

# Workshop - Transit Bus Fleet Rule



Sacramento: May 3, 2002  
El Monte: May 9, 2002

California Environmental Protection Agency



**Air Resources Board**

## Workshop Presentation

- Background
- Board Meeting Resolutions
- March 2002 Board Hearing Consideration
- Possible Amendments
  - PM Fleet Average
    - New Tier Structure
    - Fleet Average
  - Fuel Path Change
  - ULSD Fuel Delay



## Background

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- Select Fuel Path by January 31, 2001
- New Engine Standards
  - 2002 and beyond: 0.01 g/bhp-hr PM
  - 2004-2006: 0.5 g/bhp-hr NOx
  - 2007 and beyond: 0.2 g/bhp-hr NOx
- Alternative NOx Strategy Exemption
- 4.8 g/bhp-hr NOx Fleet Average Effective October 1, 2002



## Background - con't

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- Annual Reports Due Each January 31
- Low Sulfur Fuel (15 ppm or less) Starting July 1, 2002
- PM Retrofits Starting January 1, 2003
- Zero-Emission Bus Demo Starting 2003
- Zero-Emission Bus Purchases in 2008



## **Resolution 01-31 (Sept. 2001)**

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- Assist Transit Agencies to Comply with NOx Fleet Average
- Assist Transit Agencies with Alternative NOx Strategy Applications
  - Submit complete plan by 12/31/01
  - Commit resources for NOx demo by 12/31/01
  - Implement demo by 12/31/02



## **March Board Hearing Summary**

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- NOx Fleet Average
  - Nearly all in compliance
  - NOVs to be issued to any that do not comply
- Alternative NOx Strategy Exemption
  - All plans submitted on time approved
  - Others may not purchase non-complying diesel engines 2004-2006
  - One joint demonstration planned



## **March Summary - con't**

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- Annual Report Due 1/31/02
  - 21 submitted late
- Low Sulfur (<15 ppm) Diesel Fuel
  - Generally available
- Retrofit Field Experience
  - 1994 MY and newer - mostly successful
- No Retrofit Devices Verified For pre-94 MY



## **Resolution 02-16 (March 2002)**

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- **Change the PM Retrofit Schedule**
- **Achieve feasible reductions in PM as compared to the current implementation schedule**
- **Bring to the Board September 2002**

## Proposed Amendment #1: Change PM Retrofit Schedule

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- Change the Tier Implementation Schedule and Structure; OR
- Eliminate Tiers and Replace with Declining PM Fleet Average
- Additional Change Needed:
  - Delete certification procedures for the retrofit device and replace with adopted verification procedure

## Current PM Retrofit Schedule

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### Current Diesel Path Requirement

Tiers	2003	2004	2005	2006	2007
Tier 1 Pre-1991	100 %				
Tier 2 1991 - 1995	50 %	100 %			
Tier 3 1996 - 2002			20 %	75 %	100 %

Note: Percentages of retrofit requirements must be met by January 1 of each year.



# Current PM Retrofit Schedule

## Current Alt. Fuel Path Requirement

Tiers	2003	2004	2005	2006	2007	2008	2009
Tier 1 Pre-1991	100 %						
Tier 2 1991 - 1995	20 %	75 %	100 %				
Tier 3 1996 - 2002					20 %	75 %	100 %

Note: Percentages of retrofit requirements should be met by January 1 of every year.

# 2002 Fleet Plans

	Pre-1991 MY		1991-1995 MY		Total
	2 stroke	4 stroke	2 stroke	4 stroke	
Retire	833	96	303	110	1342
Repower	40	4	139	93	276
Retrofits	528	67	674	368	1637
Exempt	537	5	13	3	558
<b>Totals</b>	<b>1938</b>	<b>172</b>	<b>1129</b>	<b>574</b>	<b>3813</b>



## Potential PM Emissions Reduction Shortfall

- Tier 1 Retrofits: 595 2- & 4-stroke buses
- Tier 2 Retrofits: 674 2-stroke buses
- 85% PM reduction
- Predicted 2005 PM Reductions: 55 tpy
- Estimated 2005 PM Shortfall: 46.5 tpy
  - If no Changes Made to Rule



## Retrofit Shortfall By Buses

	Diesel Path	Alt Fuel Path	Required No.	Actual No.
Tier 1	316 (100%)	279 (100%)	595	0
Tier 2	383 (50%)	187 (20%)	570	1042

Shortfall = 1165 - 1042 = **123**

(If No Changes Made to Rule)



## **Proposed Alternative A: New Tier Structure**

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- Change from 3 tiers to 2.
- New Tier 1: Pre-1994 engines
  - pre-91 engines with 0.6 g/bhp-hr PM
  - '91-93 engines with 0.1 g/bhp-hr PM
- New Tier 2: 1994-2002 engines
  - '94-95 engines with 0.07 g/bhp-hr PM
  - '96-02 engines with 0.05 g/bhp-hr PM
- Accelerate Alt. Fuel path schedule



## **Proposed Alternative A: New Tier Structure**

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- Focuses on reducing older bus PM emissions to 0.1 g/bhp-hr or lower.
  - Require all Tier 1 engines to use EPA 0.1 g/bhp-hr kit, if available
  - Remaining Tier 1 engines must reduce PM emissions by 50% or more



## Proposed Alternative A: New Tier Structure

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- Modifies Existing Tier Structure
- New Tier 2 coincides with available technology
- New Tier 1 coincides with existing US EPA retrofit/rebuild program



## Proposed Alternative A: New Tier Structure

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- But...
- Significantly different (0.6 and 0.1 g/bhp-hr) engine technologies in Tier 1
- Potentially higher PM emissions from the oldest engines after rule changes
- Needs additional work on technology feasibility and emissions reductions



## Proposed Alternative B PM Fleet Average

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- Establish declining PM Fleet Average by Transit Agency
- Target two dates
  - 2004
  - 2009



## Proposed Alternative B PM Fleet Average

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- Potentially more flexibility to select options for compliance
- Eliminates retrofit mandate
- Emphasizes annual report submittal and ARB monitoring
- Similar to NO<sub>x</sub> fleet average approach



## **Proposed Alternative B PM Fleet Average**

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- Major change from Tiered approach
- Wide range of PM emissions between diesel-path and alt-fuel path fleets
- Potentially harder for smaller fleets to comply



## **Proposed Amendment #2: Fuel Path Change Proposal**

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- Board requested we consider allowing TA to change fuel path from Diesel to Alt Fuel
- Requires analysis of potential impact: which Transit Agencies would make the change?



## **Proposed Amendment #3: ULSD Fuel Delay Proposal**

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- An alt-fuel path fleet, with less than 10 diesel buses within two years of retirement, could allow ULSD fuel compliance provided:
  - Replace buses with alt-fuel buses
  - Executive Officer approves
- Issue: Rule amended after 7/1/02, thus those fleets would be out of compliance for some time
- Which Transit Agencies would be helped?



## **Summary of Proposed Amendments**

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- **PM Fleet Average**
  - New Tier Structure, OR
  - Fleet Average
- **Fuel Path Change**
  - One Time, Diesel to Alt Fuel only
- **ULSD Fuel Delay**
  - Limited Circumstances

## Contacts for Changes to Transit Fleet Rule

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## Discussion

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