Updates to ARB's Heavy Duty Truck Emissions Estimates

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Background

- EMFAC last updated in 2003
- EMFAC2007 release on November 1
- Two year outreach process
  - Workshops
  - Technical memoranda
- Reflect new information
- Stakeholder involvement
- Basis for SIP and regulations

HHDDT Base Emission Rates

- Improved Emission Rates
  - Revised using CRC E-55/59 chassis test data
  - Larger sample size (70 vs 23 trucks)
  - Included testing of 1999-2003 MYs
  - Projection for 2007+ rates based on 2003 MY instead of 1998 MY data

Comparison of Zero-Mile Rates

Model Year Groups	NOx (g/mi)		PM (g/mi)	
	EMFAC2002	Draft Model	EMFAC2002	Draft Model
1987-1990	**16.8**(4)	**22.7**(9)	**0.84**(4)	**1.88**(9)
1991-1993	**16.0**(3)	**19.6**(10)	**0.51**(3)	**0.78**(10)
1994-1997	**19.1**(5)	**19.3**(11)	**0.32**(5)	**0.51**(11)
1999-2002	13.4	**18.9**(8)	0.21	**0.56**(8)
2003-2006	6.68	**12.5**(4)	0.26	**0.35**(4)
2010+	0.67	1.14	0.026	0.035

- **Rates in red: projected using ratio of standards**
- **Numbers in parentheses: number of trucks tested.**

Tampering & Malmaintenance Rates

- EMFAC2002 did not account for a variety of malfunctions in future year engines
- OBD designed to reduce frequency of failures
- Draft model accounts for benefits from OBD regulations

TM&M Frequency for 2010+ MYs

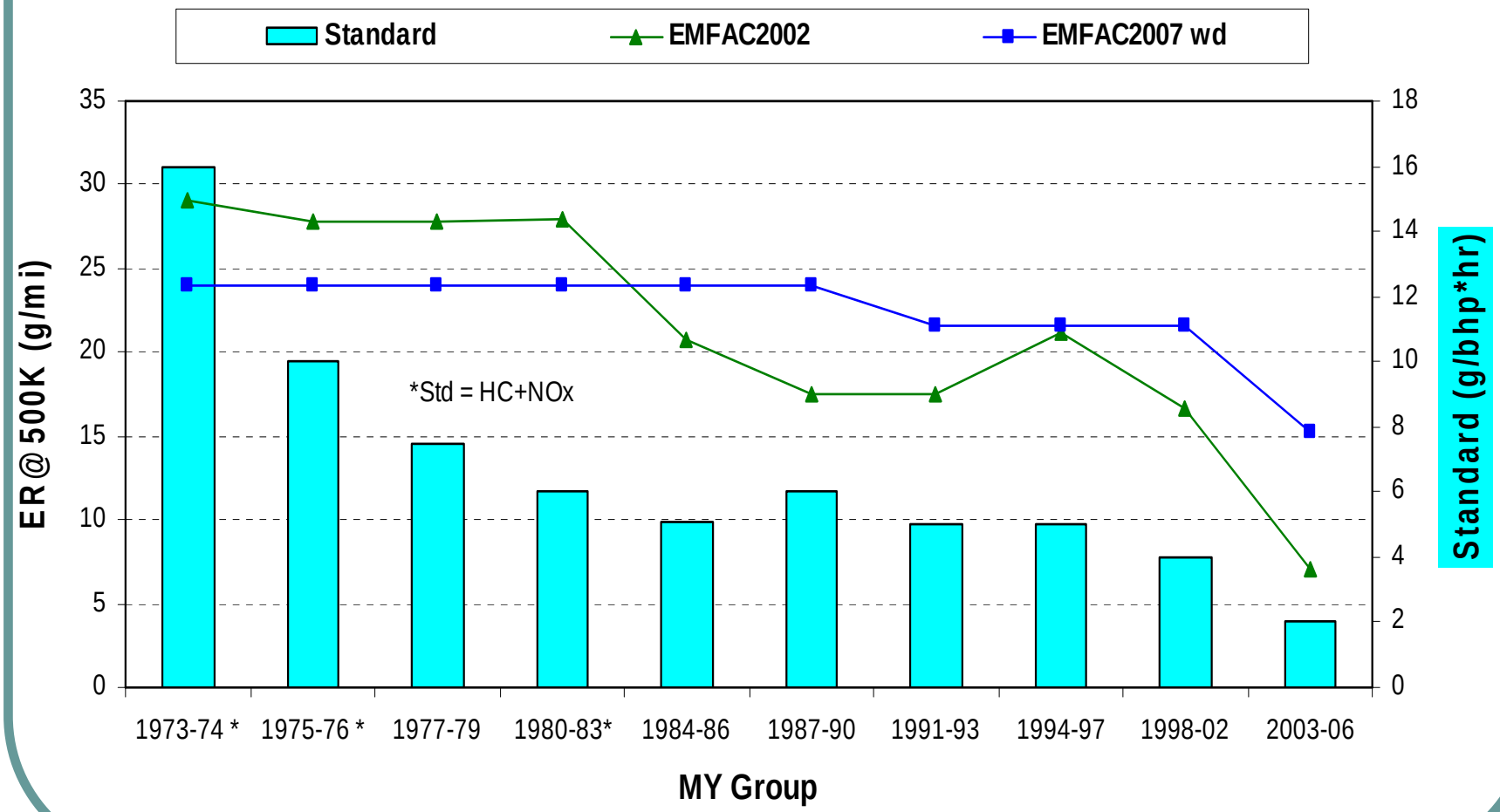
TM&M Act	EMFAC2002	EMFAC2007 wd	
	2003+	2010+ No OBD	2010+ w/ OBD
NOx Aftertreatment Sensor	n/a	53%	40%
NOx Aftertreatment Sensor (R)	n/a	2%	11%
NOx Aftertreatment Malfunction	n/a	17%	12%
PM Filter Leak	n/a	14%	10%
Electronics Failed	3%	30%	20%
Oxi Cat Malfunction/Removed	0%	5%	3%
EGR Disabled/Low Flow	15%	20%	13%

Comparison of NOx Emission Rates

Model Year Group	EMFAC2002 (g/mi)	EMFAC(wd) (g/mi)	Ratio (Ewd/E2002)
Pre1975 - 1990	29.1 - 17.5	24.0	0.8 - 1.4
1991 - 2002	17.5 - 14.0	21.6	1.2 - 1.5
2003 - 2006	7.0	15.2	2.2
2007 - 2009	4.0	9.2	2.3
2010+ (w/OBD)	1.0	3.2 (2.7)	3.2 (2.7)

Emission rates at 500,000 miles

HHDDT NOx Emission Trend

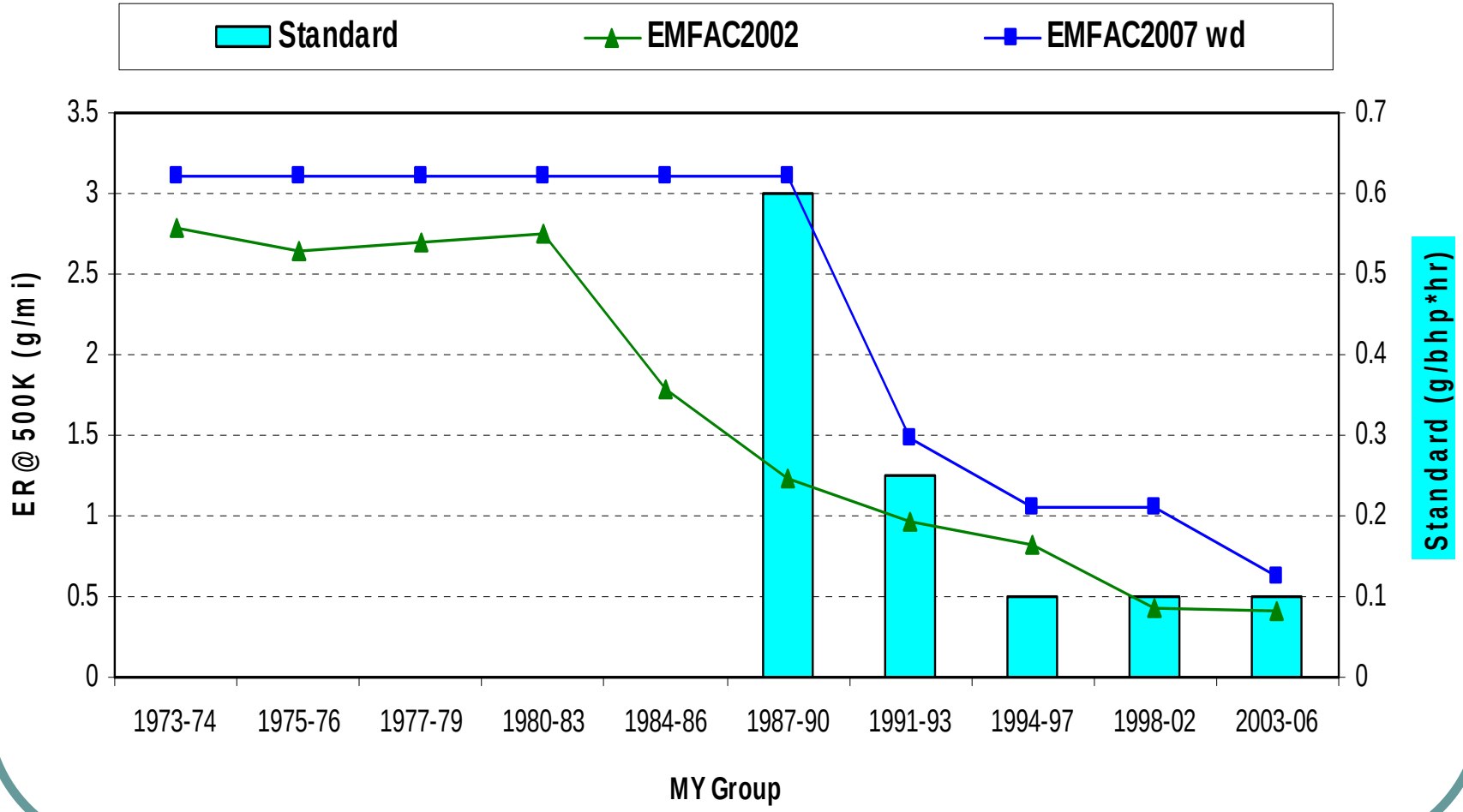


Comparison of PM Emission Rates

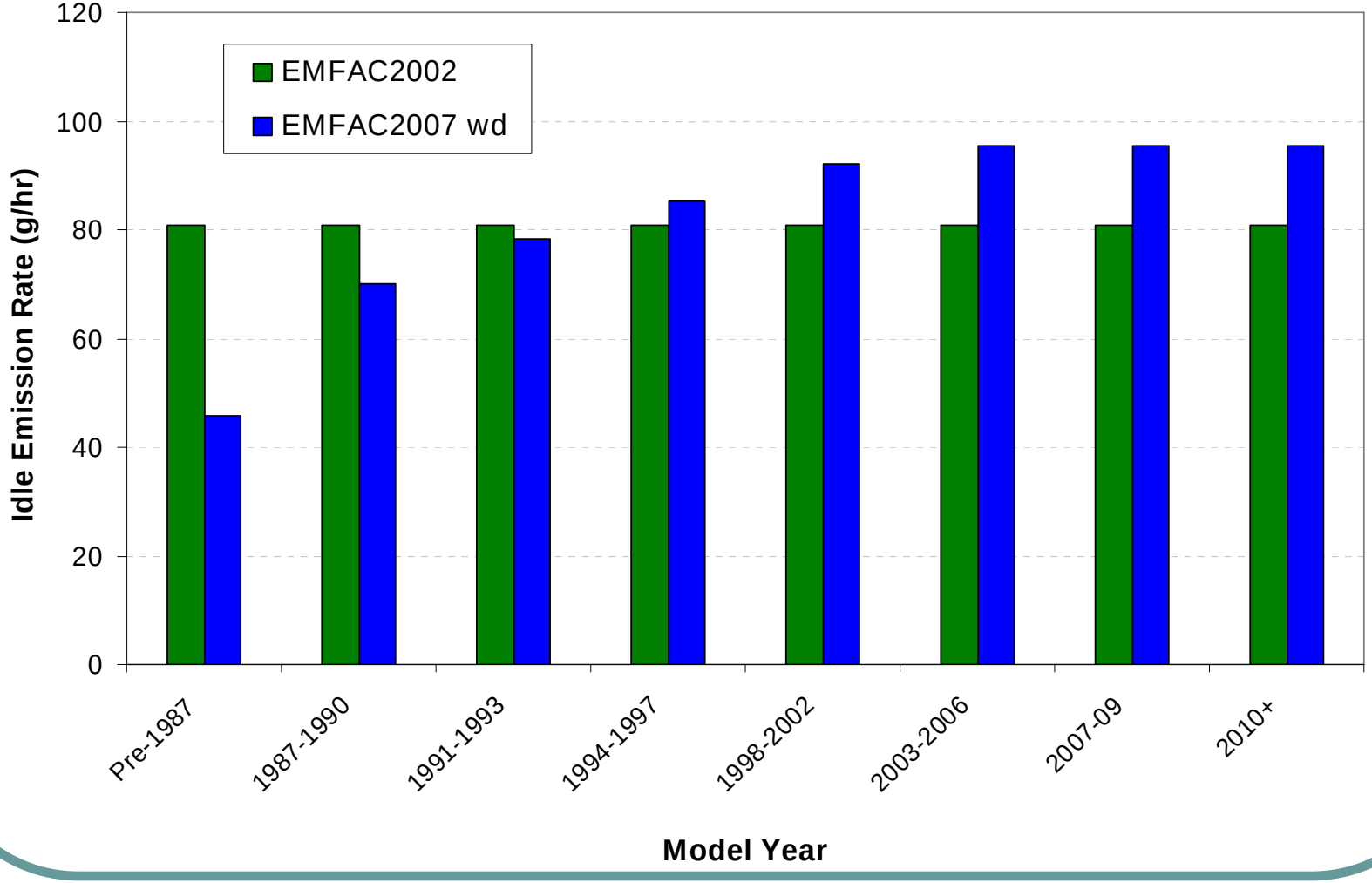
Model Year Group	EMFAC2002 (g/mi)	EMFAC(wd) (g/mi)	Ratio (Ewd/E2002)
Pre1975 - 1990	2.78 - 1.24	3.11	1.1 - 2.5
1991 - 2002	0.96 - 0.36	1.49 - 1.05	1.6 - 2.9
2003 - 2006	0.41	0.62	1.5
2007 - 2009	0.18	0.09	0.5
2010+ (w/OBD)	0.18	0.09 (0.07)	0.5 (0.4)

Emission rates at 500,000 miles

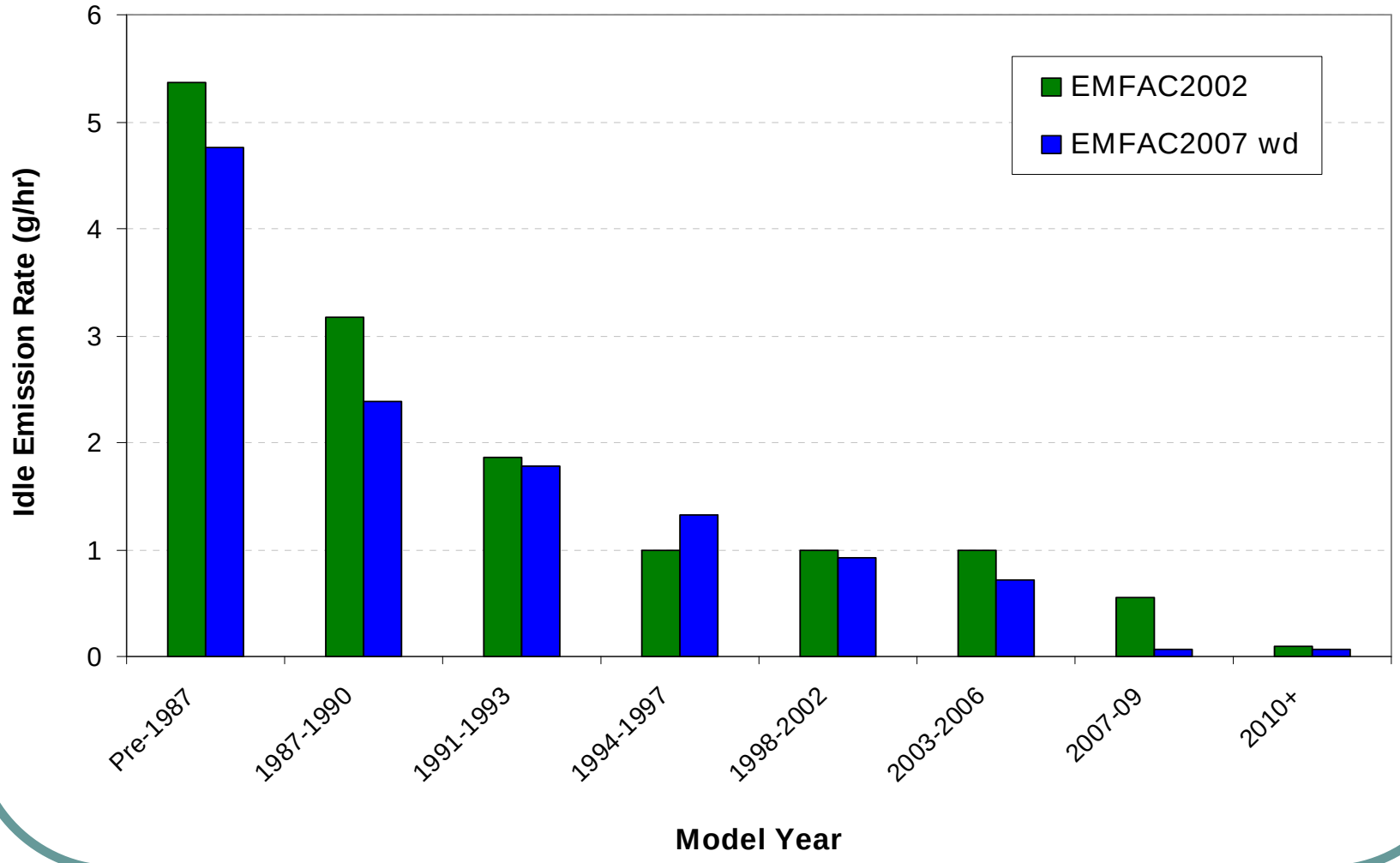
HHDDT PM Emission Trend



Comparison of NOx Idle Emission Rates



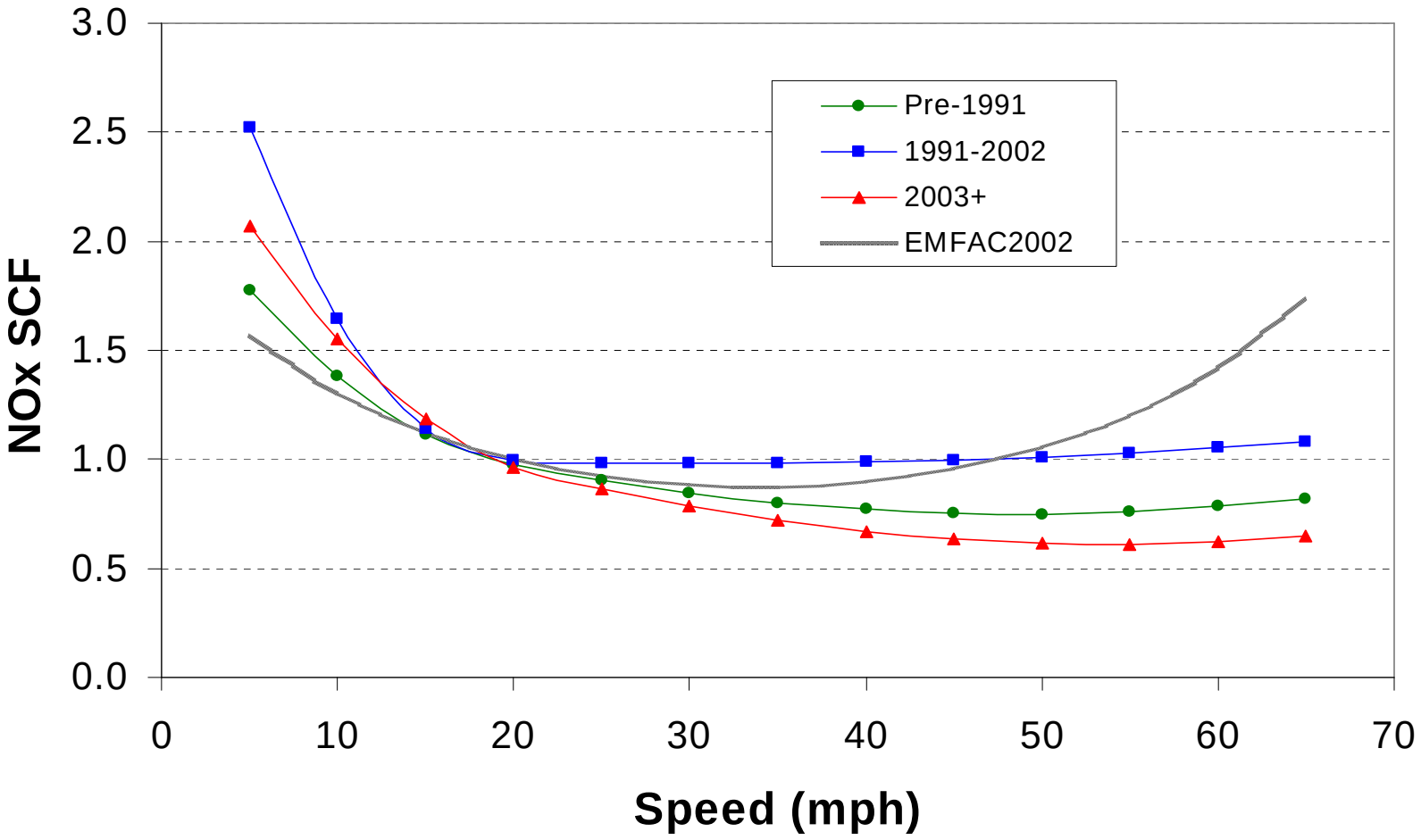
Comparison of PM Idle Emission Rates



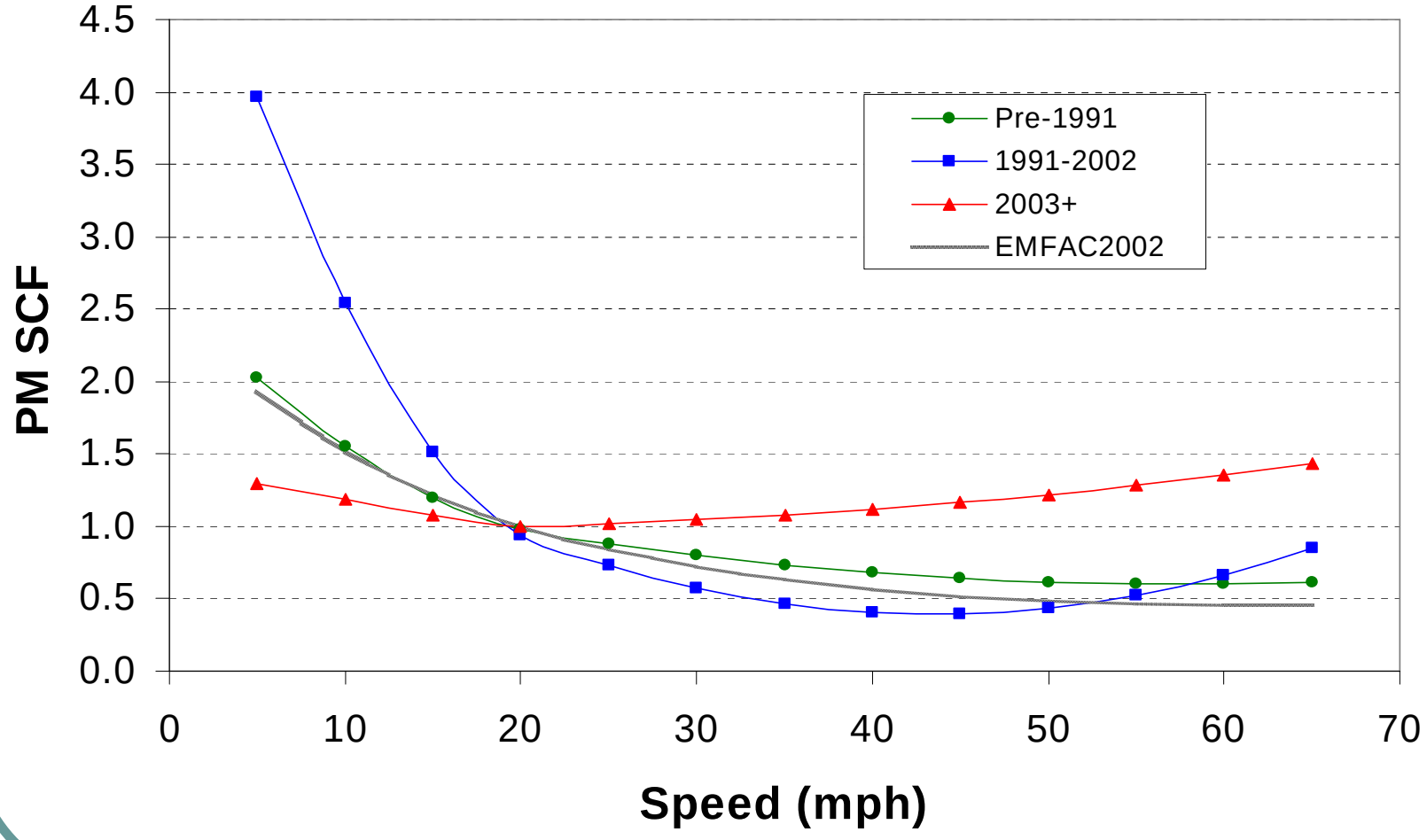
Speed Correction Factors

- Revised Speed Correction Factors – *Using CRC E-55/59 data*
  - Three curves for Pre-1991 MY, 1991-2002 MY, and 2003+ MY
  - Reflect off-cycle NOx

NOx Speed Correction Factors



PM Speed Correction Factors



Future Work

- Extended Idle Regulations – *This will probably be an off-model adjustment*
- Chip Reflash – Issues
  - Lawsuit underway
  - Off-model adjustment