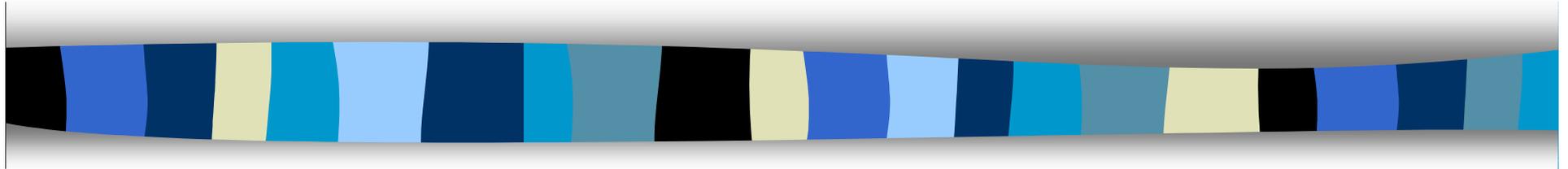


# MOBILE6.2 Model Update

Mobile Source Present and Future Models Work Shop

November 7, 2002

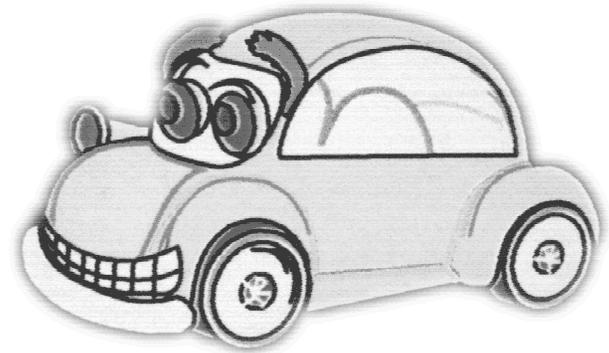
Ed Glover - US EPA

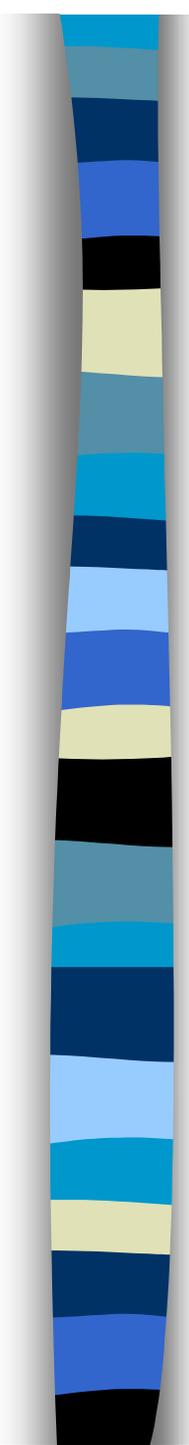


HC, CO and NO<sub>x</sub>

Particulate Matter

Air Toxics

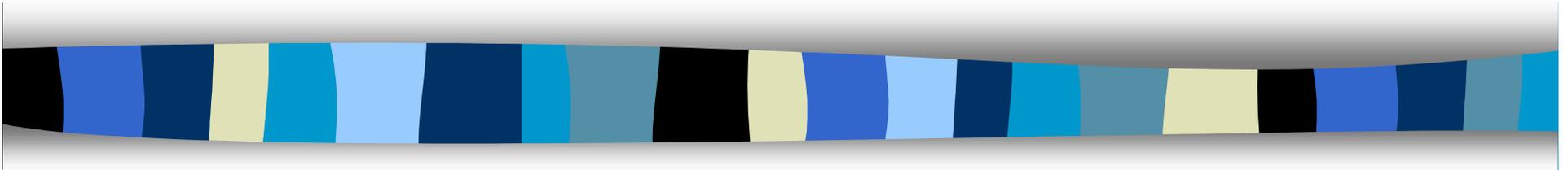




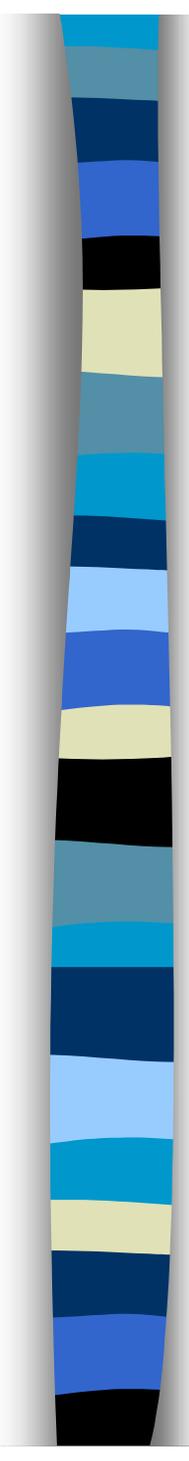
# MOBILE6.2 Update and Integration

- Stakeholders Require Updated Model
- Integrating Recent EPA Rulemaking Requirements
- Fulfilling the NRC Comments
- Unified the Software, Documentation and Training Process

# MOBILE6.2 - HC, CO and NO<sub>x</sub>



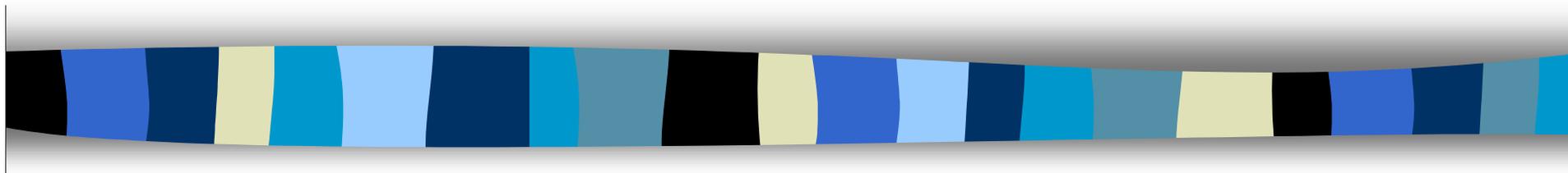
Just a Few More Refinements ...



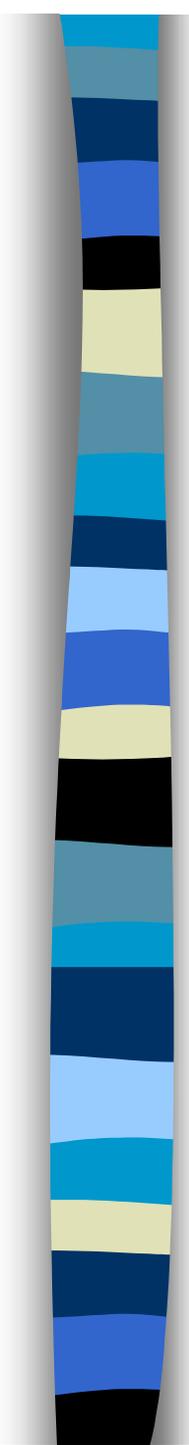
# Changes in HC, CO and NO<sub>x</sub>

- NO Changes were Made to the Emission Rates
- Recent Improvements Include:
  - Hourly Relative Humidity Input
  - Daily Barometric Pressure Input
  - Format Change in Spreadsheet Output
  - Fixed Batch Mode Capability

# MOBILE6.2 - Particulates

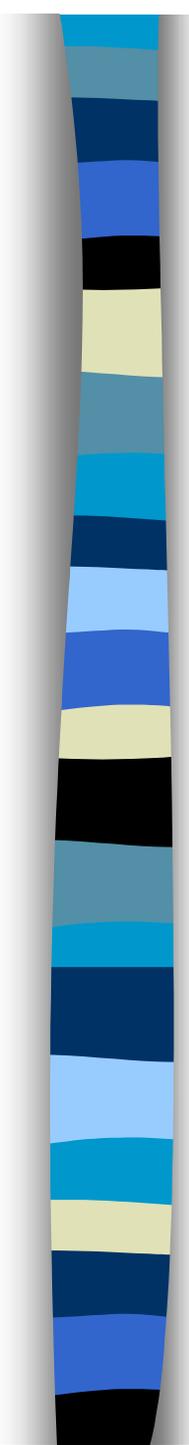


An Upgraded PART5 Model



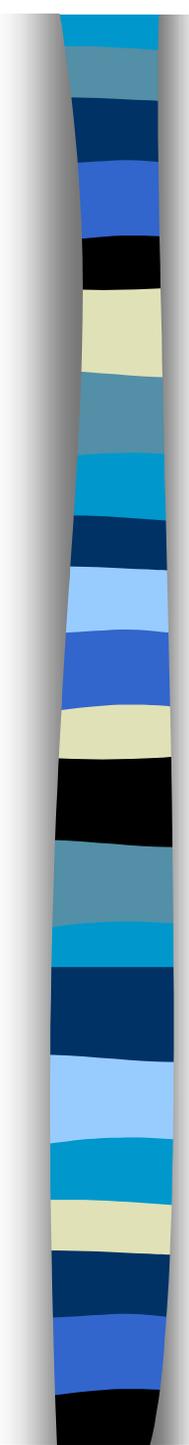
# Particulate Model Features

- Use of existing PART5 emission factors in MOBILE6.2
- Incorporation of emission factors developed during recent rulemaking process
- Estimates reflect MOBILE6 fleet data and assumptions



# Particulate Model Features

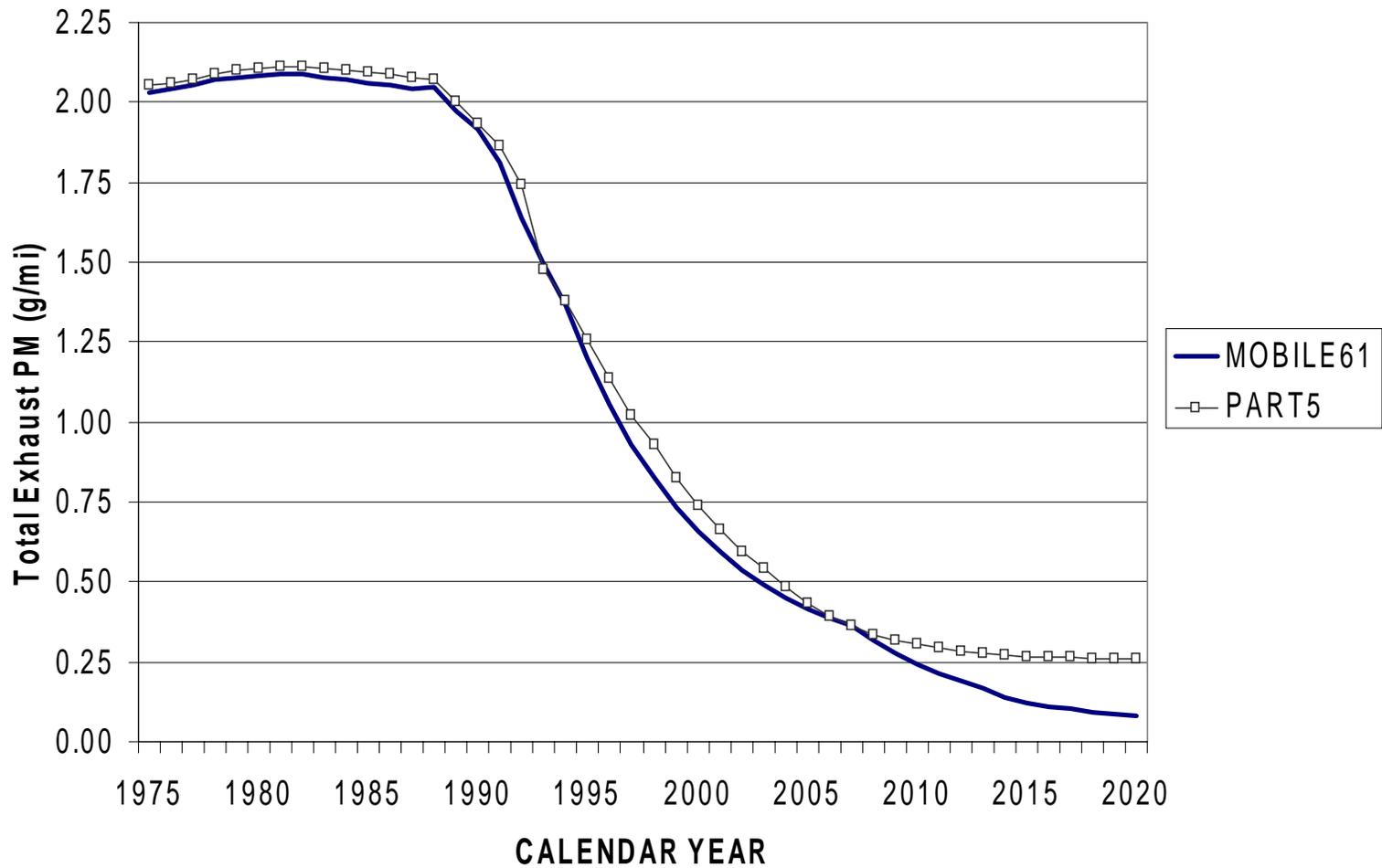
- Allow Input of Alternate PM Emission Factors
- PART5 fuel sulfur and sulfate emission methodology updated to accommodate user input
- Ammonia emission factors have been added
- Fugitive Dust and Indirect Sulfate Emissions have been removed



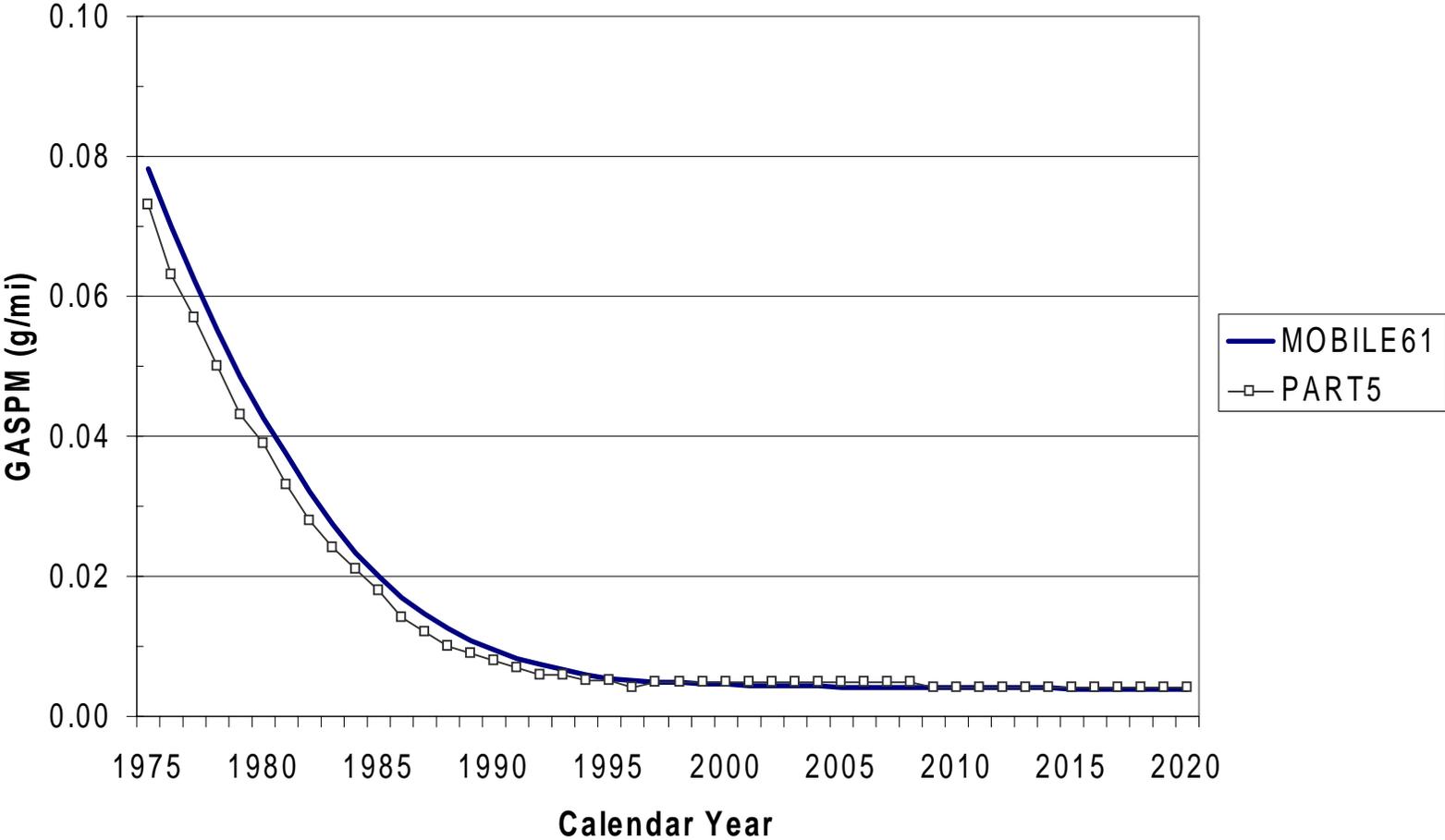
# Particulate Model - Results

- Results are very similar to PART5; some differences occur because...
  - 2007 rulemaking modeling is different
  - Modeling of fuel sulfur is more robust
  - Technology penetration rates, model year distributions, mileage accumulations, etc. Have been updated as part of MOBILE6
  - PART5 software “bugs” have been corrected
- See EPA Document *“MOBILE6.1 Particulate Emission Factor Model Technical Description”*  
***EPA240-R-02-012***

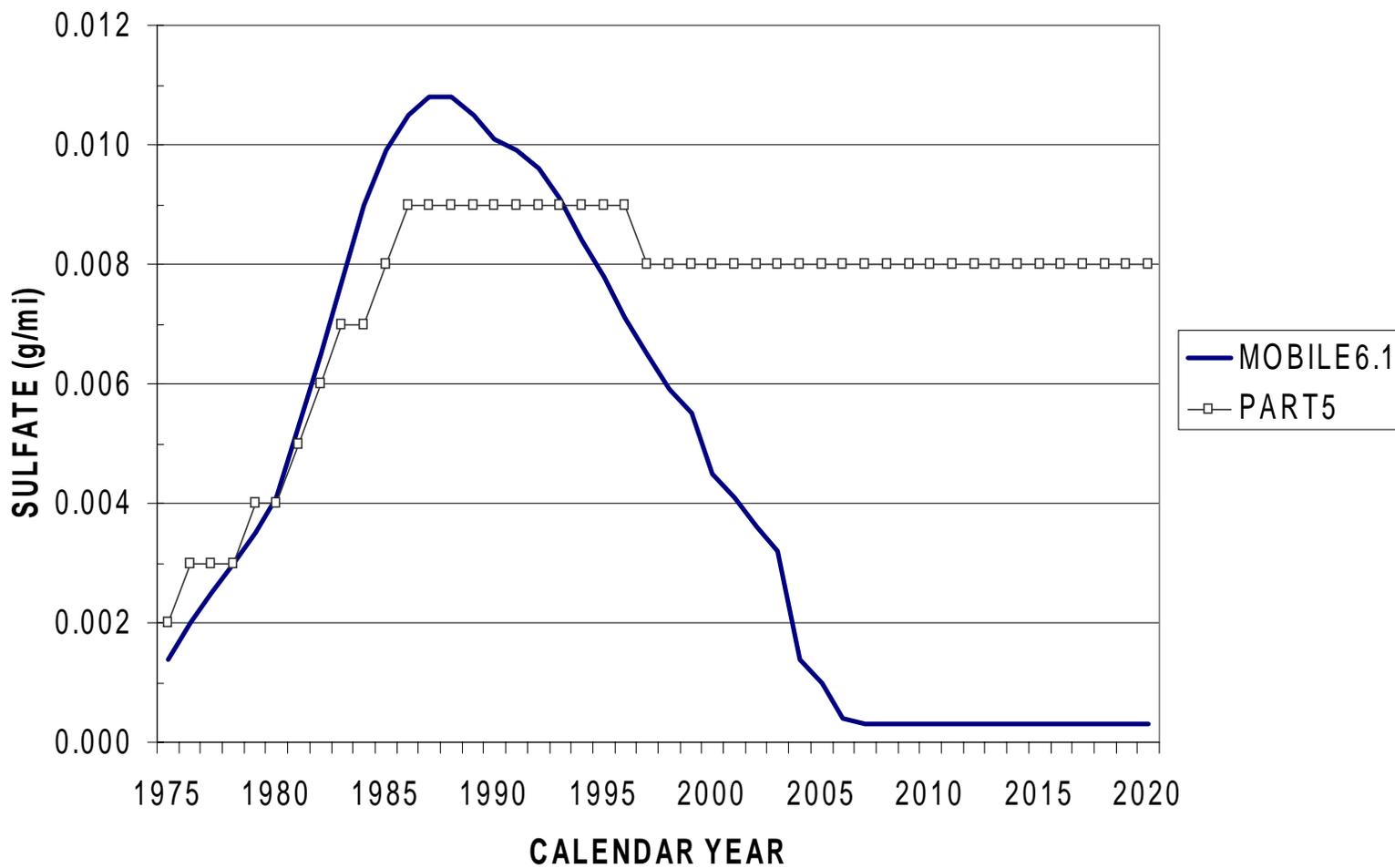
## Comparison of MOBILE6.2 and PART5 TOTAL EXHAUST PM10 for Heavy-Heavy Duty Diesels



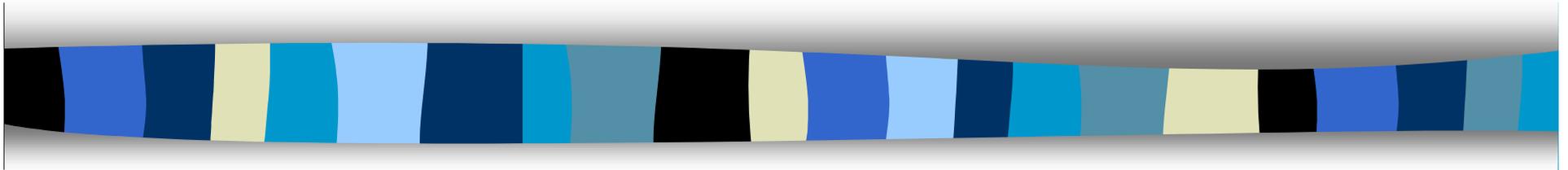
# MOBILE6.2 GASPM Emissions Versus PART5 Carbon Emissions for LDGVs



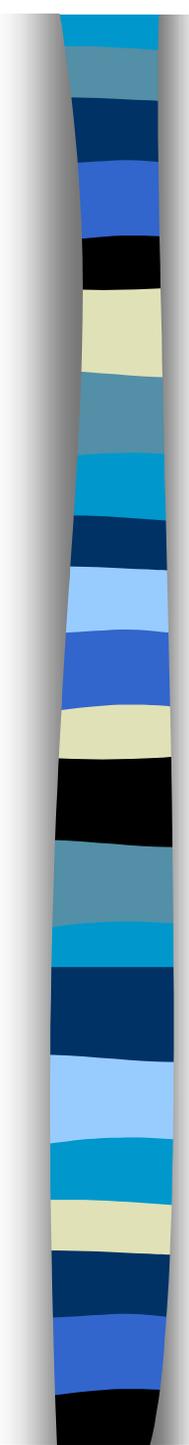
## Comparison of MOBILE6.2 and PART5 SULFATE Emissions for LDGVs



# MOBILE6.2 - Air Toxics

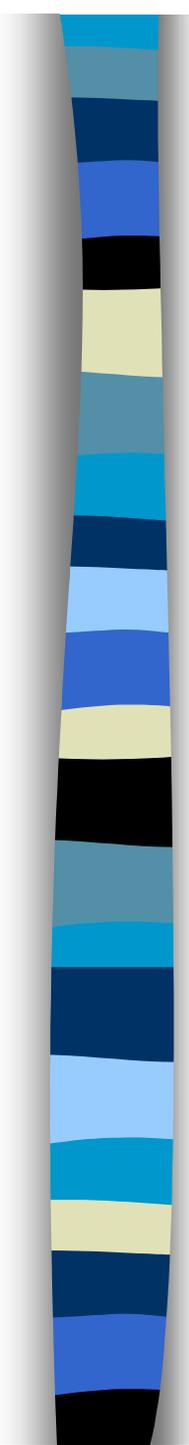


Making MobTox user friendly ...



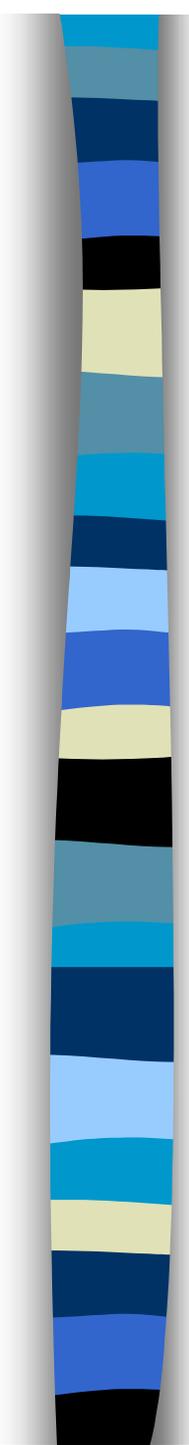
# MOBILE6.2 - Air Toxic Pollutants

- Estimates in-use emission factors for:
  - exhaust and evaporative benzene
  - formaldehyde
  - acetaldehyde
  - 1,3-butadiene
  - acrolein
  - exhaust and evaporative MTBE
  - User Defined Hazardous Air Pollutants (HAPs)
    - EPA will provide Guidance for 28 compounds that appear in the 1999 National Emission Inventory
    - Will be available as part of Report EPA420-R-02-011



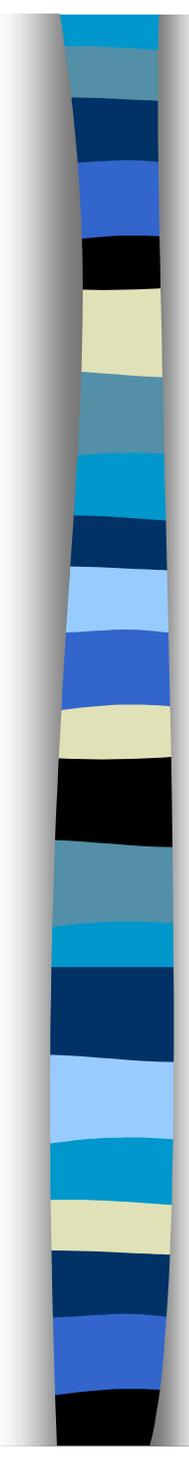
# Air Toxic Model - Methodology

- Ratio of Air Toxic Emission to Hydrocarbon Emission
- Toxic EF = Toxic/TOG ratio \* MOBILE6 TOG
- Ratio is a function of fuel type, technology type, driving cycles, and normal and high emitter type



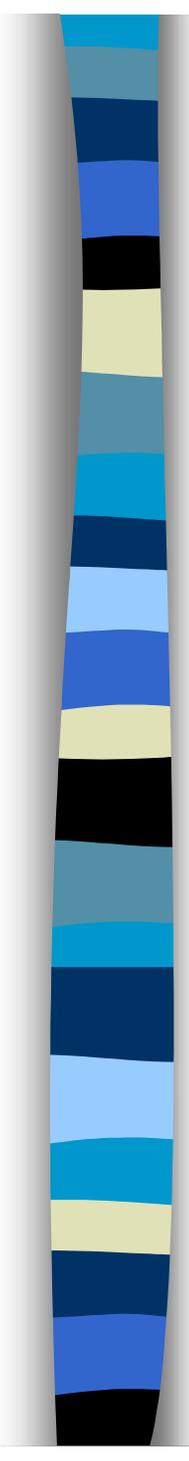
# Air Toxic Model - Methodology

- Complex Model algorithms used for post-1981 light duty vehicles
  - *Final Regulatory Impact Analysis for RFG Rule, 1993*
  - [www.epa.gov/otaq/fuels.htm](http://www.epa.gov/otaq/fuels.htm)
- Off-cycle adjustments from a small speciation database from a California test program
  - *Analysis of the Impacts of Control Programs on Motor Vehicle Toxic Emissions and Exposure in the Urban Areas and Nationwide* EPA420-R-99-029 Appendix G
  - [www.epa.gov/otaq/toxics.htm](http://www.epa.gov/otaq/toxics.htm)



# Air Toxic Model - Methodology

- For older technology vehicles, motorcycles, HDGVs, more simplified exhaust equations are used
- Limited data allowed only simple toxic fractions to be developed for diesel vehicles
  - *Technical Description of MOBILE6.2 AND Guidance on its Use for Emission Inventory Preparation* EPA420-R-02-011
  - [www.epa.gov/otaq/mobile.htm](http://www.epa.gov/otaq/mobile.htm)



# Air Toxic Model - Fuel Parameters

## ■ MOBILE6.2 Input Parameters

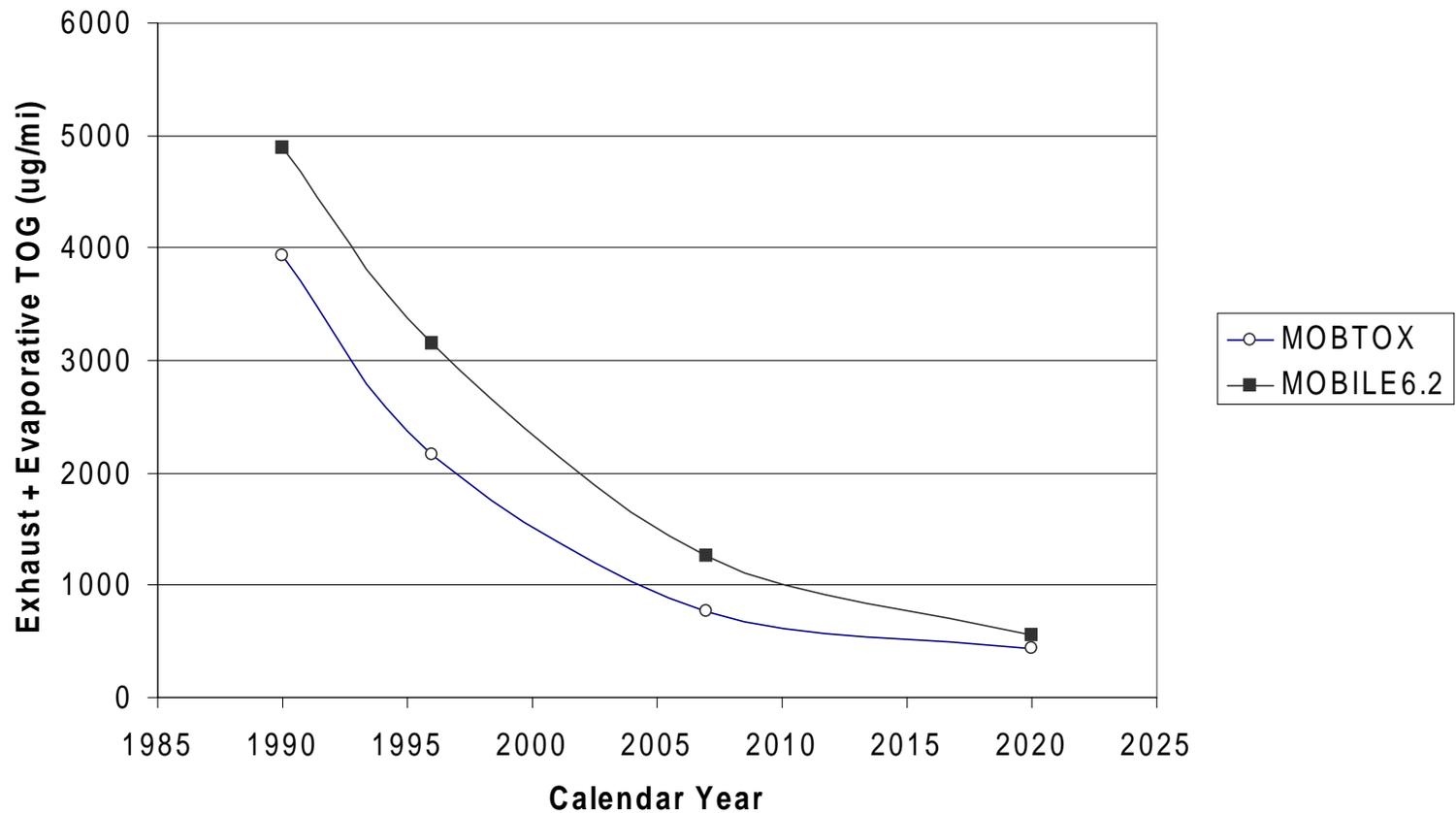
- % aromatics
- % olefins
- % benzene
- E200 -- percentage of vapor a gasoline produces at 200 degrees F
- E300
- Oxygenate type and % of total volume

## ■ DATA Source

- 1990, 1996 and 1999 County Level Fuel Parameters
- [Ftp://ftp.epa.gov/EmisInventory/draftnei99ver3](ftp://ftp.epa.gov/EmisInventory/draftnei99ver3)

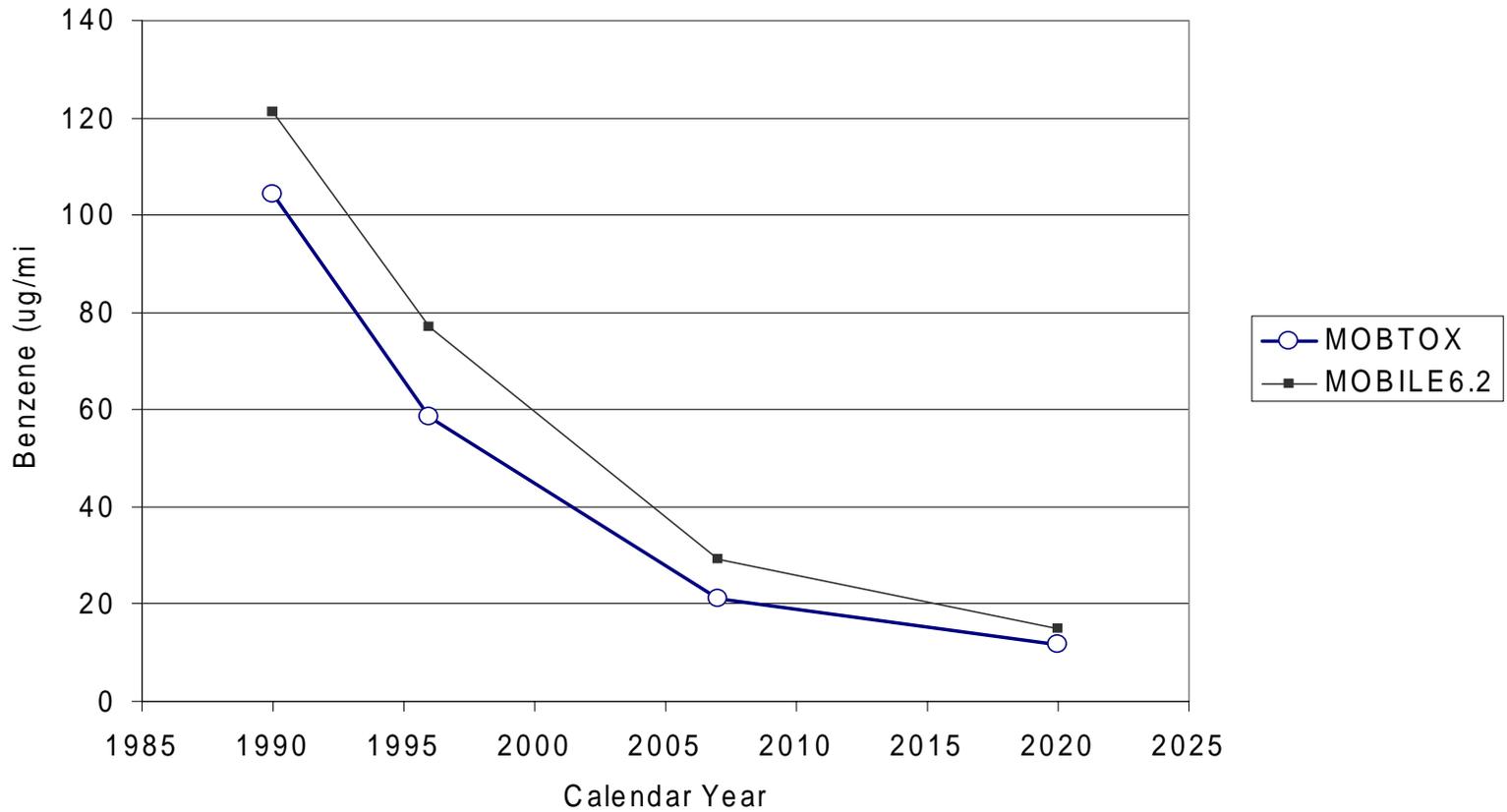
# Air Toxic Model - Results

Figure 4.5. MOBILE6.2 and MOBTOX5b Comparison for TOG Emissions (Exhaust and Evaporative)



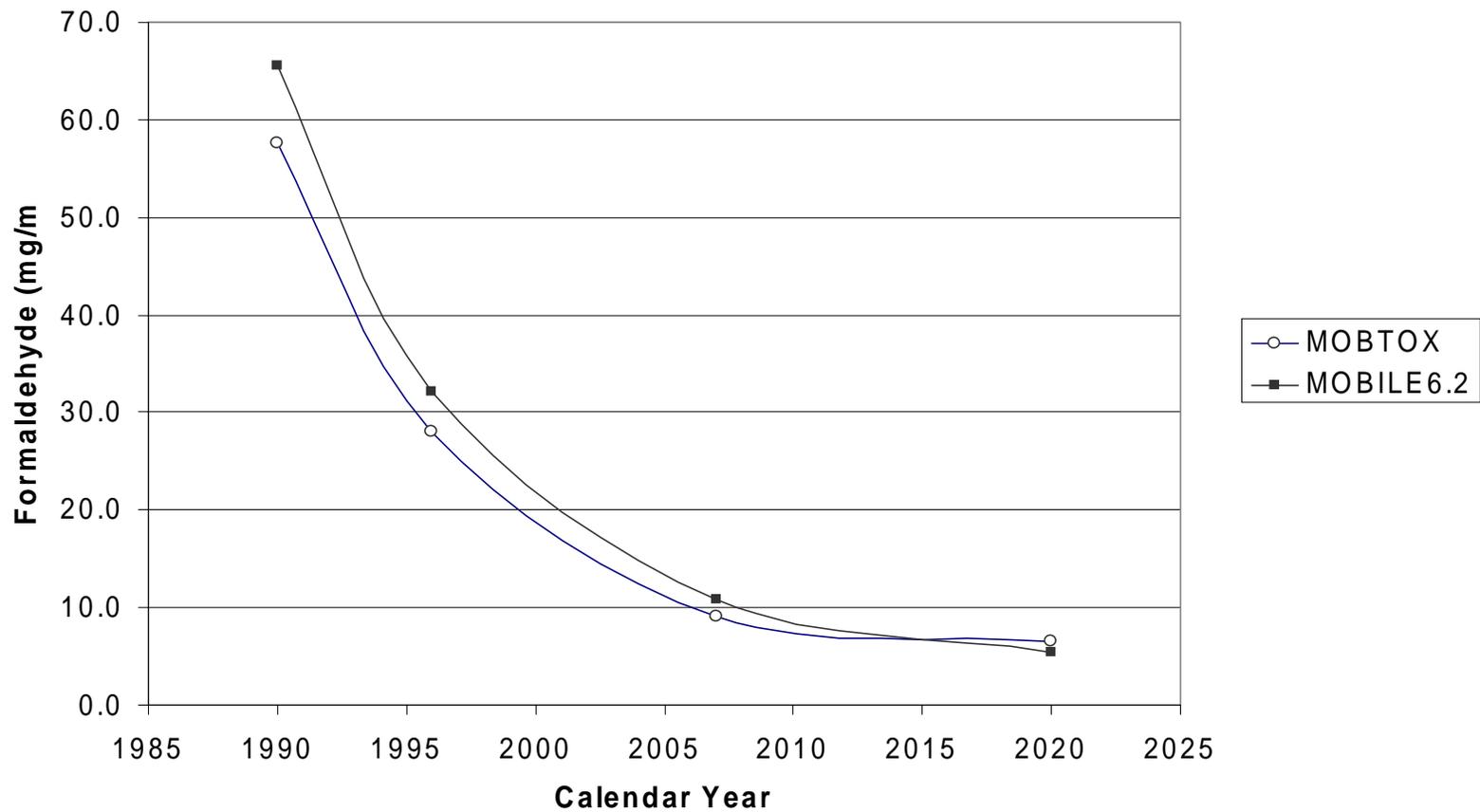
# Air Toxic Model - Results

## MOBILE6.2 and MOBTOX5b Comparison for Benzene



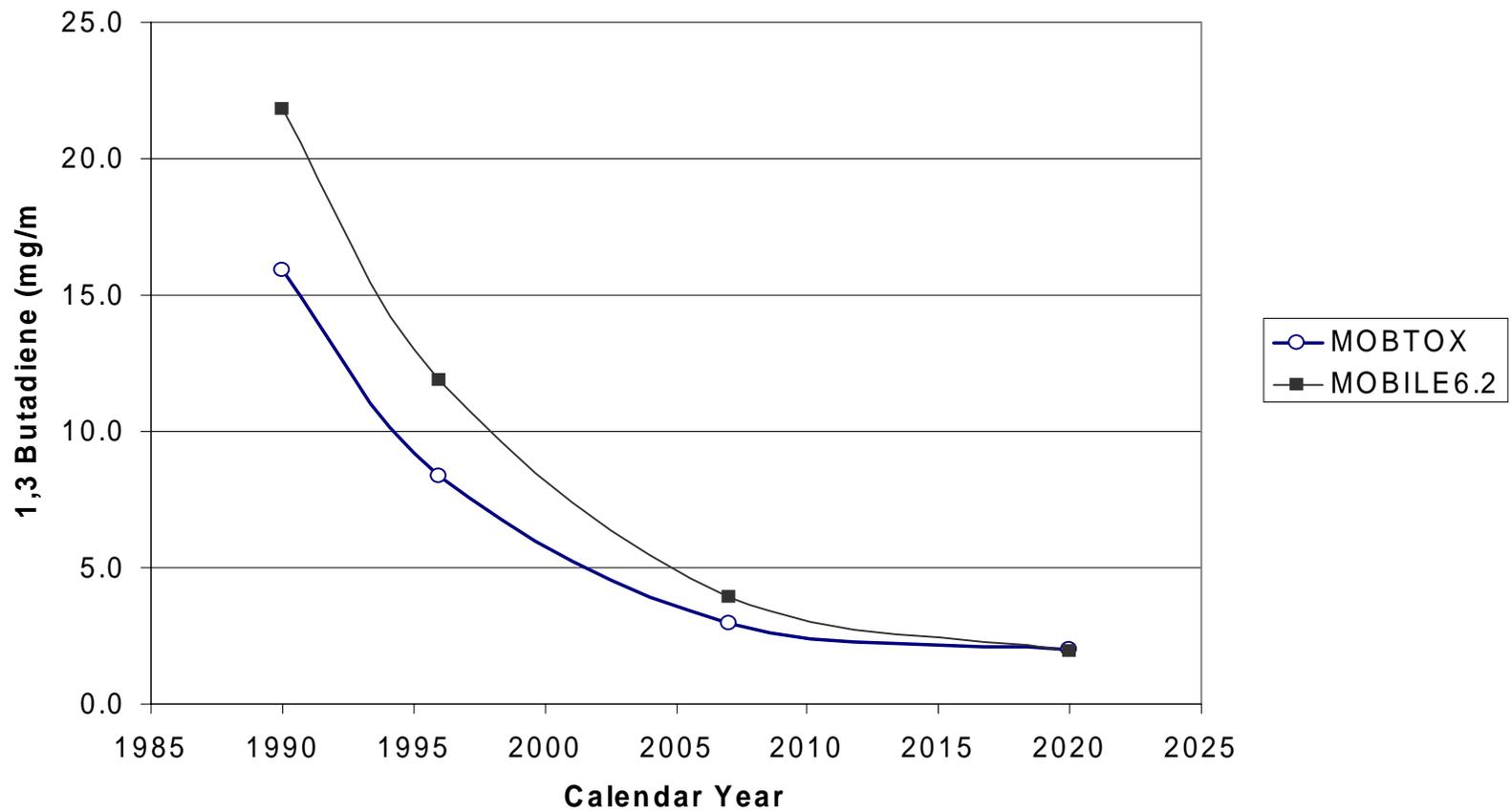
# Air Toxic Model - Results

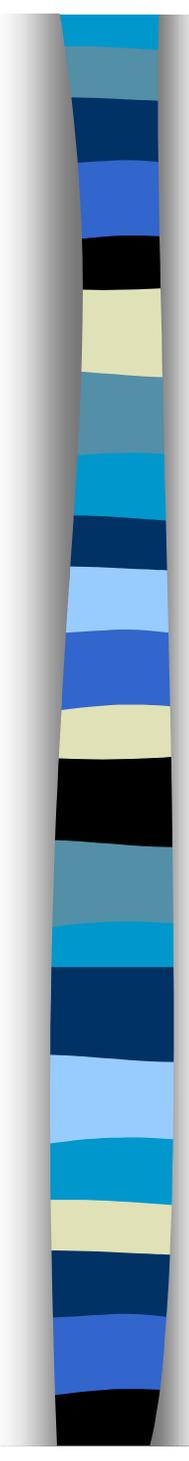
MOBILE6.2 and MOBTOX5b Comparison for Formaldehyde



# Air Toxic Model - Results

MOBILE6.2 and MOBTOX5b Comparison for 1,3-Butadiene

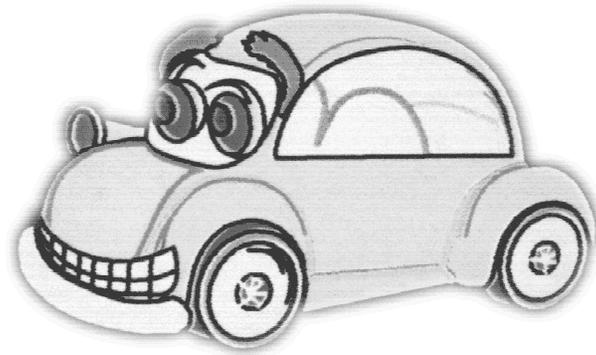




# Air Toxic Model Summary

- MOBILE6.2 and MOBTOX results differ largely because of different TOG emission rates between MOBILE5 and MOBILE6
- MOBILE6.2 produces generally higher toxic emission factors in earlier years
- MOBILE6.2 and MOBTOX results converge in later years

# Questions and Comments ???



**Moby**