School Bus Demonstration Program

- Host Sites: L.A. Unified School District
  Anaheim Union High School District
  Hemet Unified School District

- Demonstration Fleet: 39 Buses
  6 Different Engine Models
  2 & 4 Stroke Engines
  1977 - 2000 Model Years

Demonstration Matrix

- Retrofit 26 buses with 3 trap manufacturers
- Run 13 buses on low-sulfur fuel only, as baseline
- Dyno. test some buses on three different cycles in the beginning and after six months

Selected Engine Models

Engine Models	**Model Years**
Detroit 671	77, 82, 89
Detroit 6V92	90, 93
Caterpillar 3208	78
Caterpillar 3116	95
Navistar 466	86, 95
Cummins 8.3	98, 99, 00

Durability Evaluation of Retrofits

- Select Two Buses with CRT & DPX Retrofits from the Demo Program
- Buses Selected from LA & Anaheim School Districts
- Design a School Bus Specific Driving Cycle
- Accumulate Accelerated Mileage up to 50,000 Miles
- Monitor & Evaluate Performance
- Emission Test if Necessary

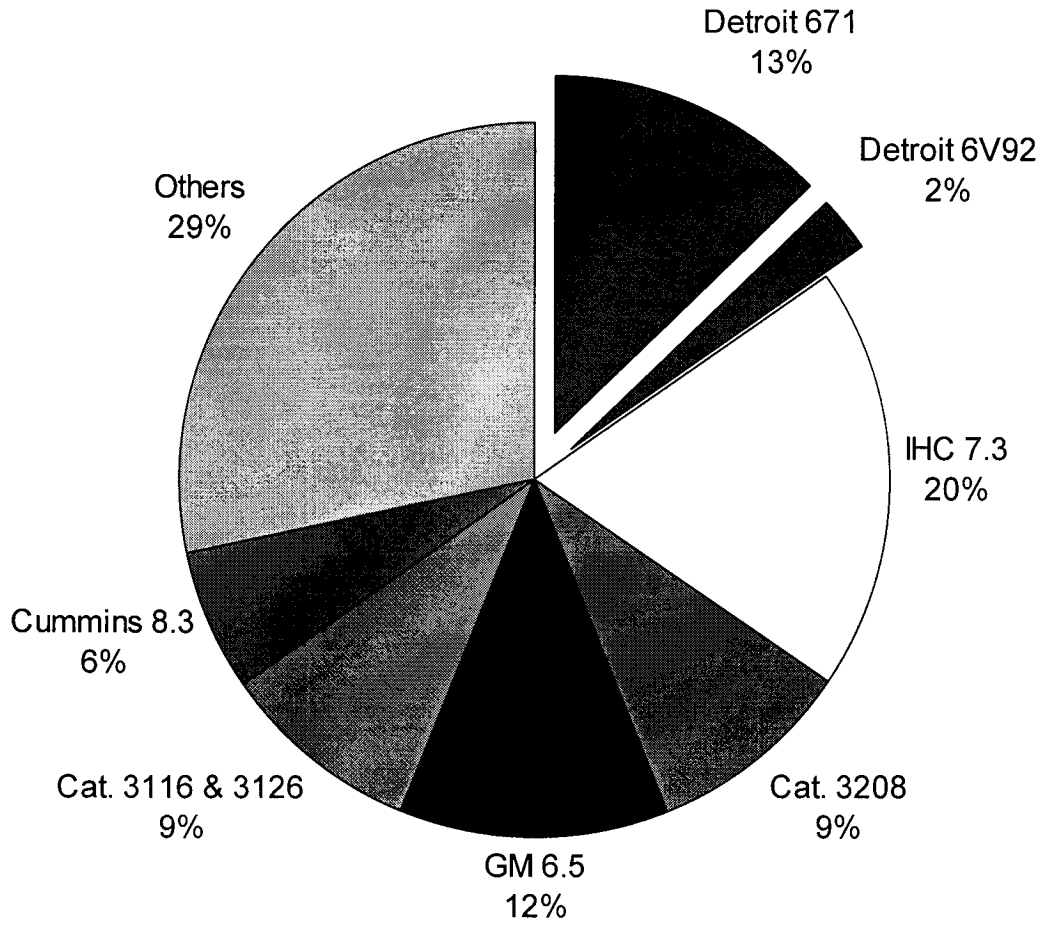
Summary of Test Results to Date

- Initial Test Results for Post-1987 Buses are Promising
  - 85% to 98% removal efficiency for PM
  - Cyrex product indicates ~20% NOx reduction potential
  - Six-month retest and durability evaluation are necessary
- 1977 and 1978 Engine Models and 2-Stroke Engines Failed So Far and Trap Manufacturers are Still Trying

Test Result Implications

- Priorities in Program Implication
  - Full-size bus engines
  - Post-1987 engines
  - 4-stroke engines
  - Engine family preference
- ARB Verification Required
- Enhanced RD&D Efforts on:
  - Older engines
  - 2-stroke engines
- California Buyers Consortium to Achieve Market Price

Diesel Fueled Engines Only



Summary of Inventory in the Basin

	Buses	Diesel 87 & Newer	Diesel 78 to 86	Diesel 77 & Older	Diesel Total	Gas.
Schools	3,612	1,701	*1,114*	*301*	3,116	391
Contractors	4,933	4,549	294	19	4,862	57
Total	8,545	6,250	1,408	320	7,978	448

Proposed School Bus PM Retrofit Plan in South Coast Air Basin

Full Size Bus Type	No. of Units	Retrofit Technology	Estimated Cost Per Unit	Estimated Cost Total
4-stroke	3,500	Catalyst w/Filter Trap	$7,500	$26.25M
2-stroke	1,000	Oxidation Catalyst	$3,500	$ 3.50M
Total	4,500			$29.75M

Potential Funding Sources for School Bus PM Retrofit

- Statewide Low-Emission School Bus Program
  - $5.3 million allocated for FY 2000-01
  - State budget proposal/legislation pending
- SCAQMD Rule 1309.1 - PM Priority Reserve
  - $8.6 million mitigation fee collected to date
  - Governing Board placed a high priority for school bus retrofit
- Adopt-A-School Bus Program
  - $350,000 contributed
  - AQMD Board allocated $1 million from Penalty Settlement Fund to the Foundation
  - Foundation has been established to administer the program