

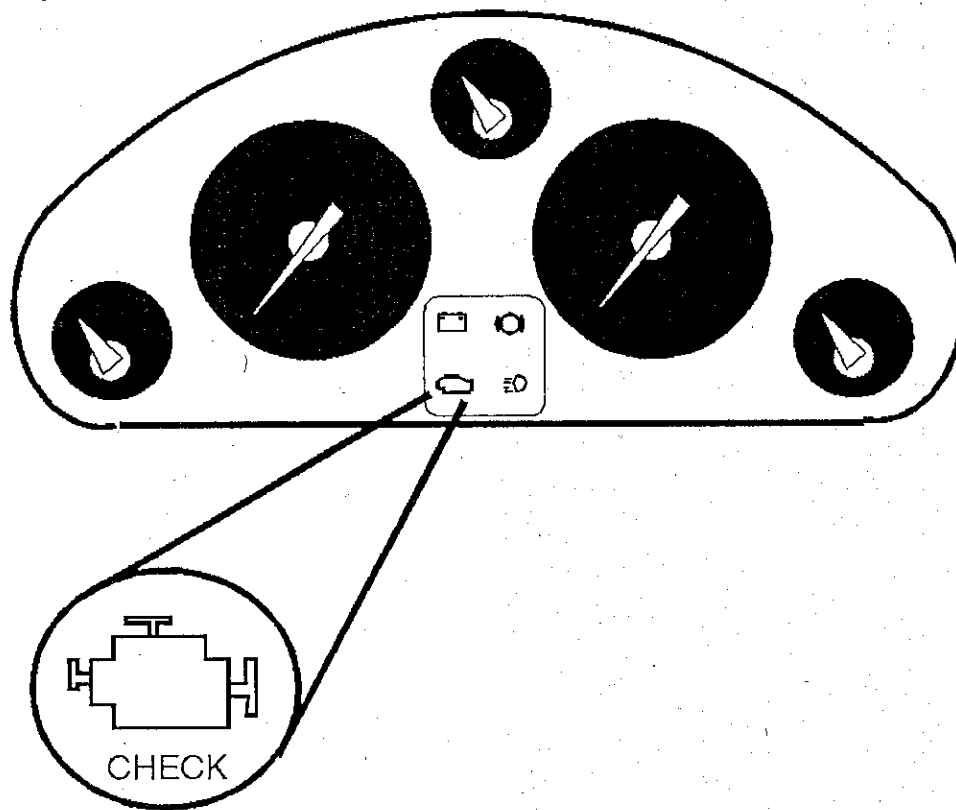
AGENDA ITEM 94-12-2

NOTICE OF PUBLIC HEARING TO CONSIDER TECHNICAL STATUS AND PROPOSED REVISIONS TO MALFUNCTION AND DIAGNOSTIC SYSTEM REQUIREMENTS FOR 1994 MODEL-YEAR PASSENGER CARS, LIGHT-DUTY TRUCKS, AND MEDIUM DUTY VEHICLES AND ENGINES (OBD II)

Copies of the slide presentation which supported the Air Resources Board's oral staff presentation given by Mr. Allen Lyons, as reflected on page 16 of the transcript.

Attachments

On-Board Diagnostics II (OBD II) Update



California Environmental Protection Agency



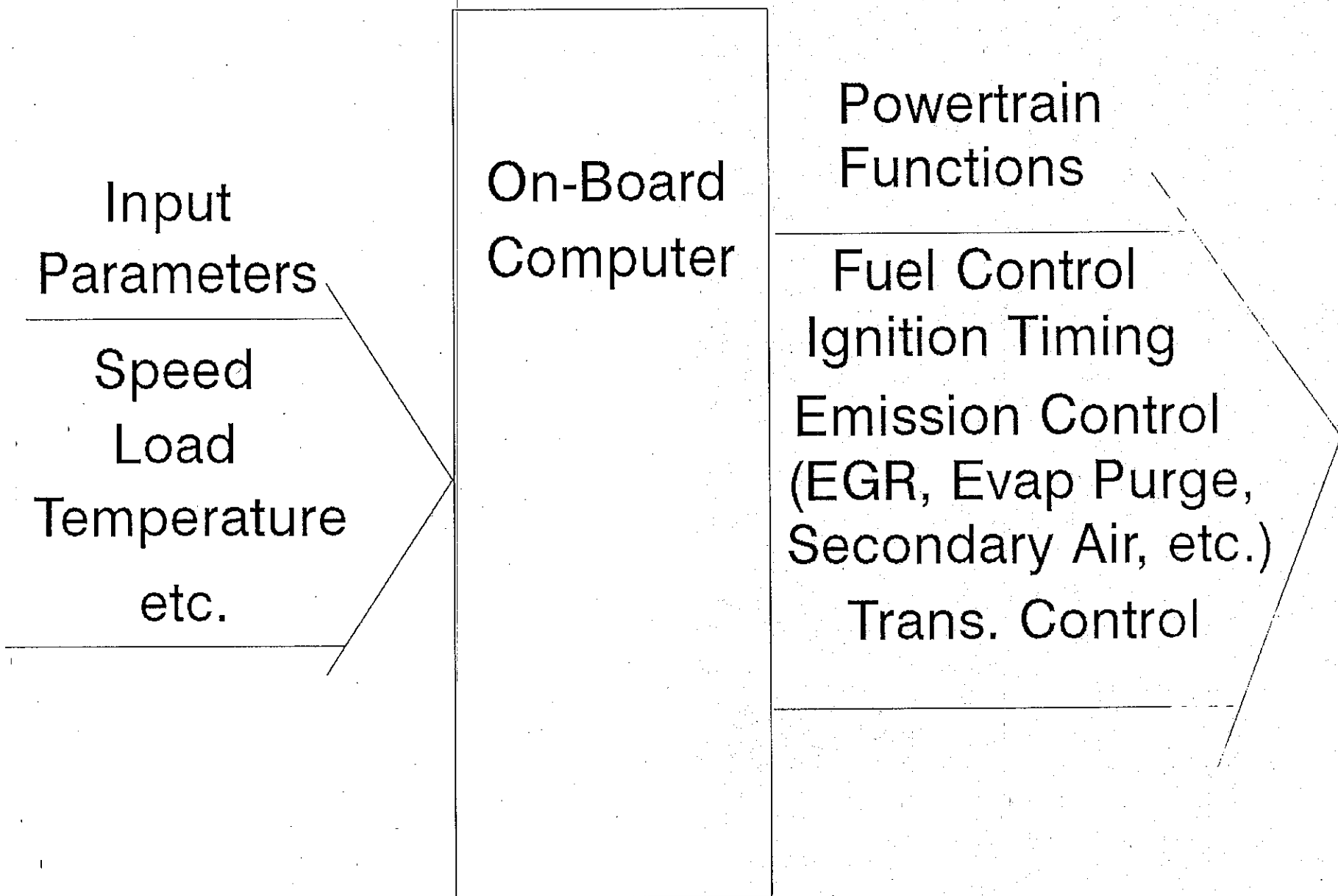
Air Resources Board

December 8, 1994

OBD II

Presentation Overview

- Purpose of OBD II
- Regulatory History
- Implementation Progress
- Issues/Proposed Amendments



Input
Parameters

Speed
Load
Temperature
etc.

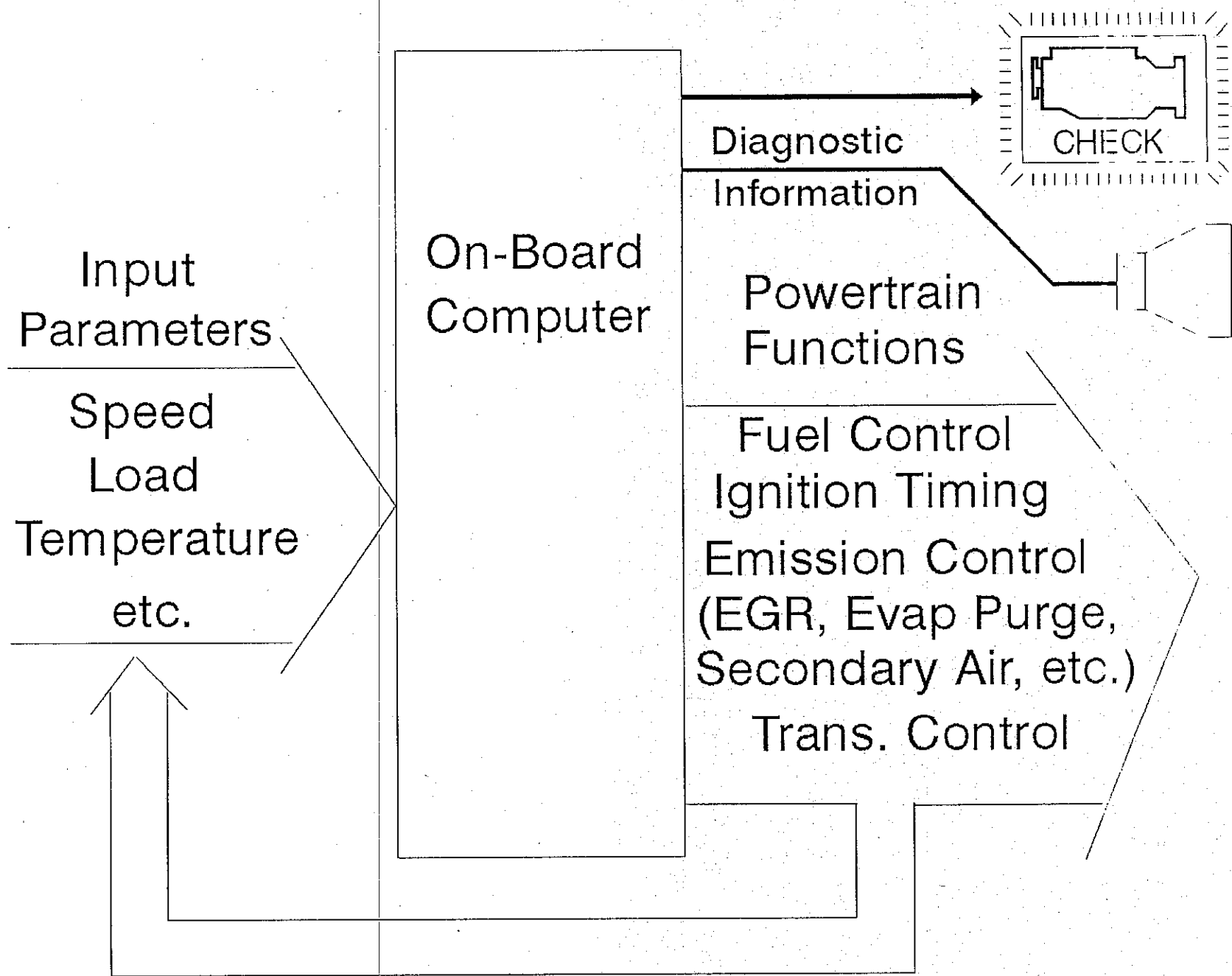
On-Board
Computer

Diagnostic
Information

Powertrain
Functions

Fuel Control
Ignition Timing
Emission Control
(EGR, Evap Purge,
Secondary Air, etc.)
Trans. Control

CHECK



On-Board Diagnostics

Purpose

- Emission Control Malfunctions Detected Quickly
- Helps in Repair of Vehicles

Regulatory History

OBD I

- Adopted for 1988 and Later Models
- Monitoring Requirements
 - EGR
 - Fuel System
 - Electronic Computer Input Components

Regulatory History

OBD II

- Adopted for 1994 and Later Models
- Revised Monitoring Requirements
 - Fuel System
 - EGR
 - Computer Input Components
- Malfunctions Correlated with Emissions

OBD II

Expanded Monitoring Requirements

- Catalyst Efficiency
- Catalyst Heating Systems
- Engine Misfire
- Evaporative System Leaks
- Secondary Air
- Computer Output Components

1994 - 1996 Model Year Phase-In

- Based on Computer Capability
- 35+ Engine Families Certified
- Examples:

Chrysler Neon	Ford Windstar
Chevy Blazer	Lexus 300
Mazda Millenia	Mercedes C220
Nissan Maxima	Volvo 850 Turbo

OBD II Implementation

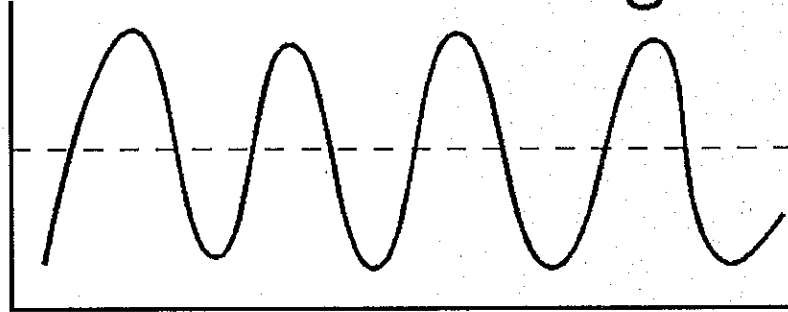
- Deficiency Provision - July 1993
- Certification on Basis of Good Faith Effort
- Fines For 3+ Deficiencies on 1995 Models

Catalyst Monitoring for LEVs

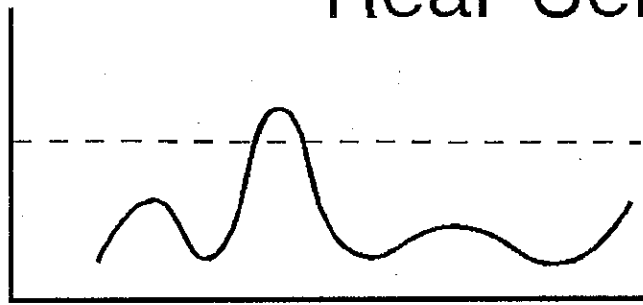
- Current Requirement:
Monitor Front Catalyst

Oxygen Sensors Indicate Catalyst Performance

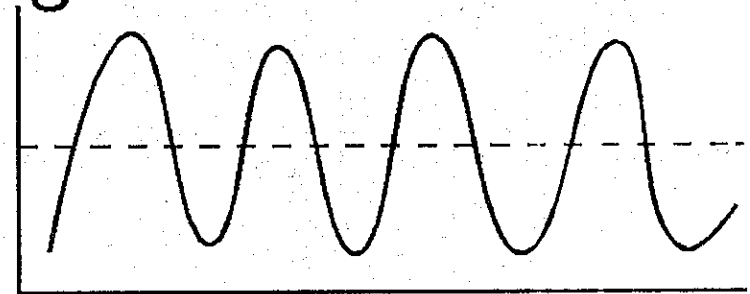
Front Sensor Signal



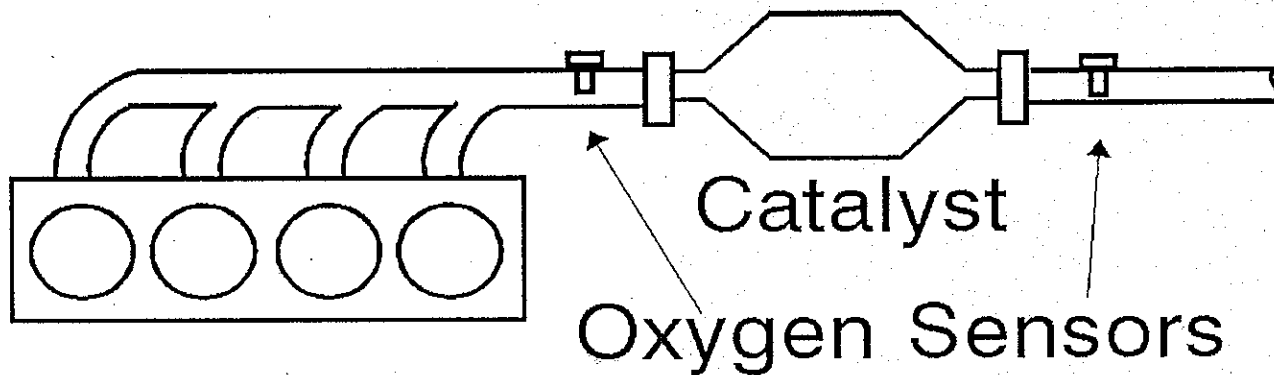
Rear Sensor Signal



Good Catalyst



Bad Catalyst



Catalyst Monitoring for LEVs

Manufacturers' Concerns

- Oxygen Storage/Front Catalyst Efficiency Correlation
 - ▶ Close Coupled Environment
 - ▶ Small Volume Catalysts
- Restricts Catalyst System Design

Catalyst Monitoring for LEVs

Staff's Proposal

- Remove Front Catalyst Monitoring Restriction
- System Based Requirement Proposed
- Malfunction Criteria:
1.5 x Hydrocarbon Standard

Catalyst Monitoring

Staff's Proposal

- More Catalyst System Design Flexibility
- Monitoring Front Portion Appears Most Effective

Catalyst Monitoring

Impact of Staff's Proposal

- May Require Catalyst Design Modifications
 - ▶ Front/Rear Catalyst Volume Changes
 - ▶ Location of Oxygen Sensor Between Catalyst Substrates

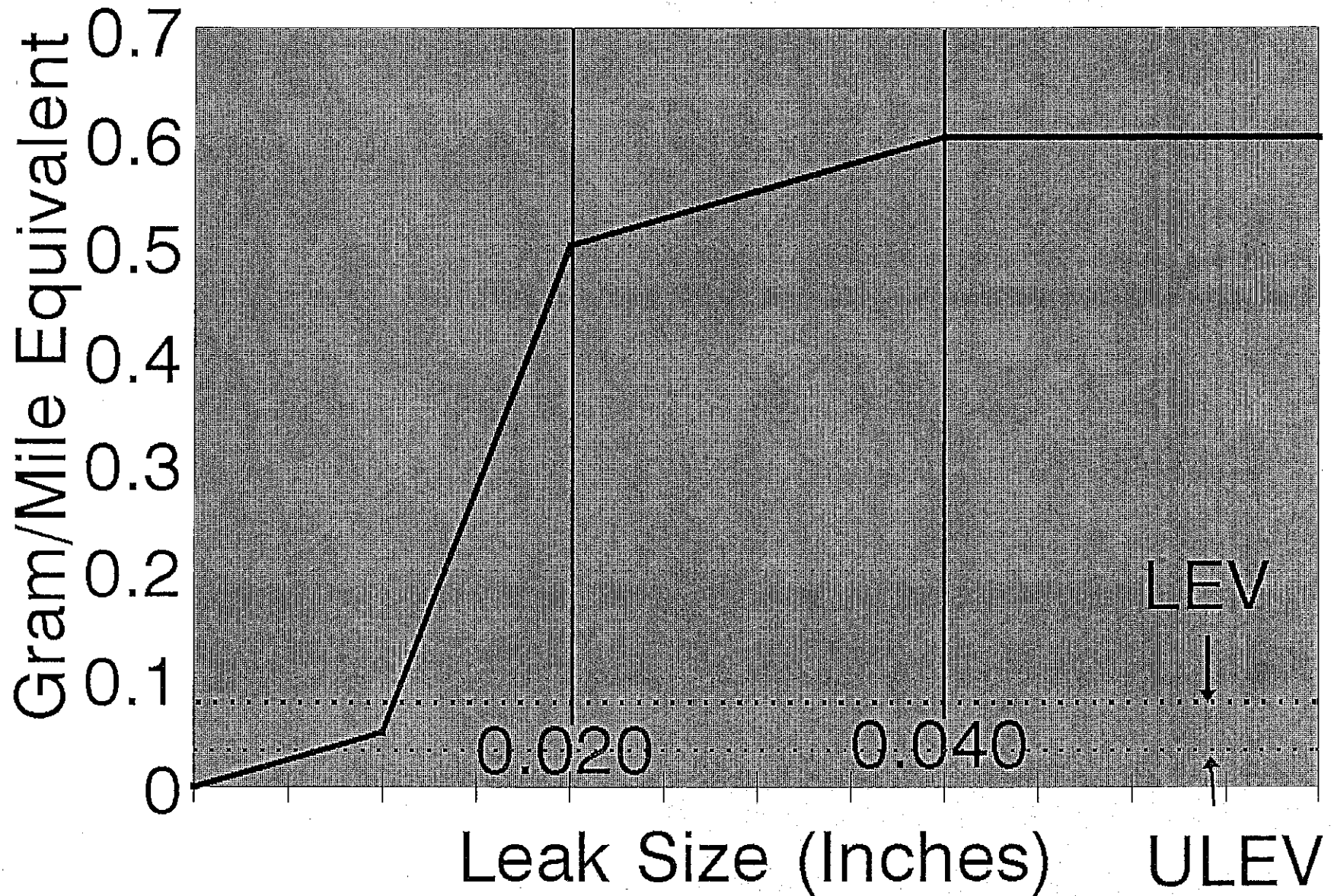
Catalyst Monitoring

- Phase-in: 1.5 x Standard
- Based on Projected Sales Volume
 - 40% - 1998
 - 70% - 1999
 - 100% - 2000
- Interim Thresholds
(Emission Increase vs 4K System)
TLEV: 2.0 x STD; LEV: 2.5 x STD

Evaporative System Monitoring Current Requirement

- Detection of Leaks \geq 0.040 In. Hole
- Requirement Phase-in: '96 - '98
 - Consistent With New Evap Phase-in

Impact of Leaks on Evap Emissions



Evaporative System Monitoring

- ARB Testing indicates 8% Occurrence of Small Leaks
- Significant Emission Reduction Possible From Repairs - 35 TPD

Evaporative System Leak Data

Impact on Fleet Emissions

2003 Fleet Average: 0.062 g/mi

Adjusted for Evap Emissions: 0.189 g/mi

Adjusted Fleet Average 0.228 g/mi

7.8% Leaks (0.02-0.04in): (21% increase)

Proposed Requirement Evaporative System Monitoring

- Detection of 0.020 Inch Leaks
- Proposed Sales Volume Phase-In
 - 1998 - 50 %
 - 1999 - 75 %
 - 2000 - 100 %

Proposed Requirement Feasibility

- Feasible with Current Hardware
- Necessary software modifications
 - longer monitoring periods
 - constrained monitoring conditions

Evaporative System Leak Detection Further Considerations

- New Data - Reduced Emission Impact on New Systems
- Impact Evaporative System Design Dependent
- Significant Emission Reduction Still Possible

Misfire Detection

Current Requirements

- 1994 - 1996 Model Years
Detection Required During FTP
Operating Conditions
- 1997+ Model Years
All Engine Speeds at Loads
Above Neutral

Misfire Monitoring

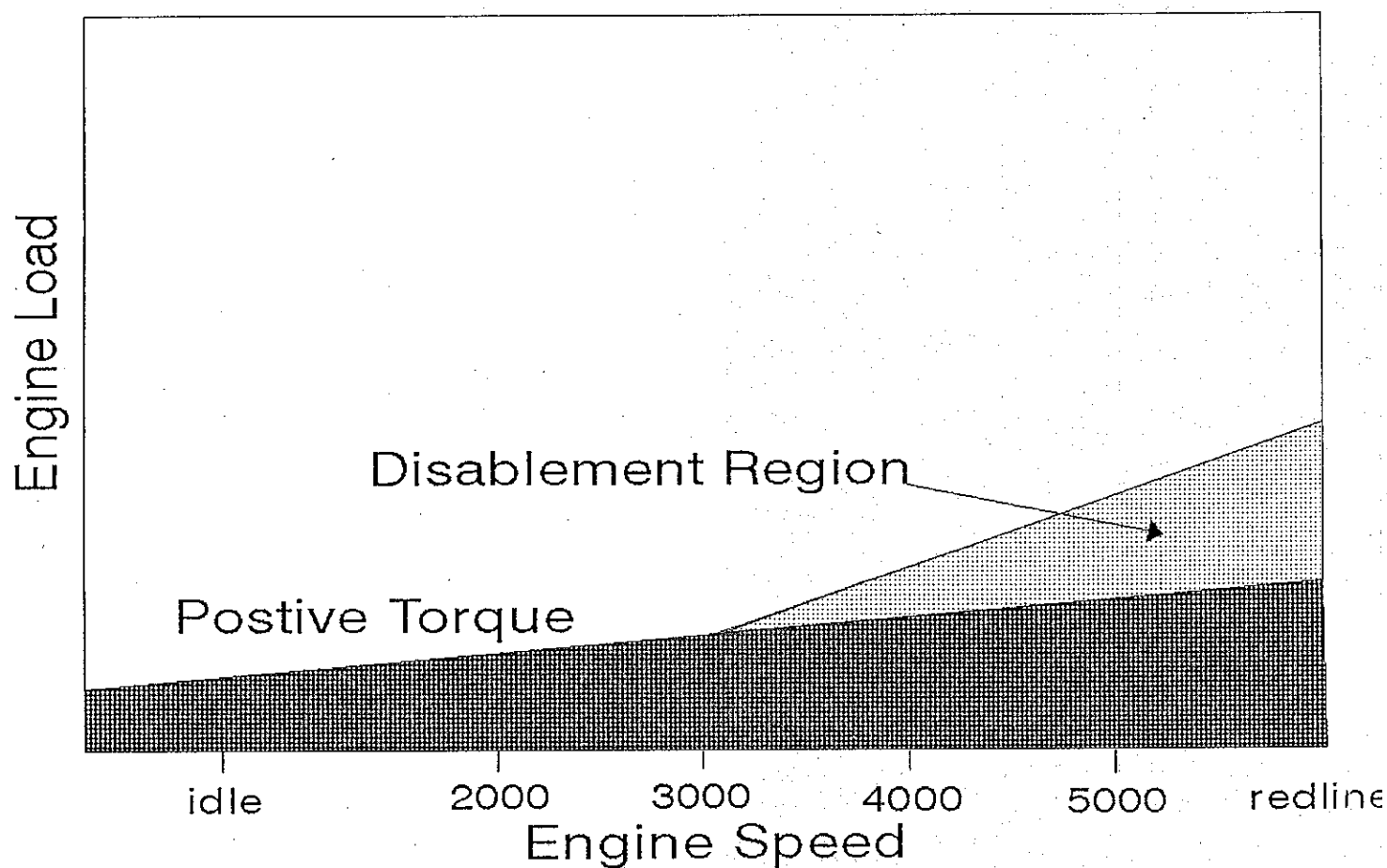
Proposed Revisions - 1997+ Model Years

- Phase-in of Expanded Monitoring Conditions
- Based on Sales Volume
 - 1997 - 50%
 - 1998 - 75%
 - 1999 - 90%
 - 2000 - 100%

Misfire Monitoring

Proposed Revisions - 1997+ Model Years

- High Speed/Light Load Disablement



OBD II Implementation on Diesels

- 1991 Amendment - Diesels Subject to OBD II
- OBD II Compliance Plan Required
- Diesel Requirements Clarifications Proposed

Diesel Vehicles

OBD II Implementation

- Catalyst Monitoring Not Yet Feasible
- Misfire Detection - 1998 Model Year
- Other Requirements Apply if Control Technologies Employed

OBD II Compliance

- 1994, 1995 Model Year Deficiencies Permitted
- Need for Further Deficiency Provisions May Exist

1996 - 2000 Compliance Staff's Proposal

- Carry over 1995 Deficiency Provision to 1996 Model Year
- Permit One Deficiency Without Penalty for 1997 - 2000 Model Year
- Additional Restrictions for 1997-2000

OBD II Amendments Summary

- Long-Term Effectiveness Maximized
- Implementation Concerns Addressed
- The Staff Will Continue to Follow Progress and Address Remaining Concerns

OBD II Implementation

Other Issues

- Alternate Fuel Vehicles
 - Additional Leadtime Proposed
- Tamper Resistance
 - Enhanced Requirements Proposed for 1999