Enhanced Supplemental Federal Test Procedures Rulemaking

SFTP II
What is SFTP?

- Designed to capture “off-cycle” emissions not reflected in the FTP
- Consists of two test cycles
  - US06: high speeds, high loads
  - SC03: load from air conditioning
- Adopted in 1997 as a 4K standard
- Emission levels established by LEV I prototype emission technology
SFTP II Regulatory Concepts

• Lower SFTP Standards Consistent with LEVII Technology
• Standards Based on LEV II Exhaust Categories
  – Establish useful life emissions up to 150K miles
  – Extend applicability to 14,000 lbs
  – Eliminate alternative fuel exemption
• Proposed Emission Levels Based upon Test Plan, Certification Data, LEV II Technology
• Misc Test Procedures Amendments (i.e., Allow Periodic Regeneration Procedure for Certification)
Emission Capabilities

- Test Program Data
- Test Program vs. Certification Data
- Current Vehicle Emissions Capabilities
Emission Standards Development

**EPA**
- UL = 4K SFTP Results + UL FTP DFs
- EPA Standards with High CM
- Standards = UL + Compliance Margin (CM)

**ARB**
- SFTP Allowed 1.5 CM
- Test Program
  - Test Program values at Intermediate UL
  - Projected TP intermediate UL values to full UL using FTP DFs
    - Compared FTP deterioration to TP results—similar
  - Emissions Capability = (TP UL) * 1.5 CM
  - Emissions Capability compared to Cert Data
## Proposed Standards
### Less than 8,500 pounds

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Mileage for Compliance</th>
<th>Vehicle Emission Category</th>
<th>US06 (g/mile)</th>
<th>SC03 (g/mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>NMHC +NOx</td>
<td>CO</td>
</tr>
<tr>
<td>All PCs, LDTs</td>
<td>150,000</td>
<td>LEV</td>
<td>0.12</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ULEV</td>
<td>0.10</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SULEV</td>
<td>0.03</td>
<td>5.6</td>
</tr>
</tbody>
</table>
## Proposed Standards

### MDV 8,501 to 14,000 pounds

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Mileage for Compliance</th>
<th>Vehicle Emission Category</th>
<th>NMHC +NOx</th>
<th>CO</th>
<th>NMHC +NOx</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MDVs 8,501 to 10,000 pounds GVWR</strong></td>
<td>150,000</td>
<td>LEV</td>
<td>0.20</td>
<td>8.8</td>
<td>0.19</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ULEV</td>
<td>0.16</td>
<td>8.8</td>
<td>0.15</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SULEV</td>
<td>0.10</td>
<td>8.8</td>
<td>0.10</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>MDVs 10,001 to 14,000 pounds GVWR</strong></td>
<td>150,000</td>
<td>LEV</td>
<td>0.40</td>
<td>10.0</td>
<td>0.42</td>
<td>6.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ULEV</td>
<td>0.32</td>
<td>10.0</td>
<td>0.38</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SULEV</td>
<td>0.20</td>
<td>10.0</td>
<td>0.21</td>
<td>3.0</td>
</tr>
</tbody>
</table>
SFTP II Issues

• Standards do not consider GHG technologies
  – Light duty diesels
  – Down-sized engines
  – Lean burn gasoline

• CO standard is too stringent
  – Staff increased proposed standard to a “capping” level of 5.6 g/mi vehicles < 8,500 pounds

• US06 cycle not appropriate for over 8,500 pounds
Composite Fleet Average

- Option of complying with a sales-weighted composite fleet average
- Composite standards weight emission values from FTP, SFTP and US06
- Manufacturers can average superclean vehicles to offset higher emitting vehicles
- Fleet average starts in 2014
- By 2022 vehicles must meet SULEV standards
- Proposed SULEV composite fleet average is 0.03 g/mile
US06 Test Cycle for MDVs

• Appropriate for 8.5K to 10K vehicles
  – Staff considering LA92 test cycle for 10K to 14K
• ARB tested several 8.5K to 10K
• Datalogged vehicles in 8.5K to 10K class
• Daily observation of vehicles
MDV US06 Sightings
Evaporative Emissions Regulations
What Are Evaporative Emissions?

• Hydrocarbon vapors that escape from vehicle’s fuel system

• Four types
  – Running loss
  – Hot Soak
  – Diurnal
  – Refueling
Typical Evap Control System

- FUEL TANK
- GAS CAP
- FILL PIPE
- CARBON CANISTER
- VAPOR PURGE LINE
Evap Regulations

• Evap Tests
  – 3-Day Diurnal + High-Temp Hot Soak, Running Loss
  – Supplemental 2-Day Diurnal + Hot Soak

• ORVR
  – Adopted 1995

• LEV II Evap
  – Adopted 1998
  – Optional Zero Emission Standard PZEV
  – In-Use Verification Program
Zero-Evaporative Emission Standards

- More PZEVs each year
- Wide Model Variety
  - Passenger Cars
  - Light-Duty Trucks
- Production Increasing
- Fuel type variety
  - Dedicated Gasoline
  - Hybrid Electric Gasoline
Typical Zero-Fuel Evaporative Emissions Technology

• Air Intake System HC Trap
• Increased Capacity Carbon Canister (increased compartmentalization)
• Bleed Canister (integrated or separate from main canister)
• Multi-layer Plastic Tanks (decreased connections, components in tank)
• Improved Fuel / Vapor Lines (better barrier layer, increased use of metal)
• Better Connections (multi o-ring quick connect or metal to metal connections)
## Zero Evaporative Emission Standards (g/test)

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Zero-Fuel Related Standards(^1)</th>
<th>Whole Vehicle D+HS Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger Cars</td>
<td>0.0</td>
<td>0.35</td>
</tr>
<tr>
<td>Smaller Light Trucks</td>
<td>0.0</td>
<td>0.50</td>
</tr>
<tr>
<td>Larger Light Trucks (&lt;8.5K)</td>
<td>0.0</td>
<td>0.75</td>
</tr>
</tbody>
</table>

\(^1\) Values 0.054 or less considered compliant
## PZEV Test Results (g/test)

### Whole Vehicle

<table>
<thead>
<tr>
<th></th>
<th>Passenger Cars</th>
<th>Light-Duty Trucks</th>
<th>Running Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3D+HS</td>
<td>2D+HS</td>
<td>3D+HS</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>0.22</td>
<td>0.22</td>
<td>0.29</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>0.10 - 0.30</td>
<td>0.11 - 0.30</td>
<td>0.22 - 0.34</td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td>0.35</td>
<td>0.35</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>3D+HS Rig Test</td>
<td>2D+HS Rig Test</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>---------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>0.026</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>0.00 – 0.048</td>
<td>0.00 – 0.45</td>
<td></td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td>0.0*</td>
<td>0.0*</td>
<td></td>
</tr>
</tbody>
</table>

*Values 0.054 or less considered compliant*
• Extended Diurnal Emission Results
  – 2004 Ford Focus - 89 mg/test
  – 2005 Honda Accord - 168 mg/test
  – 2006 Toyota Camry – 139 mg/test
  – 2006 VW Jetta – 226 mg/test
• Certification Data
  – Mitsibushi – 110 mg/test
• LEV2 Test Program
  – Background data – 90 mg/test
Proposed LEV III Evap Standards

- Lower whole vehicle D+HS zero evaporative standards (g/test) for all vehicles < 14K GVWR
- Extend current zero evap technology to all vehicle categories
- Same standards for both 3day+HS and 2 day+HS
- Eliminate the “rig” test
- Change the cert fuel to E10
Evap Test Plan Underway

- PZEVs will be procured
- Vehicle selection based on low whole vehicle certification levels
- Vehicle will be tested on several fuels
  - E0, E10
- Identify technologies needed to minimize impact of increased ethanol in the fuel
Certification Fuel Update
Updating the Certification Fuel

- Starting in this year gasoline sold at the pump will have 10% ethanol (E10)
- Proposed E10 specifications
- LEVIII phase-in considerations
- Carryover/carryacross provisions
# Evaporative Test Fuel Requirements

<table>
<thead>
<tr>
<th></th>
<th>U. S. EPA</th>
<th>ARB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Accumulation Fuel</strong></td>
<td>Commercial Gasoline with Ethanol</td>
<td>Commercial Gasoline</td>
</tr>
<tr>
<td><strong>Emission Test Fuel</strong></td>
<td>Tier 2 Unleaded</td>
<td>Tier 2 Unleaded or California Phase 2</td>
</tr>
<tr>
<td><strong>PZEV Zero-Fuel Test Fuel</strong></td>
<td>Not Applicable</td>
<td>California Phase 2</td>
</tr>
</tbody>
</table>
SFTP and Zero Evap Contacts

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