

**Great Lakes  
Binational Toxics Strategy  
Integration Workgroup Meeting**

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Windsor, Ontario**

# Alkyl-Lead

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## Background on Alkyl-Lead

- Man-made compounds used as fuel additive to reduce “knock” in combustion engines and lubricate engine components
- Primarily released through evaporative emissions from unburned gasoline and evaporative losses
- TEL and TML, are the most common alkyl-lead compounds and are still in use today
  - ◆ Only TEL is used in aviation gasoline (avgas)

## Background on Alkyl-Lead

- Human exposure pathways are through inhalation of leaded gasoline vapors, dermal exposure to leaded gasoline, and ingestion of lead-contaminated soil, food, or water
- Exposure can cause serious toxic effects to the nervous system
  - ◆ Children and certain occupational groups may be at higher risk

# Alkyl-Lead Challenges

## Canada

- 90% reduction in use, generation, or release\*
- By 2000

\* Consistent with 1994 COA

## United States

- Confirm no longer use in automotive gasoline
- Support and encourage stakeholder efforts to reduce releases from other sources
- By 1998

■ **Canada and the U.S. have both met their challenge goals outlined in the Strategy**

# Progress Toward The Challenge Goal

- Primarily due to regulated phase-out of leaded gasoline in on-road vehicles
- Leaded gasoline sales in Ontario declined from about 3 billion liters in 1988 to roughly 33 million liters by 1997 → **a reduction of almost 99%**
- Leaded gasoline production in U.S. decreased from 77.5 billion gallons in 1967 to 3.1 billion gallons in 1991 → **or 3% of all gasoline produced**
  - ◆ 1997 production of unleaded gasoline represented ~ 97% of all gasoline produced

## Environmental and Health Data

- Data on the *use* of alkyl-lead used in place of environmental monitoring data, due to rapid degradation of alkyl-lead in the environment to inorganic compounds
- Applies to the use of alkyl-lead nationwide (U.S.)
- Dominant historic uses have been discontinued
- Remaining fuel uses limited to aviation, race car, and off-road and marine engines

■ **Conclusion: There are sufficient data for GLBTS purposes relative to the remaining sources to assess the impact in the Basin**

## Ontario Use Data

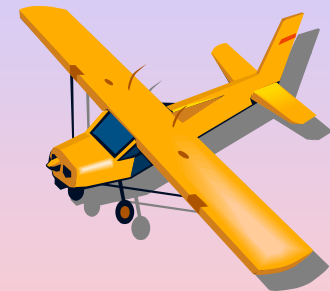
- Two primary remaining sources in Ontario are avgas and leaded motor gasoline for use in competition vehicles
- Competition Vehicles
  - ◆ In Canada, about 110 racetracks host approximately 1,200 events per year. Not all races use leaded fuel.
  - ◆ Leaded gasoline sales in Canada a very small fraction of all gasoline sales.



## Ontario Use Data

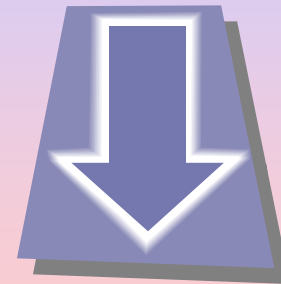
### ■ General Aviation

- ◆ Total aviation fuel use in Ontario was almost 1.8 billion liters of both jet fuel and avgas in 1997.
- ◆ Avgas made up just 1.5% of the total aviation fuel
- ◆ Relative to motor gasoline, avgas comprised 0.2% of Ontario's gasoline mix in 1997



## United States Use Data

- On-road vehicles estimated to account for less than one half of one percent of the total amount of lead emitted in 2000 (0.47%)
- Overall lead emissions have decreased by two orders of magnitude between 1970 and 2000 → **a reduction of approximately 98%**
- Leaded gasoline still used predominantly for general aviation (piston-engine) aircraft and non-road competition race vehicles (cars, boats, etc.)



## United States Use Data

- **Transportation sector now accounts for only 12% of total 2001 lead emissions, with most from aircraft**
- **Leaded avgas currently available in several grades with differing lead concentrations (e.g. Avgas 100LL)**
- **Used primarily for reciprocating piston engine aircraft (not jet engines)**
  - ◆ **TEL is the "silver bullet" ingredient in 100LL**
- **Conservative estimate of TEL use in aviation: 630 metric tons in 1998**

# United States Use Data

## ■ Competition Vehicles

- ◆ Estimated 100,000 gallons of leaded gasoline used by NASCAR in 1998
- ◆ Gasoline additives may be added to unleaded motor gasoline to raise the octane level
- ◆ Suppliers offer racing fuel at various octanes and lead content; many offer unleaded fuels

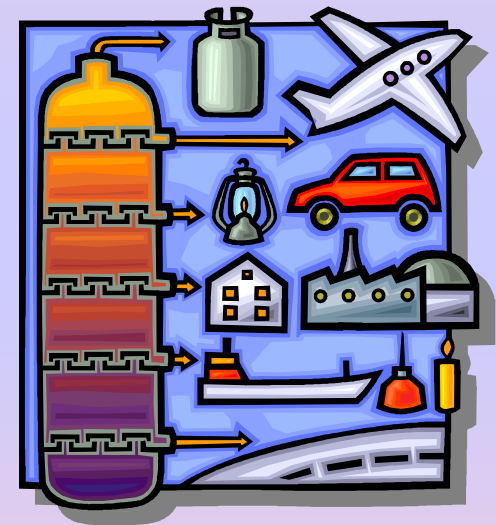


# **Environmental Analysis Conclusions**

- **Virtual elimination not achieved, however dominant historic uses have been discontinued**
- **Criteria information not sufficient to conclude that alkyl-lead has adverse impact on Basin because of rapid environmental degradation**
- **Trend data indicates significant decline in use and emission levels in both the United States and Ontario from on-road vehicles**
- **Most available information on use in gasoline is limited to older data or is not readily accessible**

## Ability for the GLBTS to Affect Further Reductions

- Little opportunity for the GLBTS to effect improvements in the Basin
- Both aviation and racing sectors can more effectively be addressed at national level



# Management Outcomes

- Refer or defer reduction efforts to another program
- National programs/US EPA's PBT Program
  - ◆ Work with racing associations such as NASCAR for voluntary agreements to reduce the use of leaded fuel in race cars
  - ◆ Work with FAA and industry to seek acceptable alternatives to leaded gasoline in aviation fuel
  - ◆ Continue efforts to enhance and promote the phase-out of leaded gasoline use in motor vehicles **worldwide**

