Natural Gas Vehicles For Heavy-Duty Applications

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ARB Diesel Toxicity Advisory Committee

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What is Natural Gas?

- "natural gas is just another by-product from refining oil.... burned off at oil refineries as waste....,"

California Trucking Association,
***Caltrux*5/31/99**

Average California Pipeline Gas Composition

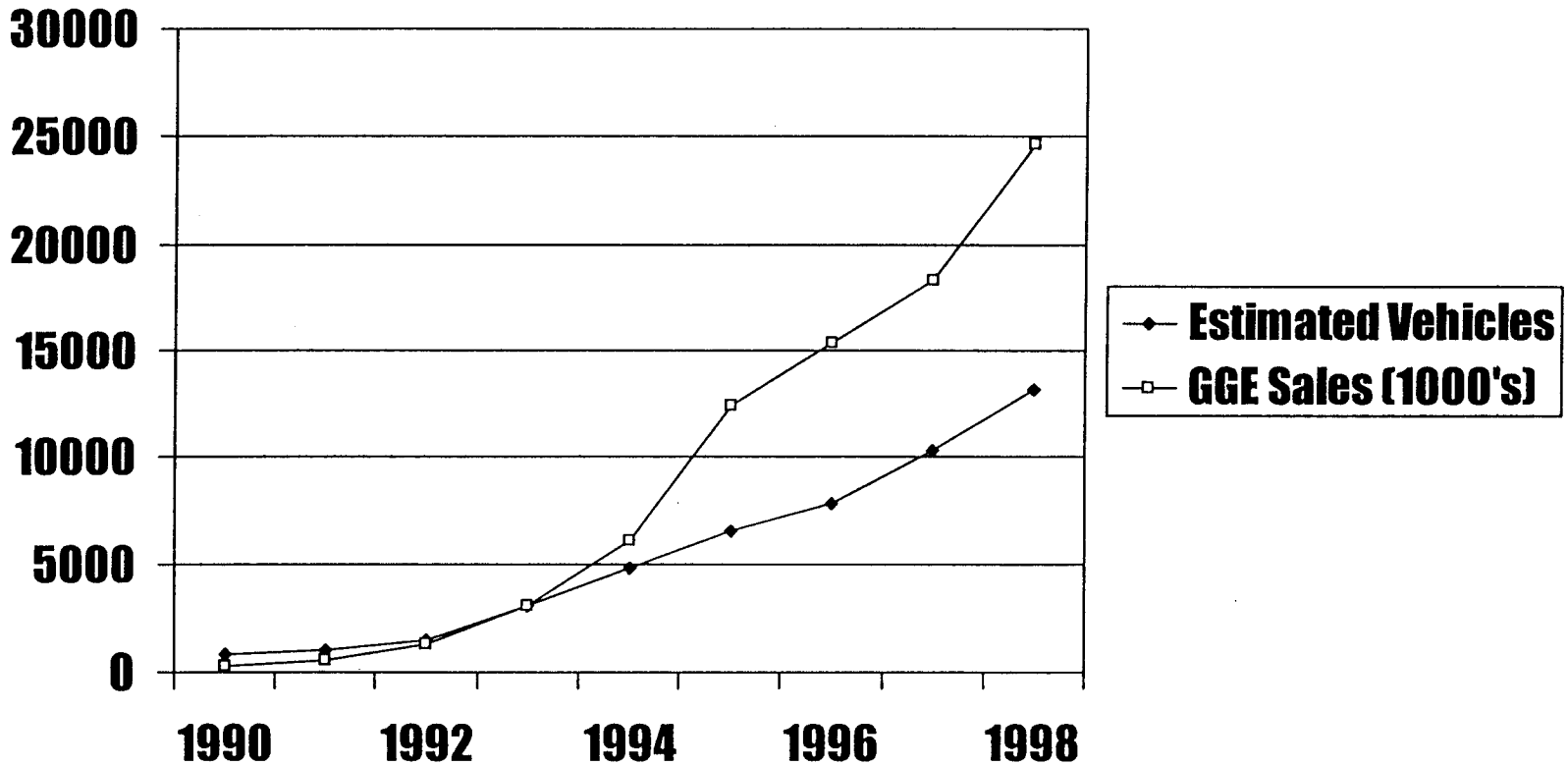
Methane	92.48%
Ethane	3.79%
C_3+	1.53%
C_6+	.08 %
Inerts	2.20%

SAE J1616 study

Sulfur Content of HD Engine Fuels

US On-road Standard	US Off-road Standard	"Typical "low-sulfur " Diesel	Proposed low-sulfur Diesel	Typical California CNG
500 ppm	none	300 ppm	<30 ppm?	4 ppm

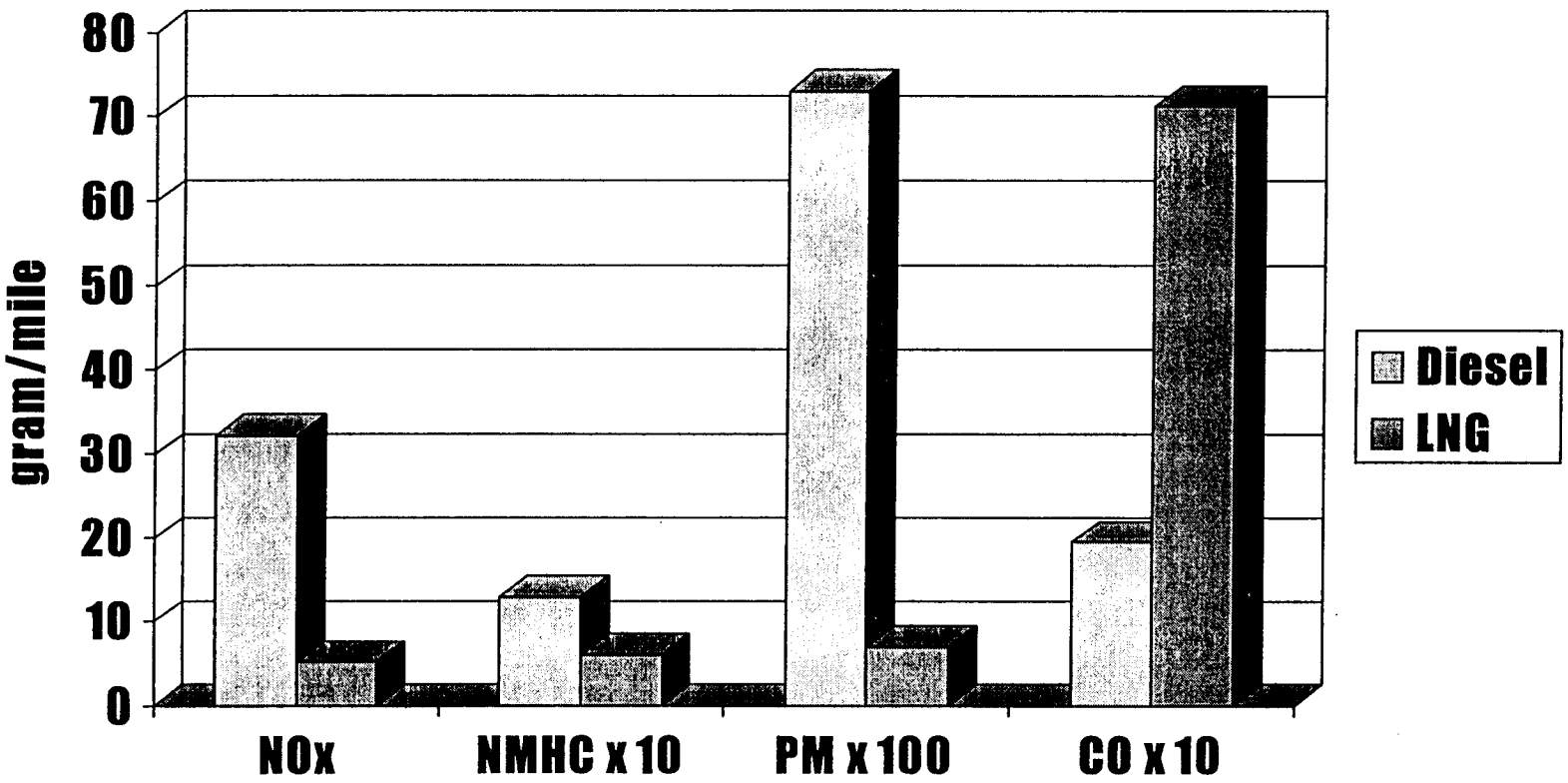
California NGV Market Growth



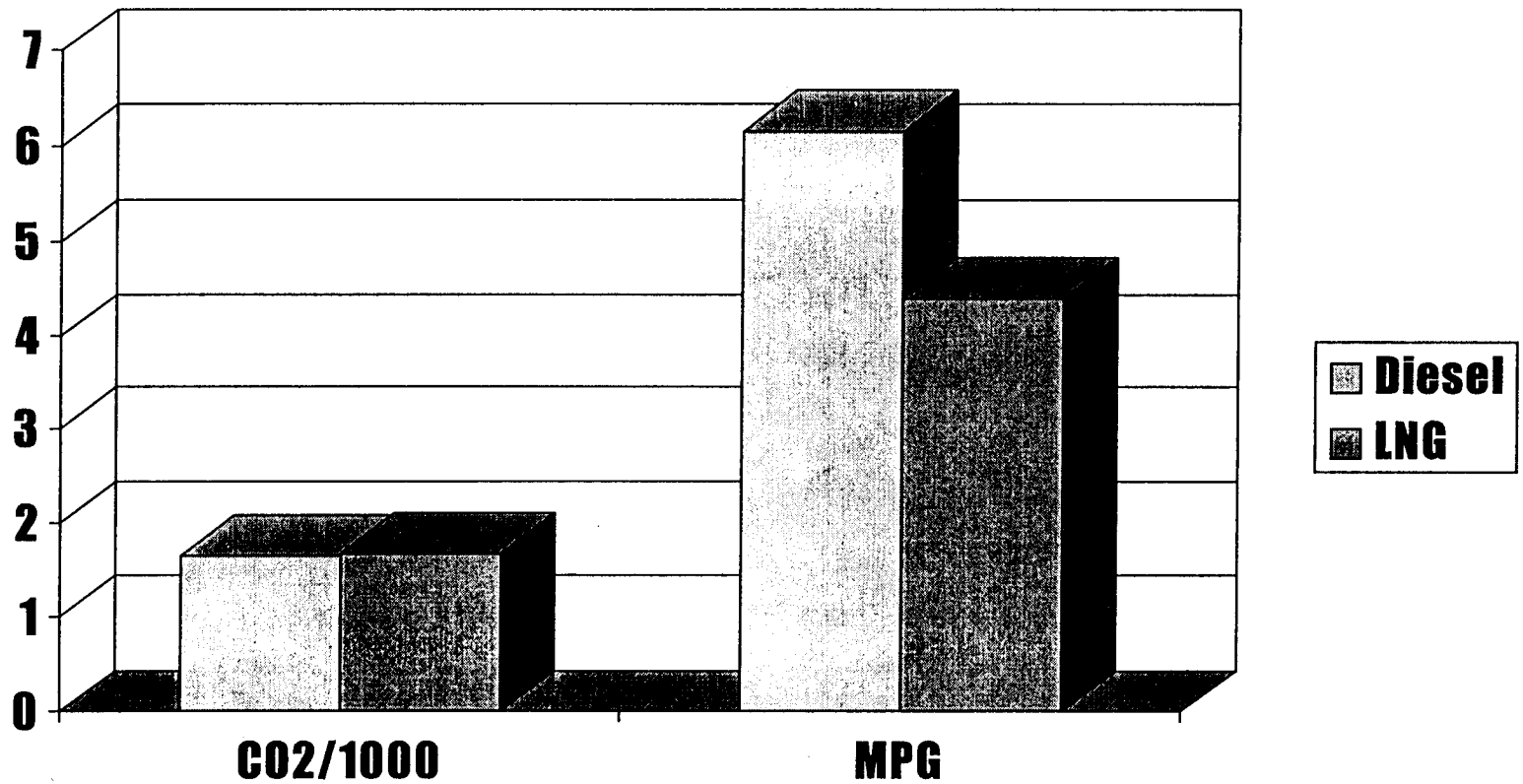
SAE 981393

- NREL, Batelle, WVU
- Focus on Cummins L-10G
- Raley's Grocery Truck Fleet
- NY CNG vs. Ohio Cummins M-11 Diesel Buses

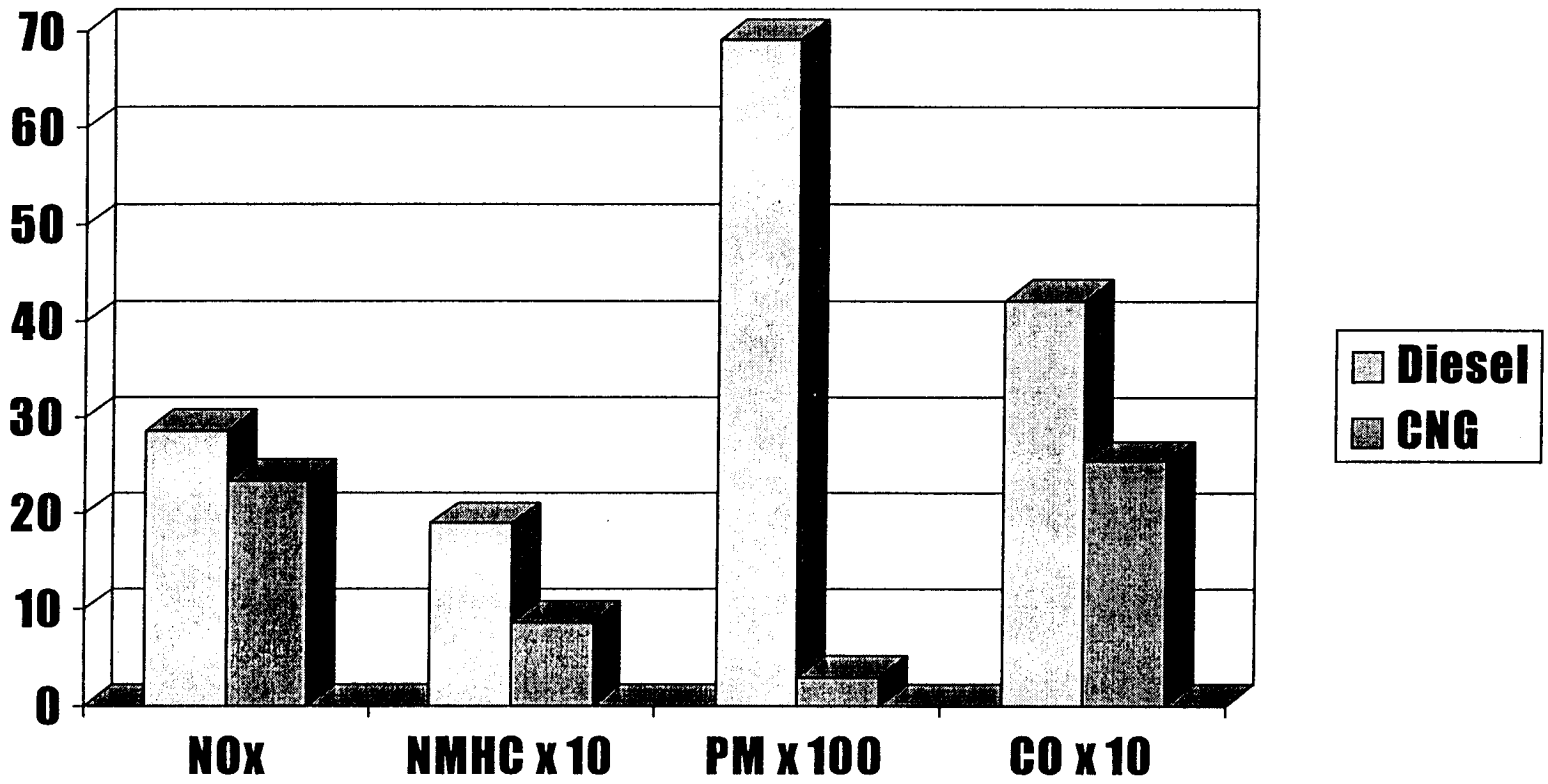
Raley's Grocery Trucks



Raley's Grocery Trucks



Urban Bus Comparison



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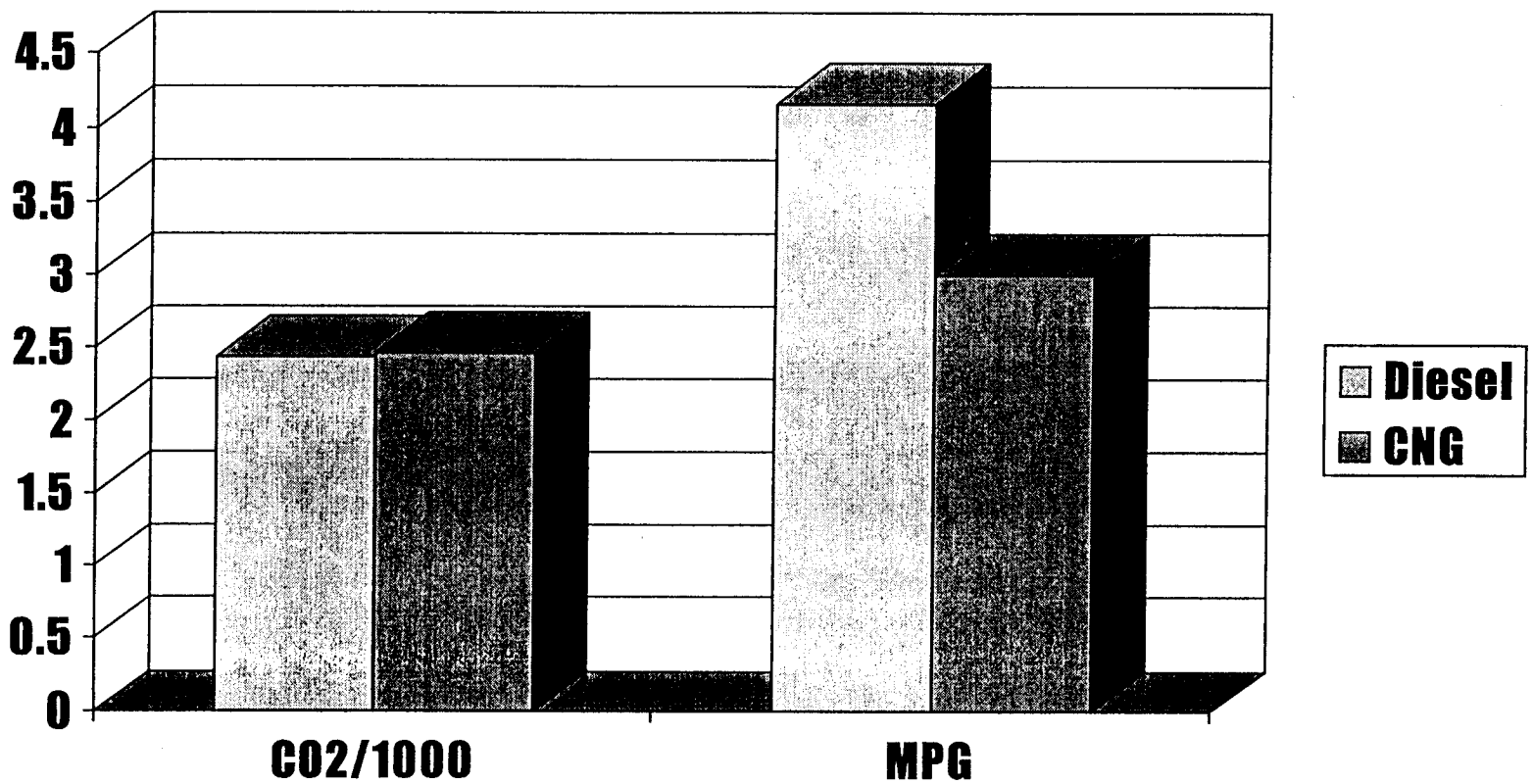

May 1999 Raley's Update

- Fuel cost per mile for Wyoming LNG was net 8% higher than diesel in March, 1999
- Maintenance cost per LNG mile was twice that of diesel ($.10 vs. $.05)
- Emission benefits remain stable
- Efficiency reduction is 30% to 37%

Market Issues for HD NGVs

- Environmentally Preferred Fuel
- Rate of RD&D by OEMs
  - Improved engine reliability
  - Improved emissions
  - Chassis integration
- Capital Investment for Infrastructure
  - Demonstrate low-cost liquefaction