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LOOKING BEYOND LEAD: DEVELOPMENTS IN FEDERAL REGULATION OF AVGAS LEAD EMISSIONS

In a letter dated October 23, 2012, U.S. Representative Henry A. Waxman wrote to the Federal Aviation Administration ("FAA") Acting Administrator Michael P. Huerta urging him to accelerate measures to increase the use of unleaded substitutes for aviation gasoline ("avgas").[1] Among other things, Representative Waxman criticized the 11-year timeline proposed in a recent FAA report for phase-in of an unleaded "drop-in" replacement for avgas. His letter marks the most recent volley in a long-running debate about how the federal government should balance and reconcile the needs of aviation safety and environmental protection. In this *Commentary*, we provide an overview of the current regulatory framework, recent developments, and technical challenges in this area.

LEAD EMISSIONS AND AIRCRAFT

Since the 1920s, avgas containing lead additive has been used to power piston-engine aircraft. Most piston-engine aircraft must use avgas to run safely. Avgas ignites at a lower temperature than jet fuel, making it susceptible to uncontrolled combustion known as "detonation." Detonation can cause engine damage and, ultimately, result in engine failure. Fuel manufacturers add compounds such as tetraethyl lead ("TEL") to avgas to prevent detonation.

There are approximately 167,000 piston-engine aircraft certified to use leaded avgas in the U.S. general aviation ("GA") fleet. These aircraft constitute 73 percent of the U.S. GA fleet.[2] There are approximately another 230,000 such aircraft outside of the United States. In contrast to piston-powered aircraft, nearly all high-performance commercial, military, and corporate jet aircraft are powered by turbine engines that use jet fuel, which ignites at higher temperatures than avgas and does not require lead additives.

U.S. AVGAS DEVELOPMENTS AND OPPOSITION TO LEADED AVGAS

Most internal combustion engines do not require leaded gasoline. The 1990 Amendments to the Clean

Air Act ("CAA") phased out the use of lead additives to gasoline for motor vehicles but did not phase out leaded avgas for aircraft. Federal regulators have continued to permit the lead additive TEL for aircraft because of its unique properties that prevent harmful detonation and because of continuing technical challenges in identifying an acceptable substitute for TEL.

While leaded avgas has important safety performance characteristics for aircraft, environmental groups and health advocates have sought to end its use. They contend that the lead in emissions from piston-engine aircraft poses a health threat to individuals living in close proximity to certain U.S. airports. Representative Waxman echoed many of their concerns in his October 23rd letter.

Recent developments at the Environmental Protection Agency ("EPA") and the FAA highlight key issues facing the continued use of avgas. Multiple regulatory, technical, and economic hurdles have hindered efforts to transition from avgas to an unleaded alternative.

EPA REGULATION OF LEAD EMISSIONS AND AIRCRAFT

The CAA grants the EPA authority to regulate lead emissions from certain sources. Under each section authorizing regulation of specific sources, the EPA must undergo a process of evaluation before issuing regulations upon that source. Section 231(a)(2)(A) of the CAA specifically authorizes the EPA to determine if emissions from aircraft cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare. If the EPA Administrator formally determines that a pollutant emitted from aircraft causes or contributes to air pollution to the detriment of public health or welfare, the determination is an "endangerment finding" as to that specific pollutant for aircraft emissions. Upon the issuance of an endangerment finding for a pollutant from aircraft emissions, the CAA in section 231(a)(2)-(3) requires that the EPA, in consultation with the FAA, develop emission standards for aircraft engines as to the target pollutant. In setting the standards, the agencies must consider the cost of compliance within the period before the regulation takes effect.

After the EPA establishes appropriate emissions standards, the CAA requires the Secretary of Transportation, as the Cabinet official with authority over the FAA and other transportation-related agencies, to enforce the emission standards through regulations aimed at achieving compliance with the standard. In addition, 49 U.S.C. § 44174 requires the FAA to mandate standards "for the composition or chemical or physical properties of an aircraft fuel or additive to control or eliminate" the targeted pollutant of an EPA emissions endangerment finding.

General EPA Lead Emission Regulation. EPA regulation of lead emissions extends beyond aircraft emissions. In addition to specific sources of lead emissions such as automobiles and factories, the EPA also regulates general ambient air concentrations of lead through the National Ambient Air Quality Standards ("NAAQS"). Under a regulation issued in 2010,[3] the EPA monitors lead levels at all airports with lead emissions exceeding 1 ton per year, and, in addition, the EPA required states to monitor certain airports with ½ to 1 ton per year of lead emissions as a part of a nationwide study.[4] The compliance attainment date for meeting the new NAAQS lead standard is 2015–2016.[5] Even though the CAA requires states to attain the NAAQS for lead, the CAA precludes states from direct regulation of GA emissions.[6] Although the ambient levels of lead at airports are potentially affected by GA aircraft emissions, the EPA may not regulate lead from aircraft emissions unless the agency first makes an endangerment finding for such aircraft lead emissions.

Suit Against EPA for Not Regulating Lead Emissions from Piston-Engine Aircraft. Environmental groups have actively sought to change the regulation of aircraft emissions. In 2006, the group Friends of the Earth ("FOE") submitted a petition for rulemaking to the EPA seeking regulation of lead emissions from piston-engine aircraft. In April 2010, the EPA issued advanced notice of proposed rulemaking in response to the petition.[7] In the intervening years, the EPA has been conducting monitoring studies and increased the stringency of NAAQS for lead, but it has not proposed a regulation in regard to piston-engine lead emissions. In March 2012, the FOE filed suit against the EPA alleging that the agency failed to give an adequate response to the group's 2006 petition.[8] FOE seeks to compel an endangerment

finding for GA lead emissions and is pressing for leaded avgas to be phased out in the near future.

In July 2012, the EPA denied FOE's petition. The agency explained that although it was not "issuing a judgment on whether lead emissions from piston-engine GA aircraft cause or contribute to air pollution which may be reasonably anticipated to endanger public health,"[9] the agency does plan to evaluate basic factual information about lead levels, develop more rigorous modeling, and conduct risk assessment in preparation for a possible endangerment finding proceeding. The District Court for the District of Columbia recently upheld EPA's authority to refrain from making this endangerment finding at this time.[10] The EPA plans to commence a rulemaking but had not announced initiation of proceedings as of December 2012.

FAA REGULATION OF LEAD IN AVGAS

The FAA does not directly regulate aircraft emissions. As noted earlier, the EPA has jurisdiction over aircraft emission standards. The FAA instead regulates aviation fuels indirectly through its design approval and airworthiness certification processes. The agency relies heavily on ASTM International, a developer of international technical consensus standards, which defines and establishes the specifications for aviation fuels known as the ASTM fuel specifications. Two ASTM fuel specifications have prevailed globally: ASTM D1655 for jet fuel and ASTM 910 for avgas. The FAA undertakes independent testing of any new fuel type, including those for which ASTM may have issued a specification. This testing is rigorous and replicates many of the processes undertaken by ASTM.

Type certification of aircraft and airworthiness certification are required for nearly every aircraft with the narrow exceptions of certain recreational and experimental aircraft. Aircraft and engine manufacturers must identify the fuel specification for their products in the course of obtaining FAA type certification. The fuel specification becomes part of the operating limitations in the aircraft flight manual with which operators must comply.[11] Any change to fuel type requires recertification of an aircraft. In addition to a type certificate that evidences FAA approval of the aircraft or engine design, each individual aircraft also must have a separate FAA airworthiness certificate that evidences that the specific aircraft conforms to its approved design and is in safe condition for flight. The implication of this certification framework process is that a change in fuel type for either a fleet of an aircraft type or simply an individual aircraft requires FAA approval and recertification.

FAA Avgas Developments. The FAA is actively facilitating the development of unleaded alternatives to avgas. In January 2011, the agency convened the Unleaded Avgas Transition Aviation Rulemaking Committee ("UAT ARC") comprising government and industry representatives. The UAT ARC gathered input from stakeholders to investigate, prioritize, and summarize the current issues relating to transition to an unleaded fuel option. In February 2012, the UAT ARC issued a report that, among other things, summarizes the challenges facing the GA industry in transitioning to unleaded fuel and makes broad recommendations to the FAA to address these challenges.[12]

The fundamental challenge identified by UAT ARC and GA interests is that no single alternative has emerged as a drop-in substitute for avgas. Transition to a drop-in avgas replacement faces two basic obstacles: (i) technical hurdles to fuel replacement in existing aircraft and (ii) systematic limitations in the current regulatory structure. The technical hurdle is that no formulation of unleaded avgas meets the performance requirements of the leaded avgas formulations for which the GA fleet is certified. ASTM has certified unleaded alternatives to avgas, but while these formulations may achieve a certain anti-knock capability or octane number, they do not support equivalent engine performance as the leaded variation with the same ratings. Because a single drop-in substitute for avgas does not yet exist, many GA aircraft and engines would require significant physical modifications or changes in operating limitations such as maximum payload capacity unique to each unleaded fuel blend in order to meet FAA safety and performance standards.

The UAT ARC also identified market and economic hurdles to an avgas transition from leaded to unleaded. Market forces alone are insufficient to drive replacement of avgas with an unleaded alternative. The avgas market has contracted in recent years, leaving little incentive

for manufacturers of aviation fuels to invest in research for unleaded replacements. Additionally, uncertainty about future avgas regulation suppresses the purchase of new GA aircraft, modifications of existing aircraft, and aircraft sales. The UAT ARC report also notes that liability concerns may impede stakeholders like manufacturers of aircraft and engines from full participation in efforts to replace avgas.

To overcome these and other challenges, the committee made five key recommendations to the FAA:

1. Implementation of a "road map" marked with specific attainment goals necessary for fuel transition;
2. Centralization of unleaded alternative fuels testing;
3. Development of an unleaded fuel selection process;
4. Establishment of a centralized certification office; and
5. Development and implementation of a government–industry partnership to achieve the other recommendations.[13]

AVGAS REGULATORY DEVELOPMENTS AND TRANSITION CHALLENGES

The FAA has taken other steps this year to facilitate the development of an unleaded alternative to avgas. In June 2012, the FAA announced its commitment to approving an unleaded avgas alternative by 2018.[14] In October, the FAA unveiled the newly created Fuels Program Office (AIR-20) to carry out the UAT ARC report recommendations and to aid its efforts in replacing current leaded avgas with an alternative fuel by 2018. The FAA designed the office to oversee application of regulation and policy in fuels certification projects for the existing fleet and to aggregate avgas fuel-related regulatory and technical expertise. The office may also eventually streamline the regulatory process by enabling applicants for both design and airworthiness approvals related to fuel transition to interact primarily with the Fuels Program Office rather than multiple FAA offices.

STATE LAW: CALIFORNIA'S PROPOSITION 65

Avgas has been the subject of legal action under California state law. Proposition 65, adopted by a 1986 ballot initiative, requires businesses to provide a "clear and reasonable" warning before exposing persons in California to a chemical listed by the state as a carcinogen or reproductive toxin. The state has listed lead as both. Proposition 65 may be privately enforced. In May 2011, the Oakland-based Center for Environmental Health ("CEH") issued Notices of Violation to multiple fixed-base operators, as well as manufacturers and distributors of avgas, alleging they had violated the warning requirement. CEH thereafter filed suit in California state court, seeking an order requiring warnings, civil penalties, and attorneys' fees. The case is still pending.

INTERNATIONAL COMPATIBILITY

In addition to costly replication of research and testing, transition to an unleaded fuel may present challenges to GA aircraft travelling across international borders. If the avgas replacement requires engine or aircraft modifications, aircraft based outside of the U.S. may no longer be able to fly to and from the United States. Similarly, U.S.-certified GA aircraft that may have been modified for an unleaded fuel may be confined to U.S. airspace for lack of suitable fuel supplies elsewhere.

PRODUCTION AND DISTRIBUTION CHALLENGES

Production and distribution issues may further complicate the transition to unleaded aviation gas. Current production and distribution segregate avgas from other petroleum products.[15] Depending on the composition of the replacements for leaded avgas, suppliers and airports may find it difficult to meet demand for specific fuel types. Without knowing replacement fuels' compatibility with the existing fleet and infrastructure, future impacts to the production and distribution system are uncertain.

CONCLUSION

Overall, transition to an unleaded fuel will have multiple systemic impacts throughout the GA market and GA supply chains as well as the FAA regulatory structure. The UAT ARC group estimates that a transition to unleaded avgas will take more than 11 years and a combination of public and private funding totaling at least $71 million.[16]

The future of leaded aviation gas remains uncertain, but developments at federal agencies indicate that aircraft stakeholders must prepare for change.

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ENDNOTES

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2 Unleaded AVGAS Transition Aviation Rulemaking Committee, Federal Aviation Admin., *Findings and Recommendations Part I Body* at 8 (2012) [hereinafter UAT ARC Report], *available at* www.faa.gov/about/initiatives/avgas/archive/2012-10-05/.

3 Revisions to Lead Ambient Air Monitoring Requirements, 75 Fed. Reg. 81,126-81,138 (Dec. 27, 2010) (codified at 40 C.F.R. pt. 58).

4 *Id.*

5 EPA, *2008 Lead (Pb)National Ambient Air Quality Standards (NAAQS) Implementation Questions and Answers* (July 8, 2011), *available at* http://epa.gov/air/lead/pdfs/20110708QAguidance.pdf.

6 42 U.S.C. § 7573.

7 Advanced Notice of Proposed Rulemaking on Lead Emissions from Piston-engine Aircraft Using Leaded Aviation Gas, 75 Fed. Reg. 22,439 (Apr. 28, 2010), *available at* http://www.epa.gov/nonroad/aviation/420f10013.pdf.

8 EPA, *EPA Response Letter and Memorandum to the 2006 Petition From Friends of the Earth Regarding Lead Emissions from Piston-Engine Aircraft* (2012), *available at* http://www.epa.gov/otaq/regs/nonroad/aviation/ltr-response-av-ld-petition.pdf.

9 *Id.*

10 *Ctr. for Biological Diversity v. EPA*, No. 1:10-CV-985 (D.D.C. Nov. 1, 2012).

11 14 C.F.R. §§ 21.5, 21.15, & 91.9.

12 *UAT ARC Report.*

13 *Id.* at 10-11.

14 Alan Levin, *U.S. Pledges Substitute for Leaded Aviation Gas by 2018*, bloombergnews.com (June 28, 2012, 12:00 AM), *available at* http://www.bloomberg.com/news/2012-06-28/u-s-pledges-substitute-for-leaded-aviation-gas-by-2018.html.

15 *UAT ARC Report* at 35.

16 *Id.* at 10.