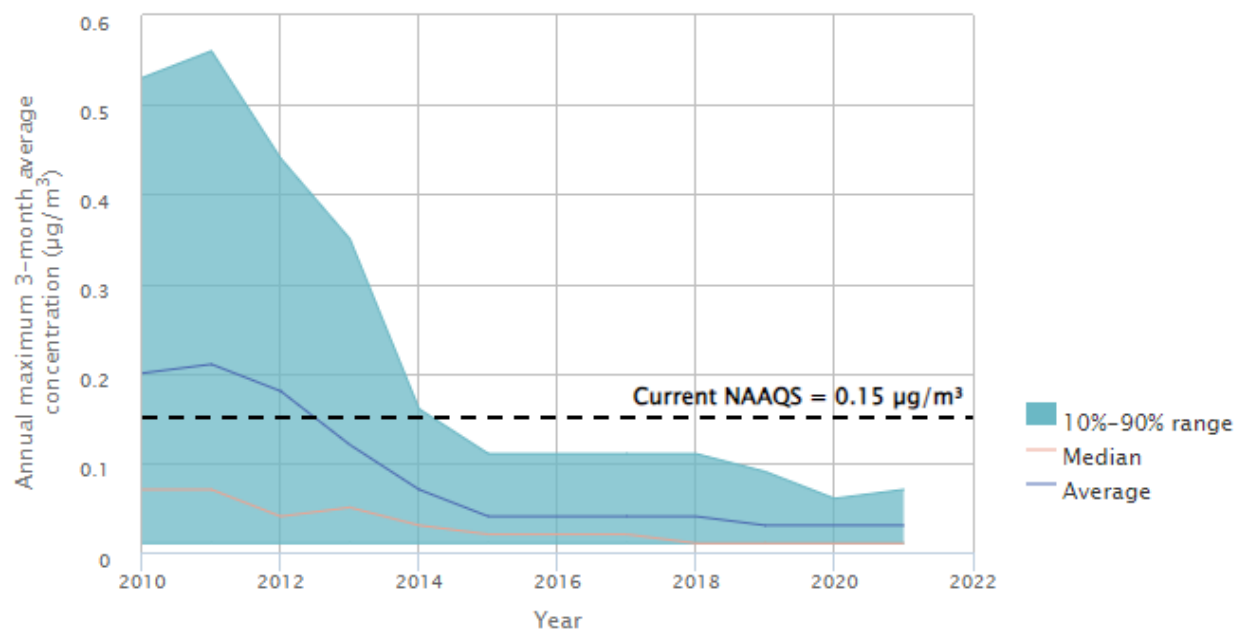
## Data Sources

Summary data in this indicator were downloaded from EPA’s National Air Quality: Status and Trends of Key Air Pollutants website (U.S. EPA, 2022a) (<https://www.epa.gov/air-trends>). The summary data are based on lead ambient air monitoring data in EPA’s Air Quality System. National trends in this indicator are based on the subset of lead monitoring stations that have sufficient data to assess trends since 2010.

## References

- U.S. EPA (United States Environmental Protection Agency). 2022a. Data from the National Air Quality: Status and Trends of Key Air Pollutants website. Accessed 2022. <https://www.epa.gov/air-trends>.
- U.S. EPA. 2022b. History of the national ambient air quality standards for lead. Accessed 2022. [https://www3.epa.gov/ttn/naaqs/standards/pb/s\\_pb\\_history.html](https://www3.epa.gov/ttn/naaqs/standards/pb/s_pb_history.html).
- U.S. EPA. 2014. Policy assessment for the review of the lead National Ambient Air Quality Standards. EPA-452/R-14-001. Research Triangle Park, NC. [https://www3.epa.gov/ttn/naaqs/standards/pb/data/140501\\_pa\\_pb\\_fin.pdf](https://www3.epa.gov/ttn/naaqs/standards/pb/data/140501_pa_pb_fin.pdf) (PDF) (304 pp, 2.3MB).
- U.S. EPA. 2013. Integrated science assessment for lead. EPA/600/R-10/075F. Research Triangle Park, NC. <https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=255721>.
- U.S. EPA. 2003. National air quality and emissions trends report—2003 special studies edition. EPA 454/R-03-005. Research Triangle Park, NC. <https://nepis.epa.gov/Exe/ZyPDF.cgi/0000335Q.PDF?Dockkey=0000335Q.pdf> (PDF) (277 pp, 10.5MB).

## Exhibit 1. Ambient 3-month lead concentrations in the U.S., 2010–2021



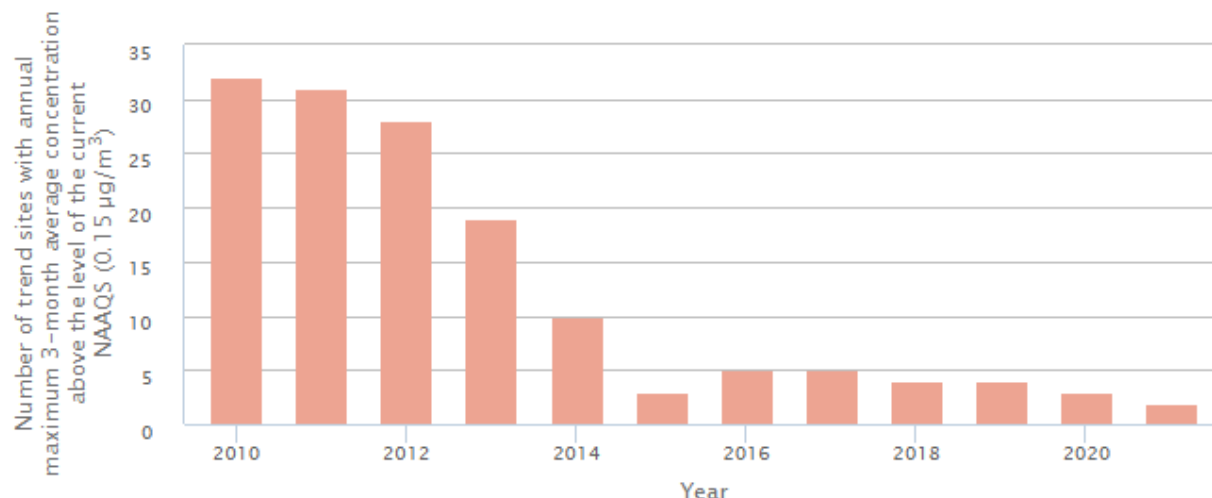
The current lead NAAQS was established in 2008 and is shown to provide context for the magnitude of pollutant concentrations. It is more stringent than all previous lead NAAQS (e.g., the concentration levels for the previous lead NAAQS are higher) (U.S. EPA, 2022b).

**Coverage:** 92 monitoring sites in 47 counties nationwide (out of a total of 114 sites measuring lead in 2021) that have sufficient data to assess lead trends since 2010.

Analysis shows that these trends are statistically significant. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** U.S. EPA, 2022a

## Exhibit 2. Ambient 3-month lead concentrations above the level of the current NAAQS in the U.S., 2010–2021



The current lead NAAQS was established in 2008 and is shown to provide context for the magnitude of pollutant concentrations. It is more stringent than all previous lead NAAQS (e.g., the concentration levels for the previous lead NAAQS are higher) (U.S. EPA, 2022b).

**Coverage:** 92 monitoring sites in 47 counties nationwide (out of a total of 114 sites measuring lead in 2021) that have sufficient data to assess lead trends since 2010.

Information on the statistical significance of the trends in this exhibit is not currently available. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

**Data source:** U.S. EPA, 2022a