

ON-ROAD SOURCES

A mobile source of air pollution is a self-propelled or portable emitter of air pollutants, and mobile source emissions are those generated by the engines or motors that power such sources. Most mobile sources, except jet or turboprop aircraft, are powered by internal combustion (IC) piston engines, and nearly all use liquid fuels.

Gaseous fuels, such as compressed natural gas (CNG) or liquefied petroleum gas (LPG), had only a very small fraction of the motor fuel market in Ohio in 2002. Solid fuels have not been used by mobile sources in significant amounts since railroads retired their coal-powered steam locomotives in the 1950s.

Examples of On-Road Sources

On-Road source examples are: motor vehicles such as cars, vans, trucks, buses and motorcycles used for transportation of goods and passengers on roads and streets

On-Road Emissions Inventories

The NMIM model mentioned above is composed of two models. The NONROAD model for calculating annual non-road inventories and MOBILE6. Within NMIM, MOBILE6 can be used to calculate the on-road annual inventory. Or, MOBILE6 can be used as a stand-alone program to run various on-road scenarios.

For example, Ohio ran a MOBILE6 run to look at the results of changing the RVP (Reed Vapor Pressure) of gasoline to see how that would affect NO_x and CO emissions in various parts of the state. This type of scenario makes MOBILE6 a useful tool for state planners looking into the future.

MOBILE6 Overview:

MOBILE6 is a computer program that estimates hydrocarbon (HC), carbon monoxide (CO), oxides of nitrogen (NO_x), exhaust particulate matter (which consists of several components), tire wear particulate matter, brake wear particulate matter, sulfur dioxide (SO₂), ammonia (NH₃), six hazardous air pollutants (HAP), and carbon dioxide (CO₂) emission factors for gasoline-fueled and diesel highway motor vehicles, and for certain specialized vehicles such as natural-gas-fueled or electric vehicles that may replace them.

The program uses the calculation procedures presented in technical reports posted on EPA's MOBILE6 Web page: www.epa.gov/otaq/models.htm.

MOBILE6 emission factor estimates depend on various conditions, such as ambient temperatures, travel speeds, operating modes, fuel volatility, and mileage accrual rates. Many of the variables affecting vehicle emissions can be specified by the user. MOBILE6 will estimate emission factors for any calendar year between 1952 and 2050, inclusive. Vehicles from the 25 most recent model years are considered to be in operation in each calendar year.

MOBILE6 Input Parameters

- Calendar year
- Month (January, July)
- Hourly Temperature
- Altitude (high, low)
- Weekend/weekday

- Fuel characteristics (Reid vapor pressure, sulfur content, oxygenate content, etc.)
- Humidity and solar load
- Registration (age) distribution by vehicle class
- Annual mileage accumulation by vehicle class
- Diesel sales fractions by vehicle class and model year
- Average speed distribution by hour and roadway
- Distribution of vehicle miles traveled by roadway type
- Engine starts per day by vehicle class and distribution by hour
- Engine start soak time distribution by hour
- Trip end distribution by hour
- Average trip length distribution
- Hot soak duration
- Distribution of vehicle miles traveled by vehicle class
- Full, partial, and multiple diurnal distribution by hour
- Inspection and maintenance (I/M) program description
- Anti-tampering inspection program description
- Stage II refueling emissions inspection program description
- Natural gas vehicle fractions
- HC species output
- Particle size cutoff
- Emissions factors for PM and HAP
- Output format specifications and selections

Sample MOBILE6 Output File

Vehicle Type GVWR	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution	0.7751	0.0320	0.0128		0.0525	0.0009	0.0002	0.1255	0.0010	1.0000
Composite Emission Factors (g/mi)										
Composite THC	0.910	0.930	1.530	1.102	1.086	0.371	0.598	0.338	3.060	0.858
Composite CO	12.130	13.240	18.360	14.710	12.960	1.226	1.140	2.199	17.870	11.304
Composite NOX	0.7560	0.9370	1.2980	1.0400	4.3060	1.4580	1.6887	14.610	1.5000	2.7020

Note: Output emission factors are in grams per mile.

MOBILE6 References

1. [User's Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model](#), U.S. Environmental Protection Agency, Ann Arbor, MI, August 2003; EPA420-R-03-010.
2. [Information on the Federal Highway Administration's \(FHWA\) Highway Performance Monitoring System \(HPMS\)](#).
3. ["Reformulated Gasoline Survey Data for 2000,"](#) U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Ann Arbor, Michigan, 2000.
4. ["U.S. EPA Oxygenated Fuel Program Summary, State Winter Oxygenated Fuel Program Requirements for Attainment or Maintenance of CO NAAQS,"](#) U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Ann Arbor, Michigan. October 2001.
5. Thompson, Ramo, and Woolridge (TRW) or National Institute for Petroleum and Energy Research (NIPER) Fuel Survey, 1999.
6. "North American Gasoline and Diesel Fuel Survey," Alliance of Automobile Manufacturers, 1999.

7. ["U.S. EPA Oxygenated Fuel Program Summary, State Winter Oxygenated Fuel Program Requirements for Attainment or Maintenance of CO NAAQS,"](#) U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Ann Arbor, Michigan. October 2001.
8. [Federal Highway Administration \(FHWA\) website for oxygenated fuel salepercentage.](#) Table MF-33E – Estimated Use of Gasohol and Table MF-21 – Motor-Fuel Use, 1999.
9. ["Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Non-road Components in the National Emissions Inventory, Volumes I and II,"](#) prepared by Eastern Research Group for U.S. Environmental Protection Agency, October 7, 2003.