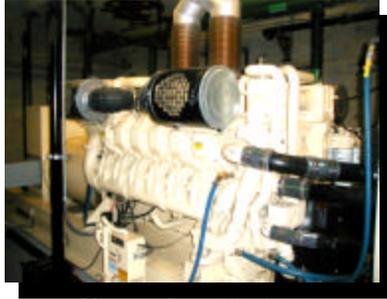


Proposed Airborne Toxic Control Measure to Reduce Diesel Particulate Matter Emissions from Stationary Diesel-Fueled Compression Ignition Engines



November 20, 2003



California Environmental Protection Agency

Air Resources Board

Overview

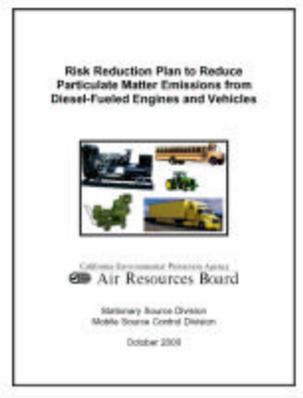
- **Background**
- **Proposed Measure**
- **Environmental and Economic Impacts**
- **Proposed 15-Day Changes**
- **Future Activities**

Diesel PM is a Toxic Air Contaminant

- Identified as TAC in 1998
- Over 70% of ambient air toxics risk from diesel PM
- Increased cancer risk
- May aggravate chronic respiratory symptoms and asthma
- Irritates eyes, nose, and lungs
- Contributes to premature death in those with heart and lung diseases
- Contributes to ambient levels of PM₁₀ and PM_{2.5}

Diesel Risk Reduction Plan Identifies Strategy to Reduce Diesel PM Exposure in California

- Comprehensive plan adopted September 2000
- Three-prong approach
 - ◆ Reduce Emissions from New Engines
 - ◆ Clean-Up Existing Engines
 - ◆ Provide Low Sulfur Fuel (<15 ppm) to Enable Aftertreatment Technology
- Included measures for stationary engines



Stationary Engines are used in a Wide Variety of Applications

■ Emergency Standby Applications

- ◆ Used to provide emergency power or pumping of water for fire protection or flood prevention
 - ◆ hospitals, schools, office buildings, retail businesses, prisons, water treatment facilities

- Average annual hours of operation around 30 hours per year for all uses



Stationary Engines are used in a Wide Variety of Applications

(continued)

■ Prime Applications

- ◆ Non-Agricultural
 - ◆ generators, pumps, rockcrushers, grinders, cranes, and turbine starters
- ◆ Agricultural
 - ◆ irrigation pumps
- ◆ Annual hours of operation can range from less than 50 to over 5,000



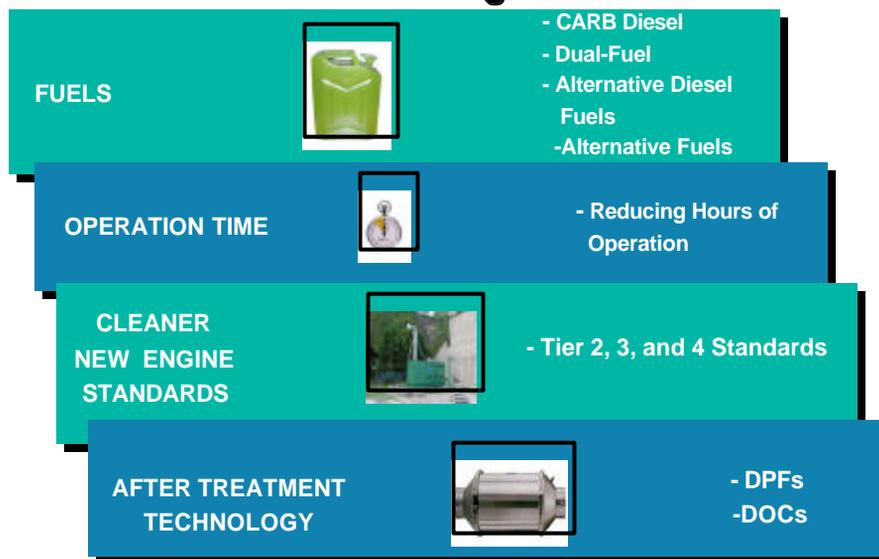
Stationary Diesel Engines Are a Significant Source of Emissions and Risk

■ Emission estimates for year 2002

Category	Number of Engines	Diesel PM Emissions (tons/day)	NOx Emissions (tons/day)
Prime Engines	6,600	2.3	34.9
Emergency Standby Engines	19,700	0.3	6.4
TOTAL	26,300	2.6	41.3

- Contribute about 4% of the total diesel PM emissions from all diesel engines
- Uncontrolled stationary diesel engine operating as little as 200 hours per year can result in a potential significant cancer risk

Strategies Available to Reduce Diesel PM Emissions from Stationary Diesel Engines



Aftertreatment Technology Shown to be Effective for Stationary Diesel Engines

- **Approximately 50 stationary diesel engines currently operating in California equipped with diesel PM emission control systems**
- **CEC/ARB Demonstration Project**
 - ◆ **Demonstrate PM controls targeted to stationary engines**
 - ◆ **Diesel Particulate Filters**
 - ◆ **Diesel Oxidation Catalysts**



Proposed Airborne Toxic Control Measure

ATCM Development Process

- **Began process in 2001**
- **Held eight Public Workshops**
- **Coordination with CAPCOA Working Group**
- **Ongoing consideration of verbal and written comments**
- **CEC/ARB Control Equipment Demonstration**
- **Test Method Workgroup**

Objectives in Developing the Proposed ATCM

- **Establish diesel PM emission standards or engine operational limits that are based on the use of best available diesel PM control technologies and lowest-emitting diesel engines**
- **Consider contribution to overall ambient PM and risk levels, potential near source risk, and the cost of controls when establishing emission standards or operational limits**

Applicability of the Proposed ATCM

- **Proposed ATCM addresses**
 - ◆ **New engines less than or equal to 50 hp**
 - ◆ **New and In-Use Engines greater than 50 hp**
- **“New” Engines are those installed after January 1, 2005**
- **“In-Use” Engines are those installed prior to January 1, 2005**
- **Portable engines and in-use stationary agricultural engines will be addressed in separate measures**

In-Use Agricultural Engines To Be Addressed in 2004

- **Working with the Agricultural Working Group to develop approaches for in-use engines**
- **Conducting feasibility study to evaluate the viability of electrification**
- **Work with Districts on SB 700 implementation**
- **Report back to the Board by mid-2004**

What Does the Proposed ATCM Require?

- **Emission Standards and Operating Requirements**
- **Fuel Use Requirements**
- **Reporting Requirements**



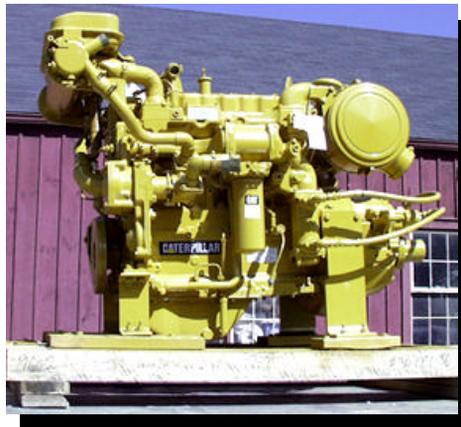
Emission Standards and Operating Requirements

- **New Engines Less Than or Equal to 50 hp**
- **New and In-Use Prime Engines Greater Than 50 hp**
- **New and In-Use Emergency Standby Engines Greater Than 50 hp**

New Stationary Diesel Engines \leq 50 hp Must Meet Off-Road Standards

- Sellers of new stationary diesel engines rated at less than or equal to 50 horsepower shall only sell engines meeting the current Off-Road Engine Certification Standards
- Requirement becomes effective on January 1, 2005

Prime Engines Greater Than 50 hp



Proposed Limits for New Prime Stationary Diesel Engines > 50 hp

- Diesel PM Emission Limit:
 - ◆ ≤ 0.01 g/bhp-hr
- NOx, HC, CO Limits:
 - ◆ Meet applicable Off-Road Engine Certification Standards
- Requirements become effective on January 1, 2005

Proposed Limits for New Agricultural Engines > 50 hp

- Diesel PM Emission Limit:
 - ◆ ≤ 0.15 g/bhp-hr
- NOx, HC, CO Limits:
 - ◆ Meet applicable Off-Road Engine Certification Standards
- Requirements become effective on January 1, 2005

**In-Use Prime Stationary Diesel Engines
> 50 hp Must Reduce PM emissions
by at Least 85%**

- Certified or Non-Certified Engines
 - ◆ Option 1: 85% reduction of diesel PM from baseline levels
 - ◆ Option 2: Diesel PM emission rate ≤ 0.01 g/bhp-hr
- Non-Certified Engines, only
 - ◆ Option 3: 30% reduction of diesel PM by January 1, 2006, and meet 0.01 g/bhp-hr standard by July 1, 2011
- Cannot increase emissions of other pollutants

**Phased-in Compliance Schedule for
Prime Engines**

- Owners and operators of three or fewer engines must be in compliance by the following dates,
 - ◆ Pre-1989 thru 1989 model year: January 1, 2006
 - ◆ 1990 thru 1995 model year: January 1, 2007
 - ◆ 1996 model year and beyond: January 1, 2008
- Owners and operators of four or more engines have compliance phased in from 2006 through 2009

Emergency Standby Engines



Proposed Limits for New Emergency Standby Stationary Diesel Engines

- Diesel PM standards are linked to hours of operation for maintenance and testing
 - ◆ Must not emit diesel PM at a rate greater than 0.15 g/bhp-hr
 - ◆ No more than 50 hours per year for maintenance and testing
- NO_x, HC, CO:
 - ◆ Must meet applicable Off-Road Engine Certification Standards
- Requirements effective January 1, 2005

Proposed Limits for In-Use Emergency Standby Stationary Diesel Engines > 50 hp

- Diesel PM standards are linked to annual hours of operation for maintenance and testing
 - ◆ Engines with PM >0.40 g/bhp-hr limited to 20 hours/year for maintenance and testing
 - ◆ Engines with PM ≤0.40 g/bhp-hr limited to 30 hours/year for maintenance and testing

- Cannot increase emissions of other pollutants

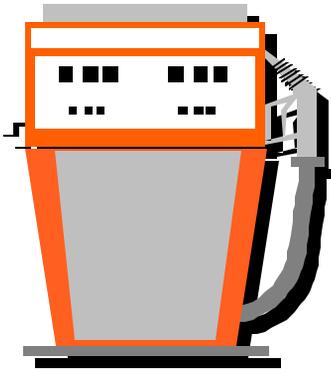
Phased-In Compliance Schedule for In-Use Emergency Standby Stationary Diesel Engines

- If complying by limiting the current hours of operation, must be in compliance by January 1, 2005

- If retrofitting, owners and operators of three or fewer engines must be in compliance by the following dates,
 - ◆ Pre-1989 thru 1989 model year: January 1, 2006
 - ◆ 1990 thru 1995 model year: January 1, 2007
 - ◆ 1996 model year and beyond: January 1, 2008

- If retrofitting, owners and operators of four or more engines have compliance phased in from 2006 through 2009

Fuel Requirements



Stationary Engines are Subject to Fuel Requirements

- By January 1, 2005, all stationary engines required to use either CARB Diesel, verified alternative diesel fuels, or alternative fuel

Reporting Requirements



Reporting Requirements

- **Initial Reporting Requirements**
 - ◆ Provide information to improve inventory, and
 - ◆ Fulfill emission inventory requirements for AB 2588 “Hot Spots” Program

- **Control Strategy Reporting Requirements**
 - ◆ Provide information on how an Owner plans on complying with the proposed ATCM

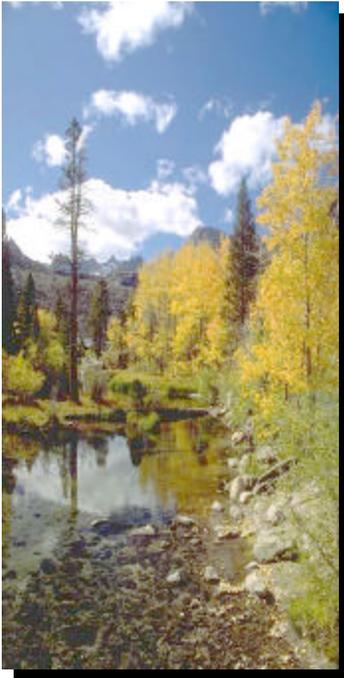
- **Demonstration of Compliance**
 - ◆ Owner to provide emissions data to District prior to installation for new engines and the compliance dates for in-use engines

Exemptions

- Exemptions include:
 - ◆ Engines used for the safe shutdown of nuclear facilities
 - ◆ Military training engines
 - ◆ Single cylinder cetane fuel test engines
 - ◆ Direct-drive fire pump engines

Test Method Workgroup Formed to Recommend Best PM Test Method

- Comprised of representatives from ARB, CEC, CE-CERT, and Districts
- Recommend engine certification test method (ISO 8178) or modified stationary source method (Method 5 filter catch)
- Results in consistent test method for certification, verification, emission inventory, and compliance with ATCM



Economic and Environmental Impacts

Estimated Cost Impacts Associated with Compliance Options

- Capital Costs
 - ◆ Diesel Particulate Filter: \$38/hp
 - ◆ Diesel Oxidation Catalyst: \$10/hp
 - ◆ New Engine: \$93/hp
- Cost Savings
 - ◆ Reduce Hours Of Operation: \$1.74/gallon saved

Cost Effectiveness

- **Total Capital Cost**
 - ◆ \$47 million
- **Cost-Effectiveness**
 - ◆ **Considering only diesel PM reduction**
 - ◆ \$15/lb. of diesel PM reduced
 - ◆ **Considering diesel PM, ROG, and NOx reduction**
 - ◆ \$8/lb. of diesel PM reduced
 - ◆ \$1/lb. of HC plus NOx reduced

Air Quality Benefits Include Reduced Diesel PM and Criteria Pollutant Emissions

- **An 80% reduction in diesel PM from all stationary engines addressed by proposed ATCM expected by 2020 relative to 2002 baseline**
- **Annual Average Reduction:**
 - ◆ 107 tons/year PM reduced
 - ◆ 790 tons/year NOx reduced
 - ◆ 106 tons/year HC reduced
 - ◆ 410 tons/year CO reduced

The Proposed ATCM Will Result in Health Benefits for All Californians

- **Avoid 121 premature deaths**
- **Reduced cancer risk to all receptors reduced**



Proposed 15-Day Changes

Summary of Proposed Changes

- **Additional Language for Demand Response Engines**
 - ◆ **Interruptible Service Contracts**
 - ◆ **Rolling Blackout Reduction Program**
- **Clarifications to Proposed ATCM**
 - ◆ **Definitions**
 - ◆ **Exemptions**
 - ◆ **Corrections to Original Text**

Proposal for Demand Response Engines



What is a Demand Response Program?

- **DRPs offered by utility service providers**
 - ◆ **Customer offered incentive (i.e discounted energy rate) to reduce power consumption when there isn't enough power to meet all demands**
 - ◆ **Some customers in DRPs operate emergency standby engines to reduce demand on grid**

ARB Staff Proposes to Allow Limited Use of Emergency Standby Engines in DRPs

- **Emergency standby engines will be allowed to be used in two types of DRPs**
 - ◆ **Interruptible Service Contracts (ISC)**
 - ◆ **SDGE's Rolling Blackout Reduction Program (RBRP)**
- **Engines enrolled in these DRPs will**
 - ◆ **Meet stringent emission limits**
 - ◆ **Be limited in their hours of operation**
 - ◆ **Be subject to additional recordkeeping requirements**
 - ◆ **RBRP engines dispatched into service taking into account public health impacts**

Staff Proposal for ISC Engines

- **Diesel PM Emission Limits for ISC Engines:**
 - ◆ Any in-use engine participating in ISC prior to January 1, 2008 must meet a diesel PM limit of 0.15 g/bhp-hr
 - ◆ Any new engine enrolled in ISC after January 1, 2005 must meet diesel PM limit of 0.01 g/bhp-hr
 - ◆ Any engine participating in ISC after January 1, 2008 must meet diesel PM limit of 0.01 g/bhp-hr
- **Limited to 150 hours/year for ISC**
- **If ISC terminated, the engines must continue to meet diesel PM standards**

Staff Proposal for RBRP Engines

- **Engines limited to 75 hours of operation per year for RBRP**
- **Total diesel MW dispatched limited to 80 MW**
- **Diesel PM Emission Limits for RBRP Engines:**
 - ◆ Engines currently in RBRP must comply with ATCM
 - ◆ Engines added to RBRP between January 1, 2005 and January 1, 2008 must meet 0.15 g-bhp-hr diesel PM limit
 - ◆ Engines added after January 1, 2008 must meet 0.01 g-bhp-hr diesel PM limit
- **Environmental dispatch protocol must be approved by San Diego Air Pollution Control District**
- **If RBRP terminated, engine must continue to meet PM standards**

Overall Impact of Additional Language Addressing DRPs

- **Compared to non-DRP emergency standby engines**
 - ◆ **In most cases, ISC and RBRP engines will be better controlled at an earlier date**
 - ◆ **In no case will an ISC or RBRP engine meet a less stringent emission limit or be allowed more hours of operation for maintenance and testing**



Future Activities

Future Activities

- **In-use agricultural engines**
 - ◆ Working with the Agricultural Working Group to develop approaches for in-use engines
 - ◆ Work with Districts on SB 700 Implementation
 - ◆ Evaluate the viability of electrification
- **Develop implementation guidelines**
- **Continue to efforts with test method workgroup**
- **Integration of AB 2588 and the ATCM**
- **Monitor stationary engine usage under DRP provisions**