



# Proposed Amendments to Heavy-Duty On-Board Diagnostic Requirements

August 23, 2012



# Today's Presentation

- Background
- Proposed Amendments
- Remaining Issue
- Summary

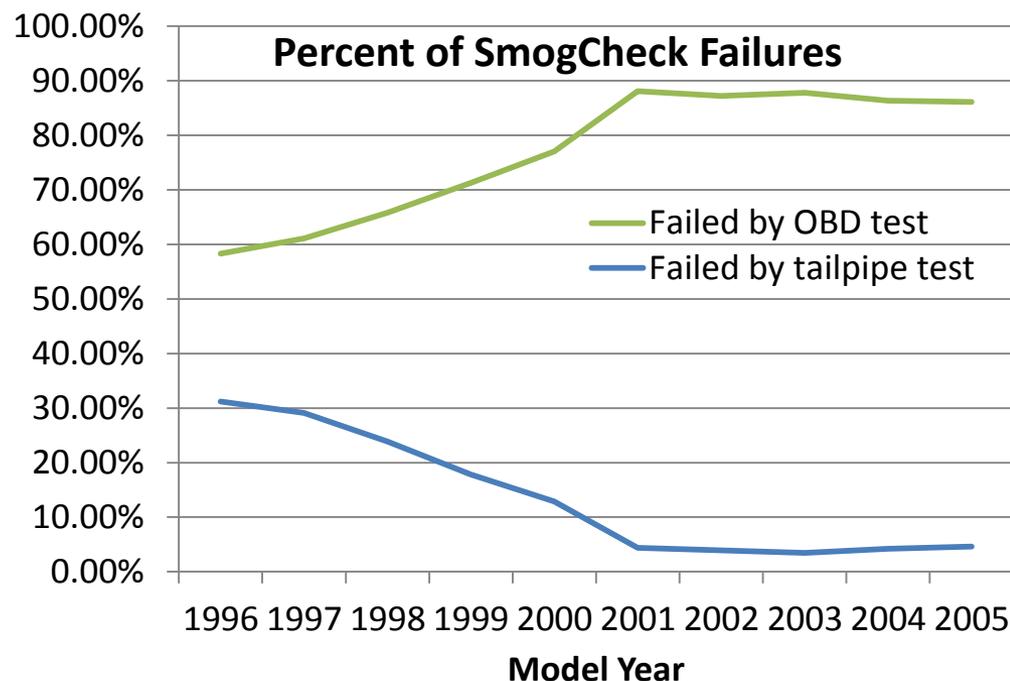
# Background

- On-Board Diagnostic (OBD) systems
  - Mostly software in engine computer
  - Illuminates 'check engine light' when fault is detected
  - Standardized information for repair technician to help fix vehicle



# OBD II for Light-Duty

- On passenger cars and trucks since 1996MY
- Has become principal method to identify failing cars in SmogCheck
  - Relied upon by all other U.S. States with Inspection programs



# Heavy-Duty

- Applies to on-road heavy-duty engines
- Phase-in started in 2010MY
- Required on all 2013+MY



# Reason for Changes

- Program updates occur regularly
  - Technology forcing regulation
  - Periodic reviews to check progress
- Last revisions before wide-scale implementation in 2013MY
- Changes affect heavy- and medium-duty
  - Mostly diesel engines

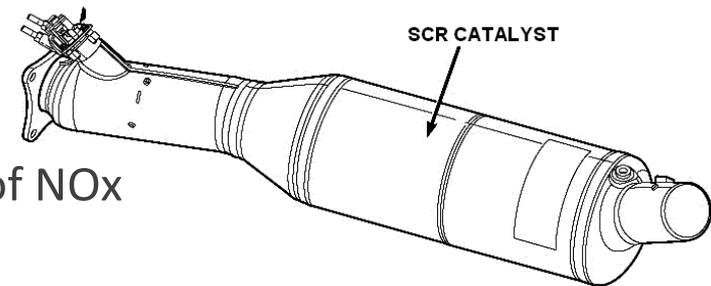


# Overview of Proposed Changes

- Changes that affect 2013-2015MY
  - Reflect current state of the art technology
- More stringent requirements for 2016MY or later
- Revised/new definitions and other revisions to clarify stakeholder responsibilities

# Selective Catalytic Reduction (SCR) Catalyst

- Critical NOx control for diesels
  - Catalyst in the exhaust that converts 90+% of NOx
- Change to monitor stringency
  - E.g., detect a fault before emissions exceed xx times the tailpipe NOx standard
- Also applies to NOx sensors used to monitor the SCR system



|          | 13MY                           | 14MY          | 15MY          | 16MY |
|----------|--------------------------------|---------------|---------------|------|
| current  | Detect a fault at 2x NOx stds. | 2x            | 2x            | 2x   |
| proposed | 3x stds.                       | Phase in 2.5x | Phase in 2.5x | 2x   |

# Particulate Matter (PM) Filter

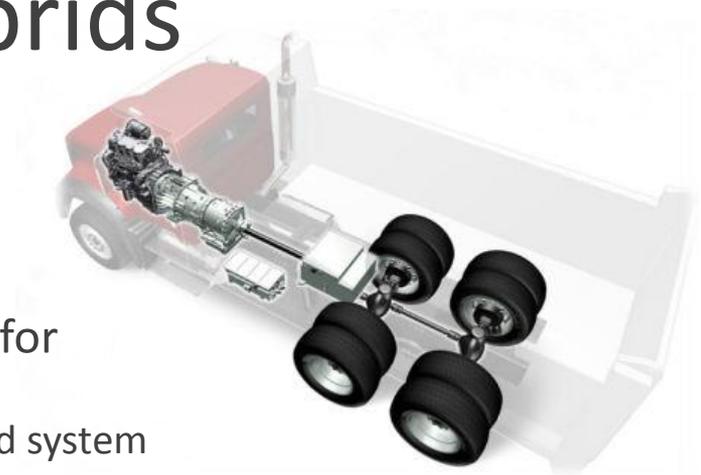
- Critical PM control for diesels
  - Similar to a catalyst in the exhaust that traps 95+% of PM
- Change to monitor stringency
  - Detect a fault before emissions exceed xx times the tailpipe PM standard
- Transitioning to new monitor technology in 2014-2016MY
  - Current approach has limited capability
  - Will use PM sensor to detect all possible failures
  - Two options for phase-in provided



|          | 13MY  | 14MY   | 15MY   | 16MY           |
|----------|---|--|--|----------------|
| Current  | 3x (one engine)<br>5x (all others)                    | ← Same                                       | ← Same                                       | 3x all engines |
| Proposed | Detect a fault at<br>5x PM standards<br>(all engines) | Phase-in 5x w/sensor<br>(20% of all engines) | ← Same                                       | 3x all engines |
|          |   | ← Same                                       | Phase-in 3x w/sensor<br>(50% of all engines) |                |

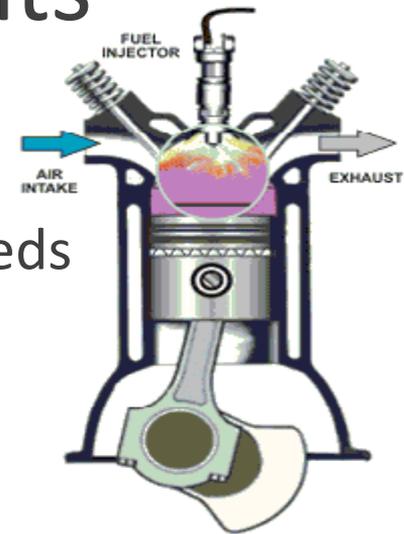
# Heavy-Duty Hybrids

- Important to monitor hybrid components
  - If hybrid system doesn't work, engine operates more and emissions increase
- Higher level of integration required than typical for today's heavy-duty vehicles
  - Independent suppliers for engine, vehicle, and hybrid system
- Coordination needed to:
  - Preserve low emission performance of vehicle
  - Maximize CO<sub>2</sub> benefits and fuel economy
  - Optimize drivability and performance
  - Properly monitor components within OBD
- Proposing one year delay before OBD required
  - 2014MY instead of 2013MY
  - Need the time to better integrate



# More Stringent Requirements

- Diesel engine misfire monitoring
  - Expand from idle-only monitor to all engine speeds and loads
  - Progressive phase-in from 2016-2021MYs
- Heavy-duty alternate fuel engines
  - Historically represent < 5% of the fleet
  - Currently exempt from OBD until 2020MY
  - Proposing pull-ahead to 2018MY
    - Some indications that sales volume may significantly increase in the near future



# Remaining Issue

- PM filter monitor phase-in

|          | 13MY  | 14MY                                      | 15MY                                      | 16MY  |
|----------|---|---|---|---|
| Proposed | Detect faults at 5x PM standard (all engines) | Phase-in 5x w/sensor (20% of all engines) | ← Same                                    | Detect faults at 3x PM standard (all engines) |
|          |   | ← Same                                    | Phase-in 3x w/sensor (50% of all engines) |   |

- Industry asking for lower phase-ins and other forms of relaxed requirements
- Staff believes current proposal is achievable and likely successful path to 2016MY compliance
- Other relief mechanisms in place should a manufacturer fall short

## Costs and Cost-Effectiveness

- Minimal impacts to cost of 2005 regulation
  - Remains at \$134/engine (<2% of retail price)
- Cost-effectiveness remains very good:
  - \$0.15/lb of ROG+NO<sub>x</sub> and \$22.50/lb of PM

# Summary

- Proposed changes necessary to ensure successful heavy-duty OBD program
  - Balance of interim adjustments and addition of future improvements
- Staff recommends adoption of amendments
  - With 15-day changes