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Workshop Q&A Document Later this Year

# EPA Clean Diesel Engine Implementation Workshop

Marty Lassen  
Johnson Matthey

6 - 7 August 2003

Chicago, IL



Johnson Matthey  
Catalysts

# EPA Clean Diesel Engine Implementation Workshop

## Presentation Outline

- Johnson Matthey – Overview
- Johnson Matthey Diesel Experience
- 2007 / 2010 Emission Standards
- Technology to meet Standards
- Maintenance Requirements
- Johnson Matthey Contacts

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## Johnson Matthey – Overview 2002/2003

British Company - Established in 1817 (London)

- Wayne, PA – North American Headquarters
- World leader in Advanced Materials Technology
- Specialists in the Manufacture of:
  - ≡ Catalysts – Environmental Control and Specialty Chemical Processes
  - ≡ Pharmaceutical Materials
  - ≡ Refining/Fabrication/Marketing of PGMs & Specialty Chemicals
  - ≡ Decorative/Specialized Materials for the Ceramics, Plastics, Ink & Construction Industries
- Employs 7,500 Personnel in 34 Countries
  - ≡ ~ 1100 in the Philadelphia area
- Turnover of \$7 billion US



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## Johnson Matthey Diesel Experience

- DCC™ Catalytic Converter > 10,000,000
- CEM™ Catalytic Exhaust Muffler > 10,000
- CCT™ 0.1 Upgrade Kit > 7,000
- CRT® Particulate Filter > 55,000
- DPFi Active Filter > 4,500
- Combined NOx / PM Systems
  - ▣ EGRT™ System > 2,400
  - ▣ SCRT™ System (Field Trials Underway) ~ 100



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## 2007 / 2010 Emission Standards

### ■ PM Standard

- ≍ 0.01 g/bhp-hr, 2007 onward

### ■ NOx Standard

- ≍ 50% at 0.2 g/bhp-hr and 50% at  $\sim$  2.2 g/bhp-hr, or  $\sim$  1.2 g/bhp-hr average in 2007
- ≍ 100% at 0.2 g/bhp-hr in 2010

### ■ Fuel Sulfur

- ≍ 15ppm S in mid-2006 (80% of total supply)



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## Technology to Meet Standards

- Engine based technology
  - ≡ Improved Control Strategies, Engine Design Improvements, EGR, Fuel Injection Enhancements, etc
  
- Catalytic Control of Emissions
  - ≡ Diesel Oxidation Catalysts (DOC)
  - ≡ Diesel Particulate Filters (DPF) with capability of active regeneration
  - ≡ Lean NO<sub>x</sub> Catalysts (LNC) – Active / Passive
  - ≡ NO<sub>x</sub> Adsorbers (NAC)
  - ≡ Selective Catalytic Reduction Catalysts (SCR)



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## Maintenance Requirements

### ■ Diesel Oxidation Catalysts

- ≡ Periodic Inspection of Packaging, Support Brackets and Piping
- ≡ No Requirement to Inspect Catalyst Brick

### ■ Diesel Particulate Filters

#### ≡ Passive

- Periodic Inspection of Packaging, Support Brackets and Piping
- Ash Removal / Filter Cleaning
- Control System Checks – Back Pressure and Temperature

#### ≡ Active

- Same as passive
- Inspection / Maintenance of Fuel Injection System – Injectors, Fuel Line
- Control System Checks – Wiring Harness, Functionality



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## Maintenance Requirements – Cont'd

### ■ Lean NOx Catalysts

#### ≡ Passive

- ▶ Periodic Inspection of Packaging, Support Brackets and Piping
- ▶ No Requirement to Inspect Catalyst Brick

#### ≡ Active

- ▶ Same as passive
- ▶ Inspection/Maintenance of Fuel Injection System – Injectors, Fuel Line
- ▶ Control System Checks – Wiring Harness, Functionality



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## Maintenance Requirements – Cont'd

### ■ NOx Adsorbers

- ⌘ Periodic Inspection of Packaging, Support Brackets and Piping
- ⌘ Inspection / Maintenance of Fuel Injection System – Injectors, Fuel Line
- ⌘ Control System Checks – Wiring Harness, Functionality

### ■ Selective Catalytic Reduction

- ⌘ Periodic Inspection of Packaging, Support Brackets and Piping
- ⌘ Inspection / Maintenance of Urea Injection System – Injector, Pump, Urea lines
- ⌘ Inspection / Maintenance of Fuel Injection System (Injector, Fuel Line) If Applicable
- ⌘ Control System Checks – Wiring Harness, Functionality



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