WSDOT Aviation Division: Aviation Fuel

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Outline

• General Aviation Aircraft Statistics
• Aviation Fuel for Discussion
• Why WSDOT is interested
• What the FAA is Doing
• Pilot Aviation Fuel Experiences and Needs
2013 GA Fixed Wing Aircraft in Service

- Experimental: 5%
- Piston: 78%
- TurboProp: 4%
- Light Sport: 13%

Source: GAMA 2013 Databook
GA Fixed Wing Aircraft in Service
1993-2033

Source: GAMA 2013 Databook
Aviation Fuel

- Jet-A
- 100LL
- MOGAS
- AVGAS Replacement
Why WSDOT is Interested

- Over the last decade General Aviation has shown a progressive decline in operations\(^1\).
- The largest segment of General Aviation activity is for personal recreation\(^1\).
- Pilots report fuel costs number one reason for not flying or flying less\(^2\).
- AVGAS prices have been steadily increasing over time\(^2\).

Sources:
1- MIT International Center for Air Transportation Study
2 - AOPA
What WSDOT is Doing

- WSDOT is exploring the availability and quality of MOGAS on airports.
  - The emergence of more experimental and light sport aircraft that are designed to use MOGAS rather than AVGAS.
  - Rising AVGAS prices
  - No-Lead replacement fuel prices expected to be higher than AVGAS prices
  - Outreach to Airport Sponsors and Pilots to understand the issues
  - Include MOGAS analysis in the upcoming System Plan study
  - Seek near-term opportunities for a pilot project

WSDOT supports the expansion of GA activity
What the FAA is Doing

• The FAA created the Fuels Program Office in August 2012.

• The UAT ARC is the Unleaded Aviation Gasoline (AVGAS) Transition Aviation Rulemaking Committee

• The UAT ARC is tasked with investigating the current issues relating to the transition to a replacement unleaded fuel and making recommendations to resolve them

Unleaded Aviation Gasoline Transition Aviation Rulemaking Committee (ARC) Membership

• FAA – Engine & Propeller Directorate, Aircraft Certification Service (Sponsor, Co-Chair, Fuels Specialist)
• FAA – Emission Division, Office of Environment and Energy
• FAA – Aviation Research & Technology Development Office, William J. Hughes Technical Center
• EPA – Environmental Protection Agency
• General Aviation Industry Engineering Consultant (Co-Chair)
• AOPA – Aircraft Owners and Pilots Association
• GAMA – General Aviation Manufacturers Association
• EAA – Experimental Aircraft Association
• Lycoming
• Teledyne Continental Motors
• Cirrus Aircraft
• Cessna Aircraft
• API – American Petroleum Institute
• Shell
• ExxonMobil
• NATA – National Air Transportation Association
• Swift Fuels
• GAMI – General Aviation Modifications, Inc.
• Clean 100 Coalition
UAT ARC – Issues Identified

• Ensure safety of existing fleet is maintained
  – Ensure the engine and aircraft meet all safety requirements when operating on known fuels
  – Require a separate analysis showing that each aircraft and engine complies with all airworthiness standards when operated on a new fuel

• Ensure market availability/viability
  – Other factors critical to determine whether a candidate unleaded fuel is a viable replacement for 100LL
    • Production and distribution infrastructure (ability to produce and distribute to over 5,000 airports in the U.S.)
    • Environmental and toxicological considerations
    • Cost to consumer
UAT-ARC Recommendations

- Develop a Fuel Roadmap
- Establish a centralized testing center to analyze candidate unleaded fuels
- Develop a solicitation and selection process for the centralized fuel testing program
- Establish an FAA centralized certification office with sufficient resources to administer the program
- Implement the Piston Aviation Fuels Initiative (PAFI)
Piston Aviation Fuels Initiative (PAFI)

Fleet wide approval is the PRIMARY GOAL OF PAFI

• Mission: Facilitate the development and deployment of an unleaded AVGAS with the least impact on the existing piston-engine aircraft fleet.

• Government and Industry collaboration to ensure all stakeholders are involved in a coordinated approach to fleet-wide implementation.

• Established to develop a path for identification, evaluation and fleet-wide certification and deployment of the most promising unleaded replacement fuels.

• Provides a sound process to ensure that this goal is achieved with a minimum of disruption to the general aviation industry and with the greatest likelihood of marketplace success.
PAFI Steering Group (PSG)

Purpose
• Facilitate, coordinate, expedite, promote and oversee the Piston Aviation Fuels Initiative (PAFI) based on the recommendations of the UAT ARC Final Report

Members
• AOPA - Aircraft Owners and Pilots Association
• API - American Petroleum Institute
• EAA - Experimental Aircraft Association
• GAMA - General Aviation Manufacturers Association
• NATA - National Air Transportation Association
• NBAA - National Business Aircraft Association
• FAA - Federal Aviation Administration
Fleet-wide Certification

Form of Approval

• Portion of fleet may be “drop-in”
  – Could issue letter of approval/statement of equivalency

• Portion of fleet may require design change
  – More complicated… (ATC, STC, option for modification of method above with contingencies??)
  – Non-traditional methods will require extensive coordination to ensure all requirements and needs are met

• FAA is committed to developing a fleet-wide approval methodology to align with PAFI schedule
Aviation Fuel Events

- Energy Policy Act Established
- EPA Cuts Lead Limits
- FAA Administrator Signs PAFI Charter
- FAA Creates Fuels Program Office
- FAA Solicits Candidate Fuels
- PAFI Steering Group Established
- PH I Fuel Solicitation Closes
- Manufacturers Deliver Test Fuels
- FAA Requests Phase I Fuels
- Phase I Testing Complete
- FAA Requests Phase II Fuels
- Manufacturers Deliver Test Fuels
- Environmental Groups Petition
- Phase II Testing Complete
- ASTM and Data Packages Complete
FAA Technical Test Program
Phase I

October 2014 – October 2015

• Evaluates candidate fuels for potentially show stopping issues
• Chemical makeup
• Performance properties
• Establish credible and peer-reviewed test protocols for ascertaining necessary fit-for-purpose data
• Fit for purpose testing across the ranges allowed by the fuel formulations (worse case formulations)
• Evaluate emissions and toxicology properties
• Data from Phase 1 will be used to evaluate the business case for candidate fuel production, distribution and availability to consumers
October 2016 – October 2017

- Fuels to be tested at the engine and aircraft level to evaluate their suitability across as much of the existing fleet as possible.
- Data collected from this testing will generate data that can be used to support the fleet wide approval of aircraft and engines including the orphaned fleet no longer supported by a manufacturer. This program is the most viable path to a fleet wide approval of new fuel formulations.
- Data from the Phase I and Phase II testing can also be submitted for ASTM Production Specification, which will enable the fuels to be accepted in the marketplace in an orderly and comprehensive manner. FAA involvement in this step will ensure acceptance and adoption of the fuel with consumers and across the petroleum and aviation industry.
AVGAS vs. MOGAS

AVGAS
• Uncertainty of future NO-Lead AVGAS performance and suitability.
• Rising AVGAS costs expected to go substantially higher with the implementation of NO-Lead alternative

MOGAS
• Suitable for many of today’s piston aircraft
• Less expensive than current and future AVGAS
• Known performance characteristics
MOGAS Issues

- **Safety**
  - Unmonitored ‘Jerry can’ fueling of MOGAS at airports is inherently unsafe for several reasons
  - Storage of MOGAS in cans in hangars is prohibited on most airports due to safety concerns
  - The EPA has determined that AVGAS lead emissions are hazardous;

- **Availability**
  - Currently there are between four and six locations in Washington state that dispense on-airport MOGAS
  - Some fuel supplier contracts preclude MOGAS distribution
  - Some insurance companies will not insure MOGAS distribution
  - Airports that would like to distribute MOGAS are faced with a high capital investment cost in plant and equipment

- **Cost**
  - Where MOGAS is available on-airport, AVGAS is always priced higher
  - Off-airport MOGAS is substantially lower than AVGAS
  - All reports indicate future No-Lead AVGAS will likely be more expensive than current 100LL

- **Applicability**
  - Many greater horsepower aircraft engines cannot burn MOGAS (compression)
  - Many smaller aircraft can obtain a Supplemental Type Rating (STC)
  - Many new experimental and light sport aircraft are designed to burn MOGAS
  - There is a fair amount of misunderstanding and confusion about the effect on aircraft engines burning one fuel or another as relates to safety and maintenance

- **Quality**
  - Aircraft require ethanol-free, high-octane Mogas, which is a low production product and difficult to obtain
  - MOGAS has a shorter shelf-life than AVGAS
• What are your ideas?

• What should we address in our system plan study?
Follow-up Discussion

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