

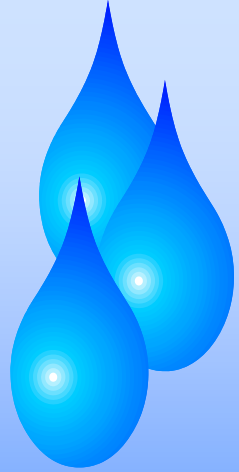
# **Future fuels of aviation**

**Höganäs Aug. 07 2010**



**Lars Hjelmberg**

**Executive director.**



# **Aviation Gasoline**

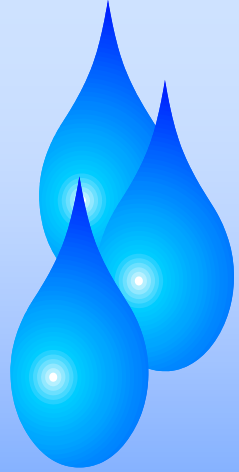
**A speciality product.  
estimated w/w production  
~ 1.600.000 ton/year**

**In volume**

**< 0.5 % of automotive gasoline**

**or**

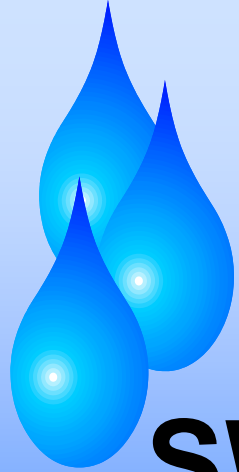
**< 1/4 of automotive gasoline system  
evaporation**



# Unleaded AVGAS

## available today

- Hjelmcø 91/96 UL for all 91/96, 80/87 octane, Rotax and Kalisz (radial) engines
- UL 91 for Rotax Engines and 80/87 octane engines
- 82 UL for certain 80/87 octane engines (Mogas without ethanol)
- **Nothing for 100/130 octane engines**



**Unleaded Avgas under development**

**Not meeting current AVGAS standard**

**SWIFT** ~ 85 % aromates, ~ 15% isopentane

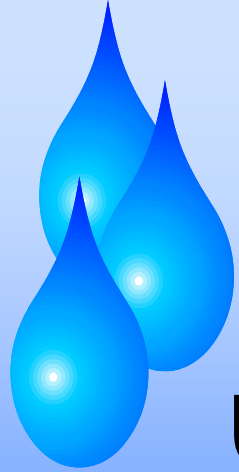
**GAMI** unknown formula

**86-87 MON** super car gasoline (no ethanol)

**Meeting current AVGAS standard**

**100 ULL** 100 LL with less lead

**94 UL** “similar” to Hjelmco 91/96 UL  
but of US origin



***Avgas under development***

***not meeting current AVGAS standard***

**Uphill battle to prove suitability**

**Parameters in current standard  
are there for known reasons**

**(trial and error)**

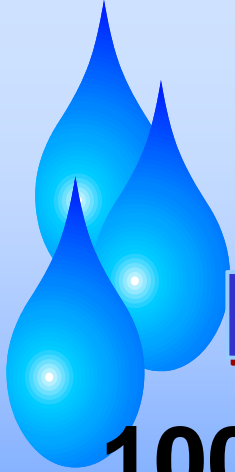
**If going outside D910 standard**

**concessions in:**

**performance**

**safety**

**reliability**



**Avgas under development**

**meeting current AVGAS standard**

**100 ULL: concession to the US EPA to reduce overall lead in the air (~50 % reduction is researched)**

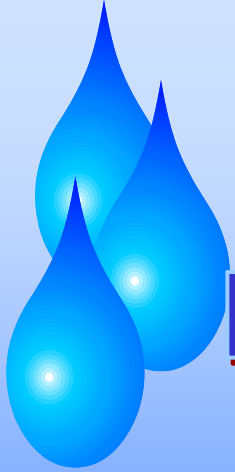
**Problem: octane numbers don't tell the whole story**

**Unleaded AVGAS 98**

**performed better than**

**a 100 LL AVGAS**

**Contradicts earlier data of the need to add about 3  
MON in a 100 unleaded AVGAS.**

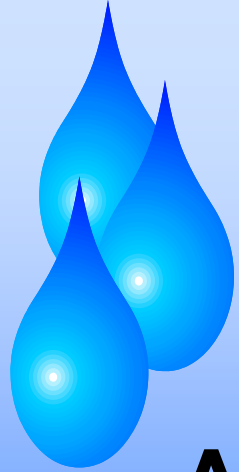


# **Avgas under development** **meeting current AVGAS standard**

**UL 94 : TCM project, final parameters not set**  
**However – first aircraft already certified – Cirrus 22 T**  
**315 HP turbocharged TIO520 TCM engine.**  
**engine initially rated for AVGAS 100 LL**



**Hjelmco AVGAS 91/96 UL**  
**in production since 1991 (19 years)**  
**meets or exceeds performance of UL 94**



**Developments  
summer/autumn  
2010 in Europe.**

**Air TOTAL launches UL 91 AVGAS**

**ROTAX approves UL 91 AVGAS**

**both meeting US standard D7547**

**EASA is working on simplifications  
for orphaned aircraft.**

**Swedish CAA to propose lower fuel  
taxes in Sweden on unleaded  
AVGAS.**

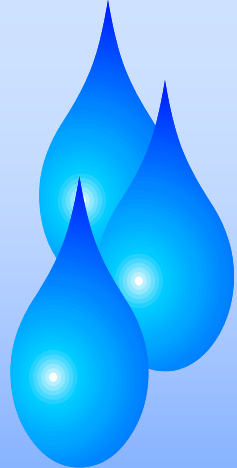


# Avgas UL 91

## ALL ABOUT THE NEW AVGAS UL 91

Total will launch a new, high-quality aviation fuel during the second half of 2010, specially designed to meet the needs of microlight pilots: AVGAS UL 91. We take a closer look at the reasons behind the development.





# Rotax-SI-912-016-R3

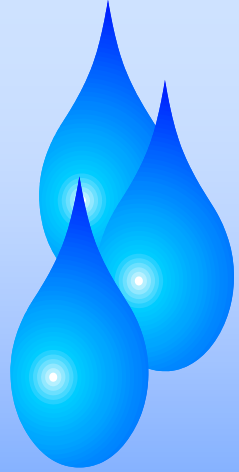
# Rotax-SI-914-019-R3

## July 13 2010

Usage / Description	
912 UL / A / F	912 ULS / S - 914 UL / F

AVGAS		
leaded	AVGAS 100 LL (ASTM D910)	AVGAS 100 LL (ASTM D910)
unleaded	UL91 ASTM D7547	UL91 ASTM D7547

released brand-name		
	HJELMCO AVGAS 91/96 UL <sup>5)</sup>	HJELMCO AVGAS 91/96 UL <sup>5)</sup>
	HJELMCO AVGAS 91/98 UL <sup>5)</sup>	HJELMCO AVGAS 91/98 UL <sup>5)</sup>



# **What will be the future AVGAS?**

**A dual AVGAS situation ?**

**Keeping AVGAS 100 LL for a/c**

**that really need 100 LL and**

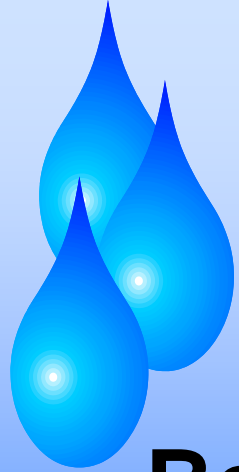
**UL 94 (Hjelmco AVGAS 91/96 UL)**

**for the rest of the fleet.**

**Requires an agreement with EPA and industry.**

**Air-quality will rule**

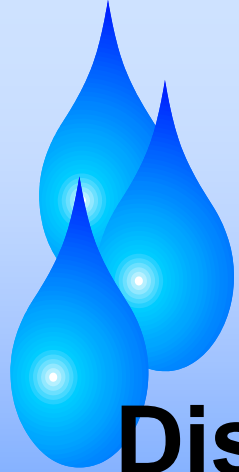
**(amount of lead in the air next to major GA-airports)**



# **Dual AVGAS**

## **Benefits:**

- **Drop in replacements fuels for 100 LL**
- **Cheap to produce**
- **Known products**
- **Allows for slow elimination of leaded AVGAS during xx-years.**
- **Allows for new a/c to be certified on UL94.**



# Dual AVGAS

## Disadvantages:

- Production of 2 AVGAS
- Logistics – storage and distribution
- costs for 2 products
- cost for 2 fuel-tanks at the airport

New fuel tank not necessary extra investment for unleaded AVGAS – old 100 LL tank might only be good for xx years allowing for a transition to UL fuel

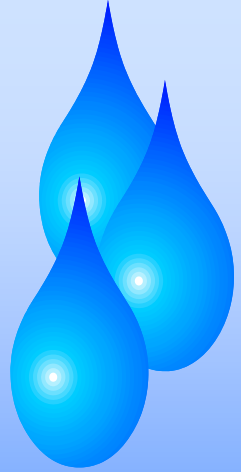


# **29 years of Unleaded Avgas in Sweden**

**Hjelmco 91/96 UL (UL94)**

**today 2010**

- Available at > 70 airports
- used by ~ 1000 aircraft
- excellent technical history
- approved by piston engine manufacturers covering > 90 % of the entire world piston aircraft fleet.
- produced by Hjelmco Oil in Sweden

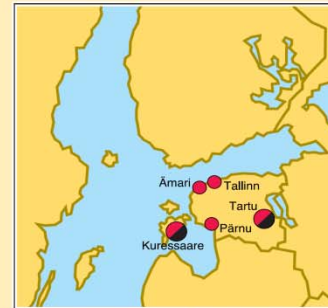
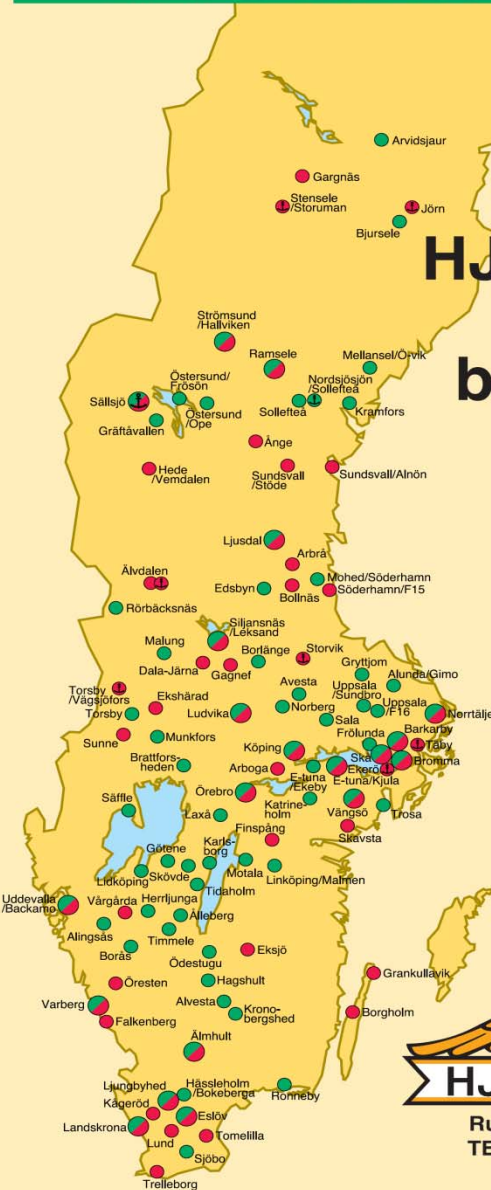


# AVGAS 100 LL

# HJELMCO 91/96 UL

## HJELMCO OIL AB

Mycket mer än  
bara flygbränsle!

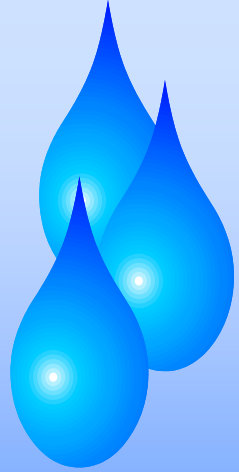


Verksamheten i Estland drivs självständigt  
från HELMCOIL A/S med huvudkontor i  
Tallinn, tel/fax 00372-6-21 29 51.

- AVGAS 100 LL
- HJELMCO 91/96 UL
- JET-A1
- ↓ sjöflyg



Runskogsvägen 4 B 192 48 SOLLENTUNA  
TELEFON 08-626 93 86 • FAX 08-626 94 16  
ORDERTELEFON 021- 12 31 76



**Future fuels of aviation**

**Höganäs Aug. 05 2006**



**Lars H. Hjelmberg**

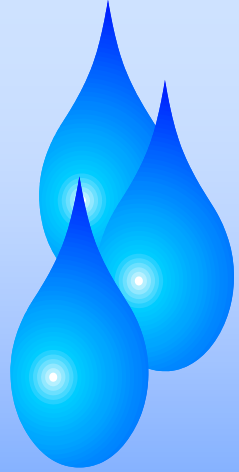
**(now past president AOPA-Sweden)**





# What happened with the ETBE – base AVGAS?

- Hjelmcø applied for an 100 UL ETBE based AVGAS to the ASTM standardisation committee in 2006.
- this application is still in the ASTM.
- in 2010 a standard for the component ETBE aviation grade has been approved.
- with the GAMI and SWIFT fuels interest seems to have shifted away from ETBE.
- AVGAS is a “political issue

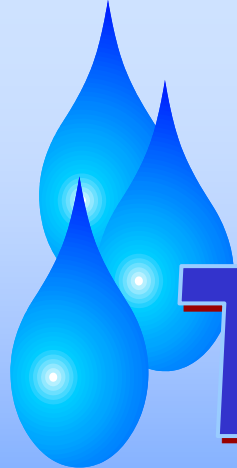


# Questions ?

Why follow Lycoming  
SI 14009\* when using  
unleaded AVGAS?

\* engine oils such as  
Total AD 15 W-50  
Shell W 15 W-50  
Shell W80+  
Shell W100+

Answer: TCP helps oil to be better  
attached to metal parts.



**Thank you**



**Lars Hjelmberg**

**Executive director.**