

Are You Flying a Boat Anchor?

Revised: Saturday, September 11, 2010

Perhaps you've heard. The general aviation piston fleet is facing the end of 100LL fuel, AKA avgas. The reasons are twofold. There is a regulatory requirement from EPA, and other regulators around the world, for the elimination of all fuels containing the tetraethyl lead octane boosting additive {TEL} used to create the 100 octane rating needed for high compression {8.5:1} engines. TEL is responsible for the fuel's highly toxic lead emissions. And – equally troublesome – there is dependence on a single manufacturer for the manufacture of TEL.

The end date is uncertain and, hopefully, further off than the rumors currently circulating would indicate.

Some Background

1. Higher compression engines {8.5:1} cannot safely operate at rated maximum power on lower than 100 octane fuel. Non-turbocharged lower compression engines can.
2. There is no current substitute {for TEL} for the production of 100 octane fuel.
3. TEL has been mostly regulated out of internal combustion engine fuels over the past several decades. After next year, GA will be the only remaining user of TEL.
4. EPA has apparently determined that the TEL in avgas is responsible for about half of current atmospheric lead emission volumes. Not good – even though the total amount is probably miniscule compared to decades ago emissions.
5. As demand for TEL has diminished, manufacturers have dropped the product leaving only a single supplier. This manufacturer, UK based Innospec, certainly sees the end coming as well.
6. The estimated 30% of the GA piston fleet using high compression or turbocharged engines are responsible for {a further estimated} 70% of all avgas consumption.
7. Avgas accounts for less than .15% {yes, that's *point* 15 percent or .0015} of US hydrocarbon-based fuels consumption; probably even less worldwide. And usage is declining.....
8. The engine manufacturers specify which fuel spec will operate their engines. Generally, fuel specs are “held by” an organization called ASTM International. This group approves, publishes and maintains all kinds of standards for many different products using a collaborative protocol – essentially an agreement among all using parties and those who regulate the subject product. If an engine manufacturer declares that an engine is intended for certification against a specific fuel standard, the FAA requires no further fuel certification for that engine as the fuel is essentially “precertified”.

Implications

1. Many engines and aircraft are clearly at risk with the loss of 100LL, or the reduction in octane.
2. While regulatory problems stand in the way of an alternate fuel, the loss of the TEL manufacturer {fire, bankruptcy, etc.} could spell the rapid loss of 100LL, depending upon how much is in the pipeline, and eventual grounding of much of the certified GA fleet. Except those approved for ethanol-free mogas. A lower octane {92 or 94??}

unleaded fuel would probably enter the system pretty quickly – with continued stranding of the high compression fleet. This may actually be the greater short run risk.

3. Although there are suggestions for multiple fuels, the economics strongly suggest there will be only one replacement fuel for 100LL; if it is rated less than 100 octane, all higher performance engines will be unacceptably compromised, and many will simply be stranded.
4. Avgas prices will continue skyward, achieving premiums beyond that which currently exist over auto fuels.
5. Many FBOs will fold without a replacement fuel rated at 100 octane. They're in trouble anyway as flying activity decreases in response to relentlessly increasing costs.

Industry Response

1. Two enterprises are developing alternate fuels. Swift Enterprises is developing a bio-mass based substitute which shows promise, and has been approved by ASTM for certification testing. The website is www.swiftenterprises.com. The aviation press has recently reported that Swift Fuel can be expected to be priced in the \$9-10/gal range, possibly rendering it a non-starter. Swift denies this, asserting that its fuel price will be competitive with current 100LL prices.

General Aviation Modifications, Inc {GAMI} has developed a 100 octane fuel formulation, known as G100UL, which is currently being tested and also shows promise. This fuel has not currently achieved any ASTM status. The website is www.gami.com, although it appears to contain nothing about the fuel project.

2. The aviation alphabet organizations including AOPA, EAA, GAMA, NATA, and NBAA are participating in an industry committee to develop a substitute fuel response. They call themselves the AvGas Coalition, previously "FAST". Their effort takes into consideration both technical and economic considerations; if all goes well, I am told the work to identify a standard {and agree upon a fuel} will require two to three years, with another five to seven years for the transition – for a total potential 10 year cycle. Other committee participants include the engine and airframe manufacturers, and oil refiner representatives.

The committee would appear to face considerable difficulties, as there are likely to be many conflicting agendas.

Encouragingly, I am told that at least two of the participating organizations' representatives are committed virtually full time to this problem.

3. The engine manufacturers {Continental, Lycoming} are key participants in the game. If a specific fuel {or standard} is selected by neither for use in their engines, that fuel will go nowhere whoever else it might impress. If it is selected by either, that fuel has a serious future..... So,

Continental has announced it will henceforth use an existing fuel standard known as 94UL which is 100LL without the TEL. In addition, over the years, the company has issued a number of statements about its intention to push diesel engines which continues today, on steroids. Its answer for the legacy 8.5:1 engines is fixed timing detuning and/or variable timing bolt-on accessories.

Lycoming has announced that 94UL, or anything short of 100 octane, will not satisfy its requirements.

4. In an effort to remain neutral and to focus on the requirements of the solution, rather than a specific vendor's formulation, none of the AvGas Coalition members are providing support to, or aligning with, a specific alternate fuel or fuel developer.

Other Matters

1. There is much discussion about the year 2017 as the shut-off date for the use of 100LL. This is not the case. To understand requires a few more sentences.....

EPA establishes air quality standards, notifies states when they are out of standards compliance, and establishes a date certain when they must be in compliance. It is up to the states to enact measures for achieving compliance. If the states fail to perform, they face litigation from EPA and other parties, and the prospect that compliance measures will be forced upon them by the courts.

The 2017 date is a proposed time at which states having areas where lead pollution exceeds a certain level must have those areas in compliance. The measurements for compliance are currently underway and there are five urban areas in which the measurements are out of compliance. This seems hardly an immediate threat to GA.

2. FAA safety and noise constraints trump EPA directives, and economic considerations carry heavy influence; it seems unlikely that FAA will permit the grounding of the 8.5:1 power plants and that a reasonable {hopefully, not too expensive??} plan will emerge allowing all users to make whatever adjustments are required within a reasonable period.

Conclusion

Well, I am certainly not an expert in this field, but several things seem pretty clear:

1. The end of 100LL from regulatory agencies is not imminent, but is certain.
2. And the year 2017, or any earlier date, does not spell the sudden, regulatory end of 100LL.
3. However, this certainty provides the industry a big incentive to drive a solution before the end is upon it. I would expect 100LL to be gone before that time.
4. Given its composition, the AvGas Coalition will require a gargantuan effort to reach consensus, and for that consensus to include the high performance engine operators. This will take a very long time..... And the projected ten year effort makes success even more difficult to anticipate. Do we have ten years??

Maybe the best we should expect from this group is to buy time for alternate fuel developers to complete their testing and qualify their products.

5. There will only be one fuel. Any replacement fuel will have to serve the majority of users; it should serve all users.
6. With sales volumes and usage trending down, it would seem GA would have strong incentives to find a way to use a fuel that is also used in other vehicles – e.g., ethanol-free mogas and Jet-A. This, of course, is not a satisfactory answer for the higher performance folks.
7. That TEL is produced by a single supplier seems to be of greater immediate concern; the loss of this additive could result in a quicker shut-down of most of GA for a period, and a much longer – if not permanent – shutdown of aircraft flying high performance engines.

8. AOPA and other GA advocacy groups are aware of the issues and actively involved in finding a solution.
9. The landscape is constantly changing.....

What Users Can Do

1. Become informed and stay that way! Take some time to occasionally browse The Clean 100 Octane Coalition website, www.100octaneformyplane.com.

A couple of good sources include Paul Bertorelli's blog and comments at www.avweb.com {at avweb do a search on "avgas"}, and the Wikipedia entry on "avgas".

2. Write letters of concern to those who might have influence over the process and the decision – especially to Teledyne Continental Motors.

*Rhett Ross, President
Teledyne Continental Motors
2039 Broad Street
P.O. Box 90
Mobile, Alabama 36615*

3. Encourage group action by your type club. {e.g. ABS, Cessna Users, Cirrus, etc }

See the attached list.

4. Support the Lycoming point-of-view. That is, *no abandonment of 8.5:1 engines!!*

*Michael Kraft
Senior Vice President and General Manager
Lycoming Engines
652 Oliver Street
Williamsport, PA 17701*

5. Checkout the effort at GAMI for G100UL, that at Swift Enterprises for Swift fuel, and any others you happen to discover. If you like what you hear, let others know.
6. Ask AOPA, and others participating in the AvGas Coalition and your type club, to publish regular status updates regarding their latest efforts.

Type Club Contacts:

The American Bonanza Society
Tom Turner, Executive Director
www.bonanza.org

Cirrus Owners and Pilots Association
Curt Sanford, President
www.cirruspilots.org

Mooney Aircraft Pilots Association
Trey Hughes, Executive Director
www.mooneypilots.com

Malibu/Mirage Owners & Pilots Association
Jonathan Sisk, President
www.mmopa.com

The Cessna Pilots Association
John Frank, President
www.cessna.org

The Cardinal Flyers
Paul Milner, Vice-President
www.cardinalflyers.com

Aerostar Owners Association
Rob Becker, President
www.aerostar-owners.com

The Twin Cessna Flyer
Bob Thomason, President
www.twinessna.org

The Duke Flyers Association
Al Uhalt, Vice President
www.dukeflyers.org

The International Comanche Society
Dave Fitzgerald, President
www.comancheflyer.com

The American Navion Society
Rusty Herrington, President
www.navionsociety.org

The Commanders Owners Group
Glenn Mores, President
www.commander.org

The Twin Commanders Flight Group
Jim Metzger, President
<http://204.8.124.244/index2.asp>

The Cessna Advanced Aircraft Club
Bob Klee, President
www.cessnaadvancedaircraftclub.com