

Use of MOBILE6 in Preparing National Onroad Emission Inventories

James H. Wilson Jr. and Maureen Mullen

E.H. Pechan & Associates, Inc.

Laurel Driver and Joseph Somers

U.S. Environmental Protection Agency

Office of Air and Radiation

Outline

- Trends Process
- Recent Data Applications
- MOBILE6 – Induced Changes
- Motor Vehicle versus Other Source Emissions
- Future Directions

Trends Process

- Provide best estimate of recent calendar year emissions
- Methods comparable to prior years
- Integrate periodic national emission inventories

Five Major Sectors

- Electric utility
- Non-utility point
- Highway
- Nonroad
- Area

Highway Methods

- VMT estimates – FHWA
- Roadway functional classes
- Vehicle speeds associated with roadway types

Data Requested from States for MOBILE5 Analyses

- Vehicle registration distributions
- Annual VMT by roadway type and 8 vehicle types

State/Local Programs Accounted for:

- Reformulated Gas
 - Northern/southern
 - May-September (summer RFG rules)
- I/M Programs
 - Inputs converted from MOBILE5
 - 1996 and later MY test type = OBD
- National LEV Program
 - OTC States schedule
 - MA, NY, VT, ME, CT schedules
- California's LEV Schedule

Comparable MOBILE5 and MOBILE6 Inputs

- Temperature
- RVP
- Reformulated Gasoline Coverage
- Oxygenated Fuel Inputs
- Speeds modeled to resemble MOBILE5 inputs as closely as possible
- VMT and VMT mix are same for results presented here

Inputs That Differed Between MOBILE5 and MOBILE6

- I/M Inputs--MOBILE6 inputs translated as closely as possible from MOBILE5 inputs
- Registration Distributions
- HDDV NO_x Defeat Device--accounted for with post-processing correction in MOBILE5, handled explicitly in MOBILE6

Registration Distributions

- MOBILE5
 - used area-specific registration distributions where available and 1999 national distribution as default
- MOBILE6
 - all areas modeled with MOBILE6 default registration distribution (based on 1996 national data)

1999 Highway Vehicle Emissions

- VOC
 - Increases in VOC from:
 - LDGV + LDGT +15%
 - HDGV + HDDV decline
 - Overall highway +12%
- NO_x
 - LDGV + LDGT -
 - Diesels +
 - Overall highway no change
- CO
 - Large increases in all light-duty categories
- SO₂
 - HDDV decline

1999 Highway Vehicle Annual VOC Emissions (tons)

<u>Vehicle Type</u>	<u>MOBILE5</u>	<u>MOBILE6T</u>
LDGV	2,865	3,276
LDGT1	1,166	1,347
LDGT2	593	737
HDGV	375	307
MC	42	27
LDDV	3	4
LDDT	2	5
HDDV	<u>286</u>	<u>250</u>
Total	5,332	5,954

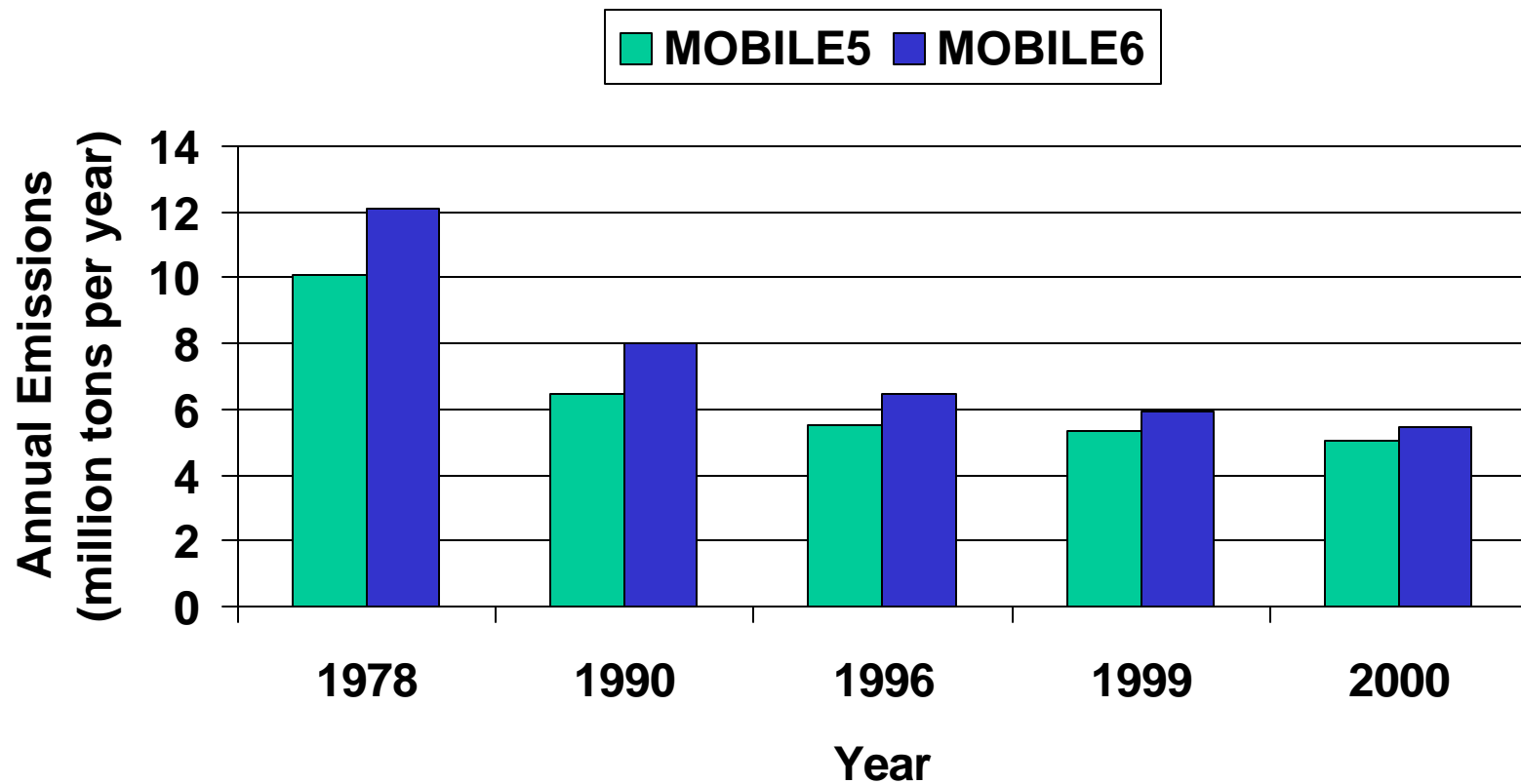
1999 Highway Vehicle Annual NO_x Emissions (tons)

<u>Vehicle Type</u>	<u>MOBILE5</u>	<u>MOBILE6T</u>
LDGV	2,813	2,413
LDGT1	1,141	986
LDGT2	535	436
HDGV	455	445
MC	12	15
LDDV	7	9
LDDT	5	6
HDDV	<u>3,644</u>	<u>4,258</u>
Total	8,612	8,569

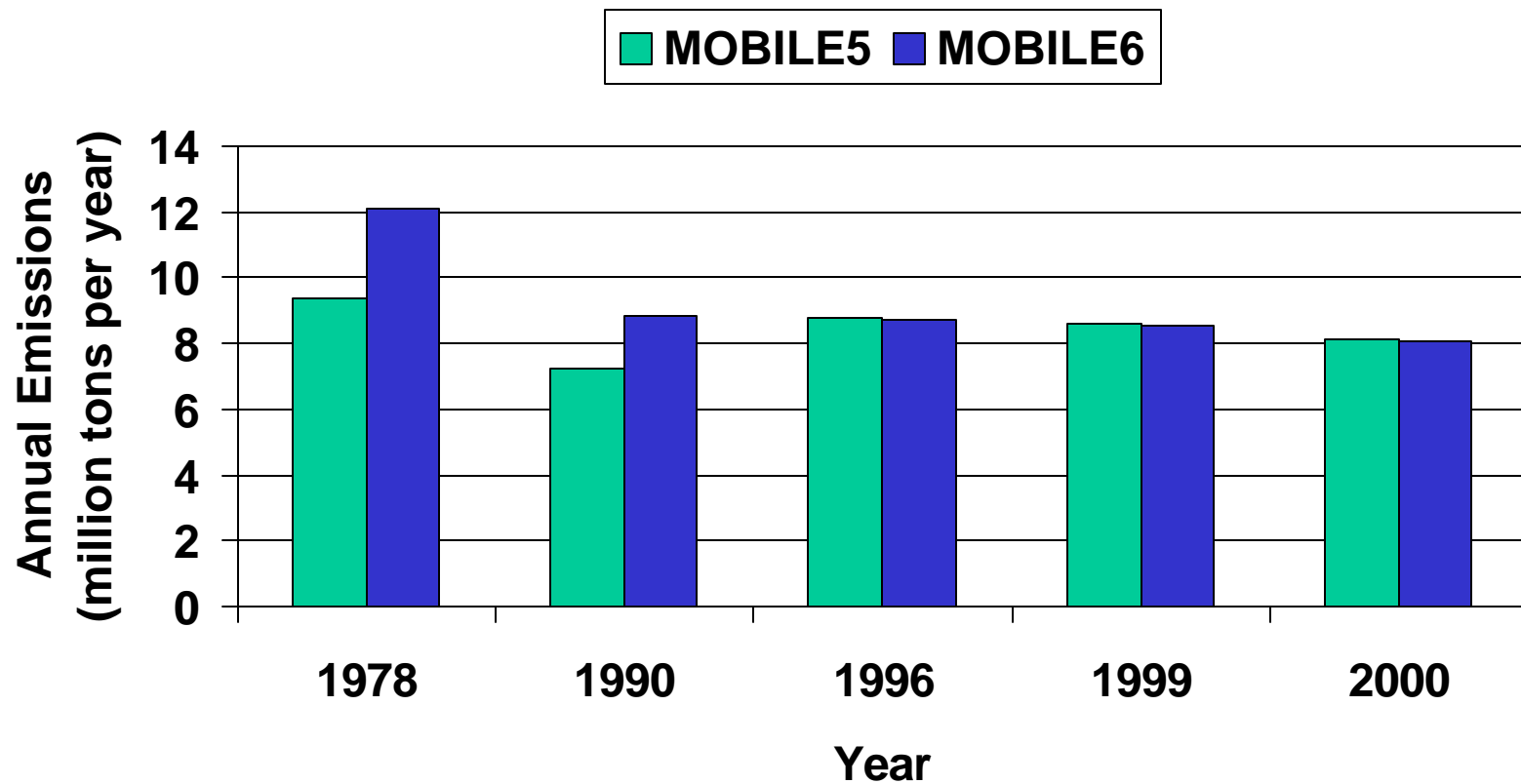
Emission Differences between MOBILE5 and MOBILE6

- Inherent increases in MOBILE6 emissions due to: acceleration and AC effects, sulfur effects on catalysts, HDDV NO_x excess, less oxy CO benefit
- Increases due to differences in model inputs: local registration distributions generally have younger fleet than MOBILE6 default registration distribution

Comparison of National MOBILE5 and MOBILE6T Onroad VOC Emissions



Comparison of National MOBILE5 and MOBILE6T Onroad NO_x Emissions



National Emissions (tons per year)

1999 Calendar Year Estimates

	<u>CO</u>	<u>NO_x</u>	<u>VOC</u>
Fuel Comb Elec Util	424	5,672	62
Fuel Comb Industrial	1,175	3,130	179
Fuel Comb Other	2,749	1,162	895
Industrial Processes	3,793	846	7,432
Waste Disposal and Recycling	3,550	87	571
On-Road	70,136	8,569	5,954
Non-Road	28,083	5,588	3,461
Miscellaneous	12,886	343	1,506
All Source Total	122,796	25,397	20,060
On-Road %	57	33.7	30

National Emissions (tons per year)

1999 Calendar Year Estimates

	<u>PM₁₀</u>	<u>PM_{2.5}</u>	<u>SO₂</u>	<u>NH₃</u>
Fuel Comb Elec Util	259	137	12,653	8
Fuel Comb Industrial	235	150	2,788	34
Fuel Comb Other	456	432	586	7
Industrial Processes	678	389	1,423	201
Waste Disposal and Recycling	533	504	34	88
On-Road	249	191	355	267
Non-Road	445	409	1,487	4
Miscellaneous	21,138	4,828	12	4,311
All Source Total	23,993	7,040	19,338	4,920

Next Steps

- Use final MOBILE6 model for highway
- Complete State review process
- NEI Version 2.0 released by EPA

Future Versions of the 1999 NEI

- June 2002 -- planned public release date for version 2
- October 2002 -- draft version 3 -- with State-submitted MOBILE6-based emission estimates
- June 2003 -- expected release of version 3

Web Sites for More Information

- Related EPA Emission Inventory Conference Paper:
 - www.pechan.com
- EPA Trends:
 - www.epa.gov/ttn/chief/trends/index.html
- Emission Inventory and Air Quality Home Page:
 - www.pechan.com/areas or
 - www.epa.gov/ttn/rto/areas