

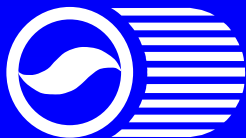
Recent Developments in Retrofit Technologies and Program Activities

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California Air Resources Board

**Western Regional Air Partnership
Workshop**

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California Environmental Protection Agency

Air Resources Board

Outline

Background

- In-Use Regulations
- Lessons Learned
- Summary
- Further Information

Health Impacts of Diesel Particulate Matter (PM)

- **California's Estimated Annual Impacts**
 - 2,900 Premature Deaths
 - 3,600 Hospital Admissions
 - 240,000 Asthma Attacks/Respiratory Symptoms
 - 600,000 Lost Days of Work
- **By Comparison**
 - 3,700 Deaths from Car Accidents
 - 2,000 Homicides


California Diesel Risk Reduction Plan (DRRP)

- **Adopted in 2000**
 - 75% Reduction in Diesel PM by 2010
 - 85% Reduction in Diesel PM by 2020
 - Assumed 90% of Fleet Could Achieve 85% Reduction Using Filters
- **Multiple Strategies**
 - New Engine Regulations
 - Cleaner Diesel Fuel (<15 ppm sulfur)
 - Ensure In-use Emissions Performance
 - Control/Retrofit of In-Use Engines

Status of DRRP Implementation

- **New Engine Regulations**
 - Trucks - **ADOPTED**
 - Off-road - **ADOPTED**
- **Cleaner Diesel Fuel - ADOPTED**
- **Ensure In-use Emissions Performance**
 - Recall testing - **AGREEMENT REACHED**
 - Engine Manufacturer Diagnostics - **ADOPTED**
 - On Board Diagnostics - **PLANNED 2005**
- **Control/Retrofit of In-Use Engines**
 - Mobile and Stationary Regulations - **8 ADOPTED**
 - Others - **PLANNED 2005/6/7**

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Adopted In-Use Regulations

- **Transit buses (8,000)**
- **Trash trucks (13,000)**
- **Stationary Engines (26,000)**
- **Transportation Refrigeration Units (40,000)**
- **Portable Engines (35,000)**
- **Idling School Buses (26,000)**
- **Commercial Idling (409,000)**
- **Intrastate Locomotive and Harbor Craft Fuel (5,000)**

Regulations Under Development

- **2005**
 - **Transit Fleet Vehicles (Non Urban Buses)**
 - **Public On Road Fleets and Private Utilities**
 - **Marine**
 - **Cargo Handling Equipment (Port/Rail)**
 - **Harbor Craft**
 - **Ship Auxiliary Engines**
 - **Ocean Vessels - Propulsion Engines (Non-regulatory)**
 - **Stationary Agricultural Engines**

Regulations Under Development

- **2006+**
 - Public and Private Off Road Fleets
 - Private On Road Fleets
- **2007+**
 - Agricultural Off-Road Equipment

Retrofit Verification

- **Verification Levels**
 - Level 1 ($\geq 25\%$ Reduction)
 - Level 2 ($> 50\%$ Reduction)
 - Level 3 ($\geq 85\%$ Reduction or ≤ 0.01 g/bhp-hr)
 - Optional 15% Minimum NOx Reduction
- **Emission Tests/Durability Demonstration**
- **Warranty**
- **In-Use Compliance Testing**

Level 3 Verifications

- Cleaire Flash & Catch CRT/DPX (25% NO_x ↓)
- Cleaire Longview DPF + Lean NO_x (25% NO_x ↓)
- Clean Air Partners DPF
- CleanAIR Systems DPF (Stationary)
- Donaldson DPF
- Johnson Matthey CRT DPF
- Lubrizol ECS Purifilter DPF
- Lubrizol ECS Combifilter DPF

Level 2 Verifications

- Environmental Solutions Worldwide Flow Thru Filter
- Lubrizol PuriNOx (**15% NOx ↓**)
- Lubrizol Purifier/Purimuffler DOC + Alt Fuel (**20% NOx ↓**) (off-road intermodal facilities)

Level 1 Verifications

- Cleaire Flash and Match DOC (**25% ↓ NOx**)
- Donaldson DOC
- Donaldson DOC + Spiracle
- Lubrizol ECS AZ Purifier & Purimuffler (on-road)
- Lubrizol ECS AZ Purifier & Purimuffler (off-road)
- Extengine ADEC DOC + SCR (off-road) (**80 % ↓ NOx**)

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Anatomy of ARB's In-Use Regulations

- **Use Best Available Retrofit Technology**
- **Phase-in Based on Several Factors**
 - **Retrofit Availability (filters, catalysts)**
 - **New Engine Availability**
 - **Fuel Availability**
- **Compliance Flexibility**

Best Available Control Technology Approach

- **Retrofit**
 - Highest Applicable Level (in-use)
- **Repower**
 - Newer Engine
- **Replacement**
 - New Diesel or Alternative Fuel Vehicle
- **Retire Old Vehicles**
 - Reduce Diesel Fleet Size


Practical Application

- **One Size (e.g., DPF) Does Not Fit All Engine Families**
- **Field Demonstration Is Important**
- **Technical Advice and Interaction with National and International Entities Is Critical**
- **Need Collaboration with End-Users, Manufacturers, and Other Stakeholders**

Compliance Flexibility

- **Allow Additional Time to Repower Engine if Verified Retrofit Controls Not Available**
- **Acknowledge Needs of Smaller Fleets**
- **Evaluate Approaches for Very Low Usage Fleets**
- **Consider Early Compliance Credit**


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Summary

- **In-Use Regulations Are Required to Reduce the Risk of Diesel PM**
- **Compliance Flexibility Is Necessary (Retrofits, Repower, Replacement, Retire) for Implementation**
- **Verification Is Critical for Proposed Diesel Emission Control Retrofits**

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Further Information

- General Information:

<http://www.arb.ca.gov/diesel/dieselrrp.htm>

- Verifications:

<http://www.arb.ca.gov/diesel/verde/verde.htm>

- Diesel Mobile Programs:

<http://www.arb.ca.gov/diesel/mobile.htm>

- Stationary/Portable Programs:

<http://www.arb.ca.gov/diesel/statport.htm>

- Offroad (In-Use) Equipment Program:

<http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm>

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