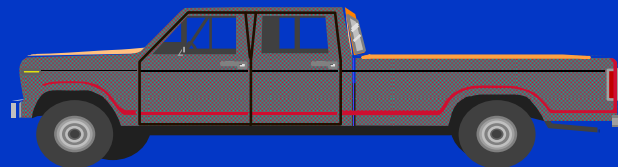
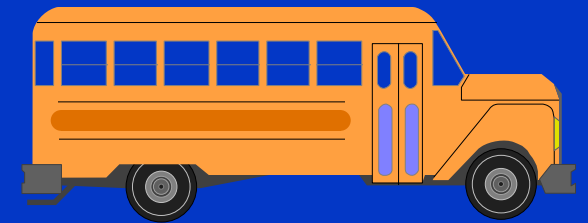
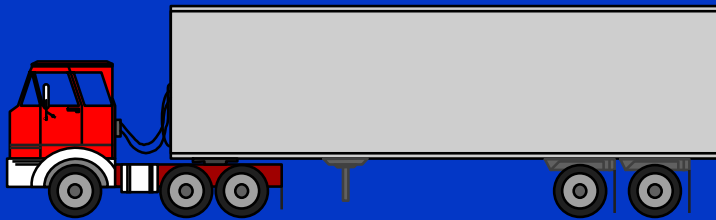


Heavy Duty Vehicle

Inspection

Program



Heavy Duty Vehicle Inspection Program

- ◆ Established by SB 1997 in 1988
- ◆ Amended by AB 584 of 1993
- ◆ Health and Safety Code 44011.6

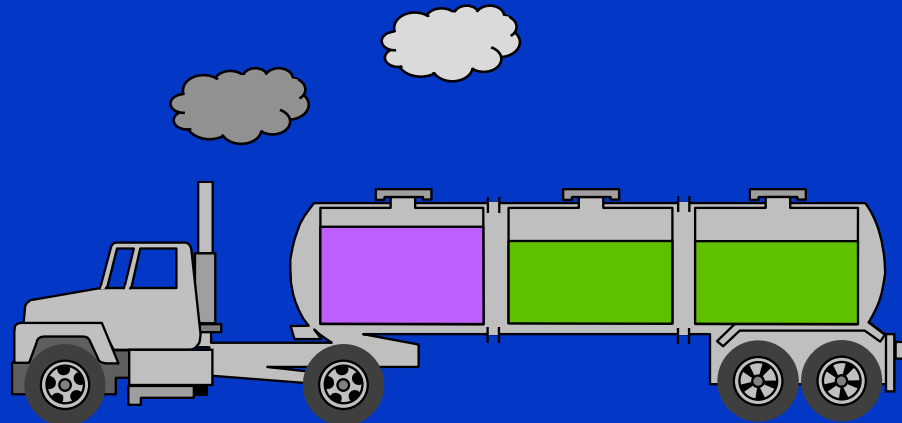
HDVIP Purpose

- ◆ To Improve Air Quality
- ◆ Reduce Public's Exposure to Toxic Emissions
- ◆ Address Public Concern over Smoking Trucks and Buses



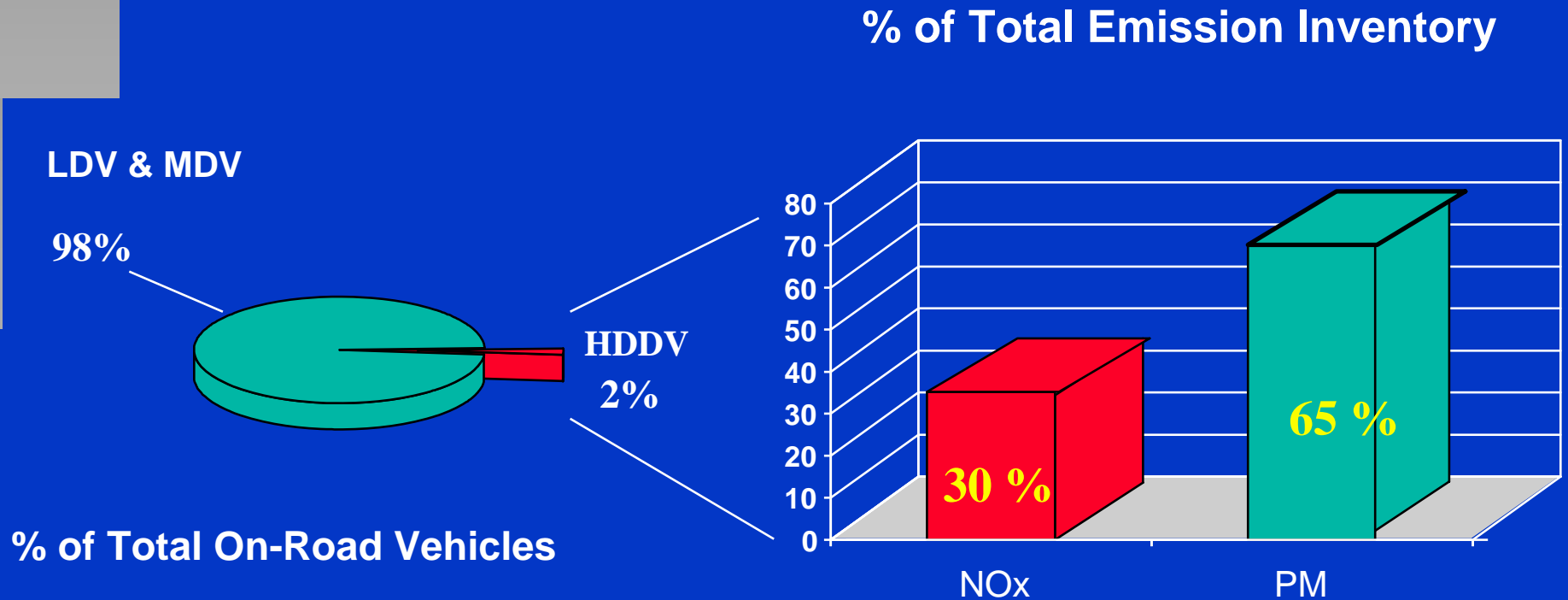
HDVIP Goal

- ◆ To Reduce Excessive Smoke Emissions and Tampering on Gasoline and Diesel Powered Vehicles above 6000 Pounds G.V.W.R.



Heavy-Duty Diesel Emissions

(NO_x & PM)



Health and Safety Code

Section 44011.6

(Established by SB 1997 of 1988)

(Amended by AB 584 of 1993)

(Amended by ARB 1460 of 1996)

Mandated Requirements

- ◆ Set up Ad Hoc Advisory Committee
(Industry-Government)
- ◆ Develop Test Procedures to Detect Excessive
Smoke Emissions Which Produce
Consistent and Repeatable Results
(fulfilled by adoption of SAE J1667
as required by AB 584)

Health and Safety Code

Section 44011.6

(Established by SB 1997 of 1988)

(Amended by AB 584 of 1993)

(Amended by AB 1460 of 1996)

Mandated Requirements

- ◆ Established Procedures to Remedy “False Failures”
- ◆ Develop Inspection Procedures for Emission Controls to Detect Tampering
- ◆ Develop Opacity Standards and Penalty Structure

Ad Hoc Advisory Committee

- ◆ Air Resources Board (ARB)
- ◆ California Highway Patrol (CHP)
- ◆ California Trucking Association (CTA)
- ◆ Engine Manufacturers Association (EMA)
- ◆ South Coast Air Quality Management District (SCAQMD)



Ad Hoc Advisory Committee

(Continued)

- ◆ Diesel Fuel Refineries
- ◆ California Bus Association
- ◆ California Energy Commission (CEC)
- ◆ Heavy Duty Diesel Service Industry
- ◆ Highway Carriers Association



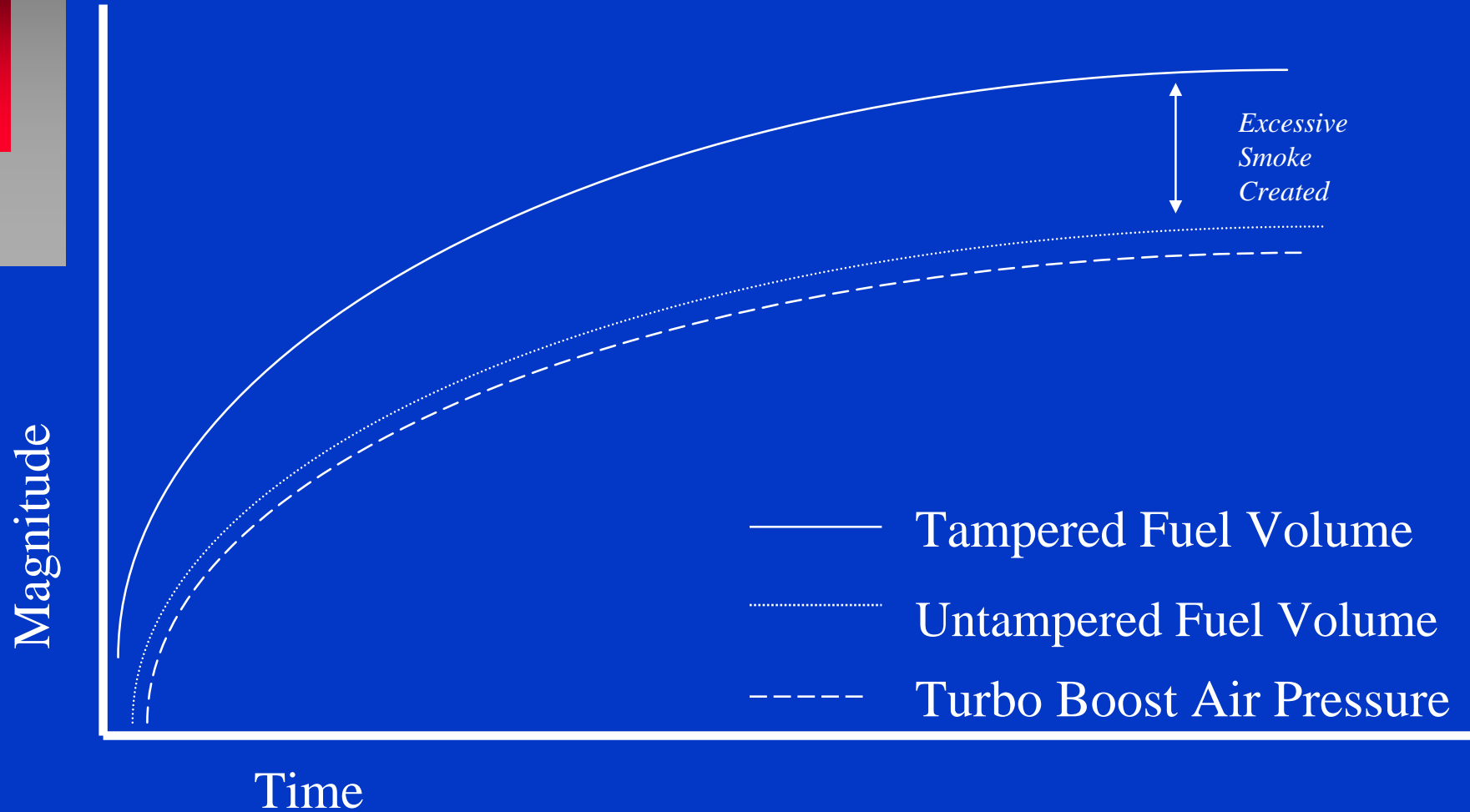
Opacity Measurement

- ◆ Electronic Instrumentation SAE J1667
- ◆ No Visual Ringelmann Scales
- ◆ Digital Print Out

Society of Automotive Engineers (SAE) J1667 Test Procedure

- ◆ Replaces SAE J1243 Test Procedure
- ◆ “Snap Acceleration” Test Cycle Replaces “Snap Idle” Test Cycle
- ◆ Peak Readings now Filtered 1/2 Second Readings
- ◆ Ambient Conditions and Altitude Corrected

Tampering Effect on Air/Fuel Ratio



Snap Acceleration Test Cycle

- ◆ Engines at Operating Temperature
- ◆ Transmission in Neutral, Wheels Chocked
- ◆ Engines Kept Running
- ◆ Rapid Acceleration to Governed Speed
- ◆ Three Clean Out Snaps
- ◆ Three Test Snaps - Averaged
 - Closest Peak Smoke Readings are Averaged



Snap Acceleration Merits

- ◆ Easy to Perform
- ◆ Safe and Quick
- ◆ Perform Anywhere



Snap Acceleration Merits

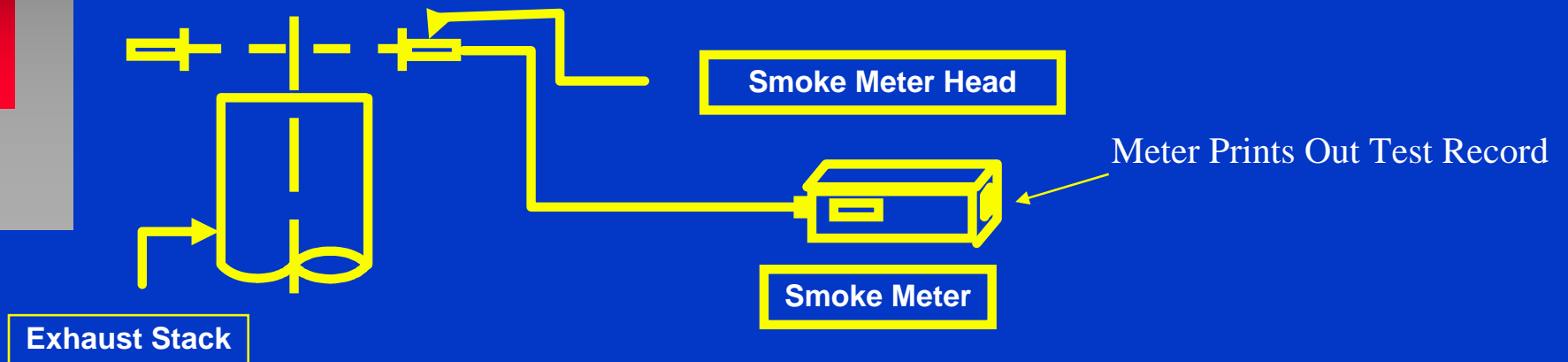
(Continued)

- ◆ Industry Approved Through the SAE J1667 Committee (ATA, CTA, EMA, Gov't Agencies, and Opacity Meter mfr.'s)
- ◆ Facilitates Meter Usage
- ◆ Very Effective
- ◆ Diagnostic Tool
(To Detect Over Fueling and Air Restriction)

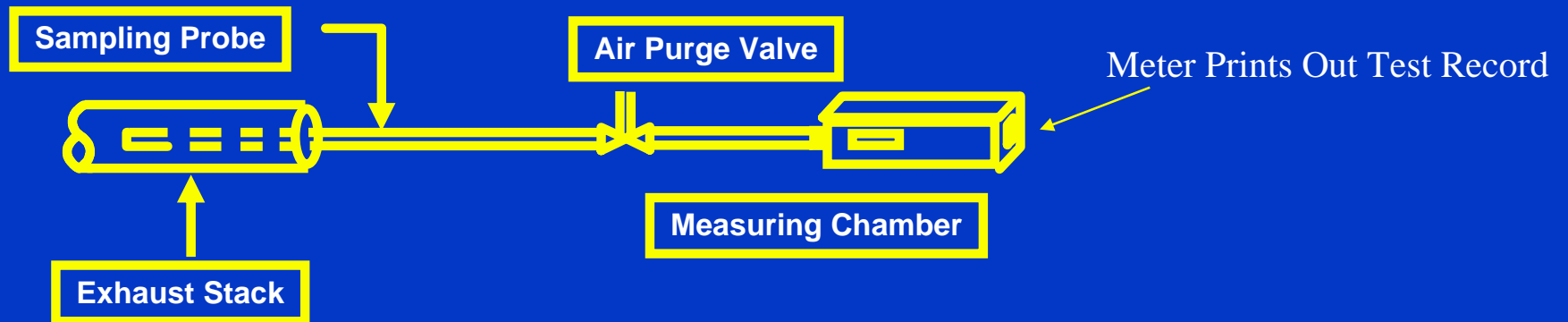


Test Instrumentation

End-Of-Line Smoke Meter (eg "Full Flow")

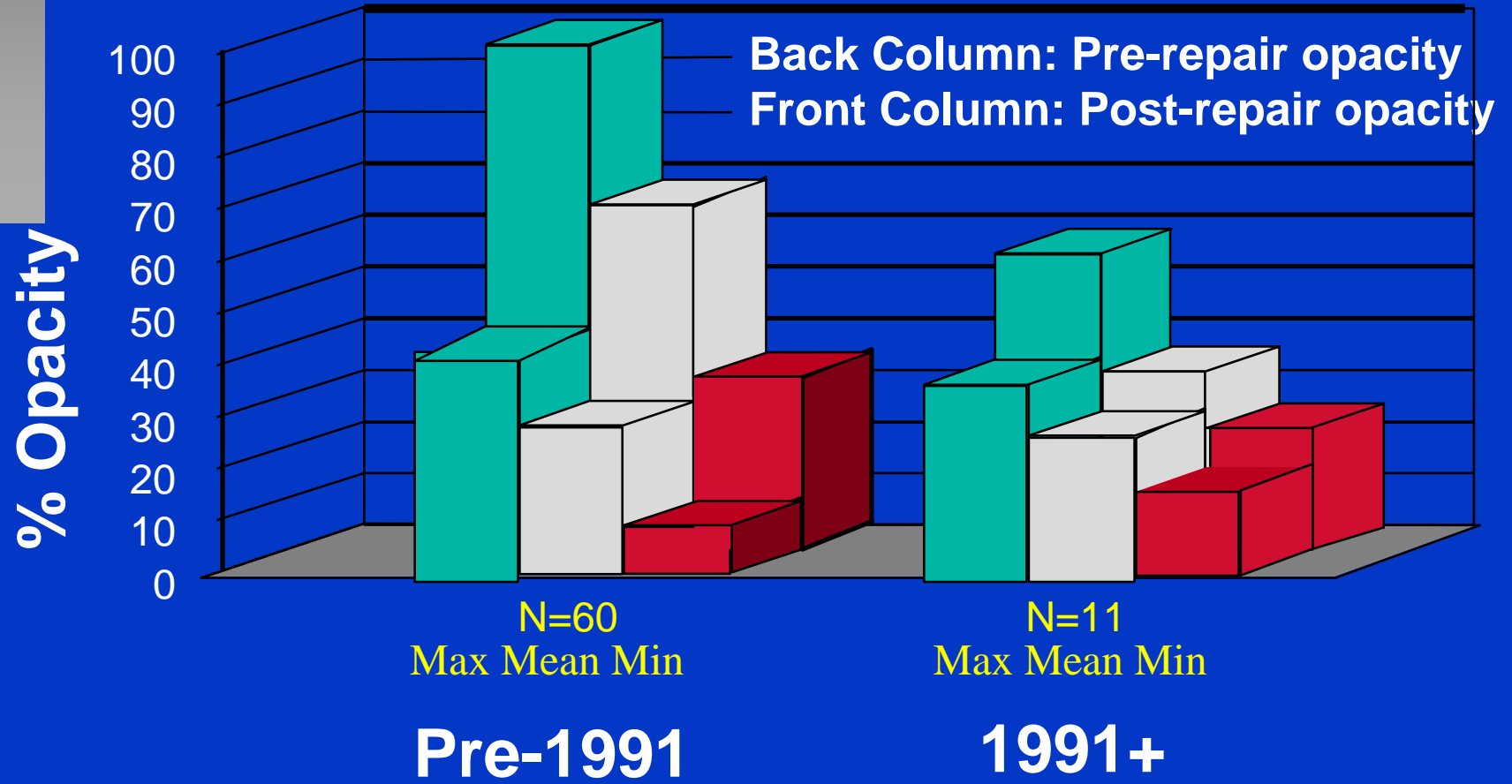


In-Line Smoke Meter (eg "Partial Flow" or "Sample")



Smoke Reduction After Repair

ARB Truck Repair Study (1997)



Smoke Opacity Standards

Vehicles with Pre-1991 Model Year Engines

Opacity Standard 55 %

Test Opacity

ARB Action

Post-Repair Standard

$\geq 70 \%$

Issue Citation

$< 55 \%$

55 - 69 %

Issue Notice of Violation (NOV)*

$< 55 \%$

* : Only One NOV is Allowed in a 12 month Period Subsequent Violations,
Between 55 - 69 % Opacity Result in a Citation

Smoke Opacity Standards

Vehicles with 1991 and
Newer Model Year Engines

Opacity Standard 40 %

Test Opacity

ARB Action

Post-Repair Standard

$\geq 40 \%$

Issue Citation

$< 40 \%$

Tampering Inspections

Diesel

- ◆ Governor
- ◆ Trap
- ◆ Seals
- ◆ Fuel Pump and Seals
- ◆ Others

Gasoline

- ◆ Catalyst
- ◆ E.G.R
- ◆ Air Injection
- ◆ Disconnected Hoses
- ◆ Evap System
- ◆ Others

Inspection Location

- ◆ CHP Inspection Facilities / Scales
- ◆ Fleet Yards
- ◆ Random Roadsides



First Violation

- ◆ \$800.00 Penalty
- ◆ Reduced to \$300.00 if Engine Repaired in 45 days
- ◆ School Buses Exempt From \$300.00 Penalty First Violation Only

CORRECTIVE ACTION

- ◆ Penalty Payment
- ◆ Valid Repair Receipt and Post Repair Test



Second / Subsequent Violations

- ◆ Issued Within One Year of First Violation
- ◆ \$1,800.00
- ◆ No Penalty Reduction

CORRECTIVE ACTION

- ◆ Overdue Penalty Payment
- ◆ \$1,800.00 Penalty Payment
- ◆ Mandatory ARB Post Repair Test

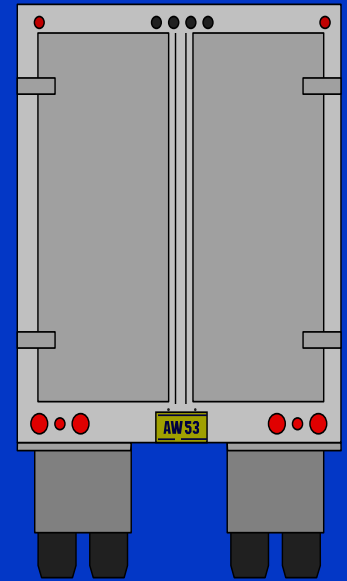


Out of Service

- ❖ CHP Action at ARB Request
- ❖ Vehicles Towed and Stored

CORRECTIVE ACTION

- ❖ Repair Vehicle Within 15 Days
- ❖ Mandatory ARB Post Repair Test
- ❖ Payment of All Storage, Repair and Pending Penalties



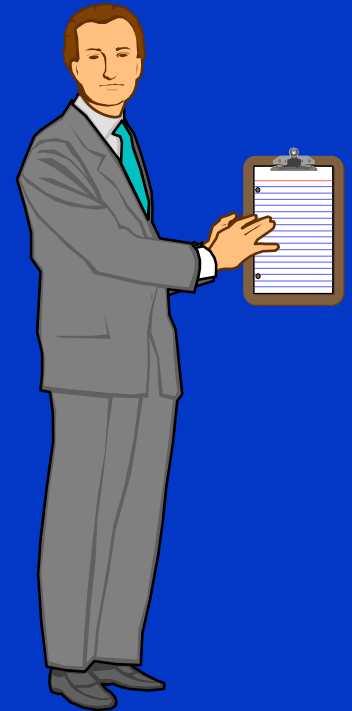
Hearings

- ◆ By Administration Law Judge
- ◆ Requested Within 45 days of Receiving Citation
- ◆ Appeal Process
Title 17, CCR 60075.1
(Senate Bill 1874 of 1990)



Causes of Excessive Smoke

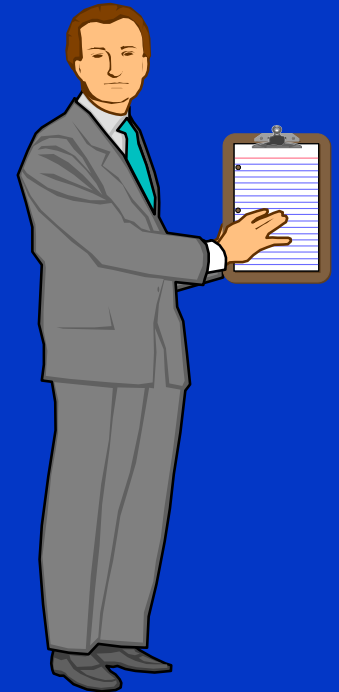
- ❖ Worn/Failed Injectors
- ❖ Maladjusted Fuel Pump Timing
- ❖ Clogged Air Filter
- ❖ Damaged Turbo
- ❖ Worn Engine



Causes of Excessive Smoke

(Continued)

- ◆ Tampered Smoke Puff Limiter
(e.g. “anerioid”, “throttle delay”)
- ◆ Boosted Fuel Pump
- ◆ Enlarged Injector Tips
- ◆ Pump Timing Advanced



Health and Environmental Effects of Diesel Exhaust Emissions

Constituent

Detrimental Effect

Particulates

Carcinogenic and
Mutagenic

HC and NO_x

Ozone (Smog) Precursors

NO_x and SO_x

Acid Rain / Deposition

NO_x and SO_x

Impairs Visibility/Fine
Particulate Formation

Toxic Air Contaminants

Carcinogenic

Projected Emissions Benefits

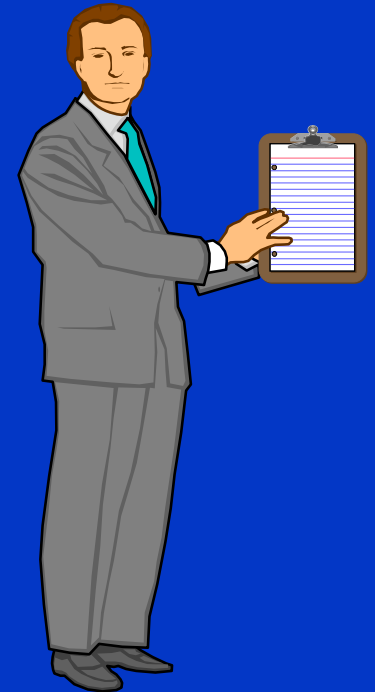
Combined HDVIP and PSI

<i>Pollutant</i>	<i>1999 Tons/Day</i>	<i>2010 Tons/Day</i>
PM	5.24	3.19
HC	6.37	5.30
NO _x	12.24	14.03
<hr/> Totals	<hr/> 23.85	<hr/> 22.52

Reduction of Smoking Trucks: 29 % — 1999, 36 % — 2010

Benefits of Smoke Emissions Reductions

- ◆ Improved Fuel Economy
- ◆ Reduced Fuel Costs
- ◆ Improved Public Relations
- ◆ Cleaner Trailers



Estimated Fuel Savings

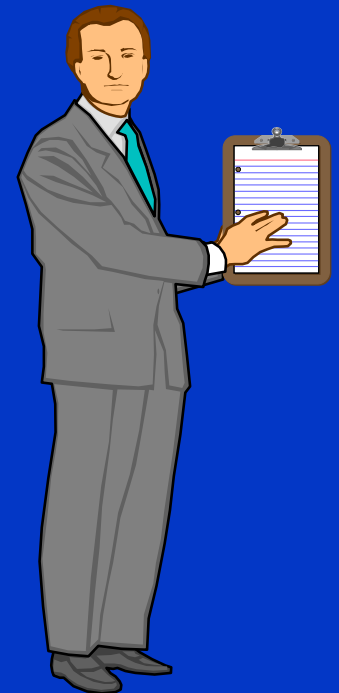
1999

- ◆ 16.7 Million gals/yr
- ◆ 0.69 % Reduction in Fuel Consumption
- ◆ \$ 21 Million / Year Savings

2010

- ◆ 19.2 Million gals/yr
- ◆ 0.66 % Reduction in Fuel Consumption
- ◆ \$ 24 Million / Year Savings

□ Based on Diesel Fuel at \$ 1.25 per Gallon



Recommendations

- ◆ Conduct Proper Maintenance
(Per Manufacturer's Recommendation/Schedule)
- ◆ Prevent Engine Tampering
(Tampering Constitutes Failure)
- ◆ Test Smoke Levels At Regular Intervals
- ◆ Have Engine Properly Identified
(Correctly Label Engine)

** Some Engine Families May Be Exempted From The More Stringent Standards Upon Proper Identification



*ARB Smoke Test Procedure
VS
California Vehicle Code 27153.5*

H & S 44011.6

- ❖ Electronic Opacity Measurement
- ❖ Snap Acceleration, Stationary Vehicle

C V C 27153.5

- ❖ Visual Ringelmann Sighting
- ❖ Ten Second Sighting, Moving Vehicle

ARB Smoke Test Procedure

VS

California Vehicle Code 27153.5

H & S 44011.6

- ◆ 40 % Standard, 1991 and Newer
- ◆ 55 % Standard, 1990 and older *

C V C 27153.5

- ◆ Ringelmann 1, 1971 and Newer
- ◆ Ringelmann 2, 1970 and Older

* 70 % or Higher, Citation Issued
Between 55 - 69 % NOV Issued

27153.5 California Vehicle Code Penalty

◆ 1st Offense \$250.00 to \$2,500.00

◆ 2nd Offense \$500.00 to \$5,000.00

Key Program Elements

- ◆ Enforcement Implementation:
June 1, 1998
- ◆ California Highway Patrol Assistance
- ◆ Snap Acceleration Test (SAE J1667)
(Diesel Vehicles Only)
- ◆ Electronic Smoke Measurement
(Smoke Meter)
- ◆ Emission Control System Tampering Check
(Gas & Diesel)

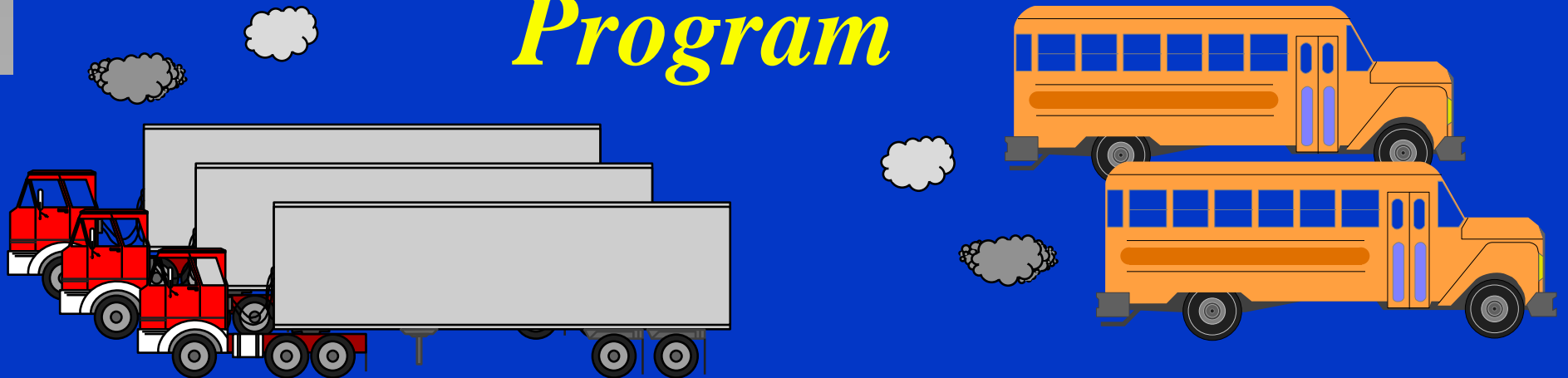
Key Program Elements

Continued

- ◆ Computerized Prior - Violation Check
- ◆ Inspections Conducted at CHP Weigh Stations/Fleets/Random
- ◆ California, Out-of-State, and Out-of-Country (NAFTA) Trucks & Buses
- ◆ Appeal Process
Title 17, CCR 60075.1
(Senate Bill 1874 of 1990)

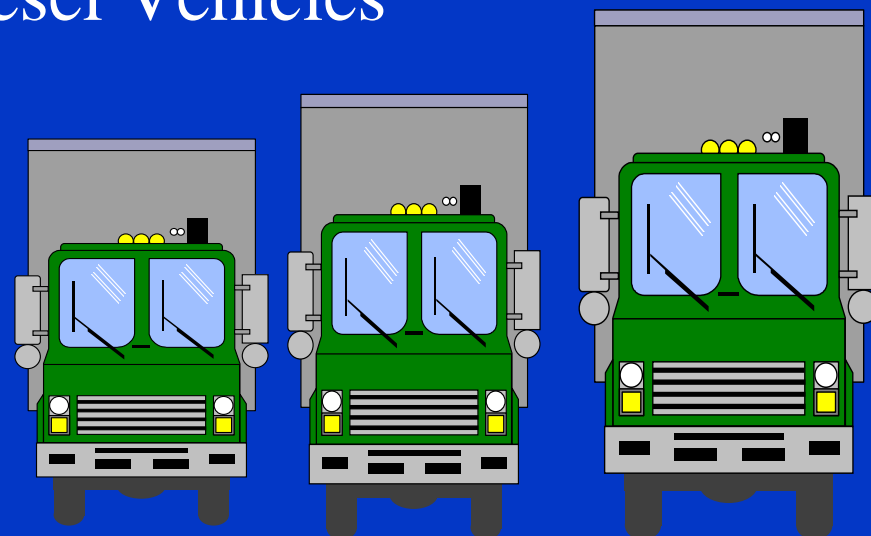
*State of California
Air Resources Board*

*Periodic Smoke
Inspection
Program*



Periodic Smoke Inspection Program (PSI Program)

- ◆ Health and Safety Code 43701(a)
- ◆ Annual Inspection and Test of Diesel Vehicle Fleets.
- ◆ Address Public's Concerns About the Health Impacts of Smoke Emissions From Heavy Duty Diesel Vehicles



PSI Goals

- ◆ Reduce Excessive Smoke Emissions from Heavy Duty Diesel Vehicles
- ◆ Detect Mal-Maintenance and/or Tampering of Heavy Duty Diesel Vehicles
- ◆ Emphasize Use of Manufacturer Specified Tune-Up and Maintenance Procedures

Health and Safety Code

Section 43701 (a)

- ❖ Consult with the Bureau of Automotive Repair and the Inspection and Maintenance Review Committee
- ❖ Adopt Regulations Which Require the Owners or Operators of Heavy Duty Diesel Vehicles to Perform Periodic Smoke Inspections on Their Vehicles

California Code of Regulations

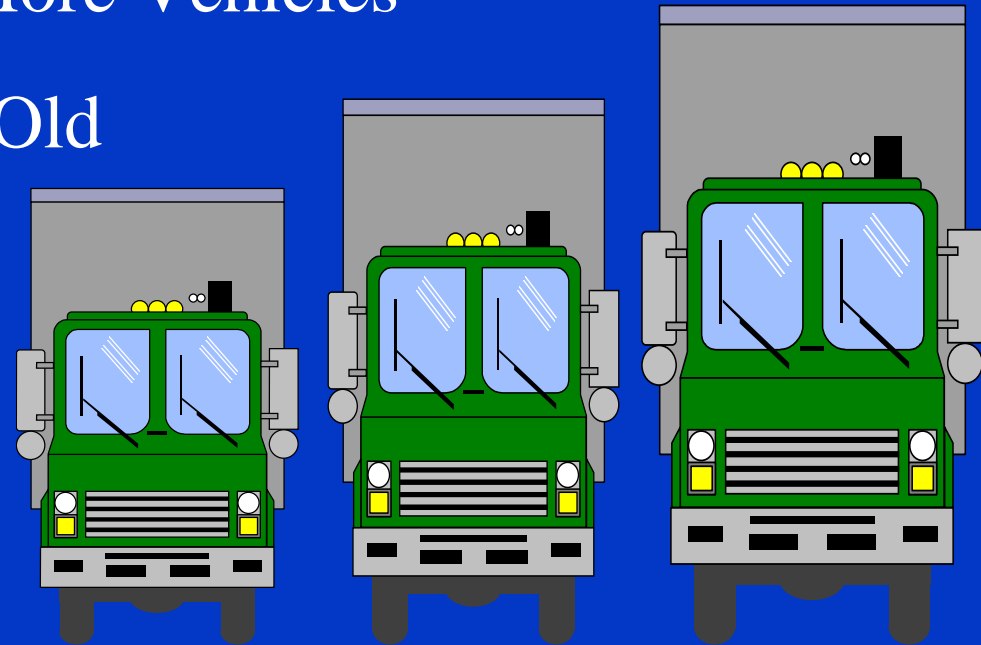
Title 13, Sections 2190 - 2194

Establishes :

- ◆ Applicability and Exemptions
- ◆ Inspection Intervals, Test Procedures, and Smoke Opacity Standards
- ◆ Vehicle Inspection Responsibilities
- ◆ Record Keeping Requirements

PSI Applications

- ◆ California - Only Based Vehicles
- ◆ Vehicles Over 6000 GVWR
- ◆ Fleets of Two or More Vehicles
- ◆ Engines > 4 Years Old



Smoke Opacity Test Procedure

- ◆ Perform the Snap Acceleration Test as Used in the Heavy Duty Vehicle Inspection Program
- ◆ Measure the Exhaust Smoke Opacity Level with a Smoke Meter
- ◆ Record the Exhaust Smoke Opacity Level

** Use SAE J1667 Test Procedures and Opacity Meters

Vehicle Inspection Responsibilities

- ◆ Perform the Snap Acceleration Test on Heavy Duty Diesel Vehicles
- ◆ Repair the Vehicles When the Smoke Opacity Standards are Exceeded
- ◆ Re-Test the Vehicles When There are Initial Failures of Snap Acceleration Test
- ◆ Make Additional Repairs When Necessary to Comply with the Smoke Opacity Standards

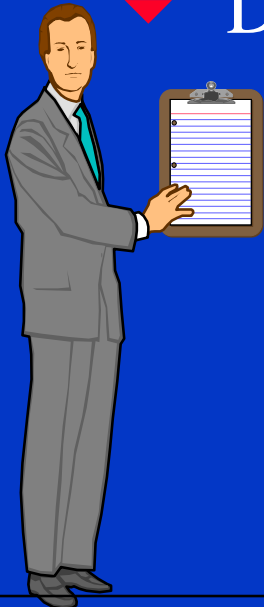
Vehicle Inspection Responsibilities

(Continued)

- ◆ Record the Snap Acceleration Test and Vehicle Repair Information
- ◆ Maintain the Records for Two Years
- ◆ Permit an ARB Inspector to Review/Audit the Records by Appointment

Record Keeping Requirements

- ❖ Hardcopy or Disk/Tape Storage Accepted
- ❖ Document the Test Equipment Information
- ❖ Document the Snap Acceleration Test Results
- ❖ Document the Vehicle Repair Information



** See Recommended Log Sheet

Exemption From PSI Program

Heavy Duty Diesel Vehicles Which :

- ◆ Are < 4 Years Old
- ◆ Are Not Part of a Fleet of Two or More Vehicles
- ◆ Operate in California Under Short-Term Vehicle Registration or Permits of 90 Days or Less

Exemption From PSI Program

(Continued)

Heavy Duty Diesel Vehicles Which Are Not Based in California and Which :

- ❖ Are Registered Under the International Registration Plan
- ❖ Operate in California Under Terms of Interstate Reciprocity Agreements or Other Apportioned Registration, Reciprocity or Bilateral Prorate Registration Agreements

Key Program Elements

- ◆ Use SAE J1667 Test Procedure with Snap Acceleration Cycle
- ◆ Apply 40% or 55% Opacity Standards
- ◆ Owner Must Repair Failed Vehicles
- ◆ ARB May Test Fleet Vehicles
- ◆ Citations May be Issued
- ◆ Fleet Audits

Your Program Benefits

- ◆ Increased Fuel Economy
- ◆ Improved Engine Reliability and Extended Engine Life
- ◆ Reduced Emergency Downtime
- ◆ Convenient and Decentralized Smoke Level Evaluation

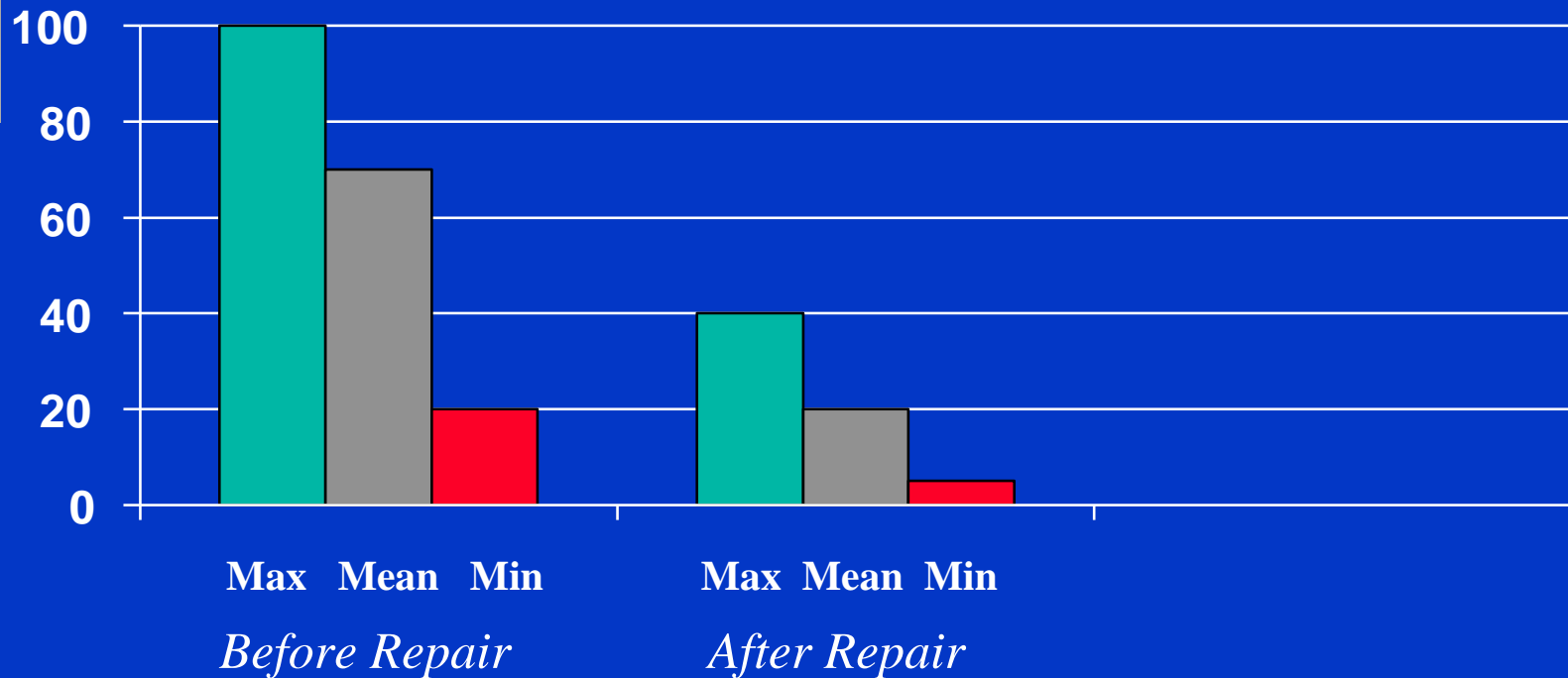
Your Program Benefits

(Continued)

- ◆ No Citations
- ◆ Enhanced Public Image
- ◆ Reduced Emissions

Smoke Reduction After Repair ARB Pilot Repair Program (1989)

Peak Smoke Opacity (%)

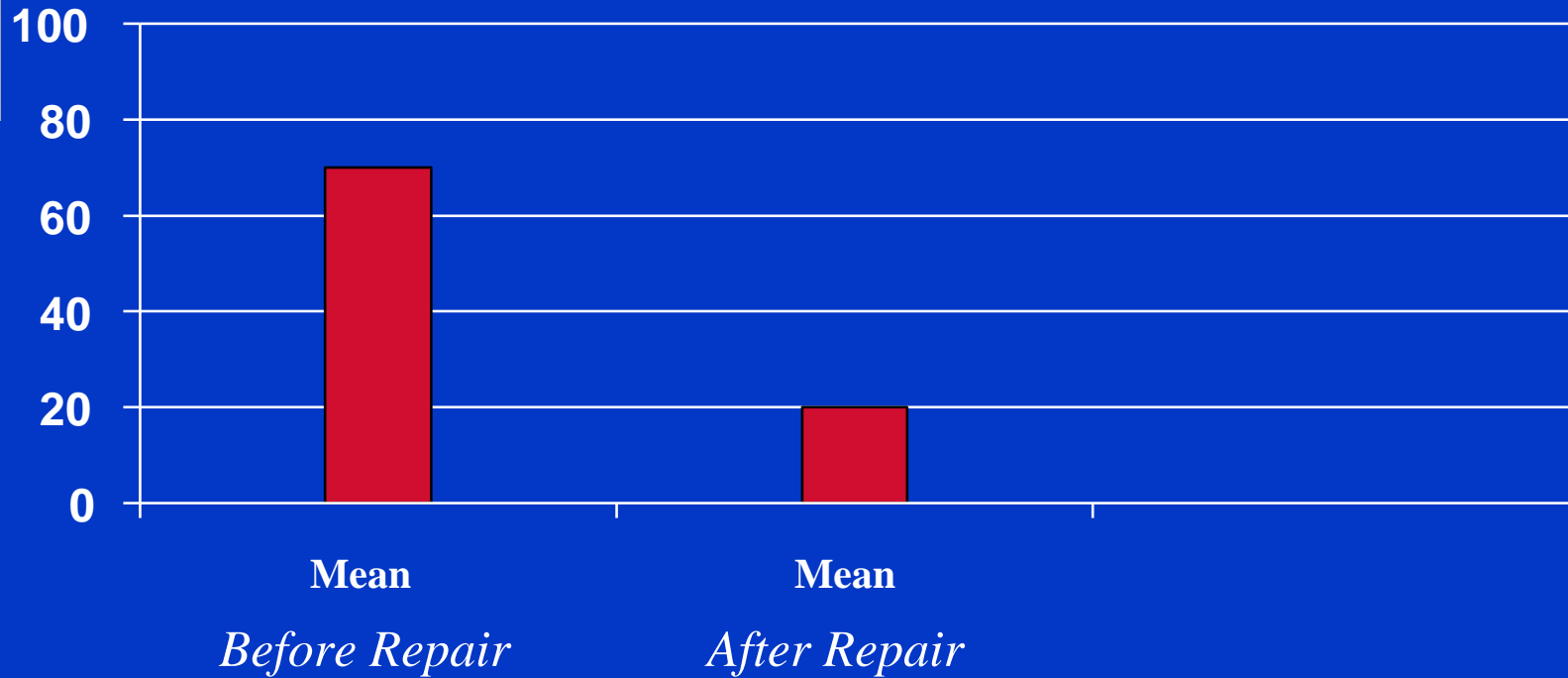


Sample Size: 58 Vehicles - Repaired to Manufacturers Specs

Smoke Reduction After Repair

ARB Pilot Repair Program (1989)

Peak Smoke Opacity (%)



Sample Size: 58 Vehicles - Repaired to Manufacturers Specs