Compression Ignition and Heavy-Duty Certification

2010 EMA Certification Workshop
May 4, 2010
2010 EMA Certification Workshop

- 2010 General Certification Topics
- 2011 On-Road Certification Topics
- 2011 Off-Road Certification Topics
2010 General Certification Topics
2010 Certification

General Topics

• CI-HD Staffing / Responsibilities
• 2010 HD Engine Certification – Lessons Learned
• Certification Application Issues
Compression-Ignition and Heavy-Duty Certification

- CA-MDE (engine certified GVWR 8501~14000)
- CA-MDV (using above: exhaust and evaporative)
- On-Road HD Otto Cycle Engines (GVWR > 14000)
- On-Road HD Diesel Cycle Engines (GVWR > 14000)
- On-Road HD Evaporative Vehicles Certification
- On-Road HD Hybrid Vehicles (GVWR > 14000)
- Off-Road Compression-Ignition Engines
- On-Road HD ZEV Approvals
- Fuel-Fired Heaters Approval (GVWR > 14000)
## CI-HD Staff / E-Mail Address

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
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</table>
On-Road Light-Duty (ONLD)--Diesel Cert

- ONLD certifies EMA manufacturers’ diesel LDT and MDV.
- Diesel SCR and AECD reviews are coordinated between CI-HD and ONLD staff.
- Current ONLD staff certifying diesels:
  - Duc Nguyen, Manager  dnguyen@arb.ca.gov
  - Seongyup Kim – GM
  - Yuh Jiun Tan - Ford
  - Lucky Benedict – Chrysler, Cummins
  - Tony Martino – Mercedes
  - Bill McDuffee – VW/Audi
Lessons Learned
From 2010 Heavy-Duty Certification

• Review of Sensors Table
• Sensors Fault vs. ATD Shut-off
• Partial SCR Strategy Approval for 2010 MY
• Toxic Compound Emissions (TAC Emissions)

• ATD = After-treatment Device
Certification Application Issues

- Engine Label Testing (self-tear and durability)
- Delegated Assembly
- DF Program (35% UL w/ opt in-use program)??

California Environmental Protection Agency
Air Resources Board
Engine Label Testing

• Label self-destruct upon removal
• Durability period = 10 years or compliance period
  • Engine compartment environment
  • Normal solvent for de-greasing engine
• Provide at least TWO samples for ARB testing
Delegated Assembly (DA)

- ARB On-Road HDDE regs do not include DA, OFCI regs are the same as EPA
- On-Road HDDE may accept EPA’s procedure
- Must fully describe DA procedures/audit in DMS
- Must identify DA parts
DF Program

- 2010+ ON-HHDD, Tier4i and Tier4 OFCI Engines

- Prefer 50% UL using in-use service cycle

- Optional 35% UL with 2011+ in-use validation program
  - EMA proposal??
  - Other alternatives??
2011
On-Road Certification Topics
2011 Certification

On-Road Topics

- OBD
- SCR
- Hybrid HD Vehicle Certification
- Sensors Table ➔ All 2010 MY Engines
- Confirmatory Testing ➔ “cut points”
- Service Information
On-Board Diagnostics

- 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)
- OBD documents to MSCD directly
- OBD approval letter from MSCD to Mfr to DMS
Upcoming SCR Workshop

- June 2010—Workshop Notice
- August 2010—Workshop in El Monte, CA
- 2010 MY SCR Strategies Need to be Improved for 2011 MY
  - Tamper Resistance
  - Emissions Compliance
- Applicable to all Mobile Source Categories
SCR Concerns

- Emission compliance requiring software and/or hardware to assure
  - Minimum SCR system downtime due to DEF maintenance and SCR system tamper
  - Minimum downtime allowed for gaming SCR system
- Cu-based or V-based SCR Catalyst: need early discuss with ARB for possible TAC emissions
Hybrid Certification

- New rulemaking effort underway for 2011CY
- Seeking rulemaking workgroup participation
  - POC = Jessica Dean (jdean@arb.ca.gov)
  - Test cycle development, test protocol development, emissions warranty and useful-life, etc.
- No changes from last year
AECD Sensors Table

- Speeds up review for 2010+ applications
- Identifies in-appropriate shut-off of critical emissions control systems
- Identifies and possibly reduces system tamper

<table>
<thead>
<tr>
<th>Name / Abbr.</th>
<th>Parameter Range</th>
<th>Sensor/Actuator Value: High (unit)</th>
<th>Sensor/Actuator Value: Low (unit)</th>
<th>Failure Detection</th>
<th>Failure Indication</th>
<th>Default Mode/Thresold Value</th>
<th>Failure Consequence</th>
<th>Impacts on Emissions</th>
<th>AECD Type</th>
<th>AECD Justification</th>
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**On-Road Heavy-Duty**

**Confirmatory Test “Cut-Points”**

- General policy to request confirmatory testing when result exceeds 85% of standard

<table>
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<tr>
<th>xxHC</th>
<th>CO</th>
<th>N0x</th>
<th>PM</th>
<th>HCHO</th>
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<td>15.5</td>
<td>0.20</td>
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<td>0.12</td>
<td>13.2</td>
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Heavy-Duty Service Information

Annual Website Reports

• Website reports are mandatory
  – ARB has received few submittals from HDDE Mfrs in the past two years
  – Received submittals from only 25% of EMA members – the remaining 75% have not submitted
  – Possible penalties for non-submittal

• ARB needs Mfrs’ reports to create the required annual report to the state legislature on the effectiveness of the service information regulation.

California Environmental Protection Agency
Air Resources Board
Service Information

Contact Information

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2011 OFCI Certification Topics
Certification Topics

- Tier-3 ~ Tier-4i / Tier-4 ➔ Transition Topics
- DPF ➔ Manual-only Regeneration Concern
- SCR ➔ Implementation Concerns
- Sensors Table ➔ All 2011 MY OFCI Engines
2011 - OFCI

Tier-3 to Tier-4 Transition Topics

• DFs carryover from Tier-3 to Tier-4(i)

• Two DFs needed for Tier-4(i) \( \Rightarrow \) NRTC and SS

• Carry-across of on-road DFs to off-road engines, where applicable
Diesel Particulate Filters

- Manual-only regeneration ➔ Approval NOT likely
  - Frequency vs. Accountability
  - Excess emissions vs. control logic

- Operator Commanded Regeneration (OCR) is allowed under safe harbor provisions per ARB letter (CHC-2006-007-1)
Selective Catalytic Reduction (SCR)

- Similar concerns addressed by On-Road SCR
- Application specific approval may be possible
- Recommended early SCR discussion with agency
- Cu and V based SCR catalyst $\rightarrow$ TAC emissions needs to be quantified (approval is an open issue)
## 2011-OFCl Confirmatory Test “Cut-Points”

General policy to request confirmatory testing when result exceeds 85% of Std

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<tr>
<th>Category/standard</th>
<th>OFCI Tier - 4i Exhaust</th>
<th>OFCI Tier - 4 Exhaust</th>
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<tr>
<td></td>
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<tr>
<td>&lt;8kw</td>
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<tr>
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<tr>
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Compression-Ignition and Heavy-Duty Certification

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