

The Clean Air Construction Initiative

Technical Background and Implementation

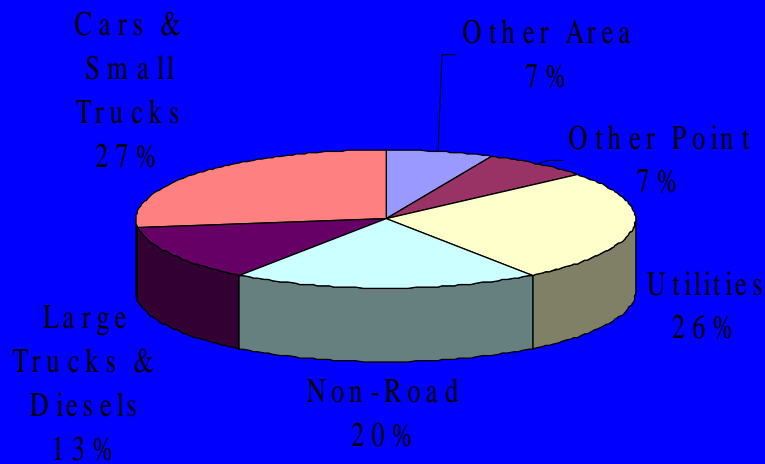
Coralie Cooper, Northeast States for Coordinated
Air Use Management

Presentation Outline

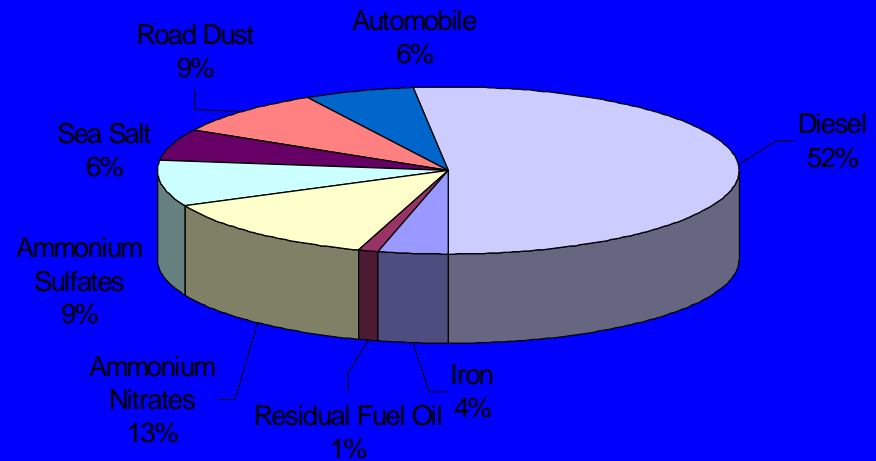


- Background
 - inventory
 - pilot
- CA/T (Big Dig) Project
 - implementation
 - technical and operational issues
- Expansion of the Initiative

Inventory Background

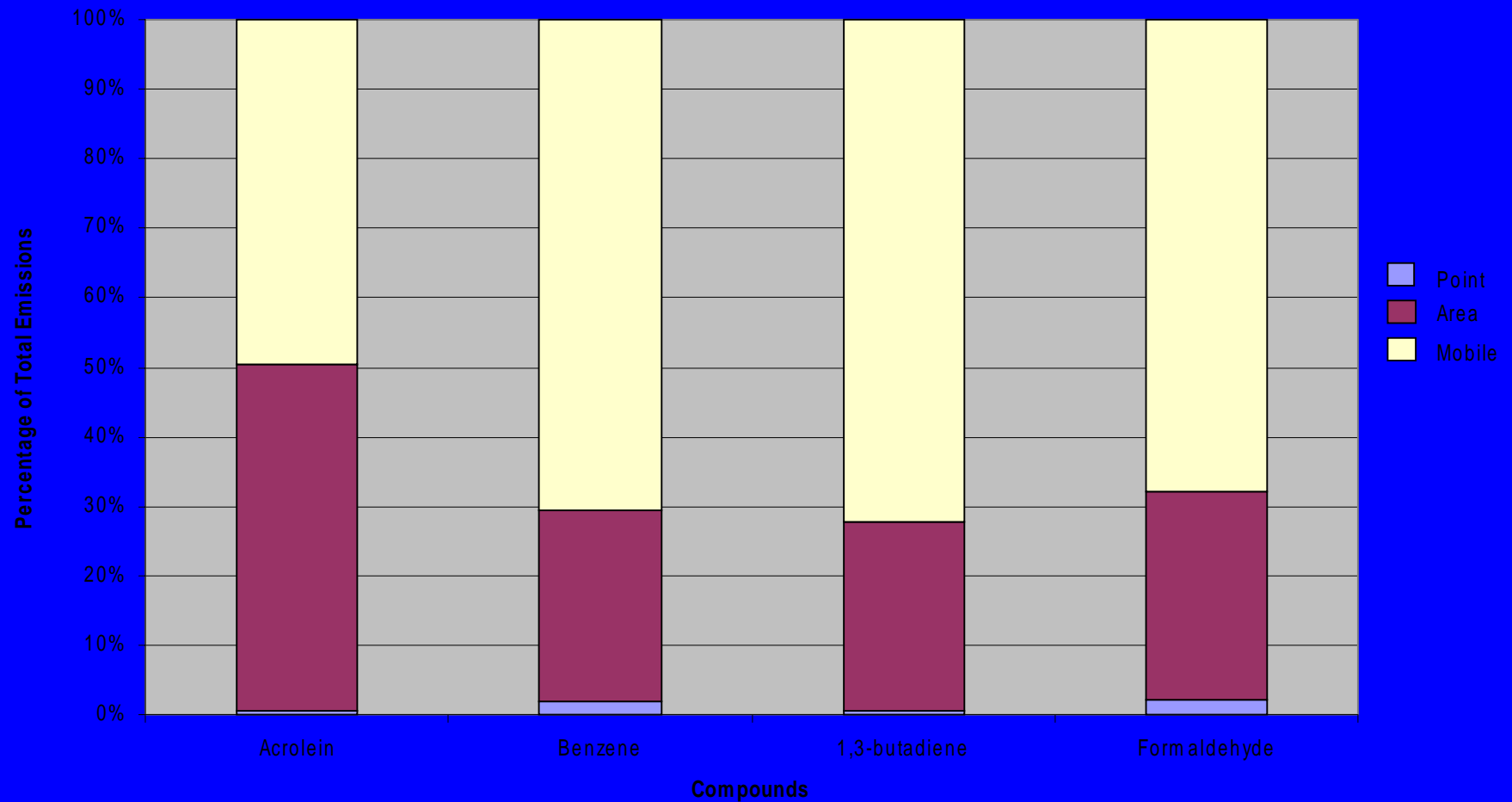


NOx Emissions



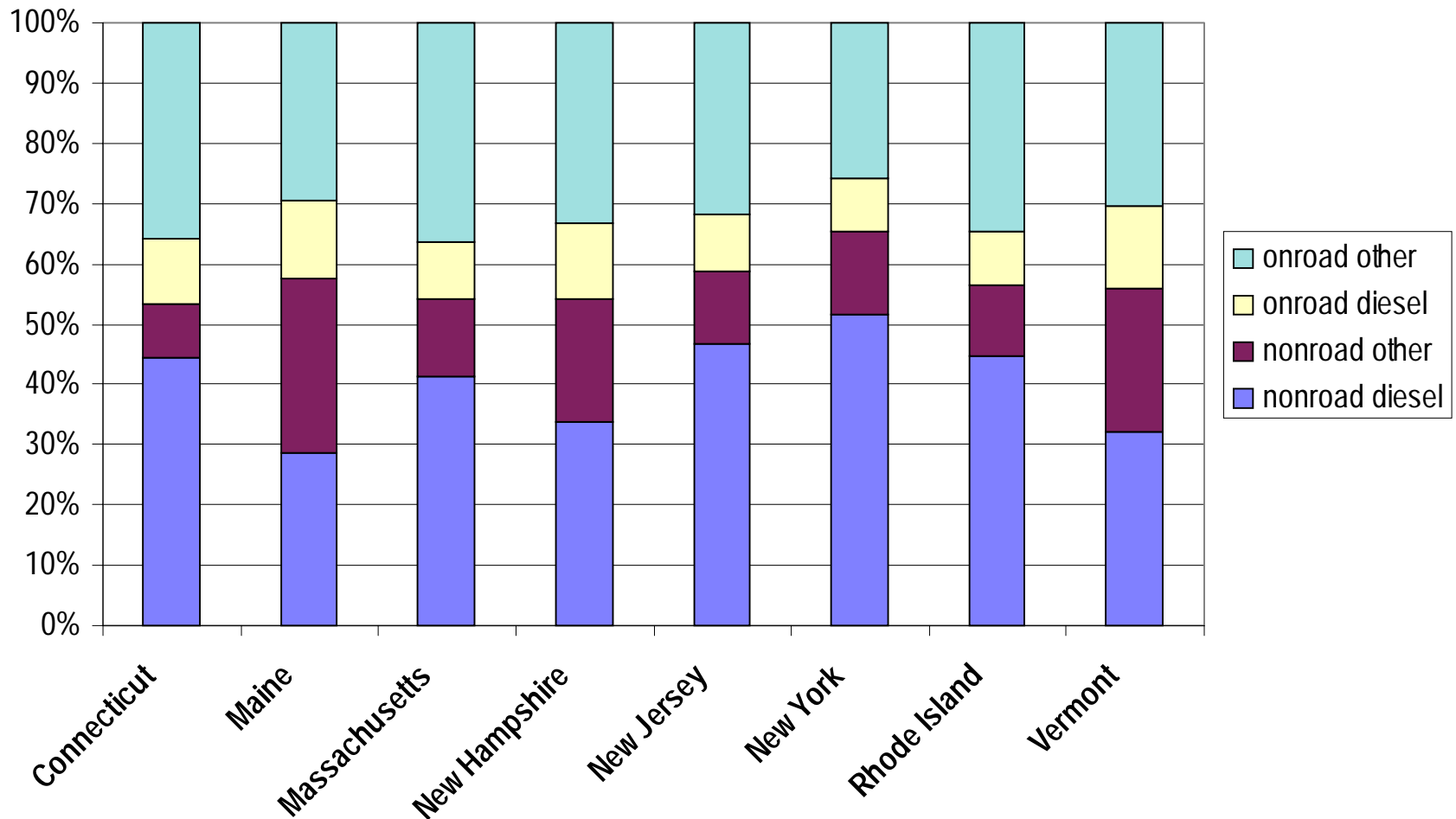
PM Emissions

Major Source Category Contribution to Northeast Regional Risk Drivers



1996 NESCAUM State Mobile Source Breakdown of Formaldehyde Emission Contributions

Percent Contribution to Mobile Source Formaldehyde Emissions



Pilot Retrofit Project (1997-98)

- Funded by project participants
- Collected in-use emissions data
- Retrofitted machines with several types of control equipment
- Assessed emissions reductions achieved through the use of control equipment
- Compared laboratory with field data

Test Site: Salem Harbor Power Plant



Test Vehicles

- Volvo WL, 1994
- Caterpillar 988 WL, 1973
- International Bulldozer, 1985
- Caterpillar Backhoe, 1994 (Perkins)
- International Dump Truck, 1988



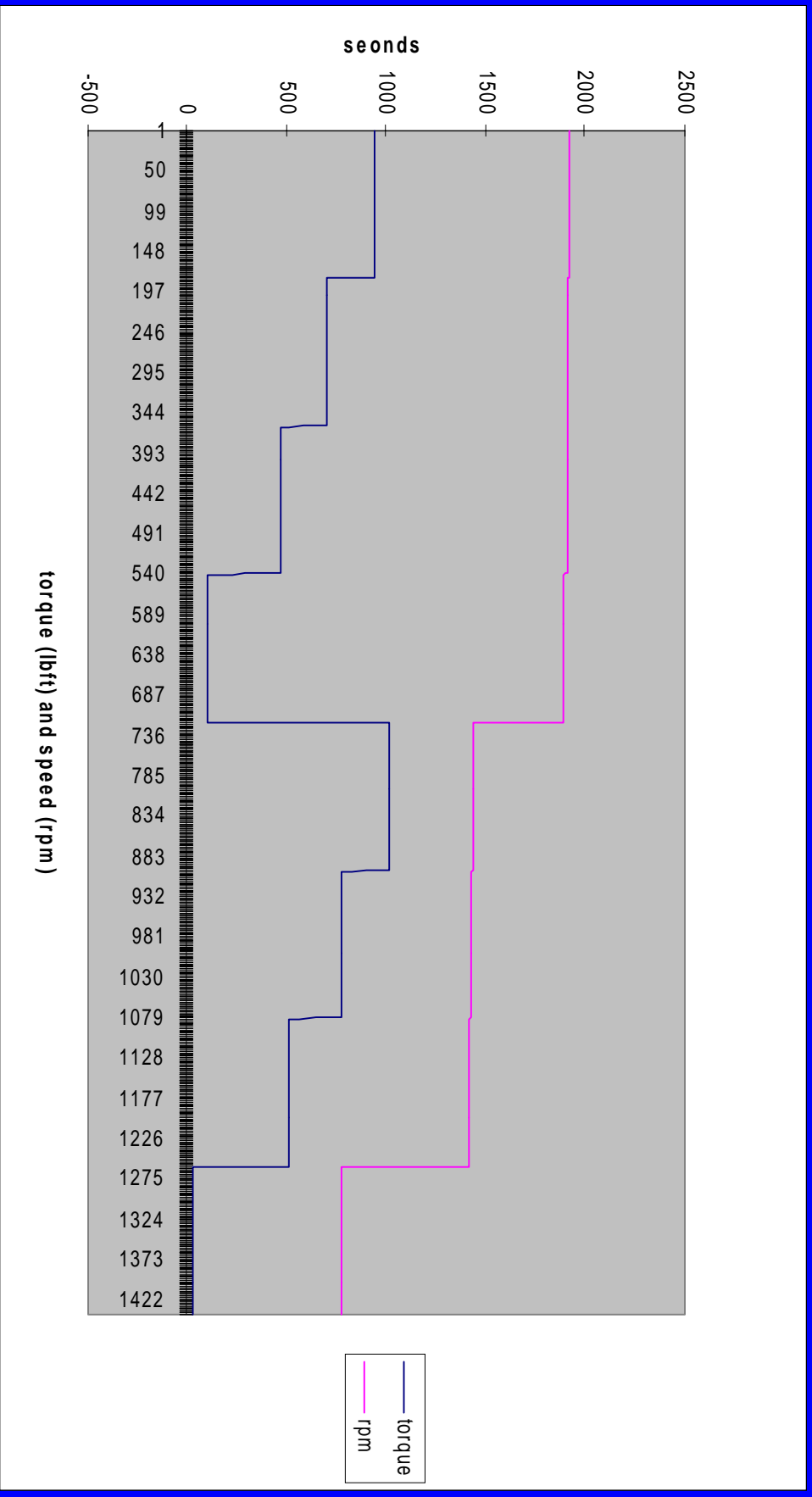
Emission Control Equipment

Vehicle	Oxidation Catalyst	Passive Filter	Active Filter	Additive
Bulldozer	X			
Volvo	X			X
Dump Truck	X			
Caterpillar		X		
Backhoe			X	

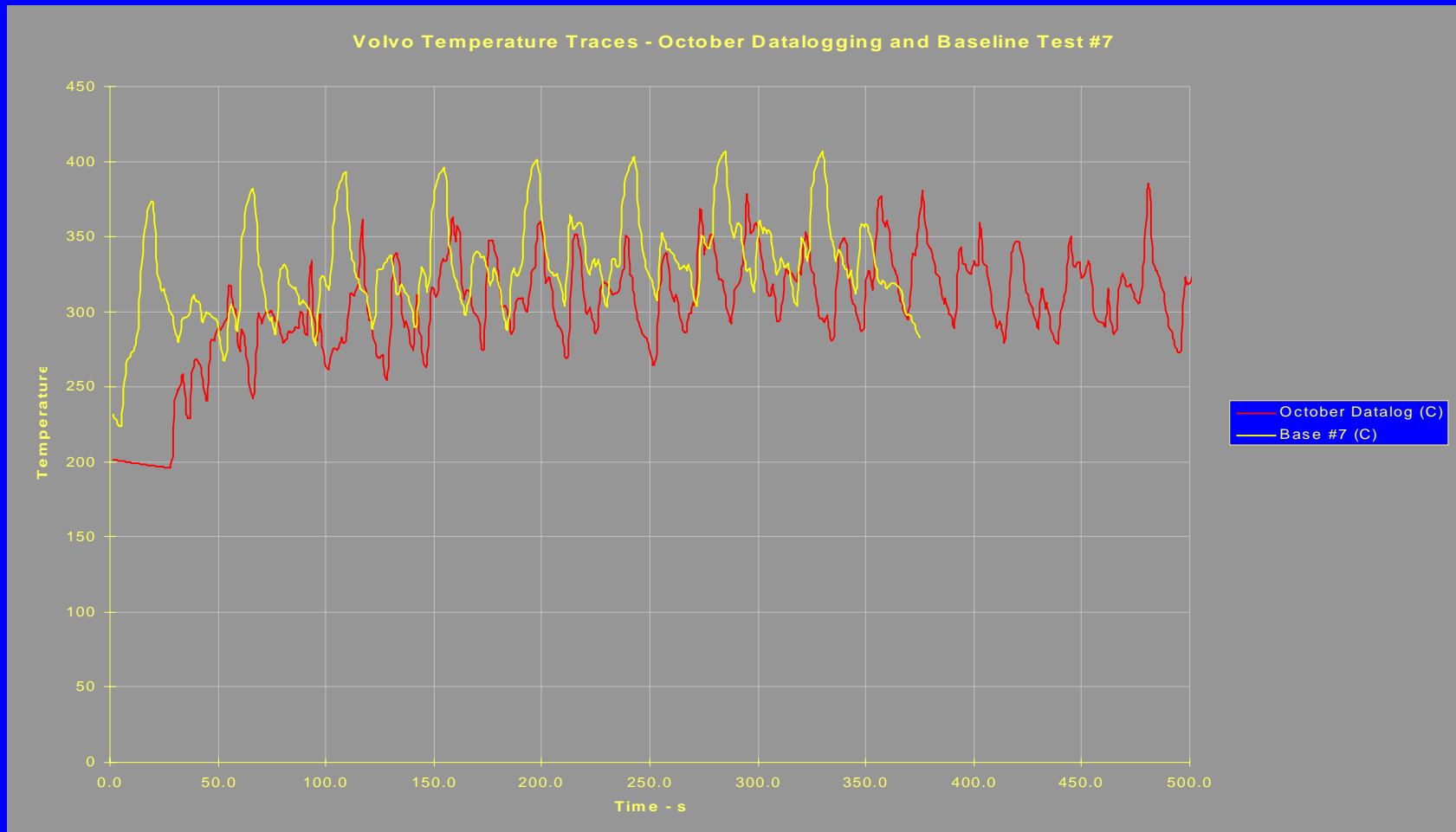
Test Cycle Development

- Test Cycle Requirements
 - Representative of actual daily use
 - Repeatable during testing phase
- Development
 - Interview operators
 - Videotape of equipment at work
 - Data acquisition of exhaust temperature, rpm, and rack position

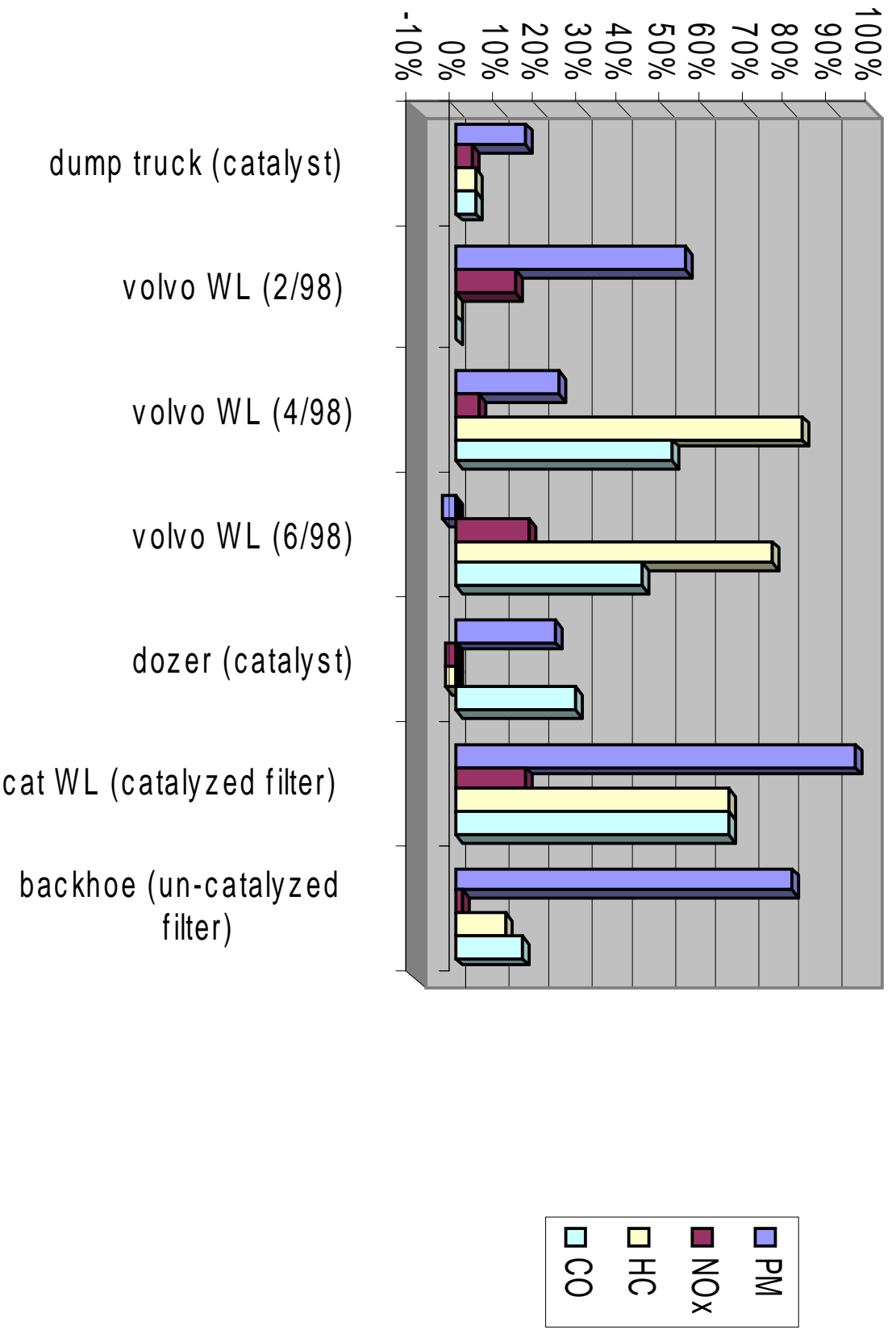
Nonroad Engine Certification Cycle



Volvo WL Test Cycle



Emission Reductions



Central Artery/Tunnel Project (Big Dig)



- \$11 billion project
- 70 to 100 machines will be retrofitted with oxidation catalysts or PM filters
- Emissions testing component
- Once implemented, 8 tons of PM and HC will be reduced annually

Project Initiation

- Big Dig located in downtown Boston
- The need to reduce diesel exhaust in offices, hospitals, and apartments adjacent to the construction spurred the retrofit effort
- MA DEP, MA Highway, NESCAUM, MA EOEA initiated the retrofit program
- The Boston City Council was highly supportive of the initiative
- Publicity for the project encouraged contractors and others to participate

Implementation

- MA Highway announced the retrofit of 70 machines already in use
- A retrofit requirement for new construction contracts was put in place
- Half of the project funds will come from MA Highway and half from Big Dig contractors
- Contractors will pay for new contract requirements

Implementation (cont.)

- 10 machines retrofitted to date
- 60 other machines being identified and data logged
- 2 new contracts include the retrofit requirement in the odor control section
- Effort dovetails with EPA VMEP retrofit initiative for selection of emission control devices

VMEP Retrofit Program

- Verification system for retrofit devices
- SIP credit protocol for HDE retrofit
- Testing requirement for program application
- In-use testing requirement
- Testing requirements used as criteria for Big Dig project participation

Technical Issues

- Some machines need to be tested for exhaust temperatures
- Data on engine displacement needed for proper sizing of catalysts
- Space constraints can pose problems as some OEM mufflers are small

Operational Issues

- The need to limit down-time is a constraint
- Data collection, installation, and emissions testing performed during off hours if required
- Zero maintenance control devices preferred
- Warranty of engine and muffler need to be respected
- Equipment operators have been pleased with the retrofitted machines

Next Steps for Big Dig Retrofit Project

- Emissions testing will be conducted on retrofitted machines
- Credit generation for emission reductions possible
- Potential to introduce SCR and emulsion pilot demonstrations on Big Dig machines

Initiative Expansion

- The MA Executive Office of Environmental Affairs (EOEA) is recommending retrofitting as a means to mitigate the air quality impacts of large construction projects
- MA DEP is encouraging agencies to retrofit owned or contracted equipment, three agencies have agreed to participate

Initiative Expansion (cont.)

- U.S. Senate Committee on Environment and Public Works staff are interested in following up on the emissions benefits achieved from the Big Dig project

Conclusions

- Retrofit of construction equipment can significantly reduce PM, HC, CO, and toxic emissions
- Potential exists to achieve NO_x reductions
- Contractual requirements, incentives, and adoption of retrofit policies for publicly owned HD engines are effective means to increasing the use of retrofit devices
- In-use testing is an important component to ensure emissions reductions are achieved