

5. Onroad Mobile Sources

5.1 Introduction

The Maricopa Association of Governments (MAG) prepared the onroad mobile source emission estimates for the 2002 Periodic Carbon Monoxide Emissions Inventory for the Maricopa County Nonattainment Area and for Maricopa County. Onroad mobile source emission estimates have been calculated for carbon monoxide (CO) for the 2002 Periodic CO Inventory. These onroad mobile source estimates are for the CO nonattainment area within Maricopa County and also for Maricopa County as a whole. Emission estimates were developed for both the carbon monoxide season and also for 2002 as a whole.

Emission estimates were calculated for the following eight vehicle classes: light duty gas vehicles (LDGV), light duty gas trucks of gross vehicle weight under 6000 pounds (LDGT1/LDGT2) or over 6000 pounds (LDGT3/LDGT4), heavy duty gas vehicles (HDGV), light duty diesel vehicles (LDDV), light duty diesel trucks (LDDT), heavy duty diesel vehicles (HDDV), and motorcycles (MC). Emission factors for these vehicle classes were calculated using MOBILE6.2, the latest version in a series of models developed by the US Environmental Protection Agency (EPA) for the purpose of estimating motor vehicle emission factors. The resulting emission factors were multiplied by the estimates of vehicle miles of travel (VMT) to generate emission estimates.

The main reference sources for preparing the onroad mobile source portion of the inventory were as follows:

- Emission Inventory Requirements for Carbon Monoxide State Implementation Plans, EPA-450/4-91-011, March 1991, (hereinafter referred to as EPA Guidance),
- Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation, US EPA, January 2002,
- User's Guide to MOBILE6.1 and MOBILE6.2 (Mobile Source Emission Factor Model), EPA420-R-03-010, August 2003, (hereinafter referred to as User's Guide), and
- Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA-450/4-81-026d (Revised), 1992.

5.2 VMT estimation procedure

MAG prepared the 2002 vehicle miles of travel (VMT) estimates for the carbon monoxide non-attainment area and Maricopa County. The source of data for these estimates is the 2002 Highway Performance Monitoring System (HPMS) data (see Appendix 5.1) submitted to the US Department of Transportation, Federal Highway Administration (FHWA) by the Arizona Department of Transportation (ADOT). The ADOT contact person for the HPMS VMT estimates is Mark Catchpole (602-712-8596).

Each year, ADOT coordinates the collection of HPMS data, including the annual average daily traffic (AADT) estimates which are utilized to develop HPMS VMT estimates. ADOT provides the AADT for the state highway system routes including interstates, urban freeways, and principal arterials in Maricopa County. AADTs for other non-local facilities are provided by local

jurisdictions. ADOT merges the Maricopa County data with information from other Arizona counties to create the statewide HPMS dataset submitted to FHWA each year.

HPMS contains a number of data elements which describe roadway characteristics and performance for every non-local roadway in Arizona. All non-local roadways have been divided into sections which are 0.3 to 10 miles in length, in accordance with HPMS criteria. These sections are called HPMS universe sections. HPMS contains additional data elements which provide more detailed information on a randomly-selected set of sample sections. The VMT estimates which ADOT submits to FHWA each year are generated from HPMS universe data for all interstates, urban freeways, and principal arterials. Sample section data are expanded to estimate VMT on all other non-local systems.

VMT on local streets in the urbanized portion of Maricopa County is estimated using traffic counts collected on 50 randomly-selected local streets in June-July of 1994. These counts resulted in an AADT of 587 for local roads in the urbanized area. To calculate VMT, this AADT was applied to local road mileage in 1994 obtained from the Maricopa County street centerline coverage. In 1994, an AADT of 150 was assumed for local roads which are in the “donut” area. The “donut” area is an HPMS term referring specifically to the area inside the PM₁₀ nonattainment area, but outside the Phoenix urbanized area boundary. Since 1994, the AADTs on local streets have been increased annually on the basis of the rate of population growth in the Maricopa County population; the mileage on local streets is updated annually by the local jurisdictions in Maricopa County. VMT for the CO nonattainment area, based on the 2002 HPMS data ADOT submitted to FHWA, is summarized by area type and facility type in Table 5.2–1.

Table 5.2–1. 2002 HPMS VMT by area type and facility type for the CO nonattainment area (annual average daily traffic).

Facility type:	Area type					Total
	1	2	3	4	5	
Interstate / Freeway	1,129,051	9,046,583	6,240,489	4,525,653	2,678,544	23,620,320
Principal Arterial / Minor Arterial	1,087,462	8,834,531	9,795,953	6,923,412	2,670,291	29,311,650
Collector	1,046,993	2,727,290	1,694,159	872,616	955,062	7,296,120
Local	195,247	1,991,136	2,564,545	1,689,510	855,772	7,296,210
Totals:	3,458,753	22,599,539	20,295,146	14,011,191	7,159,670	67,524,300

Notes:

- Area Type = f(DENSITY of a planning district) where:
 DENSITY = (Population + 2 × Employment) / Area
 For Area Type 1, DENSITY = 20,001+ (Central Business District)
 For Area Type 2, DENSITY = 10,001–20,000 (Outlying Central Business District)
 For Area Type 3, DENSITY = 5,001–10,000 (Mixed Urban)
 For Area Type 4, DENSITY = 1,001–5,000 (Suburban)
 For Area Type 5, DENSITY = 0–1,000 (Rural)
- Total VMT by facility type is extracted from the appropriate HPMS templates, with the urbanized area VMT reduced by 1 percent and the donut area VMT reduced by 28 percent.
- VMT is split up into Area Types using data from MAG 2002 EMME/2 travel demand modeling results.
- In some cases, the total VMT estimates may differ slightly from the sum of the component VMT estimates due to rounding. This difference will not exceed one vehicle mile of travel.

The 2002 HPMS System Length and Daily Vehicle Travel for individual urbanized areas (in Appendix 5.1) was submitted to FHWA by ADOT in October 2003. This table reported a 2002 average daily VMT (AADT) for the Phoenix urbanized area (#33) of 63.338 million. In comparison, the 2002 urbanized area VMT for the CO nonattainment area used in the periodic emissions inventory is 62.705 million. The one percent difference between these totals is attributable to small sections of the Phoenix urbanized area (i.e. Apache Junction) which are not located in the CO nonattainment area and Maricopa County. The HPMS System Length and Daily Vehicle Travel, donut area data for individual NAAQS nonattainment areas, (in Appendix 5.1), reported a 2002 VMT for the “donut” area (#33) of 6.694 million. The factors (i.e. 99 percent for the urbanized area and 72 percent for the donut area) used to determine the allocation of HPMS VMT to the CO nonattainment area were derived from the report, “Maricopa Association of Governments Highway Performance Monitoring System Update Study”, January 1995. These factors were also used to derive VMT for the CO tracking area in Chapter Three of the “MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area”, June 1999. The total 2002 daily VMT for the urbanized and “donut” areas in the CO nonattainment area is 67.524 million, as shown in Table 5.2–1. It is important to note that the 2002 HPMS daily VMT for the CO nonattainment area is within one percent of the 2002 VMT estimated by the MAG EMME/2 travel demand models for the same domain (after conversion of EMME/2 estimates from average weekday traffic to annual average daily traffic).

The distribution of VMT by facility type for the CO nonattainment area in Table 5.2–1 was derived from the 2002 HPMS data, while the distribution by area type was derived from a MAG EMME/2 travel demand model run for 2002. The output of this traffic assignment was evaluated using GIS to obtain VMT by area type and facility type for the Phoenix urbanized and “donut” areas. The area type distributions from the EMME/2 assignment were applied to the 2002 HPMS VMT estimates by facility type for the urbanized and “donut” areas to create Table 5.2–1.

VMT estimates for all of Maricopa County were also developed by ADOT. The VMT division by area type for all of Maricopa County were developed by applying all additional VMT for each facility type to the Area Type 5 (rural) category, since all VMT outside of the CO nonattainment area but inside Maricopa County is expected to be in a rural setting. The total VMT estimated for Maricopa County is 73.579 million miles per day for an annual average day. The VMT estimates for Maricopa County are shown in Table 5.2–2.

Table 5.2–2. 2002 HPMS VMT by area type and facility type for Maricopa County (annual average daily traffic)

Facility type:	Area Type					Total
	1	2	3	4	5	
Interstate / Freeway	1,129,051	9,046,583	6,240,489	4,525,653	5,662,224	26,604,000
Principal Arterial / Minor Arterial	1,087,462	8,834,531	9,795,953	6,923,412	3,738,642	30,380,000
Collector	1,046,993	2,727,290	1,694,159	872,616	2,390,942	8,732,000
Local	195,247	1,991,136	2,564,545	1,689,510	1,422,562	7,863,000
Totals:	3,458,753	22,599,540	20,295,146	14,011,191	13,214,370	73,579,000

Notes:

1. For the definition of “Area Type”, see Table 5.2–1, Note 1.
2. VMT is split up into Area Types using data from MAG 2002 EMME/2 travel demand modeling results. All VMT outside of the HPMS urbanized and donut areas were applied to Area Type 5.
3. In some cases, the total VMT estimates may differ slightly from the sum of the component VMT estimates due to rounding. This difference will not exceed one vehicle mile of travel.

Although HPMS reports vehicle mix data for urban and rural areas of Arizona, there are insufficient classification stations in the Phoenix urbanized area to justify use of this information in calculating VMT by vehicle class. In addition, the HPMS vehicle class data do not discriminate between gas and diesel vehicles. Therefore, MOBILE6.2 model defaults, representing the fraction of total VMT for each vehicle class, were applied to VMT estimates for each facility type and area type.

5.3 Speed estimation procedure

MAG prepared the average daily speeds for the onroad mobile sources portion of the 2002 periodic CO emissions inventory. The average daily speeds were developed from several sources representing the latest planning assumptions for 2002.

For the Interstate/Freeway category and for the Principal/Minor Arterial category, the speeds were developed using data in the February 11, 2004 draft report 2002-2003 MAG Regional Travel Time & Travel Speed Study. This report contained data for the functional classifications “HOV”, “Freeway”, “Expressway”, “6 Leg Arterial”, and “Major Arterial”. Speeds for the first three categories were combined through a weighted average to develop the average speed for the Interstate/Freeway category used in the Periodic Inventory. Similarly, the two arterial categories contained in the speed study were combined through a weighted averaging to obtain a Principal Arterial/Minor Arterial category speed. In both of these categories, speeds were unique by area type.

The third facility type included in the periodic inventory is collectors. To develop speed estimates for this facility type, speeds were extracted from the latest 2002 travel demand model run created using the EMME/2 software. In the EMME/2 runs performed by MAG, some traffic links that are classified as “locals” would actually be classified as “collectors” by HPMS. The EMME/2 runs also contain artificial links that are categorized as locals. Since the HPMS collector category includes some EMME/2 collector links and some EMME/2 locals, the EMME/2 speeds for locals and collectors were averaged and the result was used for the HPMS category of collectors. Like the speeds for the Interstate/Freeway and Principal/Minor Arterials categories, the speeds for Collectors were calculated separately for each of the five area types.

The fourth of the HPMS facility types is local roadways. The MOBILE6.2 model assumes a set speed of 12.9 miles per hour for local roadways. This speed was incorporated into the current analysis for all local roadways, regardless of area type.

Table 5.3–1. Average daily speeds (mph) for the 2002 periodic emissions inventory.

Facility type:	Area Type *				
	1	2	3	4	5
Interstate / Freeway	59.7	60.3	63.2	64.8	64.2
Principal Arterial / Minor Arterial	30.3	34.4	36.1	39.0	42.6
Collector	18.2	19.1	24.4	24.7	28.2
Local	12.9	12.9	12.9	12.9	12.9

* For the definition of “Area Type”, see Table 5.2–1, Note 1.

5.4 Monthly VMT factors

In the development of annual emissions totals for this inventory, emission factor estimates were estimated independently for each month, with month-specific meteorological and fuel data. Since average daily VMT varies by month, and the number of days in each month varies, these monthly average emission factors were weighted to more appropriately represent an annual average emission factor. Similarly, the conversion of annual average day traffic to the three months of the peak CO season utilized the monthly VMT factors listed below.

Average daily VMT estimate factors were developed from the 1998 MAG Regional Congestion Study and the monthly factors are as follows:

Table 5.4-1. Average daily VMT adjustment factors by month.

Month	Avg daily VMT estimate factor	Month	Avg daily VMT estimate factor
January	0.98	July	0.94
February	1.03	August	0.96
March	1.03	September	0.99
April	1.03	October	1.02
May	0.99	November	1.02
June	0.98	December	1.04

These factors indicate, as an example, that an average day in February has three percent more traffic than an average month while an average day in June has two percent less traffic than average. Separately, the different number of days in a month will effect the weighting of monthly emission factors to an annual average. For instance, if each month had the same number of days, each monthly emission factor would be equally weighted by 1/12 (0.0833). Since each month does not have the same number of days, the monthly emission factors are weighted accordingly, with January being weighted 31/365 (0.0849), February being weighted 28/365 (0.0767), etc. Combining the two sets of adjustments, the February emission factors would be weighted by 1.03×0.0767 in the development of the annual emission factors.

These weightings are applied by the FORTRAN program "NEIProgram", which was created by MAG. NEIProgram reads in the individual MOBILE6.2 output files for all twelve months and for the I/M versus non-I/M scenarios. NEIProgram weighs those 24 sets of MOBILE6.2 output files to a single set of annual average emission factors. The complete source code for NEIProgram may be found in Appendix 5.6.

The same monthly factors were used to convert the annual average daily traffic estimates from the HPMS system to reflect an average day during the peak CO season. The peak CO season reflects the three consecutive months when peak CO concentrations occur. For consistency with the 1999 carbon monoxide inventory, the three consecutive months selected were November 2002 through January 2003, in accordance with EPA guidance. Averaging the monthly factors for November through January results in a factor of 1.01.

Table 5.4-2. Average daily VMT during 2002 carbon monoxide season for the CO nonattainment area (November 2002–January 2003).

Facility type:	Area Type					Total
	1	2	3	4	5	
Interstate / Freeway	1,140,342	9,137,049	6,302,894	4,570,910	2,705,329	23,856,523
Principal Arterial / Minor Arterial	1,098,337	8,922,876	9,893,913	6,992,646	2,696,994	29,604,765
Collector	1,057,463	2,754,563	1,711,101	881,342	964,613	7,369,081
Local	197,199	2,011,047	2,590,190	1,706,405	864,330	7,369,172
Totals:	3,493,341	22,825,535	20,498,098	14,151,303	7,231,266	68,199,541

Notes:

1. For the definition of “Area Type”, see Table 5.2–1, Note 1.
2. In some cases, the total VMT estimates may differ slightly from the sum of the component VMT estimates due to rounding. This difference will not exceed one vehicle mile of travel.

Table 5.4-3. Average daily VMT during 2002 carbon monoxide season for Maricopa County (November 2002–January 2003).

Facility type:	Area Type					Total
	1	2	3	4	5	
Interstate / Freeway	1,140,342	9,137,049	6,302,894	4,570,910	5,718,846	26,870,041
Principal Arterial / Minor Arterial	1,098,337	8,922,876	9,893,913	6,992,646	3,776,028	30,683,800
Collector	1,057,463	2,754,563	1,711,101	881,342	2,414,851	8,819,320
Local	197,199	2,011,047	2,590,190	1,706,405	1,436,788	7,941,629
Totals:	3,493,341	22,825,535	20,498,098	14,151,303	13,346,513	74,314,790

Notes:

1. For the definition of “Area Type”, see Table 5.2–1, Note 1.
2. In some cases, the total VMT estimates may differ slightly from the sum of the component VMT estimates due to rounding. This difference will not exceed one vehicle mile of travel.

5.5 Emission factor estimation procedure

5.5.1 Emission factor model

CO vehicle exhaust emission factors were calculated using MOBILE6.2, the latest version in a series of models developed by the US EPA for the purpose of estimating motor vehicle emission factors. The resulting emission factors were combined with vehicle miles of travel (VMT) estimates to produce emission estimates for carbon monoxide. The MOBILE6.2 runs were executed by the Maricopa Association of Governments. The contact person for the MOBILE6.2 emission estimates is Roger Roy (602-254-6300).

For the CO season analysis, two MOBILE6.2 runs were executed for a typical day (24-hour period) during the three-month period of November through January. For the annual emissions estimates, two MOBILE6.2 runs were executed for each month of the year using month specific fuel and temperature data, reflecting vehicles registered locally (subject to the I/M program) and those not registered locally (not participating in the I/M program).

The emission factors estimated with these runs were combined to reflect the actual proportions of vehicles subject to the specified levels of inspection. The term “I/M vehicles” denotes vehicles which are required to undergo an emission test and/or inspection under the Arizona Vehicle Inspection/Maintenance Program. It is important to note that participation in the I/M program is required for all vehicles registered in the nonattainment area, with the exception of

certain model year and vehicle classes. However, it is assumed that of the vehicles which are of an age and type subject to an I/M program, only 91.7 percent of the vehicles operating within the nonattainment area participate in the I/M program. The remaining 8.3 percent do not participate in the program. These percentages reflect the control measures “Tougher Registration Enforcement” and “Expansion of Area A Boundaries”, described in the Revised MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area, MAG, March 2001. In the absence of any additional data, this percentage split is assumed to apply directly to VMT as well. Refer to Appendix 5.2 for portions of the actual input and output files and a spreadsheet showing the emission factor calculations.

5.5.2 Development of model inputs

The inputs to MOBILE6.2 are grouped into three categories: Header inputs, run inputs, and scenario inputs. The input values used in the MOBILE6.2 runs are specified and explained below. This next section looks like it maybe should be an appendix section. Humidity was not used as an input to these runs. After reviewing the MOBILE6.2 guidance on the use of local humidity data (see page 7 of <http://www.epa.gov/otaq/models/mobile6/m6techgd.pdf>), it does not appear that inputting specific humidity values would be appropriate for the development of an annual average emissions inventory of this type.

Header Section

1. **MOBILE6 INPUT FILE:** indicates that the MOBILE6.2 input file is a regular command file rather than a batch file.
2. **POLLUTANTS: CO** indicates that the only pollutant for which output is desired is carbon monoxide for this analysis. For the annual CO emissions estimate, the monthly MOBILE6.2 runs performed did not include this flag because other emission factor estimates in addition to CO were desired.

Run Data Section

1. **NO REFUELING:** indicates that refueling emissions are excluded from the MOBILE6.2 outputs. This command is included for completeness, but does not affect carbon monoxide outputs.
2. **I/M PROGRAM: 1 1977 2050 1 T/O LOADED IDLE** indicates the program start and end dates, frequency of testing, and test type. There are five components of the I/M program modeled; a loaded idle test for heavy duty gasoline vehicles (shown in the example in Appendix 5.2), a transient idle test (I/M240 modeled as a surrogate for the I/M147 test) for light duty cars and trucks through model year 1995, a loaded idle test for light duty cars and trucks of model years 1967 to 1980, an on-board diagnostic (OBD) exhaust test for model year 1996 and newer vehicles, and an OBD evaporative test for the same vehicles. The remaining four occurrences of this command are as follows:

I/M PROGRAM: 2 1977 2050 2 T/O IM240 - relating to the transient idle I/M240 program modeled as a surrogate for the I/M147 program.

I/M PROGRAM: 3 1977 2050 1 T/O LOADED IDLE - relating to the loaded idle program for model year 1967-1980 light duty cars and trucks.

I/M PROGRAM: 4 2001 2050 2 T/O OBD I/M - relating to the exhaust portion of the OBD test.

I/M PROGRAM: 5 2001 2050 2 T/O EVAP OBD & GC - relating to the evaporative and gas cap portion of the OBD test.

3. **I/M MODEL YEARS: 1 1967 2050** indicates the first and last model years affected by the given component of the I/M program. The inputs shown above indicate that model years 1967 and newer are tested by component 1 of the I/M program. The remaining four occurrences of this command are as follows:

I/M MODEL YEARS: 2 1981 1995 - relating to the transient idle I/M240 program modeled as a surrogate for the I/M147 program.

I/M MODEL YEARS: 3 1967 1980 - relating to the loaded idle program for model year 1967-1980 light duty cars and trucks.

I/M MODEL YEARS: 4 1996 2050 - relating to the exhaust portion of the OBD test.

I/M MODEL YEARS: 5 1996 2050 - relating to the evaporative and gas cap portion of the OBD test.

4. **I/M VEHICLES: 1 11111 22222222 2** indicates that for the first component of the I/M program (1), the five vehicle categories LDGV, LDGT1, LDGT2, LDGT3, and LDGT4 are not subject to this portion of the I/M program (indicated by "1") while HDGV2B, HDGV3, HDGV4, HDGV5, HDGV6, HDGV7, HDGV8A, HDGV8B, and gasoline buses are covered (indicated by "2"). The remaining four occurrences of this command are as follows:

I/M VEHICLES: 2 22222 11111111 1 indicates that the opposite vehicle classes are subject to the transient idle I/M240 program modeled as a surrogate for the I/M147 program. This selection of vehicle classes is also applied to the remaining three portions of the I/M program.

5. **I/M STRINGENCY: 1 28.0** indicates that the initial test failure rate for pre-1981 LDGVs and pre-1984 LDGTs is 28.0 percent. This stringency rate is also applied to the remaining portions of the I/M program.

6. **I/M COMPLIANCE: 1 97.0** indicates that the fraction of the total vehicle fleet subject to the I/M program that passes the I/M test or receives a waiver is 97.0 percent. This compliance rate is also applied to the remaining portion of the I/M program.
7. **I/M WAIVER RATES: 1 1.3 1.0** indicates that the fraction of vehicles that fail the I/M program is 1.3 for pre-1981 model years and 1.0 percent for 1981 and later model years. These waiver rates are also applied to the remaining portion of the I/M program.
8. **I/M GRACE PERIOD: 1 5** indicates that vehicles less than 5 years old are exempted from the I/M program. This exemption is identical for all portions of the I/M program.
9. **I/M CUTPOINTS: 2 CUTcmp03.d** indicates that for the CO peak season analysis, MOBILE6.2 reads the external data file "CUTcmp03.d" for the I/M cutpoint values for HC, CO, and NO_x. There are 25 values for each vehicle class and pollutant, for the most recent 25 model years, starting with the youngest vehicle. This data is only input for the I/M240 program. For the monthly MOBILE6.2 runs performed to develop the annual CO emissions estimates, the file CUTcmp02.d was used for the January through September 2002 analyses and CUTcmp03.d was used for October through December.
10. **ANTI-TAMP PROGRAM: 87 75 80 22222 22222222 2 11 097. 22111222** indicates the nature of the anti-tampering program. Specifically, this portion of the anti-tampering program began in 1987 and covers model year vehicles 1975 to 1980. Vehicle classes subject to the inspection (indicated by a "2") include LDGV, LDGT1, LDGT2, LDGT3, LDGT4, HDGV2B, HDGV3, HDGV4, HDGV5, HDGV6, HDGV7, HDGV8A, HDGV8B, and gasoline powered buses. The test is performed annually. The test has a 97 percent compliance rate. The parameters tested include air pump disablement, catalyst removal, evaporative system disablement, PCV system disablement, and missing gas cap. The parameters not tested are fuel inlet restrictor disablement, tailpipe lead deposit test, and EGR disablement. A second data line indicates that the same test is also performed on model year 1981 to 1995 vehicles, but with the LDGV, LDGT1, LDGT2, LDGT3, and LDGT4 classes omitted because those vehicles are subject to the transient I/M or OBD test.
11. **REG DIST: 02reg03.d** indicates that for the CO peak season analysis, vehicle registration distributions by age for the 16 composite vehicle types are read by MOBILE6.2 from an external data file, called 02reg03.d. The raw data upon which the registration distributions and diesel fractions are based may be found in Appendix 5.3. The file 02reg02.d was used for the months January through September, 2002. The file 02reg03.d was used for the remaining months of October 2002 through December 2002 because those analyses are closer to a January 2003 scenario than a July 2002 scenario.
12. **DIESEL FRACTIONS:** indicates the user-supplied diesel sales fractions. This input is followed by 350 fractional values representing the fraction of the 14 vehicle classes internally examined by MOBILE6.2 and 25 most recent model years that are diesel vehicles. As an example, the first value, 0.0050, indicates that for the most recent model year of light duty vehicles, 0.5 percent of the vehicles sold are diesel.

Scenario Section

1. **SCENARIO RECORD:** Allows the user to enter a name to identify the scenario being run.
2. **CALENDAR YEAR: 2003** was input because the applicable three-month period for the CO season inventory is November and December of 2002 and January 2003. To be consistent with the User's Guide, the calendar year 2003 was chosen to model conditions representative of the applicable period. For the annual emission estimates, the calendar year 2002 was chosen for the months January through September while for the months of October through December, the calendar year 2003 was chosen because a January 2003 scenario more closely matches those months than a January 2002 scenario.
3. **EVALUATION MONTH: 1** indicates that the month to be modeled for the peak CO season inventory is January. For the annual emissions estimates, the months January through March and October through December were run with this setting while the remaining months were processed with the evaluation month set to July. January and July are the only settings allowed for the evaluation month.
4. **ALTITUDE:1** indicates the geographic area modeled was low altitude.
5. **MIN/MAX TEMPERATURE: 45.0 73.** provides the model with the daily minimum and maximum temperatures for the peak CO season day modeled. The temperatures used are consistent with those modeled for the previous carbon monoxide periodic inventories. For the monthly analyses used to estimate annual emissions, temperatures were derived from the appropriate Sky Harbor Airport Local Climatological Data (LCD) reports. The raw meteorological data may be found in Appendix 5.4.
6. **AVERAGE SPEED: various speeds analyzed** indicates to MOBILE6.2 the average speed to be modeled for each facility type and area type combination. All facility and area type combinations with unique speeds will be modeled in this manner.
7. **VMT BY FACILITY: allfwy.def** indicates to MOBILE6.2 that the external file allfwy.def is to be referenced for the ratio of VMT by hour by facility type. The file allfwy indicates that all VMT is occurring on the MOBILE6.2 facility type freeways for use in developing the emission factors for the periodic inventory functional classifications Interstates/Freeways/Expressways. Similarly, the external file allart.def is called when estimating the emission factors for the arterials or collectors, and allloc.def is called when estimating the emission factors for the periodic inventory category locals.
8. **FUEL RVP: 8.5** Indicates that the average Reid Vapor Pressure of the gasoline sold is 8.5 pounds per square inch for the peak CO season day modeled. This estimate is based upon raw gasoline data provided by the Arizona Department of Weights and Measures. Specifically, this value represents the average RVP of 138 samples collected during November and December of 2002. For the annual emissions estimates, monthly RVP estimates were derived from the Arizona Department of Weights and Measures data table for use in the monthly MOBILE6.2 analyses incorporated into this analysis. Monthly

fuel qualities, including RVP, sulfur content, and ethanol content, are summarized in Appendix 5.7.

9. **FUEL PROGRAM: 4** Indicates that the model is to be run with user-supplied gasoline sulfur levels. The following four lines include 32 numbers, the first 16 listing the average gasoline sulfur value in parts per million for the years 2000 through 2015 and the second 16 indicate the maximum gasoline sulfur content vehicles of model year 2000 through 2015 will be exposed. For the purposes of this analysis, the gasoline data from the time period of November and December 2002 was examined and the average sampled sulfur values during that time period were entered for all time periods. Similarly, the gasoline data for all of 2002 was examined and the maximum sulfur value during that time period was entered for each model year of 2000 through 2015. Those values were 45.6 for average sulfur content and 338.0 ppm for a maximum sulfur content. For the monthly MOBILE6.2 analyses incorporated into this analysis, the average monthly sulfur content from the Arizona Department of Weights and Measures data table were used for the average sulfur value while the 338.0 ppm estimate was used for each month as the maximum sulfur content.

10. **OXYGENATED FUELS: 0.000 1.000 0.000 0.031 1** Indicates that the 0 percent of the gasoline sold during the CO season modeled used MTBE as an oxygenate and 100 percent of the gasoline used ethanol as an oxygenate. The average MTBE content was 0.0 percent by weight and the average ethanol content was 3.1 percent by weight. The number “1” indicates that no RVP waiver has been granted to allow for the “splash” blending of ethanol oxygenates. For the monthly MOBILE6.2 analyses incorporated into this analysis, the average monthly oxygenate content from the Arizona Department of Weights and Measures data table were used, with the exception of January through March 2003, a time period during which no oxygenate data were available. For those months, an average of the oxygenate data from the months November and December were used.

5.5.3 Model outputs

MOBILE6.2 was executed with the inputs described above to obtain composite emission factors in grams per mile (g/mi) for exhaust CO. These values were obtained for the eight vehicle classes described in section 5.1 for the various speeds as described in item six of the **Scenario Section**, described on the preceding page. The emission factors generated for 2002 are presented in the following section. Representative output runs are contained in Appendix 5.2. These values were subsequently used in developing emission estimates.

5.5.4 Summary of emission factors

Refer to Appendix 5.2 for the emission factors developed for CO for each facility and area type.

5.5.5 Emission estimates

MOBILE6.2 was used to generate CO emission factors for vehicle class, facility, and area type. Daily VMT for the CO season (Table 5.4–2 and 5.4–3) or for a monthly average day (Table 5.2–1 and 5.2–2) was then multiplied by the VMT mix by vehicle class and the appropriate CO emission factor (Appendix 5.2) to estimate CO emissions on a kilogram per day (kg/day) basis. VMT mix refers to the fraction of total onroad vehicle miles of travel from a particular vehicle type. For example, since the EPA MOBILE6.2 model estimates that 42.2 percent of onroad VMT was from light duty gasoline vehicles, the VMT Mix value for LDGVs is 0.422. An example calculation is given below, reflecting light duty gasoline vehicles on interstates, free-ways, and expressways in area type 1 (see Table 5-4(a) at this time, 5-4(a) can not be changed to 5.4–4 and on:

$$\begin{aligned}
 \text{CO emissions} &= \text{DMVT} \times \text{VMT mix} \times \text{CO emission factor} \div \text{unit conversion factor} \\
 (\text{kg/day}) & & & (\text{g/mi}) & & (\text{g/kg}) \\
 &= 1,140,342 \times 0.422 \times 12.446 \div 1,000 \\
 &= 5,991 \text{ kg CO/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{CO emissions} &= \text{CO emissions} \div \text{unit conversion factor} \\
 (\text{lb/day}) & \quad (\text{kg/day}) \quad (\text{kg/lb}) \\
 &= 5,991 \text{ kg} \div 0.4536 \\
 &= 13,208 \text{ lb CO/day}
 \end{aligned}$$

Tables 5.5–1 through 5.5–4 show daily VMT data, associated speed estimates, MOBILE6.2 emission factors, and the calculated CO emissions for each vehicle class, facility type, and area type for the CO season runs and the annual average runs for the CO nonattainment area and Maricopa County, respectively.

Table 5.5–1. Daily CO emissions in the CO nonattainment area, by vehicle class, facility type and area type (peak CO season day).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
INTERSTATE, FREEWAY, and EXPRESSWAY	LDGV with VMT mix of 42.2%	1	59.7	12.446	1,140,342	13,208.0	5,991.2
		2	60.3	12.496	9,137,049	106,262.3	48,200.6
		3	63.2	12.526	6,302,894	73,477.5	33,329.4
		4	64.8	12.526	4,570,910	53,286.5	24,170.7
		5	64.2	12.526	2,705,329	31,538.0	14,305.7
	LDGT1 with VMT mix of 28.7%	1	59.7	16.382	1,140,342	11,804.6	5,354.6
		2	60.3	16.442	9,137,049	94,931.3	43,060.8
		3	63.2	16.483	6,302,894	65,647.8	29,777.9
		4	64.8	16.483	4,570,910	47,608.3	21,595.1
		5	64.2	16.483	2,705,329	28,177.4	12,781.3
	LDGT2 with VMT mix of 13.4%	1	59.7	17.857	1,140,342	5,998.2	2,720.8
		2	60.3	17.928	9,137,049	48,251.3	21,886.8
		3	63.2	17.969	6,302,894	33,360.4	15,132.3
		4	64.8	17.969	4,570,910	24,193.2	10,974.0
		5	64.2	17.969	2,705,329	14,319.0	6,495.1
	HDGV with VMT mix of 3.6%	1	59.7	10.036	1,140,342	898.3	407.5
		2	60.3	10.289	9,137,049	7,378.8	3,347.0
		3	63.2	10.450	6,302,894	5,170.0	2,345.1
		4	64.8	10.450	4,570,910	3,749.3	1,700.7
		5	64.2	10.450	2,705,329	2,219.1	1,006.6
LDDV with VMT mix of 0.2%	1	59.7	1.258	1,140,342	7.0	3.2	
	2	60.3	1.268	9,137,049	56.2	25.5	
	3	63.2	1.275	6,302,894	39.0	17.7	
	4	64.8	1.275	4,570,910	28.3	12.8	
	5	64.2	1.275	2,705,329	16.7	7.6	
LDDT with VMT mix of 2.3%	1	59.7	0.655	1,140,342	37.7	17.1	
	2	60.3	0.661	9,137,049	304.9	138.3	
	3	63.2	0.666	6,302,894	211.9	96.1	
	4	64.8	0.666	4,570,910	153.7	69.7	
	5	64.2	0.666	2,705,329	91.0	41.3	
HDDV with VMT mix of 9.2%	1	59.7	2.287	1,140,342	528.4	239.7	
	2	60.3	2.324	9,137,049	4,302.6	1,951.6	
	3	63.2	2.349	6,302,894	2,999.9	1,360.8	
	4	64.8	2.349	4,570,910	2,175.6	986.8	
	5	64.2	2.349	2,705,329	1,287.6	584.1	
MC with VMT mix of 0.5%	1	59.7	16.110	1,140,342	202.5	91.9	
	2	60.3	16.790	9,137,049	1,691.2	767.1	
	3	63.2	17.230	6,302,894	1,197.2	543.0	
	4	64.8	17.230	4,570,910	868.2	393.8	
	5	64.2	17.230	2,705,329	513.9	233.1	

Table 5.5–1. Daily CO emissions in the CO nonattainment area, by vehicle class, facility type and area type (peak CO season day) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
		1	30.3	9.753	1,098,337	9,969.5	4,522.1
PRINCIPAL	LDGV	2	34.4	9.832	8,922,876	81,642.3	37,032.9
ARTERIALS	with VMT	3	36.1	9.933	9,893,913	91,463.1	41,487.7
and	mix of	4	39.0	10.157	6,992,646	66,101.4	29,983.6
MINOR	42.2%	5	42.6	10.451	2,696,994	26,230.9	11,898.3
ARTERIALS		1	30.3	13.315	1,098,337	9,240.9	4,191.7
	LDGT1	2	34.4	13.423	8,922,876	75,683.6	34,330.1
	with VMT	3	36.1	13.544	9,893,913	84,675.4	38,408.7
	mix of	4	39.0	13.816	6,992,646	61,049.4	27,692.0
	28.7%	5	42.6	14.151	2,696,994	24,115.6	10,938.8
		1	30.3	14.437	1,098,337	4,670.8	2,118.7
	LDGT2	2	34.4	14.545	8,922,876	38,228.1	17,340.3
	with VMT	3	36.1	14.685	9,893,913	42,798.7	19,413.5
	mix of	4	39.0	14.989	6,992,646	30,873.3	14,004.1
	13.4%	5	42.6	15.373	2,696,994	12,212.7	5,539.7
		1	30.3	8.457	1,098,337	729.1	330.7
	HDGV	2	34.4	7.578	8,922,876	5,307.4	2,407.4
	with VMT	3	36.1	7.335	9,893,913	5,696.0	2,583.7
	mix of	4	39.0	7.011	6,992,646	3,848.2	1,745.6
	3.6%	5	42.6	6.829	2,696,994	1,445.6	655.7
		1	30.3	1.311	1,098,337	7.0	3.2
	LDDV	2	34.4	1.231	8,922,876	53.3	24.2
	with VMT	3	36.1	1.207	9,893,913	57.9	26.3
	mix of	4	39.0	1.173	6,992,646	39.8	18.0
	0.2%	5	42.6	1.147	2,696,994	15.0	6.8
		1	30.3	0.688	1,098,337	38.2	17.3
	LDDT	2	34.4	0.638	8,922,876	287.4	130.4
	with VMT	3	36.1	0.622	9,893,913	310.7	140.9
	mix of	4	39.0	0.601	6,992,646	212.2	96.2
	2.3%	5	42.6	0.584	2,696,994	79.5	36.1
		1	30.3	2.472	1,098,337	550.1	249.5
	HDDV	2	34.4	2.195	8,922,876	3,968.5	1,800.1
	with VMT	3	36.1	2.110	9,893,913	4,230.0	1,918.7
	mix of	4	39.0	1.993	6,992,646	2,823.8	1,280.9
	9.2%	5	42.6	1.901	2,696,994	1,038.8	471.2
		1	30.3	10.210	1,098,337	123.6	56.1
	MC	2	34.4	9.250	8,922,876	909.9	412.7
	with VMT	3	36.1	8.930	9,893,913	974.0	441.8
	mix of	4	39.0	8.460	6,992,646	652.2	295.8
	0.5%	5	42.6	8.040	2,696,994	239.0	108.4

Table 5.5–1. Daily CO emissions in the CO nonattainment area, by vehicle class, facility type and area type (peak CO season day) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
COLLECTOR		1	18.2	10.314	1,057,463	10,150.3	4,604.2
	LDGV	2	19.1	10.220	2,754,563	26,198.8	11,883.8
	with VMT	3	24.4	9.873	1,711,101	15,722.5	7,131.7
	mix of	4	24.7	9.853	881,342	8,081.8	3,665.9
	42.2%	5	28.2	9.777	964,613	8,776.6	3,981.1
		1	18.2	13.974	1,057,463	9,337.4	4,235.4
	LDGT1	2	19.1	13.870	2,754,563	24,141.4	10,950.6
	with VMT	3	24.4	13.455	1,711,101	14,547.7	6,598.8
	mix of	4	24.7	13.443	881,342	7,486.6	3,395.9
	28.7%	5	28.2	13.347	964,613	8,135.6	3,690.3
		1	18.2	15.262	1,057,463	4,753.9	2,156.4
	LDGT2	2	19.1	15.127	2,754,563	12,273.8	5,567.4
	with VMT	3	24.4	14.628	1,711,101	7,372.8	3,344.3
	mix of	4	24.7	14.607	881,342	3,792.1	1,720.1
	13.4%	5	28.2	14.480	964,613	4,114.4	1,866.3
		1	18.2	14.457	1,057,463	1,199.9	544.3
	HDGV	2	19.1	13.758	2,754,563	2,974.5	1,349.2
	with VMT	3	24.4	10.571	1,711,101	1,419.8	644.0
	mix of	4	24.7	10.430	881,342	721.5	327.3
	3.6%	5	28.2	9.095	964,613	688.6	312.3
	1	18.2	1.803	1,057,463	9.2	4.2	
LDDV	2	19.1	1.748	2,754,563	23.4	10.6	
with VMT	3	24.4	1.490	1,711,101	12.4	5.6	
mix of	4	24.7	1.479	881,342	6.3	2.9	
0.2%	5	28.2	1.365	964,613	6.4	2.9	
	1	18.2	1.000	1,057,463	53.4	24.2	
LDDT	2	19.1	0.965	2,754,563	134.2	60.9	
with VMT	3	24.4	0.802	1,711,101	69.3	31.4	
mix of	4	24.7	0.795	881,342	35.4	16.0	
2.3%	5	28.2	0.723	964,613	35.2	16.0	
	1	18.2	4.183	1,057,463	896.3	406.5	
HDDV	2	19.1	3.991	2,754,563	2,227.5	1,010.4	
with VMT	3	24.4	3.095	1,711,101	1,073.1	486.7	
mix of	4	24.7	3.055	881,342	545.6	247.5	
9.2%	5	28.2	2.661	964,613	520.1	235.9	
	1	18.2	15.100	1,057,463	176.0	79.8	
MC	2	19.1	14.550	2,754,563	441.8	200.4	
with VMT	3	24.4	12.080	1,711,101	227.9	103.4	
mix of	4	24.7	11.980	881,342	116.4	52.8	
0.5%	5	28.2	10.800	964,613	114.8	52.1	

Table 5.5–1. Daily CO emissions in the CO nonattainment area, by vehicle class, facility type and area type (peak CO season day) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
LOCAL		1	12.9	11.118	197,199	2,040.4	925.5
	LDGV	2	12.9	11.118	2,011,047	20,808.2	9,438.6
	with VMT	3	12.9	11.118	2,590,190	26,800.6	12,156.8
	mix of	4	12.9	11.118	1,706,405	17,656.1	8,008.8
	42.2%	5	12.9	11.118	864,330	8,943.2	4,056.6
		1	12.9	14.927	197,199	1,860.0	843.7
	LDGT1	2	12.9	14.927	2,011,047	18,968.8	8,604.2
	with VMT	3	12.9	14.927	2,590,190	24,431.4	11,082.1
	mix of	4	12.9	14.927	1,706,405	16,095.3	7,300.8
	28.7%	5	12.9	14.927	864,330	8,152.6	3,698.0
		1	12.9	16.431	197,199	954.4	432.9
	LDGT2	2	12.9	16.431	2,011,047	9,733.3	4,415.0
	with VMT	3	12.9	16.431	2,590,190	12,536.3	5,686.5
	mix of	4	12.9	16.431	1,706,405	8,258.9	3,746.2
	13.4%	5	12.9	16.431	864,330	4,183.3	1,897.5
		1	12.9	20.082	197,199	310.8	141.0
	HDGV	2	12.9	20.082	2,011,047	3,169.9	1,437.8
	with VMT	3	12.9	20.082	2,590,190	4,082.7	1,851.9
	mix of	4	12.9	20.082	1,706,405	2,689.7	1,220.0
	3.6%	5	12.9	20.082	864,330	1,362.4	618.0
		1	12.9	2.236	197,199	2.1	1.0
	LDDV	2	12.9	2.236	2,011,047	21.8	9.9
	with VMT	3	12.9	2.236	2,590,190	28.1	12.7
	mix of	4	12.9	2.236	1,706,405	18.5	8.4
	0.2%	5	12.9	2.236	864,330	9.4	4.3
	1	12.9	1.275	197,199	12.7	5.8	
LDDT	2	12.9	1.275	2,011,047	129.5	58.7	
with VMT	3	12.9	1.275	2,590,190	166.7	75.6	
mix of	4	12.9	1.275	1,706,405	109.8	49.8	
2.3%	5	12.9	1.275	864,330	55.6	25.2	
	1	12.9	5.688	197,199	227.3	103.1	
HDDV	2	12.9	5.688	2,011,047	2,317.8	1,051.3	
with VMT	3	12.9	5.688	2,590,190	2,985.2	1,354.1	
mix of	4	12.9	5.688	1,706,405	1,966.7	892.1	
9.2%	5	12.9	5.688	864,330	996.2	451.9	
	1	12.9	20.110	197,199	43.7	19.8	
MC	2	12.9	20.110	2,011,047	445.8	202.2	
with VMT	3	12.9	20.110	2,590,190	574.2	260.5	
mix of	4	12.9	20.110	1,706,405	378.3	171.6	
0.5%	5	12.9	20.110	864,330	191.6	86.9	

Table 5.5–2. Daily CO emissions in Maricopa County, by vehicle class, facility type and area type (peak CO season day).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
INTERSTATE, FREEWAY, and EXPRESSWAY	LDGV with VMT mix of 42.2%	1	59.7	12.446	1,140,342	13,208.0	5,991.2
		2	60.3	12.496	9,137,049	106,262.3	48,200.6
		3	63.2	12.526	6,302,894	73,477.5	33,329.4
		4	64.8	12.526	4,570,910	53,286.5	24,170.7
		5	64.2	12.526	5,718,846	66,668.8	30,241.0
	LDGT1 with VMT mix of 28.7%	1	59.7	16.382	1,140,342	11,804.6	5,354.6
		2	60.3	16.442	9,137,049	94,931.3	43,060.8
		3	63.2	16.483	6,302,894	65,647.8	29,777.9
		4	64.8	16.483	4,570,910	47,608.3	21,595.1
		5	64.2	16.483	5,718,846	59,564.7	27,018.5
	LDGT2 with VMT mix of 13.4%	1	59.7	17.857	1,140,342	5,998.2	2,720.8
		2	60.3	17.928	9,137,049	48,251.3	21,886.8
		3	63.2	17.969	6,302,894	33,360.4	15,132.3
		4	64.8	17.969	4,570,910	24,193.2	10,974.0
		5	64.2	17.969	5,718,846	30,269.1	13,730.1
	HDGV with VMT mix of 3.6%	1	59.7	10.036	1,140,342	898.3	407.5
		2	60.3	10.289	9,137,049	7,378.8	3,347.0
		3	63.2	10.450	6,302,894	5,170.0	2,345.1
		4	64.8	10.450	4,570,910	3,749.3	1,700.7
		5	64.2	10.450	5,718,846	4,690.9	2,127.8
LDDV with VMT mix of 0.2%	1	59.7	1.258	1,140,342	7.0	3.2	
	2	60.3	1.268	9,137,049	56.2	25.5	
	3	63.2	1.275	6,302,894	39.0	17.7	
	4	64.8	1.275	4,570,910	28.3	12.8	
	5	64.2	1.275	5,718,846	35.4	16.0	
LDDT with VMT mix of 2.3%	1	59.7	0.655	1,140,342	37.7	17.1	
	2	60.3	0.661	9,137,049	304.9	138.3	
	3	63.2	0.666	6,302,894	211.9	96.1	
	4	64.8	0.666	4,570,910	153.7	69.7	
	5	64.2	0.666	5,718,846	192.3	87.2	
HDDV with VMT mix of 9.2%	1	59.7	2.287	1,140,342	528.4	239.7	
	2	60.3	2.324	9,137,049	4,302.6	1,951.6	
	3	63.2	2.349	6,302,894	2,999.9	1,360.8	
	4	64.8	2.349	4,570,910	2,175.6	986.8	
	5	64.2	2.349	5,718,846	2,721.9	1,234.7	
MC with VMT mix of 0.5%	1	59.7	16.110	1,140,342	202.5	91.9	
	2	60.3	16.790	9,137,049	1,691.2	767.1	
	3	63.2	17.230	6,302,894	1,197.2	543.0	
	4	64.8	17.230	4,570,910	868.2	393.8	
	5	64.2	17.230	5,718,846	1,086.3	492.7	

Table 5.5–2. Daily CO emissions in Maricopa County, by vehicle class, facility type and area type (peak CO season day) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
		1	30.3	9.753	1,098,337	9,969.5	4,522.1
PRINCIPAL	LDGV	2	34.4	9.832	8,922,876	81,642.3	37,032.9
ARTERIALS	with VMT	3	36.1	9.933	9,893,913	91,463.1	41,487.7
and	mix of	4	39.0	10.157	6,992,646	66,101.4	29,983.6
MINOR	42.2%	5	42.6	10.451	3,776,028	36,725.5	16,658.7
ARTERIALS		1	30.3	13.315	1,098,337	9,240.9	4,191.7
	LDGT1	2	34.4	13.423	8,922,876	75,683.6	34,330.1
	with VMT	3	36.1	13.544	9,893,913	84,675.4	38,408.7
	mix of	4	39.0	13.816	6,992,646	61,049.4	27,692.0
	28.7%	5	42.6	14.151	3,776,028	33,764.0	15,315.3
		1	30.3	14.437	1,098,337	4,670.8	2,118.7
	LDGT2	2	34.4	14.545	8,922,876	38,228.1	17,340.3
	with VMT	3	36.1	14.685	9,893,913	42,798.7	19,413.5
	mix of	4	39.0	14.989	6,992,646	30,873.3	14,004.1
	13.4%	5	42.6	15.373	3,776,028	17,098.9	7,756.0
		1	30.3	8.457	1,098,337	729.1	330.7
	HDGV	2	34.4	7.578	8,922,876	5,307.4	2,407.4
	with VMT	3	36.1	7.335	9,893,913	5,696.0	2,583.7
	mix of	4	39.0	7.011	6,992,646	3,848.2	1,745.6
	3.6%	5	42.6	6.829	3,776,028	2,024.0	918.1
		1	30.3	1.311	1,098,337	7.0	3.2
	LDDV	2	34.4	1.231	8,922,876	53.3	24.2
	with VMT	3	36.1	1.207	9,893,913	57.9	26.3
	mix of	4	39.0	1.173	6,992,646	39.8	18.0
	0.2%	5	42.6	1.147	3,776,028	21.0	9.5
		1	30.3	0.688	1,098,337	38.2	17.3
	LDDT	2	34.4	0.638	8,922,876	287.4	130.4
	with VMT	3	36.1	0.622	9,893,913	310.7	140.9
	mix of	4	39.0	0.601	6,992,646	212.2	96.2
	2.3%	5	42.6	0.584	3,776,028	111.3	50.5
		1	30.3	2.472	1,098,337	550.1	249.5
	HDDV	2	34.4	2.195	8,922,876	3,968.5	1,800.1
	with VMT	3	36.1	2.110	9,893,913	4,230.0	1,918.7
	mix of	4	39.0	1.993	6,992,646	2,823.8	1,280.9
	9.2%	5	42.6	1.901	3,776,028	1,454.5	659.7
		1	30.3	10.210	1,098,337	123.6	56.1
	MC	2	34.4	9.250	8,922,876	909.9	412.7
	with VMT	3	36.1	8.930	9,893,913	974.0	441.8
	mix of	4	39.0	8.460	6,992,646	652.2	295.8
	0.5%	5	42.6	8.040	3,776,028	334.7	151.8

Table 5.5–2. Daily CO emissions in Maricopa County, by vehicle class, facility type and area type (peak CO season day) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
COLLECTOR		1	18.2	10.314	1,057,463	10,150.3	4,604.2
	LDGV	2	19.1	10.220	2,754,563	26,198.8	11,883.8
	with VMT	3	24.4	9.873	1,711,101	15,722.5	7,131.7
	mix of	4	24.7	9.853	881,342	8,081.8	3,665.9
	42.2%	5	28.2	9.777	2,414,851	21,971.7	9,966.4
		1	18.2	13.974	1,057,463	9,337.4	4,235.4
	LDGT1	2	19.1	13.870	2,754,563	24,141.4	10,950.6
	with VMT	3	24.4	13.455	1,711,101	14,547.7	6,598.8
	mix of	4	24.7	13.443	881,342	7,486.6	3,395.9
	28.7%	5	28.2	13.347	2,414,851	20,367.0	9,238.5
		1	18.2	15.262	1,057,463	4,753.9	2,156.4
	LDGT2	2	19.1	15.127	2,754,563	12,273.8	5,567.4
	with VMT	3	24.4	14.628	1,711,101	7,372.8	3,344.3
	mix of	4	24.7	14.607	881,342	3,792.1	1,720.1
	13.4%	5	28.2	14.480	2,414,851	10,300.2	4,672.2
		1	18.2	14.457	1,057,463	1,199.9	544.3
	HDGV	2	19.1	13.758	2,754,563	2,974.5	1,349.2
	with VMT	3	24.4	10.571	1,711,101	1,419.8	644.0
	mix of	4	24.7	10.430	881,342	721.5	327.3
	3.6%	5	28.2	9.095	2,414,851	1,723.8	781.9
		1	18.2	1.803	1,057,463	9.2	4.2
	LDDV	2	19.1	1.748	2,754,563	23.4	10.6
	with VMT	3	24.4	1.490	1,711,101	12.4	5.6
	mix of	4	24.7	1.479	881,342	6.3	2.9
	0.2%	5	28.2	1.365	2,414,851	16.0	7.3
	1	18.2	1.000	1,057,463	53.4	24.2	
LDDT	2	19.1	0.965	2,754,563	134.2	60.9	
with VMT	3	24.4	0.802	1,711,101	69.3	31.4	
mix of	4	24.7	0.795	881,342	35.4	16.0	
2.3%	5	28.2	0.723	2,414,851	88.2	40.0	
	1	18.2	4.183	1,057,463	896.3	406.5	
HDDV	2	19.1	3.991	2,754,563	2,227.5	1,010.4	
with VMT	3	24.4	3.095	1,711,101	1,073.1	486.7	
mix of	4	24.7	3.055	881,342	545.6	247.5	
9.2%	5	28.2	2.661	2,414,851	1,302.0	590.6	
	1	18.2	15.100	1,057,463	176.0	79.8	
MC	2	19.1	14.550	2,754,563	441.8	200.4	
with VMT	3	24.4	12.080	1,711,101	227.9	103.4	
mix of	4	24.7	11.980	881,342	116.4	52.8	
0.5%	5	28.2	10.800	2,414,851	287.5	130.4	

Table 5.5–2. Daily CO emissions in Maricopa County, by vehicle class, facility type and area type (peak CO season day) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
LOCAL		1	12.9	11.118	197,199	2,040.4	925.5
	LDGV	2	12.9	11.118	2,011,047	20,808.2	9,438.6
	with VMT	3	12.9	11.118	2,590,190	26,800.6	12,156.8
	mix of	4	12.9	11.118	1,706,405	17,656.1	8,008.8
	42.2%	5	12.9	11.118	864,330	8,943.2	4,056.6
		1	12.9	14.927	197,199	1,860.0	843.7
	LDGT1	2	12.9	14.927	2,011,047	18,968.8	8,604.2
	with VMT	3	12.9	14.927	2,590,190	24,431.4	11,082.1
	mix of	4	12.9	14.927	1,706,405	16,095.3	7,300.8
	28.7%	5	12.9	14.927	864,330	8,152.6	3,698.0
		1	12.9	16.431	197,199	954.4	432.9
	LDGT2	2	12.9	16.431	2,011,047	9,733.3	4,415.0
	with VMT	3	12.9	16.431	2,590,190	12,536.3	5,686.5
	mix of	4	12.9	16.431	1,706,405	8,258.9	3,746.2
	13.4%	5	12.9	16.431	864,330	4,183.3	1,897.5
		1	12.9	20.082	197,199	310.8	141.0
	HDGV	2	12.9	20.082	2,011,047	3,169.9	1,437.8
	with VMT	3	12.9	20.082	2,590,190	4,082.7	1,851.9
	mix of	4	12.9	20.082	1,706,405	2,689.7	1,220.0
	3.6%	5	12.9	20.082	864,330	1,362.4	618.0
		1	12.9	2.236	197,199	2.1	1.0
	LDDV	2	12.9	2.236	2,011,047	21.8	9.9
	with VMT	3	12.9	2.236	2,590,190	28.1	12.7
	mix of	4	12.9	2.236	1,706,405	18.5	8.4
	0.2%	5	12.9	2.236	864,330	9.4	4.3
	1	12.9	1.275	197,199	12.7	5.8	
LDDT	2	12.9	1.275	2,011,047	129.5	58.7	
with VMT	3	12.9	1.275	2,590,190	166.7	75.6	
mix of	4	12.9	1.275	1,706,405	109.8	49.8	
2.3%	5	12.9	1.275	864,330	55.6	25.2	
	1	12.9	5.688	197,199	227.3	103.1	
HDDV	2	12.9	5.688	2,011,047	2,317.8	1,051.3	
with VMT	3	12.9	5.688	2,590,190	2,985.2	1,354.1	
mix of	4	12.9	5.688	1,706,405	1,966.7	892.1	
9.2%	5	12.9	5.688	864,330	996.2	451.9	
	1	12.9	20.110	197,199	43.7	19.8	
MC	2	12.9	20.110	2,011,047	445.8	202.2	
with VMT	3	12.9	20.110	2,590,190	574.2	260.5	
mix of	4	12.9	20.110	1,706,405	378.3	171.6	
0.5%	5	12.9	20.110	864,330	191.6	86.9	

Table 5.5–3. Daily CO emissions in the CO nonattainment area, by vehicle class, facility type and area type (annual average daily traffic).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
INTERSTATE, FREEWAY, and EXPRESSWAY		1	59.7	13.108	1,129,051	14,710.1	6,672.5
	LDGV	2	60.3	13.177	9,046,583	118,484.5	53,744.6
	with VMT	3	63.2	13.222	6,240,489	82,011.2	37,200.3
	mix of	4	64.8	13.222	4,525,653	59,475.2	26,977.9
	45.1%	5	64.2	13.222	2,678,544	35,200.8	15,967.1
		1	59.7	16.711	1,129,051	11,737.2	5,324.0
	LDGT1	2	60.3	16.788	9,046,583	94,474.3	42,853.5
	with VMT	3	63.2	16.840	6,240,489	65,373.4	29,653.4
	mix of	4	64.8	16.840	4,525,653	47,409.3	21,504.9
	28.2%	5	64.2	16.840	2,678,544	28,059.6	12,727.8
		1	59.7	18.807	1,129,051	5,223.8	2,369.5
	LDGT2	2	60.3	18.890	9,046,583	42,041.0	19,069.8
	with VMT	3	63.2	18.943	6,240,489	29,081.1	13,191.2
	mix of	4	64.8	18.943	4,525,653	21,089.8	9,566.3
	11.2%	5	64.2	18.943	2,678,544	12,482.2	5,661.9
		1	59.7	12.791	1,129,051	1,133.4	514.1
	HDGV	2	60.3	13.109	9,046,583	9,306.8	4,221.6
	with VMT	3	63.2	13.317	6,240,489	6,521.7	2,958.2
	mix of	4	64.8	13.317	4,525,653	4,729.6	2,145.3
	3.6%	5	64.2	13.317	2,678,544	2,799.2	1,269.7
		1	59.7	1.243	1,129,051	6.8	3.1
	LDDV	2	60.3	1.254	9,046,583	55.0	25.0
	with VMT	3	63.2	1.261	6,240,489	38.2	17.3
	mix of	4	64.8	1.261	4,525,653	27.7	12.6
	0.2%	5	64.2	1.261	2,678,544	16.4	7.4
	1	59.7	0.664	1,129,051	35.7	16.2	
LDDT	2	60.3	0.671	9,046,583	288.8	131.0	
with VMT	3	63.2	0.675	6,240,489	200.6	91.0	
mix of	4	64.8	0.675	4,525,653	145.5	66.0	
2.2%	5	64.2	0.675	2,678,544	86.1	39.0	
	1	59.7	2.449	1,129,051	554.1	251.3	
HDDV	2	60.3	2.489	9,046,583	4,511.0	2,046.2	
with VMT	3	63.2	2.515	6,240,489	3,144.3	1,426.2	
mix of	4	64.8	2.515	4,525,653	2,280.2	1,034.3	
9.1%	5	64.2	2.515	2,678,544	1,349.6	612.2	
	1	59.7	21.115	1,129,051	268.0	121.6	
MC	2	60.3	22.030	9,046,583	2,240.5	1,016.3	
with VMT	3	63.2	22.630	6,240,489	1,587.6	720.2	
mix of	4	64.8	22.630	4,525,653	1,151.4	522.3	
0.5%	5	64.2	22.630	2,678,544	681.4	309.1	

Table 5.5–3. Daily CO emissions in the CO nonattainment area, by vehicle class, facility type and area type (annual average daily traffic) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
		1	30.3	9.686	1,087,462	10,469.1	4,748.8
PRINCIPAL	LDGV	2	34.4	9.835	8,834,531	86,363.5	39,174.5
ARTERIALS	with VMT	3	36.1	9.982	9,795,953	97,190.5	44,085.6
and	mix of	4	39.0	10.157	6,923,412	69,893.5	31,703.7
MINOR	45.1%	5	42.6	10.538	2,670,291	27,969.8	12,687.1
ARTERIALS		1	30.3	12.995	1,087,462	8,791.1	3,987.7
	LDGT1	2	34.4	13.205	8,834,531	72,572.5	32,918.9
	with VMT	3	36.1	13.375	9,795,953	81,506.2	36,971.2
	mix of	4	39.0	13.593	6,923,412	58,544.9	26,556.0
	28.2%	5	42.6	14.022	2,670,291	23,291.6	10,565.1
		1	30.3	14.894	1,087,462	3,984.5	1,807.4
	LDGT2	2	34.4	15.091	8,834,531	32,797.5	14,876.9
	with VMT	3	36.1	15.270	9,795,953	36,798.8	16,691.9
	mix of	4	39.0	15.509	6,923,412	26,415.6	11,982.1
	11.2%	5	42.6	15.966	2,670,291	10,488.4	4,757.5
		1	30.3	10.773	1,087,462	919.4	417.0
	HDGV	2	34.4	9.660	8,834,531	6,697.0	3,037.8
	with VMT	3	36.1	9.346	9,795,953	7,184.5	3,258.9
	mix of	4	39.0	8.936	6,923,412	4,854.9	2,202.2
	3.6%	5	42.6	8.701	2,670,291	1,823.4	827.1
		1	30.3	1.296	1,087,462	6.8	3.1
	LDDV	2	34.4	1.217	8,834,531	52.1	23.6
	with VMT	3	36.1	1.193	9,795,953	56.7	25.7
	mix of	4	39.0	1.160	6,923,412	38.9	17.7
	0.2%	5	42.6	1.133	2,670,291	14.7	6.7
		1	30.3	0.698	1,087,462	36.1	16.4
	LDDT	2	34.4	0.647	8,834,531	272.1	123.4
	with VMT	3	36.1	0.631	9,795,953	294.2	133.4
	mix of	4	39.0	0.609	6,923,412	200.8	91.1
	2.2%	5	42.6	0.592	2,670,291	75.3	34.1
		1	30.3	2.647	1,087,462	576.7	261.6
	HDDV	2	34.4	2.350	8,834,531	4,160.2	1,887.1
	with VMT	3	36.1	2.260	9,795,953	4,435.5	2,012.0
	mix of	4	39.0	2.134	6,923,412	2,960.6	1,342.9
	9.1%	5	42.6	2.036	2,670,291	1,089.2	494.1
		1	30.3	13.080	1,087,462	159.9	72.5
	MC	2	34.4	11.765	8,834,531	1,168.5	530.1
	with VMT	3	36.1	11.328	9,795,953	1,247.6	565.9
	mix of	4	39.0	10.694	6,923,412	832.4	377.6
	0.5%	5	42.6	10.114	2,670,291	303.6	137.7

Table 5.5–3. Daily CO emissions in the CO nonattainment area, by vehicle class, facility type and area type (annual average daily traffic) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
COLLECTOR		1	18.2	10.040	1,046,993	10,448.3	4,739.3
	LDGV	2	19.1	9.940	2,727,290	26,946.0	12,222.7
	with VMT	3	24.4	9.609	1,694,159	16,180.2	7,339.3
	mix of	4	24.7	9.595	872,616	8,321.6	3,774.7
	45.1%	5	28.2	9.559	955,062	9,074.1	4,116.0
		1	18.2	13.268	1,046,993	8,641.7	3,919.9
	LDGT1	2	19.1	13.167	2,727,290	22,338.1	10,132.5
	with VMT	3	24.4	12.875	1,694,159	13,568.5	6,154.7
	mix of	4	24.7	12.863	872,616	6,982.4	3,167.2
	28.2%	5	28.2	12.859	955,062	7,639.7	3,465.4
		1	18.2	15.380	1,046,993	3,961.5	1,796.9
	LDGT2	2	19.1	15.251	2,727,290	10,232.5	4,641.4
	with VMT	3	24.4	14.841	1,694,159	6,185.5	2,805.7
	mix of	4	24.7	14.827	872,616	3,182.9	1,443.8
	11.2%	5	28.2	14.777	955,062	3,472.0	1,574.9
		1	18.2	18.423	1,046,993	1,513.7	686.6
	HDGV	2	19.1	17.524	2,727,290	3,750.6	1,701.3
	with VMT	3	24.4	13.463	1,694,159	1,789.9	811.9
	mix of	4	24.7	13.282	872,616	909.5	412.6
	3.6%	5	28.2	11.581	955,062	868.0	393.7
		1	18.2	1.786	1,046,993	9.1	4.1
	LDDV	2	19.1	1.731	2,727,290	22.9	10.4
	with VMT	3	24.4	1.474	1,694,159	12.1	5.5
	mix of	4	24.7	1.463	872,616	6.2	2.8
	0.2%	5	28.2	1.350	955,062	6.3	2.8
	1	18.2	1.015	1,046,993	50.6	23.0	
LDDT	2	19.1	0.979	2,727,290	127.2	57.7	
with VMT	3	24.4	0.813	1,694,159	65.6	29.8	
mix of	4	24.7	0.806	872,616	33.5	15.2	
2.2%	5	28.2	0.733	955,062	33.3	15.1	
	1	18.2	4.479	1,046,993	939.7	426.3	
HDDV	2	19.1	4.274	2,727,290	2,335.5	1,059.4	
with VMT	3	24.4	3.314	1,694,159	1,125.0	510.3	
mix of	4	24.7	3.271	872,616	572.0	259.5	
9.1%	5	28.2	2.849	955,062	545.3	247.3	
	1	18.2	19.735	1,046,993	232.3	105.4	
MC	2	19.1	18.983	2,727,290	582.0	264.0	
with VMT	3	24.4	15.626	1,694,159	297.6	135.0	
mix of	4	24.7	15.480	872,616	151.9	68.9	
0.5%	5	28.2	13.874	955,062	149.0	67.6	

Table 5.5–3. Daily CO emissions in the CO nonattainment area, by vehicle class, facility type and area type (annual average daily traffic) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
LOCAL		1	12.9	10.904	195,247	2,116.1	959.8
	LDGV	2	12.9	10.904	1,991,136	21,579.8	9,788.6
	with VMT	3	12.9	10.904	2,564,545	27,794.3	12,607.5
	mix of	4	12.9	10.904	1,689,510	18,310.8	8,305.8
	45.1%	5	12.9	10.904	855,772	9,274.8	4,207.0
		1	12.9	14.157	195,247	1,719.5	780.0
	LDGT1	2	12.9	14.157	1,991,136	17,535.4	7,954.1
	with VMT	3	12.9	14.157	2,564,545	22,585.3	10,244.7
	mix of	4	12.9	14.157	1,689,510	14,879.1	6,749.1
	28.2%	5	12.9	14.157	855,772	7,536.6	3,418.6
		1	12.9	16.521	195,247	793.5	360.0
	LDGT2	2	12.9	16.521	1,991,136	8,092.6	3,670.8
	with VMT	3	12.9	16.521	2,564,545	10,423.1	4,727.9
	mix of	4	12.9	16.521	1,689,510	6,866.7	3,114.7
	11.2%	5	12.9	16.521	855,772	3,478.1	1,577.7
		1	12.9	25.590	195,247	392.1	177.9
	HDGV	2	12.9	25.590	1,991,136	3,998.6	1,813.8
	with VMT	3	12.9	25.590	2,564,545	5,150.1	2,336.1
	mix of	4	12.9	25.590	1,689,510	3,392.9	1,539.0
	3.6%	5	12.9	25.590	855,772	1,718.6	779.5
		1	12.9	2.216	195,247	2.1	1.0
	LDDV	2	12.9	2.216	1,991,136	21.4	9.7
	with VMT	3	12.9	2.216	2,564,545	27.6	12.5
	mix of	4	12.9	2.216	1,689,510	18.2	8.2
	0.2%	5	12.9	2.216	855,772	9.2	4.2
	1	12.9	1.294	195,247	12.0	5.5	
LDDT	2	12.9	1.294	1,991,136	122.7	55.6	
with VMT	3	12.9	1.294	2,564,545	158.0	71.7	
mix of	4	12.9	1.294	1,689,510	104.1	47.2	
2.2%	5	12.9	1.294	855,772	52.7	23.9	
	1	12.9	6.090	195,247	238.3	108.1	
HDDV	2	12.9	6.090	1,991,136	2,429.9	1,102.2	
with VMT	3	12.9	6.090	2,564,545	3,129.7	1,419.6	
mix of	4	12.9	6.090	1,689,510	2,061.8	935.2	
9.1%	5	12.9	6.090	855,772	1,044.4	473.7	
	1	12.9	26.555	195,247	58.3	26.4	
MC	2	12.9	26.555	1,991,136	594.4	269.6	
with VMT	3	12.9	26.555	2,564,545	765.6	347.3	
mix of	4	12.9	26.555	1,689,510	504.4	228.8	
0.5%	5	12.9	26.555	855,772	255.5	115.9	

Table 5.5-4. Daily CO emissions in Maricopa County, by vehicle class, facility type and area type (annual average daily traffic).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
INTERSTATE, FREEWAY, and EXPRESSWAY		1	59.7	13.108	1,129,051	14,710.1	6,672.5
	LDGV	2	60.3	13.177	9,046,583	118,484.5	53,744.6
	with VMT	3	63.2	13.222	6,240,489	82,011.2	37,200.3
	mix of	4	64.8	13.222	4,525,653	59,475.2	26,977.9
	45.1%	5	64.2	13.222	5,662,224	74,411.7	33,753.2
		1	59.7	16.711	1,129,051	11,737.2	5,324.0
	LDGT1	2	60.3	16.788	9,046,583	94,474.3	42,853.5
	with VMT	3	63.2	16.840	6,240,489	65,373.4	29,653.4
	mix of	4	64.8	16.840	4,525,653	47,409.3	21,504.9
	28.2%	5	64.2	16.840	5,662,224	59,315.7	26,905.6
		1	59.7	18.807	1,129,051	5,223.8	2,369.5
	LDGT2	2	60.3	18.890	9,046,583	42,041.0	19,069.8
	with VMT	3	63.2	18.943	6,240,489	29,081.1	13,191.2
	mix of	4	64.8	18.943	4,525,653	21,089.8	9,566.3
	11.2%	5	64.2	18.943	5,662,224	26,386.3	11,968.8
		1	59.7	12.791	1,129,051	1,133.4	514.1
	HDGV	2	60.3	13.109	9,046,583	9,306.8	4,221.6
	with VMT	3	63.2	13.317	6,240,489	6,521.7	2,958.2
	mix of	4	64.8	13.317	4,525,653	4,729.6	2,145.3
	3.6%	5	64.2	13.317	5,662,224	5,917.3	2,684.1
	1	59.7	1.243	1,129,051	6.8	3.1	
LDDV	2	60.3	1.254	9,046,583	55.0	25.0	
with VMT	3	63.2	1.261	6,240,489	38.2	17.3	
mix of	4	64.8	1.261	4,525,653	27.7	12.6	
0.2%	5	64.2	1.261	5,662,224	34.6	15.7	
	1	59.7	0.664	1,129,051	35.7	16.2	
LDDT	2	60.3	0.671	9,046,583	288.8	131.0	
with VMT	3	63.2	0.675	6,240,489	200.6	91.0	
mix of	4	64.8	0.675	4,525,653	145.5	66.0	
2.2%	5	64.2	0.675	5,662,224	182.0	82.5	
	1	59.7	2.449	1,129,051	554.1	251.3	
HDDV	2	60.3	2.489	9,046,583	4,511.0	2,046.2	
with VMT	3	63.2	2.515	6,240,489	3,144.3	1,426.2	
mix of	4	64.8	2.515	4,525,653	2,280.2	1,034.3	
9.1%	5	64.2	2.515	5,662,224	2,852.9	1,294.1	
	1	59.7	21.115	1,129,051	268.0	121.6	
MC	2	60.3	22.030	9,046,583	2,240.5	1,016.3	
with VMT	3	63.2	22.630	6,240,489	1,587.6	720.2	
mix of	4	64.8	22.630	4,525,653	1,151.4	522.3	
0.5%	5	64.2	22.630	5,662,224	1,440.5	653.4	

Table 5.5–4. Daily CO emissions in Maricopa County by vehicle class, facility type and area type (annual average daily traffic) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
		1	30.3	9.686	1,087,462	10,469.1	4,748.8
PRINCIPAL	LDGV	2	34.4	9.835	8,834,531	86,363.5	39,174.5
ARTERIALS	with VMT	3	36.1	9.982	9,795,953	97,190.5	44,085.6
and	mix of	4	39.0	10.157	6,923,412	69,893.5	31,703.7
MINOR	45.1%	5	42.6	10.538	3,738,642	39,160.1	17,763.0
ARTERIALS		1	30.3	12.995	1,087,462	8,791.1	3,987.7
	LDGT1	2	34.4	13.205	8,834,531	72,572.5	32,918.9
	with VMT	3	36.1	13.375	9,795,953	81,506.2	36,971.2
	mix of	4	39.0	13.593	6,923,412	58,544.9	26,556.0
	28.2%	5	42.6	14.022	3,738,642	32,610.3	14,792.0
		1	30.3	14.894	1,087,462	3,984.5	1,807.4
	LDGT2	2	34.4	15.091	8,834,531	32,797.5	14,876.9
	with VMT	3	36.1	15.270	9,795,953	36,798.8	16,691.9
	mix of	4	39.0	15.509	6,923,412	26,415.6	11,982.1
	11.2%	5	42.6	15.966	3,738,642	14,684.6	6,661.0
		1	30.3	10.773	1,087,462	919.4	417.0
	HDGV	2	34.4	9.660	8,834,531	6,697.0	3,037.8
	with VMT	3	36.1	9.346	9,795,953	7,184.5	3,258.9
	mix of	4	39.0	8.936	6,923,412	4,854.9	2,202.2
	3.6%	5	42.6	8.701	3,738,642	2,552.9	1,158.0
		1	30.3	1.296	1,087,462	6.8	3.1
	LDDV	2	34.4	1.217	8,834,531	52.1	23.6
	with VMT	3	36.1	1.193	9,795,953	56.7	25.7
	mix of	4	39.0	1.160	6,923,412	38.9	17.7
	0.2%	5	42.6	1.133	3,738,642	20.5	9.3
		1	30.3	0.698	1,087,462	36.1	16.4
	LDDT	2	34.4	0.647	8,834,531	272.1	123.4
	with VMT	3	36.1	0.631	9,795,953	294.2	133.4
	mix of	4	39.0	0.609	6,923,412	200.8	91.1
	2.2%	5	42.6	0.592	3,738,642	105.4	47.8
		1	30.3	2.647	1,087,462	576.7	261.6
	HDDV	2	34.4	2.350	8,834,531	4,160.2	1,887.1
	with VMT	3	36.1	2.260	9,795,953	4,435.5	2,012.0
	mix of	4	39.0	2.134	6,923,412	2,960.6	1,342.9
	9.1%	5	42.6	2.036	3,738,642	1,524.9	691.7
		1	30.3	13.080	1,087,462	159.9	72.5
	MC	2	34.4	11.765	8,834,531	1,168.5	530.1
	with VMT	3	36.1	11.328	9,795,953	1,247.6	565.9
	mix of	4	39.0	10.694	6,923,412	832.4	377.6
	0.5%	5	42.6	10.114	3,738,642	425.1	192.8

Table 5.5–4. Daily CO emissions in Maricopa County by vehicle class, facility type and area type (annual average daily traffic) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
COLLECTOR		1	18.2	10.040	1,046,993	10,448.3	4,739.3
	LDGV	2	19.1	9.940	2,727,290	26,946.0	12,222.7
	with VMT	3	24.4	9.609	1,694,159	16,180.2	7,339.3
	mix of	4	24.7	9.595	872,616	8,321.6	3,774.7
	45.1%	5	28.2	9.559	2,390,942	22,716.5	10,304.2
		1	18.2	13.268	1,046,993	8,641.7	3,919.9
	LDGT1	2	19.1	13.167	2,727,290	22,338.1	10,132.5
	with VMT	3	24.4	12.875	1,694,159	13,568.5	6,154.7
	mix of	4	24.7	12.863	872,616	6,982.4	3,167.2
	28.2%	5	28.2	12.859	2,390,942	19,125.5	8,675.3
		1	18.2	15.380	1,046,993	3,961.5	1,796.9
	LDGT2	2	19.1	15.251	2,727,290	10,232.5	4,641.4
	with VMT	3	24.4	14.841	1,694,159	6,185.5	2,805.7
	mix of	4	24.7	14.827	872,616	3,182.9	1,443.8
	11.2%	5	28.2	14.777	2,390,942	8,691.9	3,942.6
		1	18.2	18.423	1,046,993	1,513.7	686.6
	HDGV	2	19.1	17.524	2,727,290	3,750.6	1,701.3
	with VMT	3	24.4	13.463	1,694,159	1,789.9	811.9
	mix of	4	24.7	13.282	872,616	909.5	412.6
	3.6%	5	28.2	11.581	2,390,942	2,173.0	985.7
		1	18.2	1.786	1,046,993	9.1	4.1
	LDDV	2	19.1	1.731	2,727,290	22.9	10.4
	with VMT	3	24.4	1.474	1,694,159	12.1	5.5
	mix of	4	24.7	1.463	872,616	6.2	2.8
	0.2%	5	28.2	1.350	2,390,942	15.7	7.1
	1	18.2	1.015	1,046,993	50.6	23.0	
LDDT	2	19.1	0.979	2,727,290	127.2	57.7	
with VMT	3	24.4	0.813	1,694,159	65.6	29.8	
mix of	4	24.7	0.806	872,616	33.5	15.2	
2.2%	5	28.2	0.733	2,390,942	83.5	37.9	
	1	18.2	4.479	1,046,993	939.7	426.3	
HDDV	2	19.1	4.274	2,727,290	2,335.5	1,059.4	
with VMT	3	24.4	3.314	1,694,159	1,125.0	510.3	
mix of	4	24.7	3.271	872,616	572.0	259.5	
9.1%	5	28.2	2.849	2,390,942	1,365.0	619.2	
	1	18.2	19.735	1,046,993	232.3	105.4	
MC	2	19.1	18.983	2,727,290	582.0	264.0	
with VMT	3	24.4	15.626	1,694,159	297.6	135.0	
mix of	4	24.7	15.480	872,616	151.9	68.9	
0.5%	5	28.2	13.874	2,390,942	372.9	169.2	

Table 5.5–4. Daily CO emissions in Maricopa County by vehicle class, facility type and area type (annual average daily traffic) (continued).

Facility type	Vehicle class	Area type	Speed (mph)	Emission factor (g/mi)	DVMT (miles)	Emissions (lb/day)	Emissions (kg/day)
LOCAL		1	12.9	10.904	195,247	2,116.1	959.8
	LDGV	2	12.9	10.904	1,991,136	21,579.8	9,788.6
	with VMT	3	12.9	10.904	2,564,545	27,794.3	12,607.5
	mix of	4	12.9	10.904	1,689,510	18,310.8	8,305.8
	45.1%	5	12.9	10.904	1,422,562	15,417.6	6,993.4
		1	12.9	14.157	195,247	1,719.5	780.0
	LDGT1	2	12.9	14.157	1,991,136	17,535.4	7,954.1
	with VMT	3	12.9	14.157	2,564,545	22,585.3	10,244.7
	mix of	4	12.9	14.157	1,689,510	14,879.1	6,749.1
	28.2%	5	12.9	14.157	1,422,562	12,528.1	5,682.8
		1	12.9	16.521	195,247	793.5	360.0
	LDGT2	2	12.9	16.521	1,991,136	8,092.6	3,670.8
	with VMT	3	12.9	16.521	2,564,545	10,423.1	4,727.9
	mix of	4	12.9	16.521	1,689,510	6,866.7	3,114.7
	11.2%	5	12.9	16.521	1,422,562	5,781.7	2,622.6
		1	12.9	25.590	195,247	392.1	177.9
	HDGV	2	12.9	25.590	1,991,136	3,998.6	1,813.8
	with VMT	3	12.9	25.590	2,564,545	5,150.1	2,336.1
	mix of	4	12.9	25.590	1,689,510	3,392.9	1,539.0
	3.6%	5	12.9	25.590	1,422,562	2,856.8	1,295.8
		1	12.9	2.216	195,247	2.1	1.0
	LDDV	2	12.9	2.216	1,991,136	21.4	9.7
	with VMT	3	12.9	2.216	2,564,545	27.6	12.5
	mix of	4	12.9	2.216	1,689,510	18.2	8.2
	0.2%	5	12.9	2.216	1,422,562	15.3	6.9
	1	12.9	1.294	195,247	12.0	5.5	
LDDT	2	12.9	1.294	1,991,136	122.7	55.6	
with VMT	3	12.9	1.294	2,564,545	158.0	71.7	
mix of	4	12.9	1.294	1,689,510	104.1	47.2	
2.2%	5	12.9	1.294	1,422,562	87.6	39.8	
	1	12.9	6.090	195,247	238.3	108.1	
HDDV	2	12.9	6.090	1,991,136	2,429.9	1,102.2	
with VMT	3	12.9	6.090	2,564,545	3,129.7	1,419.6	
mix of	4	12.9	6.090	1,689,510	2,061.8	935.2	
9.1%	5	12.9	6.090	1,422,562	1,736.1	787.5	
	1	12.9	26.555	195,247	58.3	26.4	
MC	2	12.9	26.555	1,991,136	594.4	269.6	
with VMT	3	12.9	26.555	2,564,545	765.6	347.3	
mix of	4	12.9	26.555	1,689,510	504.4	228.8	
0.5%	5	12.9	26.555	1,422,562	424.7	192.6	

5.6 Summary of CO emissions from onroad mobile sources

Tables 5.6–1 through 5.6–4 summarize the calculated CO emissions by vehicle class, area, and facility type. Total daily CO emissions from onroad mobile sources for the CO nonattainment area in the 2002 carbon monoxide season are estimated to be 799,751 kilograms per day or 1,763,151 pounds per day. Total CO emissions from daily onroad mobile sources for all of Maricopa County for the 2002 carbon monoxide season are estimated to be 873,558 kilograms per day or 1,925,867 pounds per day.

Similarly, total CO emissions were estimated for all of 2002. For the carbon monoxide nonattainment area, onroad estimates are 322,867 English tons per year. For all of Maricopa County, onroad emissions are estimated to be 352,821 English tons per year.

Table 5.6–1. Daily CO emissions (kg/day) in the CO nonattainment area from onroad mobile sources by vehicle class, area type and facility type (winter day).

Facility type	Area type	Vehicle class						MC	TOTAL	
		LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT			HDDV
INTERSTATE, FREEWAY, and EXPRESSWAY	1	5,991.2	5,354.6	2,720.8	407.5	3.2	17.1	239.7	91.9	14,825.8
	2	48,200.6	43,060.8	21,886.8	3,347.0	25.5	138.3	1,951.6	767.1	119,377.8
	3	33,329.4	29,777.9	15,132.3	2,345.1	17.7	96.1	1,360.8	543.0	82,602.3
	4	24,170.7	21,595.1	10,974.0	1,700.7	12.8	69.7	986.8	393.8	59,903.8
	5	14,305.7	12,781.3	6,495.1	1,006.6	7.6	41.3	584.1	233.1	35,454.6
	Total	125,997.5	112,569.6	57,209.0	8,806.9	66.7	362.5	5,123.0	2,029.0	312,164.3
PRINCIPAL ARTERIAL and MINOR ARTERIAL	1	4,522.1	4,191.7	2,118.7	330.7	3.2	17.3	249.5	56.1	11,489.3
	2	37,032.9	34,330.1	17,340.3	2,407.4	24.2	130.4	1,800.1	412.7	93,478.1
	3	41,487.7	38,408.7	19,413.5	2,583.7	26.3	140.9	1,918.7	441.8	104,421.3
	4	29,983.6	27,692.0	14,004.1	1,745.6	18.0	96.2	1,280.9	295.8	75,116.3
	5	11,898.3	10,938.8	5,539.7	655.7	6.8	36.1	471.2	108.4	29,655.1
	Total	124,924.7	115,561.4	58,416.2	7,723.1	78.5	420.9	5,720.5	1,314.9	314,160.1
COLLECTOR	1	4,604.2	4,235.4	2,156.4	544.3	4.2	24.2	406.5	79.8	12,055.1
	2	11,883.8	10,950.6	5,567.4	1,349.2	10.6	60.9	1,010.4	200.4	31,033.3
	3	7,131.7	6,598.8	3,344.3	644.0	5.6	31.4	486.7	103.4	18,346.0
	4	3,665.9	3,395.9	1,720.1	327.3	2.9	16.0	247.5	52.8	9,428.4
	5	3,981.1	3,690.3	1,866.3	312.3	2.9	16.0	235.9	52.1	10,156.9
	Total	31,266.6	28,871.1	14,654.5	3,177.2	26.2	148.5	2,387.1	488.5	81,019.7
LOCAL	1	925.5	843.7	432.9	141.0	1.0	5.8	103.1	19.8	2,472.8
	2	9,438.6	8,604.2	4,415.0	1,437.8	9.9	58.7	1,051.3	202.2	25,217.9
	3	12,156.8	11,082.1	5,686.5	1,851.9	12.7	75.6	1,354.1	260.5	32,480.2
	4	8,008.8	7,300.8	3,746.2	1,220.0	8.4	49.8	892.1	171.6	21,397.8
	5	4,056.6	3,698.0	1,897.5	618.0	4.3	25.2	451.9	86.9	10,838.4
	Total	34,586.3	31,528.9	16,178.2	5,268.8	36.3	215.2	3,852.5	741.0	92,407.2
GRAND TOTALS:		316,775.2	288,531.0	146,457.9	24,975.9	207.6	1,147.2	17,083.0	4,573.4	799,751.2

Table 5.6–2. Daily CO emissions (kg day) in Maricopa County from onroad mobile sources by vehicle class, area type and facility type (winter day).

Facility type	Area type	Vehicle class								
		LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	TOTAL
INTERSTATE, FREEWAY, and EXPRESSWAY	1	5,991.2	5,354.6	2,720.8	407.5	3.2	17.1	239.7	91.9	14,825.8
	2	48,200.6	43,060.8	21,886.8	3,347.0	25.5	138.3	1,951.6	767.1	119,377.8
	3	33,329.4	29,777.9	15,132.3	2,345.1	17.7	96.1	1,360.8	543.0	82,602.3
	4	24,170.7	21,595.1	10,974.0	1,700.7	12.8	69.7	986.8	393.8	59,903.8
	5	30,241.0	27,018.5	13,730.1	2,127.8	16.0	87.2	1,234.7	492.7	74,948.1
	Total	141,932.9	126,806.9	64,443.9	9,928.1	75.2	408.5	5,773.6	2,288.6	351,657.8
PRINCIPAL ARTERIAL and MINOR ARTERIAL	1	4,522.1	4,191.7	2,118.7	330.7	3.2	17.3	249.5	56.1	11,489.3
	2	37,032.9	34,330.1	17,340.3	2,407.4	24.2	130.4	1,800.1	412.7	93,478.1
	3	41,487.7	38,408.7	19,413.5	2,583.7	26.3	140.9	1,918.7	441.8	104,421.3
	4	29,983.6	27,692.0	14,004.1	1,745.6	18.0	96.2	1,280.9	295.8	75,116.3
	5	16,658.7	15,315.3	7,756.0	918.1	9.5	50.5	659.7	151.8	41,519.7
	Total	129,685.1	119,937.9	60,632.6	7,985.5	81.2	435.4	5,909.0	1,358.2	326,024.8
COLLECTOR	1	4,604.2	4,235.4	2,156.4	544.3	4.2	24.2	406.5	79.8	12,055.1
	2	11,883.8	10,950.6	5,567.4	1,349.2	10.6	60.9	1,010.4	200.4	31,033.3
	3	7,131.7	6,598.8	3,344.3	644.0	5.6	31.4	486.7	103.4	18,346.0
	4	3,665.9	3,395.9	1,720.1	327.3	2.9	16.0	247.5	52.8	9,428.4
	5	9,966.4	9,238.5	4,672.2	781.9	7.3	40.0	590.6	130.4	25,427.2
	Total	37,251.9	34,419.2	17,460.4	3,646.7	30.5	172.6	2,741.8	566.8	96,290.0
LOCAL	1	925.5	843.7	432.9	141.0	1.0	5.8	103.1	19.8	2,472.8
	2	9,438.6	8,604.2	4,415.0	1,437.8	9.9	58.7	1,051.3	202.2	25,217.9
	3	12,156.8	11,082.1	5,686.5	1,851.9	12.7	75.6	1,354.1	260.5	32,480.2
	4	8,008.8	7,300.8	3,746.2	1,220.0	8.4	49.8	892.1	171.6	21,397.8
	5	6,743.4	6,147.3	3,154.3	1,027.3	7.1	42.0	751.1	144.5	18,016.9
	Total	37,273.1	33,978.2	17,435.0	5,678.1	39.1	231.9	4,151.7	798.6	99,585.6
GRAND TOTALS:		346,142.9	315,142.2	159,971.9	27,238.4	226.0	1,248.3	18,576.1	5,012.3	873,558.1

Table 5.6–3. Daily CO emissions (kg/day) in the CO nonattainment area from onroad mobile sources by vehicle class, area type and facility type (annual average day).

Facility type	Area type	Vehicle class								
		LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	TOTAL
INTERSTATE, FREEWAY, and EXPRESSWAY	1	6,672.5	5,324.0	2,369.5	514.1	3.1	16.2	251.3	121.6	15,272.3
	2	53,744.6	42,853.5	19,069.8	4,221.6	25.0	131.0	2,046.2	1,016.3	123,107.9
	3	37,200.3	29,653.4	13,191.2	2,958.2	17.3	91.0	1,426.2	720.2	85,257.7
	4	26,977.9	21,504.9	9,566.3	2,145.3	12.6	66.0	1,034.3	522.3	61,829.6
	5	15,967.1	12,727.8	5,661.9	1,269.7	7.4	39.0	612.2	309.1	36,594.3
	Total	140,562.4	112,063.6	49,858.8	11,108.9	65.3	343.2	5,370.2	2,689.4	322,061.9
PRINCIPAL ARTERIAL and MINOR ARTERIAL	1	4,748.8	3,987.7	1,807.4	417.0	3.1	16.4	261.6	72.5	11,314.5
	2	39,174.5	32,918.9	14,876.9	3,037.8	23.6	123.4	1,887.1	530.1	92,572.3
	3	44,085.6	36,971.2	16,691.9	3,258.9	25.7	133.4	2,012.0	565.9	103,744.6
	4	31,703.7	26,556.0	11,982.1	2,202.2	17.7	91.1	1,342.9	377.6	74,273.2
	5	12,687.1	10,565.1	4,757.5	827.1	6.7	34.1	494.1	137.7	29,509.3
	Total	132,399.6	110,998.8	50,115.9	9,742.9	76.8	398.5	5,997.6	1,683.8	311,413.9
COLLECTOR	1	4,739.3	3,919.9	1,796.9	686.6	4.1	23.0	426.3	105.4	11,701.5
	2	12,222.7	10,132.5	4,641.4	1,701.3	10.4	57.7	1,059.4	264.0	30,089.4
	3	7,339.3	6,154.7	2,805.7	811.9	5.5	29.8	510.3	135.0	17,792.2
	4	3,774.7	3,167.2	1,443.8	412.6	2.8	15.2	259.5	68.9	9,144.6
	5	4,116.0	3,465.4	1,574.9	393.7	2.8	15.1	247.3	67.6	9,882.9
	Total	32,192.1	26,839.7	12,262.8	4,006.1	25.6	140.7	2,502.7	640.8	78,610.5
LOCAL	1	959.8	780.0	360.0	177.9	1.0	5.5	108.1	26.4	2,418.5
	2	9,788.6	7,954.1	3,670.8	1,813.8	9.7	55.6	1,102.2	269.6	24,664.4
	3	12,607.5	10,244.7	4,727.9	2,336.1	12.5	71.7	1,419.6	347.3	31,767.3
	4	8,305.8	6,749.1	3,114.7	1,539.0	8.2	47.2	935.2	228.8	20,928.1
	5	4,207.0	3,418.6	1,577.7	779.5	4.2	23.9	473.7	115.9	10,600.5
	Total	35,868.7	29,146.4	13,451.1	6,646.3	35.6	203.9	4,038.9	988.0	90,378.9
GRAND TOTALS:		341,022.9	279,048.5	125,688.5	31,504.3	203.3	1,086.3	17,909.5	6,002.0	802,465.3

Table 5.6-4. Daily CO emissions (kg/day) in Maricopa County from onroad mobile sources by vehicle class, area type and facility type (annual average day).

Facility type	Area type	Vehicle class								
		LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC	TOTAL
INTERSTATE, FREEWAY, and EXPRESSWAY	1	6,672.5	5,324.0	2,369.5	514.1	3.1	16.2	251.3	121.6	15,272.3
	2	53,744.6	42,853.5	19,069.8	4,221.6	25.0	131.0	2,046.2	1,016.3	123,107.9
	3	37,200.3	29,653.4	13,191.2	2,958.2	17.3	91.0	1,426.2	720.2	85,257.7
	4	26,977.9	21,504.9	9,566.3	2,145.3	12.6	66.0	1,034.3	522.3	61,829.6
	5	33,753.2	26,905.6	11,968.8	2,684.1	15.7	82.5	1,294.1	653.4	77,357.5
	Total	158,348.5	126,241.4	56,165.7	12,523.3	73.6	386.7	6,052.1	3,033.7	362,825.0
PRINCIPAL ARTERIAL and MINOR ARTERIAL	1	4,748.8	3,987.7	1,807.4	417.0	3.1	16.4	261.6	72.5	11,314.5
	2	39,174.5	32,918.9	14,876.9	3,037.8	23.6	123.4	1,887.1	530.1	92,572.3
	3	44,085.6	36,971.2	16,691.9	3,258.9	25.7	133.4	2,012.0	565.9	103,744.6
	4	31,703.7	26,556.0	11,982.1	2,202.2	17.7	91.1	1,342.9	377.6	74,273.2
	5	17,763.0	14,792.0	6,661.0	1,158.0	9.3	47.8	691.7	192.8	41,315.7
	Total	137,475.6	115,225.8	52,019.3	10,073.9	79.4	412.1	6,195.3	1,738.9	323,220.2
COLLECTOR	1	4,739.3	3,919.9	1,796.9	686.6	4.1	23.0	426.3	105.4	11,701.5
	2	12,222.7	10,132.5	4,641.4	1,701.3	10.4	57.7	1,059.4	264.0	30,089.4
	3	7,339.3	6,154.7	2,805.7	811.9	5.5	29.8	510.3	135.0	17,792.2
	4	3,774.7	3,167.2	1,443.8	412.6	2.8	15.2	259.5	68.9	9,144.6
	5	10,304.2	8,675.3	3,942.6	985.7	7.1	37.9	619.2	169.2	24,741.1
	Total	38,380.3	32,049.7	14,630.5	4,598.0	29.9	163.5	2,874.6	742.4	93,468.8
LOCAL	1	959.8	780.0	360.0	177.9	1.0	5.5	108.1	26.4	2,418.5
	2	9,788.6	7,954.1	3,670.8	1,813.8	9.7	55.6	1,102.2	269.6	24,664.4
	3	12,607.5	10,244.7	4,727.9	2,336.1	12.5	71.7	1,419.6	347.3	31,767.3
	4	8,305.8	6,749.1	3,114.7	1,539.0	8.2	47.2	935.2	228.8	20,928.1
	5	6,993.4	5,682.8	2,622.6	1,295.8	6.9	39.8	787.5	192.6	17,621.4
	Total	38,655.1	31,410.6	14,496.0	7,162.6	38.3	219.8	4,352.7	1,064.8	97,399.8
GRAND TOTALS:		372,859.4	304,927.4	137,311.5	34,357.8	221.3	1,182.0	19,474.6	6,579.8	876,913.9

5.7 Quality assurance process

5.7.1 VMT estimates

Normal quality assurance procedures, including extensive automated consistency checks, were used by ADOT in developing the 2002 HPMS data. These data were submitted to the Federal Highway Administration in October 2003.

5.7.2 Emission factor estimates

The quality assurance (QA) process performed on the MOBILE6.2 analyses included accuracy, completeness, and reasonableness checks. For accuracy and completeness, a system was used that included a two-layer, independent reviewer set-up. All hard copy and computer-based data entries as well as all calculations procedures were checked independently for accuracy and completeness by two different reviewers. Any errors found were corrected and the changes were then rechecked by the reviewers.

The entire onroad mobile source portion of the 2002 periodic CO inventory was reviewed by MAG staff that did not directly participate in its development. All comments were addressed.

5.7.3 Quality review of 2002 periodic CO emissions inventory

The draft onroad mobile source portion of the 2002 periodic carbon monoxide emissions inventory was reviewed using published EPA quality review guidelines for base year emission inventories (EPA Document 450/4-91-022, September 1991). The procedural review (Levels I, II, and III) included checks for completeness, consistency, and the correct use of appropriate procedures.

Additionally, the draft onroad mobile source portion of the 2002 periodic carbon monoxide emissions inventory for the carbon monoxide nonattainment area was compared with the onroad mobile source portions of the 1990, 1993, 1996, and 1999 base year and periodic emissions inventories. The results are in Table 5.7–1. Estimates for Maricopa County in its entirety were not prepared for previous inventories, so no comparison is possible.

Table 5.7–1. Comparison of CO emissions from onroad mobile sources and vehicle miles traveled (VMT) in the CO nonattainment area, 1990–2002.

Year of analysis	CO emissions from onroad mobile sources (lb/yr)	Vehicle miles traveled (VMT)
1990	1,615,410	45,877,773
1993	1,220,223	48,153,240
1996	1,120,508	53,091,273
1999	1,080,829	57,853,980
2002	1,763,151	68,199,542

While the VMT increases over time, the modeled onroad CO emissions decrease between 1990 and 1999 because of the implementation of control measures designed to reduce onroad emissions such as I/M program, cleaner gasoline, cleaner vehicle technologies, etc. This decline would have continued if MOBILE5a had been used for the 2002 inventory. Significant increase is modeled between 1999 and 2002 due to the use of MOBILE6.2 in the 2002 analysis versus MOBILE5a in the 1999 and previous analyses. It is also important to note that the base case emissions from the Serious Area CO Plan may not match those in the periodic inventories because of a different year modeled and different modeling domain size.

As an additional QA check, the average miles per gallon estimate was derived using average annual daily VMT estimates and gasoline sales from ADOT. The results of that QA check may be found in Appendix 5.5.

5.8 References

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