

# Proposed Regulatory Amendments for Approval of Aftermarket DPFs

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April 22, 2016

California Environmental Protection Agency

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 **Air Resources Board**

# Need for Regulatory Amendments

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- 2007-2009 on-road engines were certified with diesel particulate filters (DPFs) and are now out of warranty
- Currently, there is no regulatory path for evaluating and approving aftermarket DPFs
- Retrofit manufacturers (Mfrs) asked for a way to approve aftermarket DPFs
- Consumers currently limited to purchasing replacement DPF from the original equipment manufacturer (OEM )

# Proposal

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- Amend title 13 CCR 2222 (aftermarket parts) to incorporate a new evaluation procedure and clarify the terms under which DPFs can be sold
- Adds a procedure for evaluation and approval of aftermarket diesel particulate filters (DPF)
- Proposal modeled after current aftermarket parts program (e.g., Three-way Catalysts)

# Procedure Objectives

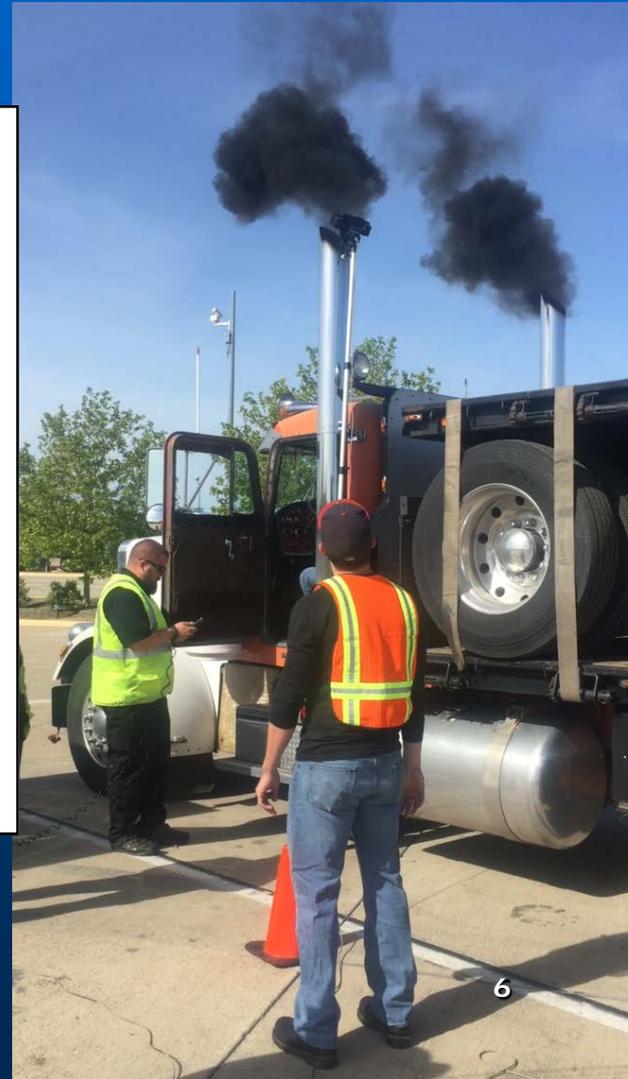
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- Ensures benefits from 2007 heavy-duty emission standards are realized
- Establishes a regulatory path for the approval of aftermarket DPFs
- Ensures requirements are sufficiently robust to protect end-users but are still economically feasible for aftermarket DPF mfrs
- Provides consumers with more choices for replacing out-of-warranty DPFs

# Background

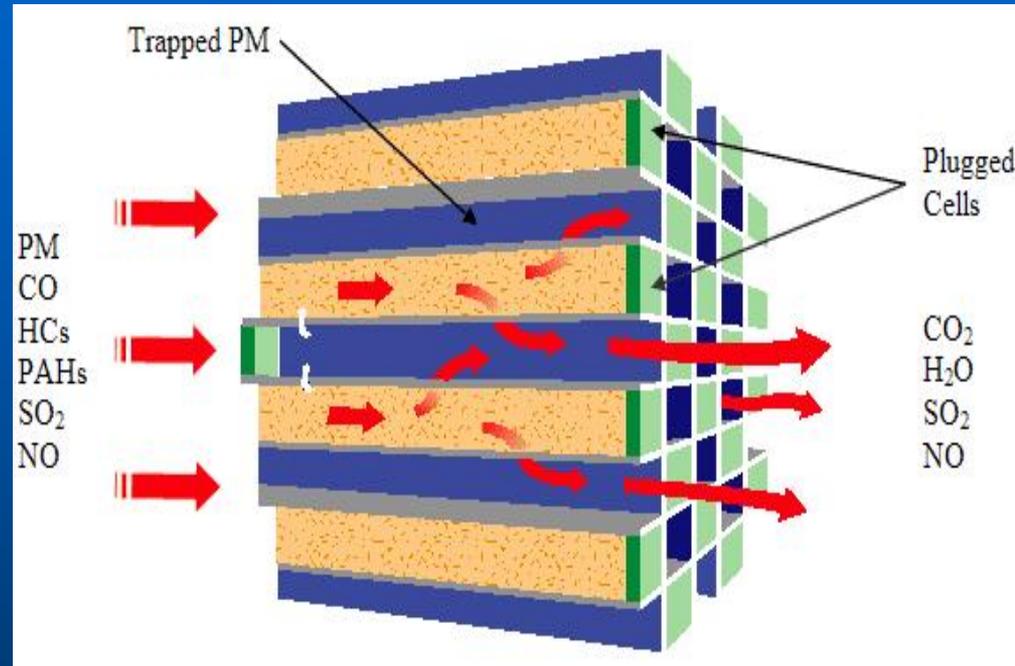


# Need for Diesel PM Emission Controls



# Diesel Particulate Filters

- DPFs are high-efficiency devices (reduce 95% of PM emissions by mass)
- Required to meet 2007 HDDE PM engine standards
- 90 million in-use worldwide in variety of applications



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# Proposed Regulatory Amendments

# Proposed Aftermarket Part Regulation Amendments

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- Adds section 2222(k)
- Provides approval path for DPFs
- Incorporates by reference ARB's evaluation procedure
- Provides clarification of the terms under which aftermarket DPFs may be sold
- Used DPFs cannot be sold
- Adds definitions to support the evaluation procedure

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# **Aftermarket DPF Evaluation Procedure**

# Applicability

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- Applies to new aftermarket DPFs
- Applies to 2007-2009 MY on-road heavy-duty diesel engines certified with DPFs that are out of warranty
- Does not apply to the following:
  - DPFs covered under verification procedure
  - OEM replacement DPFs
  - Engines equipped with selective catalytic reduction (SCR) technology
  - Metal DPFs

# Procedure Overview

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- Aftermarket approval program is specifically designed to address unique considerations of DPFs
- Basis of formal application is Mfrs determination of target engines (Emission Control Group or ECG)
- Manufacturer's DPF testing requirements
- Warranty/Audit/Recall requirements
- Labeling requirements
- Recordkeeping

# Testing Objectives

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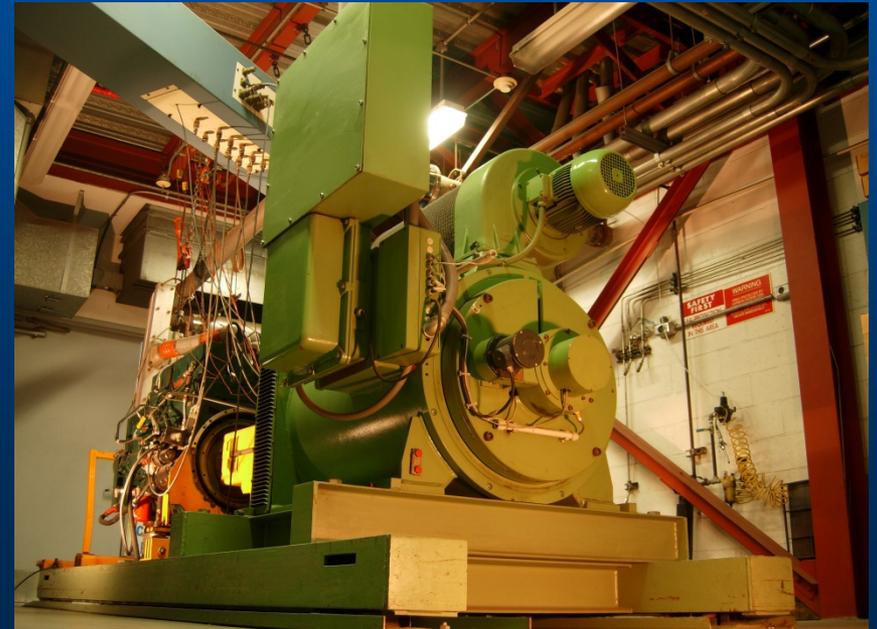
- DPF-equipped engine is compliant with the original certification emission standards
- DPF is durable
- DPF is compatible with the engine
  - Has no effect on engine function or normal operations
  - Regenerates similarly to the original part
  - Generates no faults, has no impact on EMD or ECU, etc.

# Testing



DPF

Heavy-Duty Engine  
Dynamometer



# Testing Elements

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- Laboratory degreening
- Laboratory aging
  - To demonstrate durability
- In-use field trials
  - To demonstrate engine and application compatibility
  - Two additional AMP DPFs installed on two other vehicles to show compatibility with entire scope of emission control group
- Emissions testing

# Laboratory Degreening

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- Devices require a break-in or aging period to stabilize function
- Protocol (OEM and aftermarket DPFs)
  - DPF installed on emission test engine
  - 25 hours each for OEM and AMP DPF including at least one regeneration
  - Backpressure, exhaust temperature, and other parameters recorded
- Ensures both the OEM and aftermarket DPF are in similar condition

# Laboratory Aging

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- Applies only to the aftermarket DPF
- Accelerated aging process under controlled conditions
- Incorporates temperature effects of regeneration
- Incorporates chemical aging effects
- Allows for the use of a “mule” engine

# In-Use Field Trials

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- Applies to aftermarket laboratory aged DPF
- Evaluation of the performance of the aged part under real-world conditions
- Data logging required
- Emission testing before and after
- Additional field trials

# Emission Testing Requirements

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- Measurements
  - PM, NO<sub>x</sub>, NO<sub>2</sub>, HC, CO, CO<sub>2</sub>, backpressure, and exhaust temperature
  - Toxics analysis if necessary
- Testing must be on appropriate certification cycles (e.g. FTP, SET, etc.)
- Emissions testing during regeneration of soot-loaded filter
- Catalytic activity check (NO<sub>2</sub> or soot accumulation)

# Warranty and Recordkeeping

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- Warranties
  - Product Warranty - 2 years
  - Installation Warranty - 2 years
  - Length consistent with other aftermarket part warranties
- Recordkeeping
  - To support warranty and potential recalls
  - Retain user, vehicle, engine, DPF, and service information
  - Keep for 6 years after warranty expiration
  - Length consistent with certification

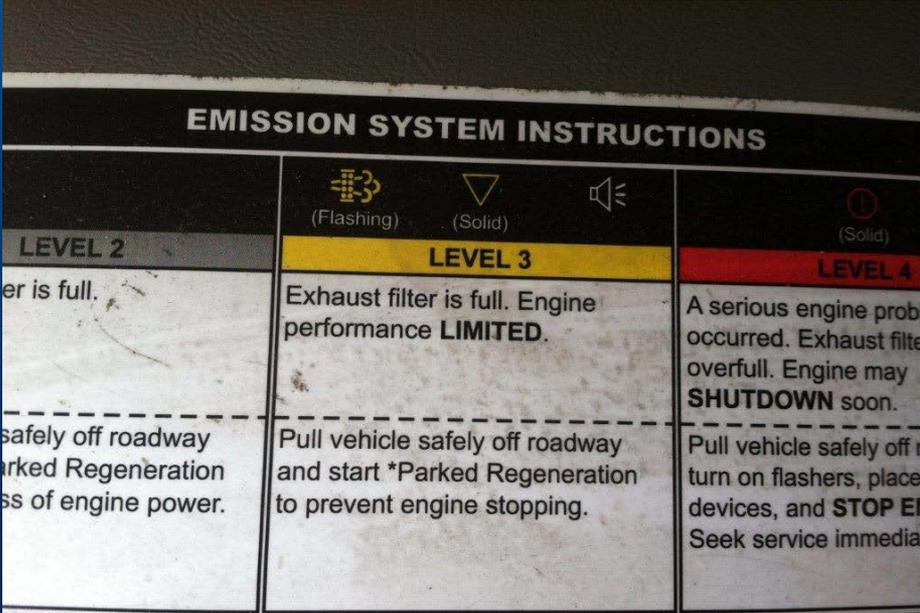
# Installation and Labeling

## ■ Installation Requirements

- Manufacturer-authorized installer
- Pre-installation assessment

## ■ Labeling Requirements

- Legible, visible, durable labels with standard information
- Includes serial number, manufacturer contact, and other miscellaneous information



**EMISSION SYSTEM INSTRUCTIONS**

	 (Flashing)	 (Solid)		 (Solid)
<b>LEVEL 2</b>	<b>LEVEL 3</b>		<b>LEVEL 4</b>	
Exhaust filter is full.	Exhaust filter is full. Engine performance <b>LIMITED</b> .		A serious engine problem has occurred. Exhaust filter is overfull. Engine may <b>SHUTDOWN</b> soon.	
Pull vehicle safely off roadway and start Parked Regeneration to prevent engine stopping.	Pull vehicle safely off roadway and start *Parked Regeneration to prevent engine stopping.		Pull vehicle safely off roadway and start Parked Regeneration to prevent engine stopping. Turn on flashers, place chock blocks behind wheels, and <b>STOP ENGINE</b> . Seek service immediately.	

\*See Operator's Manual for Further Details

# Miscellaneous Provisions

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- Recall if:
  - Corrective or enforcement action is needed
  - Parts fail quality control or have high warranty claims
- Audit testing
  - Mfr may be required to provide devices for inspection and testing
- Swapping allowed under specified conditions:
  - Restricted to a common ownership fleet, same size/model, ARB approved swapping policy, and other requirements specified in the Procedure.

# Miscellaneous Provisions

## (Continued)

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- Safety
  - Must be considered in design and installation
  - Comply with Federal Motor Carrier Safety Administration, Subpart G, *Miscellaneous Parts and Accessories*, Section 393.83 *Exhaust Systems*
  - Provide analysis of all potential safety and failure issues
- Quality control (QC)
  - Ensures that parts are consistent and effective

# Projected Benefits

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- New CA market for aftermarket DPFs
  - ~ 51,000 CA 2007-2009 heavy-duty on-road vehicles
  - ~ \$1200 per device savings over OEM DPF
  - The estimated statewide savings to end users over lifetime of the regulation is \$15 million
- Lower-cost DPFs could lead to more timely replacement of failing DPFs, resulting in continued diesel PM emission control
- Improved environmental and public health via more timely replacement of DPFs

# Projected Costs

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- Estimated total lifetime cost of the regulation is \$2.1 million
- Cost per manufacturer: ~\$250,000
  - Testing
  - Warranty
  - Recordkeeping
- Cost per installer: ~ \$7,500
  - Warranty
  - Recordkeeping
- Only companies which expect to benefit economically are expected to participate

# Public Outreach

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- Public Workshops in El Monte
  - December 4, 2014
  - April 7, 2015
  - August 10, 2015
- Mail-out with revisions to draft procedure June 9, 2015
- Industry Meetings
  - Manufacturers of Emission Controls Association (MECA)
  - Engine Manufacturers Association (EMA)
  - Individual companies
- NGOs, government entities, other organizations etc.
- Proposal reflects consideration of comments

# Major Comments Received

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- ARB received often conflicting comments which fell into three major categories:
  - Testing requirements
  - Administrative requirements
  - Installer requirements
- Proposed procedure balances technical evaluation, economical feasibility, and end-user protections

# Modifications Over Course of Rulemaking

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- Reduced number of ECGs to balance technological requirements with testing costs
- Streamlined testing when feasible
- Eliminated or reduced some administrative requirements
  - Reduced warranty length from 5 to 2 years
  - Eliminated bond (not feasible)
- Added flexibility
  - NO<sub>2</sub> measurement or soot accumulation test
- Allow DPF swapping within a single fleet

# Recommendation

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- Staff recommends adoption of the proposed amendments to CCR Title 13, section 2222; thus, we are not recommending any 15-day changes

