# Proposed Amendments to the Verification Procedure for In-Use Strategies to Control Emissions From Diesel Engines

California Environmental Protection Agency

Air Resources Board

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# Overview

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- Verification Program Overview
- Proposed Amendments
- Impacts and Outreach
- Recommendation

# Background

# Need to Address Diesel Emissions

- In 1998, Board identified diesel PM as a toxic air contaminant
- Board approved Diesel Risk Reduction Plan in September 2000
  - Reduce overall risk of exposure to diesel PM
  - Prescribed four aggressive strategies for in-use vehicles
    - Significant use of exhaust retrofits

# In-Use Diesel Regulatory Activity

- Urban Buses (2000)
- Garbage Trucks (2003)
- School Bus Idling (2003)
- Stationary Engines (2004)
- TRUs (2004)
- Truck and Bus Idling (2004)
- Portable Engines (2004)
- Transit Fleet Vehicles (2005)
- Public Fleets & Utilities (2005)
- Cargo Handling Equipment at Ports and Rail Yards (2005)
- Off-Road Vehicles (2007)
- Port Trucks (2007)
- Private Trucks and Buses (under development for 2008)
- Off-Road Agricultural Vehicles (under development for 2009)

# Need for Verification Program

- The success of the in-use fleet rules is dependent on viable retrofit solutions
- Devices must be:
  - Durable
  - Provide real emissions reductions
- Verification program provides foundation upon which ARB's in-use rules can succeed

# Verification Program Overview

www.dieselnet.com

# ARB Verification Program

- Adopted in 2002
  - Amended in 2004 and 2006
- Key principles
  - Ensure emissions reductions
  - Technologies must be based on sound principles of science and engineering
  - Provide warranty protection to end-users
  - No increase in other pollutants

# An Adequate Demonstration Must be Made

- To be verified, an applicant must:
  - Perform robust emissions testing
    - Including both new and aged device
  - Demonstrate the durability of the system
    - 50,000 miles or 1,000 hours for on-road applications
    - 1,000 hours for off-road and stationary applications
  - Perform in-use compliance testing

# Current Verification Levels

- PM reduction
  - Level 1 ≥ 25%
  - Level 2 ≥ 50%
  - Level 3 ≥ 85%
- Optional NOx reduction
  - 15% minimum
  - 5% increments thereafter

# Limits on $NO_2$ Production

- Due to concerns regarding emissions of $NO_2$, limits were established
  - Cannot increase by more than 30%
  - Limit drops to 20% in 2009
- Devices meeting the 2009 standard are designated as “Plus” systems

# A Comprehensive Warranty Must be Provided

- Intended to protect the end user
- Device manufacturer and/or installer are accountable
  - Includes both device and damage to engine
- Spans most of the device's useful life
  - Up to unlimited miles or 5 years for on-road applications
  - Up to 5 years or 4,200 hours for off-road applications

# Verification Timeline


- Process can take 12 to 18 months
- Timeline can be impacted by:
  - System development status
  - Changes to the system or testing protocol
  - Failures during verification
  - Deviations from the requirements of the Procedure
- Flexibility can decrease costs but often increases review times

# Other Verification Programs

- U.S. EPA
  - No warranty provisions
  - Lacks $NO_2$ protections
- VERT
  - No NOx verification
  - Not based on total reductions in mass
    - Utilizes particle counts, sizing, and elemental carbon mass concentration
- ARB program most robust and comprehensive

# What's Been Verified to Date?

- Verifications covering over 40 devices
  - Wide range of applications
  - Two new passive off-road systems recently verified
- Diverse technologies
  - Active, passive DPFs
  - Lean NOx catalysts and EGR
  - Flow through filters
  - DOCs
  - Emulsified Fuel
- Most compatible with certain biodiesel blends
- More on the way!

# On-Going Activities

- 29 prospective devices will be demonstrated on 245 vehicles
  - Showcase Program
  - U.S. EPA SEP Program
- Continuous interactions with U.S. EPA Verification Program

# Proposed Amendments

# Need for Amendments

- Facilitate market availability
  - Easier extension to additional engines
  - Reduced testing requirements
  - Verification of NOx-only control systems
- Changes based on real-world information
  - New transient test cycle
  - Increase flexibility in test fuel
  - Unidirectional installation requirement
- Minor clarifying changes

# Extension to Additional Engines

- Verified off-road devices must start from scratch for on-road verification
- Allow existing durability data to support the conditional extension to on-road
- Will expand retrofit options for end-users

# Reduced Testing Requirements

- It is currently difficult to comply with certain testing requirements
- Propose rescission of elevated NOx testing
- Will reduce testing costs and time

# NOx-Only Control Systems

- Currently, candidate technologies must achieve PM reductions
- Proposal to allow NOx-only control systems
- Will help meet SIP commitments

# New Transient Test Cycle

- Need more representative test cycle
- Non-Road Composite Transient Cycle (NRTC) available
- Provides more realistic emissions measurements

# Increased Flexibility in Test Fuel

- No allowance for various in-use test fuels
- Propose to allow representative fuels for verification testing
- Provides for more accurate testing on fuel that will be used in real world

# Unidirectional Installations

- Incorrect installation orientation results in:
  - Potential device malfunction and/or failure
  - Release of hazardous materials
- Proposing to require unidirectional design
- Will prevent end user misuse, and preserve emissions reductions

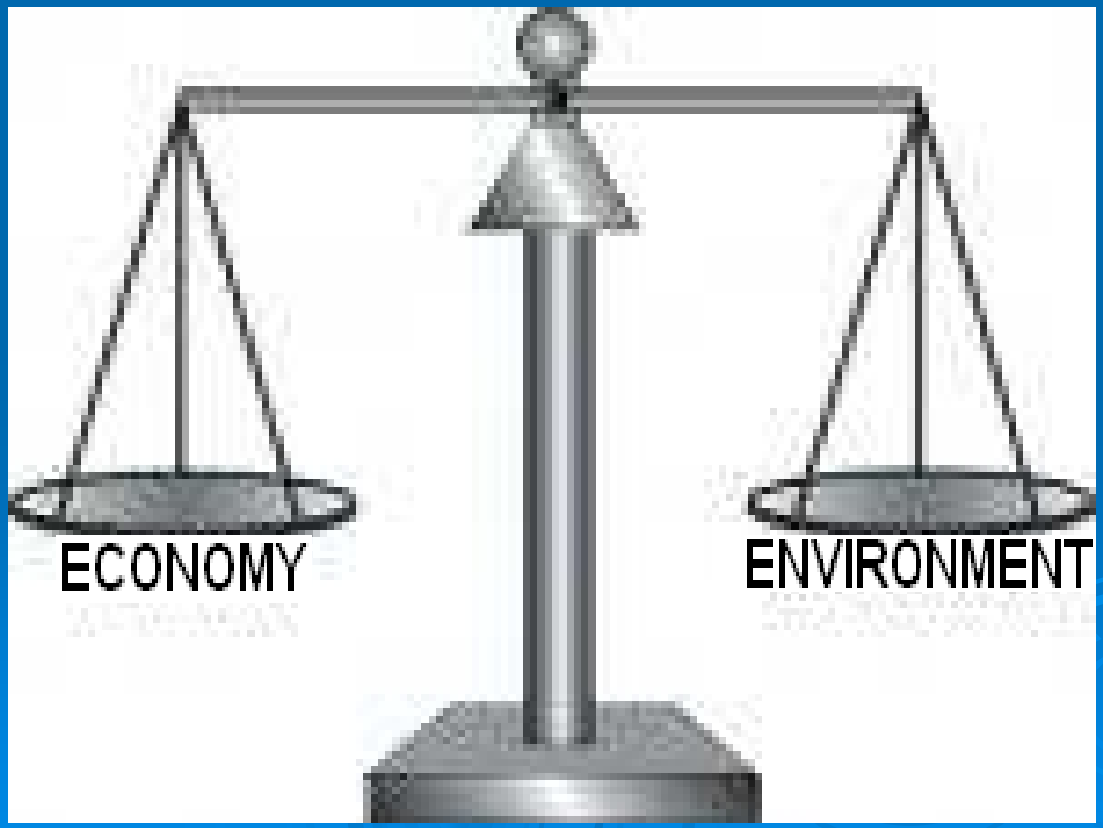
# Other Changes

- Revised NOx classifications
- In-use compliance deadlines
- Record keeping
- NOx control durability
- Proof of sales in California
- System labeling
- Sales and installation practices

# 15-Day Changes

- Staff will propose subsequent clarifications
  - Appropriate phase in schedule for the transition to uni-directional flow devices
  - Provisions allowing end-users to install used systems on different vehicles

# Impacts and Outreach



# Overall Potential Impacts

- Unquantifiable environmental benefits
- Costs will vary among manufacturers and type of device
  - Possible small increase in cost of control systems
- No significant economic impact on the state, businesses, and fleets

# Public Outreach

- Four Public Workshops
  - Los Angeles
  - El Monte
  - Sacramento
- Meetings with Manufacturers of Emission Controls Association (MECA) and individual companies
- Incorporated comments into proposal

# Recommendation

- Staff recommends adoption of the proposed amendments
  - Direct staff to work with stakeholders to address additional clarifications