"Automotive Fuels and Lubricants: Yesterday, Today and Tomorrow"

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San Antonio, Texas

Congratulations!

Big Round of Applause!

40 Year Ago

- The Cold War
- Civil Rights
- Environmental movement gaining steam
- No EPA
- Elvis was “The King”
- The Beatles had invaded
- Few imported vehicles in the USA
- GM ruled the auto industry

1965 Chevrolet Owner's Manual – Gasoline

"All Chevrolet 6-cylinder engines and V-8 engines with two-barrel carburetors are designed to operate efficiently on regular grade gasolines commonly sold in the United States and Canada. All Chevrolet higher-performance V-8 engines are designed to operate efficiently on premium grade gasolines…."

"Excessive knocking should be avoided as much as possible in order to prevent possible engine damage."

1965 Chevrolet Owner's Manual – Engine Oil

"The use of high-quality oil of the correct viscosity is your best assurance of continued reliability and performance from your engine. It is recommended that you use an oil which, according to the label on the can is: intended for service MS and passes car makers' tests or meets General Motors Standard GM 4745-M."

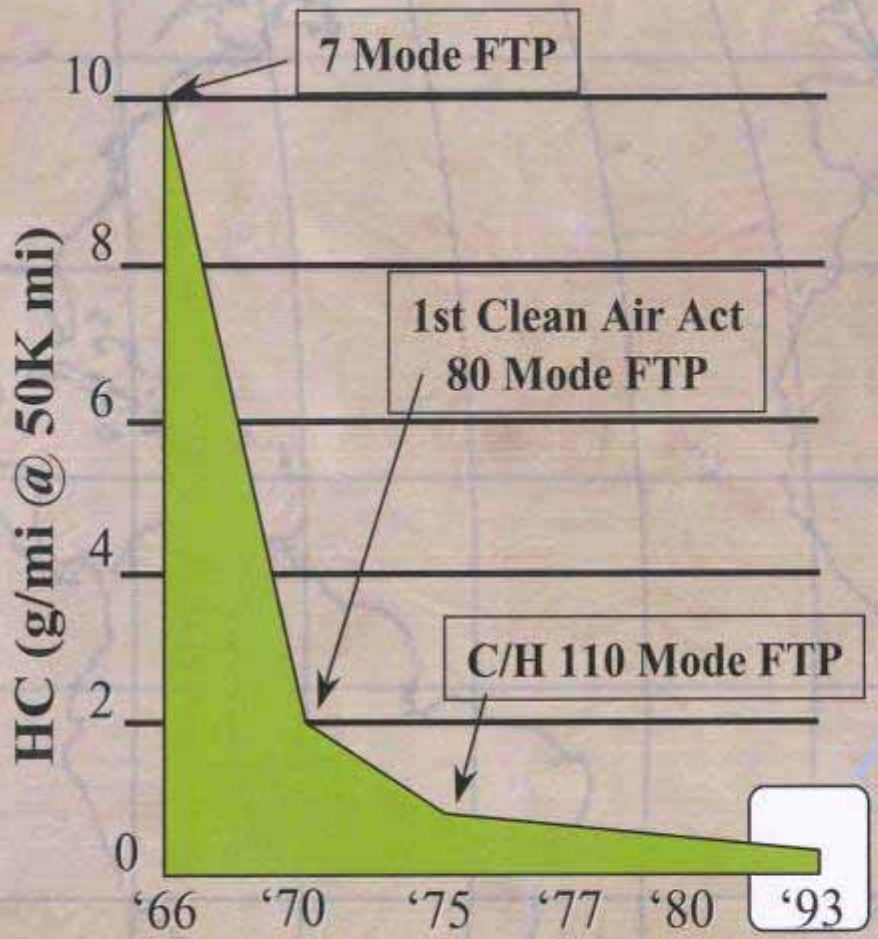
"Engine oil should be changed at 60-day or 6,000-mile intervals, whichever occurs first."

Reasons for Vehicle Powertrain, Fuels and Lubricant Changes over Past 40 Years

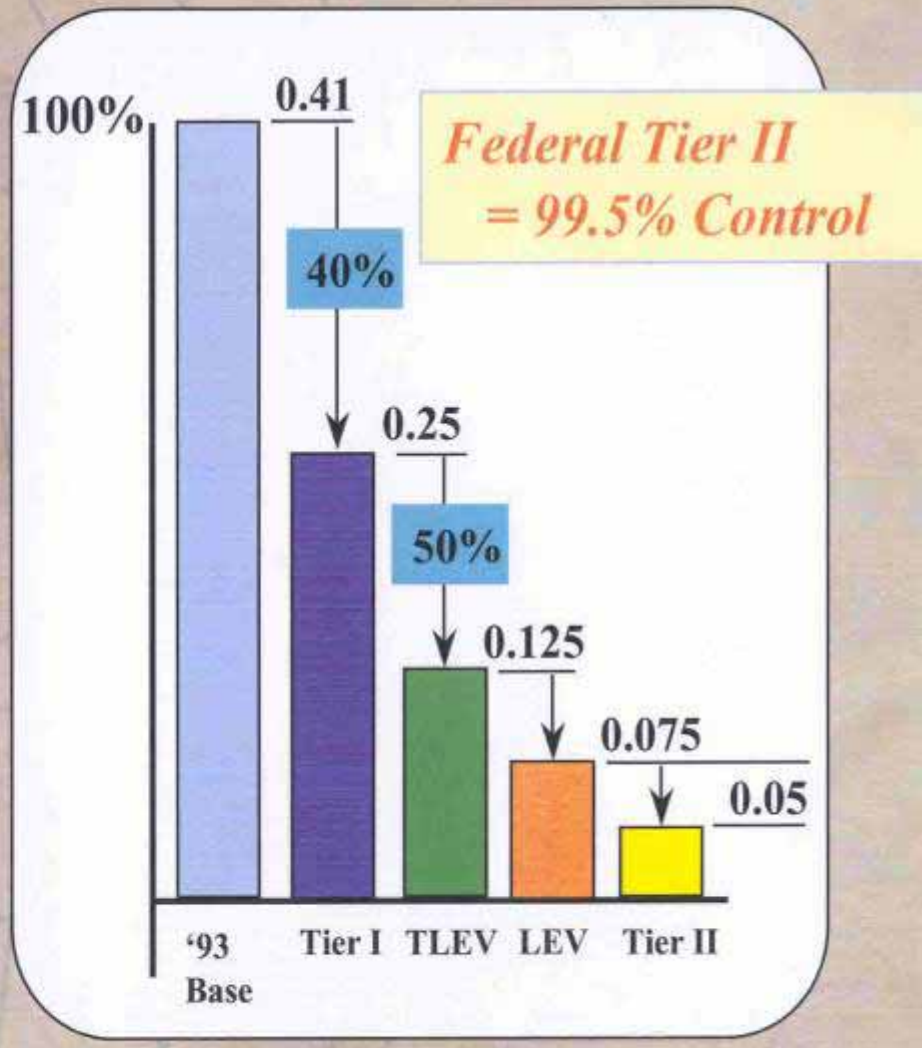
- Environmentalism, Clean Air Acts and vehicle emissions regulations
- Arab Oil embargoes
- CAFE
- Alternative fuels
- The “greenhouse effect”
- Customer desire for improved vehicle driveability and performance, and reduced maintenance
- Competition from imported vehicles

Evolution of U.S. Hydrocarbon Emission Standards

HC Reduced By 96%

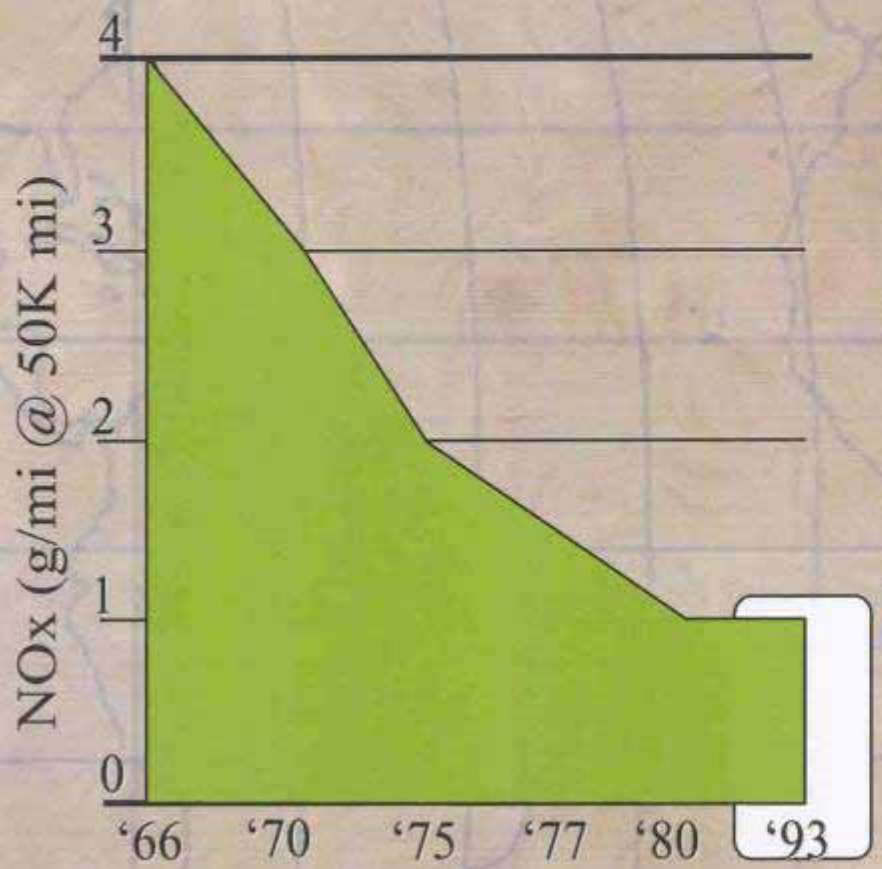


90% Additional Reduction

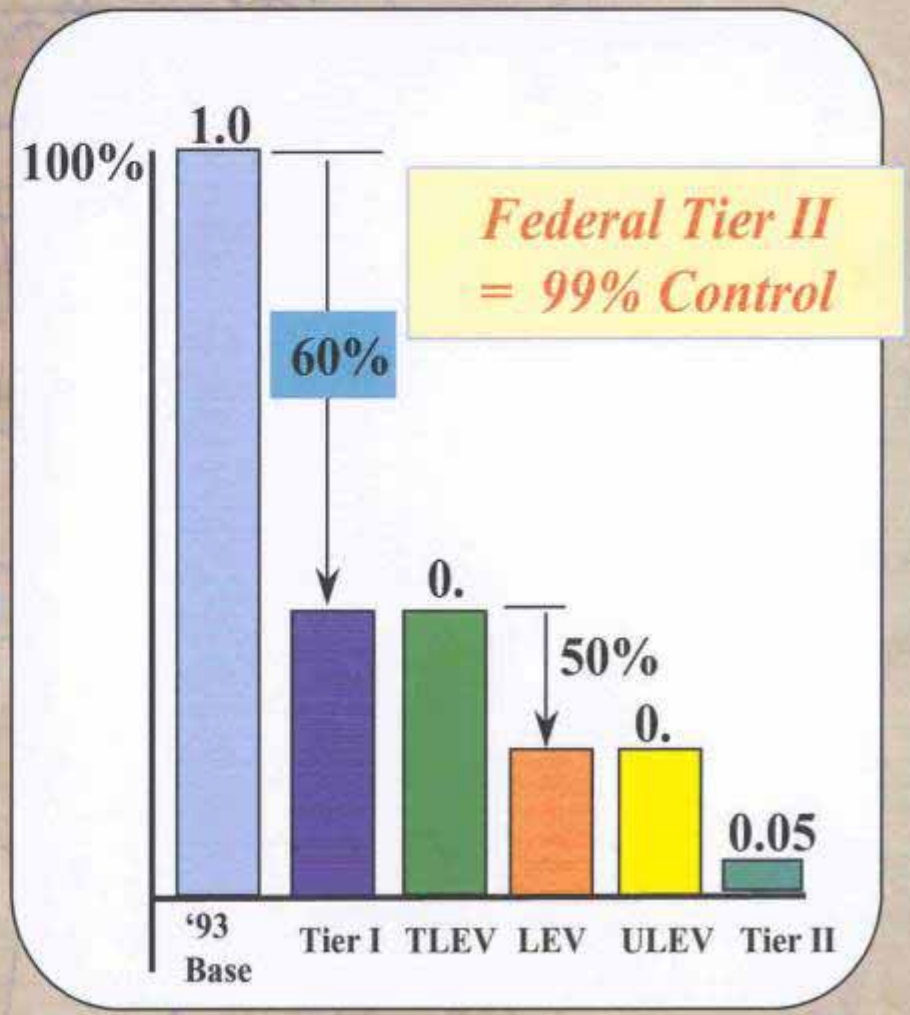


Evolution of U.S. Oxides of Nitrogen Emission Standards

NOx Reduced By 75%



95% Additional Reduction



Major Vehicle Hardware Changes – Past 40 Years

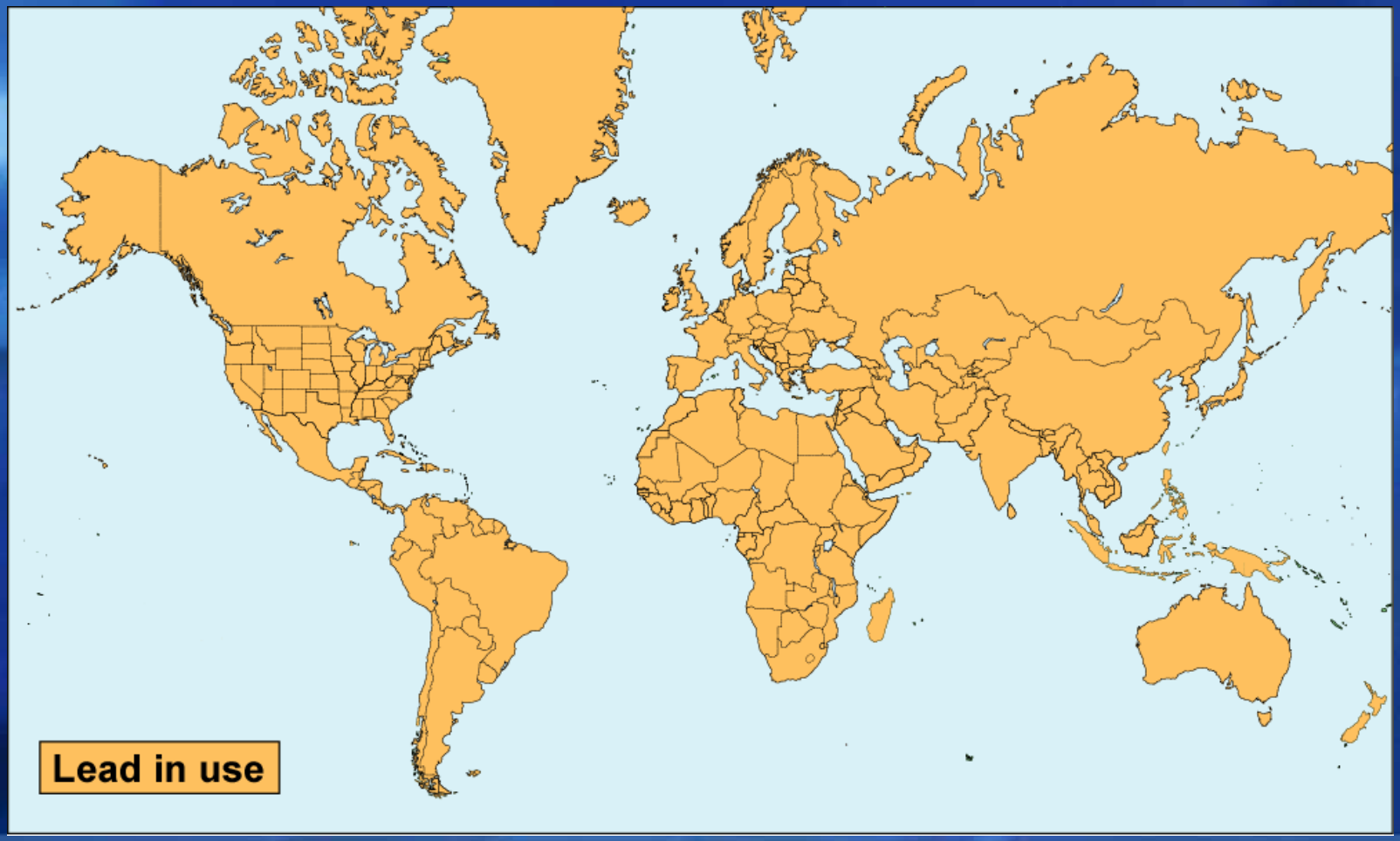
- Oxidation catalysts and EGR
- Fuel injection systems
- Electronic control systems, O_2 sensors and 3-way catalysts
- On-board diagnostics
- Evaporative emission control systems
- Knock sensors
- More efficient engines with higher specific outputs

Major Gasoline Changes – Past 40 Years

- **Elimination of lead**

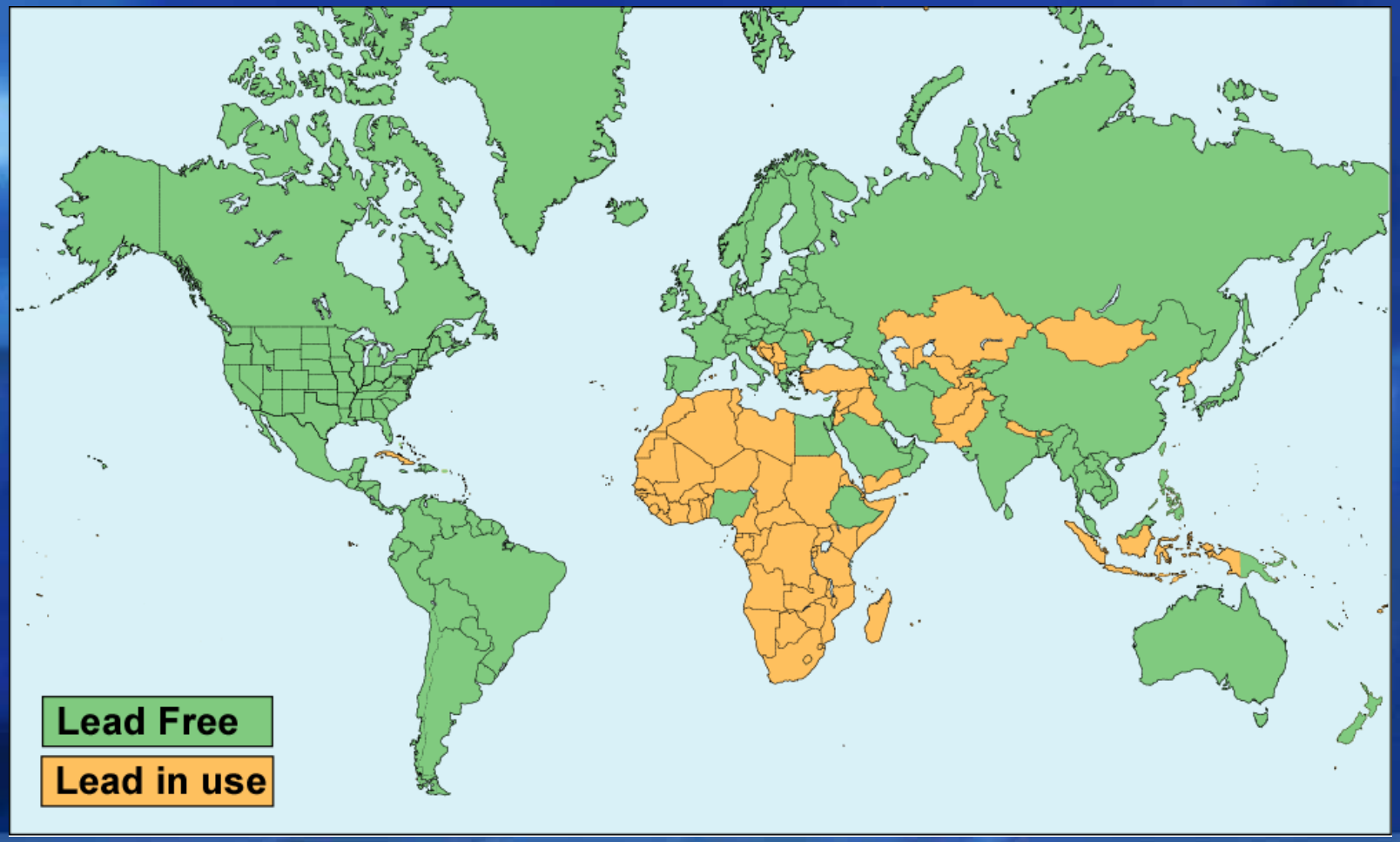
Worldwide Lead Usage 1965

(Source: IFQC)



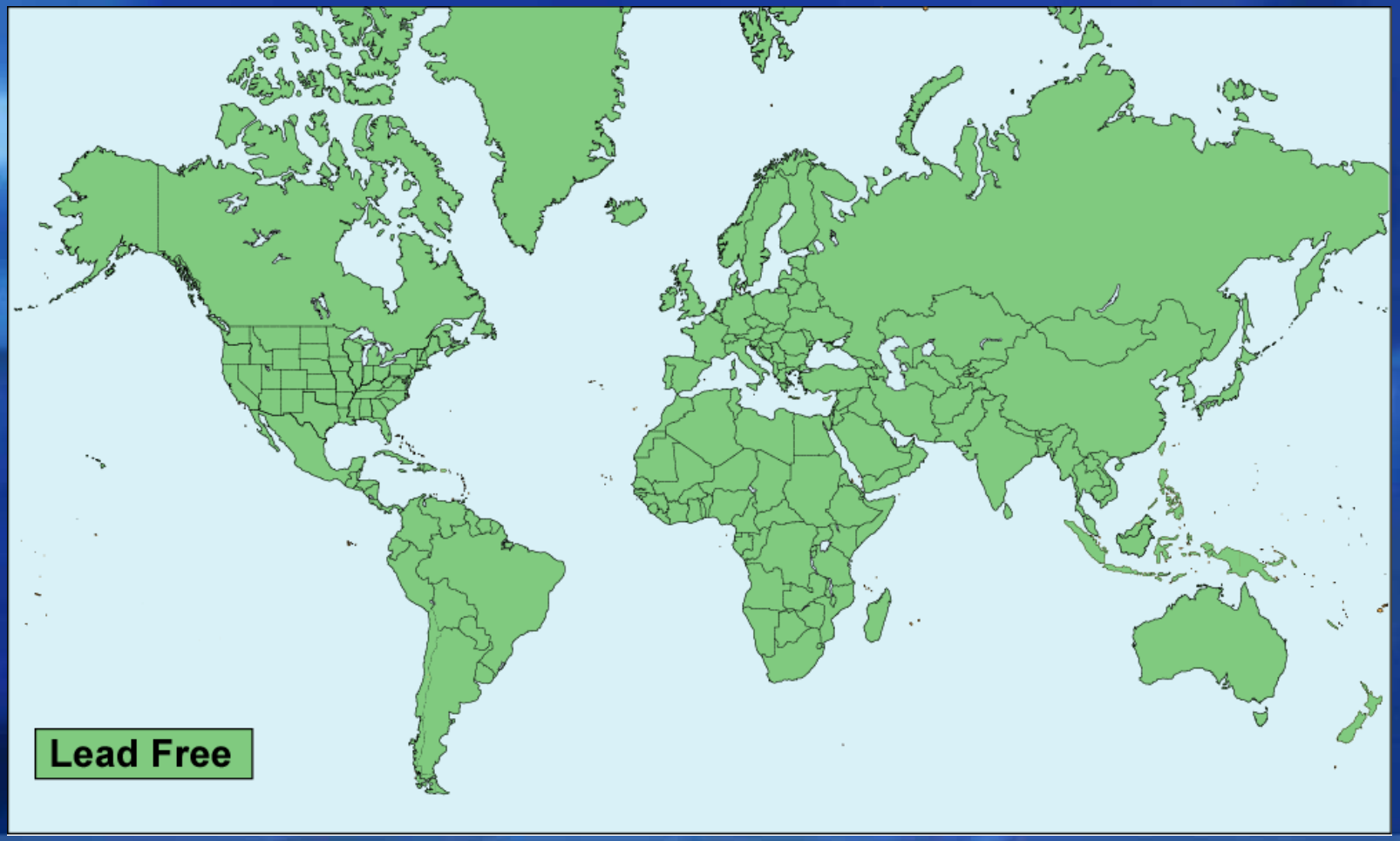
Worldwide Lead Usage 2005

(Source: IFQC)



Worldwide Lead Usage 2045

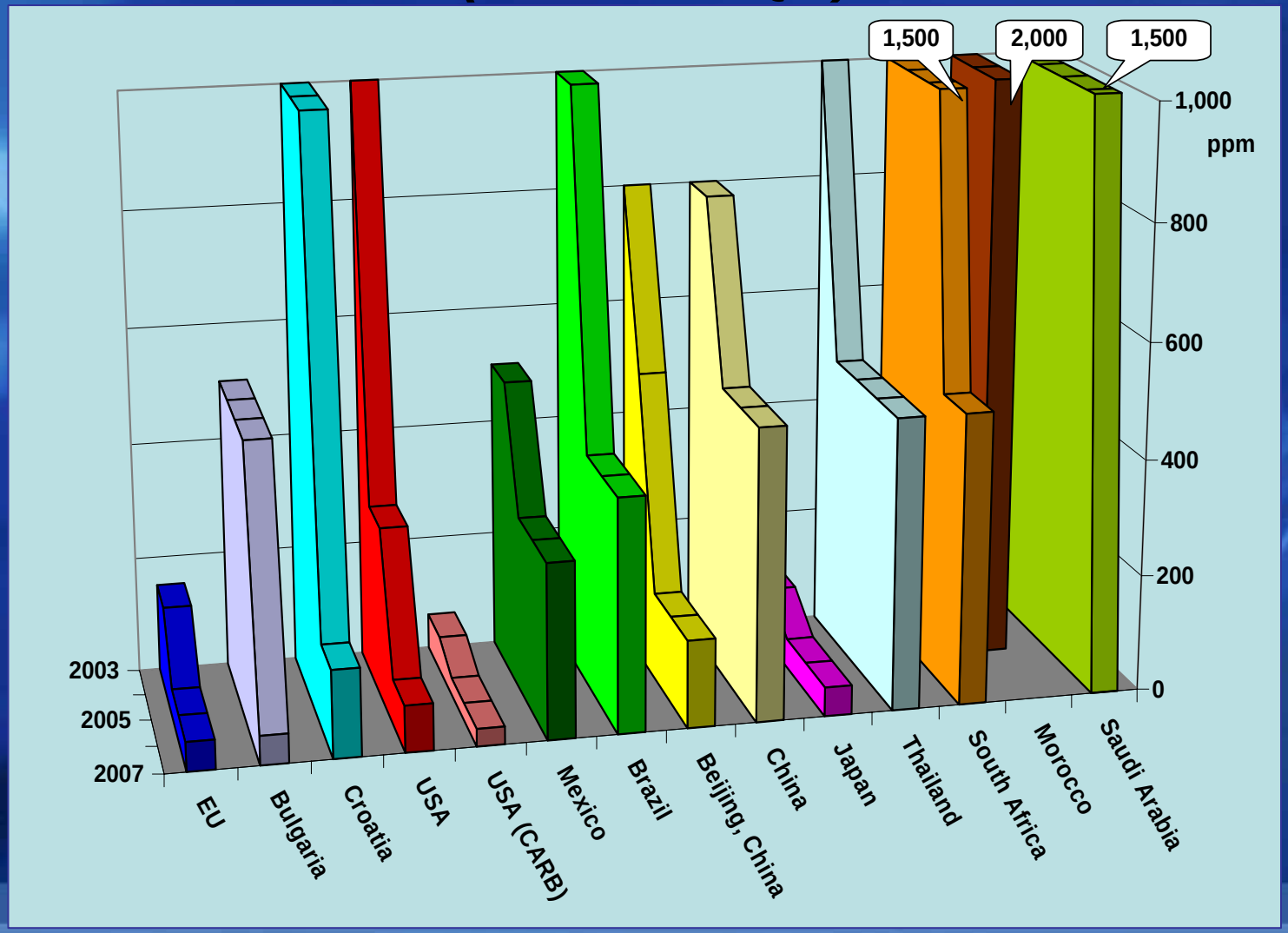
(Source: IFQC)



Major Gasoline Changes – Past 40 Years

- **Elimination of lead**
- **Reduction of sulfur**

Gasoline Sulfur Levels
(Source: IFQC)



Major Gasoline Changes – Past 40 Years

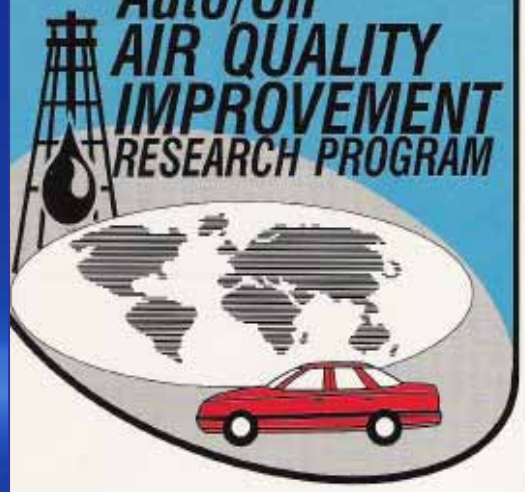
- **Elimination of lead**
- **Reduction of sulfur**
- **Better deposit control additives**

Fuel Spray Pattern from Fouled and Clean Port Fuel Injectors

Major Gasoline Changes – Past 40 Years

- Elimination of lead
- Reduction of sulfur
- Better deposit control additives
- RVP reduction
- Oxygenates (ethers and ethanol)
- Improved refinery processing
- Reduced driveability index (DI)
- Tightened gasoline specifications
- Regulation of the fuel / vehicle system
- Reformulated gasoline

Auto/Oil AIR QUALITY IMPROVEMENT RESEARCH PROGRAM



Mobil

MARATHON

Chevron

Ford

CONOCO
A Du Pont Subsidiary

GM

AMOCO

76

CHRYSLER CORPORATION

Shell

BP

PHILLIPS 66

ARCO

EXXON

Ashland

TEXACO

SUNOCO

Bad Gasoline-Related Items

- Banning MTBE
- Government minimums on deposit control additives
- Boutique fuels
- Too many specifications
- UNOCAL RFG patents

Bad Engine Oil-Related Item

- **3,000-mile oil changes**

Major Engine Oil Changes – Past 40 Years

- Better knowledge / use of additives for reducing engine wear and keeping engines clean
- Reduced vehicle emissions via lower oil phosphorus content and greatly reduced oil consumption
- Better fuel economy through friction modifiers and lower viscosity
- ILSAC standards and CMA Code of Practice ensuring oil quality
- Longer oil-change intervals and the GM Engine Oil Life System
- Improved base oils including greater use of synthetics
- Better low-temperature performance

2005 Chevrolet Owner's Manual – Gasoline

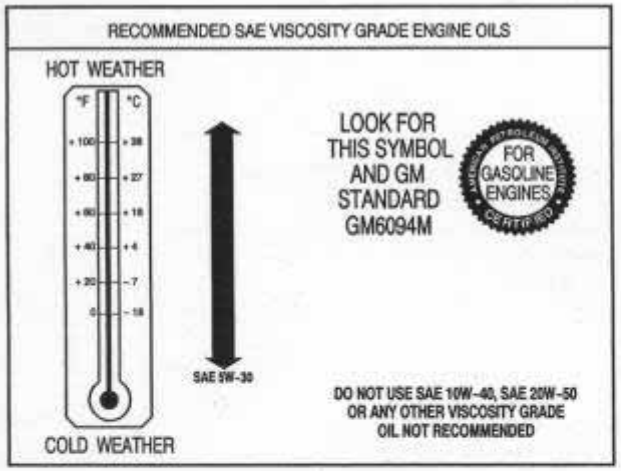
"Use regular unleaded gasoline with a posted octane of 87 or higher."

"It is recommended that gasoline meet specifications which were developed by automobile manufacturers around the globe and are contained in the World-Wide Fuel Charter."

"Gasolines containing oxygenates, such as ethers and ethanol, and reformulated gasolines may be available in your area to contribute to clean air. General Motors recommends their use."

2005 Chevrolet Owner's Manual – Engine Oil

What Kind of Engine Oil to Use



Look for two things:

- GM6094M

  Your vehicle's engine requires oil meeting GM Standard GM6094M. You should look for and use only an oil that meets GM Standard GM6094M.

- SAE 5W-30

  As shown in the viscosity chart, SAE 5W-30 is best for your vehicle.

These numbers on an oil container show its viscosity, or thickness. Do not use other viscosity oils such as SAE 20W-50.

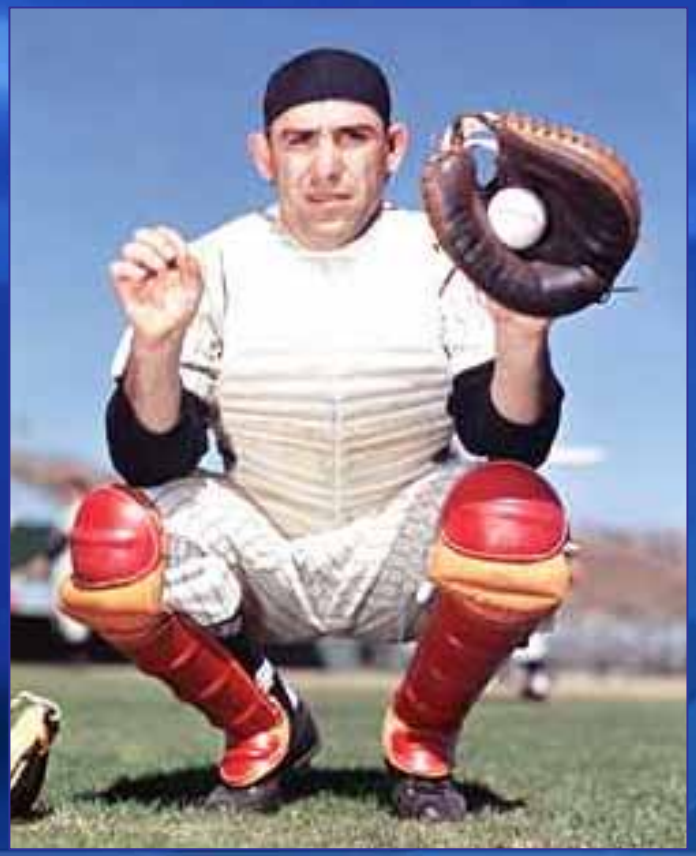
Oils meeting these requirements should also have the starburst symbol on the container. This symbol indicates that the oil has been certified by the American Petroleum Institute (API).

You should look for this information on the oil container, and use *only* those oils that are identified as meeting GM Standard GM6094M and have the starburst symbol on the front of the oil container.

Notice: **Use only engine oil identified as meeting GM Standard GM6094M and showing the American Petroleum Institute Certified For Gasoline Engines starburst symbol. Failure to use the recommended oil can result in engine damage not covered by your warranty.**

GM Goodwrench® oil meets all the requirements for your vehicle.

"It ain't over 'til it is over and it ain't over yet."



– Yogi Berra

The World Today

- Terrorism
- Horrendous natural disasters
- War in Iraq
- Worldwide concern about environment and global warming
- Energy conservation
- Biofuels
- GM no longer rules
- Toyota leads

Conclusions from SAE's North American International Powertrain Conference

- **Fuel economy improvement and CO_2 reduction will drive new propulsion technologies**
- **Advanced biofuels offer the most cost-effective near-term strategy for reducing transportation CO_2**
- **Gasoline-electric and diesel-electric hybrids unlikely to be "mainstream" passenger vehicle technologies**
- **Hydrogen is the best long-term fuel alternative for removing the automobile from the environmental debate**

National Policy Initiatives SAE's North American International Powertrain Conference

- Encourage conservation
- Expand the Strategic Petroleum Reserve to include refined products
- Encourage new refinery construction
- Increase North American energy production
- Harmonize global fuel and emissions standards

Proposed Gasoline Changes – Next 20-40 Years

- Optimized octane (miles per barrel of petroleum approach)
- Use of more non-petroleum feedstocks
- Optimized use of ethanol
- Improved gasoline cleanliness additives
- National gasoline standards
- Worldwide gasoline standards
- Automatic refueling

Proposed Engine Oil Changes – Next 20-40 Years

- Better fuel economy oils
- Elimination of phosphorus
- Additives for achieving deposit-free engines
- 25,000-mile oil change
- Worldwide engine oil quality standards
- On-board engine oil condition monitors
- Fill-for-life crankcases

HYDROGEN3

The World in 2045

- Long-term thinking by leaders
- Political sanity and stability
- No terrorism
- Poverty and class differences greatly reduced
- Transition to sustainable fuels
- Great advancements in preserving the globe
- Peace

2045 Chevrolet Owner's Manual Statements

- **Gasoline – Use available fuel**
- **Engine Oil – Your engine is sealed for life**

“Doing nothing is hard to do. You never know when you are done.”

– Leslie Nielson, Actor