

# On-Road Heavy-Duty

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2008 EMA Certification Workshop

April 15, 2008

California Environmental Protection Agency

 **Air Resources Board**

# On-Road Heavy-Duty

## Topics

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- What's New For MY2009-2010
- SCR Certification
- Durability Testing - DF Determination for MY2010
- Hybrid Vehicle Certification
- Idle Emission Reduction
- New Engine Family Naming
- Service Information

# On-Road Heavy-Duty

## What's New For MY2009-2010

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### Certification:

- 0.20 g/bhp-hr NO<sub>x</sub> STD for MY2010 HDDE – expect SCR usage with concomitant issues of durability testing, DF determination, and AECD evaluation

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## What's New For MY2010+

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### Certification: (continued)

- OBD – MY2010-2012, one engine family with OBD per non SVM (except alternative fueled engines)
  - Parent rating (highest sales) – full OBD
  - Child ratings (others) – extrapolated OBD (malfunction criteria per engineering evaluation approved by ARB)

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## SCR Driver Inducement

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Concerns for continued proper SCR operation:

- Empty tank
- Improper refill (different or dilute reagent)
- No injection / no reagent usage

# On-Road Heavy-Duty

## SCR Driver Inducement

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### Empty Reagent Tank

- Initial early warning for low level (1/2 Full)
- Second warning of near empty tank (1/4 Full)
- Third warning at empty tank
- Driver inducement = no start; can be preceded by progressive derating

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## SCR Driver Inducement

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Improper Refill  
(e.g., different or dilute reagent)

- Must detect improper refill
- Immediate alert to driver
- Driver inducement = no start; can be preceded by progressive derating

# On-Road Heavy-Duty SCR Driver Inducement

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No Reagent Usage  
(e.g., disabled injector, blocked feed line)

- Must detect no reagent usage
- Immediate alert to driver
- Driver inducement = no start ???



# On-Road Heavy-Duty

## MY2010 Durability

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- Bench aging of after-treatment devices (e.g., DOC, SCR, DPF) may be considered with prior approval

Base engine must have stable engine-out emissions

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## MY2010 Durability

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- Must account for in-use regeneration effects (e.g., increased frequency and/or duration)
- Minimum service accumulation:
  - whole engine durability -  $\frac{1}{2}$  useful life
  - bench aging - full useful life

# On-Road Heavy-Duty Hybrid Certification

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Under current procedures, two cert options

- Option 1: Using Certified Engines
- Option 2: Chassis Certification (engine + hybrid system + vehicle)
- No changes planned

# On-Road Heavy-Duty Hybrid Certification

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Contact ARB for hybrid certification plans

- Durability and DF plan
- Emission Factor determination plan
- Warranty and Maintenance
- Other related discussions:
  - Special test conditions/procedures
  - Test vehicle configuration

# On-Road Heavy-Duty

## Hybrid Certification

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### Hybrid Electric Buses (HEBs)

- CA transit agencies (TAs) seeking HEBs to meet fleet rules
- TAs hoping to use MHDD engines in hybrids:
  - needs to work with engine MFRs to certify MHDDE to 220K-mi alternative UL
  - only 1 engine change-out during 435K-mi urban bus UL

# On-Road Heavy-Duty

## Idle Emission Reduction

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### MY2008+ HDDEs

- Requirements:
  - Five-minute engine shutdown (ESS), or
  - 30 g/hr NOx (clean idle), or
  - Approved alternatives (APS or Heaters).
- Part of AECD review process
- <http://www.arb.ca.gov/regact/idling/idling.htm>

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## Idle Emission Reduction

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### Engine Shutdown System (ESS) - MAC 07-03

- ESS required for all CA-only and all 50-state-labeled engines not in exempt vehicles
- ESS disablement for exempt vehicles must be under strict manufacturer control
- ESS disablement using a software toggle is allowed for MY2008-2009. A complete reflash is required for MY2010+

# On-Road Heavy-Duty

## Idle Emission Reduction

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### 30 g/hr NOx Clean Idle

- ARB approval of “Certified Clean Idle” vehicle label is integral to clean idle certification
- Engine MFR to provide a label to all CA-only-labeled and all 50-state-labeled engines not in exempt vehicles



# On-Road Heavy-Duty

## Idle Emission Reduction

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Engines with ESS recertified to 30 g/hr NO<sub>x</sub> Clean Idle

- allowed for MY2007 and 2008 engines
- approved via running changes (MY2008 still in production ) and field fixes (MY2007-2008 already produced)
- within an engine family, ESS-equipped engines and clean idle engines must be in separate model or engine code designations

# On-Road Heavy-Duty

## Idle Emission Reduction

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MFR-Sanctioned Ducting of Certified APU Engine to Main Engine Exhaust System Upstream of DPF

- ARB approval of “Verified Clean APS” vehicle label is integral to this certification
- Engine MFR to provide a label to all CA-only-labeled and all 50-state-labeled engines not in exempt vehicles
- Regen. of main engine DPF with APU added is part of main engine AECD review

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## Idle Emission Reduction

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ARB staff considerations for approving “Certified Clean Idle” and “Verified Clean APS” vehicle label

- color, contrast, and holographic effects of CA state outline and background “Clean Skies” lettering
- self destructiveness of label upon removing, e.g., deformation of the removed label and leaving a “VOID”, blank, or some other pattern on the vehicle that bear no resemblance to a valid label from a distance

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## Idle Emission Reduction

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### MY2008 Idle Emission Compliance Status

- 27 families with ESS
- 14 families with clean idle
- 3 families with clean idle *plus* APU exhausting into main engine exhaust system upstream of DPF

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## MY2009+ Engine Family Names

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- Use EPA CISC-07-03 for naming EFs.
- Unique ARB requirements indicated at the 10th position by special codes.
- ARB has not specified any such special codes.
- When special codes are needed, guidance letter will be issued in advance.

# Heavy-Duty Service Information

## Annual Website Reports

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- **ALL** heavy-duty engine manufacturers must submit annual reports pursuant to 13 CCR 1969(f)(6) that:
  - Show compliance with minimum website content and criteria in (f)(2)
  - Indicate the website's performance and effectiveness using Internet metrics
- Reports must be submitted no later than 30 days after the end of each calendar year

# On-Road Heavy-Duty

## Contact Information

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# On-Road Heavy-Duty Hybrid Certification

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## Option 1: Using Certified Engines

Must be used in HEVs in the same service class as the certified engine.

- no need for recertification
- no emission credit from hybrid use

# On-Road Heavy-Duty

## Hybrid Certification

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### Option 2: Chassis Certification

#### Interim HEV Test Procedure Applies

- One party certification
- Hybrid buses and hybrid trucks
- For hybrids using an engine not previously certified or seeking emission credits beyond the emission levels of the certified engine
- Emission factors (EFs) for determining certification compliance
- Determination of EFs requires approval