

**Evaluation of Mobile Source Emission Inventories,  
or  
The Contribution of Mobile Source Emissions to Air Quality  
in the South Coast Air Basin – Past, Present, and Future**

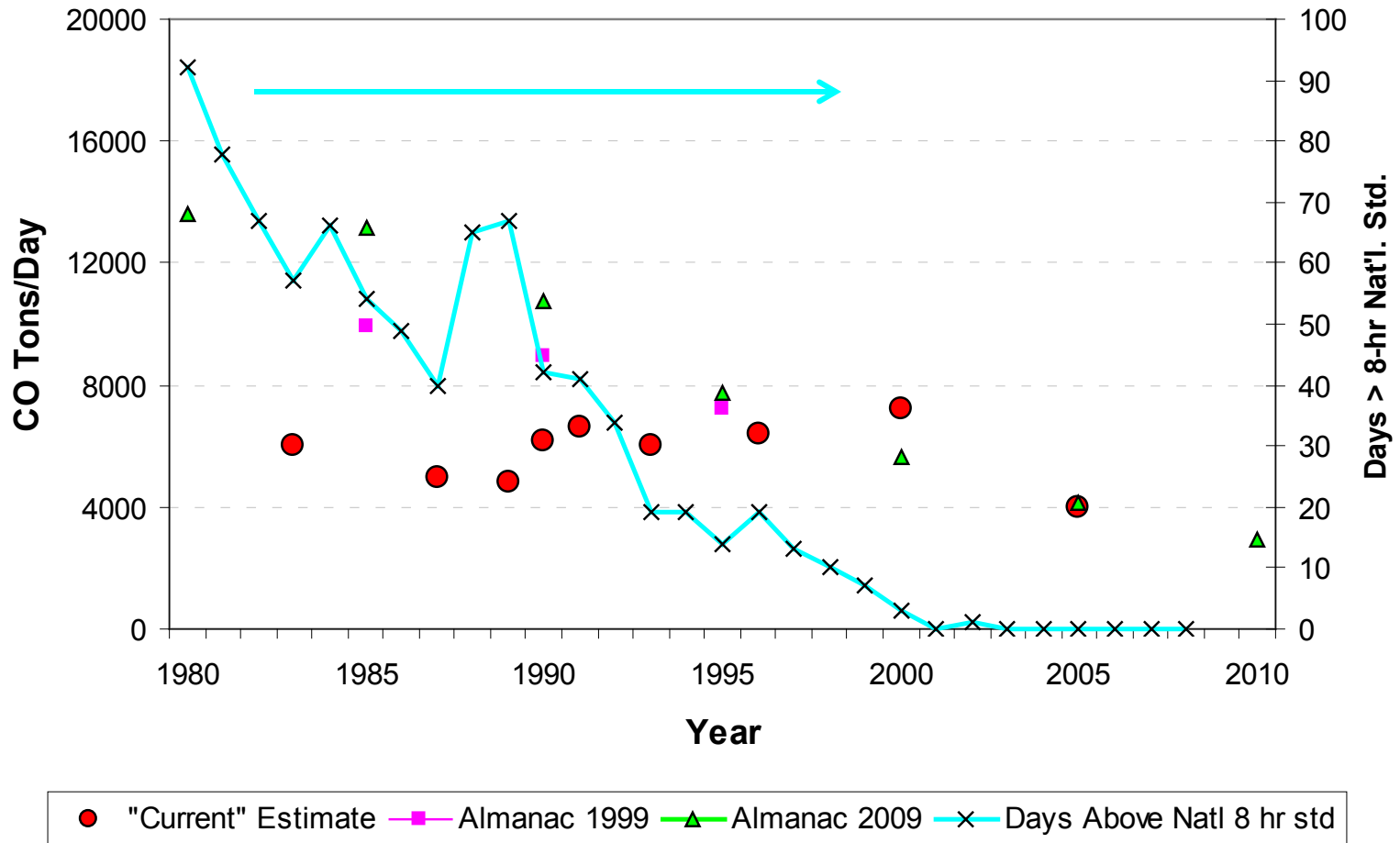
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Midwest Transportation Air Quality Summit  
Grafton, Illinois  
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# Outline of Presentation

- CO Trends – Ambient vs. Inventory
  - Easiest of all pollutants to understand
  - “Mostly” inert (especially at times of highest concentration – winter and night)
  - Easy to measure accurately
  - Dominant source at monitoring sites (mobile sources/at or near roads)
- Historical Reports and Predictions – focus on NMHC emissions
- Fleet Emissions and Standards
- What we’re doing in the Midwest
- What you’ll see here applies to PM, air toxics, and hot spots

# South Coast Air Basin Trends – CO Emission Inventory and Ambient Data

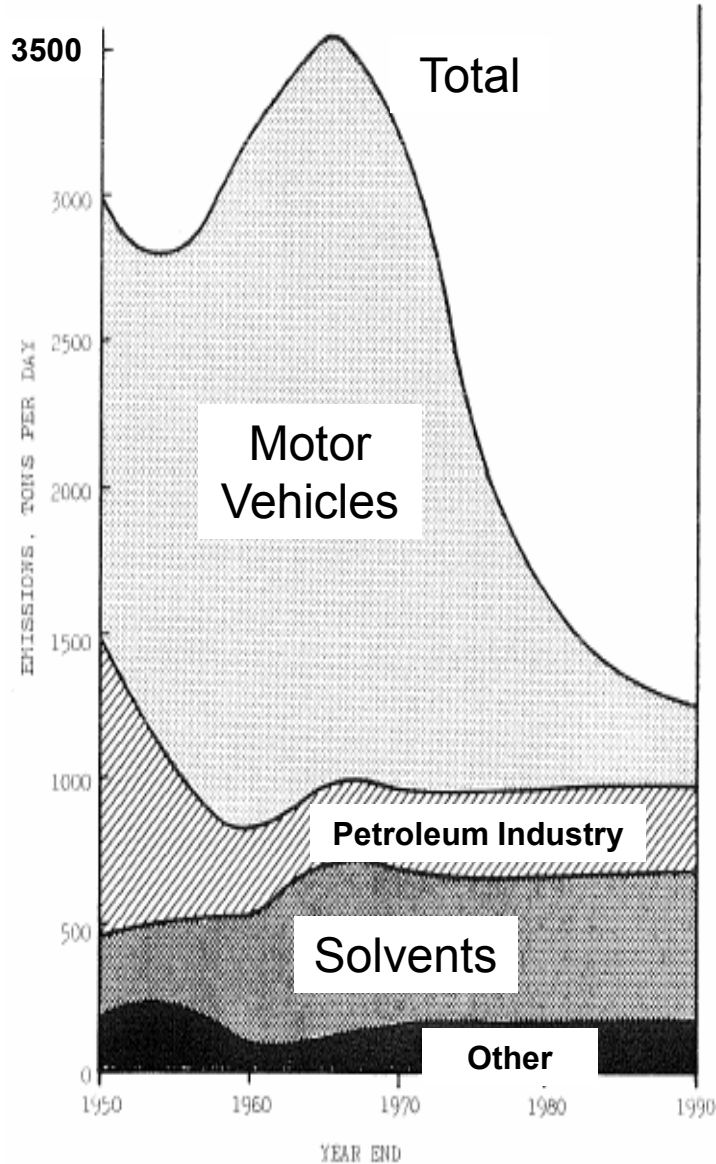


# ***“Air Pollution Control in California,” 1971 Annual Report***

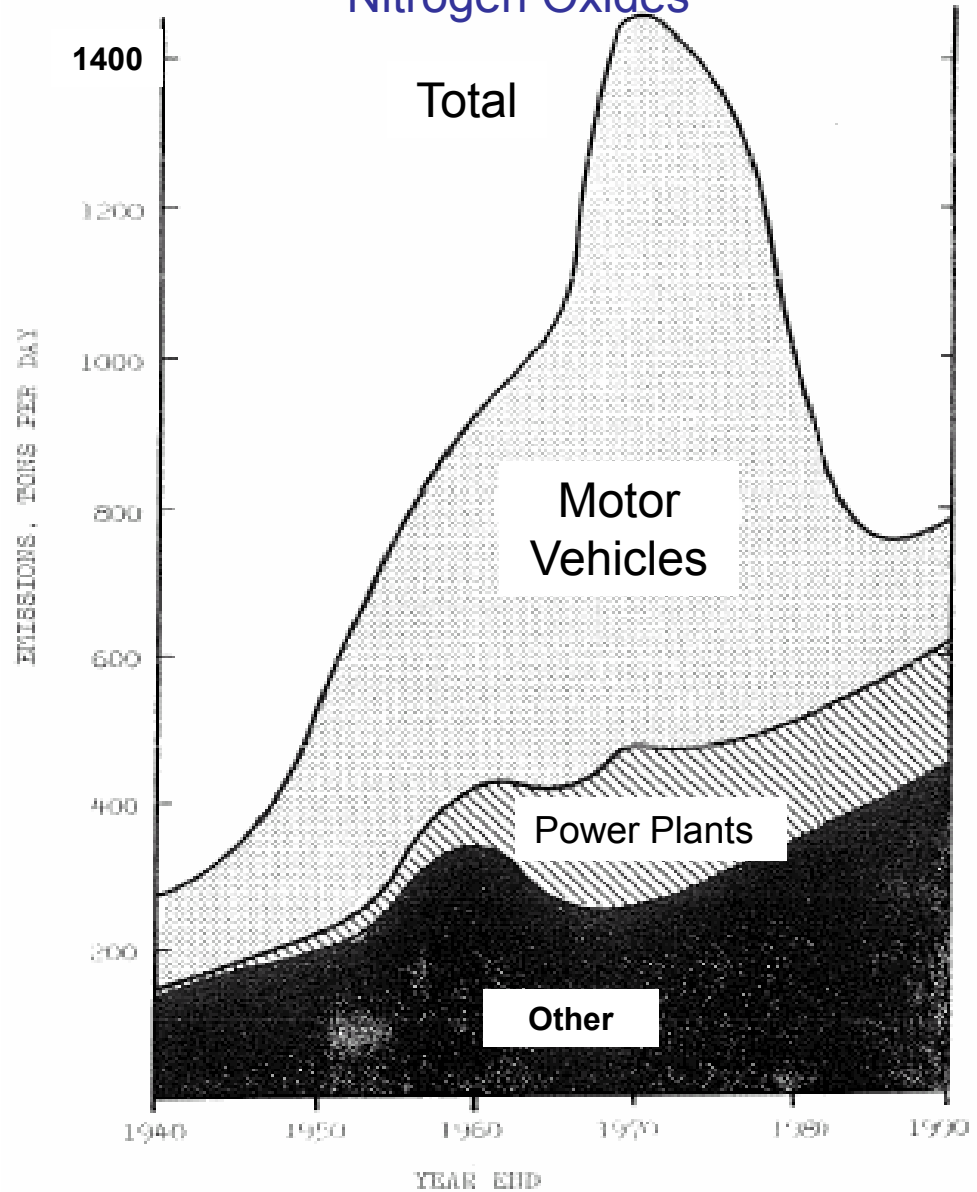
- “It is apparent that by 1980, motor vehicles will **not** be the major source of hydrocarbons and oxides of nitrogen, **and greater emphasis will have to be placed on emissions from nonvehicular sources.**” -- page 34.
- Sections titled “EVALUATION OF LOW EMISSION VEHICLES” and “NATURAL GAS AND LPG FUELED VEHICLES”
- Section titled “STEAM BUS TESTING” – “The emissions from the steam buses, V-8 diesel buses equipped with regular fuel injectors, were generally lower than those from the diesel-powered buses. The oxides of nitrogen were particularly lower than from the diesels. These preliminary results indicate that steam-powered vehicles show promise in reducing vehicular air pollutant emissions.” -- page 57.

# Estimates of South Coast Air Basin Emissions

## Hydrocarbons/Organic Gases



## Nitrogen Oxides



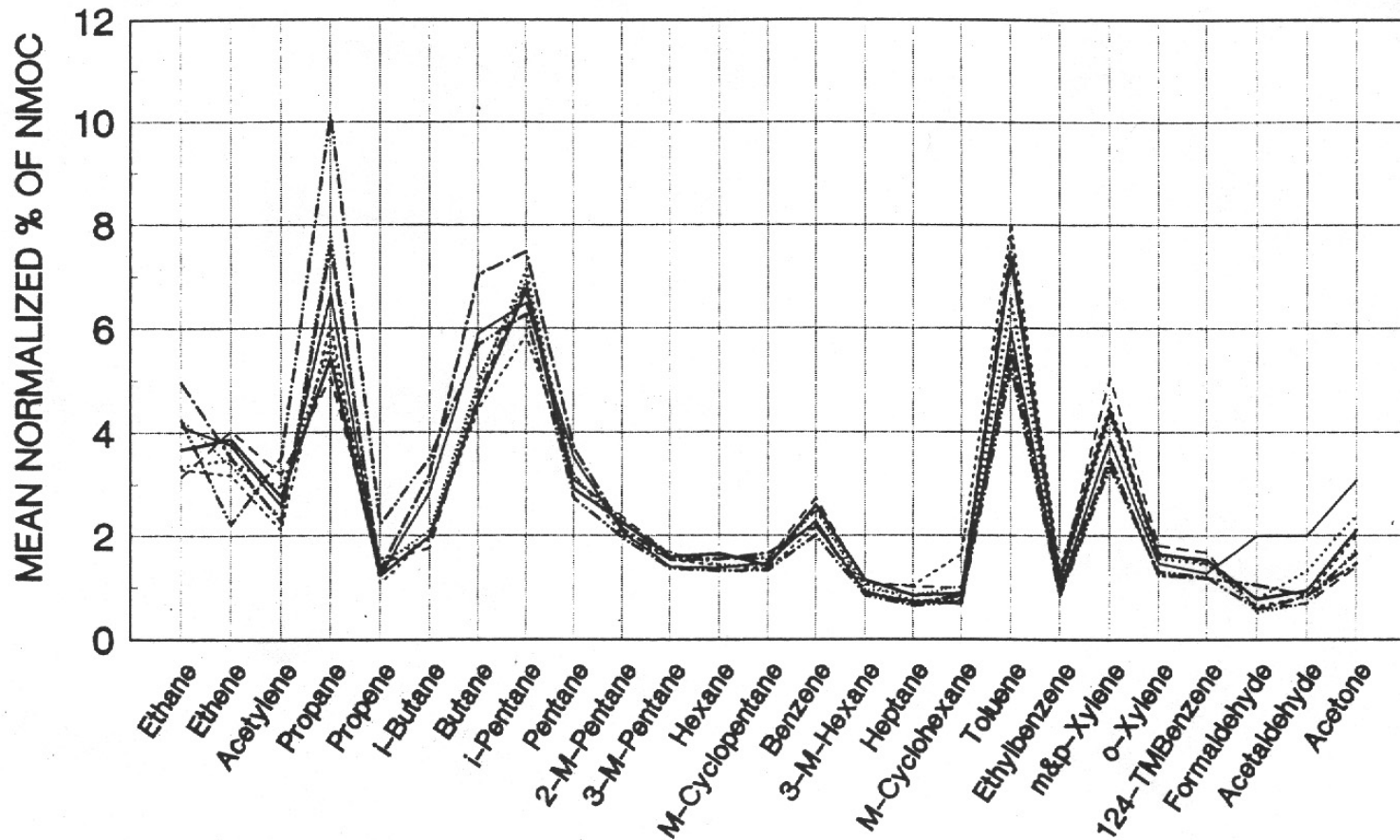
# ***“Air Pollution Control in California,” 1972 Annual Report***

- “Looking five years to the future, the attainment of the oxidant standards in the State’s metropolitan areas will be difficult and will not be possible in the South Cost Air Basin even though the Implementation Plan’s strategy represents a comprehensive control effort using practically all available control technology. The difference between the oxidant standard and the background is so little that the emission of relatively small quantities of hydrocarbons and oxides of nitrogen causes the standard to be exceeded.” -- page 37.
- “During 1972 the Board published results of its study of horse deaths due to lead poisoning in the Benicia area.” -- page 1.

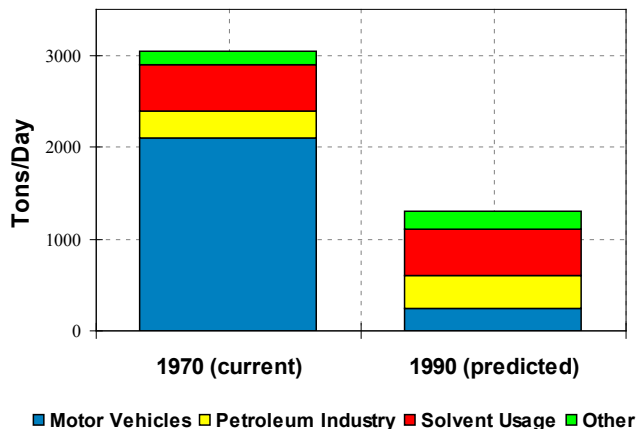
# *2003 Air Quality Management Plan,* South Coast AQMD

“Contribution to VOC by mobile sources is reduced due to the CARB programs. On the contrary, **area sources become major contributors to VOC emissions (from 28% in 1997 to 36% in 2010).**” -- Appendix 3, page III-2-15.

# Summer 1987 SCAQS Ambient Normalized NMOG Speciation – 8 sites – One Common Source?

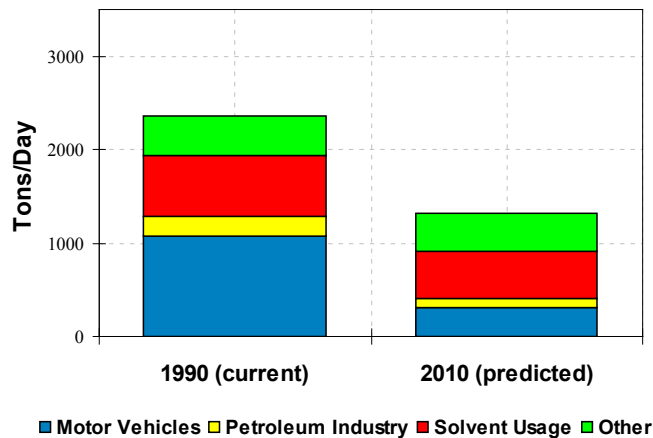


# South Coast Air Basin Hydrocarbon Inventories – Current vs. Predicted

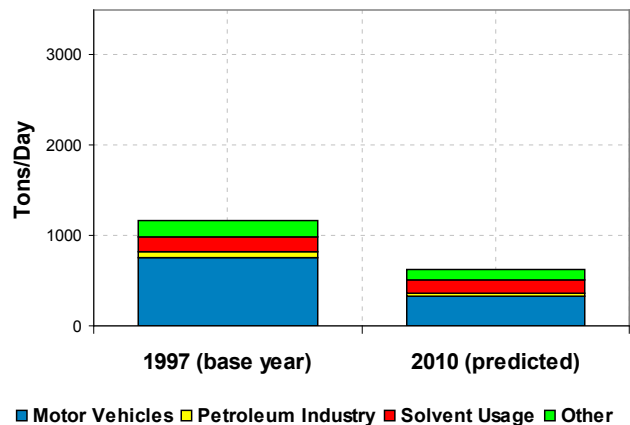


CARB,  
1972

ARB,  
SCAQMD,  
1990

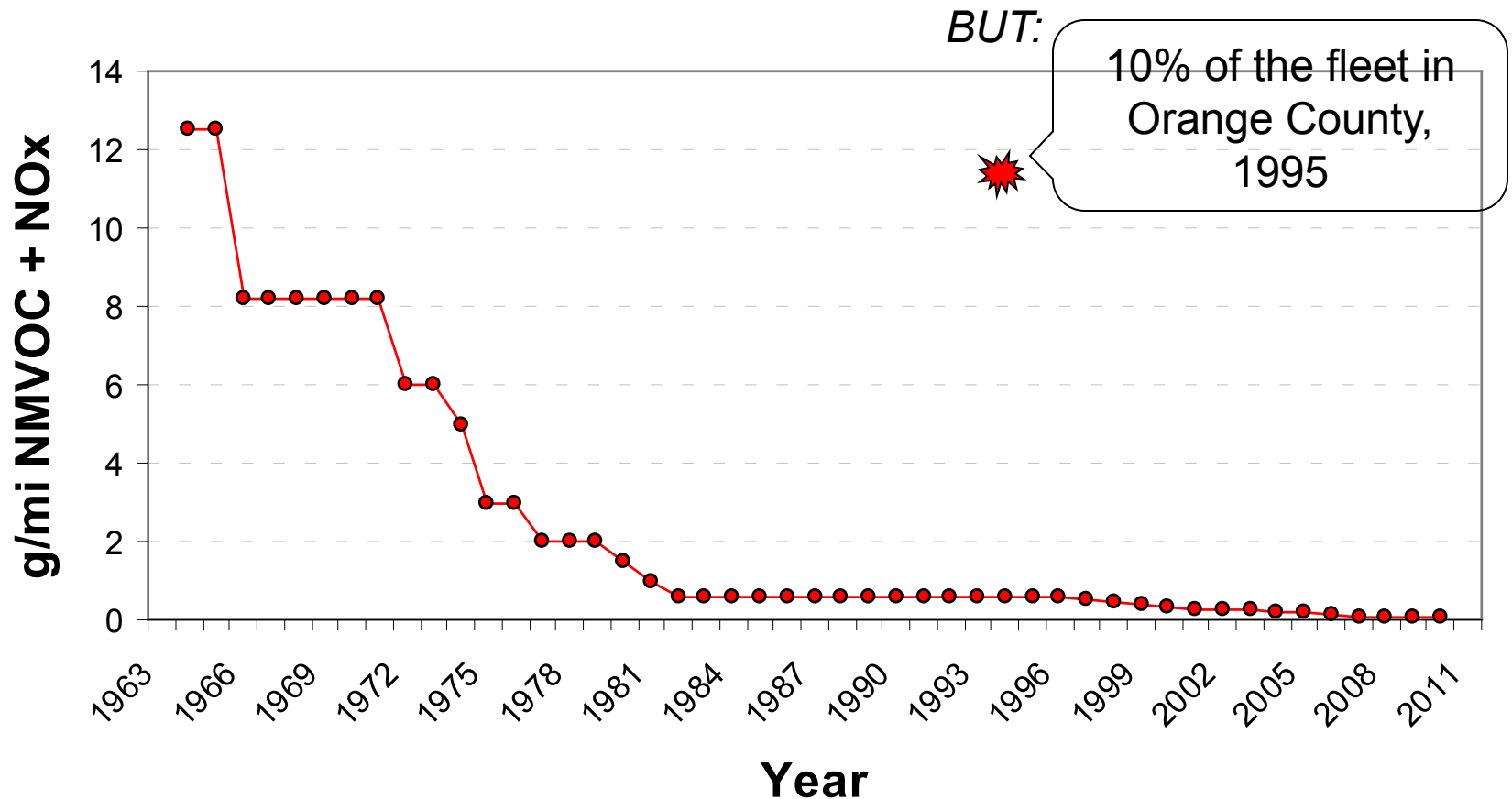


SCAQMD,  
2003 AQMP



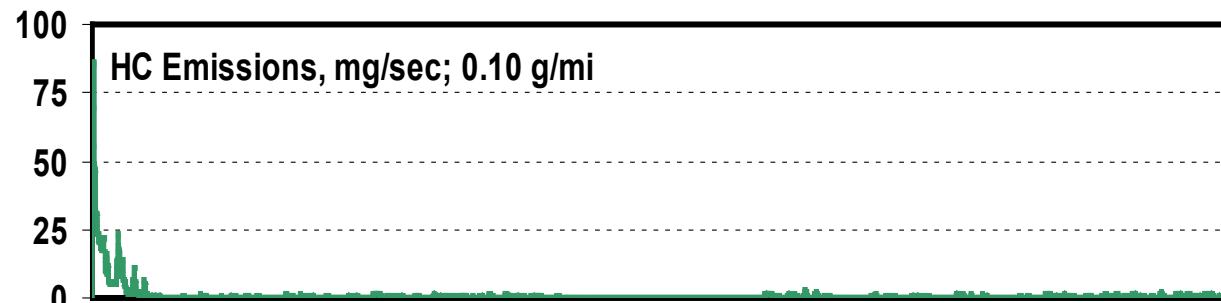
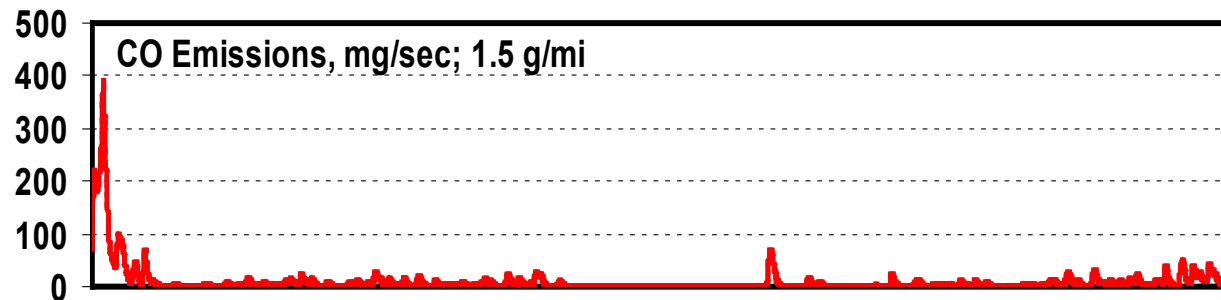
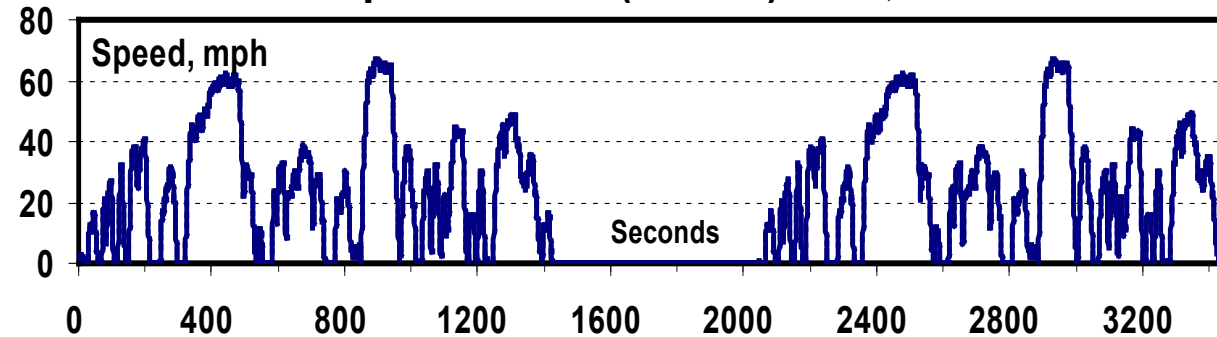
# Why are we having so much trouble meeting the ambient standards?

## California Auto Standards

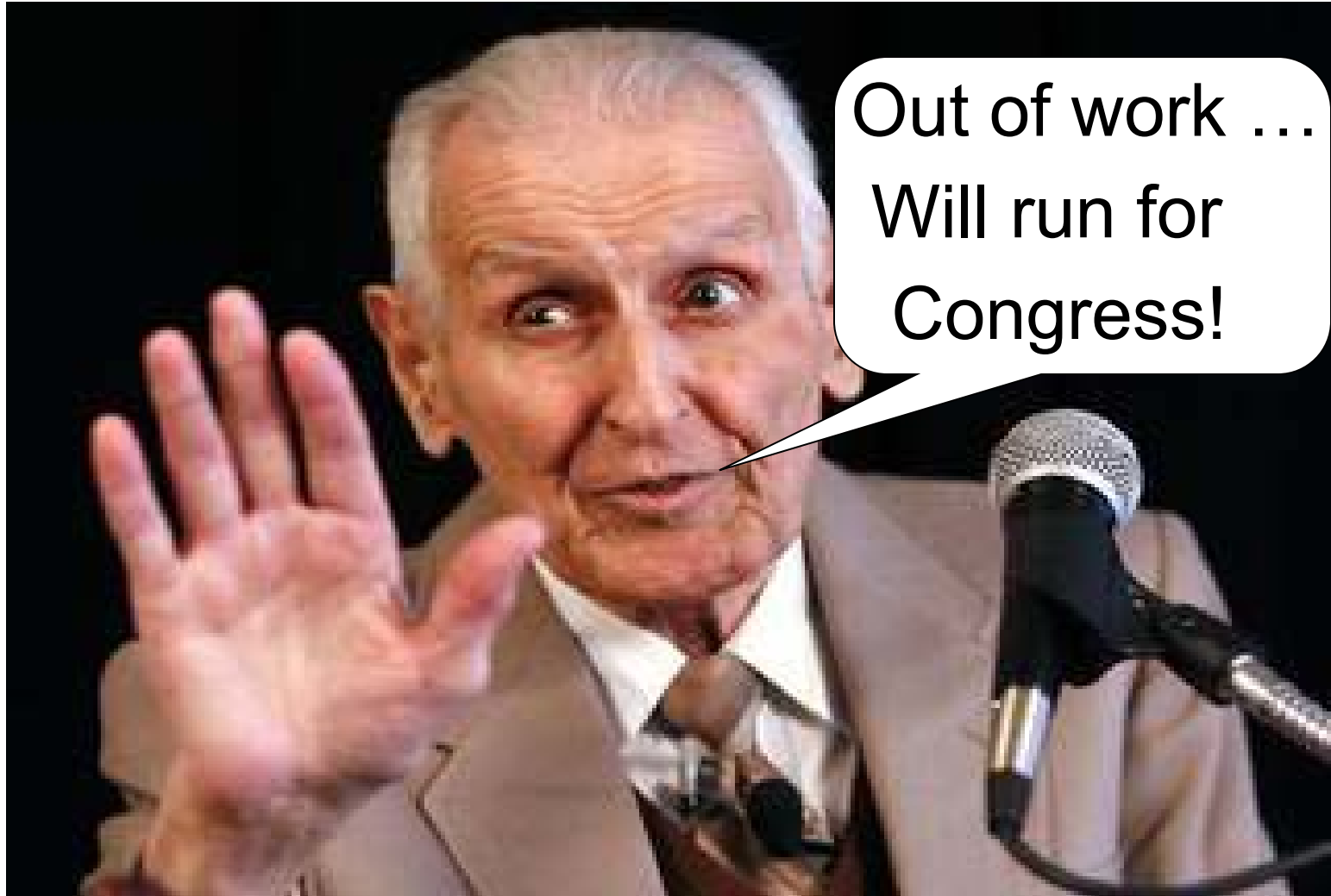


# Even 6-yr old SUVs are clean!

1995 Jeep Cherokee (No.1-4) -- 45,359 miles



# Jack Kevorkian – March 24, 2008



# What about PM?



Soot from the tailpipe of a low-mileage Prius at NREL

# PM Emissions from “Mobile Sources”



PM from light-duty vehicle “normal” emitter’s tailpipe = <1-2 mg/mile  
PM from new 2007-compliant heavy-duty diesel trucks = 1-4 mg/mile  
PM from Amy Winehouse’s open window at 60 mph = 5 mg/mile

# Existence of High Emitters first reported in 1983

“Thus, the 40 vehicles...account for only 12% of the vehicles tested, but they account for nearly half (47%) of the total CO emissions from vehicles tested...Since outliers contribute a large fraction of the total emissions, it is more important to know their contribution accurately than to know accurately the relatively minor contributions of low-emitting vehicles.” – Wayne and Horie, “Evaluation of CARB’s In-Use Vehicle Surveillance Program,” CARB Contract A2-043032, 1983 report to CARB.

# Nationwide On-Road Idle HC Emissions

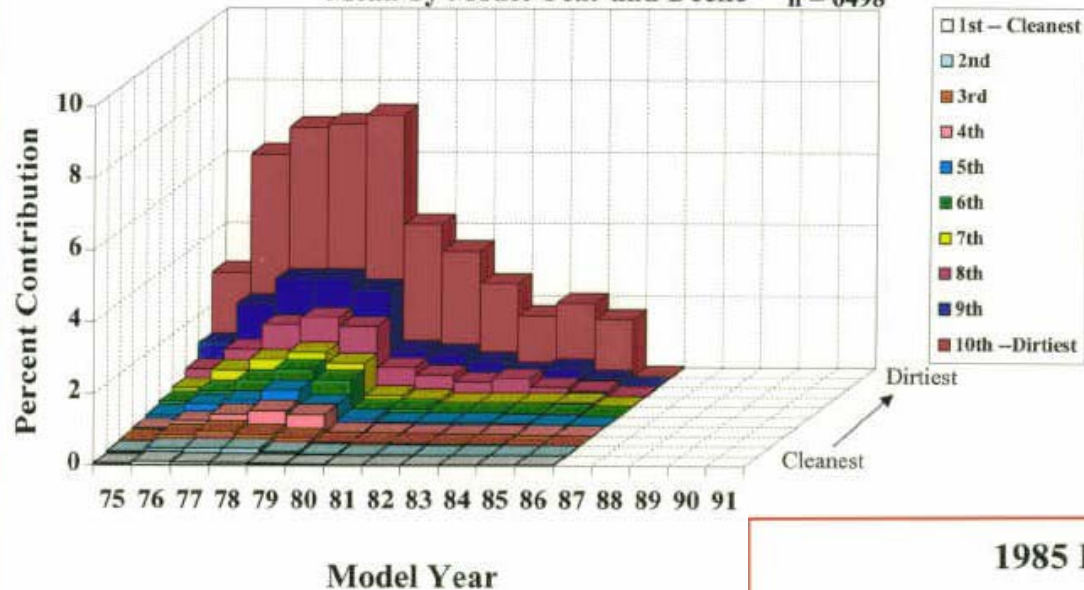
EPA's 1985 National Tampering Survey

6498 vehicles

## 1985 EPA National Tampering Survey

Contribution to Low Idle HC Emissions

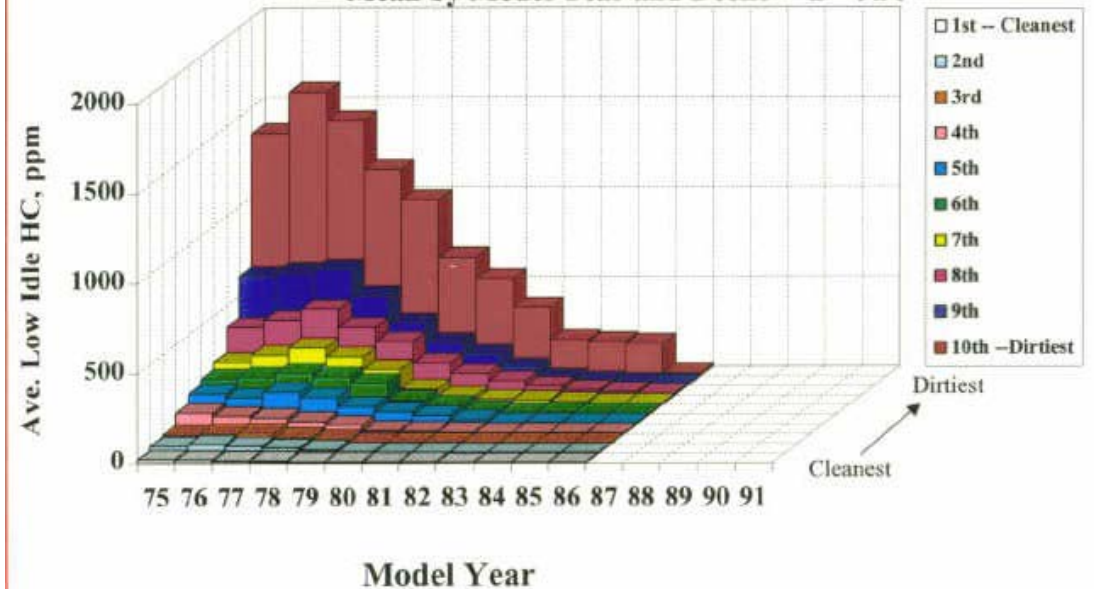
Mean by Model Year and Decile n = 6498



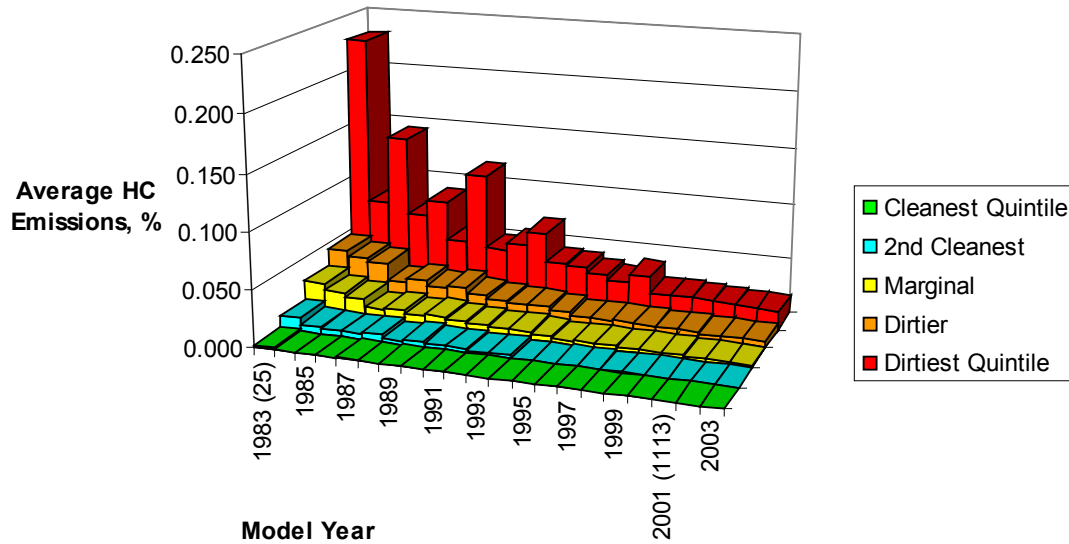
## 1985 EPA National Tampering Survey

Low Idle HC Emissions

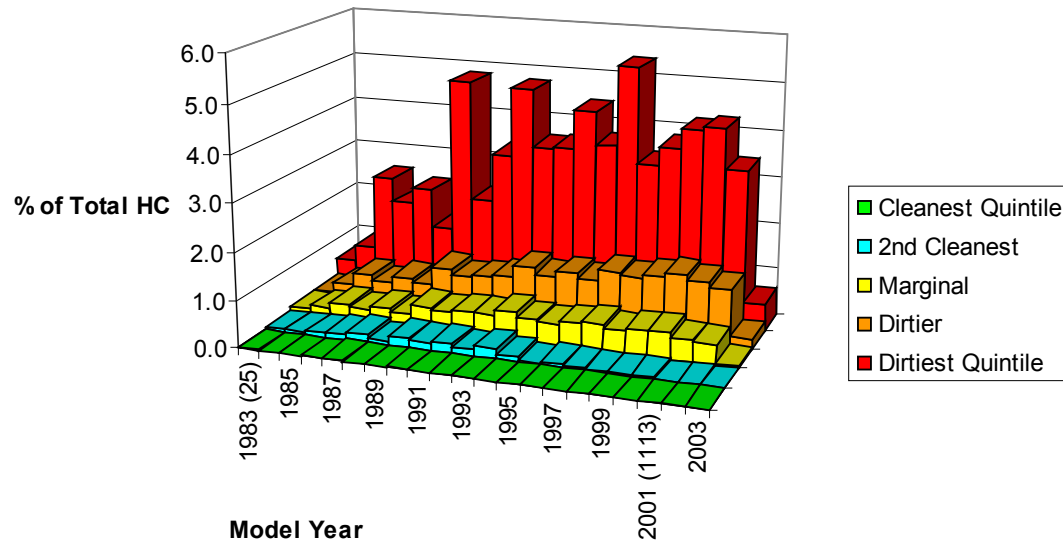
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# Remote Sensing HC Emissions by Quintile Speer Blvd./I-25 (Denver)



Dec. 3, 5, 6, 2002  
10,015 Measurements



# How to Verify Accuracy of Mobile Source Inventories

- Tunnel Studies – directly measure emissions of on-road vehicles
- “Top-down” ambient/inventory comparisons of VOCs and NO<sub>x</sub>
  - Exploit weekday/weekend differences in fleet activity and emissions
  - NREL funding a project in coordination with LADCO to compare ambient data with emission inventories in the Midwest
- Remote Sensing

If we have bad inventories, we get bad air pollution control policies!

# California Low-Emitting Vehicle (LEV)



“We easily forget that smog is the price of freedom of our streets from manure, and from the flies and diseases it brought.” – Daniel J. Boorstin (1914-2004), Librarian of Congress from 1975-1987.