

Heavy-Duty Diesel Engine Software Upgrade (Chip Reflash) Update

October 28, 2004
Fresno, California



California Environmental Protection Agency

Air Resources Board

Overview

- Background
- Heavy-Duty Diesel Engine Software Upgrade Regulation
- Voluntary Software Upgrade Program
- Next Steps

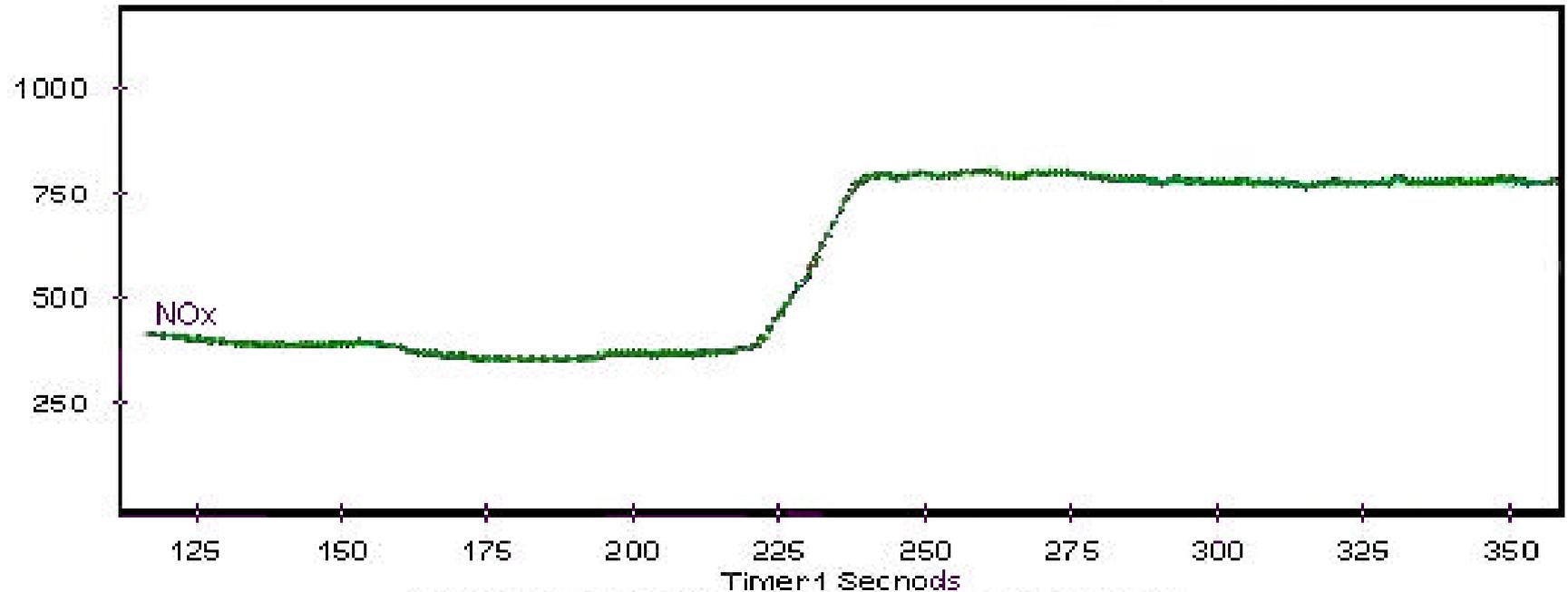
Background

Software Programs on Computer-Controlled Engines

- Computer-controlled engines introduced in the early 1990s
- Manufacturers used software programming that allowed engines to pass certification tests BUT...
- Caused high NO_x emission levels during some types of real-world driving: 2 - 3 times certification levels

The Problem: Off-Cycle NOx Emissions

Parts Per Million vs. Time



Consent Decrees/Settlement Agreements

Mfrs: Caterpillar, Cummins, DDC, Volvo,
Mack/Renault, International (Navistar)

Govt: Dept. of Justice, U.S. EPA, ARB

- Agreements announced October 1998
- Engine manufacturers developed low NOx software upgrades
 - reprogram engines at time of rebuild,
 - . . . or upon request

Reflash on Rebuild Too Slow

- Rebuild expected to occur at 300,000 to 350,000 miles
- Engines lasting much longer before rebuild: 750,000 to 1 million miles
- Low NOx software installed on only 13% of eligible engines as of March 31, 2004

**Heavy-Duty Diesel
Engine Software
Upgrade Regulation**

Applicability

- 1993 - 1999 model year heavy-duty diesel trucks, school buses, and motor homes
- Includes out-of-state vehicles that visit California
- Excluded:
 - engines not electronically controlled,
 - software not developed

Board Action in March 2004

- Board adopted regulation
- Board approved Voluntary Program
- Board directed staff to:
 - Withhold filing of regulation, pending Report to Board on December 9th
- Asked staff to review early results

Voluntary Software Upgrade Program

Voluntary Program Reflash Targets

- 35 percent by October 28, 2004
- 60 percent by May 31, 2005
- 80 percent by January 31, 2006
- 100 percent by 2008

Targets based on emission reductions from reflashable California-registered vehicles

ARB Outreach

- Outreach letter -- over 60,000 sent
- Over 200 calls to dealers -- contacted every authorized dealer
- Distributed brochures
- Booth at Truck Show in Anaheim

ARB Technical Work

- Significant Technical Analysis
 - 146,000 DMV registration records decoded
 - Over 306,000 records obtained from 12 chassis manufacturers
- Engines and truck IDs successfully matched
 - Allows accurate assessment of progress

CTA Outreach

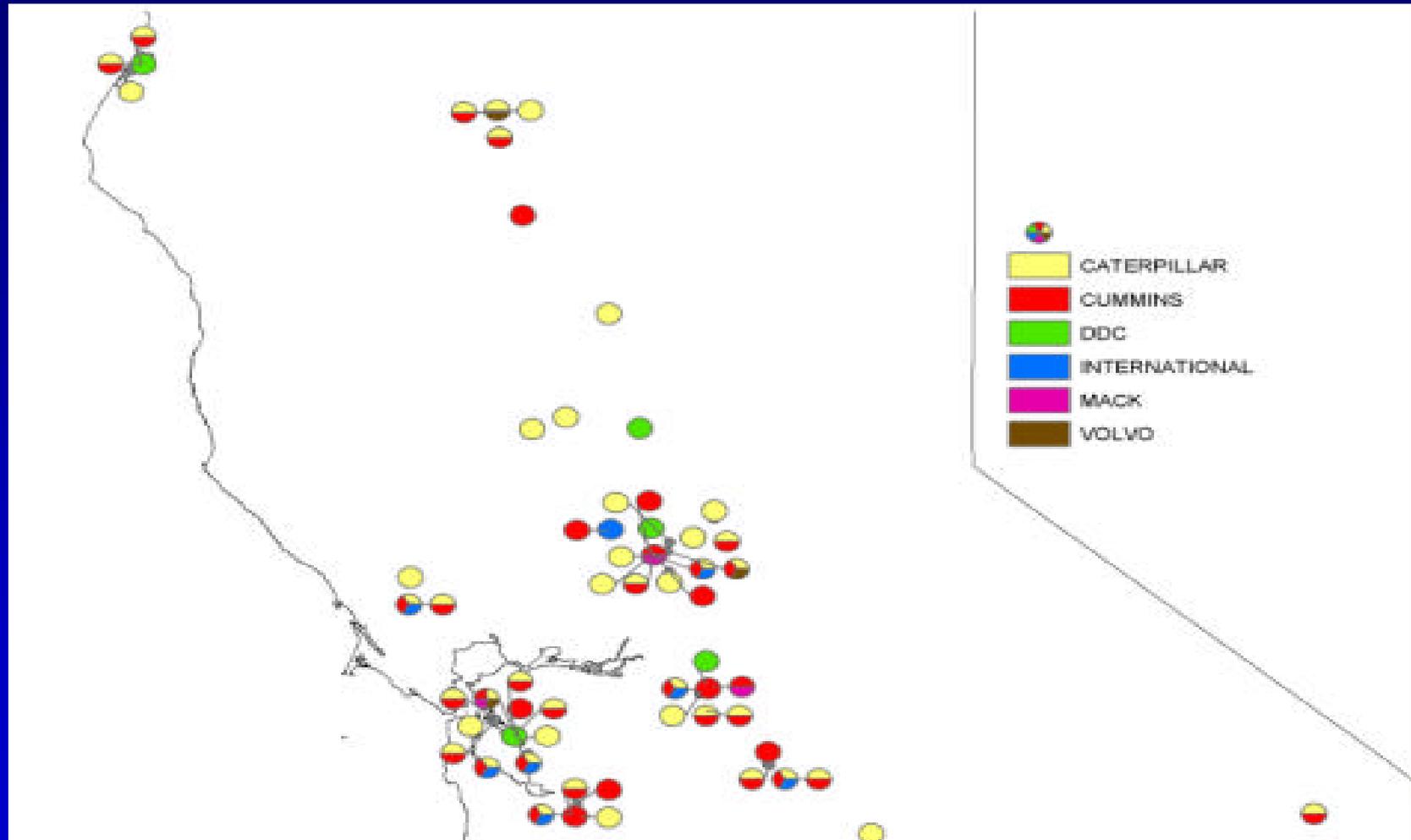
- Dealer Meetings
- Barbecues
- Truck Show
- Fleet Contacts



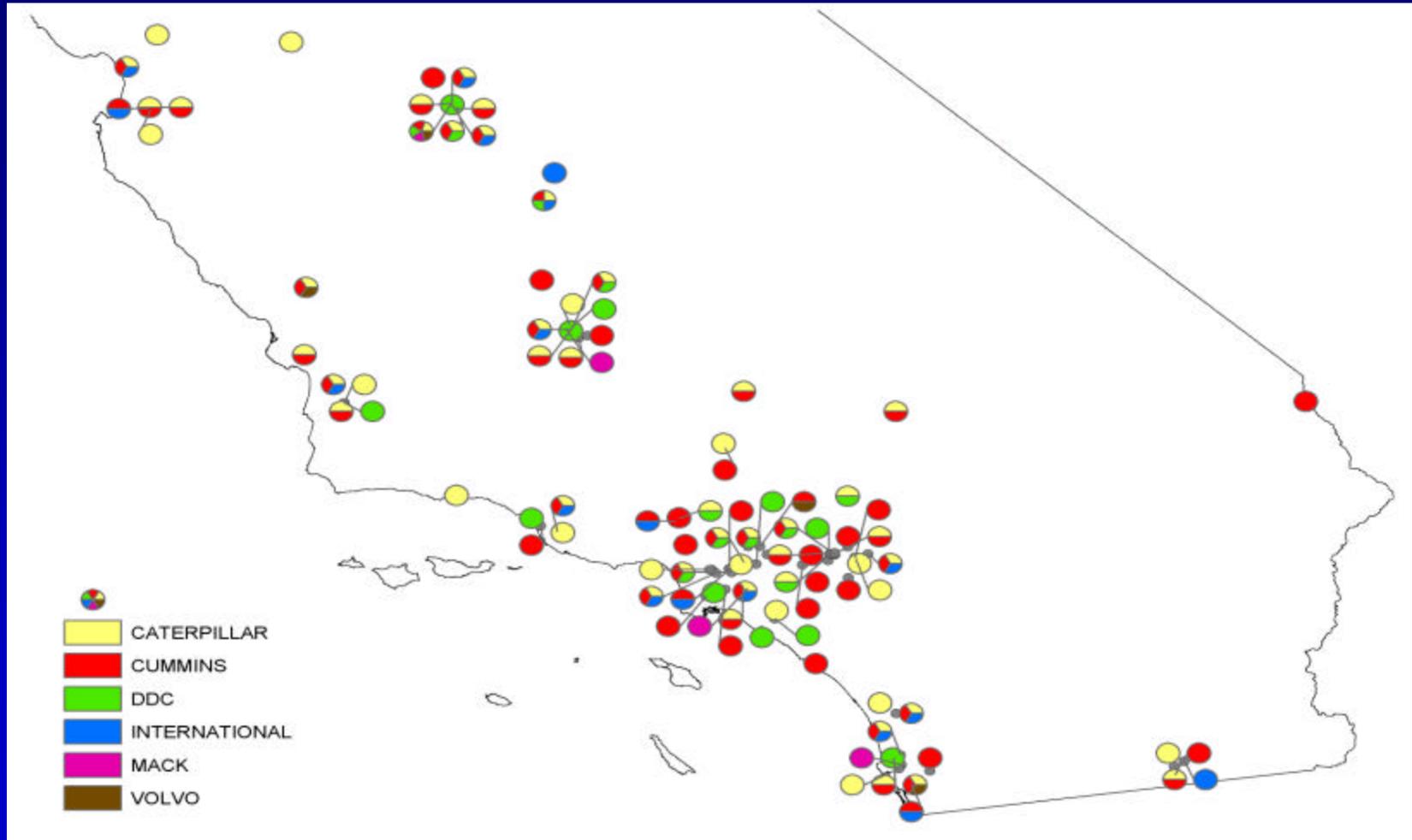
Engine Manufacturer Outreach

- Letters to authorized dealers/distributors informing them of Voluntary Program
- Conference calls with ARB
- Follow up calls to authorized dealers/distributors
- Case-by-case reimbursement for ECM failures

Northern California Authorized Dealers/Distributors



Southern California Authorized Dealers/Distributors

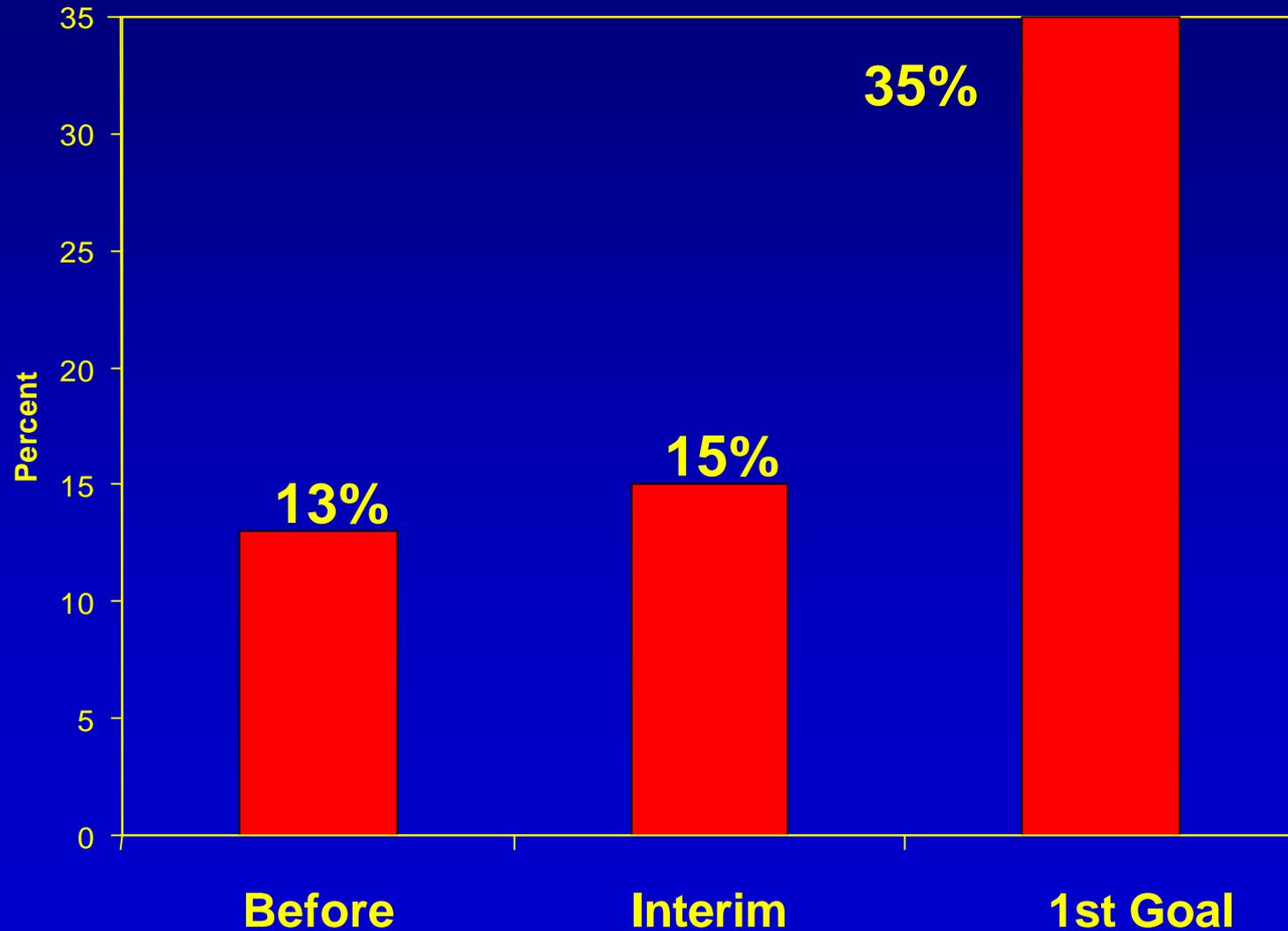


Reported Reflashes During the Voluntary Program (4/1/04 - 8/31/04)

Manufacturer	Reported Reflashes
Caterpillar	301
Cummins	313
DDC	619
Volvo	2
Mack/Renault	20
International	33
Total	1,288

Average is 1.6 trucks per dealer per month

Progress Toward First Goal of Voluntary Program



Interim Reflash Status by Manufacturer

Manufacturer	Reflashable CA Trucks	Before	Interim (8/31/04)
Caterpillar	18,141	15%	17%
Cummins	20,641	8%	9%
DDC	11,460	21%	26%
Volvo	971	2%	2%
Mack/Renault	1,018	2%	4%
International	1,884	1%	3%
Total	54,115	13%	15%

Next Steps

- November 1st reporting deadline
- Staff will:
 - Verify number of reflashes reported
 - Calculate emission benefits
 - Analyze sustainability
- Board meeting on December 9th