

Regulatory Brief

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The issues

Increasing global environmental issues and dwindling global market demand for gasoline containing lead have raised concerns regarding the continued use of avgas (100LL) by general aviation (GA) aircraft.

Background

Congress enacted the Clean Air Act of 1970 and shortly after created the Environmental Protection Agency (EPA). In 1978 the EPA established a National Ambient Air Quality Standard for lead. Thirty-five years ago, cars and trucks were the major contributors of lead emissions to the air. In the 1970s, EPA set national regulations to gradually reduce the lead content in gasoline. By 1996, EPA promulgated regulations that banned the use of leaded gasoline in highway vehicles. As a result, emissions of lead from the transportation sector have dramatically declined (96 percent between 1980 and 2005). The addition of lead to fuel used in piston-engine powered aircraft was not banned in this action, and the use of leaded avgas is now the largest source category of lead emissions.

Piston engine aircraft include a diverse set of aircraft types and engine models and are used in a wide variety of applications. Lead is added to fuel for piston engine aircraft in the form of tetraethyl lead (TEL). This lead additive helps boost fuel octane, prevents knock, and prevents valve seat recession and subsequent loss of compression for engines without hardened valves. There are two main types of leaded avgas: 100 Octane, which can contain up to 4.24 grams of lead per gallon; and 100 Octane Low Lead (100 LL), which can contain up to 2.12 grams of lead per gallon. The use of 100 octane avgas continued in piston-engine aircraft until the early 1970s when 100LL became the dominant leaded fuel in use. Currently, 100LL is the most commonly available and most commonly used type of avgas. Very little 100 Octane is supplied in the U.S.

- October 2006 - Since no regulation to eliminate lead from general aviation aircraft had been promulgated, the environmental advocacy organization, The Friends of the Earth (FOE), formally petitioned for rulemaking by the EPA to limit lead emissions from general aviation aircraft. [Friends of the Earth Petition](#)
- December 2007 - The EPA published a [Notice of Proposed Rulemaking \(NPR\) regarding the National Ambient Air Quality Standards \(NAAQS\) for Lead NPRM](#) and requested public comment on the proposed rulemaking.
- June 2008 - At a public hearing hosted by the EPA, [AOPA testified to the importance of leaded aviation fuel](#). AOPA testified that changes to the NAAQS for lead could impact the amount or type of fuel used in general aviation aircraft and stated that any change in the aviation fuel standard would have a direct impact on the safety of flight and the future of light aircraft in this country. Also in 2008, AOPA filed [official comments](#) to the EPA's NPR.
- October 2008 - Following up on the Notice of Proposed Rulemaking (NPR), the EPA announced that it had strengthened the [National Ambient Air Quality Standards \(NAAQS\) for lead](#) for the first time since 1978. The new standard lowered the NAAQS for lead by a factor of 10. This change set into motion a multi-year effort requiring state and local governments to ensure they meet new standards by 2017. (See also: [Lead Emissions from the Use of Leaded Aviation Gasoline in the United States Technical Support Document](#))
- February 2010 - The EPA published the document "[Development and Evaluation of an Air Quality Modeling Approach for Lead Emissions from Piston-Engine Aircraft Operating on Leaded Aviation Gasoline](#)" in preparation for their upcoming Advanced Notice of Proposed Rulemaking on Lead Emissions from Piston-Engine Aircraft using Leaded Aviation Gasoline.

- April 28, 2010 - [The EPA filed their "Advance Notice of Proposed Rulemaking on Lead Emissions from Piston-Engine Aircraft Using Leaded Aviation Gasoline"](#). The ANPR gives the GA community an opportunity to comment regarding data collection regarding lead and the possible new environmental standard.
- April 2010 – the EPA expanded on an earlier air quality study done in 2005 at the [Santa Monica airport](#). The current study focuses on air and soil lead levels around the airport.
- June 2010 – The Aircraft Owners and Pilots Association (AOPA), the Experimental Aircraft Association (EAA), the General Aviation Manufacturers Association (GAMA), the National Air Transportation Association (NATA), the National Business Aviation Association (NBAA), the American Petroleum Institute (API) and the National Petrochemical and Refiners Association (NPRA) together representing General Aviation aircraft owners, operators, and manufacturers and the oil and natural gas industry, producers, refiners and distributors of aviation gasoline (avgas) submitted a joint letter requesting an extension to the ANPR comment period.
- June 24, 2010 - EPA published an [extension to the comment period](#) for the ANPR

While past airport air quality studies show that the lead levels around most airports are under the limit set by the NAAQs, changes to the NAAQs standard highlight the important of industry's research into a suitable replacement unleaded avgas.

The importance to our members

Three-fourths of the U.S. fleet—167,000 of the 220,000 aircraft—are piston-powered aircraft certified to fly on leaded fuel. Lead boosts the octane of the fuel used in piston-powered aircraft, thus protecting aircraft engines against early detonation, which can cause an engine to literally tear itself apart during operation. High performance engines are especially susceptible to early detonation / knock. It is estimated that 30% of the piston fleet are the high performance engines that would be most affected by a move to an unleaded fuel and that this 30% of the fleet burns approximately 70% of the total fuel used by General Aviation.

The past 20 years of research has been focused on finding a suitable replacement for 100LL. At present there is no viable, drop-in replacement for 100LL. And although several different companies will continue research toward this goal, we are now in a situation where we can no longer hold off regulation while waiting for such a fuel.

It is important that we consider all aspects of an alternative as we move towards a future unleaded fuel. This future fuel must meet the safety and performance needs of all general aviation aircraft (high and low compression engines). Also, manufacturers must be able to produce and distribute the product at a reasonable cost.

AOPA's position

The ANPR gives the GA community an opportunity to comment regarding the possible new environmental standard and the development of a plan for identifying, evaluating, and ultimately transitioning to an unleaded fuel. This is particularly important given the technical complexity and safety implications of removing lead from aviation gasoline. Currently there is no high-octane replacement unleaded avgas available that has been approved and meets the requirements of the entire GA fleet.

Aircraft Owners and Pilots Association (AOPA), Experimental Aviation Association (EAA), General Aviation Manufacturers Association (GAMA), National Air Transportation Association (NATA), and the National Business Aviation Association (NBAA) among others will be continuing their work with the EPA and the FAA on establishing a realistic standard to reduce lead emissions from GA aircraft along a transition timeline which balances environmental benefit with aviation safety, technical feasibility and economic impact upon the GA industry.

Status

AOPA along with the other organizations listed above have joined together as the General Aviation Avgas Coalition in order to assure safety, minimize impact on existing fleet, and ensure sustainability and growth of General Aviation as we move forward in the process to identify and transition to an unleaded avgas.

In order to achieve these goals the coalition:

- Has been educating the EPA on complexity of this issue, safety concerns, economic impacts, etc.
- Worked with the EPA in order to secure the extension to ANPR comment period
- Continue to emphasize need for FAA leadership
- Continues to address questions
- Continues to highlights the need for more data and analysis
- Continues to provide more information on safety and economic impacts

- Has presented a plan for transition with short term and long term strategies for reducing and ultimately eliminating the TEL content in avgas

Is continuing to work in partnership with FAA:

- Staying in direct dialogue with the Administrator and senior staff
- Focusing attention to the issues involved in certification, funding, and staffing
- R&D support through FAA tech center activity

Have conducted several briefings for congressional legislators and their staff resulting in:

- Support for extension of the ANPR comment period
- Congressional interest in FAA reauthorization and appropriations activities related to identifying an alternative avgas
- Work towards the appropriation of an additional \$2M in the FAA's 2011 research and development budget specifically intended for avgas

July 2010 - The EPA publically addressed concerns posed to the Agency by AOPA and the GA Avgas Coalition. They stated in no uncertain terms that there is no date by which lead is banned from avgas and that they will work closely with the FAA and industry stakeholders to on issues associated with potential future emission standards.

- The ANPRM provides a comment period for industry and the public from the date it was published in the *Federal Register*. (Final comments are due August 27, 2010)
- AOPA is participating as a full member of both the [Coordinating Research Council](#) (CRC) and the [American Society of Testing and Materials](#) (ASTM).
- Research and development is continuing under the auspices of the CRC where matrices of test blends of potential aviation ultra low lead and unleaded fuels are being examined.