

# Technical Update: Reports on the Impact of Lead Emissions from Piston-Engine Aircraft on Air Quality Near U.S. Airports

The Environmental Protection Agency (EPA) released two technical reports that provide information relevant to evaluating the impact of piston-engine aircraft operating on leaded fuel on air quality at and around U.S. airports. Piston-engine aircraft are typically small planes that carry between 2 and 10 passengers. This fact sheet provides information, background and a summary of these reports.

## Background

In December 2018, the President's Task Force on Environmental Health Risks and Safety Risks to Children issued a [Federal Action Plan to Reduce Childhood Lead Exposures and Associated Health Impacts](#) to focus action on the key sources of lead exposure for children including lead-based paint, lead-contaminated drinking water and lead-contaminated soil. In addition, because lead exposure can result from multiple sources, the Federal Action Plan describes additional actions to assess other sources of lead, including lead emitted to air.

The United States has made enormous progress in reducing lead emissions. Between 1980 and 2018 air lead concentrations have decreased by 99 percent.<sup>1</sup> The highest remaining air concentrations of lead in the United States are currently found near smelting operations, such as battery recycling facilities and other metal processing facilities. However, piston-engine aircraft operating on leaded fuel are the largest remaining aggregate source of lead emissions to air in the country. Because of this, EPA has committed to evaluate the impact of these lead emissions on air quality at the 13,000 airports where piston-engine aircraft operate.

<sup>1</sup> [www.epa.gov/air-trends/lead-trends](http://www.epa.gov/air-trends/lead-trends)

## Lead Emissions from Piston-Engine Aircraft and Air Quality

EPA's modeling and monitoring data indicate that lead concentrations at and near airports are typically well below the National Ambient Air Quality Standard for lead (lead NAAQS).<sup>2</sup> Among the more active airports in the United States, there are a few where lead concentrations may be above the lead NAAQS, in very close proximity to where aircraft conduct pre-flight engine checks. For the vast majority of airports, these small areas with lead concentrations potentially above the air standard are within the fence line of the airport and not accessible to the public, in all but a few instances. Lead levels dissipate quickly with distance from piston-engine aircraft exhaust. Thus, within 50 meters of the high concentration area, lead levels were uniformly below the lead air standard.

EPA is concerned about all potential sources of lead exposure, including these low concentrations in air from piston-engine aircraft, and there are actions that can and are being taken to reduce lead from this source. These actions include making unleaded fuel available and taking steps to mitigate the potential for elevated lead levels beyond airport property. The Federal Aviation Administration (FAA) shares EPA's concerns about lead emissions from piston-engine aircraft, and FAA has a program underway to identify unleaded alternatives for the fleet of piston-engine aircraft.<sup>3</sup> EPA recognizes the need for continued effort to further reduce lead exposure, especially for children, due to the potential impact of multiple sources of lead.

The two reports summarized below add to the literature available to characterize the impact of leaded aviation gasoline on air quality at and around airports in the U.S.

### Key Points about the Technical Reports

- The two reports are based on the best available, recent data, and use sound analytical methods, but they do not draw definitive conclusions about actual lead levels or risk and should not be used to evaluate attainment of the lead NAAQS.
- The reports describe screening analyses, which are routinely used by the Agency as initial assessments of potential health and environmental issues. The reports add to the literature available to characterize the impact of leaded aviation gasoline on air quality at and around airports in the United States.
- The reports will be used by the National Academy of Sciences as part of its requirement to provide a report to Congress that assesses the air quality impact of lead emitted by piston-engine aircraft.

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<sup>2</sup> [www.epa.gov/regulations-emissions-vehicles-and-engines/airport-lead-monitoring-and-modeling](http://www.epa.gov/regulations-emissions-vehicles-and-engines/airport-lead-monitoring-and-modeling)

<sup>3</sup> [www.faa.gov/about/initiatives/avgas/](http://www.faa.gov/about/initiatives/avgas/)

## **Summary: Model-extrapolated Estimates of Airborne Lead Concentrations at U.S. Airports**

The report titled, “Model-extrapolated Estimates of Airborne Lead Concentrations at U.S. Airports” was developed to provide estimated ranges of lead concentrations that may occur at and near airports where leaded aviation gas is used. The study extrapolated modeling results to estimate air lead concentrations at the “maximum impact area” for over 13,000 U.S. airports. The “maximum impact area” is the assigned area at the end of the runway where pilots are required to conduct safety checks with engines running just prior to takeoff. This area is expected to have the highest concentration of lead in air, and in fact air monitoring has reported concentrations of lead above the lead NAAQS near this location at some airports. The model-extrapolated lead estimates in this study indicate that some additional U.S. airports may have air lead concentrations above the NAAQS at this area of maximum impact. The report also shows that estimated lead concentrations decrease to below the standard within 50 meters from the area of highest concentration. Estimated lead concentrations from this study should not be used to directly evaluate attainment of the lead NAAQS.

## **Summary: National Analysis of the Populations Residing Near or Attending School Near U.S. Airports**

The second report, titled “National Analysis of the Populations Residing Near or Attending School Near U.S. Airports,” was designed to provide an initial, national-scale understanding of the number of people who live or attend school within 500 meters (one half kilometer) of airport runways. This report found that approximately 5 million people live, and 163,000 children attend schools, within 500 meters of an airport runway. This report does not assess the risk or characterize air lead concentrations for this population.

### **Lead and Health**

- Lead exposure to children can result from multiple sources and can cause irreversible and life-long health effects. No safe blood lead level in children has been identified. Even low levels of lead in blood have been shown to affect IQ, ability to pay attention and academic achievement.
- In adults, health effects from lead exposure can include cardiovascular effects, increased blood pressure and incidence of hypertension, decreased kidney function, and reproductive issues (in both women and men).
- EPA is concerned about aggregate exposures from all sources of lead, especially given the persistence of lead in the environment. The information about aircraft lead provided by these reports can help guide efforts to reduce potential exposure to this source.

## Next Steps

- EPA will provide opportunities for follow-up with State, local and tribal governments; community organizations; and other stakeholders, as needed.
- EPA will continue to conduct outreach to help individual airports and the communities near them understand what this information means at the local level.
- There are steps that can be and have been taken at airports to minimize the potential for exposure to lead emissions.
- EPA will be working with airports and local air agencies, as requested, to evaluate on a case by case basis whether further assessment of exposure and risk is needed, and if appropriate, mitigation measures that could be considered.
- The Federal Aviation Administration (FAA) is actively working to identify unleaded fuels for use in piston-engine aircraft. The reduction or removal of lead from this fuel is under FAA's authority.

## For More Information

The reports summarized in this fact sheet may be found here:

[www.epa.gov/regulations-emissions-vehicles-and-engines/airport-lead-monitoring-and-modeling](http://www.epa.gov/regulations-emissions-vehicles-and-engines/airport-lead-monitoring-and-modeling)

Information on the Federal lead action plan may be found here:

[www.epa.gov/lead/federal-action-plan-reduce-childhood-lead-exposure](http://www.epa.gov/lead/federal-action-plan-reduce-childhood-lead-exposure)

Information about the health effects of lead may be found here:

[www.epa.gov/isa/integrated-science-assessment-isa-lead](http://www.epa.gov/isa/integrated-science-assessment-isa-lead)

Information on the Federal Aviation Administration's Piston Aviation Fuels Initiative may be found here:

[www.faa.gov/about/initiatives/avgas/](http://www.faa.gov/about/initiatives/avgas/)

For further information about these reports please contact Marion Hoyer, U.S. EPA, Office of Transportation and Air Quality, at:

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