



Proposed Amendments to Heavy-Duty On-Board Diagnostic Requirements

August 23, 2012

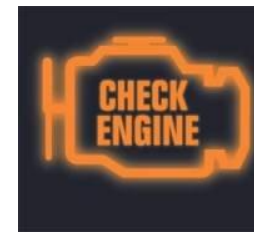


Today's Presentation

- Background
- Proposed Amendments
- Remaining Issue
- Summary

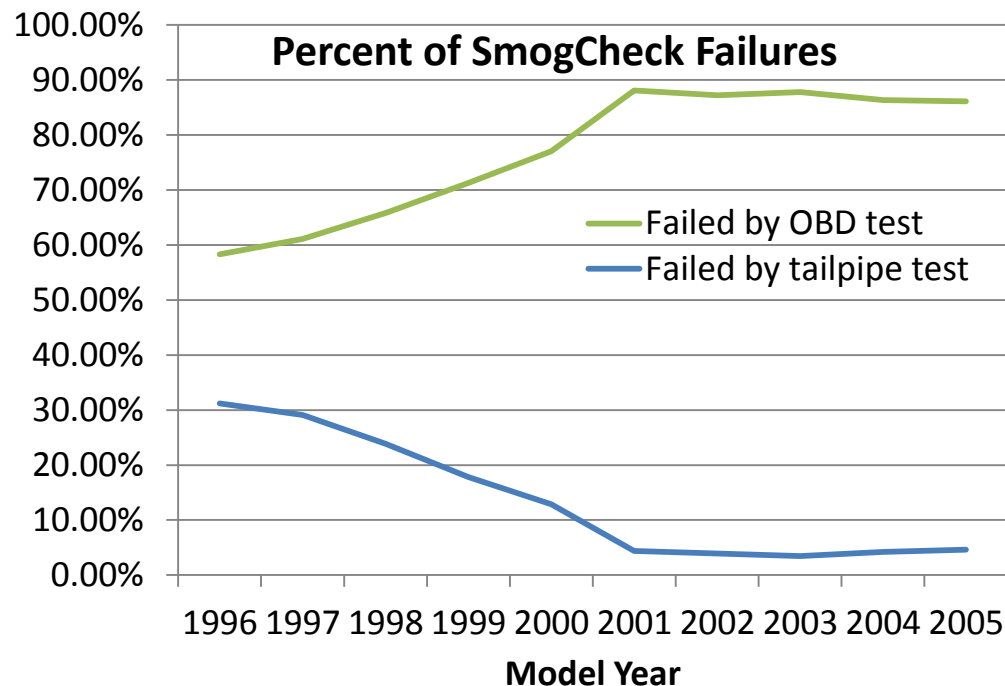
Background

- 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

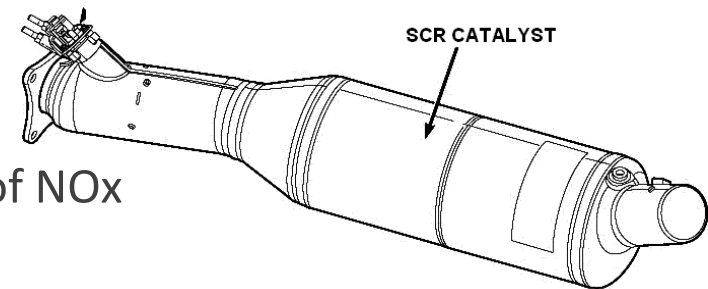
- Program updates occur regularly
 - Technology forcing regulation
 - Periodic reviews to check progress
- Last revisions before wide-scale implementation in 2013MY
- Changes affect heavy- and medium-duty
 - Mostly diesel engines

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

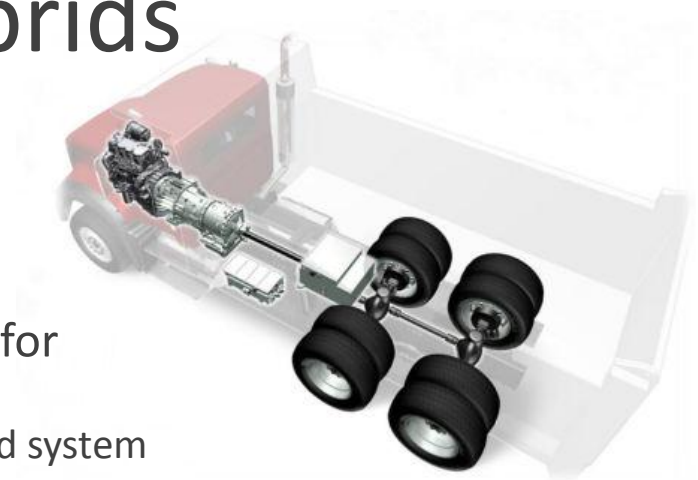
- Critical PM control for diesels
 - Similar to a catalyst in the exhaust that traps 95+% of PM
- Change to monitor stringency
 - Detect a fault before emissions exceed xx times the tailpipe PM standard
- Transitioning to new monitor technology in 2014-2016MY
 - Current approach has limited capability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



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

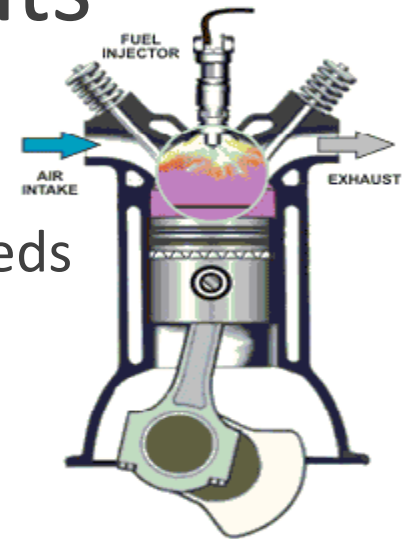
Heavy-Duty Hybrids

- 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 CO₂ 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_x 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