



On-Road Diesel Retrofits and Experience



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Johnson Matthey Global Diesel Experience

- DCC™ Catalytic Converter > 11,000,000
- CEM™ Catalytic Exhaust Muffler > 15,000
- CCT™ 0.1 Upgrade Kit > 7,000
- CRT® Particulate Filter > 90,000
- DPFi Active Filter > 4,500
- Combined NOx / PM Systems
 - EGRT™ System > 2,800
 - SCRT™ System (Field Trials Underway) ~ 100



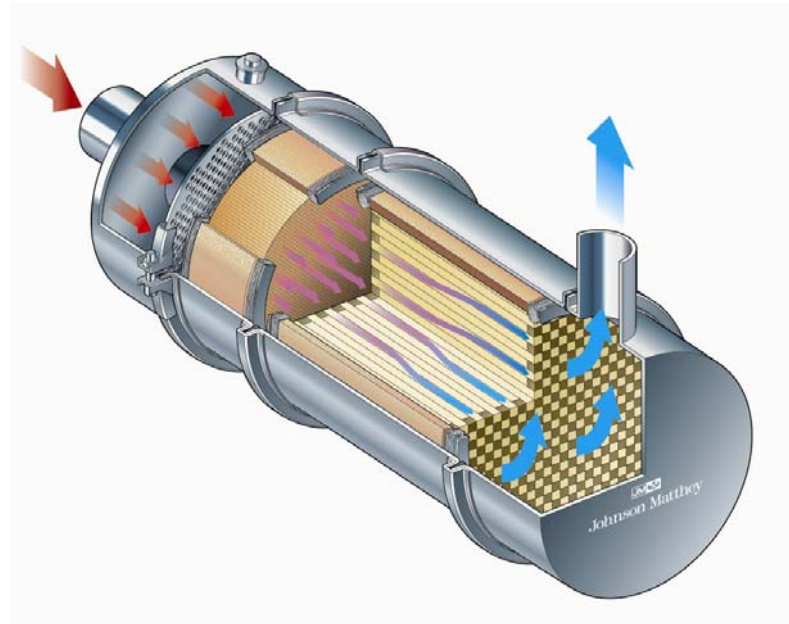
- DCC™ - PM reductions over 20%, HC and CO over 40%
 - Can work with high sulfur fuel (up to 500 ppm)
 - Benefits from low sulfur fuel (low sulfate make)
 - No restriction on most applications
 - Proven low cost technology
 - If properly applied, no maintenance required



CRT® and CCRT® PM Reducing Technologies



- **Patented System combining Oxidation Catalyst & Filter**
- **Engineered as a totally passive**
- **Requires the use of Ultra Low Sulfur fuel and back pressure monitor**
- **EPA and CARB verified for 1994-2006 Engines**



CRT® & CCRT®

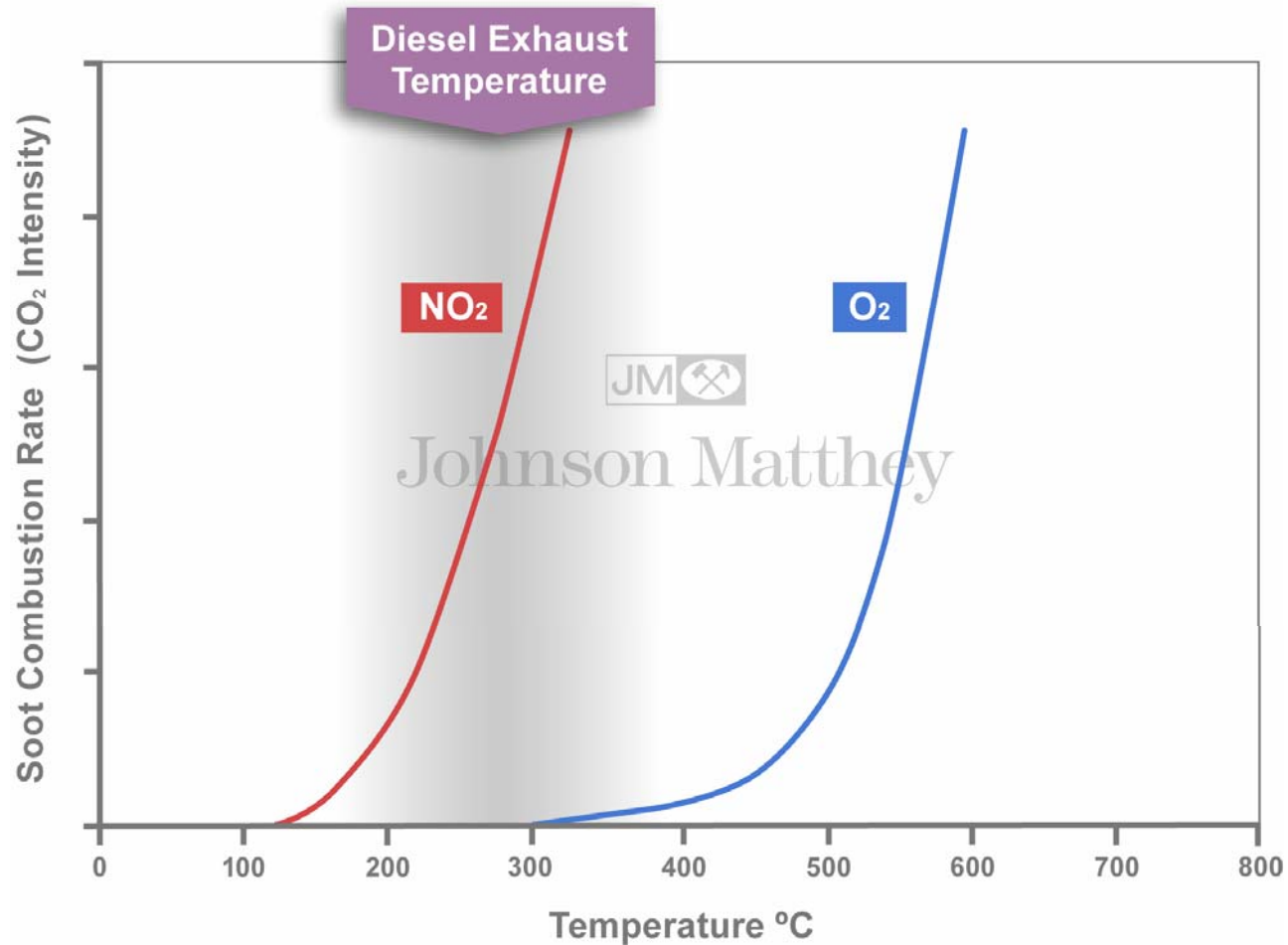
>85% PM Reduction

>85% HC Reduction

>85% CO Reduction



Soot Combustion



Continuously Regenerating Trap

Please select a page from the list below.



- Unlike DOC's, Diesel Particulate Filters require upfront analysis to properly apply the technology
- Datalogging provides important exhaust temperature information as well as typical duty cycle
 - The CRT® requires a minimum temperature of 240°C for 40% of the time
 - The CCRT® requires a minimum temperature of 200°C for 40% of the time
- Maintenance requirements
 - Highly durable, last the useful life of the vehicle
 - Periodic filter cleaning is required, recommend once a year or every 60,000 miles
 - Modular design allows for easy filter servicing



Real World Experience: Performance of NYCT Test Fleet with CRT -10/31/2000

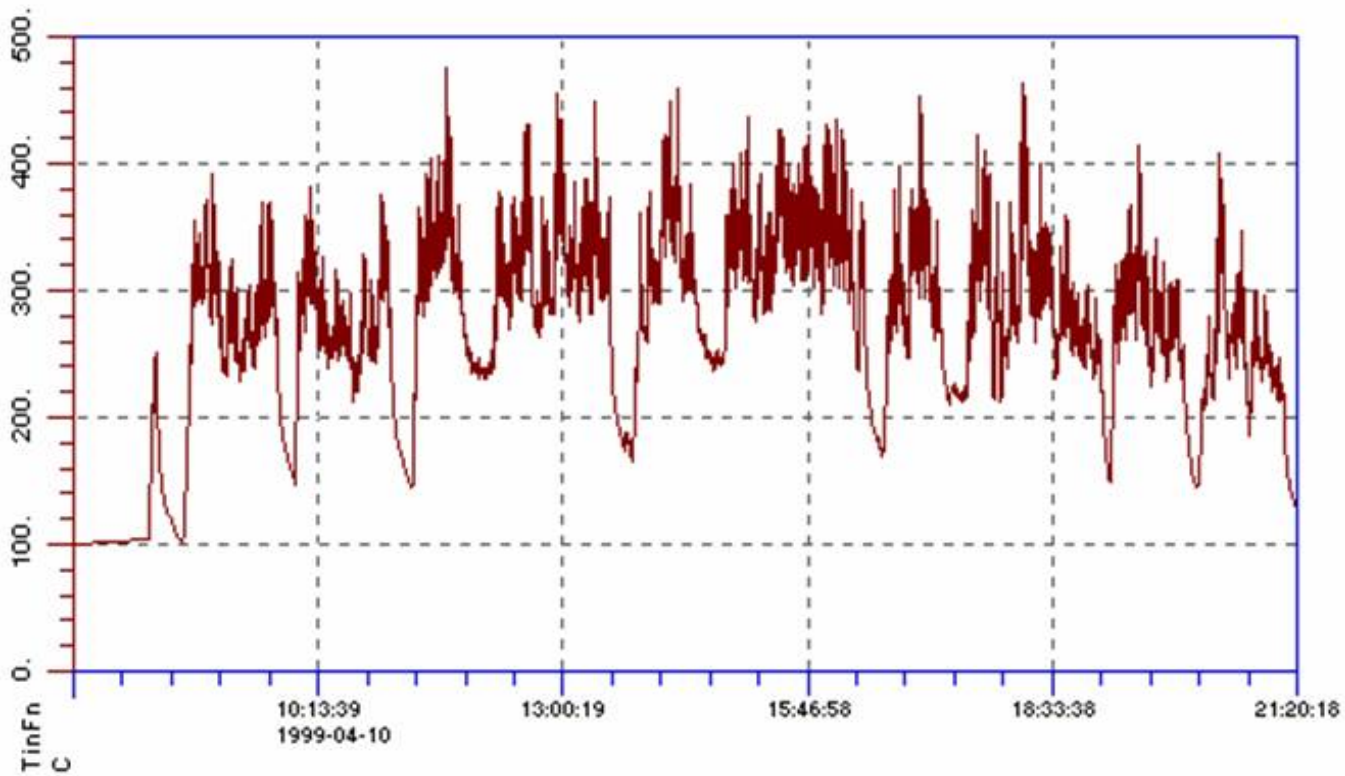


Total Accum. CRT Fleet Miles	488,602
Average Miles/Bus	19,544
Total CRTs Installed	25
Total Related Road Calls	1
Fuel Economy	1.83
Remaining MCH Fleet Economy	1.82
MDBF	3,847
MDBF remaining MCH Fleet	3,230



Exhaust Temperature with CRT® on Series 50 Bus

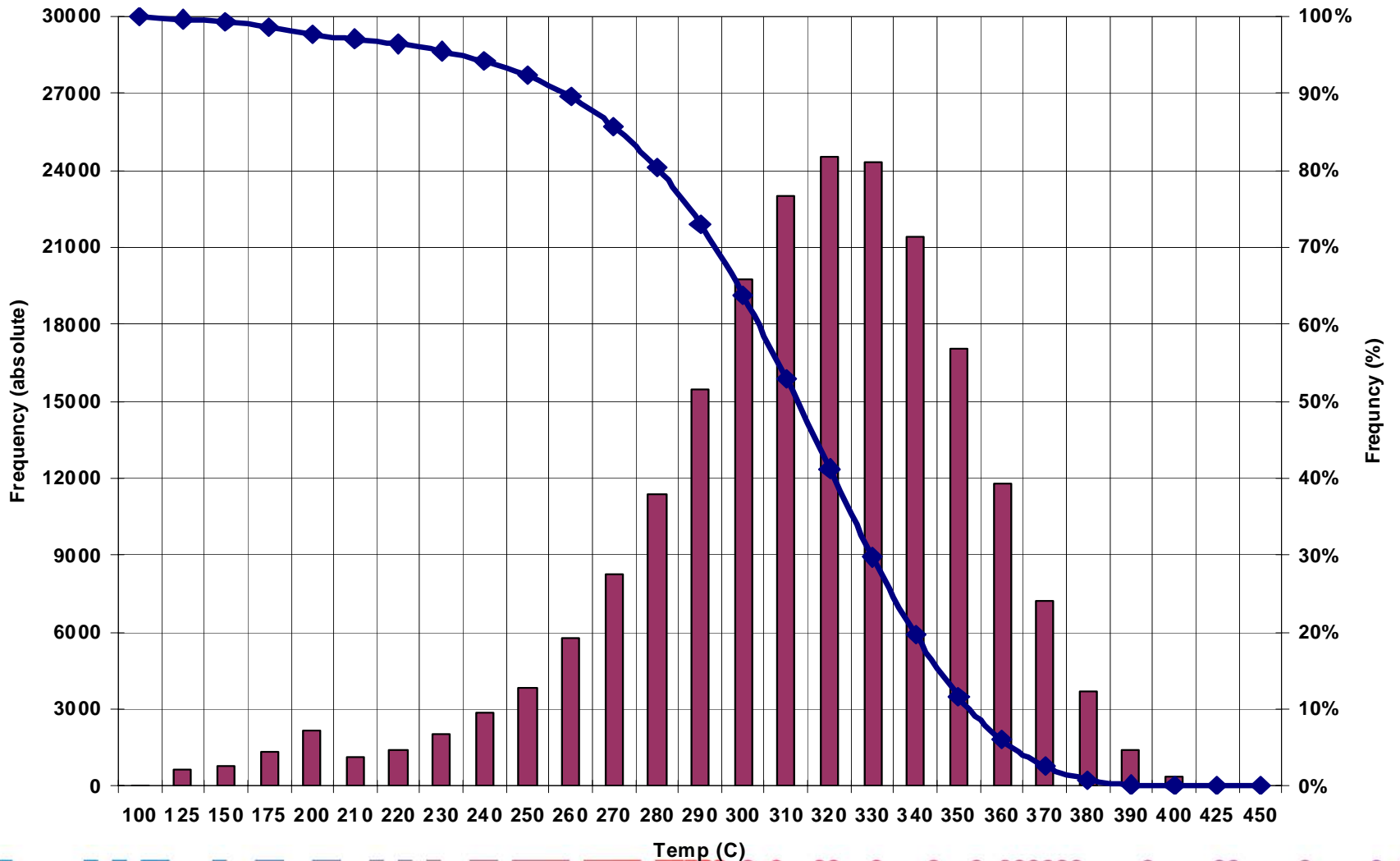
Temperature (C)



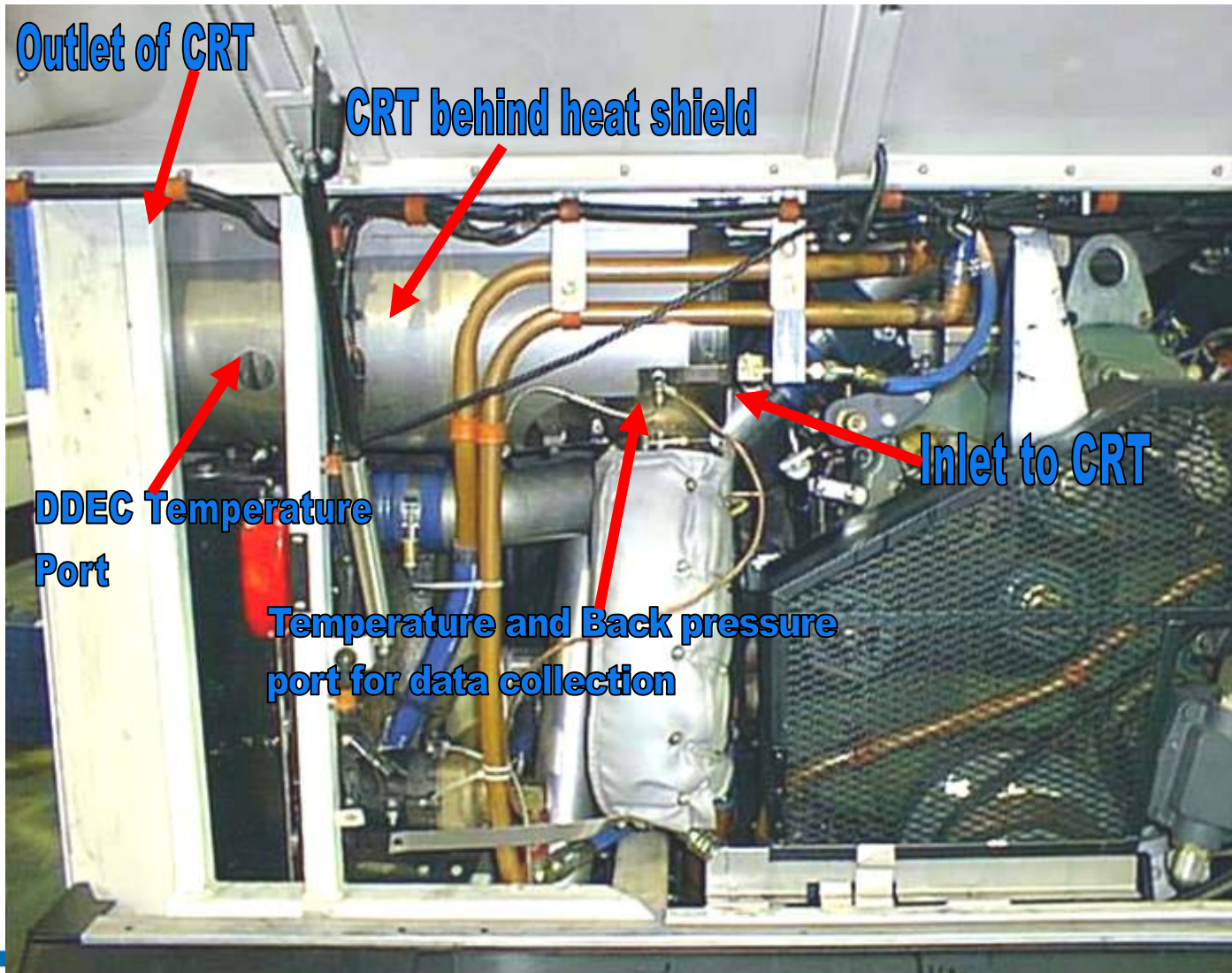
Time



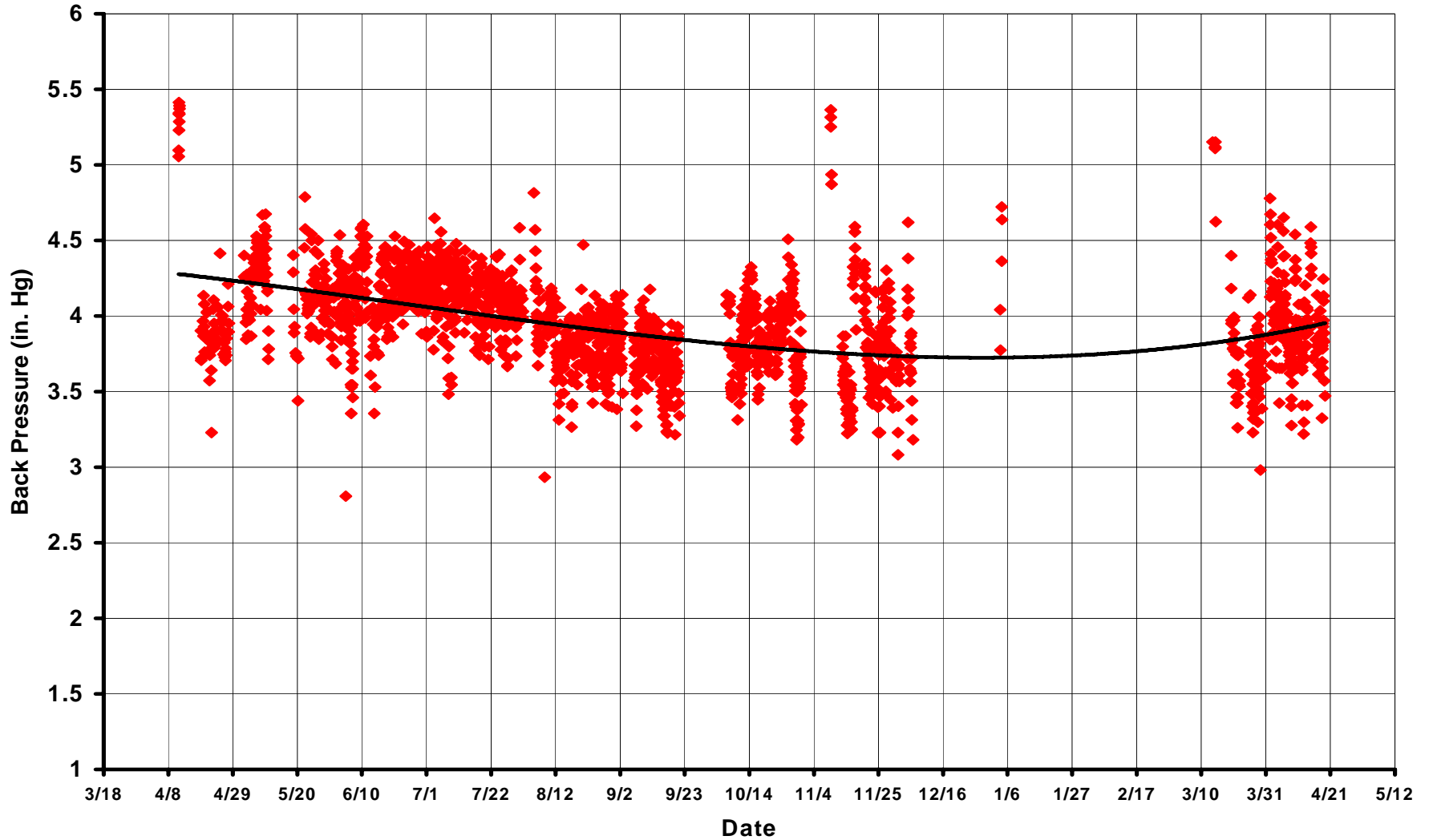
Temperature Histogram on Series 50 Bus



Series 50 DDEC Bus CRT® installation



Peak Back pressure with CRT® on Series 50 Bus; NY Road Test - Bus 6065



CRT Filter from Bus 6019



Filter Inlet



Filter Outlet



CRT Filter from Bus 6019



CRT Inlet Section



CRT Outlet Section



CCRT® – An Advanced CRT for Challenging Applications



- CCRT = DOC + Catalyzed Filter
- Advantages of CCRT:
 - Higher soot burn rate than CRT or CSF
- Install in Challenging Applications
 - Low temperature applications (200 – 250°C)
 - Low NOx/PM applications (NOx/PM>15)
- EPA and CARB Verified

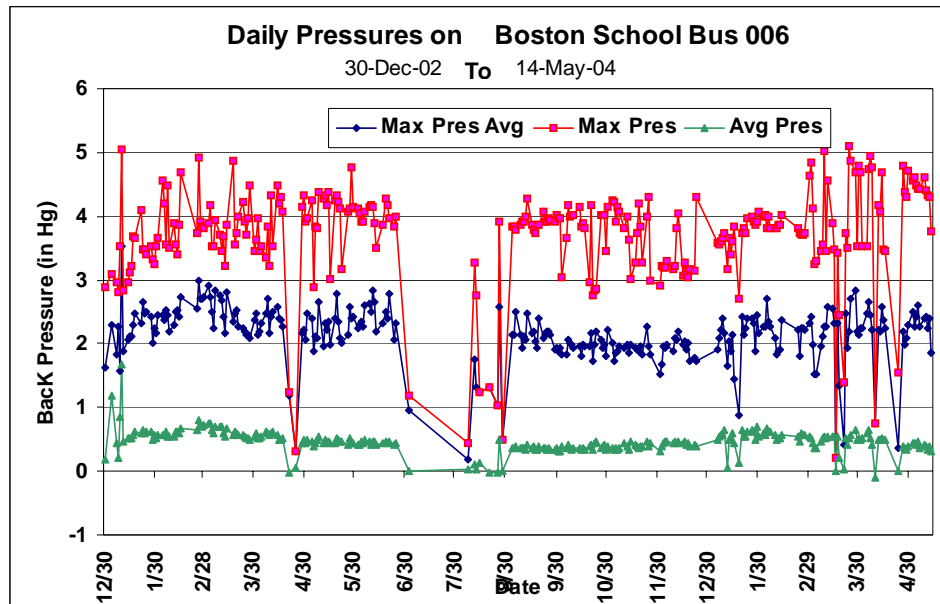


CCRT Experience on low temperature School Bus

Boston School Bus with 175 hp 2000 MY CAT 3126 Engine



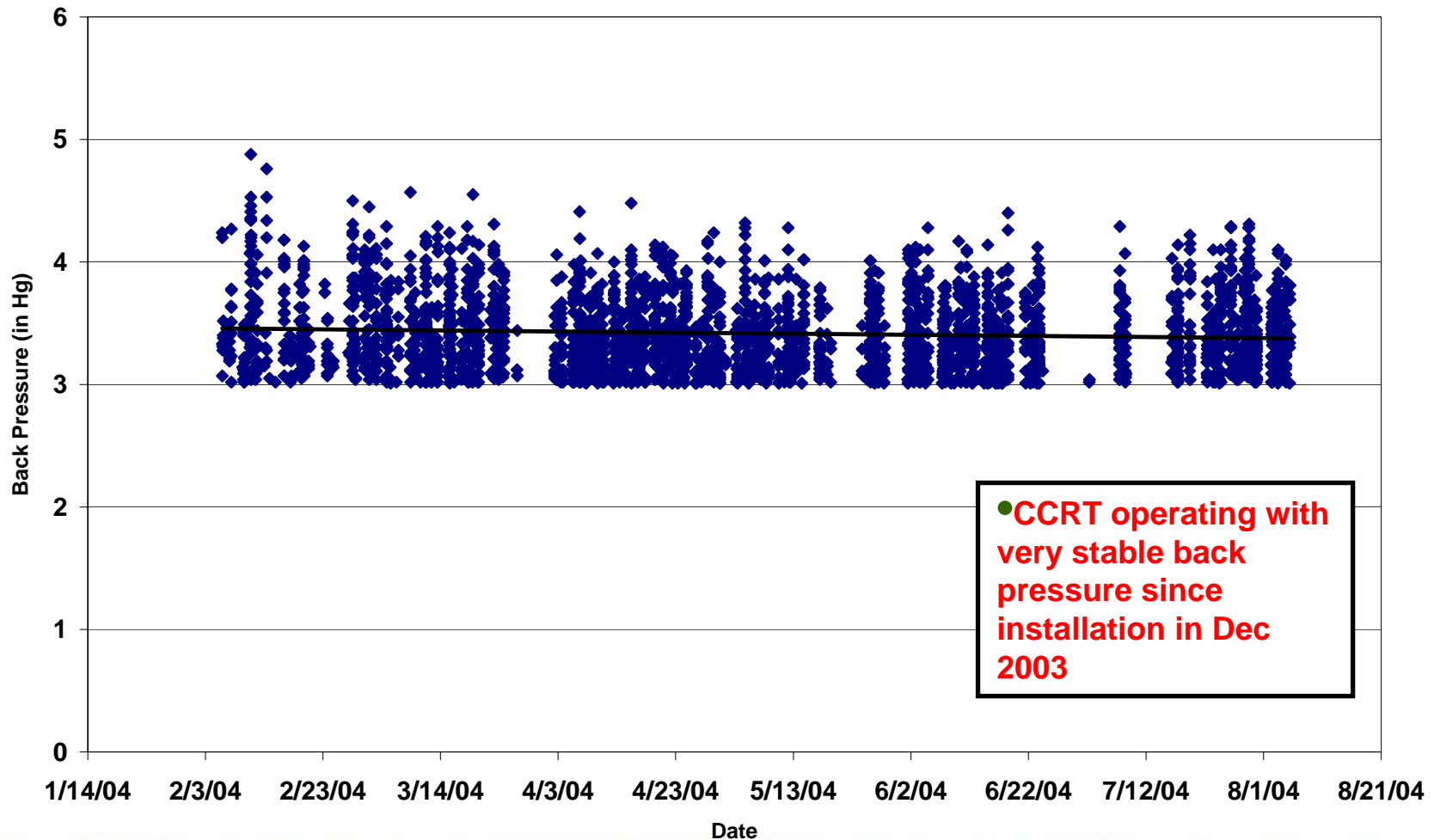
- Cold Exhaust Temperature Profile
- Only 8% of time Temp > 260 C; 40% time @ 200 C
- CCRT operating with stable back pressure for over 17 months



Stable Operation of CCRT on NY City Trash Truck with MACK E7 Engine



Peak Pressure on MACK DOS Truck 25CW-316
2/5/04 to 8/5/04



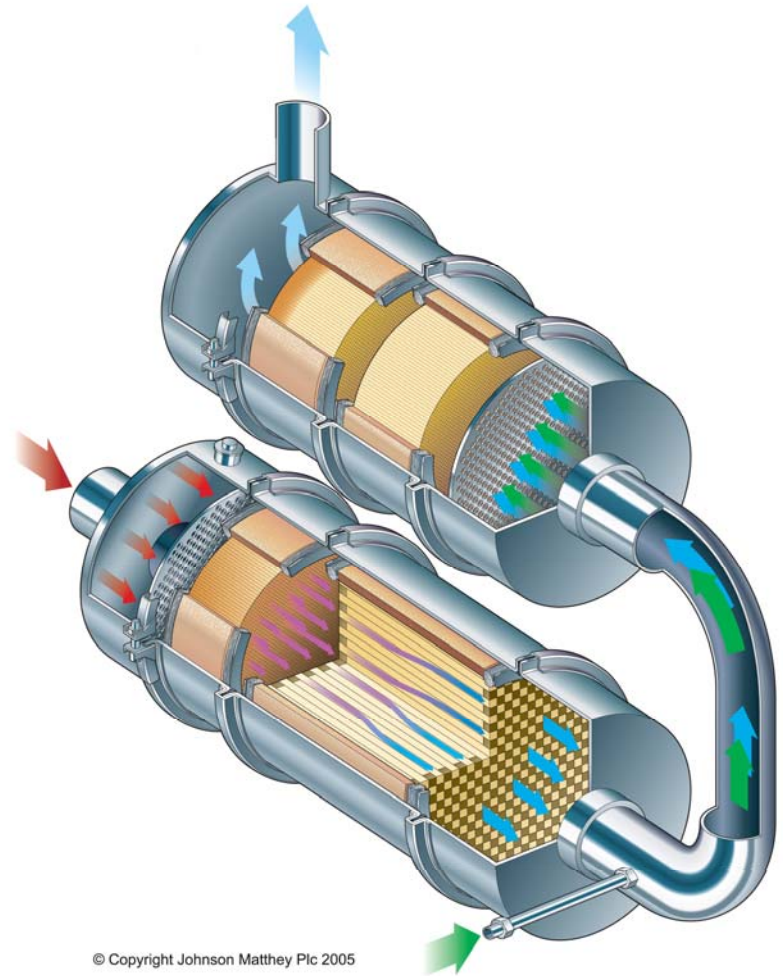
● CCRT operating with very stable back pressure since installation in Dec 2003

- On-Road
 - Transit Buses
 - Refuse Haulers
 - DOT Trucks
 - School Buses
 - Over the Road Trucks
 - All major engine makes, model year, and types
 - 175 HP to 450 HP
 - 1994-2006
 - Low NOx engines (2.5g NOx)



NOx/PM Reduction Technology

- SCRT = SCR + CRT[®]
 - SCR = Selective Catalytic Reduction of NOx with urea
 - CRT[®] = Continuously Regenerating Technology for reduction of PM emissions



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SCRT Vehicle Demonstrations

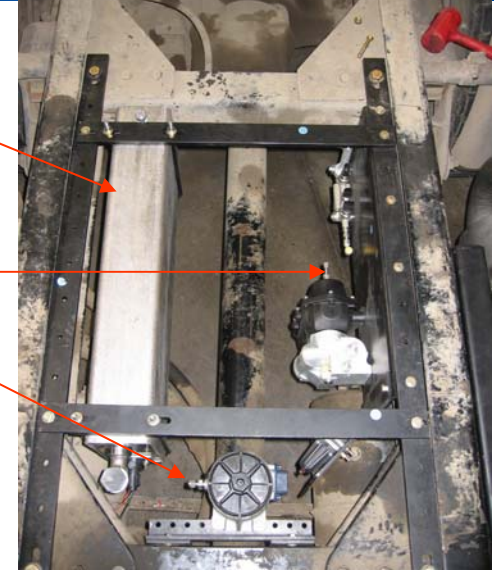
LASD Truck



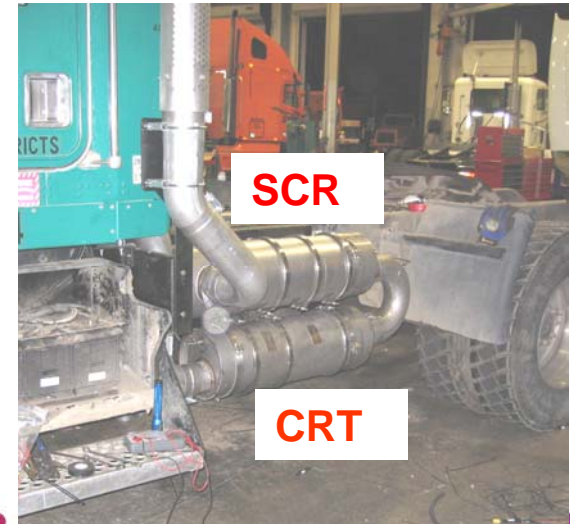
Urea Tank

Injection Hardware

Urea Filter

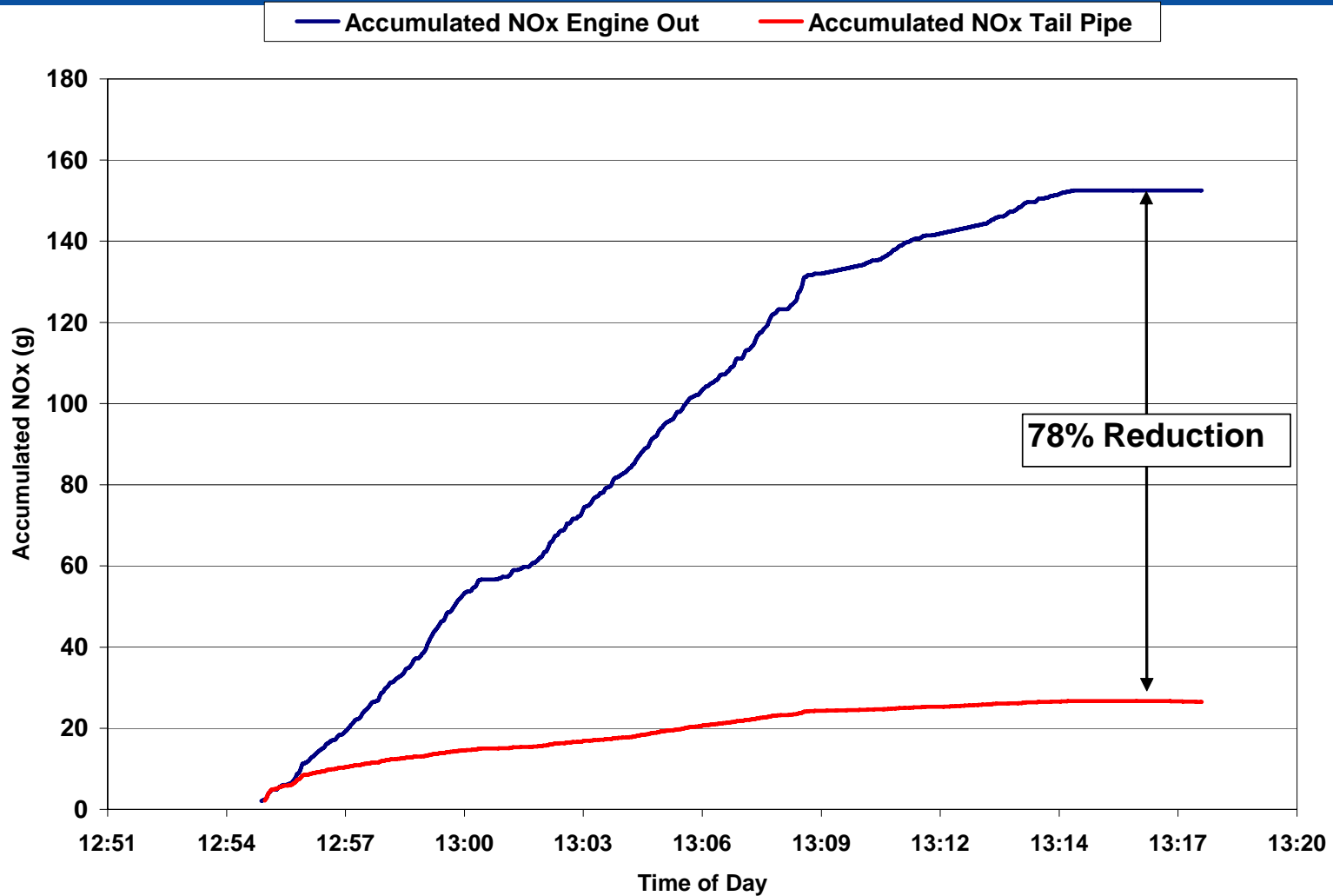


Engine Model	CRT Size		SCR Size	
	Cat (liter)	Filter (liter)	Cat (liter)	Slip (liter)
Cummins M11	8.5	17	25.5	4.2



SCRT Vehicle Demonstrations

LASD Truck – On Road data



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[Thank You for your time!](#)

