

Failing the Grade: Why Clean School Buses Matter!

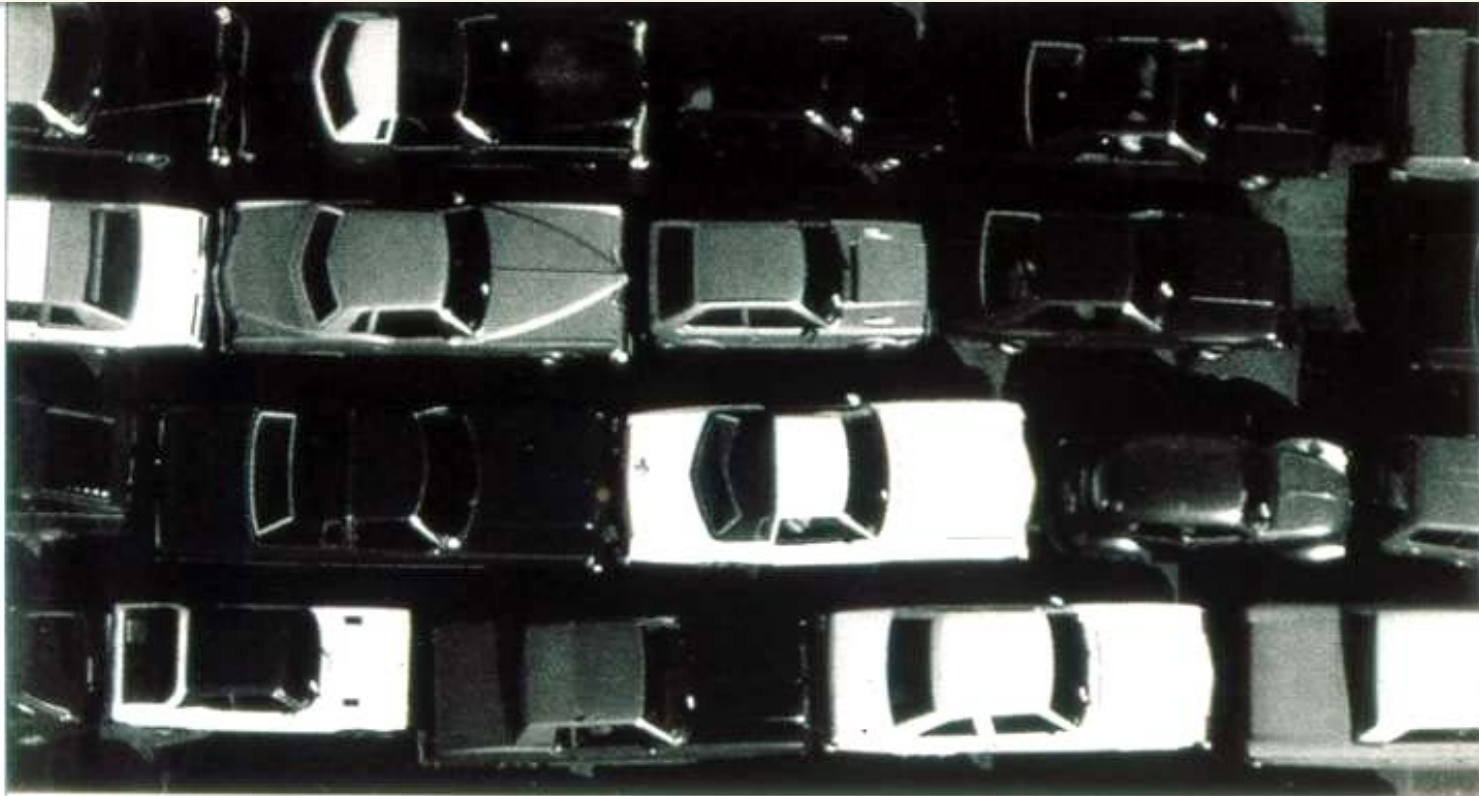
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Natural Gas School Bus Seminar
Lido Beach, NY

June 28, 2006

Thank you for your invitation!



LA: Once you're here, you'll never move.

AGENDA

- Air pollution impacts on Children's Health
- Key School Bus Studies
- Natural Gas: "The" Clean School Bus Strategy
- Conclusions

Why are school children at risk?

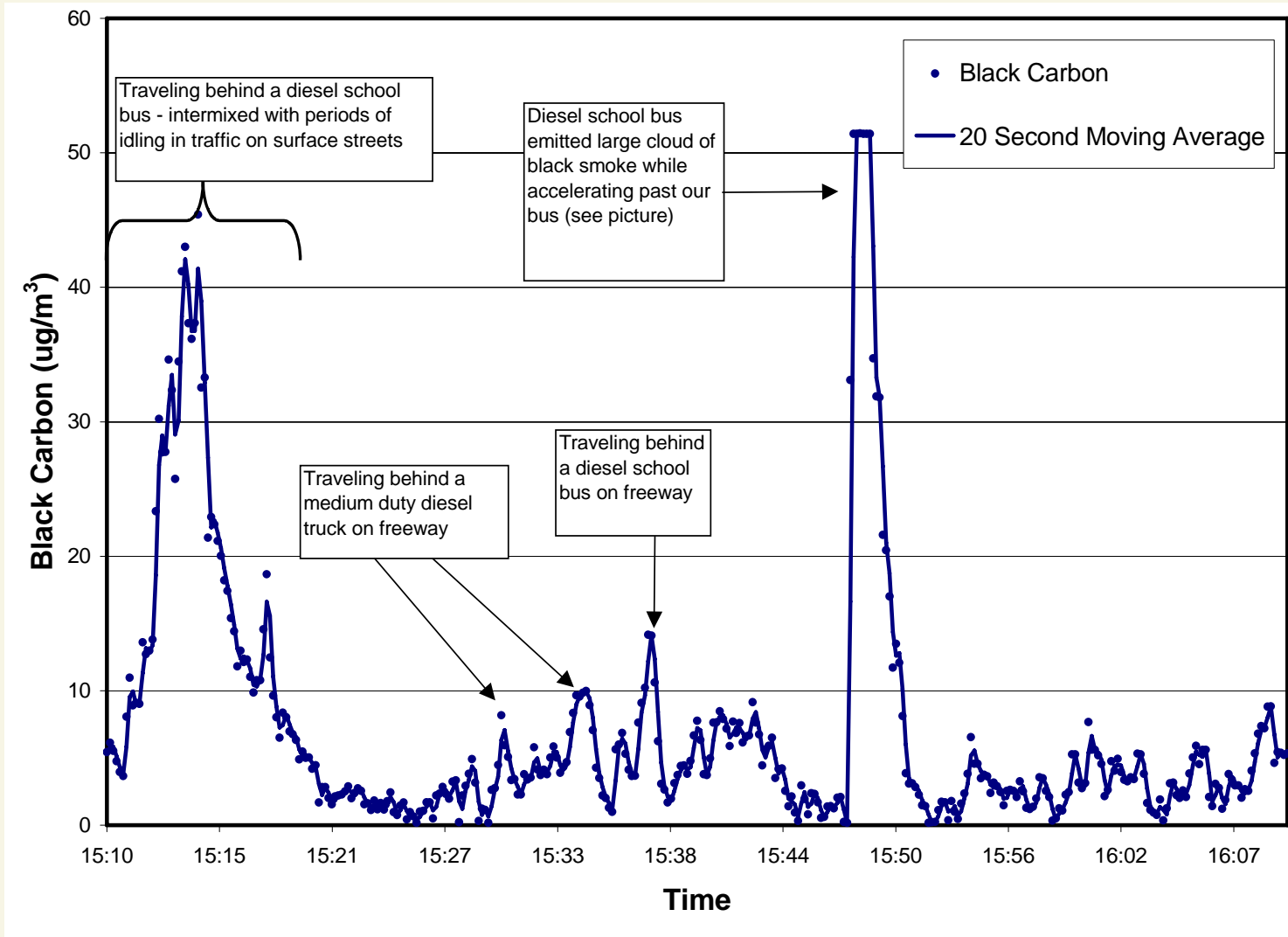
- Children are a vulnerable population
- Majority of school buses in U.S. are powered by diesel engines and diesel exhaust PM is a Toxic Air Contaminant
- Children may be exposed to high concentrations of diesel particles and gases during bus commutes, at school bus stops, or at loading/unloading zones
- Some children in southern California spend up to three hours a day on school buses

Key School Bus Studies:

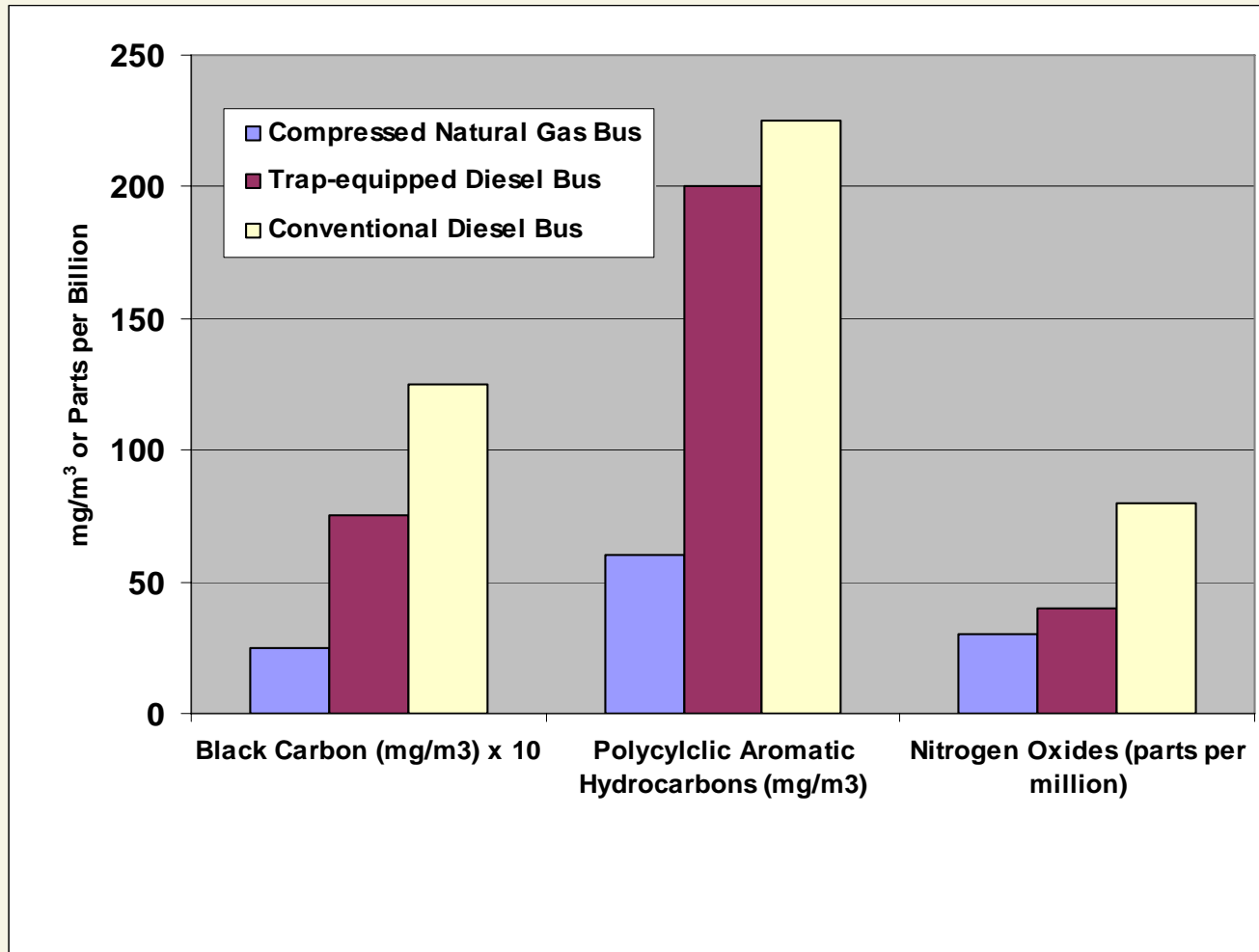
Coalition for Clean Air, NRDC, ALA, ED, UCS, Yale School of Forestry, UCLA Particle Center, etc.



UCLA In-Vehicle Measurements

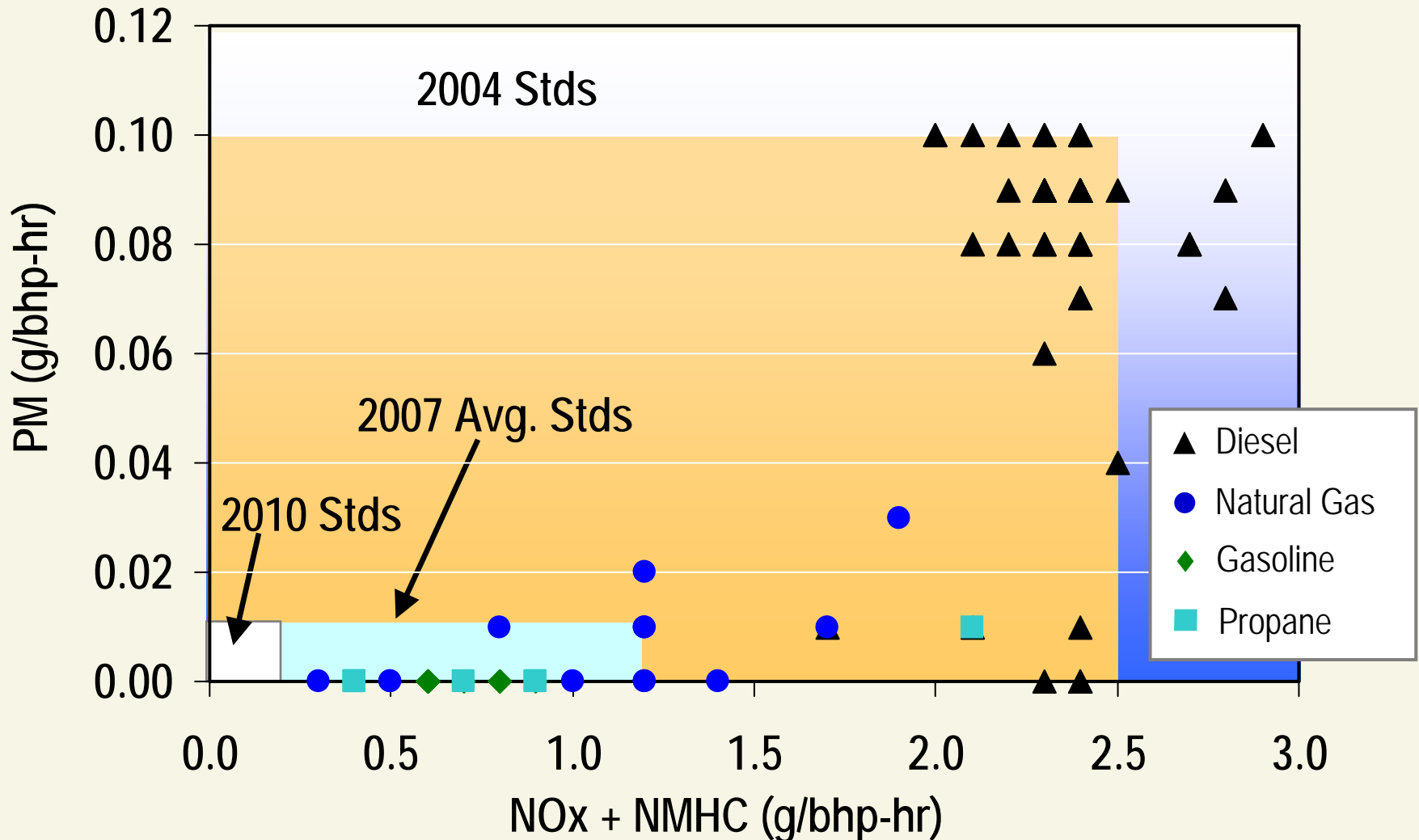


Comparing Onboard Pollution by Fuel (with Windows Closed)



2006 On-Road Heavy-Duty Engine Certifications

(as of May 19, 2006)



Future Diesel Alternative Technologies

Technology	NOx Reduction	PM Reduction
<u>New Technologies</u>		
Hybrids (Gasoline)*	~80%	90% + (oxidation catalyst)
Hybrids (Diesel)*	~25%	90% + (diesel trap)
<u>Future Technologies Under Development</u>		
Natural Gas (Yr 2007)**	>85%	90% + (oxidation catalyst)
Gas-to-Liquids	0-14%	20-55%
EGR (Yr 2007)	50%	Needs Trap
SCR (Yr 2010)	> 85%	Needs Trap
NOx Adsorbers (Yr 2010)	> 85%	Needs Trap
Fuel Cells (compressed hydrogen)	100%	100%

* Initial Orders for Hybrid Buses Placed by Transit Agencies

** Two Engine Manufacturers Indicated That They Will Produce Natural Gas Engines at 0.2 g/bhp-hr

Key Findings!

- In terms of exposure, bus commutes are much more important than bus stops or loading-unloading zones.
- Peak pollutant concentrations occurred for close proximity to other diesel vehicles and when idling (due to bus's own exhaust).
- Impact of a bus's own exhaust is most important when windows are closed due to self-pollution.
- Cleaner fuels (e.g. CNG) are the best way to reduce pollutant concentrations inside the bus.

Conclusions

- School bus emissions can pose a significant health risk to children as they are a susceptible population
- Natural gas school buses provide significant pollutant reductions that make the safest way to get to school “safer”
 - Inherently cleaner fuel, requires less controls
 - Will meet 2010 emission standards in 2007
- Natural gas school buses are cost effective
 - Federal Vehicle Tax Incentive (32K) + fuel savings
 - Public/private partnerships



Thank You!

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