



Clean Diesel Engine Implementation Workshop

Panel on Other
Perspectives
Chicago, August 7, 2003



Summary

- Review Concerns With Diesel Emissions
 - Health Effects From All Particles
 - Diesel Toxicity
 - Small Size (nano-particles)
- Fuel Sulfur Developments
- PM, NOx Technology Developments
- Conclusions



Health Effects From Diesel Emissions Beyond Dispute

- WHO Concludes ~ 800,000 Premature Deaths Each Year From Urban PM; Diesels One Major Source
- Numerous Studies in Europe & US Consistently Link PM With Premature Deaths, Hospital Admissions, Asthma Attacks, Etc.
- No Evidence of a Threshold
- Ozone Also A Serious Health Concern

PM - The Epidemiology Studies

- A Number of Epidemiology Studies

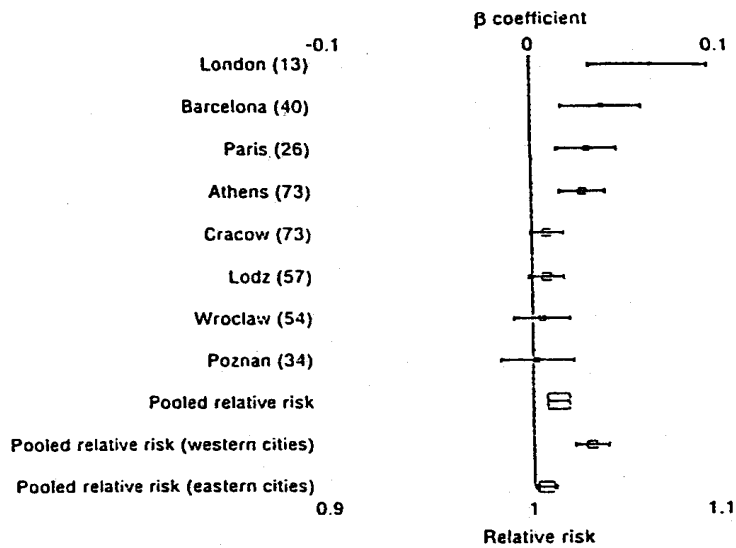
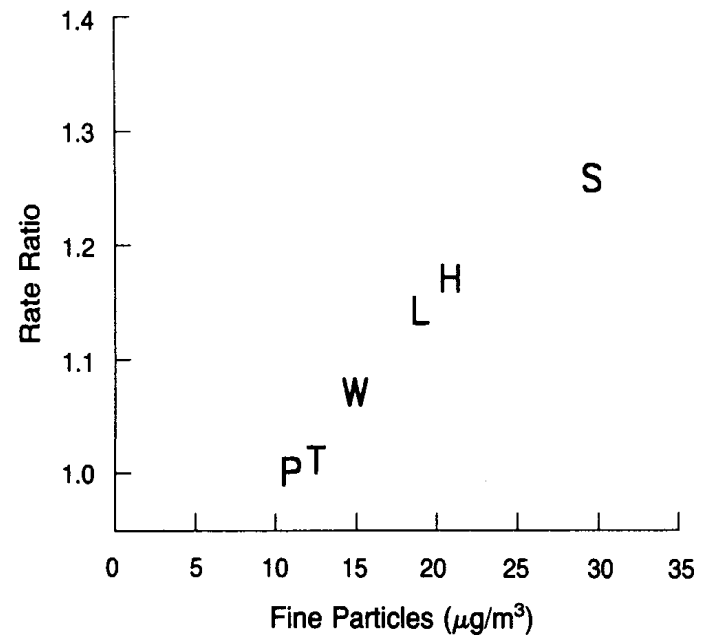


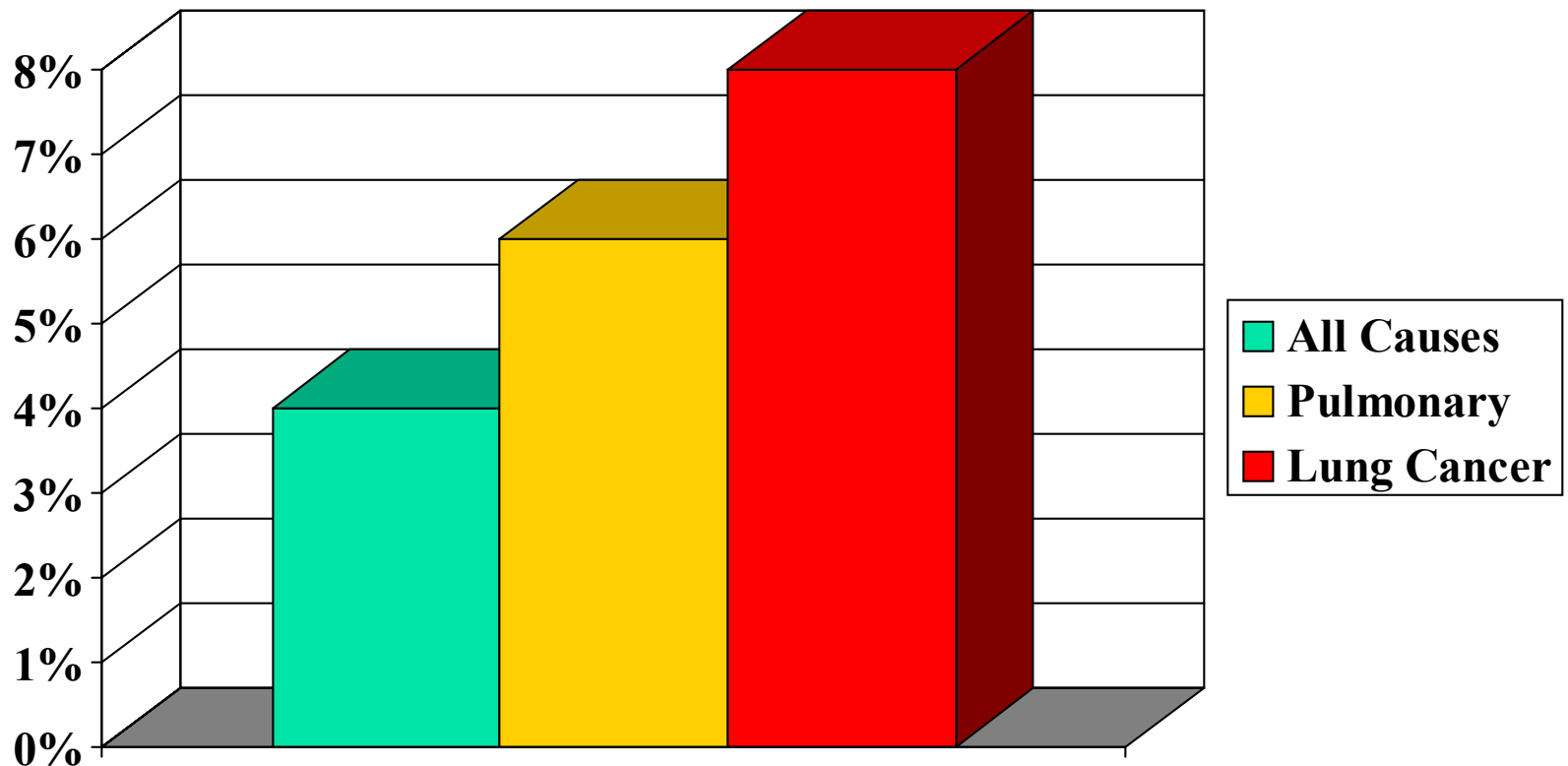
Fig 2 Estimated individual city and pooled relative risks of mortality associated with increase of $50 \mu\text{g}/\text{m}^3$ in black smoke levels. Numbers in parentheses are median value of pollutant, and the size of the point representing each relative risk is inversely proportional to its variance



Harvard 6 Cities Study

- Europe Studies

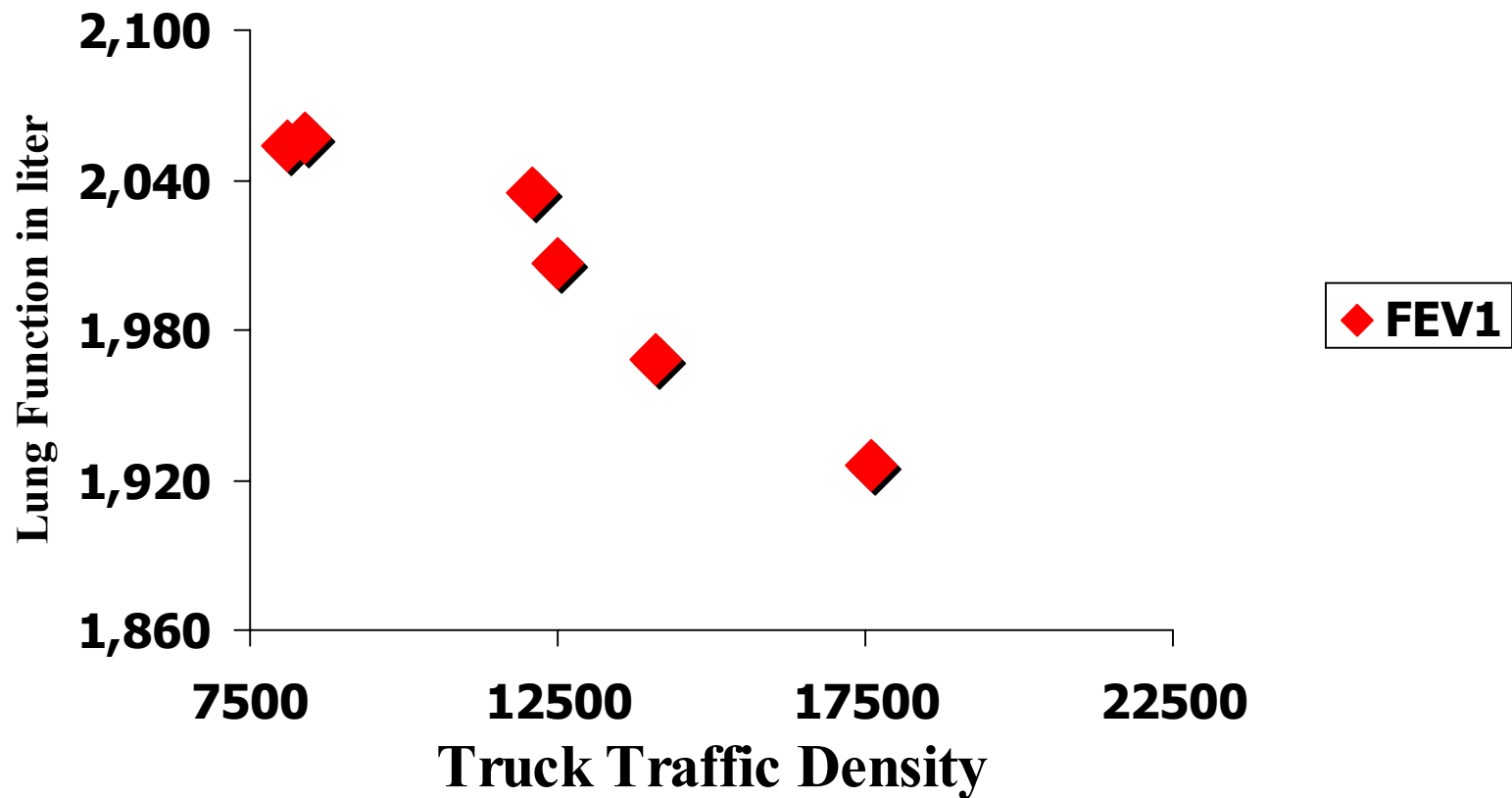
Increased Risk of Premature Mortality Due To $10\mu\text{g}/\text{m}^3$ $\text{PM}_{2.5}$



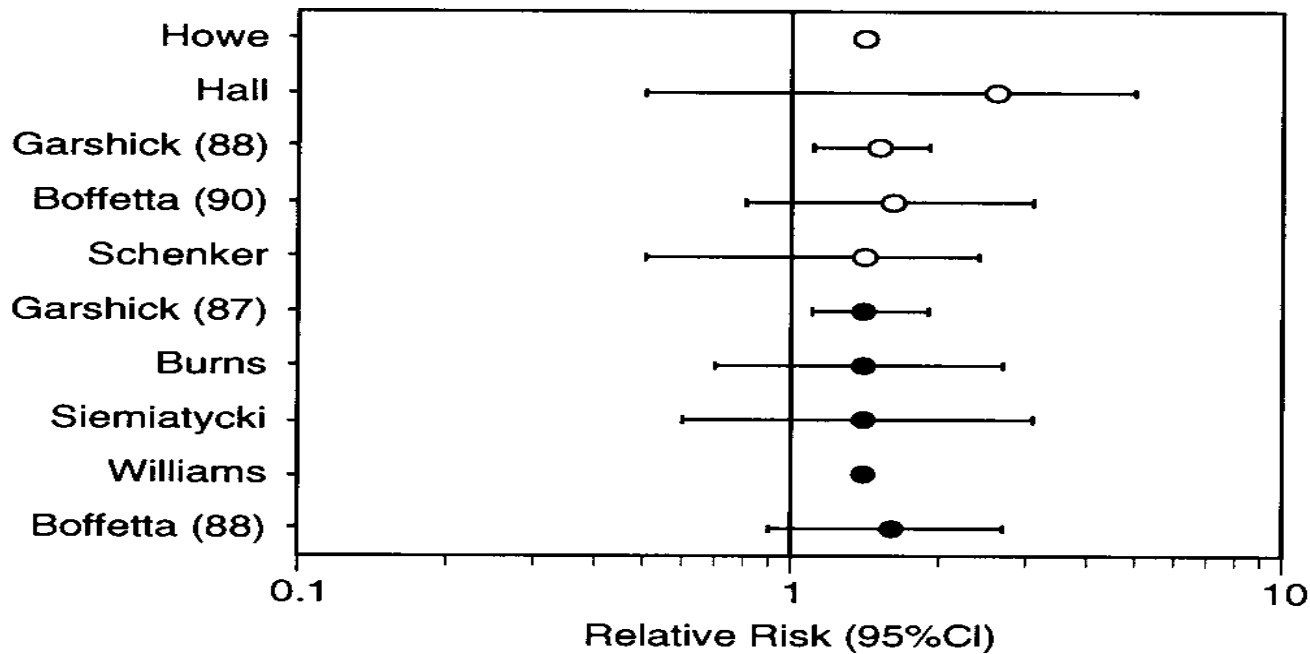
Journal of the American Medical Association, March 2002

Dutch Study Links Proximity To Truck Traffic With Lung Function

Bruneekreef, Epidemiology 1997; 8: 298-303

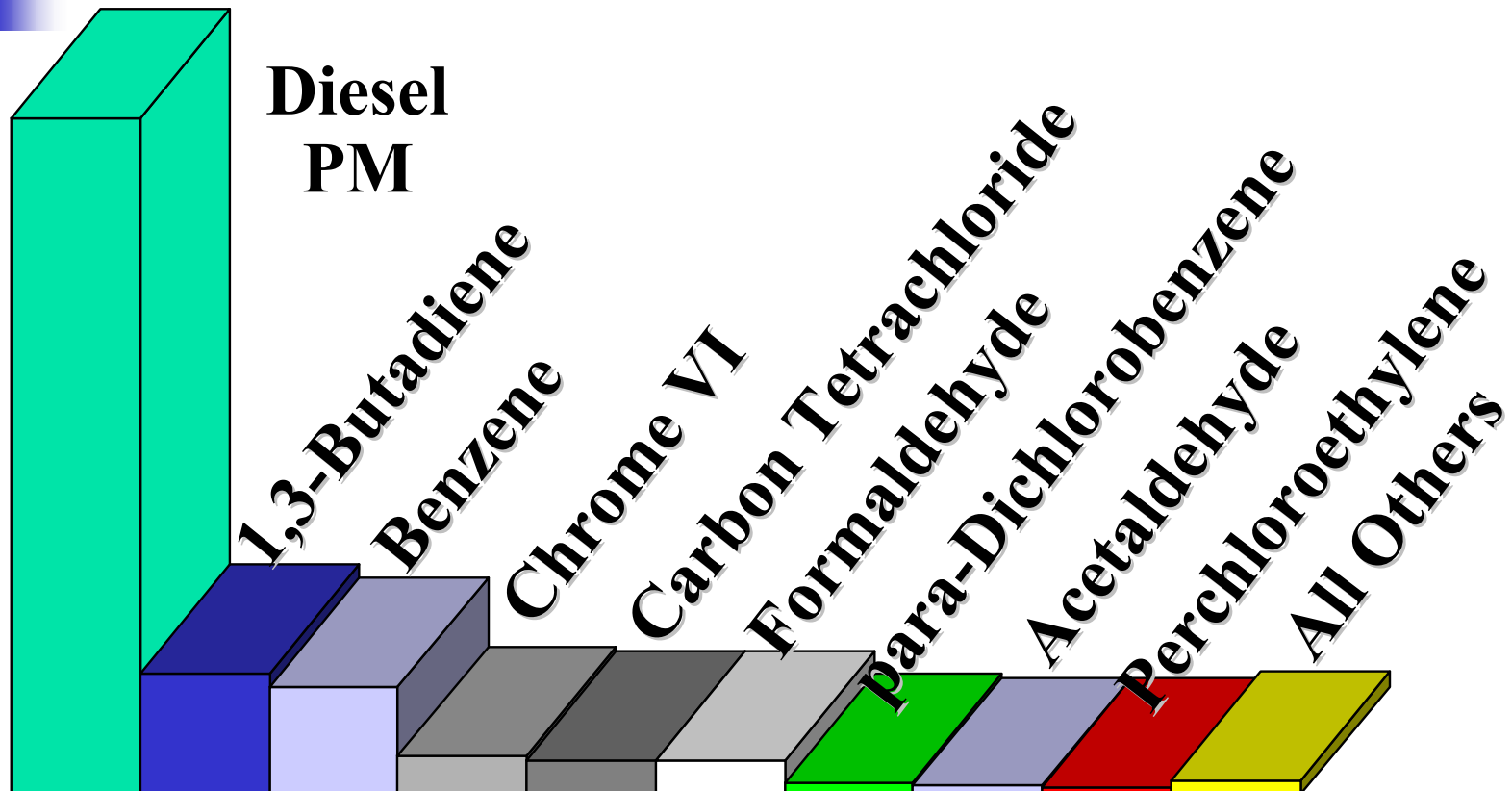


Cancer Studies in Railroad Workers



Source: Health Effects Institute

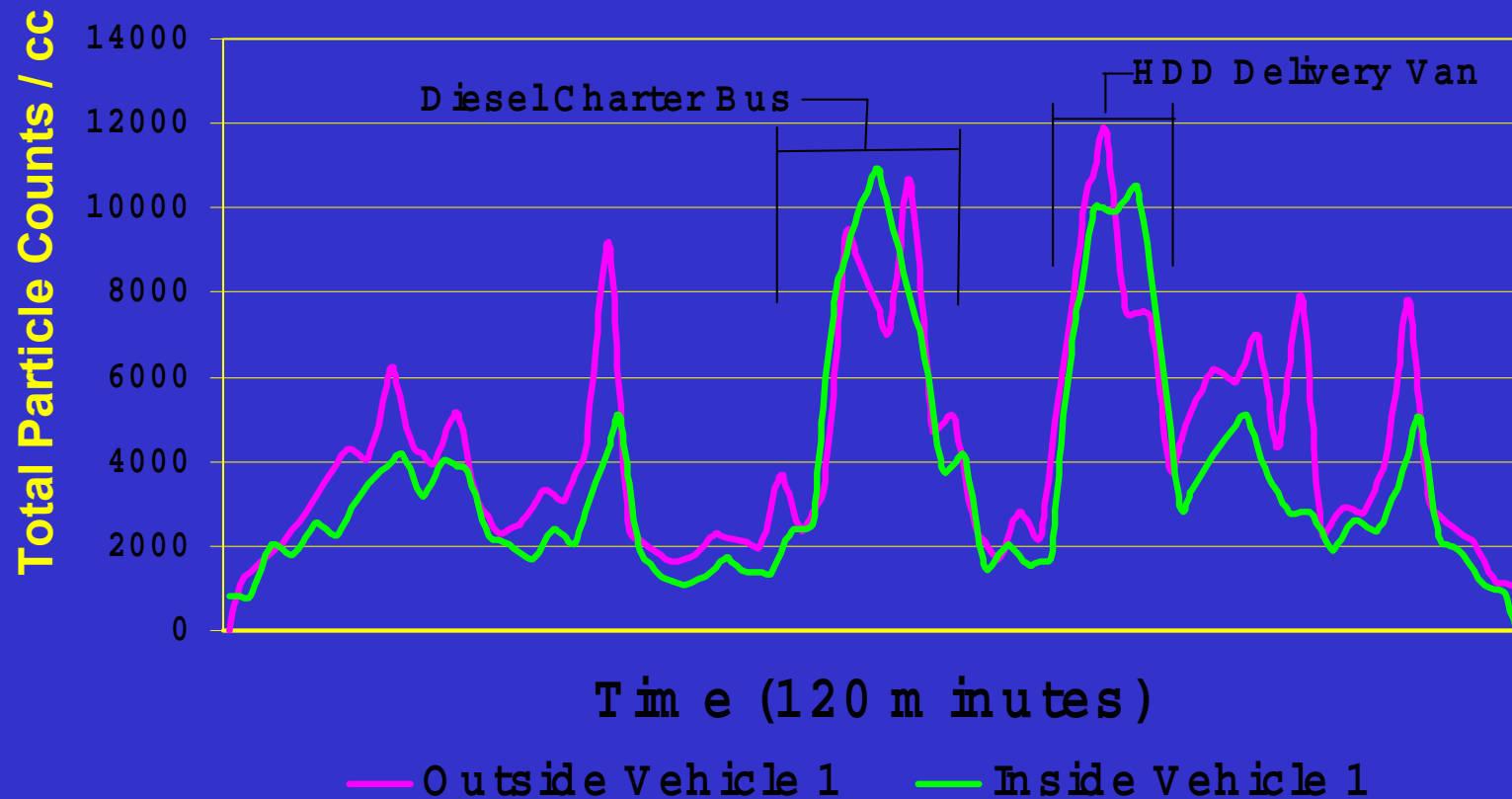
Relative Cancer Risks



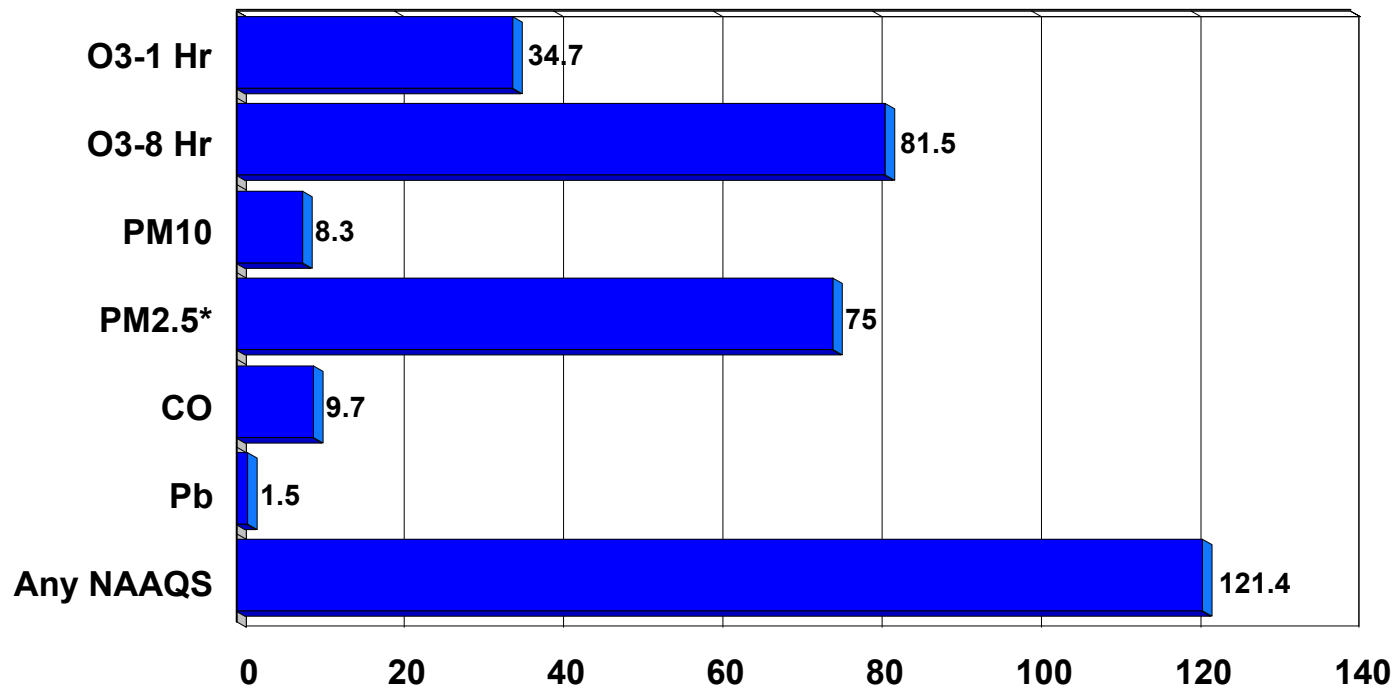
Based on ARB monitoring data 1995 - 1997

ARB In-Vehicle Study Real-Time Fine Particle Counts

(L.A. Freeway, AM Rush Hour, Vent Open)



Number of People Living in Areas Exceeding Air Quality Standards in the US



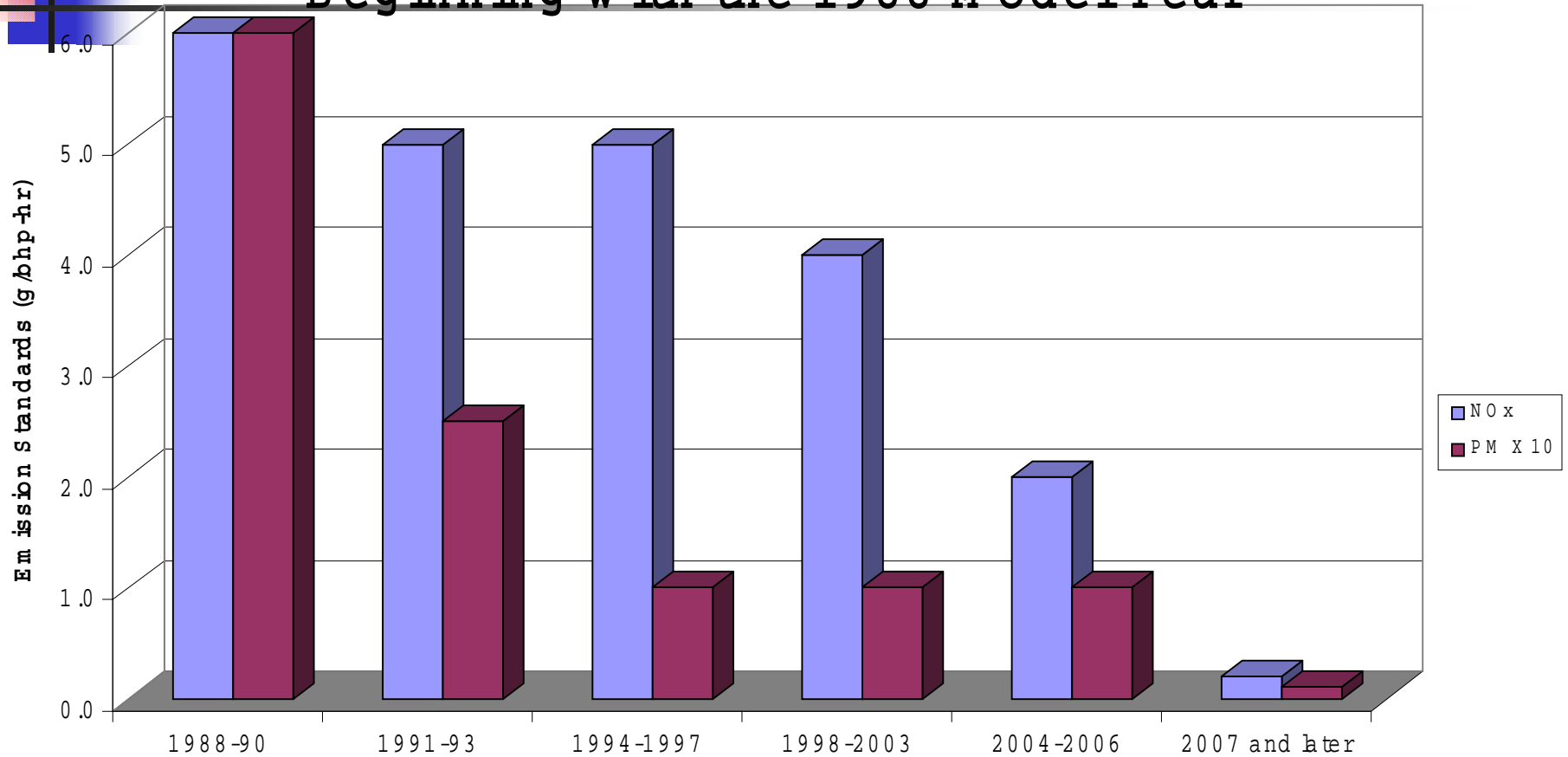
EPA 454/K-01-002
September 2001

*= this number will likely increase

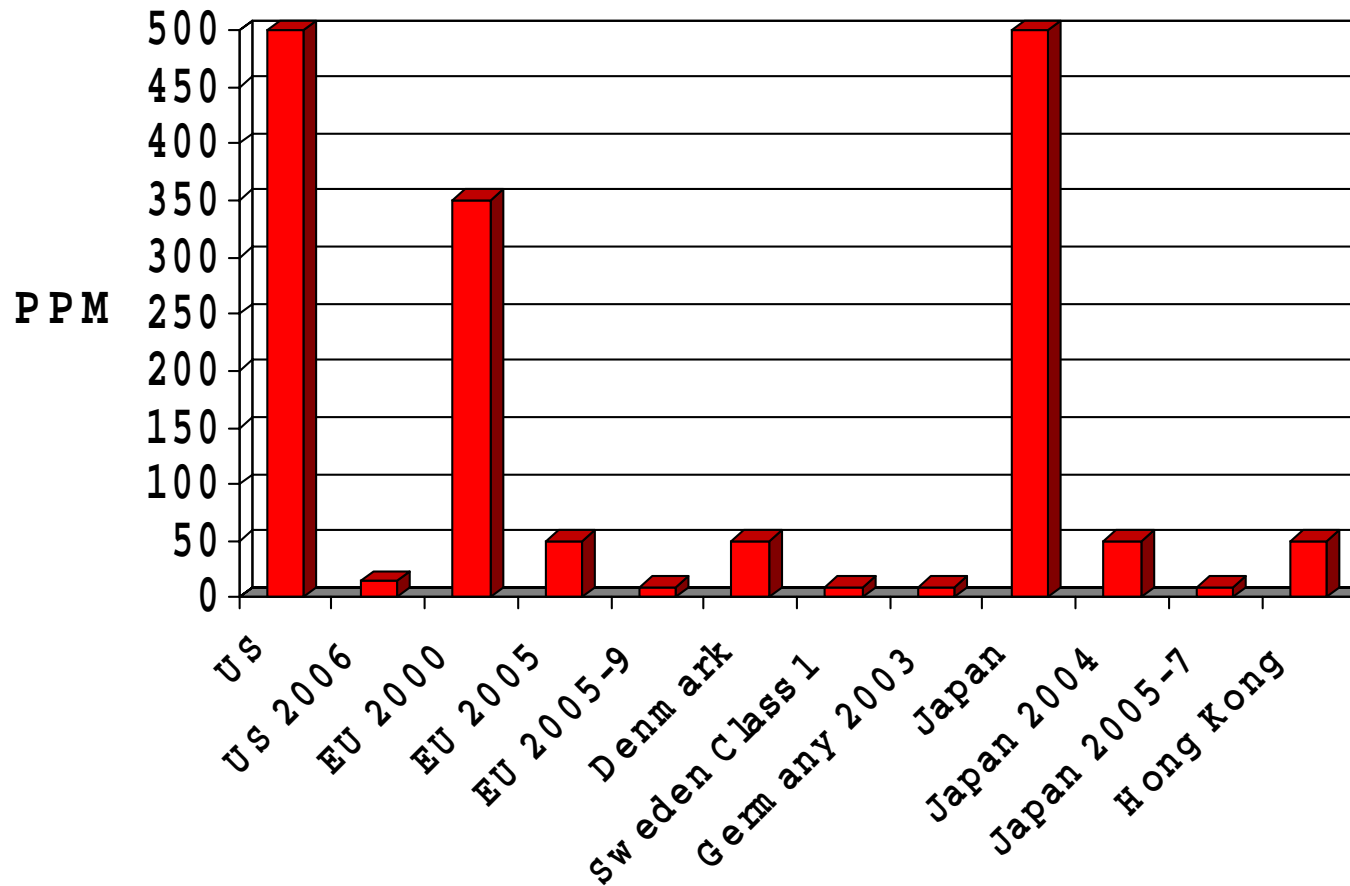
•As more PM 2.5 Data become

•Available

United States and California On-road Truck Engine Standards, Beginning with the 1988 Model Year



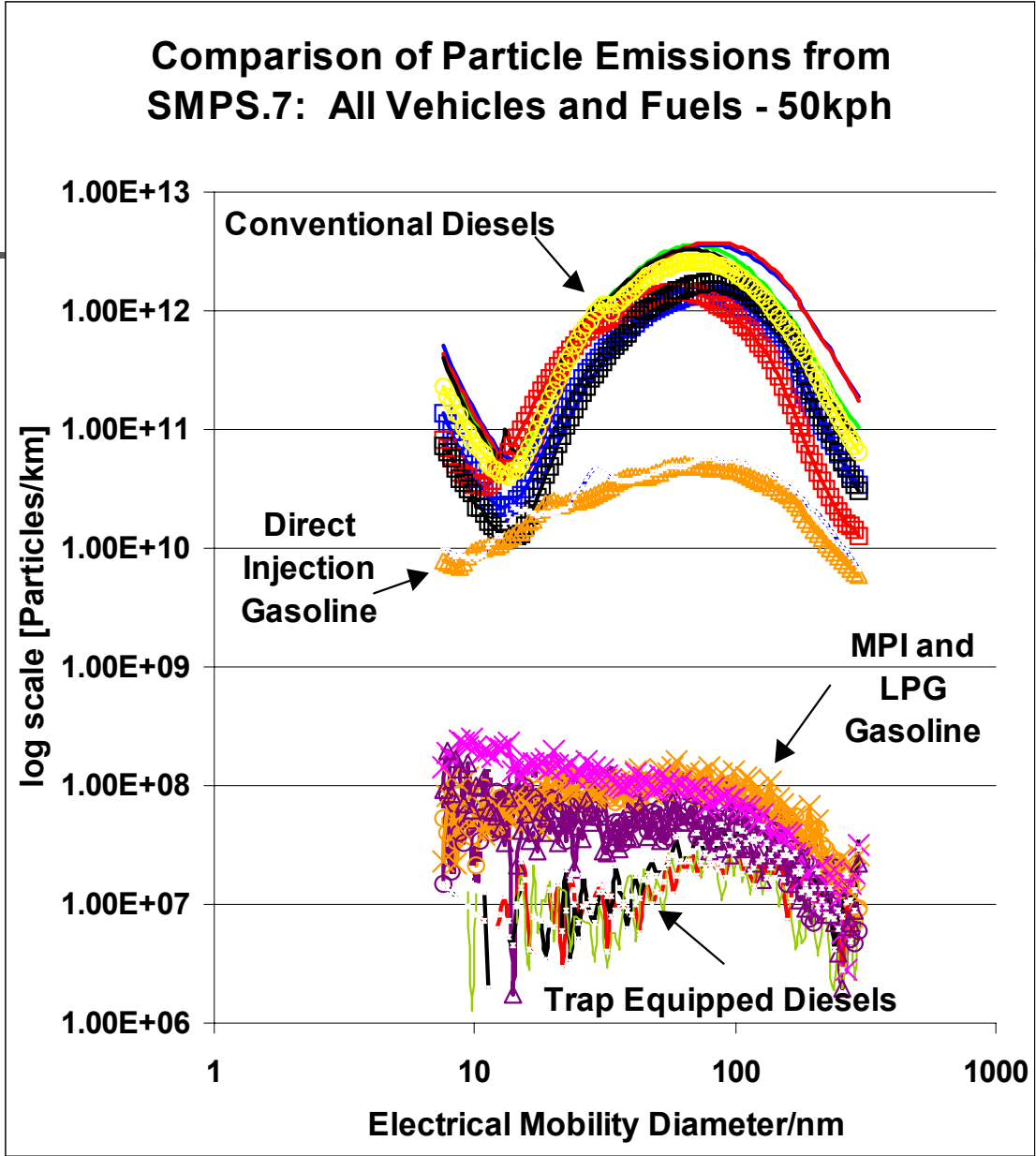
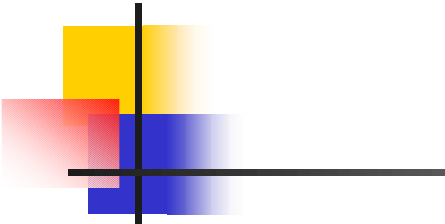
Ultra Low Sulfur Diesel Fuel Is Spreading





Diesel PM Filters Are Now Widespread

- Over 500,000 New Cars in Europe
- Retrofitted on Thousands of Vehicles Worldwide (e.g., Sweden since '96)
- Will Be On 100% of New Diesel Vehicles in Japan by 2005
- International Already Certified & Cummins & Caterpillar On Track For 2007





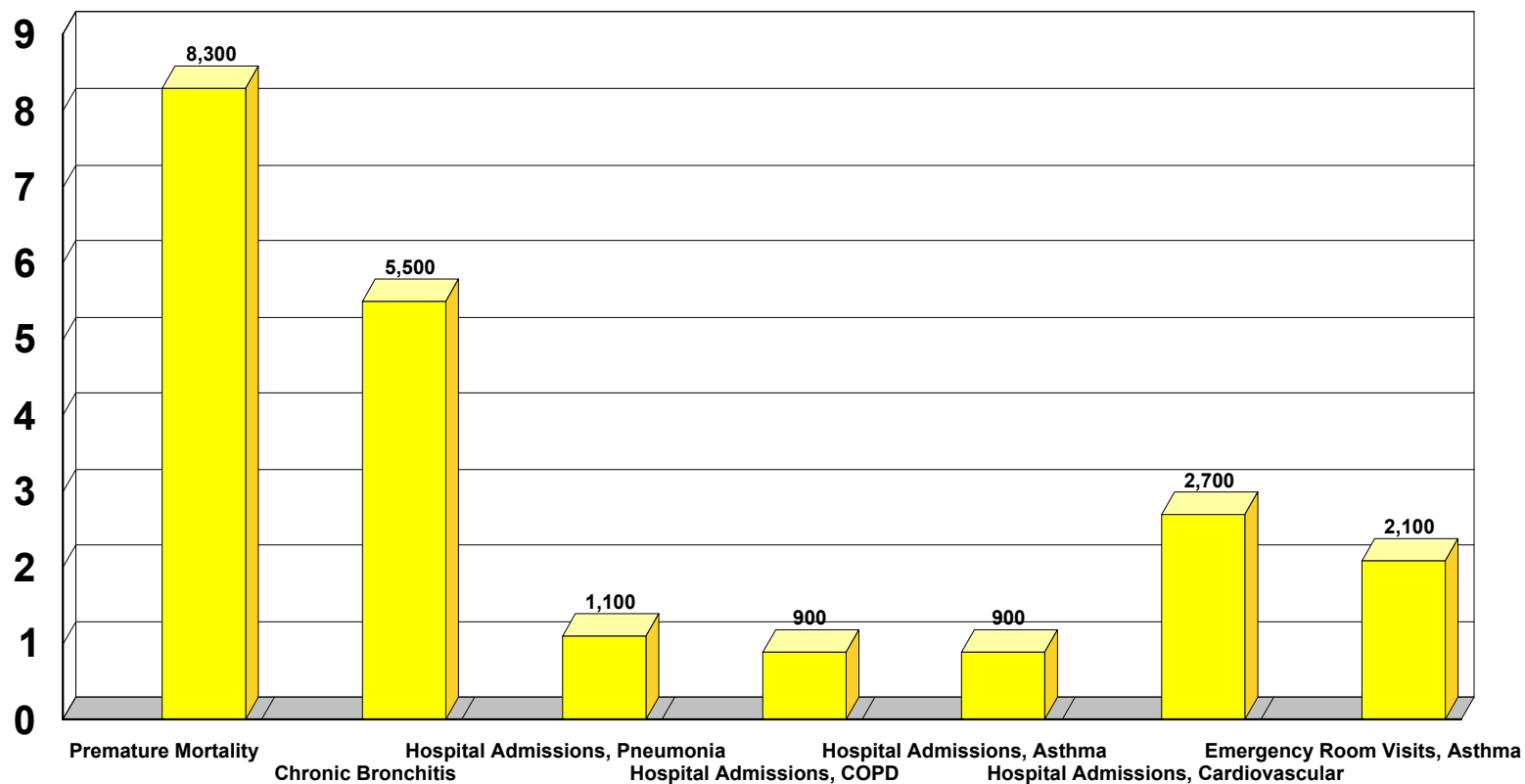
NOx Control Developments Are Where They Need To Be At This Point

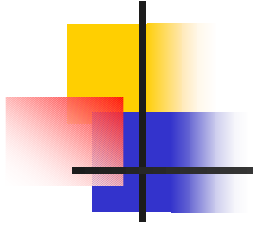
- NOx Aftertreatment Will Not Be Needed Before 2010
 - (over 6 more years lead time is available which is extraordinary)
- DeNox Catalysts Are Where They Need To Be At This Point According To Independent Diesel Review Panel – No Show Stoppers!
- SCR Is Also An Available Option
 - Infrastructure Remains A Concern
 - Places Refueling Burden on Truckers Instead of Engine Makers

Expected Benefits of Heavy Duty Truck Rule (PM Only)

Avoided Incidences Per Year

Thousands





Thank You for Your
Attention !