



# **Future of In-Use Test Programs for Light-, Medium-, and Heavy-Duty Vehicles**

## **Clean Fuels Program Advisory Group**

### **August 19, 2010**

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# Current In-Use Test Programs

## Heavy-Duty

### ● ARB Inspections

- Border crossings, random roadside, CHP weigh stations, fleet facilities
- Check tampering, opacity, Emission Control Label

### ● Periodic Smoke Inspection Program

## Light- & Medium-Duty

### ● Biennial Smog Check Inspections

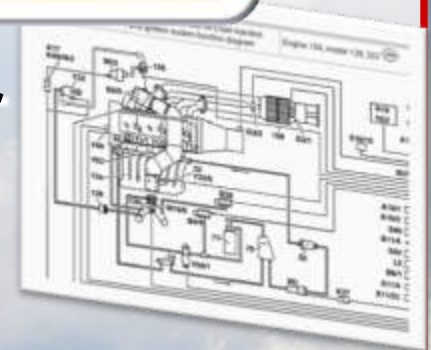
- Vehicles exempt first 6 years
- Inclusion of diesels January 1, 2010
- Many vehicles exempted from loaded mode test



# On-Board Diagnostics (OBD)

## What is it?

- Diagnostics incorporated into hardware & software of onboard computer
- Illuminates 'check engine light'
- When component deterioration or failure causes emissions to exceed tailpipe certification standard by specified levels
- Performance of emission controls judged by information from sensors
- Sensors do not directly measure emissions



# OBD (Continued)

## Key Role in Monitoring In-Use Emissions

- Monitors virtually all components & systems that can affect emissions or other OBD monitors
- Current fault codes scanned during smog check
- Cutting edge: Updated as technologies changes

## Regulatory History

- Passenger cars, trucks, SUVs
  - 1996 - OBD II
- Heavy-duty:
  - 2007 - Engine Manufacturer Diagnostic (EMD) System
  - 2010 to 2016 OBD phase-in; By 2013, EMD phased out)



# Heavy-Duty OBD

## ● Why Not Earlier?

- Lag in electronic engine controls, aftertreatment
- This began changing in 2007, with initiation of more stringent emission controls

## ● 2009 Amendments

- Reduced monitoring stringency through 2012
- To reflect current state of technology
- PM filter, NOx sensors, NOx catalyst (e.g. SCR)

# Future of In-Use Monitoring

## OBD III (Continuous Testing Program)

- Remote Monitoring of OBD II for Light-, Medium-, & Heavy-Duty
- Vehicles Equipped with Transponders that Transmit OBD Trouble Codes
- Receivers Located Strategically or Through Cellular or Wi-Fi
- Exempt from Biennial Smog Check if Repairs Made within 45 Days
- Emissions Benefit
  - Up to two year repair delay w/ smog check



# Efficacy of Smog Check Program

- **Independent Analysis for ARB**

- Roadside inspections in 2003 – 2006
- Pre-1996 model years (pre-OBD II)
- Of those failing initial smog check & then passing a re-test, 59% failed roadside test
- Conclusion: Many vehicles were not actually repaired or were repaired only temporarily



- **SIP Shortfall of 70 TPD (ROG/NOx)**

- **Smog Check Analyzers Inadequate to Measure Current Certification Levels**

# Proposed AB 2289 (Eng)

- **Modified Biennial Smog Check Test for Light- & Medium-Duty Vehicles**
  - Drop tailpipe test
  - 2000 model year and later
  - Beginning 2013
  - Relies heavily on OBD
- **Still Perform Visual Test**
- **More Stringent Fines for Stations that Perform Improper or Incomplete Inspections**





# **Remote Sensing Study on Heavy-Duty Vehicles**

- **Evaluate Impact on Heavy-Duty Emissions as Stricter Standards are Introduced**
- **Emission Changes Expected as a Result of Recent CARB Regulations & the Ports Clean Air Action Plan**
- **Year 3 of 5-Year Study**
- **Two Locations**
  - **Port of Los Angeles (Funded by AQMD)**
  - **Weigh station - Fwy 91 (Funded by NREL)**



# Remote Sensing Study on Heavy-Duty Vehicles (Continued)



## Preliminary Results - Year 2

- Out of State Trucks at Weigh Station an Avg. of 3.4 Model Years Newer than Calif. HD Fleet
- NO<sub>x</sub> & PM Dramatically ↓ with Newer Model Years
- NO<sub>x</sub> Emissions 33% ↓ at Port in 2009 than 2008
- ↑ NH<sub>3</sub> Emissions from Stoichiometric Natural Gas Engines
- No High SO<sub>2</sub> Emissions Observed, as Opposed to Previous Year (Likely Due to High Sulfur Fuels)

# Additional In-Use Testing

- On-Road Heavy-Duty, Existing & New
- Board Approval in July for Release of RFP
- Assess Impact of Technologies on Emissions
  - Are certification levels being met?
  - If needed, demonstrate retrofit technologies



# OBD III + Remote Sensing

- **Combination of These Technologies  
May be Most Effective Way of Monitoring  
In-Use Emissions from Light-, Medium-,  
& Heavy-Duty Fleets**
- **PM Sensor Technology  
Not Adequately Developed  
Yet for OBD**
- **Remote Sensing  
Provides a Check of In-Use Emissions**

