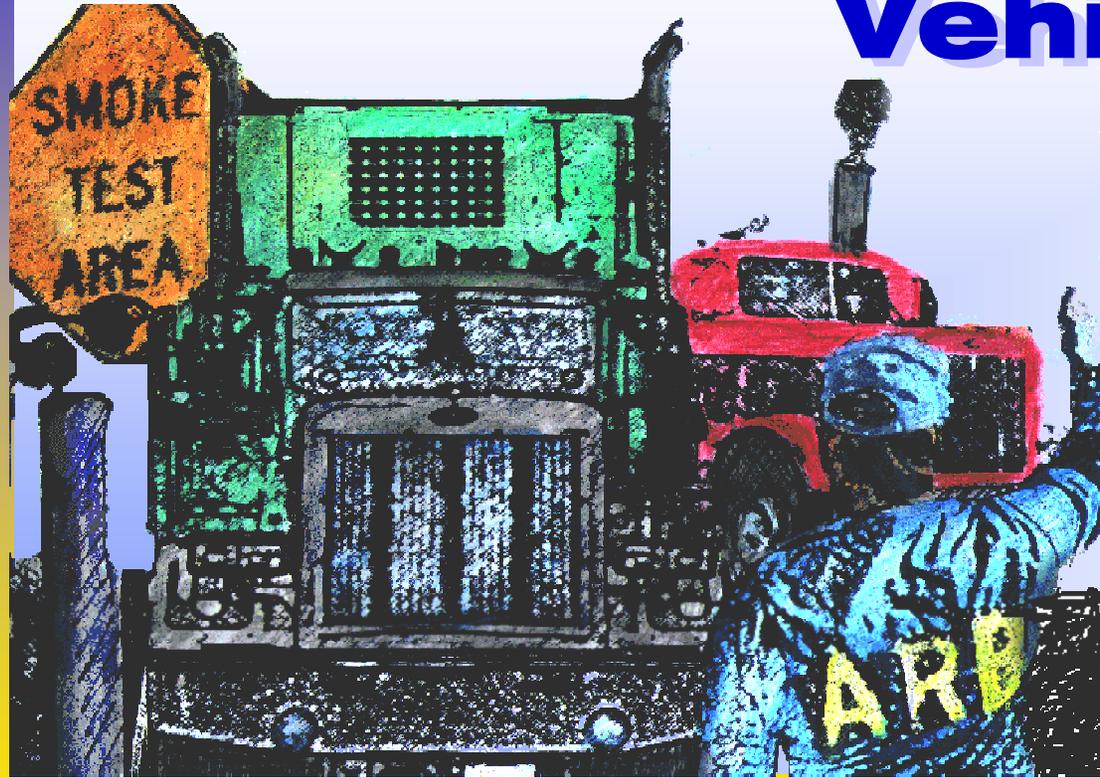


ARB's Heavy-Duty Vehicle Smoke Inspection Program

*Presented to the
Diesel Engine Emissions Reduction
Conference*

*by
Paul E. Jacobs, Chief
Mobile Source
Enforcement Branch
August 2000*



Overview

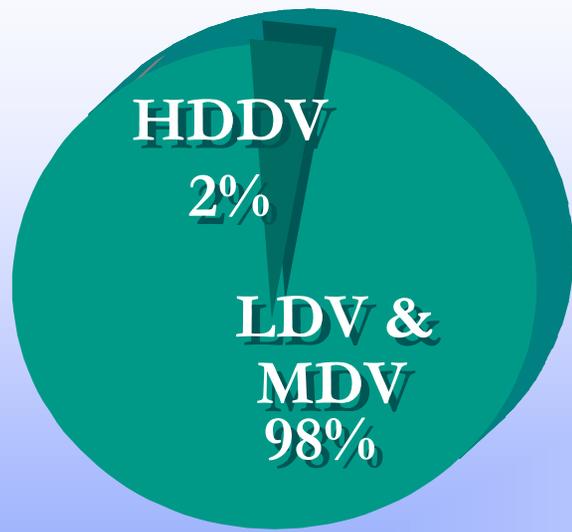
- ARB's Heavy-Duty Vehicle Smoke Inspection Program (Roadside Inspections, Fleet Inspections)
- Related Topics/Issues



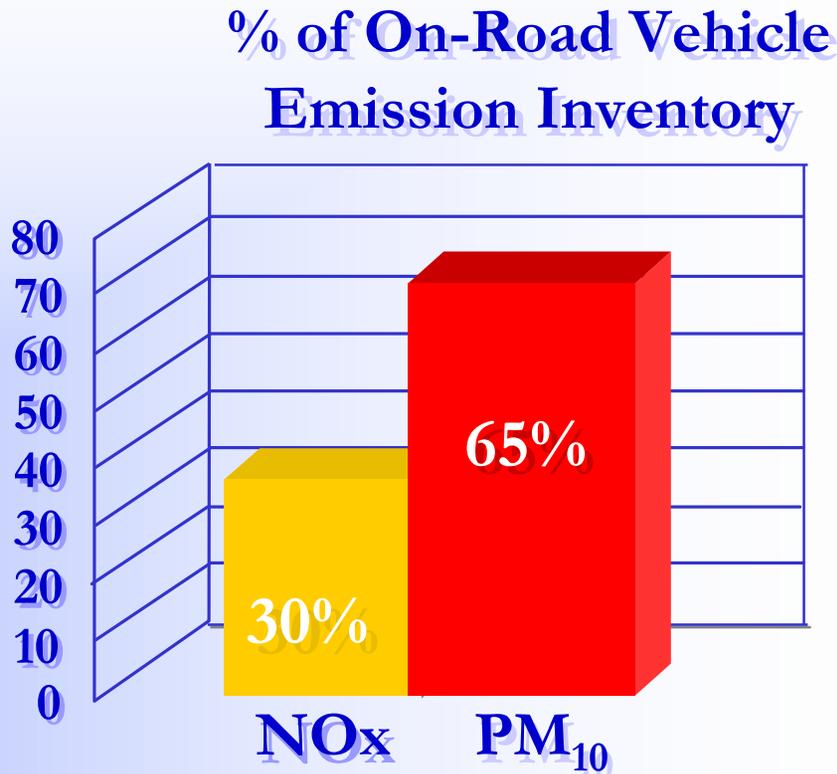
Heavy-Duty Vehicle Smoke Inspection Program

- The Problem
- History of the Program, 1988 - 1996
- History of the Program, 1997 - present

The Problem



% of Total On-Road Vehicles



Clear Day



Smoggy Day



Health and Environmental Impacts

Constituent

Detrimental Effect

Particulates (PM₁₀/PM_{2.5})

Carcinogenic/Mutagenic
Respiratory Disease

HC & NO_x (Smog Precursors)

Ozone (smog)
Respiratory Disease
Crop Losses

NO_x & SO_x

Acid Deposition
Visibility Degradation

Toxic Air Contaminants

Carcinogenic



Types of Smoke

Black smoke
is caused by
incomplete combustion
(wasted fuel)



Blue smoke is caused
by unburned engine oil
mixed in the exhaust



White smoke is caused
by drops of unburned
liquid fuel and
water vapor



Source: ATA, EMA "On the Road to Clean Air"

Mechanical Causes of Excessive Smoke

- Restricted air filter
- Improper injection timing
- Clogged, worn or mismatched fuel injectors
- Faulty fuel injection pump
- Defective or maladjusted puff limiter
- Low air box pressure
- Improperly adjusted governor
- Air manifold leaks
- Malfunctioning turbocharger
- Malfunctioning aftercoolers
- Maladjusted fuel rack
- Defective air fuel controller
- Poor fuel quality
- Improper driving gear

Source: ATA, EMA "On the Road to Clean Air"



**History of the
Heavy-Duty Vehicle
Smoke Inspection Program
1988 - 1996**

Initial Roadside Inspections

- Roadside smoke inspections required by legislation in 1988 (SB 1997, Presley)
- Initial regulations adopted 1990
 - Intrastate/interstate/ international vehicles
 - Inspections performed at roadside locations
 - Used SAE J1243 test protocol
 - Smoke opacity limits:
 - 1991+ engines: 40%
 - pre-1991 engines: 55%
- Program enforced from 1991 to 1993



Initial Fleet Inspections



- Fleet inspections required by legislation in 1990 (SB 2330, Killea)
- California fleets of two or more vehicles
- First regulations adopted in 1992; voluntary enforcement
- Annual self-inspection
- ARB audits

Initial Roadside Inspections - Litigation

- **Valley Spreader et al. v. ARB**
Imperial County Superior Court
1993 decision for ARB
Upheld the program and test procedures
- **Harris Transportation et al. v. ARB**
Sacramento County Superior Court
1994 decision for ARB
Upheld the program and test procedures
Upheld by 3rd District Court of Appeals
(Sacramento);
California Supreme Court denied review
- **Aura Hardwood et al. v. ARB**
Sacramento County Superior Court
1994 decision for ARB
Upheld the program and test procedures
Upheld by 3rd District Court of Appeals
(Sacramento);
California Supreme Court denied review
- **Viviano et al. v. ARB**
Sacramento County Superior Court
1997 decision for ARB
Upheld the program and test procedures
Upheld by 3rd District Court of Appeals
(Sacramento); California Supreme Court
denied review

SAE J1667

- Committee established in 1992
- Diverse membership: (ARB, US E.P.A., EMA, ATA, CTA, smokemeter manufacturers, other states, academia)
- Test protocol and smokemeter specifications
- Adopted by SAE in February 1996

Statutory Requirements (AB 584, Cortese) 1993

- Consistent and repeatable tests
- No false failures (unless remedied without cost to owner)
- Adoption of SAE J1667 satisfies requirements



**History of the
Heavy-Duty Vehicle
Smoke Inspection Program
1997 - present**

Updated Roadside Inspections

- Updated regulations adopted by ARB in December 1997
- Opacity cutpoints retained
 - 1991+ engines: 40%
 - pre-1991 engines: 55%
- Use of SAE J1667 test protocol
- Administrative appeals through Administrative Law Judge (ALJ) hearing process
- Enforcement resumed June 1, 1998



Penalty Schedule

Violation	Correction	Penalty
Notice of Violation	Repaired within 45 days	\$0
First citation	Repaired within 45 days	\$300
First citation	Not repaired within 45 days	\$800 (\$300 + \$500)
More than one citation in a year	Repaired within 45 days	\$1,800 (\$300 + \$1,500)

Updated Periodic Fleet Inspections



- Revised regulations adopted December 1997
 - Same cutpoints as roadside program
 - Uses SAE J1667 test protocol
 - Four-year rolling exemption
- Commenced July 1, 1998
- 15-month phase-in

Statewide Benefits

(tons per day)

	ROG	NO _x	PM ₁₀
1999	6.4	12.2	5.2
2010	5.3	14.0	3.2

(EMFAC 7g)



Annual Costs (Combined Roadside and Fleet Programs)

	1999	2010
Administrative Costs to Fleets	\$17 million	\$22 million
Costs to Vehicle Owners	\$24 million	\$20 million
Fuel Costs (Savings)	-\$22 million	-\$25 million
Total Net Costs of Both Programs	\$19 million	\$17 million

Note - Gallons of fuel saved: in 1999 - 16.7 million, in 2010 - 19.2 million

Cost Effectiveness

1999

2010

\$1.12/pound*

\$1.05/pound*

*(ROG, NO_x, PM-10)

Roadside Inspections Statistics

	Initial Program (1991 - 1993)	Current Program (June 1998 - June 2000)
No. Visual Inspections	38,947	43,098
Number of Citations	8,492	2,485
Number of NOV's	N/A	761
Total Violations	8,492	3,246
Failure Rate	22%	7.5%
Number Appealed	1,157 (14%)	65 (2.0%)
Penalties Assessed	\$2,613,300	\$ 756,000
Penalties Collected	\$2,061,500 (79%)	\$ 626,142 (82%)



California Environmental Protection Agency

 **Air Resources Board**

Periodic Fleet Inspections Statistics

- 14,000+ fleets in state
- 56,000+ terminals in state (CHP 2000 BIT database)
- ARB audits these fleets/terminals for compliance
- Phase-in period ended October 1, 1999
- Activity to date:
 - 2,210 fleets audited
 - Compliance rates:
 - 51% show full compliance
 - 45% partial compliance
 - 4% require formal enforcement action

Outreach Activities

- Compliance assistance to fleets
- Presentations to associations
- Technical papers/presentations
- Mailouts
- Pamphlets/fact sheets
- Information on ARB website
- ARB to release updated video in fall 2000



California Council on Diesel Education and Technology



- **Partnership:** Community colleges, government, industry
- **Low-cost training of smoke-test protocol and smoke-related engine repairs**
- **ARB audits classes for QA/QC**
- **Participating Schools:**
 - College of Alameda (Oakland)
 - San Joaquin Delta College (Stockton)
 - L.A. Trade Tech College (Los Angeles)
 - Palomar College (San Diego County)
 - Santa Ana College (Orange County)
 - San Diego Miramar College

Related Topics

- National HDD I/M Guidance
- On the Road to Clean Air
- Enforcement at the Mexican Border
- Dyed Diesel Inspections
- Repair Effectiveness Study
- Use of Penalty Funds
- Smoking Vehicle Complaint Line
- M-17 Heavy-Duty Diesel Vehicle I/M

US EPA Heavy-Duty Diesel I/M Guidance

- Adopted February 1999
- ARB program serves as model
- Recommends nationwide use of SAE J1667 test protocol
- Recommends cutpoints (adjusted for altitude):
 - 40% for 1991+
 - 55% for pre-1991
- Other states/provinces with smoke programs:
Arizona, Colorado, Connecticut, Maryland, Nevada, New Jersey, New York, Ohio, Utah, Washington, British Columbia and Ontario (Canada), Jalisco (Mexico), and others

On the Road to Clean Air



- Campaign co-sponsored by:
 - American Trucking Association
 - Engine Manufacturers' Association
 - Supported by ARB
- Video, pamphlet, public service announcements and press releases - Spring 1997
- Strong anti-tampering message

Enforcement at the Mexican Border

- **Legislation (Peace) in 1998 authorized:**
 - 3 PYs for fulltime enforcement at Otay Mesa
 - Funding for inspection site improvements at Otay Mesa
 - Calexico full-time positions and site improvements authorized in current budget
- **2,200 commercial trucks cross into California at Otay Mesa each day**

Calexico* **Otay Mesa***

Inspections	441	3,198
Citations	38	306
NOVs	3	90
Failure rate	9.3%	12.4%

* Data through June 30, 2000

Dyed Diesel Inspections

- Dyed diesel is a tax-free fuel intended for use in public fleets and non-road (agriculture and construction) vehicles
- ARB performs inspections for Board of Equalization
 - Concurrent with roadside inspections
 - Approximately 25,000 inspections per year



Repair Effectiveness Study

- Cooperative project of ARB, American Trucking Association Foundation, Engine Manufacturers, and regulated industry
- Determine effectiveness of various repairs for reducing smoke
- Goal is to make recommendations to vehicle owners on effective repair strategies

Use of Penalty Funds

- **Diesel Emissions Reduction Fund**
 - \$300 portion of citation
 - Funds research for clean diesel technology
 - Provided \$2.7 million, to date, towards research
 - Current program to support Advanced Technology Program and Carl Moyer Program low-NOx technology incentives
- **Vehicle Inspection and Repair Fund**
 - Funds from the portion of a citation that is greater than \$300
 - Funds used for ARB, BAR (Smog Check) and other clean air programs



Smoking Vehicle Complaint Line

- Toll-free number and toll-free cellular telephone number available for motorists to report smoking vehicles
1-800-END-SMOG or **#SMOG** on cellular telephone
- ARB sends owner a courtesy letter alerting them that their vehicle is emitting excessive smoke
- ARB receives approximately 1,500 calls each year
- Approximately 45% of owners repair their vehicles

M-17 **Heavy-Duty I/M**

- Board adopted M-17 SIP Amendment in February 1997
- Heavy-Duty Diesel Engine test cycles under development

Summary

- On-road heavy-duty diesel vehicles produce a disproportionate amount of California's NO_x and Particulates
- ARB administers two-part program to reduce smoke emissions from these vehicles
- Program is cost-effective and achieves significant emissions reductions
- Program has become model for national and international programs