Maricopa County
Air Quality Department

2008 Periodic Emissions Inventory
for
Carbon Monoxide

for the
Maricopa County, Arizona, Maintenance Area

November 2012

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2008 Periodic Emission Inventory for Carbon Monoxide for the Maricopa County, Arizona Maintenance Area

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1. Introduction

1.1 Overview

This 2008 periodic carbon monoxide (CO) emissions inventory was developed to meet requirements set forth in Title I of the Clean Air Act Amendments of 1990 (CAAA). The CAAA require development of a baseline emission inventory and periodic revisions for areas that fail to meet the National Ambient Air Quality Standards (NAAQS) and for maintenance areas. In 2005, the Phoenix metropolitan area was redesignated to attainment for CO and the area became a maintenance area.

This inventory includes emission estimates for carbon monoxide (CO) from point, area, nonroad mobile, and onroad mobile sources. Note that totals shown in all tables may not equal the sum of individual values due to independent rounding.

1.2 Agencies responsible for the emissions inventory

Maricopa County Air Quality Department (MCAQD) has primary responsibility for preparing and submitting the 2008 Periodic Carbon Monoxide Emissions Inventory for Maricopa County. Point, area, and nonroad mobile source emission estimates were prepared by MCAQD. The Maricopa Association of Governments (MAG) prepared the emission estimates for onroad mobile and biogenic source categories. Table 1.2–1 lists those responsible for inventory preparation and quality assurance/quality control activities, which are described in the respective chapters.

Table 1.2–1. Contact information for chapter authors and QA/QC personnel.

Chapter	Author(s)	QA/QC contact persons
2. Point Sources	Matt Poppen, MCAQD (602) 506-6790	Bob Downing and Eric Raisanen MCAQD (602) 506-6790
3. Area Sources	Matt Poppen, Eric Raisanen and Dena Konopka, MCAQD (602) 506-6790	Bob Downing, MCAQD (602) 506-6790
4. Nonroad Mobile Sources	Matt Poppen and Bob Downing MCAQD (602) 506-6790	Bob Downing and Eric Raisanen MCAQD (602) 506-6790
5. Onroad Mobile Sources	Ieesuck Jung and Cathy Arthur MAG (602) 254-6300	Bob Downing and Eric Raisanen MCAQD (602) 506-6790
6. Biogenic Sources	Feng Liu MAG (602) 254-6300	Bob Downing and Eric Raisanen MCAQD (602) 506-6790

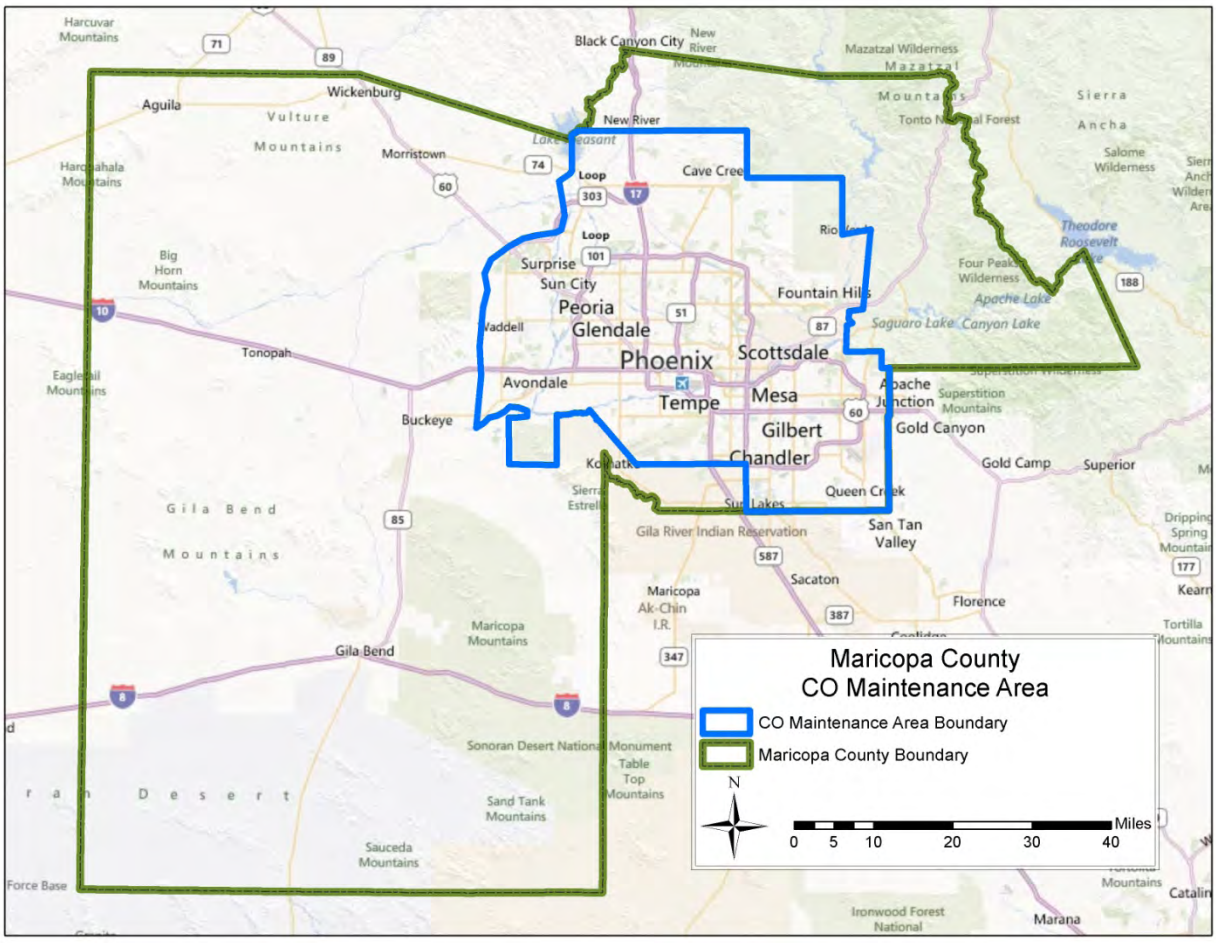
1.3 Temporal scope

Annual and CO season-day emissions were estimated for the year 2008, for Maricopa County and the Maricopa County CO maintenance area. The three-month peak CO season for Maricopa County is defined as November through January. The CO season is based on CO exceedances from 1988 through 1991 and is consistent with the CO season in the 1990 base year inventory.

1.4 Geographic scope

This inventory includes emission estimates for Maricopa County and for the Maricopa County CO maintenance area. Maricopa County encompasses approximately 9,223 square miles of land area, while the Maricopa County CO maintenance area is approximately 1,946 square miles or approximately 21 percent of the Maricopa County land area. A map of Maricopa County and the CO maintenance area is provided in Figure 1.4–1.

Figure 1.4–1. Map of Maricopa County and the CO maintenance area.



1.5 Overview of local demographic and land-use data

Many of the emissions estimates generated in this report were calculated using demographic and land-use data provided by the Maricopa Association of Governments (MAG). These data were used to apportion and/or scale Maricopa County emissions estimates to the maintenance area and vice versa. (For example, county-level emissions from residential natural gas usage in Maricopa County were apportioned to the maintenance area using the ratio of occupied households in each area). Detailed explanations of how emission estimates were apportioned or scaled are presented in each of the following chapters, along with the data sources used.

1.5.1 Demographic data

The demographic data provided by MAG included population, housing and employment data for calendar year 2008, for Maricopa County and the maintenance area. Table 1.5-1 provides an overview of the demographic data used in this report.

Table 1.5–1. Demographic profile of Maricopa County and the CO maintenance area.

Demographic variable	Maricopa County totals	Within CO Maintenance Area	Percent within CO Maintenance Area
Total resident population	4,026,000	3,899,350	96.85%
Total non-resident population	253,760	248,420	97.90%
Total population:	**4,279,760**	**4,147,770**	**96.92%**
Retail employment	537,430	526,840	98.03%
Office employment	444,170	442,770	99.68%
Industrial employment	412,580	406,050	98.42%
Public employment	278,610	267,370	95.97%
Other employment	191,770	184,210	96.06%
Construction	79,680	73,420	92.14%
Work at home	65,620	63,370	96.57%
Total employment:	**2,009,860**	**1,964,030**	**97.72%**
Single-family/multi-family household split:			
Single-family	75%	75%	
Multi-family	25%	25%	

1.5.2 Land-use data

MAG provided draft 2009 land use data (as of March 2010). The draft 2009 land-use data was assumed to be representative of 2008. Table 1.5–2 presents a summary of the land-use categories and acreage used to develop emission estimates for this inventory.

Table 1.5–2. Land-use categories used to apportion emissions.

Land use category	Area within Maricopa County (acres)	Area Within CO Maintenance Area (acres)	Percent within CO Maintenance Area
General/active open space/golf course (e.g., parks)	228,295	187,787	82.26%
Passive/restricted open space (e.g., mountain preserves)	2,373,545	89,051	3.75%
Lakes	12,525	12,525	100.00%
Agriculture	295,509	84,979	28.76%
Vacant (e.g., developable land)	2,227,981	171,785	7.71%

1.6 Emissions overview by source category

1.6.1 Point sources

The point source category includes those stationary sources that emit a significant amount of pollution into the air such as power plants, petroleum product storage and transfer facilities, and large industrial facilities. MCAQD utilizes the US EPA's Annual Emissions Reporting Requirements (AERR) Rule to define which stationary sources are listed as point sources. A detailed definition of a point source can be found in Section 2.1 of Chapter 2.

Table 1.6–1 summarizes annual and season-day emissions from point sources (including emission reduction credits) in Maricopa County and the CO maintenance area, respectively. A detailed breakdown of emissions calculations for all point sources is contained in Chapter 2.

Table 1.6–1. Summary of annual and season-day point source emissions.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	738.04	3,235.7
CO Maintenance Area	371.77	1,575.4

1.6.2 Area sources

Area sources are facilities or activities whose individual emissions do not qualify them as point sources. Area sources represent numerous facilities or activities that individually release small amounts of a given pollutant, but collectively they can release significant amounts of a pollutant. Stationary sources with annual emissions lower than the point source thresholds described in Section 2.1 were included in the area source inventory. Examples of area source categories include residential wood burning, commercial cooking, waste incineration, and wildfires.

Table 1.6–2 summarizes annual and season-day emissions of the chief area source categories, for both Maricopa County and the CO maintenance area. A detailed breakdown of emissions calculations for each area source category is contained in Chapter 3.

Table 1.6–2. Summary of annual and season-day area source emissions, by source category.

	Maricopa County		CO maintenance area	
Source category	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Fuel combustion	6,900.04	79,250.4	6,725.01	77,055.5
Industrial processes	655.87	4,134.3	629.03	3,985.3
Waste treatment/disposal	730.70	17,039.4	257.60	1,657.3
Miscellaneous area sources	4,968.33	2,486.9	140.40	712.9
All area sources:	**13,254.94**	**102,911.0**	**7,752.04**	**83,411.1**

1.6.3 Nonroad mobile sources

Nonroad mobile sources include off-highway vehicles and engines that move or are moved within a 12-month period. Table 1.6–3 summarizes annual and season-day emissions from nonroad mobile sources, for both Maricopa County and the CO maintenance area. A detailed breakdown of emissions calculations for each source category is contained in Chapter 4.

Table 1.6–3. Summary of annual and season-day emissions from nonroad mobile sources.

	Maricopa County		CO maintenance area	
Equipment category	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Agricultural	367.01	513.7	105.55	147.7
Airport ground support equipment	4,842.26	26,460.4	21,327.08	116,541.4
Commercial	37,407.59	204,928.7	36,816.55	201,690.8
Construction & mining equipment	17,097.10	90,379.7	15,753.27	83,275.9
Industrial equipment	10,294.56	64,617.8	10,131.90	63,596.8
Lawn & garden	66,712.36	100,753.6	64,657.62	97,650.4
Pleasure craft	1,627.41	5,008.5	431.81	1,328.9
Railway maintenance	19.33	120.8	18.73	117.1
Recreational equipment	7,270.41	24,593.7	412.23	1,394.5
Aircraft	17,105.50	93,472.7	16,683.40	91,166.1
Locomotives	276.93	1,513.3	119.23	651.6
All nonroad mobile sources:	**163,020.46**	**612,362.8**	**166,457.38**	**657,561.2**

1.6.4 Onroad mobile sources

Emissions from onroad mobile sources were calculated for the CO maintenance area located primarily within Maricopa County as well as for Maricopa County as a whole. A detailed break-down of emissions calculations by vehicle class and roadway type is contained in Chapter 5.

Table 1.6–4 summarizes annual and season-day emissions from onroad mobile sources for both Maricopa County and the CO maintenance area.

Table 1.6–4. Annual and season-day emissions from onroad mobile sources in Maricopa County.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	255,355.67	1,293,502.6
CO Maintenance Area	237,324.41	1,201,621.5

1.6.5 Biogenic sources

The biogenic source category includes emissions from all vegetation (e.g., crops, indigenous vegetation, landscaping, etc.) in Maricopa County and the CO maintenance area. Emissions were estimated using the Model of Emissions of Gases and Aerosols from Nature (MEGAN). MEGAN is a state-of-the-art biogenic emissions model developed by the National Center for Atmospheric Research (NCAR). Some corrections and improvements were made in the latest version of MEGAN2.04. MEGAN2.04 was used to compute biogenic emissions in Maricopa County and the CO maintenance area. Annual and daily CO emissions from biogenic sources are shown in Table 1.6–5 for Maricopa County and the CO maintenance area.

Table 1.6–5. Annual and season-day emissions from biogenic sources.

Geographic area	Annual CO emissions (tons/yr)	Typical daily CO emissions (lbs/day)
Maricopa County	14,452.68	21,144.7
CO Maintenance Area	3,130.39	4,646.0

2. Point Sources

2.1 Introduction and scope

This carbon monoxide (CO) inventory is one of a number of emission inventory reports being prepared to meet US EPA reporting requirements. In addition to preparing periodic emissions inventories for the CO maintenance area as a commitment under the current CO State Implementation Plan (SIP), the federal Air Emission Reporting Requirements (AERR) requires that state and local agencies prepare emissions estimates on a county basis, and submit data electronically to the US EPA for inclusion in the National Emission Inventory (NEI) for 2008. This CO inventory was developed concurrently with similar inventories for ozone precursors (VOC, NO_x and CO), and PM (including PM_{10}, $PM_{2.5}$, NO_x, SO_x, and NH_3), as part of Maricopa County's requirements under the respective SIPs.

In order to provide consistency among all these inventories, it was decided to standardize the definition of a "point source" by adopting the designation of point sources as outlined in the AERR:

> *We are basing the requirement for point source format reporting on whether the source is major under 40 CFR part 70 for the pollutants for which reporting is required, i.e., CO, VOC, NO_x, SO_2, $PM_{2.5}$, PM_{10}, lead and NH_3 but without regard to emissions of HAPs…this approach will result in a more stable universe of reporting point sources, which in turn will facilitate elimination of overlaps and gaps in estimating point source emissions, as compared to nonpoint source emissions. Under this requirement, states will know well in advance of the start of the inventory year which sources will need to be reported. (US EPA, 2008)*

Additionally, EPA guidance requires emission inventories prepared for SIP development purposes to consider point sources within 25 miles of the CO maintenance area. No additional point sources met this reporting threshold.

This point source inventory includes actual CO emissions for the year 2008 and a typical day during the CO season (defined as November through January). A description and map of the maintenance area are provided in Chapter 1.

Several tables have been constructed to provide the point source emissions and category totals. Table 2.2–1 provides an alphabetical list of all point sources and their location, while Table 2.4–1 shows the 2008 annual and average CO season-day emissions broken out by facility. Note that totals shown in all tables may not equal the sum of individual values due to independent rounding.

2.2 Identification of CO point sources

The Maricopa County Air Quality Department (MCAQD) identified point sources within Maricopa County through its electronic permit system database, Environmental Management System (EMS), and the 2008 annual emissions reports submitted to the department. A total of 21 stationary sources were identified as point sources using the definition described in Section 2.1.

There are no additional point sources within the 25-mile boundary around the CO maintenance area with permits issued by the Pinal County Air Quality Control District (PCAQCD). While the Arizona Department of Environmental Quality (ADEQ) retains permitting authority for a limited number of industrial source categories in Maricopa County, no ADEQ-permitted facilities are considered point sources, and are addressed instead as area sources.

Table 2.2–1 contains an alphabetical listing of all point sources, including a unique business identification number, NAICS industry classification code, business name, and physical address.

Table 2.2–1. Name and location of all point sources in Maricopa County.

ID #	NAICS	Business name	Address	City	ZIP	
245	337122	AF Lorts Manufacturing Company	8120 W Harrison St	Tolleson	85353	
3313	221112	APS West Phx Power Plant	4606 W Hadley St	Phoenix	85043	
43063	221112	Dynegy Arlington Valley LLC	39027 W Elliot Rd	Arlington	85322	*
44439	221112	Gila River Power Station	1250 E Watermelon Rd	Gila Bend	85337	*
1418	326299	Goodrich Corporation	3414 S 5th St	Phoenix	85040	
355	336412	Honeywell-Engines Systems & Services	111 S 34th St	Phoenix	85034	
3300	92811	Luke AFB - 56th Fighter Wing	14002 W Marauder St	Glendale	85309	
62	33711	Mastercraft Cabinets Inc.	305 S Brooks	Mesa	85202	
44186	221112	Mesquite Generating Station	37625 W Elliot Rd	Arlington	85322	*
43530	221112	New Harquahala Generating Co	2530 N 491st Ave	Tonopah	85354	*
20706	32614	New Wincup Holdings, Inc.	7980 W Buckeye Rd	Phoenix	85043	
52382	221112	Ocotillo Power Plant	1500 E University Dr	Tempe	85281	
1341	33992	Penn Racquet Sports Inc.	306 S 45th Ave	Phoenix	85043	
42956	221112	Redhawk Generating Facility	11600 S 363rd Ave	Arlington	85322	*
303	332431	Rexam Beverage Can Company	211 N 51st Ave	Phoenix	85043	
3315	221112	Santan Generating Station	1005 S Val Vista Rd	Gilbert	85296	
4175	424710	SFPP LP Phoenix Terminal	49 N 53rd Ave	Phoenix	85043	
3316	221112	SRP Agua Fria Generating Station	7302 W Northern Ave	Glendale	85303	
3317	221112	SRP Kyrene Generating Station	7005 S Kyrene Rd	Tempe	85283	
552	337122	Thornwood Furniture Mfg	5125 E Madison St	Phoenix	85034	
174	325998	W. R. Meadows Of Arizona, Inc.	4220 S Sarival Ave	Goodyear	85338	

* = Facility is outside the CO maintenance area.

2.3 Procedures for estimating emissions from point sources

Both annual and average season-day CO emissions were estimated from annual source emission reports, MCAQD investigation reports, permit files and logs, or telephone contacts with sources. For most of the sources, material balance methods were used for determining emissions. Emissions were estimated using the emission factors from AP–42, source tests, engineering calculations, or manufacturers' specifications.

MCAQD distributes annual emissions survey forms to nearly all facilities for which MCAQD has issued an operating permit. Facilities are required to report detailed information on stacks, control devices, operating schedules, and process-level information concerning their annual activities. (See Appendix 1 for a copy of the instructions to complete the emissions inventory.) These instructions include examples and explanations on how to complete the annual emissions reporting forms that facilities must submit to MCAQD. Activity data reported for the December–February winter season is presumed to be representative of the November–January CO season.

After a facility has submitted an annual emissions report to MCAQD, emissions inventory staff check all reports for missing and questionable data, and check the accuracy and reasonableness of all emissions calculations with AP–42, the Factor Information and REtrieval (*webFIRE*) software, and other EPA documentation. Control efficiencies are determined by source tests when available, or by AP–42 factors, engineering calculations, or manufacturers' specifications. MCAQD has conducted annual emissions surveys for permitted facilities since 1988, and the department's database system, EMS, contains numerous automated quality assurance/quality control checks for data input and processing.

2.3.1 Application of rule effectiveness

Rule effectiveness reflects the actual ability of a regulatory program to achieve the emission reductions required by regulation. The concept of applying rule effectiveness in a SIP emission inventory has evolved from the observation that regulatory programs may be less than 100 percent effective for some source categories. Rule effectiveness (RE) is applied to those sources affected by a regulation and for which emissions are determined by means of emission factors and control efficiency estimates.

MCAQD has estimated RE for industrial processes that claimed emissions reductions through the use of a control device, RE calculations were performed separately for Title V and non-Title V sources. Overall RE values of 90.94% (for Title V processes) and 84.27% (for non-Title V) were calculated. (See Appendix 2 for details on the methods and data used in computing RE rates.)

2.4 Detailed overview of point source emissions

Table 2.4–1 provides a summary of annual and CO season-day emissions from all point sources, within and outside the CO maintenance area. Sources for which rule effectiveness has been applied (for CO emissions) are noted. Values of “0.00” and “0.0” for annual and season-day emissions denote a value below the level of significance (0.005 tons/yr and 0.05 lbs/day, respectively).

Table 2.4–1. Annual and CO season-day point source emissions, by facility.

ID #	Business name	City	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
245	AF Lorts Manufacturing Company	Tolleson	0.0	0.06
3313	APS West Phx Power Plant	Phoenix	72.2	372.60
43063	Dynegy Arlington Valley LLC	Arlington *	41.5	97.98
44439	Gila River Power Station	Gila Bend * †	84.8	415.40
1418	Goodrich Corporation	Phoenix †	0.2	2.96
355	Honeywell-Engines Systems & Services	Phoenix	18.8	103.35
3300	Luke AFB - 56th Fighter Wing	Glendale	4.9	40.73
62	Mastercraft Cabinets Inc.	Mesa	0.0	0.68
44186	Mesquite Generating Station	Arlington * †	21.2	126.08
43530	New Harquahala Generating Co	Tonopah *	55.4	304.15
20706	New Wincup Holdings, Inc.	Phoenix	10.4	61.93
52382	Ocotillo Power Plant	Tempe	12.9	25.04
1341	Penn Racquet Sports Inc.	Phoenix	2.9	23.49
42956	Redhawk Generating Facility	Arlington *	163.4	716.74
303	Rexam Beverage Can Company	Phoenix	3.7	20.24
3315	Santan Generating Station	Gilbert	130.7	637.81
4175	SFPP LP Phoenix Terminal	Phoenix	9.6	52.73
3316	SRP Agua Fria Generating Station	Glendale	80.6	92.31
3317	SRP Kyrene Generating Station	Tempe	11.7	67.83
552	Thornwood Furniture Mfg	Phoenix	0.5	4.06
174	W. R. Meadows Of Arizona, Inc.	Goodyear	0.1	1.24

† = Facility is outside the CO maintenance area.
* = Facility for which rule effectiveness has been applied.

2.5 Emission reduction credits

A major source or major modification planned in a maintenance area must obtain emissions reductions as a condition for approval. These emissions reductions, generally obtained from existing sources located in the vicinity of a proposed source must offset the emissions increase from the new source or modification. The obvious purpose of acquiring offsetting emissions decreases is to allow an area to move towards attainment of the national ambient air quality standards while still allowing some industrial growth.

Table 2.5–1 provides a list of emission reduction credits for carbon monoxide. One previously operational facility maintains emission reduction credits in the Arizona Emissions Bank (http://www.azdeq.gov/environ/air/permits/eb.html) that is still valid for inclusion in this report.

Table 2.5–1. CO emission reduction credits.

ID	Facility Name	Emission Reduction Credits (tons)
1151	Freescale Semiconductor, Inc. (formerly Motorola Mesa)	12.5

2.6 Summary of point source emissions

Table 2.6–1 provides an overview of point source emissions for Maricopa County and the CO maintenance area.

Table 2.6–1. Annual and season-day point source CO emissions (including emission reduction credits).

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	738.04	3,235.7
CO Maintenance Area	371.77	1,575.4

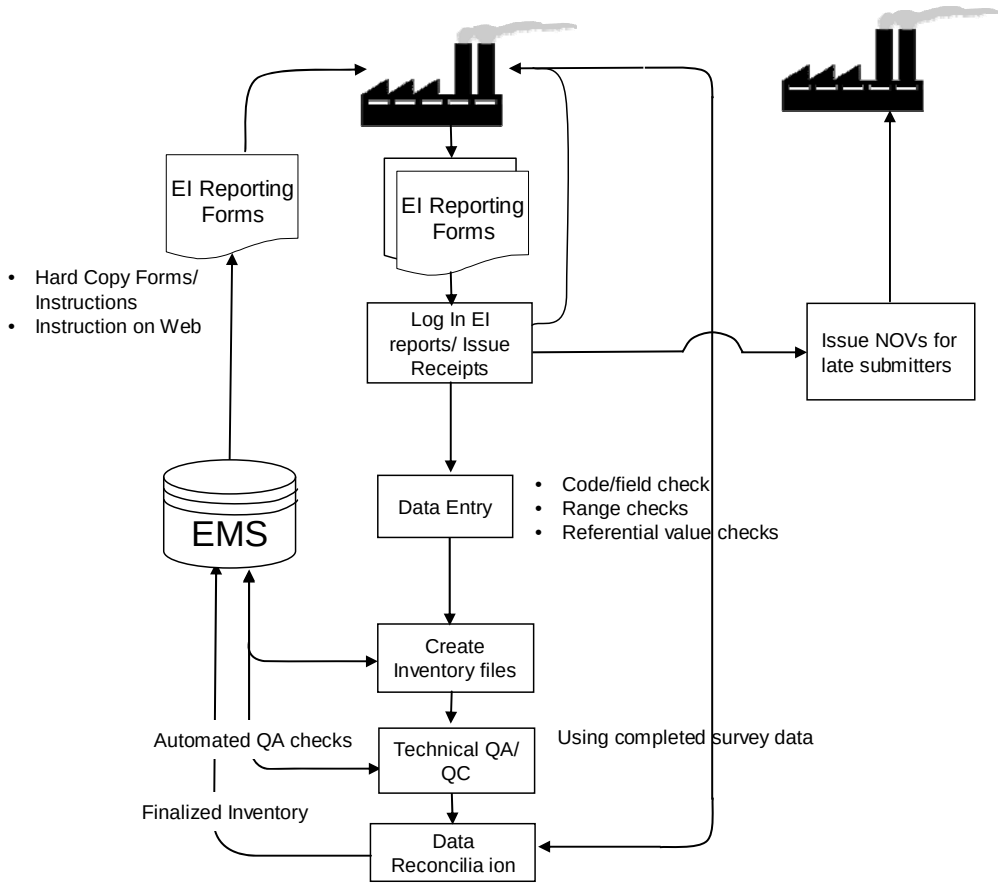
2.7 Quality assurance / quality control procedures

2.7.1 Emission survey preparation and data collection

The MCAQD's Emissions Inventory (EI) Unit annually collects point source criteria pollutant emission data from sources in the county. MCAQD annually reviews EPA guidance, documents from the Emission Inventory Improvement Program (EIIP), and other source materials to ensure that the most current emission factors and emission calculation methods are used for each year's survey. Each January, the EI Unit prepares a pre-populated hard copy of the preceding year's submissions and mails reporting forms to permitted sources, along with detailed instructions for completing the forms. (A copy of these instructions is included as Appendix 1). The EI Unit asks sources to verify and update the data. The EI Unit also holds periodic workshops from January through April to assist businesses in completing EI forms.

The general data flow for data collection and inventory preparation is shown in Figure 2.7–1.

Figure 2.7–1. Data flow for annual point source emission inventory reporting.



2.7.2 Submission processing

Submitted EI reports are logged in as they are received, and receipts are issued for emissions fees paid. The data are input "as received" into the department's data base. During data entry, numerous automated quality control (QC) checks are performed, including:

- pull-down menus to minimize data entry errors (e.g., city, pollutant, emission factor unit, etc.)
- mandatory data field requirement checks (e.g., a warning screen appears if a user tries to save an emission record with a missing emission factor).
- range checks (e.g., were valid SCC, Tier, SIC, and NAICS codes entered?)
- referential value checks (e.g., emission factor units, annual throughput units)
- automatic formatting of date, time, telephone number fields, etc.

Automated quality assurance (QA) checks on the report that has been entered include the following:

- Comparing reported emission factors to SCC reference lists
- Comparing reported emission factors to material name reference list
- Checking the report for calculation errors. This includes annual throughput, emission factors, unit conversion factors (e.g., BTU to therms), capture efficiency, primary / secondary control device efficiency, and any offsite recycling credits claimed.
- Checking the report for completeness of required data.

When data entry is complete, an electronic version of the original data is preserved separately to document changes made during the technical review and QA/QC process.

When errors are flagged, the businesses are contacted and correct information is obtained and input to the EMS. Outstanding reporting issues are documented. Confidential business information (CBI) is identified by a checkbox on the form, and these data elements are flagged during data entry and are not transmitted to the EPA. To prepare the inventory for submittal to the National Emissions Inventory (NEI), the EI Unit runs Microsoft Access queries on the data in the EMS to pull fields for the NEI Input format (NIF) tables.

2.7.3 Analysis of annual point source emissions data for this inventory

Two environmental planners checked inventory accuracy and reasonableness, and assured that all point sources had been identified and that the methodology applied to calculate emissions was appropriate and that the calculations were correct. Other reasonableness checks were conducted by recalculating emissions using methods other than those used to make the initial emissions calculations and then comparing results. QA was conducted by checking all emissions reports submitted to MCAQD for the year 2008 for missing and questionable data and by checking the accuracy and reasonableness of all emissions calculations made for such reports. Notes concerning follow-up calls and corrections to calculations were documented on each 2008 annual emissions report.

The QA point source coordinator reviewed checked calculations, identified errors, and performed completeness, reasonableness and accuracy checks.

2.8 References

US EPA, 2008. Air Emissions Reporting Requirements. 73 Fed. Reg. 76539. Available at: http://www.epa.gov/ttn/chief/aerr/final_published_aerr.pdf.

3. Area Sources

3.1 Scope and methodology

This chapter considers all stationary sources which are too small or too numerous to be treated as point sources. EPA guidance documents, including "Introduction to Area Source Inventory Development" as well as permit and emissions data in the MCAQD's Environmental Management System (EMS) database, and previous SIP inventories, were evaluated to develop the list of area source categories for inclusion. Some source categories were deemed "insignificant" because there are no large production facilities and/or very few small sources, and therefore emissions were not quantified. MCAQD prepared the area source emission estimates for all area sources and provided quality assurance checks on all data. Table 3.1–1 contains a list of all area source categories addressed in this chapter.

Table 3.1–1. List of area source categories.

Area source description	Section
Fuel combustion:	
Industrial natural gas	3.2.1
Industrial fuel oil	3.2.2
Commercial/institutional natural gas	3.2.3
Commercial/institutional fuel oil	3.2.4
Residential natural gas	3.2.5
Residential wood	3.2.6
Residential fuel oil	3.2.7
Industrial processes:	
Secondary metal production	3.3.1
Commercial cooking	3.3.2
State-permitted portable sources	3.3.3
Industrial processes not elsewhere classified	3.3.4
Electrical equipment manufacturing	3.3.5
Waste treatment and disposal:	
On-site incineration	3.4.1
Open burning	3.4.2
Landfills	3.4.3
Other industrial waste disposal	3.4.4
Miscellaneous area sources:	
Wildfires	3.5.1.1
Prescribed Fires	3.5.1.2
Structure fires	3.5.1.3
Vehicle fires	3.5.1.4
Engine testing	3.5.1.5
Health services (crematories)	3.5.2

For nearly all categories, emissions were calculated in one of the following ways:

- emissions estimates for some categories were developed by conducting surveys on local usage (e.g., natural gas consumption) or derived from state-wide data (e.g., fuel oil use).
- for some widespread or diverse categories (e.g., consumer solvent use), emissions were calculated using published per-capita or per-employee emission factors.
- for source categories with some information available from annual emissions reports (e.g., bakeries), these data were combined with employment data to "scale up" reported emissions to reflect the entire source category.
- for those source categories with detailed emissions data available from most or all significant sources in the category, emissions were calculated based on detailed process and operational data provided by these sources.

The specific emissions estimation methodologies used for each source category (including any application of rule effectiveness) are described in greater detail in the respective sections.

3.2 Fuel combustion

Area source emissions for the following seven categories of fuel consumption were calculated: Industrial natural gas, industrial fuel oil, commercial/institutional natural gas, commercial institutional fuel oil, residential natural gas, residential wood, and residential fuel oil. Data for emissions calculations from natural gas combustion came from a survey of the three natural gas suppliers in Maricopa County. The following table summarizes the natural gas sales data received from Maricopa County natural gas suppliers.

Table 3.2–1. Annual natural gas sales in Maricopa County, by supply company and end-user category.

	Sales by end user category (in MMCF/yr)					
Natural gas supplier	**Electric Utilities**	**Industrial**	**Commercial/ Institutional**	**Residential**	**Transport***	**Other***
Southwest Gas	17.07	1,543.27	15,643.15	14,911.67	6,487.35	n/a
City of Mesa	6.52	93.02	1,609.12	1,339.62	n/a	244.97
El Paso	227,608.92	201.90	n/a	n/a	n/a	6.07

* For emissions calculations, sales from these two categories were grouped with industrial sales.

Area source emissions for wood and fuel oil combustion were calculated from Arizona state-level sales and consumption data as described in the following subsections. Area source emissions from coal and liquid petroleum gas were not calculated as emissions from these categories were determined to be insignificant.

3.2.1 Industrial natural gas

All natural gas suppliers in Maricopa County were surveyed to gather information on the volume of natural gas distributed, by user category, within the county in 2008. Area source industrial natural gas usage for the county is based on the reported total volume of natural gas sold to industrial sources, minus natural gas used by industrial point sources.

Natural gas is used for both external combustion (boilers, heaters) and internal combustion (generators), each of which have different emission factors. Thus the area source natural gas usage derived must be apportioned between these two categories. This apportionment was based

on the percentages of external and internal natural gas combustion reported by all industrial area sources in 2008.

Annual emissions for the county are calculated by multiplying natural gas usage by the respective AP-42 emission factors for external and internal combustion.

Table 3.2–2. Emission factors and annual CO emissions from area-source industrial natural gas combustion, by combustion type.

Combustion type	% of total	Annual natural gas usage (MMCF)	CO emission factor (lbs/MMCF)	Annual CO emissions (tons/yr)
External	98.44	7,934.68	84	333.26
Internal	1.56	125.74	399	25.09
Totals:	**100.00**	**8,060.43**		**358.34**

Season-day emissions for the county are calculated by first multiplying annual emissions by the percentage of industrial natural gas sold used during the CO season. (Figures reported by natural gas suppliers for the December–February time period are assumed to be representative for the November–January CO season.) CO season emission totals are then divided by the number of days that activity occurs during the CO season. Annual and season-day emissions within the CO maintenance area are calculated by applying the ratio of industrial employment in the maintenance area to county-level emission calculations. (See Section 1.5.1 for a discussion of the employment data used).

Table 3.2–3. Annual and season-day CO emissions from area-source industrial natural gas combustion.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	358.34	2,513.9
CO Maintenance Area	352.68	2,474.1

3.2.2 Industrial fuel oil

Area source emissions from industrial fuel oil combustion are calculated by a multi-step process which allocates Arizona state-level industrial fuel oil sales data from the US Department of Energy, Energy Information Administration (US DOE, 2010a) to Maricopa County.

To derive industrial fuel oil usage in Maricopa County, reported Arizona sales of high-sulfur diesel for 2008 are first subtracted from Arizona state-level total industrial fuel oil sales, as it is presumed that no high-sulfur diesel fuel is used in Maricopa County due to local air quality regulations and market conditions.

Arizona state industrial fuel oil sales (less high-sulfur diesel fuel) are then multiplied by the ratio of industrial employment in Maricopa County to Arizona State (0.70), as determined by data from the US Census Bureau (2010) to estimate annual Maricopa County industrial fuel oil sales. To avoid double-counting, industrial fuel oil use attributable to stationary point sources (addressed in Chapter 2) and nonroad mobile sources (addressed in Chapter 4) are subtracted from County industrial fuel oil sales to estimate county fuel oil usage by area sources.

Industrial fuel oil is used for both external combustions (boilers, heaters) and internal combustion (generators), each of which have different emission factors. Thus the area-source industrial fuel oil sales derived above must be apportioned between these two categories. This apportion-

ment was based on the percentages of external and internal fuel oil combustion reported by all industrial area sources surveyed in 2008 shown in Table 3.2–4.

County-level annual emissions from this area source category were calculated by multiplying industrial fuel oil sales by the respective AP-42 emission factors for external and internal combustion.

Table 3.2–4. Emission factors and annual CO emissions from area-source industrial fuel oil combustion, by combustion type.

Combustion type	% of total	Annual fuel oil sales (Mgals)	CO emission factor (lbs/Mgals)	Annual CO emissions (tons/yr)
External	78.01	65,634.56	5	164.09
Internal	21.99	18,501.53	130	1,202.60
Totals:	**100.00**	**84,136.09**		**1,366.69**

Season-day emissions for the county are calculated by first multiplying annual emissions by 25.07% to estimate CO season emission totals. CO season emission totals are then divided by the number of days that activity occurs during the CO season (78), as recommended by EIIP guidance (US EPA, 2001a).

Annual and season-day emissions in the CO maintenance area are calculated by applying the ratio of industrial employment in the maintenance area to county-level emission calculations. (See Section 1.5.1 for a discussion of the employment data used).

Table 3.2–5. Annual and season-day CO emissions from area-source industrial fuel oil combustion.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	1,366.69	8,784.8
CO Maintenance Area	1,345.09	8,646.0

3.2.3 Commercial/institutional natural gas

All natural gas suppliers in Maricopa County were surveyed to gather information on the volume of natural gas distributed, by user category, within the county in 2008. Area source commercial and institutional (C&I) natural gas usage for the county is based on the reported total volume of natural gas sold to C&I sources, minus natural gas used by C&I point sources.

Natural gas is used for both external combustions (boilers, heaters) and internal combustion (generators), each of which have different emission factors. Thus the area source natural gas usage derived above must be apportioned between these two categories. This apportionment was based on the percentages of external and internal natural gas combustion reported by all C&I area sources in 2008.

Annual emissions for the county and the CO maintenance area are calculated by multiplying natural gas usage by the respective AP-42 emission factors for external and internal combustion.

Table 3.2–6. Emission factors and annual CO emissions from area-source commercial/institutional natural gas combustion, by combustion type.

Combustion type	% of total	Annual natural gas usage (MMCF)	CO emission factor (lbs/MMCF)	Annual CO emissions (tons/yr)
External	98.34	17,130.07	84	719.46
Internal	1.66	289.16	399	57.69
Totals:	**100.00**	**17,419.23**		**777.15**

Season-day emissions for the county are calculated by first multiplying annual emissions by the percentage of C&I natural gas sold used during the CO season. (Figures reported by natural gas suppliers for the December–February time period are assumed to be representative for the November–January CO season.) CO season emission totals are then divided by the number of days that activity occurs during the CO season.

Annual and season-day emissions in the CO maintenance area are calculated by applying the combined ratio of retail, office, public and other employment in the maintenance area to county-level emission calculations. (See Section 1.5.1 for a discussion of the employment data used).

Table 3.2–7. Annual and season-day CO emissions from area-source commercial/institutional natural gas combustion.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	777.15	7,248.7
CO Maintenance Area	760.67	7,095.1

3.2.4 Commercial/institutional fuel oil

Area source emissions from commercial and institutional (C&I) fuel oil combustion are calculated by a multi-step process of allocating Arizona state-level C&I fuel oil sales as reported by the US Department of Energy, Energy Information Administration (US DOE, 2010b) to Maricopa County.

To derive commercial/institutional fuel oil usage in Maricopa County, reported Arizona state-level sales of high-sulfur diesel for 2008 are first subtracted from Arizona state-level total commercial/institutional fuel oil sales, as it is presumed that no high-sulfur diesel fuel is used in Maricopa County due to local clean air act requirements and market conditions. Arizona state commercial/institutional fuel oil sales (less high-sulfur diesel fuel) are then multiplied by the ratio of C&I employment in Maricopa County to Arizona state (0.80), as determined by data from the US Census Bureau (2010) to estimate Maricopa County-level C&I fuel oil sales.

To avoid double-counting, commercial/institutional fuel oil use attributable to stationary point sources (addressed in Chapter 2) and nonroad mobile sources (addressed in Chapter 4) are subtracted from County C&I fuel oil sales to estimate county fuel oil usage used by C&I area sources.

Fuel oil is used for both external combustion (boilers, heaters) and internal combustion (generators), each of which have different emission factors. Thus the area source C&I fuel oil sales derived above must be apportioned between these two categories. This apportionment was based on the percentages of external and internal fuel oil combustion reported by all

commercial/institutional area sources surveyed by MCAQD in 2008 (shown in Table 3.2–8 below).

Annual emissions for the county are calculated by multiplying C&I fuel oil sales by the respective AP-42 emission factors for external and internal combustion.

Table 3.2–8. Emission factors and annual CO emissions from area-source commercial/institutional fuel oil combustion, by combustion type.

Combustion type	% of total	Annual fuel oil sales (Mgals)	CO emission factor (lbs/Mgals)	Annual CO emissions (tons/yr)
External	66.95	20,321.18	5	50.80
Internal	33.05	10,031.59	130	652.05
Totals:	**100.00**	**30,352.78**		**702.86**

Season-day emissions for the county are calculated by first multiplying annual emissions by 26.66% to estimate CO season emission totals. CO season emission totals are then divided by the number of days that activity occurs during the CO season (78) as recommended by EIIP guidance (US EPA, 2001a).

Annual and season-day emissions within the CO maintenance area are calculated by applying the combined ratio of retail, office, public and other employment in the maintenance area to county-level emission calculations. (See Section 1.5.1 for a discussion of the employment data used).

Table 3.2–9. Annual and season-day CO emissions from area-source commercial/institutional fuel oil combustion.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	702.86	4,804.7
CO Maintenance Area	687.96	4,702.8

3.2.5 Residential natural gas

All natural gas suppliers in Maricopa County were surveyed to gather information on the volume of natural gas sold, by user category, within the county. Annual emissions from residential natural gas combustion emissions were calculated by multiplying residential natural gas sales by emission factors for residential natural gas combustion listed in AP-42 Tables 1.4-1 and 1.4-2 (US EPA, 1998).

CO season-day emissions are calculated by first multiplying reported natural gas usage during the CO season (8,172.3 MMCF) by the emission factor for CO for residential natural gas combustion (40 lbs CO/MMCF) to produce CO season emissions (natural gas usage reported for the months of December-February are assumed to represent CO season usage). CO season emissions are then divided by the number of days during the CO season that residential natural gas combustion occurs (91) (US EPA, 2001a).

Annual and season-day residential natural gas emissions in the CO maintenance area are calculated by multiplying county-level emissions by the percentage of total resident population (96.85%) in the CO maintenance area.

Table 3.2–10. Annual and season-day CO emissions from residential natural gas combustion.

Geographic area	Annual CO emissions (tons/year)	Season-day CO emissions (lbs/day)
Maricopa County	325.03	3,592.2
CO Maintenance Area	314.79	3,479.1

3.2.6 Residential wood combustion

Area-source emissions from residential wood combustion are calculated based on the amount of wood burned in fireplaces and woodstoves in Maricopa County, as recommended by EIIP guidance (US EPA, 2001b). Residential wood combustion in the county is estimated by multiplying data on statewide residential wood combustion usage (651,000 cords/yr) from the US Department of Energy (US DOE, 2010) by the ratio of county to state households that report use of wood for heating (3.2867%) from the US Census Bureau (2010a). The latest available data on residential wood use for household heating from the US Department of Energy is for the calendar year 2007. Since all fireplaces in homes constructed since 1999 are required by Arizona statute to be clean-burning, it is assumed that these new homes have negligible emissions. Thus, year 2007 data is assumed to be representative of 2008 emissions.

To calculate emissions, the amount of wood used is converted to tons by multiplying cords by the number of cubic feet of wood in a cord (79 avg. ft^3 wood/cord) and by the density of the wood used (US EPA, 2001b). Wood density is determined by weighted average of types of wood used for residential combustion in Maricopa County (31.57 lbs/ft^3), provided by the US Forest Service (USFS, 1993).

Annual emissions from residential wood combustion are calculated by multiplying the tons of wood used by the CO emission factor for residential total woodstoves and fireplaces (252.6 lbs/ton) from EIIP Volume III, Chapter 2, Table 2.4-1 (US EPA, 2001b).

Season-day CO emissions are calculated by apportioning wood burning activity based on heating degree days (i.e., the number of degrees per day that the daily average temperature is below 65°F). Data provided by Arizona Department of Commerce (ADOC, 2010) indicated that there were a total of 885 heating degree days in Phoenix during 2008, with 625 heating degrees days reported during the CO season. Co season-day emissions were derived by applying the ratio of CO season heating degree days to annual heating degree days and are shown in Table 3.2-11.

Annual and season-day emissions within the CO maintenance area are calculated by multiplying county totals by the percentage of residential population within the CO maintenance area of 96.85%. See Section 1.5.1 for a further discussion of the housing data used.

Table 3.2–11. Annual and season-day CO emissions from residential wood combustion.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	3,369.91	52,305.0
CO Maintenance Area	3,263.75	50,657.4

3.2.7 Residential fuel oil

Emissions from residential fuel oil use were calculated using an approach similar to that used for residential wood combustion described in Section 3.2.6. County-level residential fuel oil use was derived from statewide totals (US EIA, 2010) using the ratio of county to state households that report fuel oil use from the US Census Bureau (2010b).

Annual and daily emissions were calculated using AP-42 emission factors and data on heating degree days and residential housing units described in Section 3.2.6. Annual and season-day emissions are shown in Table 3.2–12.

Table 3.2–12. Annual and season-day CO emissions from residential fuel oil combustion.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	0.07	1.1
CO Maintenance Area	0.07	1.0

3.3 Industrial processes

3.3.1 Secondary metal production

Annual emissions from secondary metal production facilities were derived from annual emission reports from permitted sources. As this category consists primarily of foundries, it was assumed that there were no significant unpermitted sources within Maricopa County. CO season-day emissions were calculated based on operating schedule information provided in the facilities' annual emission reports. Since all facilities considered in this section are located within the CO maintenance area, total emission values for the county and the CO maintenance area from secondary metal production are equal.

Table 3.3–1. Annual and season-day CO emissions from area-source secondary metal production.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	107.72	703.5
CO Maintenance Area	107.72	703.5

3.3.2 Commercial cooking

Emissions from commercial cooking were estimated for five types of commercial cooking equipment using EPA methodology (US EPA, 2006). The equipment types include: chain-driven charbroilers, underfired charbroilers, deep-fat fryers, flat griddles, and clamshell griddles. EPA's methodology estimates commercial cooking activity for restaurants with each type of cooking equipment (ethnic, family, fast food, seafood, and steak & barbeque) based on an average number of equipment pieces by restaurant type and average pounds of meat cooked on each type of equipment per week (steak, hamburger, poultry, pork, and seafood). The estimated number of restaurants in Maricopa County for the five restaurant types was obtained from a commercial database (www.selectoryonline.com) and is shown in Table 3.3–2.

Table 3.3–2. Number of Maricopa County restaurants, by restaurant type.

Restaurant category	No. of restaurants
Ethnic food	907
Fast food	1,068
Family	253
Seafood	37
Steak & barbecue	75
All restaurants:	**2,340**

Using the number of restaurants for each restaurant type, along with the default emission factors and equations from US EPA (2006), emissions for each combination of equipment type, restaurant type, and meat type were calculated, and the results were summed to estimate annual emissions for each type of cooking equipment, as shown in Table 3.3–3.

Commercial cooking is assumed to occur uniformly throughout the year, therefore, it was assumed that 25% of annual activity occurs during the CO season, and activity occurs 7 days/week.

Annual and season-day emissions for the CO maintenance area were calculated by multiplying the Maricopa County emission totals by the percentage population within the maintenance area (96.92%). (See Section 1.5.1 for a discussion of the population data used.) Table 3.3–3 summarizes the annual and season-day emissions from commercial cooking for Maricopa County and the CO maintenance area.

Table 3.3–3. Annual and season-day CO emissions from commercial cooking.

	Maricopa County		CO Maintenance Area	
Equipment type	**Annual CO emissions (tons/yr)**	**Season-day CO emissions (lbs/day)**	**Annual CO emissions (tons/yr)**	**Season-day CO emissions (lbs/day)**
Chain-driven charbroilers	86.79	476.9	84.12	462.2
Underfired charbroilers	270.94	1,488.7	262.60	1,442.8
Deep fat fryers	–	0.0	0.00	0.0
Flat griddles	22.55	123.9	21.86	120.1
Clamshell griddles	–	0.0	0.00	0.0
Totals:	**380.29**	**2,089.5**	**368.58**	**2,025.1**

3.3.3 State-permitted portable sources

The Arizona Department of Environmental Quality (ADEQ) retains the authority to permit certain categories of sources within Maricopa County, including portable sources. MCAQD requested information from ADEQ for all ADEQ-permitted sources that reported any activity in Maricopa County during 2008. Annual total emissions for most pollutants were provided, along with information on the facility type, and information on the location of the site(s) during the year. Permits were classified into four major types: asphalt batch, concrete batch, crushing/ screening, and other (including soil remediation, generators, etc.). From this information, emissions that occurred within Maricopa County were estimated as in the following example.

Data provided:

Source information:	McNeil Brothers - Erie Strayer Portable Plant
Permit type:	Concrete batch plant
Operating schedule:	Operated from 1/1-5/15 in Mesa at SR202 and McKellips (SE Corner); operated from 10/16-12/31 in Goodyear at Northside I-10 east of Estrella.

Total annual emissions:	CO
(tons/yr)	6.19

Using this information, calculations were made to determine:

Total operating days in 2008: 136 = 31 (Jan.) + 29 (Feb.) + …16 (Oct.) + 30 (Nov.) + 31 (Dec.)
Total operating days in Maricopa County: 136 = 31 (Jan.) + 29 (Feb.) + …16 (Oct.) + 30 (Nov.) + 31 (Dec.)

All emissions were assumed to be equally distributed among all reported days of operation. First, the total emissions attributable to activity in Maricopa County were calculated as follows:

$$\text{Annual CO emissions in Maricopa County} = \text{Total annual emissions (tons/yr)} \times \frac{\text{operating days in Maricopa County}}{\text{total operating days in 2008}}$$

$$= 6.19 \times \frac{136}{136}$$

$$= 6.19 \text{ tons CO/yr}$$

Since activity was presumed to be spread equally among all "in-county" days, season-day emissions were thus calculated as follows:

$$\text{Season-day CO emissions in Maricopa County (lbs/day)} = \frac{\text{total emissions attributable to activity in Maricopa County}}{\text{number of operating days in Maricopa County}} \times \frac{2{,}000 \text{ lbs}}{\text{ton}}$$

$$= \frac{6.19 \text{ tons}}{136 \text{ days}} \times \frac{2{,}000 \text{ lbs}}{\text{ton}}$$

$$= 91.03 \text{ lbs CO /day}$$

Table 3.3–4 summarizes the annual and season-day emissions for all ADEQ-permitted portable sources that operated within Maricopa County at some point during 2008. Since precise location data was not available for all permits, all emissions are conservatively assumed to have originated within the CO maintenance area; thus emission estimates for Maricopa County and the maintenance area are equal.

Table 3.3–4. CO emissions from ADEQ-permitted portable sources.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	145.42	1,212.6
CO Maintenance Area	145.42	1,212.6

3.3.4 Industrial processes, not elsewhere classified (NEC)

Annual area-source emissions from other industrial processes not elsewhere classified (NEC) were derived from annual emissions reports from permitted facilities. Other industrial processes

include a wide array of industrial activities that are often specific to the permitted facility that reported the process. For this reason, it is assumed there are no significant emissions from other industrial processes, other than those reported by permitted facilities on their annual emissions reports. CO season-day emissions are calculated based on operating schedule information provided by the facilities in their annual emissions report.

Table 3.3–5. Annual and season-day CO emissions from other industrial processes.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	18.59	107.3
CO Maintenance Area	3.47	22.7

3.3.5 Electrical equipment manufacturing

Annual and season-day emissions from electric equipment manufacturing were derived from annual emission reports submitted by permitted sources. It was assumed that there were no significant unpermitted sources within Maricopa County and all electrical equipment manufacturing permitted sources are reported here as area-sources.

All facilities addressed in this source category are located within the CO maintenance area; thus, emissions for the county and maintenance area are equal. Annual and season-day emissions are shown in Table 3.3–6.

Table 3.3–6. Annual and season-day CO emissions from area-source electric equipment manufacturing.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	3.85	21.3
CO Maintenance Area	3.85	21.3

3.4 Waste treatment and disposal

3.4.1 On-site incineration

This section includes emissions from on-site industrial incinerators, primarily burn-off ovens used to reclaim electric wire or other materials. Emissions from human and animal crematories are addressed in Section 3.5.2. There were no incinerators at residential (e.g., apartment complexes) or commercial/institutional facilities (e.g., hospitals, service establishments) in operation during 2008.

Emissions from on-site incineration were determined from annual emissions reports. It is assumed that all incinerator emissions are accounted for, since all permitted incinerators received reports in 2008. Season-day emissions are based on operating schedules as supplied in the annual emissions reports. All surveyed facilities are located within the CO maintenance area; thus, emissions for the county and maintenance area are equal.

Table 3.4–1. Annual and season-day CO emissions from on-site incineration.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	0.69	5.7
CO Maintenance Area	0.69	5.7

3.4.2 Open burning

Emissions from controlled open burning are regulated by MCAQD Rule 314, which requires a burn permit for open burning in Maricopa County. Burn permits are issued primarily for purposes of agricultural ditch bank and fencerow burning, tumbleweed burning, land clearance, air curtain destructor burning of trees, and fire fighting training. Maricopa County's burn permit database was used to identify all burn permits issued during 2008. A total of 55 permits were issued during the year; however, not all permit applications contained the information needed to calculate emissions. Where data were missing, activity data for each permit category was grown from those permits that contained information.

Reported and estimated activity data for each open burning category are summarized in Table 3.4–2. Permits issued for firefighting training are addressed in Section 3.5.1.3, Structure fires.

Table 3.4–2. Summary of 2008 Maricopa County burn permit activity.

Category	Unit of measure	Total reported activity	Number of permits with activity data	Total permits issued	Activity grown to total number of permits issued
Ditchbank/fencerow	Linear ft	541,336	22	32	787,398
Land clearance	Acres	564	5	12	1,354
Air curtain	Material Burned	70*	0	7	70
Tumbleweeds	Piles	14	2	4	28

*Assumed that air curtain destructors burn 10 tons/day of brush/trees/vegetation.

The above activity data were converted to tons material burned using fuel loading factors from AP-42, Table 2.5-5 (US EPA, 1992). The emission and loading factors used are shown in Table 3.4–3.

Table 3.4–3. Emission and fuel loading factors for open burning.

Category	CO emission factors (lbs/ton burned)	Fuel loading factors (tons/acre)
Weeds, unspecified	85	3.2
Russian Thistle (tumbleweeds)	309	0.1
Orchard Crops: Citrus	81	1.0

The following assumptions were made based on previous Maricopa County emission inventory work:

- Ditch banks and fence rows in Maricopa County average 7 feet in width and are burned twice per year (MCESD, 1999).
- A pile of tumbleweeds 15 feet in diameter and 5 feet high weighs 200 lbs (MCESD, 1993). This is equivalent to 0.1 tons/acre, the AP-42 fuel loading factor for tumbleweeds.
- Air curtain destructors burn between 7-10 tons of material per day (MCAQD, 2006).

To calculate the annual amount of material burned on ditch banks and fence rows in Maricopa County, MCAQD estimated the area burned and then applied AP-42 fuel loading factor. Activity data for the other categories were similarly converted to material burned using AP-42 fuel loading factors.

Annual emissions were then calculated by multiplying the amount of material burned by emission factors listed in AP-42 (Table 3.4–3). To account for unpermitted illegal outdoor burning, all calculated emissions estimates were increased 2.87 times based on complaints received in 2008 for open or illegal outside burning (158 complaints received; 158 complaints/55 open burn permits = 2.87). Table 3.4–4 summarizes the annual emissions for Maricopa County from each open burning category.

Table 3.4–4. Annual CO emissions from open burning in Maricopa County (tons/yr).

Category	Ton-equivalents	CO emissions (tons/yr)
Ditchbank/fencerow	809.8	98.87
Land clearance	4,331.5	528.94
Air curtain	70.0	8.14
Tumbleweeds	2.80	1.24
Total:		**637.10**

Annual emissions for the maintenance area are calculated by multiplying the percentage of agricultural and/or vacant land use located in the CO maintenance area by the Maricopa County emission totals. (See Section 1.5.2 for a discussion of the land-use data used.) Table 3.4–5 summarizes the annual emissions for the CO maintenance area.

Table 3.4–5. Maintenance area:county ratios and annual CO emissions from open burning in the CO maintenance area.

Category	Surrogate land-use category	2009 Maint. area:county land-use ratio	CO emissions (tons/yr)
Ditchbank/fencerow	Agriculture	28.76%	28.43
Land clearance	Vacant	7.71%	152.08
Air curtain	agriculture and vacant	10.17%	2.34
Tumbleweeds	agriculture and vacant	10.17%	0.36
Total:			**183.21**

Ditch bank/fence row burning is not allowed from November to February, therefore daily emissions during the CO season are zero. For the other burning categories, it was assumed that open burning occurs 5 days per week (most burn permits are issued for weekdays but permits may be issued on weekends depending on circumstances) and open burning occurs evenly during the CO season months (November – January).

Season-day emissions for the maintenance area are calculated by multiplying the percentage of agricultural and/or vacant land use located in the maintenance area (listed in Table 3.4–5) by the County season-day emissions. Table 3.4–6 summarizes the CO season-day emissions from open burning for both Maricopa County and the CO maintenance area.

Table 3.4–6. Season-day CO emissions from open burning (lbs/day).

Category	Maricopa County (lbs/day)	CO maintenance area (lbs/day)
Ditchbank/fencerow	0.0	0.0
Land clearance	16,272.0	1,254.6
Air curtain	250.6	25.5
Tumbleweeds	38.2	3.9
Totals:	**16,560.8**	**1,284.0**

3.4.3 Landfills

Emissions from municipal solid waste (MSW) landfills come from uncontrolled landfill gas emissions as well as from cover operations and combustion from control measures, such as a flare. Total emissions were calculated from annual emissions inventory reports from all landfills located within the county; results are shown in Table 3.4–7 below. No landfills were considered point sources; thus all MSW landfills are reported here as an area-source activity.

Table 3.4–7. Annual and season-day CO emissions from landfills.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	40.05	219.9
CO Maintenance Area	20.84	114.7

3.4.4 Other industrial waste disposal

Annual area-source emissions from other industrial waste disposal were derived from annual emissions reports from permitted facilities. Other industrial waste disposal processes include a wide array of industrial activities that are often specific to the permitted facility that reported the process. For this reason, it is assumed there are no significant emissions from this category, other than those reported by permitted facilities on their annual emissions reports. Typical daily emissions were calculated based on operating schedule information provided by the facilities in their annual emissions report. Emission estimates are shown in Table 3.4–8 below.

All facilities that reported area-source emissions from other industrial waste disposal are located inside the CO maintenance area, therefore emissions for Maricopa County and the CO maintenance area are equal.

Table 3.4–8. Annual and typical daily CO emissions from other industrial waste disposal.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	52.86	252.9
CO Maintenance Area	52.86	252.9

3.5 Miscellaneous area sources

3.5.1 Other combustion

3.5.1.1 Wildfires

Data on wildfires in 2008 within Maricopa County were obtained from the Arizona State Land Department (ASLD) Forestry Division (ASLD, 2009), the Arizona Department of Fire, Building, and Life Safety (DFBLS, 2009), and the Federal Fire Occurrence website (FFOW, 2009).

The ASLD Forestry Division provides for the prevention and suppression of wildfires on state and private lands located outside of incorporated municipalities. The wildfire data provided by ASLD includes wildfires that occur outside of local fire districts and municipalities on State, private, and U.S. Bureau of Land Management (BLM) land in 2008. The ASLD reported 25 wildfires in 2008 in Maricopa County which encompassed nearly 750 acres. Wildfire data provided by ASLD were compared to wildfires reported in the Geospatial Multi-Agency

Coordination Group (GeoMAC) Wildland Fire Support database and 2008 Incident Status Summary reports (ICS-209) to identify wildfires that may have occurred outside of ASLD jurisdiction. GeoMAC and ICS-209 reports only include large wildfires, generally fires greater than 100 acres. Three Maricopa County wildfires were reported in GeoMAC and on ICS-209 reports in 2008 (USDA, 2008 and USGS, 2008). Two of these fires were included in the ASLD data. One fire, the Ethan fire, was not captured in the ASLD data because it occurred on tribal lands. The Ethan fire encompassed more than 6,600 acres.

The DFBLS coordinates reporting to the National Fire Incident Reporting System (NFIRS) for Arizona fire departments. NFIRS is a national reporting system used by fire departments to report fires and other incidents to which they respond and to maintain records of these incidents in a uniform manner. Twenty-one of thirty-six fire departments in Maricopa County reported over 10,000 fires to NFIRS in 2008. This included ten "forest, woods or wildland fires". The ten "forest, woods or wildland fires" were analyzed for inclusion in the wildfire emission estimates. First, the DFBLS fires were culled for duplicates by comparing the incident dates and locations with wildfires reported by ASLD. One DFBLS fire was excluded from the combined dataset because it may have been a duplicate already captured in the ASLD data. Because only four of the ten DFBLS fires included acreage, an average number of acres burned (1.05 acres) were determined from the fires with reported acreage. This average number of acres burned was then applied to the fires with no reported acreage.

The Federal Fire Occurrence Website is an official government website that provides users with the ability to query, research and download wildland fire occurrence data. The data available through this website contains over 548,000 fire records collected by Federal land management agencies for fires that occurred from 1980 through 2008 in the United States. The 2008 data for Maricopa County included eighty-one fires. The federal wildland fire occurrence data were culled for duplicates by comparing the incident names, dates and locations with wildfires reported by ASLD and DFBLS. Thirteen fires were excluded from the combined dataset because they appeared to be duplicates already captured in either the ASLD or DFBLS data and seven fires were excluded because they contained no acreage data. The final 2008 dataset listed 96 fires encompassing over 7,400 acres. Table 3.5-1 summarizes fire data obtained from each data sources.

Table 3.5–1. Fire data sources.

Data Source	Number of Fires	Acreage
Arizona State Land Department (ASLD)	25	747.25
Arizona Department of Fire, Building, and Life Safety (DFBLS)	9	9.45
Federal Fire Occurrence website (FFOW)	61	16.79
ICS-209	1	6,660.00
Totals	**96**	**7,433.49**

Fuel loading was assigned using the National Fire Danger Rating System (NFDRS) fuel model codes and a table of fuel loading values for NFDRS fuel model categories (WGA/WRAP, 2005). The department used the NFDRS Fuel Model map in ArcGIS to identify NFDRS fuel types for fires with latitude and longitude data.

Table 3.5–2. NFDRS fuel model categories and fuel loading factors for 2008 Maricopa County wildfires.

Land use type (by NFDRS Model Category)	No. of Fires	Total area (acres)	Fuel loading factor (tons/acre)
Agriculture*	33	744.05	4.5
California chaparral	1	0.01	19.5
Barren*	2	0.4	0.5
Pine-grass savanna	1	0.01	4.7
Intermediate brush	17	2.87	15.0
Sagebrush grass	42	6,686.15	4.5
Totals	**96**	**7,433.49**	

***** "Agriculture" and "Barren" NFDRS model categories were not included in WGA/WRAP 2002 fuel loading values for NFDRS fuel model categories. Therefore, it was assumed that "Agriculture" is similar to "sagebrush grass" and "Barren" is similar to "western grasses (annual)", and fuel loadings were assigned accordingly.

Estimates of the material burned were derived by multiplying the number of acres burned by the fuel loading factor. Table 3.5–3 shows the number of wildfires and acres burned for Maricopa County and the CO maintenance area in 2008 and an estimate of material burned. No wildfires occurred during the CO season; therefore season-day emissions from wildfires were zero.

Table 3.5–3. Summary of fires, acres burned and estimate of material burned

Geographic Area	No. of Fires	Acres Burned	Material Burned Annually (tons/yr)	Material Burned in CO Season (tons/season)
Maricopa County	96	7,433	33,479	12.8
CO Maintenance Area	19	28	127	0

The CO emission factor was obtained from the Western Regional Air Partnership's (WRAP) 2002 Fire Emission Inventory (WGA/WRAP, 2005). The CO emission factor for wildfires and prescribed broadast burning (289 lbs CO/ton) was used.

The majority of fire data included fire locations in latitude and longitude. For those fires without longitude and latitude, the fire location address was used to determine latitude and longitude. This latitude and longitude data was used to determine the number of acres burned inside of the CO maintenance area. Nineteen wildfires occurred within the CO maintenance area, resulting in nearly 28 acres burned.

Annual emissions from wildfires within the CO maintenance area were calculated in the same manner as Maricopa County annual emissions, except that material burned in the CO maintenance area were used rather than material burned in Maricopa County.

Annual and season-day emissions from wildfires for Maricopa County and the maintenance area are shown in Table 3.5−4.

Table 3.5–4. Annual and season-day CO emissions from wildfires

Geographic area	CO-season burn days	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	7	4,837.77	526.4
CO Maintenance Area	0	18.29	0.0

3.5.1.2 Prescribed fires

Prescribed fire data were obtained from the U. S. Forest Service (USFS, 2009). The USFS reported that six prescribed fires occurred in Maricopa County in 2008. Twenty-nine acres of piled fuels were burned. All six prescribed fires occurred outside the maintenance area. Because all 2008 prescribed fires were piled fuels, the total mass of material burned was derived by multiplying the number of acres burned by tons of piles per acre for each fire. Data provided by the USFS and the resulting material burned for each fire are shown below in Table 3.5–5.

Table 3.5−5. Prescribed fire activity in Maricopa County in 2008.

Date of burn	Burn number	Burn location	Acres Burned	Tons of piles/acre	Material Burned (tons)
01/13/2008	TNF0106	T6N,R7E,S28	3	1	3
03/13/2008	TNF0106P	T6N,R7E,S28	3	3	9
04/04/2008	TNF0302	T3N,R7E,S34	2	5	10
04/09/2008	TNF0302	T3N,R8E,S28	5	5	25
09/25/2008	TNF0302	T3N,R8E,S31	10	5	50
11/06/2008	TNF0302	T2N,R7E,S18	6	5	30
Totals:			**29**	**24**	**127**

The prescribed fire CO emission factor (74.3 lbs CO per ton burned) was obtained from the Western Regional Air Partnership's (WRAP) 2002 Fire Emission Inventory (WGA/WRAP, 2005).

Annual emissions from prescribed fires in Maricopa County were calculated by multiplying the material burned (tons/acre) by the emission factor (lbs CO/ton) and dividing the result by 2,000 lbs/ton.

Two prescribed fires occurred during the CO season. The fires occurred on January 13, 2008 and November 6, 2008, and resulted in 33 tons of material burned. It was assumed the prescribed fires lasted one day each. CO-season day emissions are determined by multiplying the tons material burned by the emission factor (lbs CO/ton) and then dividing the resulting emissions by the number of burn days. In this case, there were only two burn days.

Because all the 2008 prescribed fires burned outside of the maintenance area, the annual and season-day emissions for the maintenance area are zero.

Table 3.5−6. Annual and season-day CO emissions from prescribed fires.

Geographic Area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	4.72	1,226.0
CO Maintenance area	0.00	0.0

3.5.1.3 Structure fires

2008 structure fire data were from the Arizona Department of Fire, Building, and Life Safety (DFBLS). The DFBLS coordinates reporting to the National Fire Incident Reporting System (NFIRS) for Arizona fire department. NFIRS is a national reporting system used by fire departments to report fires and other incidents to which they respond and to maintain records of these incidents in a uniform manner. Twenty-one of thirty-six fire departments in Maricopa County reported over 10,000 fires to NFIRS in 2008. This included nearly 2,150 reported structure fires.

Because the DFBLS data only included data reported by twenty-one of thirty-six fire departments in Maricopa County, the number of structure fires reported were scaled up to the entire inventory area based on population. The most recent population estimates for Maricopa County were used to scale up the number of structure fires (ADOC, 2008). Seven open burn permits were issued in 2008 for fire training; these were included in the total number of estimated structure fires for 2008. It was estimated that 2,422 structure fires occurred in the county during 2008.

Estimates of the material burned in a structure fire were determined by multiplying the number of structure fires by a fuel loading factor of 1.15 tons of material per fire, which factors in percentage structural loss and content loss (US EPA, 2001c). Annual emissions were then calculated by multiplying the amount of material burned by a 60 lbs of CO per ton of material burned emission factor (from US EPA, 2001c) and dividing the resultant amount by 2,000 lbs/ton.

Annual emissions for the CO maintenance were derived by multiplying Maricopa County annual emissions by the percentage of total population within the maintenance area (96.92%). See Section 1.5.1 for a discussion of the population data used.

It was assumed that structure fires occur 7 days a week; however, structure fires vary seasonally and may increase during cold weather. Because local season-specific data were not available from the NFIRS data, seasonal occurrences of residential and non-residential structure fires reported by the Federal Emergency Management Agency (FEMA) were used to derive a seasonal adjustment factor for the CO season (US EPA, 2001c). FEMA reported that 29.6% of residential structure fires and 24.5% of non-residential structural fires occurred during November, December, and January 1994. Thus, an average occurrence of 27.05% [(29.6% + 24.5%) ÷ 2] was used as a seasonal adjustment factor to estimate CO season-day emissions.

CO season-day emissions for Maricopa County were derived by multiplying the annual emissions by the 27.5% seasonal adjustment factor and then dividing the result by 91 (7 days/wk × 13 weeks/season).

Table 3.5−7. Annual and season-day CO emissions from structure fires.

Geographic area	Annual CO emissions (tons/yr)	Season day CO emissions (lbs/day)
Maricopa County	83.56	496.8
CO Maintenance area	80.98	481.4

3.5.1.4 Vehicle fires

2008 vehicle fire data were from the Arizona Department of Fire, Building, and Life Safety (DFBLS). The DFBLS coordinates reporting to the National Fire Incident Reporting System (NFIRS) for Arizona fire department. NFIRS is a national reporting system used by fire departments to report fires and other incidents to which they respond and to maintain records of these incidents in a uniform manner. Twenty-one of thirty-six fire departments in Maricopa County reported over 10,000 fires to NFIRS in 2008. This included over 2,100 reported vehicle fires. Because the DFBLS data only included data reported by twenty-one of thirty-six fire departments in Maricopa County, the number of vehicle fires reported were scaled up to the

entire inventory area based on population. The most recent population estimates for Maricopa County were used to scale up the number of vehicle fires (ADOC, 2008). It was estimated that 2,403 vehicle fires occurred in Maricopa County in 2008.

Annual emissions from vehicle fires were calculated by first multiplying the number of vehicle fires by a fuel loading factor of 0.25 tons per vehicle fire to estimate the annual amount of material burned in vehicle fires (US EPA, 2000). The amount of annual material burned in vehicle fires was then multiplied by the emission factor for open burning of automobile components (125 lbs of CO/ton of material burned) from AP-42 as listed in table 3.7–12 (US EPA, 1992). The resultant amount was divided by 2,000 lbs/ton to obtain annual emissions in tons per year.

Annual emissions for the CO maintenance area were derived by multiplying Maricopa County annual emissions by the percentage of total population within the CO maintenance area (96.92%). See Section 1.5.1 for a discussion of the population data used. It is assumed that vehicle fires occur evenly throughout the year. Thus, CO season day emissions were derived by dividing the Maricopa County and maintenance area annual emissions by 366 days/year. The results are shown in Table 3.5−8 below.

Table 3.5−8. Annual and season-day CO emissions from vehicle fires.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	37.55	205.2
CO Maintenance area	36.39	198.8

3.5.1.5 Engine testing

Annual emissions from engine testing facilities were derived from annual emission reports from permitted sources that were not considered point sources in this inventory. It was assumed that there were no significant unpermitted sources within Maricopa County. Season-day emissions were calculated based on operating schedule information provided in the facilities' annual emission reports. Since all facilities considered in this section are located within the CO maintenance area, total emission values for the county and the CO maintenance are equal. Results are shown in Table 3.5–9.

Table 3.5–9. Annual and season-day CO emissions from engine testing.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	4.06	27.5
CO Maintenance Area	4.06	27.5

3.5.2 Health services: crematories

Emissions from human and animal crematories were calculated from annual emissions inventory reports from all crematories located within the county. It is assumed that there are no unpermitted crematories in Maricopa County. CO season-day emissions were calculated based on operating schedule information provided in the facilities annual emission reports. Location information provided in those annual emission reports indicated whether the facility was inside or outside the CO maintenance area.

Table 3.5–10. Annual and season-day CO emissions from crematories.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	0.68	5.2
CO Maintenance Area	0.68	5.1

3.6 Summary of area source emissions

Table 3.6–1 summarizes the total annual and CO season-day emissions from all area sources addressed in this chapter for both Maricopa County and the CO maintenance area.

Table 3.6–1. Summary of annual and season-day area source CO emissions, by source category.

	Maricopa County		CO maintenance area	
Source category	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Fuel combustion:				
Industrial natural gas	358.34	2,513.9	352.68	2,474.1
Industrial fuel oil	1,366.69	8,784.8	1,345.09	8,646.0
Commercial/institutional natural gas	777.15	7,248.7	760.67	7,095.1
Commercial/institutional fuel oil	702.86	4,804.7	687.96	4,702.8
Residential natural gas	325.03	3,592.2	314.79	3,479.1
Residential wood	3,369.91	52,305.0	3,263.75	50,657.4
Residential fuel oil	0.07	1.1	0.07	1.0
Total, all fuel combustion:	**6,900.04**	**79,250.4**	**6,725.01**	**77,055.5**
Industrial processes:				
Commercial cooking	380.29	2,089.5	368.58	2,025.1
Secondary metal production	107.72	703.5	107.72	703.5
State-permitted portable sources	145.42	1,212.6	145.42	1,212.6
Industrial process NEC	18.59	107.3	3.47	22.7
Electric equipment mfg	3.85	21.3	3.85	21.3
Total, all industrial processes:	**655.87**	**4,134.3**	**629.03**	**3,985.3**
Waste treatment/disposal:				
On-site incineration	0.69	5.7	0.69	5.7
Open burning	637.10	16,560.8	183.21	1,284.0
Landfills	40.05	219.9	20.84	114.7
Other industrial waste disposal	52.86	252.9	52.86	252.9
Total, all waste treatment	730.70	17,039.4	257.60	1,657.3
Miscellaneous Area Sources:				
Wildfires	4,837.77	526.4	18.29	0.0
Prescribed fires	4.72	1,226.0	0.00	0.0
Structure fires	83.56	496.8	80.98	481.4
Vehicle fires	37.55	205.2	36.39	198.8
Engine testing	4.06	27.5	4.06	27.5
Crematories	0.68	5.2	0.68	5.1
Total, all miscellaneous sources:	**4,968.33**	**2,486.9**	**140.40**	**712.9**
Total, all area sources:	**13,254.94**	**102,911.0**	**7,752.04**	**83,411.1**

3.7 Quality assurance / quality control procedures

Quality assurance and quality control (QA/QC) activities for the area source emissions inventory were driven by the goal of creating a comprehensive, accurate, representative and comparable inventory of area source emissions for Maricopa County and the CO maintenance area. During each step of creating, building and reviewing the area source emissions inventory, quality checks and assurances were performed to establish confidence in the inventory structure and data.

Area source categories were selected for inclusion in the inventory based on the latest Emission Inventory Improvement Program (EIIP) guidance available. EPA's guidance for area source categories included in prior National Emission Inventories (NEIs) was also evaluated. The list of area source categories developed based on these guidance documents was modified to fit the characteristics of Maricopa County, with some area source categories determined to be insignificant (e.g., emissions from industrial coal combustion, or oil and natural gas production facilities). Prior Maricopa County periodic inventories for ozone and carbon monoxide, as well as and other similar emission inventories from other locales were also consulted, to cross-check the completeness of the list of area source categories identified for inclusion in the present inventory.

Data for area source emission calculations were gathered from a wide universe of resources. Whenever applicable, local surveyed data (such as annual emissions report) was used as this data best reflects activity in the county and the CO maintenance area. When local data was not available, state data from Arizona State agencies (such as the Arizona Department of Transportation) and regional bodies (such as the Western Regional Air Partnership [WRAP]) were used. National level data (such as the US Census Bureau) was used when no local, state or regional data was available. In addition, the most recent EIIP guidance for area sources was consulted for direction in determining the most relevant data source for use in emissions calculations.

Emissions calculations for area sources were performed by three air quality planners and one unit manager. All area source emission estimates were calculated in spreadsheets to ensure the calculations could be verified and reproduced. Whenever possible or available, the "preferred method" described in the most recent EIIP guidance documents for area sources was used to calculate emissions. Emissions were estimated using emission factors from EIIP guidance, AP-42, and local source testing. Local seasonal and activity data were used when available, with EPA and EIIP guidance used when no local seasonal or activity data existed. All calculations were evaluated to ensure that emissions from point sources were not being double-counted and to determine if rule effectiveness applied.

Once area source emission estimates had been produced, several quality control checks were performed to substantiate the calculations. Most area source calculations were peer-reviewed by two other planners, with all area sources being reviewed by at least one other planner. Peer review ensured that all emission calculations were reasonable and could be reproduced. Sensitivity analyses and computational method checks were performed on area sources when emissions seemed to be outside the expected ranges. When errors were found, the appropriate changes were made by the author of the calculations to ensure consistency of the emissions calculations. The peer-reviewed emissions estimates were combined into a draft area source chapter. This draft chapter was read through in its entirety by the unit manager and the three air quality planners for final review, with any identified errors corrected by the author of the section.

The draft version of the area source chapter was sent to the Arizona Department of Environmental Quality, the Arizona Department of Transportation, and the Maricopa Association of Governments for a quality assurance review. These agencies provided comments which were addressed and incorporated into the final area source chapter. The QA/QC activities described here have produced high levels of confidence in the area source emissions estimates detailed in this chapter, and represent the best efforts of the inventory preparers.

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4. Nonroad Mobile Sources

4.1 Introduction

Nonroad mobile sources are defined as those sources that move or are moved within a 12-month period and are not licensed or certified as highway vehicles. Nonroad mobile sources are vehicles and engines that fall under the following categories:

- Agricultural equipment, such as tractors, combines and balers;
- Airport ground support equipment, such as baggage tugs and terminal tractors;
- Commercial equipment, such as generators and pumps;
- Industrial equipment, such as forklifts and sweepers;
- Construction and mining equipment, such as graders, back hoes and trenchers;
- Lawn and garden equipment, such as leaf blowers and lawn mowers;
- Logging equipment (not present in Maricopa County);
- Pleasure craft, such as power boats and personal watercraft;
- Railway maintenance equipment, such as rail straighteners;
- Recreational equipment, such as all-terrain vehicles and off-road motorcycles;
- Underground mining and oil field equipment (not present in Maricopa County);
- Aircraft, such as jet and piston engines; and
- Locomotives, such as switching and line haul trains.

Emission calculations for most nonroad mobile source categories except aircraft, airport ground support equipment (GSE) and locomotives were derived using EPA's NONROAD model, ver. 2008.1.0 (Core version 2008, April 2009). Aircraft and airport GSE emission estimates were made using the Federal Aviation Administration's EDMS (Emissions Dispersion Modeling System) model, ver. 5.1.1. Locomotive emission calculations were derived from surveys of the three railroad companies that have operations in the county (Burlington Northern Santa Fe, Union Pacific and Amtrak).

County specific temperature and fuel-related inputs are required for the operation of the NON-ROAD model. Monthly temperature and fuel data were provided by the Arizona Department of Weights and Measures. Table 4.1-1 below lists the local county inputs used:

Table 4.1–1. NONROAD model county temperature- and fuel-related inputs.

Month	Temperatures (°F)			Fuel RVP (psi)	Diesel Sulfur (ppm)	Gasoline Sulfur (ppm)	Ethanol Blend		
	Max.	Min.	Average				ETOH (Vol%)	Market Share (%)	Total Oxygen (wt%)
January	64	45	54.90	8.8	6	35	9.47	100	3.49
February	69	48	58.45	8.4	6	23	9.24	100	3.42
March	79	54	66.84	8.4	7	49	9.18	100	3.41
April	87	61	74.23	7.8	7	23	5.57	100	2.06
May	91	66	78.74	6.8 *	6 *	27*	0.00*	0*	0.00*
June	107	80	93.40	6.6	6	25	0.00	0	0.00
July	106	84	95.16	7.0	4	19	0.00	0	0.00
August	104	82	93.16	6.8	6	29	0.00	0	0.00
September	101	79	90.07	6.5	6	35	0.00	0	0.00
October	91	65	78.13	7.9	7 †	25	6.79	100	2.52
November	81	56	68.67	8.4	7 †	15	8.78	100	3.27
December	65	46	56.03	8.3 †	7	28†	8.17†	100†	3.03†

* Since measurements were not available, the average of June, July, August and September data was used.
† Since measurements were not available, the average of October, November, January, February, March and April data was used.

EPA recommends adjusting default NONROAD model values (such as equipment population, activity levels of equipment, growth factors, etc.) where local data is available, as the default values in the model are derived from national averages.

NONROAD model default values were adjusted based on 2003 survey results of the commercial lawn and garden industry as part of an inventory developed to study the impact of visibility impairing pollutants (ENVIRON et al., 2003). Survey results show that for most categories of lawn and garden equipment, the equipment population estimates for Maricopa County are significantly lower than EPA default values, while the average annual hours of operation for most equipment types are slightly higher than EPA's values. Using these local data results in a considerable decrease in emissions from this category, compared with earlier results using EPA default data.

Spatial allocation factors were developed (based on EPA guidance documents) to apportion non-road emissions to the CO maintanence area. The approaches used are described in each section of this chapter.

Temporal allocations (used to calculate CO season-day emissions) for nonroad equipment categories modeled in the NONROAD model come from EPA recommendations on weekday and weekend day activity levels for each nonroad equipment category (US EPA, 1999). Table 4.1–2 below lists the weighted activity level allocation fractions for each equipment class for weekdays and weekend days. For this report, the most conservative (highest) allocation fraction in each nonroad equipment class was used to calculate season-day emissions.

Table 4.1–2. Default weekday and weekend day activity allocation fractions.

Equipment category	Weekday	Weekend day
Agricultural	0.1666667	0.0833334
Airport ground support	0.1428571	0.1428571
Commercial	0.1666667	0.0833334
Construction and mining	0.1666667	0.0833334
Industrial	0.1666667	0.0833334
Lawn and garden (residential)	0.1111111	0.2222222
Lawn and garden (commercial)	0.1600000	0.1000000
Pleasure craft	0.0600000	0.3500000
Railway maintenance	0.1800000	0.0500000
Recreational	0.1111111	0.2222222

4.2 Agricultural equipment

Annual emissions from agricultural equipment in Maricopa County were calculated using EPA's NONROAD model, as discussed above. CO maintenance area annual emissions were calculated based on EIIP guidance (US EPA, 2002) which recommends using the ratio of agricultural land inside the maintenance area (84,979 acres) to agricultural land inside the county (295,509 acres). See Section 1.5.2 for a discussion of land-use data used.

County season-day emissions were calculated by multiplying CO season emissions (generated by the NONROAD2002 model) by the most conservative weekday/weekend day activity allocation factor for agricultural equipment listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the CO season (US EPA, 1999).

CO maintenance area season-day emissions were calculated by multiplying county season-day emissions by the agricultural land-use allocation factor.

Table 4.2–1. Annual and season-day CO emissions from agricultural equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	367.01	513.7
CO Maintenance Area	105.55	147.7

4.3 Airport ground support equipment

Annual emissions from airport ground support equipment (GSE) and auxiliary power units (APUs) at most airports in the county were estimated using the Emissions Dispersion Modeling System (EDMS, v. 5.1.1) from the U.S. Federal Aviation Administration (FAA). The model can estimate emissions from affiliated GSE and APUs, by using either default equipment profiles, or user-specified data on equipment populations and activity patterns. In most cases, activity data on 2008 aircraft operations and GSE/APU usage was obtained from individual airport surveys issued by MAG and/or MCAQD. Where survey responses were incomplete or information was otherwise unavailable, activity data was estimated using commercially available data, and EDMS default assumptions where appropriate. Further details concerning the modeling input data and results are presented in Section 4.11 of this report.

For Luke Air Force Base (AFB), emissions estimates for ground support equipment were obtained from a recent base-wide mobile source emissions inventory for calendar year 2008 that

had recently been completed for the US Air Force (Weston, 2010). GSE emissions from the Luke AFB study were added to the EDMS-estimated emissions from the other airports in the County. (The Luke study assumed APU usage, and thus emissions, to be negligible.) A simplifying assumption was made for all airports; i.e., that activity is spread fairly evenly throughout the week and year; thus CO season day emissions were estimated by dividing annual totals by 366 (= days/yr in 2008). Table 4.3–1 below presents the totals for all airport GSE and APU usage within both Maricopa County and the CO maintenance area, on an annual and season-day basis, respectively.

Table 4.3–1. Annual and season day CO emissions from airport ground support equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	4,842.26	26,460.4
CO Maintenance Area	4,765.55	26,041.3

4.4 Commercial equipment

Annual emissions from commercial equipment in Maricopa County were calculated using EPA's NONROAD model, as described in Section 4.1. Annual emissions for the CO maintenance area for this category were derived by applying the ratio of industrial employment in the maintenance area to Maricopa County-level totals, as data on the number of wholesale establishments recommended by EIIP guidance (US EPA, 2002) was not available. See Section 1.5.1 for a discussion of the industrial employment data used.

County season-day emissions were calculated by multiplying Maricopa County CO season emissions (generated by the NONROAD model) by the most conservative weekday/ weekend day activity allocation factor for commercial equipment (0.1666667) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the CO season (US EPA, 1999). CO maintenance area season-day emissions were calculated based on industrial employment ratios as described above.

Table 4.4–1. Annual and season day CO emissions from commercial equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	37,407.59	204,928.7
CO Maintenance Area	36,816.55	201,690.8

4.5 Construction and mining equipment

Annual emissions from construction and mining equipment in Maricopa County were calculated using EPA's NONROAD model as described in Section 4.1. Annual emissions for the CO maintenance area for this category were derived by applying the ratio of population in the maintenance area to Maricopa County-level totals as a conservative estimate, as the EIIP-recommended allocation factor of total dollar value of construction was unavailable (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used.

County season-day emissions were calculated by multiplying Maricopa County CO season emissions (generated by the NONROAD model) by the most conservative weekday/ weekend day activity allocation factor for construction/mining equipment (0.1666667) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the CO season (US EPA, 1999). CO

maintenance area season-day emissions were calculated based on population ratios as described above.

Table 4.5–1. Annual and season day CO emissions from construction and mining equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	17,097.10	90,379.7
CO Maintenance Area	15,753.27	83,275.9

4.6 Industrial equipment

Annual emissions from industrial equipment in Maricopa County were calculated using EPA's NONROAD model, as described in Section 4.1. Annual emissions for the CO maintenance area for this category were derived by applying the ratio of industrial employment in the maintenance area to Maricopa County-level totals as a conservative estimate, as the number of employees in manufacturing recommended by EIIP guidance (US EPA, 2002) was not available. See Section 1.5.1 for a discussion of the industrial employment data used.

County season-day emissions were calculated by multiplying Maricopa County CO season emissions (generated by the NONROAD model) by the most conservative weekday/weekend day activity allocation factor for industrial equipment (0.1666667) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the CO season (US EPA, 1999). CO maintenance area season-day emissions were calculated based on industrial employment ratios as described above.

Table 4.6–1. Annual and season day CO emissions from industrial equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	10,294.56	64,617.8
CO Maintenance Area	10,131.90	63,596.8

4.7 Lawn and garden equipment

Annual emissions from lawn and garden equipment in Maricopa County were calculated using EPA's NONROAD model, as described in Section 4.1. These results reflect new equipment population and usage estimates from survey work done in early 2003 for the Arizona Department of Environmental Quality (discussed further in Section 4.1). Annual emissions for the CO maintenance area for this category were derived by applying the ratio of population in the maintenance area to Maricopa County-level totals, since housing units was not available, as recommended by EIIP guidance (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used.

County season-day emissions were calculated by multiplying Maricopa County CO season emissions (generated by the NONROAD model) by the most conservative weekday/weekend day activity allocation factor for lawn and garden equipment (0.1600000 for the commercial segment, 0.2222222 for residential) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the CO season (US EPA, 1999). CO maintenance area season-day emissions were calculated based on population as described above.

Table 4.7–1. Annual and season day CO emissions from lawn and garden equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	66,712.36	100,753.6
CO Maintenance Area	64,657.62	97,650.4

4.8 Pleasure craft

Annual emissions from pleasure craft equipment in Maricopa County were calculated using EPA's NONROAD model, as described in Section 4.1. Annual emissions for the CO maintenance area for this category were derived by applying the ratio of water surface area in the maintenance area to Maricopa County-level totals, as recommended by EIIP guidance (US EPA, 2002). See Section 1.5.2 for a discussion of the land-use data used.

County season-day emissions were calculated by multiplying Maricopa County CO season emissions (generated by the NONROAD model) by the most conservative weekday/weekend day activity allocation factor for pleasure craft (0.350000) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the CO season (US EPA, 1999). CO maintenance area season-day emissions were calculated based on water surface area as described above.

Table 4.8–1. Annual and season day CO emissions from pleasure craft equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	1,627.41	5,008.5
CO Maintenance Area	431.81	1,328.9

4.9 Railway maintenance equipment

Annual emissions from railway maintenance equipment in Maricopa County were calculated using EPA's NONROAD model, as described in Section 4.1. Annual emissions for the CO maintenance area for this category were derived by applying the ratio of population in the maintenance area to Maricopa County-level totals, as recommended by EIIP guidance (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used.

County season-day emissions were calculated by multiplying Maricopa County CO season emissions (generated by the NONROAD model) by the most conservative weekday/weekend day activity allocation factor for railway maintenance equipment (0.1800000) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the CO season (US EPA, 1999). CO maintenance area season-day emissions were calculated based on the population ratio as described above.

Table 4.9–1. Annual and season day CO emissions from railway maintenance equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	19.33	120.8
CO Maintenance Area	18.73	117.1

4.10 Recreational equipment

Annual emissions from recreational equipment in Maricopa County were calculated using EPA's NONROAD model (see Section 4.1). Annual emissions for the CO maintenance area were

derived by applying the ratio of passive open space, golf courses and vacant land use in the CO maintenance area to Maricopa County-level totals per EIIP guidance (US EPA, 2002). See Section 1.5.2 for a discussion of the land use data used.

County season-day emissions were calculated by multiplying Maricopa County CO season emissions (generated by the NONROAD model) by the most conservative weekday/weekend day activity allocation factor for recreational equipment (0.2222222) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the CO season (US EPA, 1999). CO maintenance area season-day emissions were calculated based on land use as described above.

Table 4.10–1. Annual and season day CO emissions from recreational equipment.

Geographic area	Annual CO emissions (tons/yr)	Season-day CO emissions (lbs/day)
Maricopa County	7,270.41	24,593.7
CO Maintenance Area	412.23	1,394.5

4.11 Aircraft

Emissions from aircraft operations at the largest civilian airports in Maricopa County were estimated using the Federal Aviation Administration's Emissions and Dispersion Model (EDMS, v. 5.1.1). The EDMS model combines specified aircraft type and activity levels with default emission factors in order to estimate annual emissions inventories for a specific airport. The model also estimates emissions from affiliated ground support equipment (GSE) and auxiliary power units (APUs); these emissions are reported separately and are summarized in Section 4.3.

MCAQD surveyed medium and large airports in Maricopa County to gather data on aircraft type and activity level of aircraft operations. Specifically, the number of landing and takeoff cycles, or (LTO's) or touch and go operations, (TGOs), along with information on the types of aircraft that comprise the airport's typical fleet mix, and other operational data, such as typical usage patterns of ground support equipment (GSE) and auxiliary power units (APUs), average taxi/idle times, etc. Where survey responses were unavailable or incomplete, aircraft activity data from publicly accessible databases, such as the FAA's Air Traffic Activity Data System (ATADS) and Enhanced Traffic Management System Counts (ETMSC), were used.

All emission estimates in this section have been developed using the EDMS model, with the exception of Luke Air Force Base (AFB), whose emissions calculations have been prepared as part of a base-wide 2008 mobile source emissions inventory that has recently been completed (Weston, 2010). Luke AFB's emissions reported as 'aircraft activity' actually comprise three distinct, though related, types of activity: (1) the operation of aircraft stationed at the base, (2) a much smaller level of "transient" aircraft traffic within Luke's airspace, and (3) emissions produced during on-wing engine testing – considered a "mobile source" emission category. As with all other airports included in this inventory, emissions from ground support equipment (GSE) at Luke AFB are addressed in Section 4.3.

In addition to the LTOs (and occasional TGO activity) reported by other airports in the area, Luke reported two additional, types of aircraft operations: aircraft low fly bys (LFB), and aircraft low fly patterns (LFP). Each of these types of operations can be characterized by a distinctive combination of the times in mode (TIM); (e.g., approach, taxi in/out, takeoff and climb out.) Luke's emissions are not based on the number of LTOs, but rather the aggregate annual operational time in modes (TIMs) for all aircraft of similar type. For the F-16, an LTO cycle includes

five modes of operation: idle (taxi in/out), intermediate, approach, military and afterburner. F-16 emissions were estimated using the annual TIMs provided by Luke AFB and emission factors from military guidance documents.

Table 4.11–1 lists the data sources for each airport's activity level, as well as fleet mix. The total number of aircraft operations in 2008 is also listed. For all airports other than Luke AFB, aircraft emissions were estimated for four aircraft categories:

- Air carriers (abbreviated "AC"): Larger commercial aircraft with at least 60 seats or 18,000 lbs payload capacity, used for scheduled service to transport passengers and/or freight;
- Air taxis ("AT"): Smaller commercial turbine- or piston-powered aircraft with less than 60 seats or 18,000 lbs payload capacity;
- General aviation ("GA"): Aircraft used on an unscheduled basis for recreational flying, personal transportation, and other activities, including business travel; and
- Military ("ML"): Aircraft used to support military operations.

Table 4.11–1. Annual airport operations (by aircraft category), and related data sources.

Airport	Airport Code	Operations Data Source[1]	Fleet Mix Data Source[2]	Aircraft Type	2008 Operations
Buckeye Municipal	BXK	airnav.com	Generic GA profile	GA	26,535
Chandler Municipal	CHD	FAA/ATADS	FAA/ETMSC	AT	2,882
				GA	233,713
				ML	247
Falcon Field	FFZ	FAA/ATADS	FAA/ETMSC	AC	6
				AT	3,813
				GA	313,448
				ML	2,152
Gila Bend Municipal	E63	airnav.com	Generic GA profile	GA	1,768
Glendale Municipal	GEU	FAA/ATADS, Survey response	FAA/ETMSC	AT	1,873
				GA	134,282
				ML	57
Luke Air Force Base	LUF	[Emission totals provided by Luke AFB are based on times-in-mode.]			
Phoenix Deer Valley	DVT	Survey response	Survey response, FAA/ETMSC	AC	284
				AT	6,217
				GA	370,003 *
				ML	130
Phoenix Goodyear	GYR	Survey response	Survey response, FAA/ETMSC	AC	140
				AT	1962
				GA	169,177 *
				ML	6,747
Phoenix-Mesa Gateway (formerly Williams Gateway)	IWA	FAA/ATADS, Survey response	FAA/ETMSC	AC	3,876
				AT	5,937
				GA	211,674
				ML	5,939
Phoenix Sky Harbor	PHX	Survey response	Survey response, FAA/ETMSC	AC	391,518
				AT	77,354
				GA	30,868
				ML	2,759
Pleasant Valley	P48	airnav.com	Generic GA profile	GA	23,535
Scottsdale	SDL	FAA/ATADS	FAA/ETMSC	AT	11,232
				GA	179,619
				ML	560
Sky Ranch at Carefree	18AZ	Survey response	Generic GA profile	GA	1,515
Stellar Airpark	P19	airnav.com	Generic GA profile	GA	19,528
Wickenburg Municipal	E25	Survey responses	Generic GA profile	GA	6,000

1. FAA/ATADS: Federal Aviation Administration's Air Traffic Activity Data System (database); http://aspm.faa.gov.
2. FAA/ETMSC: Federal Aviation Administration's Enhanced Traffic Management System Counts (database); http://aspm.faa.gov.

* includes touch-and-go (TGO) operations levels reported by the airport.

The following section describes how activity and emissions were estimated for a representative airport, Chandler Municipal (CHD). Data from FAA's Air Traffic Activity Data System (ATADS, http://www.aspm.faa.gov) provided data on 2008 activity by aircraft type; these results are contained in Table 4.11–1. While ATADS reported a total of 233,713 general aviation operations at this airport in 2008, further information on the aircraft types comprising this activity was needed. The FAA's Enhanced Traffic Management System Counts (ETMSC) database was used to "grow" available aircraft-specific operational data as described below.

The ETMSC database on general aviation activity at CHD in 2008 comprises 152 different aircraft types, totaling 3,589 operations (See Table 4.11–2). To simplify modeling input requirements, this aircraft-specific activity data was ranked in order of decreasing frequency and activity data for the most frequently reported aircraft was then grown to represent all general aviation ("GA") activity, as shown in Table 4.11–2 below.

Table 4.11–2. Example showing how most common aircraft-specific activity was grown for modeling.

Rank	Aircraft Type	ETMSC-reported operations	% of total reported operations	Cumulative Percent	"Grown" operations for EDMS modeling
1	BE20 - Beech 200 Super King	240	6.7%		21,919
2	BE58 - Beech 58	233	6.5%		21,280
3	PA28 - Piper Cherokee	233	6.5%		21,280
4	C525 - Cessna CitationJet/CJ1	232	6.5%		21,189
5	C182 - Cessna Skylane 182	203	5.7%	31.8%	18,540
6	C172 - Cessna Skyhawk 172/Cutlass	194	5.4%		17,718
7	TBM7 - Socata TBM-7	166	4.6%		15,161
8	R22 - Robinson R-22 Mariner	138	3.8%		12,604
9	BE9L - Beech King Air 90	106	3.0%		9,681
10	BE36 - Beech Bonanza 36	97	2.7%	51.3%	8,859
11	BE55 - Beech Baron 55	90	2.5%		8,220
12	BE35 - Beech Bonanza 35	87	2.4%		7,946
13	C210 - Cessna 210 Centurion	75	2.1%		6,850
14	PA32 - Piper Cherokee Six	73	2.0%		6,667
15	P28R - Cherokee Arrow/Turbo	71	2.0%	62.4%	6,484
16	P46T - Piper Malibu Meridian	67	1.9%		6,119
17	SR22 - Cirrus SR 22	67	1.9%		6,119
18	BE30 - Raytheon 300 Super King Air	65	1.8%		5,936
19	MO20 - Mooney M-20	62	1.7%		5,662
20	C560 - Cessna Citation V/Ultra/Encore	60	1.7%	71.3%	5,480
⋮	⋮	⋮	⋮	⋮	
152	XL2 - Liberty XL-2	1	< 0.1%	100.0%	(n/a)
	Totals:	**3,589**			**233,713**

This approach of ranking reported activity, and then growing the most frequently occurring subset of aircraft typically resulted in a set comprised of 10 to 30 aircraft types being modeled for each airport/aircraft class combination, representing 60 to 100% of all reported activity. For ease in modeling computation and the assessment of emissions, all activity was assumed to occur evenly throughout the year. Thus, CO season day emissions were calculated by dividing annual totals by 366 (= days per year in 2008). Table 4.11–3 lists the total annual emissions and season-day emissions, of each airport and aircraft type, and for airports within and outside the CO maintenance area, respectively.

Table 4.11–3. Annual and season-day CO emissions, by airport and aircraft type.

Airport	Category[1]	Annual CO Emissions (tons/yr)	Typical season day CO emissions (lbs/day)
Buckeye Muni (BXK)	Aircraft: GA	351.30	1,919.7
Chandler Muni (CHD)	Aircraft: AT	13.70	74.8
	Aircraft: GA	2,146.93	11,731.8
	Aircraft: ML	1.28	7.0
	CHD total	2,161.90	11,813.7
Falcon Field (FFZ)	Aircraft: AC	0.03	0.2
	Aircraft: AT	15.25	83.3
	Aircraft: GA	2,824.89	15,436.5
	Aircraft: ML	9.28	50.7
	FFZ total	2,849.45	15,570.8
Gila Bend Muni (E63)	Aircraft: GA	23.42	128.0
Glendale Muni (GEU)	Aircraft: AT	118.76	648.9
	Aircraft: GA	1,068.47	5,838.6
	Aircraft: ML	0.65	3.6
	GEU total	1,187.88	6,491.1
Luke AFB (LUF)	Aircraft: ML	665.20	3,635.0
Phx Deer Valley (DVT)	Aircraft: AC	2.29	12.5
	Aircraft: AT	26.75	146.2
	Aircraft: GA	3,159.04	17,262.5
	Aircraft: ML	0.83	4.5
	DVT total	3,188.91	17,425.7
Phx Goodyear (GYR)	Aircraft: AC	0.81	4.4
	Aircraft: AT	8.30	45.3
	Aircraft: GA	2,428.23	13,269.0
	Aircraft: ML	36.49	199.4
	GYR total	2,473.82	13,518.1
Phx Sky Harbor (PHX)	Aircraft: AC	1,795.49	9,811.4
	Aircraft: AT	200.51	1,095.7
	Aircraft: GA	151.06	825.5
	Aircraft: ML	24.69	134.9
	PHX total	2,171.75	11,867.5
Williams Gateway (IWA)	Aircraft: AC	14.37	78.5
	Aircraft: AT	30.55	166.9
	Aircraft: GA	823.11	4,497.8
	Aircraft: ML	48.93	267.4
	IWA total	916.95	5,010.7
Pleasant Valley (P48)	Aircraft: GA	2.70	14.7
Scottsdale (SDL)	Aircraft: AT	52.75	288.3
	Aircraft: GA	702.20	3,837.1
	Aircraft: ML	3.53	19.3
	SDL total:	758.48	4,144.7
Sky Ranch / Carefree	Aircraft: GA	11.61	63.4
Stellar Airpark (P19)	Aircraft: GA	294.75	1,610.7
Wickenburg Muni (E25)	Aircraft: GA	47.39	259.0
	County totals:	17,105.50	93,472.7
Maricopa County	Aircraft: AC	1,812.99	9,907.0
	Aircraft: AT	466.56	2,549.5
	Aircraft: GA	14,035.08	76,694.4
	Aircraft: ML	790.88	4,321.8
	Aircraft, total	17,105.50	93,472.7
CO Maintenance area: (excludes Buckeye, Gila Bend and Wickenburg)	Aircraft: AC	1,812.99	9,907.0
	Aircraft: AT	466.56	2,549.5
	Aircraft: GA	13,613.0	74,387.8
	Aircraft: ML	790.88	4,321.8
	Aircraft, total	16,683.40	91,166.1

1. AC = air carrier, GA = general aviation, AT = air taxi, ML = military.

4.12 Locomotives

Annual emissions from locomotives were calculated based on diesel fuel usage provided by Burlington Northern/Santa Fe Railway (BNSF), Union Pacific Railway (UP) and Amtrak. Railway operations from these companies fall into two categories: Class I haul lines and yard/switching operations. Annual emissions from Class I haul operations and yard/switching operations were calculated by multiplying diesel fuel usage by the emission factors listed in Table 4.12–1 (US EPA, 2009).

Table 4.12–1. Emission factors for locomotives.

Activity type	Emission factors (lbs/gal diesel)
Class I haul line	0.059
Yard/switch operations	0.061

Fuel use reported by railroads, and annual emission totals are summarized in Table 4.12–2.

Table 4.12–2. Fuel use and annual CO emissions from locomotives in Maricopa County.

Locomotive type	Diesel fuel used (gals)	Annual CO emissions (tons/yr)
BNSF Class I haul line	750,094	22.13
UP Class I haul line	7,780,284	229.52
BNSF yard/switch operations	400,000	12.20
UP yard/switch operations	378,199	11.54
Amtrak	52,416	1.55
Totals:	**9,360,993**	**276.93**

CO maintenance area emissions were calculated by multiplying Maricopa County emissions by the percentage of track miles inside the CO maintenance area, determined by GIS mapping. Results are shown in Table 4.12–3.

Table 4.12–3. Annual CO emissions (in tons/yr) from locomotives in the CO maintenance area.

Locomotive type	Track in maintenance area (%)	Annual CO emissions (tons/yr)
BNSF Class I haul line	37.95	8.40
UP Class I haul line	37.95	87.10
BNSF yard/switch operations	100.00	12.20
UP yard/switch operations	100.00	11.54
Amtrak	0.00	0.00
Totals:		**119.23**

CO season-day emissions for both the county and the CO maintenance area (shown in Table 4.12–4) were calculated by dividing annual totals by 366 days per year (= days/yr in 2008), as locomotive activity is assumed to be uniform throughout the year.

Table 4.12–4. Season-day emissions (in lbs/day) from locomotives in Maricopa County and the CO maintenance area.

Locomotive type	Maricopa County	CO maintenance area
BNSF Class I haul line	120.9	45.9
UP Class I haul line	1,254.2	476.0
BNSF yard/switch operations	66.7	66.7
UP yard/switch operations	63.0	63.0
Amtrak	8.4	0.0
Totals:	**1,513.3**	**651.6**

4.13 Summary of all nonroad mobile source emissions

Table 4.13−1 summarizes the annual and season-day emissions of carbon monoxide from nonroad mobile sources in Maricopa County and the CO maintenance area.

Table 4.13–1. Summary of annual and season-day CO emissions from nonroad mobile sources.

	Annual CO emissions (tons/yr)		Season-day CO emissions	
Equipment category	Maricopa County	CO maintenance area	Maricopa County	CO mainten-ance area
Agricultural	367.01	513.7	105.55	147.7
Airport GSE (+APU)	4,842.26	26,460.4	4,765.55	26,041.3
Commercial equipment	37,407.59	204,928.7	36,816.55	201,690.8
Construction & mining equipment	17,097.10	90,379.7	15,753.27	83,275.9
Industrial equipment	10,294.56	64,617.8	10,131.90	63,596.8
Lawn & garden equipment	66,712.36	100,753.6	64,657.62	97,650.4
Pleasure craft	1,627.41	5,008.5	431.81	1,328.9
Railway maintenance	19.33	120.8	18.73	117.1
Recreational equipment	7,270.41	24,593.7	412.23	1,394.5
Aircraft	17,105.50	93,472.7	16,683.40	91,166.1
Locomotives	276.93	1,513.3	119.23	651.6
Totals:	**163,020.46**	**612,362.8**	**149,895.85**	**567,061.0**

4.14 Quality assurance procedures

Established procedures were used to check, and correct when necessary, the off-road mobile sources emissions estimates. All NONROAD model input and output files, and Excel spreadsheets used to calculate the emissions, were checked by personnel who were not involved in the development of the modeling inputs/outputs and spreadsheets. In addition, the emissions estimates were reviewed for reasonableness by external agency staff.

4.15 References

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5. Onroad Mobile Sources

5.1 Introduction

Onroad mobile source emissions for carbon monoxide (CO) have been calculated for the CO maintenance area and Maricopa County for the 2008 Periodic Emissions Inventory (PEI).

Motor Vehicle Emission Simulator (MOVES2010b) is the latest model developed by the U.S. Environmental Protection Agency (EPA) for the purpose of estimating onroad and off-network motor vehicle emission factors.

The MOVES2010b modeling accounted for the oxygenated fuel and the Arizona Vehicle Inspection/Maintenance (I/M) programs applied in Maricopa County in 2008. The fuel use assumptions, including oxygen content and Reid Vapor Pressure (RVP), were derived from the 2008 fuel inspection results provided by the Arizona Department of Weights and Measures.

In order to develop the 2008 onroad mobile source emissions, the 2008 vehicle miles traveled (VMT) estimates by facility type and road type were derived from the 2008 Highway Performance Monitoring System (HPMS) data provided by the Arizona Department of Transportation (ADOT). The distribution of VMT by vehicle type is based on the July 2008 vehicle registration data for Maricopa County provided by ADOT. The VMT by vehicle type was provided as local input data for MOVES2010b to produce onroad exhaust emissions.

The main references for preparing the onroad mobile source portion of the 2008 emissions inventory were:

- Emission Inventory Requirements for Ozone State Implementation Plans (EPA, 1991);
- Procedures for Emission Inventory Preparation Volume IV: Mobile Sources (EPA, 1992a);
- Quality Review Guidelines for 1990 Base Year Emission Inventories (EPA, 1992b);
- User's Guide for the SMOKE-MOVES Integration Tool (EPA, 2010a);
- Motor Vehicle Emission Simulator (MOVES) - User Guide Version, MOVES2010b (EPA, 2012a);
- Policy Guidance on the Use of MOVES2010 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes (EPA, 2012b); and
- Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b (EPA, 2012c).

5.2 Exhaust emissions

Vehicle exhaust emission factors for CO were calculated using MOVES2010b. The MOVES2010b runs were executed by MAG. The contact person for the MOVES2010b emission estimates is Ieesuck Jung (602-254-6300).

5.2.1 MOVES2010b model

The emissions were calculated using MOVES2010b. MOVES2010b is EPA's state-of-the-art emissions modeling tool, which replaces EPA's previous mobile source emissions model, MOBILE6.2. MOVES2010b is intended for official use to estimate national, state, and county

level inventories of criteria air pollutants from highway vehicles. The user of MOVES2010b is allowed to specify vehicle types, time periods, geographical areas, pollutants, vehicle operating characteristics, and road types for a particular scenario to be modeled by creating a Run Specification (RunSpec).

In order to calculate vehicle emissions for the calendar year 2008, MOVES2010b was executed using local input data for each month of the year and each geographical area (the CO maintenance area and Maricopa County). Each scenario was created using the County Domain/Scale and the Inventory Calculation Type. The specific MOVES2010b model RunSpec and RunSpec summaries are described in Appendix 3.

5.2.2 MOVES2010b local input data

Compared with MOBILE6.2, MOVES2010b requires a more detailed level of local data, including fuel data, I/M program, meteorological data, vehicle population, source type age distribution, annual VMT, monthly/daily/hourly VMT fractions, road type distribution, average speed distribution, ramp fraction, and Alternative Vehicle and Fuel Technologies (AVFT) strategy.

5.2.2.1 Fuel data

Regarding the fuel local input data, MOVES2010b provides two MOVES tables, which are [fuelsupply] and [fuelformulation]. The fuel data for each month were derived from the 2008 fuel inspection results in Maricopa County provided by the Arizona Department of Weights and Measures. The fuel data for Maricopa County were also applied to the CO maintenance area. The specific MOVES tables for fuel data are presented in Appendix 3.

5.2.2.2 I/M programs

MOVES2010b has an [IMCoverage] table for I/M programs; this table was prepared using MOBILE6.2 input. This table reflects 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 Vehicle Inspection/Maintenance Program. It is important to note that participation in the I/M program is required for all vehicles registered in the CO maintenance area, with the exception of certain model years and vehicle classes. However, it is assumed that 91.6 percent of the vehicles operating within the CO maintenance area and Maricopa County participate in the I/M program and the remaining 8.4 percent do not participate in the program. These percentages reflect the control measures "Tougher Enforcement of Vehicle Registration and Emissions Test Compliance" and "Expansion of Area A Boundaries," described in the MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area (MAG, 2009). This percentage is directly applied to the Compliance Factor in the [IMCoverage] table. The same I/M programs were applied for the CO maintenance area and Maricopa County. The specific MOVES table for I/M programs is presented in Appendix 3.

5.2.2.3 Meteorological data

MOVES2010b requires hourly temperature and relative humidity data by specific month of the year. Meteorological data for the Phoenix Sky Harbor International Airport in 2008 were obtained from the National Climatic Data Center (http://www7.ncdc.noaa.gov/IPS/lcd/lcd.html?_page=1&state=AZ&wban=23183&_target2=Next+%3E). The same hourly average temperature

and relative humidity data for each month were applied for the CO maintenance area and Maricopa County. The specific MOVES table [ZoneMonthHour] for meteorological data is presented in Appendix 3.

5.2.2.4 Vehicle population

In order to capture start, evaporative, and extended idle emissions, MOVES2010b introduced a new mobile source emission category called off-network emissions. In MOVES2010b, these off-network emissions are directly determined by population of vehicles in an area. The vehicle population in Maricopa County was obtained from the July 2008 vehicle registration data provided by ADOT. The vehicle population data were allocated to the 28 MOBILE6.2 vehicle types based on MOBILE6.2 VMT fractions for 2008. Then, the vehicle population data allocated to the 28 MOBILE6.2 vehicle types were assigned to the 13 MOVES source types using the match-up table (Table A.1) in EPA's technical guidance (EPA, 2010a). The vehicle population in the CO maintenance area was estimated by applying the population ratio of the two geographical areas to the vehicle population in Maricopa County. The population ratio for 2008 was derived from the MAG socioeconomic data, which is 3,688,000 people for the CO maintenance area and 3,988,000 people for Maricopa County. The specific MOVES table [SourceTypeYear] for vehicle population is presented in Appendix 3.

5.2.2.5 Source type age distribution

MOVES2010b categorizes vehicles according to vehicle classes and model years. The source type age distribution was prepared using EPA's data converter that takes the registration distribution input file created for MOBILE6.2 and converts it to the appropriate MOVES age distribution input table [SourceTypeAgeDistribution]. The same source type age distribution was applied for the CO maintenance area and Maricopa County. The specific MOVES table for source type age distribution is presented in Appendix 3.

5.2.2.6 Annual VMT

The 2008 daily VMTs by facility type were used to estimate onroad exhaust emissions. The 2008 VMT distributions by facility type for the CO maintenance area and Maricopa County were obtained from the 2008 Maricopa County Estimates of Daily Vehicle Travel by Highway Functional Classification provided by ADOT. The 2008 VMT distributions were multiplied by the 2008 HPMS VMT for the CO maintenance area and Maricopa County. The resultant VMT estimates by facility type for the CO maintenance area and Maricopa County are shown in Table 5.2-1.

Since MOVES2010b requires annual VMTs by HPMS vehicle type as a local input, the daily VMTs by HPMS vehicle type were derived from the 2008 traffic assignment data provided by the MAG transportation modeling group in January 2012 and the daily VMTs by facility type and the estimated percentages of daily vehicle travel by vehicle type and highway functional classification provided by ADOT. Then, the daily VMTs by HPMS vehicle type were multiplied by 366 days to obtain the annual VMTs by HPMS vehicle type. The specific MOVES table [HPMSvTypeYear] for annual VMT is presented in Appendix 3.

Table 5.2–1. 2008 daily VMT by facility type (annual average daily traffic).

	Facility Type	CO Maintenance Area (thousand miles/day)	Maricopa County (thousand miles/day)
Rural	Interstate	2,040	3,223
	Other Principal Arterial	819	1,293
	Minor Arterial	418	661
	Major Collector	1,065	1,682
	Minor Collector	130	205
	Local	498	787
Urban	Interstate	10,467	10,939
	Other Freeway/Expressway	18,907	19,760
	Other Principal Arterial	21,673	22,651
	Minor Arterial	14,285	14,930
	Collector	4,655	4,865
	Local	9,818	10,261
Totals:		**84,775**	**91,257**

5.2.2.7 Road type distribution

MOVES2010b requires the distribution of VMTs by road type as a local input. The road type VMT distribution by HPMS vehicle type was derived from the 2008 traffic assignment data and the daily VMTs by HPMS vehicle type mentioned in the previous section. As suggested in EPA's technical guidance (EPA, 2010a), the same road type distribution by HPMS vehicle type was used for all MOVES source types within an HPMS vehicle class. The specific MOVES table [RoadTypeDistribution] for road type distribution is presented in Appendix 3.

5.2.2.8 VMT fraction

Since VMT varies by month, day of week, and hour, MOVES2010b requires month/day/hour VMT fractions as a local input in order to derive hourly VMT for each weekday/weekend and month from the annual VMT. The month/day/hour VMT fractions were developed from data recorded by continuous traffic counters on freeways (ADOT Freeway Management System) and arterials (Phoenix Automatic Traffic Recorders) during the year 2007. The specific MOVES tables [MonthVMTFraction], [DayVMTFraction], and [HourVMTFraction] for VMT fractions are presented in Appendix 3.

5.2.2.9 Average speed distribution

In MOVES2010b, vehicle power, speed, and acceleration have a significant effect on vehicle emissions for all pollutants. MOVES2010b estimates those emission effects by assigning activity to operating mode distributions, which are determined by the distribution of vehicle hours traveled (VHT) by average speed. As recommended in EPA's technical guidance (EPA, 2010a), estimates of local average speeds were developed by post-processing the output from the 2008 traffic assignment data provided by the MAG transportation modeling group in January 2012. To develop the average speed distribution, VHTs in sixteen speed bins were accumulated separately for each hour of the day, source type, and road type in Maricopa County. Then, the average speed distribution was calculated by normalizing VHTs in sixteen speed bins for each hour of the day, source type, and road type. The same methodology was applied to develop the

speed estimates for the CO maintenance area. The specific MOVES table [AvgSpeedDistribution] for the average speed distribution is presented in Appendix 3.

5.2.2.10 Ramp fraction

MOVES2010b requires the ramp fraction, which represents the percent of VHT on ramps, on both rural restricted roads (road type 2) and urban restricted roads (road type 4). The fraction of VHT on ramps was derived by dividing the total VHTs on ramps by the total VHTs for each restricted road type. Those VHTs were obtained from the 2008 traffic assignment data provided by the MAG transportation modeling group in January 2012. The specific MOVES table [RoadType] for ramp fractions is presented in Appendix 3.

5.2.2.11 AVFT strategy

MOVES2010b allows users to modify the fuel engine fraction using different fuels and technologies in each model year in order to reflect the local situation. The fleet information for transit buses for model years 1997 through 2010 was provided by Valley Metro and used to prepare the AVFT input file. Since the fleet data are available only for specific model years, MOVES2010b default values were obtained from the [fuelEngFraction] table in the MOVES default database and used for the rest of the model years. The specific MOVES table [AVFT] for AVFT strategy is presented in Appendix 3.

5.2.3 MOVES2010b outputs

MOVES2010b was executed with the RunSpec files described in Appendix 3 to obtain exhaust emissions for CO. These values were obtained for the following categories by month:

- Vehicle classes: light duty gasoline vehicles (LDGV), light duty gasoline trucks 1 & 2 (LDGT1), light duty gasoline trucks 3 and 4 (LDGT2), heavy duty gasoline vehicles 2B thru 8B and gasoline buses (HDGV), motorcycles (MC), light duty diesel vehicles (LDDV), light duty diesel trucks 1 thru 4 (LDDT), heavy duty diesel vehicles class 2B (2BHDDV), heavy duty diesel vehicles classes 3, 4, and 5 (LHDDV), heavy duty diesel vehicles classes 6 and 7 (MHDDV), heavy duty diesel vehicles classes 8A and 8B (HHDDV), and heavy duty diesel buses (BUSES)
- Facility types: rural interstate, rural principal arterial, rural minor arterial, rural major collector, rural minor collector, rural local, urban interstate, urban freeway/expressway, urban principal arterial, urban minor arterial, urban collector, urban local, and off-network, which was newly added in MOVES2010b
- Days: weekdays and weekend days

5.2.4 MOVES2010b emission estimates

MOVES2010b was used to generate onroad emissions by vehicle class, facility type, weekdays /weekend days, and month. By specifying the output time aggregate level as month, MOVES2010b produces monthly emissions including weekday and weekend emissions for a given month. The annual emissions were calculated by aggregating monthly onroad emissions derived by MOVES2010b. The CO season-day emissions were calculated by dividing the three-month peak CO season emissions from November through January by 92 days.

Table 5.2-2 shows the calculated annual and season-day CO emissions by facility type and vehicle class in the CO maintenance area and Maricopa County.

Table 5.2–2. Annual and CO season-day onroad mobile source emissions by facility type and vehicle class in the CO maintenance area and Maricopa County.

Facility Type	Vehicle Class	SCC	Annual CO emissions (tons/year)		Season-day CO emissions (lbs/day)	
			CO Maintenance Area	Maricopa County	CO Maintenance Area	Maricopa County
Rural Interstate	LDGV	2201001110	1,315.28	2,145.56	5,249.8	8,541.7
	LDGT1	2201020110	1,026.34	1,716.57	4,191.5	6,991.0
	LDGT2	2201040110	528.72	884.29	2,159.3	3,601.4
	HDGV	2201070110	410.53	540.14	1,970.5	2,543.7
	MC	2201080110	46.53	63.10	236.8	321.1
	LDDV	2230001110	0.35	0.52	1.5	2.3
	LDDT	2230060110	7.61	11.09	32.7	47.5
	2BHDDV	2230071110	3.33	4.85	14.3	20.7
	LHDDV	2230072110	18.21	26.48	78.5	113.7
	MHDDV	2230073110	64.39	84.06	351.2	458.6
	HHDDV	2230074110	162.43	260.03	886.0	1,418.6
	BUSES	2230075110	3.67	6.41	20.0	34.9
Rural Principal Arterial	LDGV	2201001130	682.58	1,062.08	2,788.2	4,329.5
	LDGT1	2201020130	562.67	876.46	2,345.7	3,643.6
	LDGT2	2201040130	289.86	451.51	1,208.4	1,877.0
	HDGV	2201070130	139.18	214.84	646.3	995.6
	MC	2201080130	32.65	46.22	166.2	235.2
	LDDV	2230001130	0.25	0.38	1.1	1.7
	LDDT	2230060130	5.68	8.45	24.9	36.8
	2BHDDV	2230071130	2.48	3.70	10.8	16.1
	LHDDV	2230072130	13.60	20.20	59.6	88.2
	MHDDV	2230073130	16.94	26.68	92.5	145.6
	HHDDV	2230074130	38.90	64.41	212.3	351.5
	BUSES	2230075130	3.01	5.30	16.5	28.9
Rural Minor Arterial	LDGV	2201001150	663.29	1,032.06	2,709.3	4,207.1
	LDGT1	2201020150	546.76	851.69	2,279.4	3,540.7
	LDGT2	2201040150	281.67	438.75	1,174.3	1,824.0
	HDGV	2201070150	135.25	208.77	628.1	967.4
	MC	2201080150	31.73	44.92	161.5	228.6
	LDDV	2230001150	0.24	0.37	1.1	1.6
	LDDT	2230060150	5.52	8.21	24.2	35.8
	2BHDDV	2230071150	2.41	3.59	10.5	15.6
	LHDDV	2230072150	13.21	19.63	57.9	85.7
	MHDDV	2230073150	16.46	25.93	89.8	141.5
	HHDDV	2230074150	37.80	62.59	206.3	341.5
	BUSES	2230075150	2.93	5.15	16.0	28.1
Rural Major Collector	LDGV	2201001170	123.63	192.36	505.0	784.1
	LDGT1	2201020170	101.91	158.74	424.9	659.9
	LDGT2	2201040170	52.50	81.78	218.9	340.0
	HDGV	2201070170	25.21	38.91	117.1	180.3
	MC	2201080170	5.91	8.37	30.1	42.6
	LDDV	2230001170	0.04	0.07	0.2	0.3
	LDDT	2230060170	1.03	1.53	4.5	6.7
	2BHDDV	2230071170	0.45	0.67	2.0	2.9
	LHDDV	2230072170	2.46	3.66	10.8	16.0
	MHDDV	2230073170	3.07	4.83	16.7	26.4
	HHDDV	2230074170	7.04	11.67	38.4	63.7
	BUSES	2230075170	0.55	0.96	3.0	5.2

Table 5.2–2. Annual and CO season-day onroad mobile source emissions by facility type and vehicle class in the CO maintenance area and Maricopa County (continued).

Facility Type	Vehicle Class	SCC	Annual CO emissions (tons/year)		Season-day CO emissions (lbs/day)	
			CO Maintenance Area	Maricopa County	CO Maintenance Area	Maricopa County
Rural Minor Collector	LDGV	2201001190	28.62	44.53	116.9	181.5
	LDGT1	2201020190	23.59	36.75	98.4	152.8
	LDGT2	2201040190	12.15	18.93	50.7	78.7
	HDGV	2201070190	5.84	9.01	27.1	41.7
	MC	2201080190	1.37	1.94	7.0	9.9
	LDDV	2230001190	0.01	0.02	0.0	0.1
	LDDT	2230060190	0.24	0.35	1.0	1.5
	2BHDDV	2230071190	0.10	0.16	0.5	0.7
	LHDDV	2230072190	0.57	0.85	2.5	3.7
	MHDDV	2230073190	0.71	1.12	3.9	6.1
	HHDDV	2230074190	1.63	2.70	8.9	14.7
	BUSES	2230075190	0.13	0.22	0.7	1.2
Rural Local	LDGV	2201001210	299.00	465.24	1,221.4	1,896.5
	LDGT1	2201020210	246.48	383.93	1,027.6	1,596.1
	LDGT2	2201040210	126.97	197.78	529.3	822.2
	HDGV	2201070210	60.97	94.11	283.1	436.1
	MC	2201080210	14.30	20.25	72.8	103.0
	LDDV	2230001210	0.11	0.17	0.5	0.7
	LDDT	2230060210	2.49	3.70	10.9	16.1
	2BHDDV	2230071210	1.09	1.62	4.7	7.0
	LHDDV	2230072210	5.96	8.85	26.1	38.6
	MHDDV	2230073210	7.42	11.69	40.5	63.8
	HHDDV	2230074210	17.04	28.21	93.0	154.0
	BUSES	2230075210	1.32	2.32	7.2	12.7
Urban Interstate	LDGV	2201001230	10,581.17	11,055.84	42,347.7	44,246.7
	LDGT1	2201020230	7,657.75	8,003.28	31,375.3	32,790.3
	LDGT2	2201040230	3,944.90	4,122.90	16,163.0	16,892.0
	HDGV	2201070230	3,124.96	3,260.99	15,041.9	15,695.1
	MC	2201080230	339.16	354.16	1,726.2	1,802.6
	LDDV	2230001230	2.69	2.81	11.7	12.2
	LDDT	2230060230	58.55	61.12	253.0	264.0
	2BHDDV	2230071230	25.58	26.70	110.3	115.1
	LHDDV	2230072230	140.47	146.62	608.2	634.8
	MHDDV	2230073230	436.75	455.92	2,382.4	2,486.9
	HHDDV	2230074230	990.85	1,036.24	5,404.9	5,652.5
	BUSES	2230075230	36.86	38.59	201.0	210.5
Urban Freeway And Expressway	LDGV	2201001250	11,101.55	11,599.57	44,430.4	46,422.8
	LDGT1	2201020250	8,034.36	8,396.88	32,918.3	34,402.9
	LDGT2	2201040250	4,138.91	4,325.66	16,957.9	17,722.7
	HDGV	2201070250	3,278.65	3,421.37	15,781.8	16,467.0
	MC	2201080250	355.84	371.58	1,811.1	1,891.2
	LDDV	2230001250	2.82	2.95	12.2	12.8
	LDDT	2230060250	61.43	64.13	265.4	277.0
	2BHDDV	2230071250	26.83	28.01	115.7	120.8
	LHDDV	2230072250	147.38	153.83	638.1	666.0
	MHDDV	2230073250	458.23	478.34	2,499.5	2,609.2
	HHDDV	2230074250	1,039.58	1,087.20	5,670.8	5,930.5
	BUSES	2230075250	38.67	40.49	210.9	220.9

Table 5.2–2. Annual and CO season-day onroad mobile source emissions by facility type and vehicle class in the CO maintenance area and Maricopa County (continued).

Facility Type	Vehicle Class	SCC	Annual CO emissions (tons/year)		Season-day CO emissions (lbs/day)	
			CO Maintenance Area	Maricopa County	CO Maintenance Area	Maricopa County
Urban Principal Arterial	LDGV	2201001270	17,742.84	18,539.93	73,323.3	76,615.7
	LDGT1	2201020270	12,966.07	13,548.16	54,751.7	57,207.8
	LDGT2	2201040270	6,679.49	6,979.35	28,205.4	29,470.7
	HDGV	2201070270	3,594.78	3,756.21	16,948.1	17,708.9
	MC	2201080270	546.45	571.05	2,781.0	2,906.2
	LDDV	2230001270	6.86	7.17	30.6	31.9
	LDDT	2230060270	150.86	157.58	669.7	699.5
	2BHDDV	2230071270	65.87	68.80	291.9	304.8
	LHDDV	2230072270	362.20	378.33	1,611.1	1,682.7
	MHDDV	2230073270	463.74	484.61	2,530.6	2,644.5
	HHDDV	2230074270	965.51	1,008.84	5,268.8	5,505.2
	BUSES	2230075270	61.82	64.60	337.4	352.5
Urban Minor Arterial	LDGV	2201001290	9,018.61	9,423.76	37,270.0	38,943.4
	LDGT1	2201020290	6,590.60	6,886.47	27,830.0	29,078.5
	LDGT2	2201040290	3,395.16	3,547.57	14,336.7	14,979.8
	HDGV	2201070290	1,827.21	1,909.26	8,614.6	9,001.4
	MC	2201080290	277.76	290.26	1,413.6	1,477.2
	LDDV	2230001290	3.49	3.64	15.5	16.2
	LDDT	2230060290	76.68	80.10	340.4	355.6
	2BHDDV	2230071290	33.48	34.97	148.3	154.9
	LHDDV	2230072290	184.11	192.30	818.9	855.3
	MHDDV	2230073290	235.72	246.32	1,286.3	1,344.2
	HHDDV	2230074290	490.77	512.79	2,678.1	2,798.3
	BUSES	2230075290	31.43	32.83	171.5	179.2
Urban Collector	LDGV	2201001310	1,761.28	1,840.40	7,278.6	7,605.4
	LDGT1	2201020310	1,287.10	1,344.88	5,435.0	5,678.8
	LDGT2	2201040310	663.05	692.82	2,799.9	2,925.5
	HDGV	2201070310	356.84	372.87	1,682.4	1,757.9
	MC	2201080310	54.24	56.69	276.1	288.5
	LDDV	2230001310	0.68	0.71	3.0	3.2
	LDDT	2230060310	14.98	15.64	66.5	69.4
	2BHDDV	2230071310	6.54	6.83	29.0	30.3
	LHDDV	2230072310	35.95	37.56	159.9	167.0
	MHDDV	2230073310	46.03	48.11	251.2	262.5
	HHDDV	2230074310	95.84	100.14	523.0	546.5
	BUSES	2230075310	6.14	6.41	33.5	35.0
Urban Local	LDGV	2201001330	8,501.75	8,883.68	35,134.1	36,711.5
	LDGT1	2201020330	6,212.89	6,491.80	26,235.1	27,412.0
	LDGT2	2201040330	3,200.58	3,344.26	13,515.0	14,121.3
	HDGV	2201070330	1,722.49	1,799.84	8,120.9	8,485.5
	MC	2201080330	261.84	273.63	1,332.5	1,392.5
	LDDV	2230001330	3.29	3.43	14.6	15.3
	LDDT	2230060330	72.29	75.51	320.9	335.2
	2BHDDV	2230071330	31.56	32.97	139.8	146.1
	LHDDV	2230072330	173.56	181.28	772.0	806.3
	MHDDV	2230073330	222.21	232.21	1,212.6	1,267.1
	HHDDV	2230074330	462.64	483.40	2,524.6	2,637.9
	BUSES	2230075330	29.62	30.95	161.7	168.9

Table 5.2–2. Annual and CO season-day onroad mobile source emissions by facility type and vehicle class in the CO maintenance area and Maricopa County (continued).

Facility Type	Vehicle Class	SCC	Annual CO emissions (tons/year)		Season-day CO emissions (lbs/day)	
			CO Maintenance Area	Maricopa County	CO Maintenance Area	Maricopa County
Off-Network	LDGV	2201001000	44,232.59	47,830.69	316,294.2	342,022.9
	LDGT1	2201020000	20,331.12	21,984.95	121,473.5	131,354.9
	LDGT2	2201040000	10,473.60	11,325.57	62,577.3	67,667.6
	HDGV	2201070000	5,302.43	5,733.76	29,934.9	32,370.0
	MC	2201080000	68.78	74.37	748.5	809.4
	LDDV	2230001000	12.03	13.01	71.6	77.5
	LDDT	2230060000	16.20	17.52	95.7	103.5
	2BHDDV	2230071000	6.96	7.52	41.2	44.5
	LHDDV	2230072000	37.59	40.65	222.4	240.5
	MHDDV	2230073000	216.62	233.95	1,201.1	1,297.2
	HHDDV	2230074000	1,231.54	1,326.20	6,745.5	7,264.1
	BUSES	2230075000	81.74	88.39	453.2	490.0

5.3 Summary of CO emissions from onroad mobile sources

Table 5.3-1 summarizes the annual and season-day emissions for CO from all onroad mobile sources in the CO maintenance area and Maricopa County in 2008.

Table 5.3–1. Annual and CO season-day emissions from all onroad mobile sources in the CO maintenance area and Maricopa County.

Emission Category	Annual CO emissions (tons/year)	Season-day CO emissions (lbs/day)
Maricopa County	255,355.67	1,293,502.6
CO maintenance area	237,324.41	1,201,621.5

5.4 Quality assurance process

5.4.1 VMT estimates

Normal quality assurance procedures, including automated and manual consistency checks, were conducted by MAG in developing the 2008 TransCAD traffic assignment network used to generate the VMT data. The VMT estimates using the MAG travel demand model have been validated against approximately 2,200 traffic counts collected in 2006–2008.

5.4.2 Emission estimates

The quality assurance process performed on the MOVES2010b analyses included accuracy, completeness, and reasonableness checks. For accuracy and completeness, all calculations were checked by an independent reviewer. Any errors found were corrected and the corrections were then rechecked by the reviewer.

5.4.3 Draft CO emissions inventory

The draft onroad mobile source portion of the 2008 periodic CO emissions inventory was reviewed using published EPA quality review guidelines for base year emission inventories (EPA, 1992b). The procedure review (Levels I, II, and III) included checks for completeness, consistency, and the correct use of appropriate procedures.

5.5 References

MAG, 2009. MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area, February 2009.

US EPA, 1991. Emission Inventory Requirements for Ozone State Implementation Plans, EPA-450/4-91-010, March 1991.

US EPA, 1992a. Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA-450/4-81-026d (Revised), 1992.

US EPA, 1992b. Quality Review Guidelines for 1990 Base Year Emission Inventories, EPA-454/R-92-007, July 1992.

US EPA, 2010a. User's Guide for the SMOKE-MOVES Integration Tool, EPA Contract EP-D-07-102 (WA 3-03), July 2010.

US EPA, 2012a. Motor Vehicle Emission Simulator (MOVES) - User Guide Version, MOVES2010b, EPA-420-B-12-001, March 2012.

US EPA, 2012b. Policy Guidance on the Use of MOVES2010 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes, EPA-420-B-12-010, April 2012.

US EPA, 2012c. Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b, EPA-420-B-12-028, April 2012.

6. Biogenic Sources

6.1 Introduction

Biogenic emissions have been estimated for the 2008 Periodic Emissions Inventory for carbon monoxide (CO) in Maricopa County (9,223 square miles) and the CO maintenance area (MA) (1,814 square miles). The Model of Emissions of Gases and Aerosols from Nature (MEGAN) has been used to estimate the biogenic emissions. MEGAN is a state-of-the-art biogenic emissions model developed by the National Center for Atmospheric Research (NCAR). Some important corrections and improvements were made in the latest version of MEGAN2.04 (Guenther, 2007 and Feng Liu, 2009) compared to previous versions (Guenther, 2006, 2006a and 2006b). MEGAN2.04 was applied to compute biogenic emissions in Maricopa County and the CO MA. Estimated emissions for CO are included in this biogenic emissions inventory. The MEGAN runs were executed by the Maricopa Association of Governments. The contact person for the MEGAN emission estimates is Feng Liu (602-254-6300).

6.2 Modeling domain

As a numerical model, the MEGAN inputs and outputs are given in two dimensional grid cells. To develop biogenic emissions for the 2008 Periodic Emission Inventory for CO, the 4-km and 12-km modeling domains developed for the MAG Eight-Hour Ozone Plans for the Maricopa Nonattainment Area (MAG, 2007 and 2009), were employed to develop biogenic CO emissions for the CO MA and Maricopa County, respectively. The definition of the domains in the Universal Transverse Mercator (UTM) coordinate system is presented in Table 6.2–1. Since MEGAN estimates biogenic emissions for an entire modeling domain, masking areas covered by the CO MA and Maricopa County, were developed by applying Geographic Information Systems (GIS) to those two target areas. For the target area, the masking file assigns 1.0 for the grid cells fully covered by the target area, a fractional value for grid cells partially covered by the target area, and 0.0 for grid cells outside the target area. As shown in Figure 6.3–1, biogenic emissions for the CO MA and Maricopa County were extracted from MEGAN outputs for the masked grid cells in the 4-km and 12-km modeling domains, respectively.

Table 6.2–1. Two modeling domains defined in the UTM coordinate system.

Grid Horizontal Resolution	Grid Size	Domain Range (km)	Target Area
4-km	50 by 29	(297,3652) to (497,3768)	CO Maintenance Area
12-km	111 by 84	(-275,3188) to (1057,4196)	Maricopa County

6.3 Input data

To calculate biogenic emissions using MEGAN, the following gridded land-cover and meteorological input files were prepared:

1) EFMAP_LAI file: This file provides emission factors (EF) for 20 MEGAN species including NOx, CO and VOC, and monthly average leaf index (LAI) for 12 months for each grid cell.

2) PFTF file: This input file gives the percentage of four plant function types (PFT) including broadleaf trees (BT), needle leaf trees (NT), grass and crops (HB) and shrubs (SB) for each modeling domain grid location.

3) METCRO2D file: This file contains meteorological parameters including temperature, short wave radiation, wind speed, humidity and soil moisture for each grid.

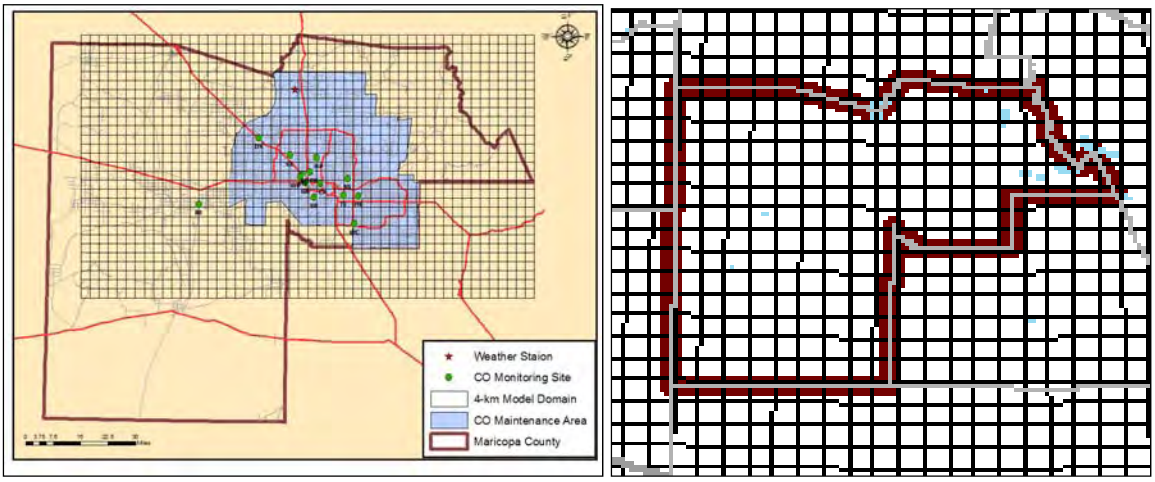

Figure 6.3–1. Masked CO maintenance area (blue area) in the 4-km domain (left) and Maricopa County in the 12-km domain (right). The red star in the left panel denotes the meteorological observation site.

6.3.1 Land cover data

The land cover data, including the monthly LAI, PFT, and EF, are provided by the EFMAP_LAI and PFTF files. These input data were derived from the MEGAN land cover database available at a base resolution of 30 seconds latitude by 30 seconds longitude (~ 1x1 km^2) in ArcGIS format (http://acd.ucar.edu/~guenther/MEGAN/MEGAN.htm). For the MEGAN runs, however, the default land cover data were replaced by local datasets, which were developed by a field study conducted by Dr. Guenther in June 2006 (ENVIRON, 2006). The substitution was made because the default database systematically underestimated the LAIs in Maricopa County.

6.3.2 Weather data

The weather data used by MEGAN include temperature, downward short wave radiation, wind speed, humidity and soil moisture. The Measurement and Instrumentation Data Center (MIDC) collects irradiance and meteorological data from nation-wide stations, one of which is located in northern Phoenix (33.83˚N, 112.17˚W, see the red star in Figure 6.3–1), and is operated by the Phoenix Federal Correction Institution (PFCI). The archived hourly temperature, wind speed, humidity and radiation data from this site are available to the public. Monthly mean diurnal cycles of the weather parameters were calculated based on hourly data for the year 2008 and a netCDF file representing 24-hour data for each month was prepared for MEGAN inputs.

Biogenic emissions of CO are highly dependent on temperature and downward short wave radiation. Figure 6.3–2 shows annual mean diurnal cycles of temperature and radiation. The peak temperature around 4:00-5:00 pm lags three hours behind the peak radiation. The delay is due to the fact that heating of the air occurs not from the sun's rays, but from heating of the earth and infrared radiation leaving the ground in the form of heat. As a result, maximum hourly emission rates take place in the afternoon because the emission rates are positively related to both temperature and short wave radiation (Guenther, 2006). Data analysis indicates that temperature and radiation peak values occur in June. The maximum monthly CO biogenic emission rates would be expected to occur in the same month.

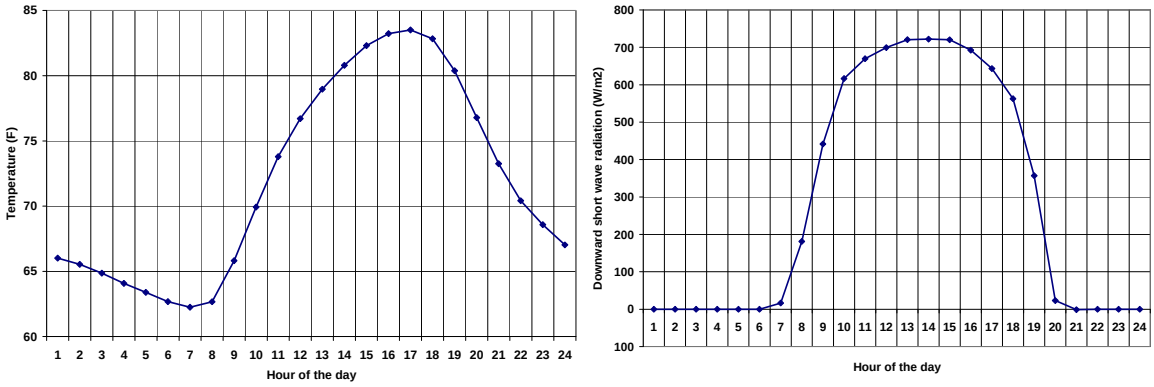

Figure 6.3–2. Annual mean diurnal cycles of measured temperature (left) and downward short wave radiation (right) in 2008.

6.4 Emission estimation

MEGAN runs for the 4-km modeling domain provide hourly biogenic emission outputs for the year 2008. Daily mean emissions for each month in 2008 are derived by using the hourly outputs for each month. The daily mean emissions for the 12 months in 2008 are shown in Table 6.4–1 for the MA and Maricopa County. Monthly total emissions were obtained by multiplying the daily mean emissions for each month by the number of days in the month. Monthly CO emissions for the MA and Maricopa County are presented in Table 6.4–2. Monthly mean emissions for the MA and Maricopa County are illustrated in Figure 6.4–1. It can be seen that the maximum monthly biogenic CO emissions took place in June, because monthly mean temperature and radiation reached the maximum in June.

Table 6.4–1. Daily mean biogenic CO emissions

	CO Maintenance Area		Maricopa County	
Month	**kg/day**	**lbs/day**	**kg/day**	**lbs/day**
Jan	1,419.3	3,129.0	6,511.4	14,355.2
Feb	1,900.4	4,189.7	9,092.3	20,045.1
Mar	4,967.9	10,952.3	23,109.3	50,947.3
Apr	7,192.1	15,855.9	33,191.0	73,173.6
May	7,744.2	17,073.0	34,216.2	75,433.8
Jun	17,801.6	39,245.8	77,086.0	169,945.6
Jul	16.420.2	36,200.3	70,985.5	156,496.3
Aug	14,891.7	32,830.5	63,556.3	140,117.7
Sep	12,355.4	27,239.0	58,326.4	128,587.7
Oct	6,675.2	14,716.3	31,130.4	68,630.8
Nov	3,408.8	7,515.1	15,432.2	34,022.2
Dec	1,494.1	3,293.9	6,829.6	15,056.7

Table 6.4–2. Monthly biogenic CO emissions in MA and Maricopa County

	CO Maintenance Area		Maricopa County	
Month	**Metric tons/month**	**Short tons/month**	**Metric tons/month**	**Short tons/month**
Jan	44.00	48.50	201.85	222.50
Feb	55.11	60.75	263.68	290.66
Mar	54.01	59.54	716.39	789.68
Apr	215.76	237.83	995.73	1,097.60
May	240.07	264.63	1,060.70	1,169.22
Jun	534.05	588.69	2,312.58	2,549.18
Jul	509.03	561.11	2,200.55	2,425.69
Aug	461.64	508.87	1,970.25	2,171.83
Sep	370.66	408.58	1,749.79	1,928.81
Oct	206.93	228.10	965.04	1,063.77
Nov	102.26	112.72	462.97	510.34
Dec	46.32	51.06	211.72	233.38

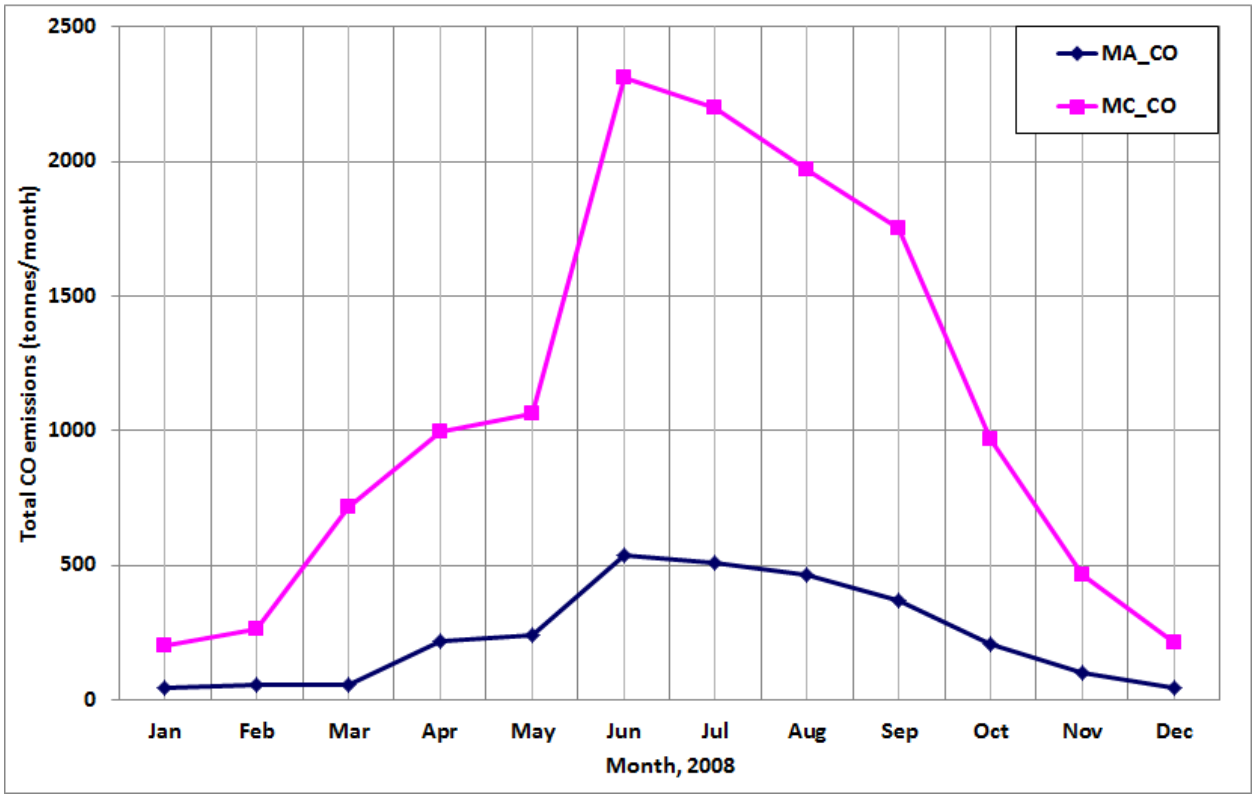

Figure 6.4–1. Monthly biogenic CO emissions in Maricopa County (pink solid line, "MC") and the CO Maintenance Area (dark blue line, "MA").

6.5 Summary of biogenic source emissions

Annual total biogenic CO emissions and daily mean biogenic CO emissions during the winter season for the MA and Maricopa County in 2008 are shown in Table 6.5–1. Due to the incorporation of land cover data that are more characteristic of plants located in the southwest desert area, as well as improvements in the MEGAN model, the 2008 biogenic CO emission estimates shown in Table 6.5–1 represent a substantial improvement over previous biogenic emission estimates for Maricopa County and the CO Maintenance Area.

Table 6.5–1. Annual total and winter season daily mean biogenic CO emissions

	Annual Total		Winter Season Daily Mean	
Area	**Tonnes*/yr**	**Tons*/yr**	**kg/day**	**lbs/day**
Maricopa County	13,111.25	14,452.68	9,591.1	21,144.7
CO Maintenance Area	2,839.84	3,130.39	2,107.4	4,646.0

** tonne denotes metric ton, and ton denotes short (or English) ton, 1 tonne = 1.10231 tons.*

6.6 References

ENVIRON International Corp., 2006. Final Report, Maricopa Association of Governments 2006 Biogenics Study.

Feng Liu, 2009: Prevention of Negative Emission Rate from MEGAN2.04, http://mailman.ucar.edu/pipermail/cdp/attachments/20110217/615f969f/attachment.pdf.

Guenther, A., T. Karl, P. Harley, C. Wiedinmyer, P. I. Palmer, and C. Geron, 2006. Estimates of global terrestrial isoprene emissions using MEGAN (Model of Emissions of Gases and Aerosols from Nature), Atmos. Chem. Phys., 6, 1-30.

Guenther, A., 2006a. User's Guide to Processing Driving Variables for Model of Emissions of Gases and Aerosols from Nature (MEGAN).

Guenther, A., 2006b. User's Guide to the Model of Emissions of Gases and Aerosols from Nature (MEGAN) Version MEGAN-VBA-2.0.

Guenther, 2007: Corrigendum to "Estimates of global terrestrial isoprene emissions using MEGAN (Model of Emissions of Gases and Aerosols from Nature)" published in Atmos. Chem. Phys., 6, 3181–3210, 2006, Atmos. Chem. Phys., 7, 4327-4327.

Maricopa Association of Governments, 2007. MAG Eight-Hour Ozone Plan for the Maricopa Nonattainment Area.

Maricopa Association of Governments, 2009. MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area.

Maricopa County Air Quality Department, 2010. 2008 Periodic Emission Inventory for Ozone Precursors for the Maricopa County, Arizona, Nonattainment Area, pp. 111-115.

Maricopa County
Air Quality Department

INSTRUCTIONS

FOR REPORTING 2008

ANNUAL AIR POLLUTION EMISSIONS

January 2009

Emissions Inventory Unit
1001 North Central Avenue, Suite 595
Phoenix, Arizona 85004
(602) 506-6790
(602) 506-6179 (Fax)

Copies of this document, related forms and other reference materials are available online at our web site:
http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx

TABLE OF CONTENTS

WHAT'S NEW FOR 2008?

Reporting forms:

- Some **preprinted information** on your report may be different from last year's version. Please review the enclosed forms carefully, and verify all preprinted information.
- Many of our reporting forms **have changed** in past years. If you use your own forms, or a computerized reproduction of our forms, the forms used ***MUST*** conform to the current information requirements and **FORMAT** as supplied on our preprinted forms. "Homemade" reporting forms that vary significantly from the preprinted forms sent to you will ***not*** be accepted.
- **Please VERIFY that your reporting forms match the preprinted forms.**

Miscellaneous:

- **If this is the first emissions inventory for your permit and your business did not operate in 2008, you must still submit a completed Business Form and a signed Data Certification Form stating that there were no operations at your facility during 2008.**
- In accordance with Maricopa County Air Pollution Control Rule 280 (Fees), the 2008 annual emission fee for Title V sources only is $38.25/ton. **NOTE:** Only Title V sources (those whose air quality permit numbers have a **"V"** prefix) are subject to this annual emissions fee.

I. INTRODUCTION

An annual emissions inventory is a document submitted by a business that: (1) lists all processes emitting reportable air pollutants and (2) provides details about each of those processes. Submitting the emissions inventory report is ***required*** as a condition of your Maricopa County Air Quality Permit. A separate emissions report is required for each business location with its own air quality permit.

Follow these steps to complete your 2008 Maricopa County emissions inventory:

STEP 1: Determine which forms are needed for your business. There are eight different forms available, but not all are required for every type of business. For most permitted sources, the packet you received from us contains the necessary preprinted forms based on your site's most recent emissions inventory.

1. **Business Form**: Contains general contact information about the permitted site. This form is required for all businesses.
2. **Stack Form**: Only required if your business location annually emits over 10 tons of a single pollutant (CO, VOC, NO_x, PM_{10}, or SO_x). A "stack" is defined as a stack, pipe, vent or opening through which a significant percentage of emissions (from one or more processes) are released into the atmosphere. See the "Stack Form Instructions" on page 9 for specific requirements.
3. **Control Device Form**: Required only if there is one or more emission control devices used at the business location.
4. **General Process Form** and
5. **Evaporative Process Form**: } Either or both will be required for all businesses.
6. **Off-Site Recycling/Disposal Form**: Required if you want to claim off-site recycling or disposal.
7. **Emission Factor Calculations**: Required as attachment for each process for which you calculated your own emission factors.
8. **Data Certification Form or Data Certification/Fee Calculation Form**: Only sources with a **Title V** (permit number would start with **"V"**) permit are required to pay a fee for their emissions and need to use the Data Certification/Fee Calculation Form. All other sources use the Data Certification Form.

STEP 2: Complete the applicable forms. Verify all preprinted information, and make corrections where necessary. When making corrections, strike out the preprinted data and write in corrections beside it. Please make all changes readily noticeable. Detailed information on how to complete the most common forms is included in this document. The packet you received also contains information about other resources (workshops, one-on-one assistance, etc.) available to help you in completing the necessary forms.

STEP 3: Make a copy of your completed emissions inventory report. Make sure to KEEP COPIES of all forms submitted and copies of all records and calculations used in completing the forms. Air pollution control regulations require that you keep all documentation for at least FIVE YEARS at the location where pollution is being emitted.

STEP 4: Make sure the Data Certification Form (or Data Certification/Fee Calculation Form for Title V sources) is ***signed*** by a company representative. ***Include your air quality permit number on all correspondence and applicable checks submitted with your report.*** Return the ***original***, signed copy of your annual emission report, with payment for any applicable emission fees to:

MCAQD One Stop Shop
Emissions Inventory Intake
501 N. 44th St. Suite 200
Phoenix AZ 85008-6538

II. REPORTING REQUIREMENTS

POLLUTANTS TO BE REPORTED:
Your emissions inventory must include your business's emissions of the following air pollutants:

CO	=	Carbon monoxide
NO_x	=	Nitrogen oxides
PM_{10}	=	Particulate matter less than 10 microns
SO_x	=	Sulfur oxides
VOC	=	Volatile organic compounds *
HAP&NON	=	Hazardous Air Pollutant (HAP) that is also NOT a volatile organic compound (VOC)**
NH_x	=	Ammonia and ammonium compounds
Pb	=	Lead

* A ***volatile organic compound (VOC)*** is defined as any compound of carbon that participates in atmospheric photochemical reactions. This definition ***excludes***: carbon monoxide, carbon dioxide, acetone, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, as well as certain other organic compounds. (See Maricopa County Air Pollution Control Rule 100, Sections 200.69 and 200.110 for a full definition.)

EPA has re-designated the chemical **t-butyl acetate (CAS Number 540-88-5)** as a VOC for record-keeping requirements and emissions reporting, but not for emission limitations or content requirements. County Rule 100, Section 200.69b states:

"The following compound(s) are VOC for purposes of all recordkeeping, emissions reporting, photochemical dispersion modeling and inventory requirements which apply to VOC and shall be uniquely identified in emission reports, but are not VOC for purposes of VOC emissions limitations or VOC content requirements: t-butyl acetate (540-88-5)."

Therefore, if your facility uses t-butyl acetate, it is necessary to report t-butyl acetate as a separate material on the evaporative process form, not as part of a grouped material (e.g., solvents, thinners, activators, etc.). T-butyl acetate will continue to be identified as a VOC on your emission report and count towards any applicable emission fees.

** ***HAP&NON:*** Usage of certain materials that are: (1) a Hazardous Air Pollutant (HAP) **and** (2) **not** also a VOC (that is, not also an ozone precursor) should also be reported if:
(a) your site is subject to a Federal MACT (Maximum Achievable Control Technology) standard ***or***
(b) your air quality permit contains specific quantitative limits for HAP emissions.

The most common materials categorized as "HAP&NON" include:

- methylene chloride (dichloromethane)
- perchloroethylene
- 111-trichloroethane (111-TCA or methyl chloroform)
- hydrochloric acid
- hydrofluoric acid

NOTE: HAPs that are also considered volatile organic compounds are reported as VOC.

EMISSION CALCULATION METHOD HIERARCHY:

When preparing emission information for your report, the most accurate method for calculating **actual** emissions must be used. The hierarchy listed below outlines the preferred methods for calculating emission estimates (taken from County Rule 280, Section 305.1).

(1) Whenever available, emissions estimates should be calculated from continuous emissions monitors certified under 40 CFR Part 75, Subpart C, or data quality assured pursuant to Appendix F of 40 CFR, Part 60.

(2) When sufficient data obtained using the methods described in paragraph 1 is not available, emissions estimates should be calculated from source performance tests conducted pursuant to Rule 270 in Maricopa County's Air Pollution Control Rules and Regulations.

(3) When sufficient data obtained using the methods described in paragraphs 1 or 2 is not available, emissions estimates should be calculated from material balance using engineering knowledge of the process.

(4) When sufficient data obtained using the methods described in paragraphs 1 through 3 is not available, emissions estimates shall be calculated using emissions factors from EPA Publication No. AP-42 "Compilation of Air Pollutant Emission Factors," Volume I: Stationary Point and Area Sources.

(5) When sufficient data obtained using the methods described in paragraphs 1 through 4 is not available, emissions estimates should be calculated by equivalent methods supported by back-up documentation that will substantiate the chosen method.

III. CONFIDENTIALITY OF DATA SUBMITTED

Information submitted in your annual emissions reports must be made available to the public unless it meets certain criteria of Arizona State Statutes and Maricopa County Rules. Applicable excerpts concerning confidentiality of data are reproduced below.

ARS § 49-487 D. ...the following information shall be available to the public:…

2. The chemical constituents, concentrations and amounts of any emission of any air contaminant. ...

MARICOPA COUNTY AIR POLLUTION CONTROL RULES AND REGULATIONS, Rule 100:

§ **200.107 TRADE SECRETS -** Information to which all of the following apply:

a. A person has taken reasonable measures to protect from disclosure and the person intends to continue to take such measures.

b. The information is not, and has not been, reasonably obtainable without the person's consent by other persons, other than governmental bodies, by use of legitimate means, other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding.

c. No statute, including ARS §49-487, specifically requires disclosure of the information to the public.

d. The person has satisfactorily shown that disclosure of the information is likely to cause substantial harm to the business's competitive position.

§ **402 CONFIDENTIALITY OF INFORMATION:**

402.2 Any records, reports or information obtained from any person under these rules shall be available to the public ... unless a person:

a. Precisely identifies the information in the permit(s), records, or reports which is considered confidential.

b. Provides sufficient supporting information to allow the Control Officer to evaluate whether such information satisfies the requirements related to trade secrets as defined in Section 200.107 of this rule.

For emissions inventory information to be deemed confidential, the following steps must be followed:

- Specific data which you request be held confidential must be identified by marking an "X" in the corresponding gray confidentiality box(es) on the relevant report forms.
- Provide a written explanation which gives factual information satisfactorily describing why releasing this information could cause substantial harm to the business's competitive position.
- Use the gray-shaded boxes on the reporting forms to indicate which data are to be held confidential. Do NOT stamp "Confidential", highlight data, or otherwise mark the page.
  No data can be held confidential without proper justification.

IV. HELPFUL HINTS AND INFORMATION

Be sure to verify all preprinted information on forms. If any information is incorrect or blank, please provide correct information. Making a change on the Business Form will **NOT** transfer the permit ownership or location. You must contact the Department's One Stop Shop at (602) 506-6464 to accomplish this.

WHAT IS A PROCESS? A ***process*** is a business activity at your location that emits one or more of the pollutants listed on page 3, and has only ***one*** material type as input and ***one*** operating schedule. For each applicable process at your business, you must assign a unique Process ID number to differentiate each process.

PROCESSES AND MATERIALS THAT DO ***NOT*** HAVE TO BE REPORTED:

- Welding.
- Acetone usage.
- Fuel use for forklifts or other vehicles. (NOTE: Fuel use in ***non-vehicle*** engines ***is*** reportable.)
- Soil remediation activities. (Note: Other periodic reporting requirements may exist; consult your permit.)
- Storage emissions from fuels or organic chemicals in any tank with a capacity of 250 gallons or less.
- Storage emissions of diesel and Jet A fuel in underground tanks of any size.
- Storage emissions of diesel and Jet A fuel in aboveground tanks, with throughput < 4,000,000 gal/yr.
- Routine pesticide usage, housekeeping cleaners, and routine maintenance painting at your facility.

Please group all similar equipment and materials together before applying the following limitations:

- Internal combustion engines (e.g., emergency generators) or external combustion equipment (e.g., boilers and heaters) that operated less than 100 hrs. and burned less than 200 gals. diesel or gas, or less than 100,000 cubic feet of natural gas.
- Materials with usage of less than 15 gallons or 100 pounds per year.

GROUPING MATERIALS AND/OR EQUIPMENT UNDER ONE PROCESS ID:
You can group together under one process ID:

- All internal combustion engines ***less than 600 hp*** if they burn the same fuel and have similar operating schedules.
- All external combustion equipment (boilers, heaters) with a capacity of ***less than 10,000,000 Btu*** per hour if they burn the same fuel and have similar operating schedules.
- All similar evaporative materials with similar emission factors that have similar operating schedules and process descriptions. For example, group low-VOC red paint, green paint and white paint together as one material: "Paint: Low-VOC." Do ***not*** group dissimilar materials together, such as thinners and paints. Attach documentation (see example, p. 20) showing how the grouped emission factor was determined.
- All underground tanks with the same fuel and same type of vapor recovery system.

ASSIGNING IDENTIFICATION NUMBERS (IDs):
Unique IDs are required for the following report elements: Stacks, Control Devices and Processes. For processes, that means a process ID number may be used only once on each General Process form and for each material reported on the Evaporative Process Forms.

These numbers are usually assigned by the person who prepares the original report. If you are adding a new item to a preprinted report, assign a number not already in use. Once an ID number is assigned, continue using the same number for that item each year. If that item is no longer reportable, mark it with 'DELETE' and return the preprinted form with a brief explanation. Do not use that ID number again.

INDUSTRY-SPECIFIC INSTRUCTIONS: Additional help sheets, detailed examples, and special instructions are available for a number of specific processes or industries listed below. To get copies of any of these documents, please visit our web site at:
http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx
or call (602) 506-6790.

- Bakeries
- Concrete Batch Plants
- Fuel Storage and Handling
- Incinerators and Crematories
- Lg. Aboveground Storage Tanks
- Natural Gas Boilers/Heaters
- Polyester Resin
- Printing Plants
- Roofing Asphalt
- Sand and Gravel Plants
- Using EPA's TANKS 4.09d Program
- Vehicle Refinishing
- Vehicle Travel on Unpaved Roads
- Woodworking

COMMONLY USED CONVERSION FACTORS:

1 gram/liter	=	0.00834 lbs/gal	1 foot	=	0.0001894 mile
1 liter	=	0.2642 gallon (US)	1 square foot	=	0.000022957 acre
1 therm	=	0.0000952 MMCF	1 pound	=	0.0005 ton

NOTE: MM = 1,000,000 Example: MMCF = 1,000,000 cubic feet
M = 1,000 Example: MGAL = 1,000 gallons

ADDITIONAL RESOURCES AND ASSISTANCE:
The Maricopa County Emissions Inventory web site at:
http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx
contains additional reference materials, such as:

- blank copies of most emissions reporting forms.
- an updated list of emission factors for a large number of industrial processes, including SCC codes.
- a list of Tier Codes for industrial processes.
- detailed help sheets for a number of specific industries or processes.

To receive any of the above materials by fax or mail, or for additional information or assistance in how to calculate and report your emissions, please call us at (602) 506-6790.

V. INSTRUCTIONS AND EXAMPLES FOR COMPLETING EMISSIONS REPORTING FORMS

Business Form Instructions

Verify all preprinted information, and make corrections where necessary. When making corrections, strike out the preprinted data and write in corrections beside it. Please make all changes readily noticeable.

NOTE: Indicating a change in ownership or business location on the Business Form will ***not*** serve to transfer the permit ownership or location. You must contact the MCAQD One Stop Shop at (602) 506-6464 to accomplish this.

Data fields:

6 Number of employees: This should be the annual average number of full-time equivalent (FTE) employee positions ***at this business location***.

9 NAICS Code: This 5- or 6-digit North American Industrial Classification System (NAICS) code has been introduced to replace the 4-digit Standard Industrial Classification (SIC) codes. Please list the primary and secondary NAICS codes for your business, if known. (Consult our website, at: http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx, for a link to a full list of NAICS codes.)

10 Preparer of the Inventory (primary contact for technical questions concerning this report): This should be the person who knows the most about the data in the report. If this person has an e-mail address used for business purposes, please provide it.

Stack Form Instructions

A "stack" is defined as a **stationary** stack, pipe, vent or opening through which a significant percentage of emissions (from one or more processes) are released into the atmosphere (with or without a control device).

NOTE: Stack information is required only if your business location annually emits over 10 tons of any one individual pollutant. If so, you must complete a Stack Form for:

- each stack connected to a control device.
- any stack that discharges annually more than 5 tons of combined pollutant emissions (such as a paint booth exhaust).

EXAMPLE Stack Form Information:

1	2	3	4	5a OR 5b		6a OR 6b & 6c		7
Stack ID	Stack Type Code*	Stack Height**	Exit Gas Temperature	Velocity feet/sec	Flow Rate acfm	Diameter inside inch	Length / Width inside inch	Stack Name/Description. Include lat/long coordinates of stack (in decimal degrees)
1	*W*	*30* ft	*90* ^{o}F		*20,000*	*36*		*paint booth Lat: N33.5276 Long: W112.2626*
2	*V*	*14* ft	*200* ^{o}F		*19,186*	*40*		*thermal oxidizer, Bldg. 2 Lat:N33.5259 Long:W112.2611*

* Stack Type Codes: **V** = Vertical unobstructed **H** = Horizontal unobstructed
D = Downward unobstructed **G** = Gooseneck
W = Obstructed vertical (e.g. weather cap)

** Stack height is calculated relative to the surrounding terrain. For instance, the stack height of a 10-foot stack on top of a 20-foot tall building is 30 feet.

Data fields:

1 Stack ID: (See "Assigning Identification Numbers" on page 6.) A number (up to three digits, numeric only) which identifies a specific stack. It is suggested you start with 1, then 2, etc.

4 Exit Gas Temperature: Should represent average operating conditions, in degrees Fahrenheit. ***DO NOT*** report "ambient".

5a Exit Gas Velocity: ***OR*** 5b Gas Flow Rate:
Provide ***EITHER*** the exit velocity (in feet per second) ***OR*** the flow rate of gas (in actual cubic feet per minute) exiting the stack during normal operations. Preprinted information provides both.

6a Inside Stack Diameter: For round stacks, provide Inside Stack ***Diameter*** in inches.
OR
6b & 6c Inside Stack Length and Width: For square or rectangular stacks, provide inside ***Length and inside Width*** in inches.

7 Stack Name/Description and Lat/Long Coordinates: Provide a brief text description of the stack along with the latitude and longitude coordinates of the stack (in decimal degrees).

Control Device Form Instructions

EXAMPLE Control Device Form Information

1	2	3	4	5	6
Control ID	Installation/ Reconstruction* Date	Size or Rated Capacity**	Control Type Code	Control Device Name/Description	Stack ID
1	***05/09/98***	***25,000.0*** cfm	***021***	***Thermal oxidizer***	***2***
4	***03/10/97***	cfm	***153***	***Watering with water trucks***	

Data fields:

1 Control ID: (See "Assigning Identification Numbers" on page 6.) A unique number (up to three digits) that you assign to identify a specific control device.

2 Installation/Reconstruction Date: The completion date (given in *mm/dd/yy* format) of installation or the most recent reconstruction of the identified control device. This is not a date on which routine repair or maintenance was done. "Reconstruction" means any component of the control device was replaced and the cost (fixed capital) of the new component(s) was more than half of what it would have cost to purchase or construct a new control device.

3 Size or Rated Capacity: Report the air or water flow rate in ***cubic feet per minute***. Some devices (e.g., water trucks for dust control) will not include a value in this field.

4 Control Type Code: A 3-digit code designating the type of control device. A complete list of all EPA control device codes can be found on the Web at: http://www.maricopa.gov/aq/divisions/planning_analysis/emissions inventory/Default.aspx or call (602) 506-6790 for assistance.

6 Stack ID: Not all businesses require a Stack ID. This is required if the Stack Form is used for your site (see page 9) ***and*** the control device is vented through that identified stack. This is the ID number shown in column 1 of the Stack Form. The Stack ID can be entered on this form after the Stack Form has been filled out.

General Process Form Instructions

The General Process Form is used to record data on all emissions-producing processes except evaporative processes. A "***general process***" is normally characterized by the burning or handling of a material. One form reports all the pollutants for one process. For example, several pollutants are produced by burning fuel, and PM_{10} is emitted by processing rock products, processing materials such as wood or cotton, and driving on unpaved areas.

Data fields: (See sample forms on pages 13 and 14.)

1 Process ID: A number (up to three digits) that is preprinted or you assign. (See "Assigning Identification Numbers" on page 6.) This Process ID number can not be used for any other process at this location.

2 Process Type/Description: Brief details on the type of activity that is occurring.

3 Stack ID(s): The stack ID number(s) shown in column 1 of the Stack Form that identify the stack(s) which vent pollution created by this process. Not all businesses are required to report stacks. This is only required if the Stack Form is required for your site (see page 9) ***and*** the process has a stack.

4 Process Tier Code and
5 SCC Code:
If these codes are not preprinted on your form, please consult the section "Other Resources" on our web site, or call (602) 506-6790.

6 Seasonal Throughput Percent: Enter the percent of total annual operating time that occurred per season, rounded to the nearest percent. For example, "Dec-Feb 30% " means 30% of total annual activity occurred in January, February and December 2008. The total for all four seasons must equal 100%.

7 Normal Operating Schedule and
8 Typical Hours of Operation:
These reflect the normal daily, weekly, and annual operating parameters of ***this process*** during 2008.

9 Emissions Based on: Provide the ***name*** of the material used, fuel used, product produced, or whatever was measured for the purpose of calculating emissions, such as "natural gas", "hours of operation," "vehicle miles traveled," or "acres."

10 Used, Produced or Existing: Indicate whether calculated emissions are based on a material type or fuel *used* (an input, such as "paint" or "natural gas"), or an *output* (such as "sawdust produced" or "finished product"). Use "Existing" if the parameter reported on line 9 is not directly used or produced in the process (such as "vehicle miles traveled" or "acres").

11 Annual Amount: The annual amount (a number) of material that was used, fuel combusted, product produced, hours of operation, vehicle miles traveled, or acres.

12 Fuel Sulfur Content (in percent): For processes that involve the combustion of oil or diesel fuels, report the sulfur content of the fuel as a decimal value. Example: 0.05 % (= 500 ppm)

13 Unit of Measure: Units of the material used, fuel used or product produced shown on line 9. For example: gallons, pounds, tons, therms, acres, vehicle miles traveled, units produced.

14 Unit Conversion Factor: You must provide this if you use an emission factor with an emission factor unit (see item 17 below) that is ***not*** the same as the unit of measure (from line 13). This is the standard number you would multiply your amount (line 11) by to convert it to the units of the emission factor. See page 7 for a list of commonly used conversion factors.

General Process Form Instructions (continued)

15 Pollutant: See page 3 for a list of pollutants that need to be reported.

16 Emission Factor (EF): The number to be multiplied by the annual amount (line 11) to determine how much of the pollutant was emitted. If you calculate your own emission factor or change the preprinted emission factor, you must provide details of your calculations in an attachment.

17 Emission Factor (EF) Units: Enter the appropriate Emission Factor Units in pounds (lb) per unit; e.g., lb/ton, lb/MMCF, lb/gal.

18 Controlled Emission Factor (EF)? YES or NO: Indicate "YES" if: 1) you have your own emission factor from testing **and** included the control device efficiency within the factor, or 2) the emission factor used is clearly identified as a controlled emission factor. A "YES" response requires the use of Formula A (see #25 below). Indicate "NO" if: 1) there is no emission control device, or 2) the emission factor represents emission rates **before** controls. A "NO" response requires the use of Formula B (see #25 below).

19 Calculation Method: Enter the number code (listed at the bottom of the General Process Form) which best describes the method you used to obtain this emission factor. Code 5, "AP-42/FIRE Method or Emission Factor" means that the factor comes from EPA documents or software. ***NOTE:*** If you have continuous emissions monitors (CEM) data or conducted a source test that was required and approved by the County for a specific process or piece of equipment, you ***must*** use the emission data from the CEM or the test results. Report "1" in this column for CEM data or "4" for performance test data.

20 through 24: Leave blank if there is no control device.

20 Capture % Efficiency: The percent of the pollutant that is captured and sent to the primary control device in this process. Be sure to list capture efficiency separately for ***each*** pollutant affected.

21 Primary Control Device ID: If this pollutant is being controlled in this process, enter the Control Device ID number which represents the first control device affecting the pollutant.

22 Secondary Control Device ID: If this pollutant is being controlled sequentially by 2 devices, enter the Control Device ID number which represents the second control device; otherwise leave this field blank.

23 Control Device(s) % Efficiency: Enter the total control efficiency of the control device(s). Be sure to list control device efficiency separately for ***each*** pollutant affected. If you report control device efficiency, you must ***also*** show capture efficiency in column 20.

24 Efficiency Reference Code: Enter the code (1 through 6) that best describes how you determined the ***control device efficiency***. A list of possible codes is included at the bottom of the form.

25 Estimated Actual Emissions (in pounds/year): You may round the calculated emissions values to the nearest pound. Calculate as follows:

A. *Emissions with no controls* or *controls are reflected in the emission factor:*
Column 25 = line 11 × line 14 × column 16

B. *Emissions after control:*
Column 25 = line 11 × line 14 × column 16 × (1 – [column 20 × column 23])

Use the decimal equivalent for columns 20 and 23. Example: 96.123% = 0.96123

General Process Form 2008

EXAMPLE: Internal Combustion

Permit number(s) V99999

Place an X in any gray cell to mark data requested to be held confidential. See page 5 for requirements for information to be deemed confidential.

1- Process ID 80

2- Process Type/Description: 3 ENGINES FOR CRUSHING (EACH LESS THAN 600 HP)

3- Stack ID(s) *(only if required on Stack Form)* _____ _____ _____ _____ _____

4- Process TIER Code: 020599 FUEL COMB. INDUSTRIAL: INTERNAL COMBUSTION

5- SCC Code 20200102 *(8 digit number)* IND:DIESEL-RECIPROCATING

6- Seasonal Throughput Percent: Dec-Feb 25 % Mar-May 25 % Jun-Aug 25 % Sep-Nov 25 %

7- Normal Operating Schedule: Hours/Day 8 Days/Week 5 Hours/Year 2080 Weeks/Year 52

8- Typical Hours of Operation: *(military time)* Start 0700 End 1530

9- Emissions based on *(name of material or other parameter, e.g. "rock", "diesel", "vehicle miles traveled")* DIESEL

10- [X] Used (input) or [ ] Produced (output) or [ ] Existing (e.g. VMT, acres)

11- Annual Amount: *(a number)* 16,250 12- Fuel Sulfur Content (in percent) 0.05 %

13- Unit of Measure: *(for example: tons, gallons, million cu ft, acres, units produced, etc.)* GALLONS

14- Unit Conversion Factor *(if needed to convert Unit of Measure to correlate with emission factor units)* 0.001

	Emission Factor (EF) Information				Control Device Information						
15	16	17	18	19	20	21	22	23	24	25
Pollutant	Emission Factor (EF) (number)		Emission Factor Unit (lb per)	Controlled EF? Yes or No	Calculation Method Code*	Capture % Efficiency	Primary Control Device ID	Secondary Control Device ID	Control Device(s) % Efficiency	Efficiency Reference Code**	Estimated Actual Emissions
CO	130		M GALS	N	5						2,113 lbs
NOx	604		M GALS	N	5						9,815 lbs
PM-10	42.5		M GALS	N	5						691 lbs
SOx	39.7		M GALS	N	5						645 lbs
VOC	49.3		M GALS	N	5						801 lbs

*** Calculation Method Codes:**

1 = Continuous Emissions Monitoring Measurements
2 = Best Guess / Engineering Judgment
3 = Material Balance
4 = Source Test Measurements (Stack Test)
5 = AP-42 / FIRE Method or Emission Factor
6 = State or Local Agency Emission Factor
7 = Manufacturer Specifications
8 = Site-Specific Emission Factor
9 = Vendor Emission Factor
10 = Trade Group Emission Factor

**** Control Efficiency Reference Codes:**

1 = Tested efficiency / EPA reference method
2 = Tested efficiency / other source test method
3 = Design value from manufacturer
4 = Best guess / engineering estimate
5 = Calculated based on material balance
6 = Estimated, based on a published value

General Process Form **2008**

EXAMPLE: Unpaved Road Travel

Permit number(s) V99999

Place an X in any gray cell to mark data requested to be held confidential. See page 5 for requirements for information to be deemed confidential.

1- Process ID 28

2- Process Type/Description: UNPAVED ROAD TRAVEL: HEAVY-DUTY TRUCKS @ 15 MPH

3- Stack ID(s) *(only if required on Stack Form)* _____ _____ _____ _____ _____

4- Process TIER Code: 140799 MISCELLANEOUS: FUGITIVE DUST

5- SCC Code 30502504 *(8 digit number)* SAND/GRAVEL: HAULING

6- Seasonal Throughput Percent: Dec-Feb 25 % Mar-May 25 % Jun-Aug 25 % Sep-Nov 25 %

7- Normal Operating Schedule: Hours/Day 8 Days/Week 5 Hours/Year 2080 Weeks/Year 52

8- Typical Hours of Operation: *(military time)* Start 0700 End 1530

9- Emissions based on *(name of material or other parameter, e.g. "rock", "diesel", "vehicle miles traveled")* VEHICLE MILES TRAVELED (VMT)

10- ☐ Used (input) or ☐ Produced (output) or ☒ Existing (e.g. VMT, acres)

11- Annual Amount: *(a number)* 7,500

12- Fuel Sulfur Content (in percent) _____ %

13- Unit of Measure: *(for example: tons, gallons, million cu ft, acres, units produced, etc.)* VMT

14- Unit Conversion Factor *(if needed to convert Unit of Measure to correlate with emission factor units)* _____

	Emission Factor (EF) Information					Control Device Information					
15	16		17	18	19	20	21	22	23	24	25
Pollutant	Emission Factor (EF) (number)		Emission Factor Unit (lb per)	Controlled EF? Yes or No	Calculation Method Code*	Capture % Efficiency	Primary Control Device ID	Secondary Control Device ID	Control Device(s) % Efficiency	Efficiency Reference Code**	Estimated Actual Emissions
PM-10	3.2		VMT	N	6	100	4		70	6	7200 lbs
											lbs
											lbs
											lbs
											lbs
											lbs

NOTE: Emissions in col. 25 are calculated as follows: (line 11 × col. 16) × (1 – [col. 20 × col. 23])

*** Calculation Method Codes:**
- **1** = Continuous Emissions Monitoring Measurements
- **2** = Best Guess / Engineering Judgment
- **3** = Material Balance
- **4** = Source Test Measurements (Stack Test)
- **5** = AP-42 / FIRE Method or Emission Factor
- **6** = State or Local Agency Emission Factor
- **7** = Manufacturer Specifications
- **8** = Site-Specific Emission Factor
- **9** = Vendor Emission Factor
- **10** = Trade Group Emission Factor

**** Control Efficiency Reference Codes**
- **1** = Tested efficiency / EPA reference method
- **2** = Tested efficiency / other source test method
- **3** = Design value from manufacturer
- **4** = Best guess / engineering estimate
- **5** = Calculated based on material balance
- **6** = Estimated, based on a published value

Evaporative Process Form Instructions

The Evaporative Process Form is used to report all emissions produced by evaporation. Examples include: cleaning with solvents, painting and other coatings, printing, using resin, evaporation of fuels from storage tanks, ammonia use, etc. All other processes should be shown on the General Process Form.

One Evaporative Process Form may be used to report numerous materials, with each material given a separate process ID number, as long as the information on lines 1–5 apply to all items on that form. Use a separate form for each group of materials that has a different Process Type/Description (shown on line 1), different Tier Code (line 2) or different operating schedule (lines 3, 4, or 5).

Data fields: (See sample forms on pages 17 and 18.)

1 Process Type/Description: Brief details of the activity in which the listed materials were used.

2 Process Tier Code: If this 6-digit code is not preprinted on your form, please refer to the Tier Code list at: http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx or call (602) 506-6790.

3 Seasonal Throughput Percent: Enter the percent of total annual operating time that occurred per season (rounded to the nearest percent). For example, "Dec-Feb 30% " means 30% of the total annual activity occurred during January, February and December 2008. The total for all four seasons must equal 100%.

4 Normal Operating Schedule and
5 Typical Hours of Operation: These represent the usual number of hours, time of day and weeks per year when ***this process*** occurred during the calendar year.

6 Process ID: A number (up to three digits) that represents this specific material (process). Each process on one form must have the same tier code and operating schedule as that shown in the top portion of the form. This Process ID number can ***not*** be used for any other process at this business location. See page 6 of these instructions for more explanation of ID numbers and for exclusions and guidance on grouping materials.

7 Stack ID(s): The stack ID number(s) shown in column 1 of the Stack Form that identify the stack(s) which vent pollution created by this process. Not all businesses are required to report stacks. This is only required if the Stack Form is required for your site (see page 9) ***and*** the process has a stack.

8 Material Type: Provide the name of the material used in this process. Give the chemical name for pure chemicals or a name that reflects its use (paint, ink, etc.), rather than just a brand name or code number. Examples of materials include: paint, thinner, degreasing solvent (plus its common name), ink, fountain solution, ammonia, alcohol, ETO (ethylene oxide), gasoline (in a storage tank).

9 Annual Material Usage/Input: Amount of this material used during the year. In most cases, the amount purchased is suitable. Write in "lbs" or "gal" (pounds or gallons).

10 Pollutant: The only pollutants reported on this form are VOC, HAP&NON and NH_X (see definitions on page 3). When one process (or material) has more than one of these pollutants, list each pollutant on a separate line, using the same process ID number.

Evaporative Process Form (continued)

11 Emission Factor (EF): An emission factor is a number used to calculate the pounds of pollutant emitted based on the quantity of material used in a process. Emission factors can be obtained from your supplier (usually provided on a Material Safety Data Sheet or environmental data sheet), and must correspond with the material units reported in column 9. If the material unit is "gal," then the emission factor must be in pounds of pollutant per gallon. If the material unit is "lb," then the emission factor must be in pounds of pollutant per pound of material.

Verify (and correct, where necessary) all preprinted emission factors, as the composition of materials used may have changed since your last report. A "lb/gal" emission factor is almost always less than 8 and never greater than 14. A "lb/lb" emission factor is never larger than 1.0.

12 Pounds of pollutant sent off-site: Required only if you wish to take credit for reduced emissions because waste of this material is sent off-site for recycling or disposal. Only waste generated during the report year may be claimed. The Off-Site Recycling/Disposal Form ***must*** be completed if you wish to claim a credit. The number of pounds reported in column 12 ***must*** equal the number of pounds reported on the Off-Site Recycling/Disposal Form(s) for the same Process ID number.

13 and 14: Leave these fields blank if there is no control device present.

13 Capture % Efficiency: The percent of the pollutant from this process that is captured and sent to the control device.

14 Control ID: If this pollutant is being controlled in this process, enter the Control Device ID number from column 1 of the Control Device Form.

Control % Efficiency: Enter the percent of this pollutant that is controlled by this control device.

Code: Select the Control Efficiency Reference Code from the list at the bottom of the form.

15 Estimated Emissions (lbs/yr): Estimated pounds of the pollutant emitted during the year, after off-site recycling/disposal and controls if applicable. **Credit will not be given for off-site recycling/disposal unless it is shown on the Off-Site Recycling/Disposal Form.** Round to the nearest pound. If the answer is 0, give a decimal answer to the first significant digit. Column 15 is calculated as follows:

Emissions without off-site recycling/disposal or controls:
Column 15 = column 9 × column 11

Emissions with off-site recycling/disposal:
Column 15 = (column 9 × column 11) – column 12

*Emissions with off-site recycling/disposal **and** controls:*
Column 15 = ([column 9 × column 11] – column 12) × (1 – [column 13 × column 14])

Use the decimal equivalent for columns 13 and 14. Example: 96.123% = 0.96123

EXAMPLE: Coating and Painting

Evaporative Process Form 2008

Permit number(s) **V99999**

Place an X in any gray cell to mark data requested to be held confidential. See page 5 for requirements for information to be deemed confidential.

1- Process Type/Description: ***Coating metal parts***

2- Process TIER Code: ***080415*** **SOLVENT USE: SURFACE COATING - MISC METAL PARTS**

3- Seasonal Throughput Percent: Dec-Feb ***25*** % Mar-May ***25*** % Jun-Aug ***25*** % Sep-Nov ***25*** %

4- Normal Operating Schedule: Hours/Day ***8*** Days/Week ***5*** Hours/Year ***2080*** Weeks/Year ***52***

5- Typical Hours of Operation *(military time)* Start ***0800*** End ***1700***

6	7	8	9		10	11		12	13	14			15
Process ID	Stack ID(s)	Material Type	Annual Usage Input	lb or gal	VOC, HAP&NON or NHx	Emission Factor	EF Units (lbs per)	Pounds of pollutant* sent off site	Capture Efficiency %	Control ID	Control Efficiency %	Control Efficiency Code**	Estimated Emissions (lbs/yr)
800	***1***	***Lacquer 6455-06***	***95***	***gl***	***VOC***	***4.7***	***gal***		%		%		***447***
801	***1***	***lacq thinner***	***120***	***gl***	***VOC***	***7.1***	***gal***		%		%		***852***
802	***1***	***Paint red 4039-03***	***940***	***gl***	***VOC***	***4.2***	***gal***		%		%		***3,948***
803	***1***	***paint thinner***	***707***	***gl***	***VOC***	***7.0***	***gal***		%		%		***4,949***
804	***1***	***powder paint 8730-11***	***20,200***	***lb***	***VOC***	***0.001***	***lb***		%		%		***20***
									%		%		

Note: Do NOT change preprinted Process ID numbers. See page 6 of these instructions for information on how to delete materials that are no longer used, or to assign Process ID numbers for new materials.

* If you have off-site recycling/disposal of any of the materials listed above, you must complete an Off-site Recycling/Disposal Form to receive credit for reduced emissions.

NOTE: Emissions in col. 15 are calculated as follows: **([col. 9 × col. 11] – col. 12) × (1 – [col. 13 × col. 14])**

**** Control Efficiency Reference Codes**

1 = Tested efficiency / EPA reference method
2 = Tested efficiency / other source test method
3 = Design value from manufacturer
4 = Best guess / engineering estimate
5 = Calculated based on material balance
6 = Estimated, based on a published value.

EXAMPLE: Cleaning solvent (with recycling)

Evaporative Process Form 2008

Permit number(s) **V99999**

Place an X in any gray cell to mark data requested to be held confidential. See page 5 for requirements for information to be deemed confidential.

1- Process Type/Description: **CLEANING METAL PARTS**

2- Process TIER Code: **080103** **SOLVENT USE: DEGREASING - COLD CLEANING**

3- Seasonal Throughput Percent: Dec-Feb **25** % Mar-May **25** % Jun-Aug **25** % Sep-Nov **25** %

4- Normal Operating Schedule: Hours/Day **8** Days/Week **5** Hours/Year **2080** Weeks/Year **52**

5- Typical Hours of Operation *(military time)* Start **1300** End **1700**

6	7	8	9		10	11		12	13	14			15
Process ID	Stack ID(s)	Material Type	Annual Usage Input	lb or gal	VOC, HAP&NON or NHx	Emission Factor	EF Units (lbs per)	Pounds of pollutant* sent off site	Capture Efficiency %	Control ID	Control Efficiency %	Control Efficiency Code**	Estimated Emissions (lbs/yr)
3	**2**	**SANITIZER**	**716**	**lb**	**VOC**	**1.0**	**lb**		**95** %	**1**	**80** %	**3**	**172**
6		**GUN CLEANER**	**180**	**gl**	**VOC**	**7.2**	**gl**	**569**	%		%		**727**
7		**XYZ STRIPPER**	**1300**	**gl**	**VOC**	**3.3**	**gl**	**1,884**	%		%		**2,406**
8		**CLEANING SOLVENTS**	**358**	**gl**	**VOC**	**6.4**	**gl**	**1,006**	%		%		**1,285**
9		**MEGASOLVE**	**2258**	**gl**	**VOC**	**6.8**	**gl**	**6,741**	%		%		**8,613**
									%		%		

Note: Do NOT change preprinted Process ID numbers. See page 6 of these instructions for information on how to delete materials that are no longer used, or to assign Process ID numbers for new materials.

* If you have off-site recycling/disposal of any of the materials listed above, you must complete an Off-site Recycling/Disposal Form to receive credit for reduced emissions.

***NOTE:** This example shows the case where 2,400 of the original 4,096 gallons of materials #6 through 9 were captured for off-site recycling, and the pollutant content of the waste material was estimated to be 75% of the original. The pounds of pollutant sent off-site shown in column 12 is calculated on the example Off-Site Recycling/Disposal Form on the next page.*

EXAMPLE

Off-Site Recycling/Disposal Form 2008

Permit number(s) ***V99999***

NOTE: If you need blank copies of this form, call the Emissions Inventory Unit at (602) 506-6790 or consult our web page at http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx

Provide one off-site recycling/disposal form for each waste stream at your business location. A waste stream is the waste from one or more processes mixed together to make one waste product before it is taken off site for recycling, disposal or combustion.

1) Assign a unique two-digit ID number to identify the waste stream that will be described below. ***01***
(Start with ID# 01 for first waste stream. Make copies of a blank Off-Site Recycling/Disposal form and use 02 for second, etc.)

2) What was the quantity of this waste stream in 2008? 2,400
Check one
☐ pounds
☒ gallons
Indicate whether this quantity is reported in pounds or gallons. Keep waste disposal company manifests as proof that this amount of waste was taken off-site.

3) What was the **average** pollutant content of the waste stream? NOTE: Report in the same units (pounds or gallons) as used in line 2.

VOC ***4.25*** lbs/unit HAP&NON _____ lbs/ unit NHx _____ lbs/ unit

NOTE: Waste normally has less pollutant content than the new product. Some of the pollutant evaporates during the use of the product, and there is usually dirt, water or other contaminants in the waste stream. The estimated pollutant content of the waste is usually between 50% and 95% of the new product. This example estimates an average VOC content (on line 3) to be 75% of the original VOC content of 5.67 lbs/gal., to account for evaporation and contaminants. See page 20 to calculate a weighted average.

4) Calculate the **total** annual pollutant content of the waste in this waste stream.
(volume of waste, from Line 2) × (pollutant content, from Line 3) = Total pollutants in waste stream, in lbs/yr.

VOC ***10,200*** lbs/yr HAP&NON _____ lbs/yr NHx _____ lbs/yr

5) List the process ID numbers of the processes contributing to this waste stream. Also estimate the pounds of pollutant that each process contributed to this waste stream.

NOTE: In this example, the amount each process material contributed to total pollutants in the waste stream (Line 4) is based on the percentage, by weight, of each material that contributed to the waste stream (e.g., Process ID #6 contributed 5.6%, therefore 5.6% × 10,200 lbs/yr = 569 lbs. See example on page 20).

NOTE: Column totals in the table below must equal the total for each pollutant type reported on line 4. The quantities you report below for each pollutant and process must also be reported in column 12 on the Evaporative Process Form.

Process ID		Annual VOC (lbs)		Annual HAP&NON (lbs)	Annual NHx (lbs)
6	Contributed about	***569***	lbs	lbs	lbs
7	Contributed about	***1,884***	lbs	lbs	lbs
8	Contributed about	***1,006***	lbs	lbs	lbs
9	Contributed about	***6,741***	lbs	lbs	lbs

EXAMPLE: Documentation of Emission Factor Calculations

Identify the process ID number(s) and pollutant(s). Show calculations made to obtain the emission factors used for the process(es). Include references to data sources used, including the document name, date published, page numbers, etc.

Emission Factor Calculation

Process ID ***201*** Permit number ***V99999***

Emission factors derived from source test performed 12/2/00 by XYZ Engineering Company (copy of summary tables also attached).

Outlet (after controls):
CO = 0.43 lb/hr × 1 hr/60 min × 1 min/77.9 cu. ft × 1,000,000 cu. ft/MMCF
= 92.0 lb/MMCF

NOx = 0.09 lb/hr × 1 hr/60 min × 1 min/77.9 cu. ft × 1,000,000 cu. ft/MMCF
= 19.3 lb/MMCF

Weighted average sample calculation

NOTE: The example below shows how the weighted average of the materials going into the waste stream is calculated. A weighted-average emission factor has been calculated by listing usage amounts and emission factors for each material, summing each column, and then dividing the total emissions by the total gallons used.

In this example: 23,231 lbs ÷ 4,096 gal = 5.67 lb/gal average VOC content. This emission factor is then used to calculate the average pollutant content in the Off-site Recycling / Disposal Form example.

This process can also be used to find the weighted average emission factor for similar materials if you are reporting them together as a single line item on the Evaporative Process form. Refer to the explanation of "grouping" on page 6.

Process ID #	Material Type	2008 Usage	Units	VOC (lbs/unit)	VOC Emissions (= Usage × VOC content)	Percent contributed to waste stream
6	*gun cleaner*	*180*	*gal*	*7.2*	*1,296 lbs.*	*5.6 %*
7	*xyz stripper*	*1,300*	*gal*	*3.3*	*4,290 lbs.*	*18.5 %*
8	*cleaning solvent*	*358*	*gal*	*6.4*	*2,291 lbs.*	*9.9 %*
9	*MEGASOLVE*	*2,258*	*gal*	*6.8*	*15,354 lbs.*	*66.1 %*
	Totals:	***4,096***	***gal***		***23,231 lbs.***	*100.0 %*

Average VOC content:	***23,231 lbs. / 4,096 gals***	**=**	***5.67 lb/gal***

EXAMPLE (for all sources except Title V sources)

Data Certification Form 2008

Permit number ***999999***

For EACH pollutant listed, total up all emissions recorded on your General Process and Evaporative Process Forms. Enter these numbers in column 1, "Totals from Process Forms." Report any emissions from accidental releases in column 2.
Add the figures in each row across, and enter the result in column 3, "Total Emissions".

NOTE: "Accidental Releases" reported in column 2 should include all excess emissions reported to the Department under Rule 140, Section 500.

Summary of 2008 Annual Emissions:	(1) Totals from Process Forms	(2) + Accidental Releases	(3) = TOTAL 2008 Emissions
CO	***2,113***	***0***	***2,113***
NH_x	***0***	***0***	***0***
Lead	***0***	***0***	***0***
HAP&NON	***0***	***0***	***0***
VOC	***24,220***	***0***	***24,220***
NO_x	***9,815***	***0***	***9,815***
SO_x	***645***	***0***	***645***
PM_{10}	***7,891***	***0***	***7,891***

NOTE: Review specific requirements for data confidentiality on page 5. We cannot hold any data confidential without the required documentation.

TO COMPLETE YOUR EMISSIONS INVENTORY REPORT:

- Complete the Confidentiality Statement below.
- Sign and date this form below where indicated.
- Send the **original** copy of your completed forms to: Maricopa County Air Quality Department, One Stop Shop, Emissions Inventory Intake, 501 N. 44th Street, Suite 200, Phoenix, AZ 85008-6538. Keep a copy of all forms for your records.

CONFIDENTIALITY STATEMENT:

This annual emissions report contains requests to keep some data confidential. ☐ YES ☒ NO
If you check "YES", you must submit documentation and meet certain requirements before your data can be deemed confidential. See enclosed instructions for further details.

NOTE: The Data Certification form must be signed by a responsible company official.

CERTIFICATION STATEMENT:

I declare under penalty of perjury that the data (e.g. inputs, emission factors, controls, and annual emissions) presented herein represents the best available information and is true, accurate and complete to the best of my knowledge.

Signature of owner/business officer | Date of signature | Telephone number

Type or print full name of owner/business officer | Type or print full title

How to calculate an emission fee (for Title V sources only):

1. For each pollutant listed on the "Data Certification/Fee Calculation" form, total up all emissions recorded on your General Process and Evaporative Process Forms. Enter these numbers in column 1, "Totals from Process Forms."

NOTE: While most processes that generate PM_{10} should be reported on line 5 of the Data Certification/Fee Calculation form, "[f]ugitive emissions of PM_{10} from activities other than crushing, belt transfers, screening, or stacking" (County Rule 280, § 305.2d) are NOT subject to annual emission fees. The most common occurrences of these PM_{10}-producing activities that are NON-billable are listed below:

SCC codes and description of PM_{10}-producing processes that are NOT subject to emission fees

SCC	Major Category	Subcategory	Facility / Process Type	Process Description
30200814	Industrial Processes	Food and Agriculture	Feed Manufacture	Storage
30400737	Industrial Processes	Secondary Metal Production	Steel Foundries	Raw Material Silo
30500120	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Storage Bins: Ferric Chloride
30500121	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Storage Bins: Mineral Stabilizer
30500134	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Blown Saturant Storage
30500135	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Blown Coating Storage
30500141	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Granules Storage
30500143	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Mineral Dust Storage
30500203	Industrial Processes	Mineral Products	Asphalt Concrete	Storage Piles
30500212	Industrial Processes	Mineral Products	Asphalt Concrete	Heated Asphalt Storage Tanks
30500213	Industrial Processes	Mineral Products	Asphalt Concrete	Storage Silo
30500290	Industrial Processes	Mineral Products	Asphalt Concrete	Haul Roads: General
30500303	Industrial Processes	Mineral Products	Brick Manufacture	Storage of Raw Materials
30500608	Industrial Processes	Mineral Products	Cement Manufacturing (Dry Process)	Raw Material Piles
30500708	Industrial Processes	Mineral Products	Cement Manufacturing (Wet Process)	Raw Material Piles
30501710	Industrial Processes	Mineral Products	Mineral Wool	Storage of Oils and Binders
30502007	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Open Storage
30502011	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Hauling
30502504	Industrial Processes	Mineral Products	Construction Sand and Gravel	Hauling
30502507	Industrial Processes	Mineral Products	Construction Sand and Gravel	Storage Piles
30502760	Industrial Processes	Mineral Products	Industrial Sand and Gravel	Sand Handling, Transfer, & Storage
30531090	Industrial Processes	Mineral Products	Coal Mining, Cleaning, Material Handling	Haul Roads: General
30532007	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Open Storage
30704002	Industrial Processes	Pulp and Paper & Wood Pdts.	Bulk Handling and Storage - Wood/Bark	Stockpiles
31100199	Industrial Processes	Building Construction	Construction: Building Contractors	Other Not Classified
31100299	Industrial Processes	Building Construction	Demolitions/Special Trade Contracts	Other Construction/Demolition
50100401	Waste Disposal	Solid Waste Disposal	Landfill Dump	Unpaved Road Traffic
50100402	Waste Disposal	Solid Waste Disposal	Landfill Dump	Fugitive Emissions
50100403	Waste Disposal	Solid Waste Disposal	Landfill Dump	Area Method
50100404	Waste Disposal	Solid Waste Disposal	Landfill Dump	Trench Method
50100405	Waste Disposal	Solid Waste Disposal	Landfill Dump	Ramp Method

2. Report any accidental releases in column 2. Add columns 1 and 2 together for each pollutant, and enter the sum in column 3. Sum lines 1 through 5 together, and enter the total on line 6.

3. Divide your facility's total billable emissions (on line 6) by 2000 to convert pounds into tons. **Round to the nearest ton.** Enter this value on line 7. Multiply this number by **$38.25**, and enter the result on line 8. This is your 2008 emission fee.

EXAMPLE (for Title V sources only)

Data Certification/Fee Calculation Form 2008

Permit number ***V99999***

For EACH pollutant listed, total up all emissions recorded on your General Process and Evaporative Process Forms. Enter these numbers in column 1, "Totals from Process Forms." Report any emissions from accidental releases in column 2.
Add the figures in each row across, and enter the result in column 3, "Total Emissions".
Carefully follow the instructions on lines 6 through 8 to calculate any emission fee owed.

NOTE: "Accidental Releases" reported in column 2 should include all excess emissions reported to the Department under Rule 140, Section 500.

	Summary of 2008 Annual Emissions:	**(1) Totals from Process Forms**	**(2) + Accidental Releases**	**(3) = TOTAL 2008 Emissions**
	CO	***2,113***	***0***	***2,113***
	NH_x	***0***	***0***	***0***
	Lead	***0***	***0***	***0***
	PM_{10} (non-billable; see page 22)	***7,200***	***0***	***7,200***
	Emissions fees are based on your emissions of the following pollutants ONLY:			
1	HAP&NON	***0***	***0***	***0***
2	VOC	***24,220***	***0***	***24,220***
3	NO_x	***9,815***	***0***	***9,815***
4	SO_x	***645***	***0***	***645***
5	PM_{10} (billable; see page 22)	***691***	***0***	***691***
6	**Add "TOTAL" column from lines 1 through 5 ONLY:**			***35,371*** lbs.
7	Divide the total on line 6 by 2000 (pounds per ton) to get tons, and round the number to the nearest ton. (Drop any decimal of .499 or less. Increase to the next whole number any decimal of .500 or more.) Enter the resulting WHOLE NUMBER here.			***18*** TONS
8	Multiply line 7 (a WHOLE number) by **$ 38.25**. This is your **2008 ANNUAL EMISSION FEE**.			$ ***688.50***

NOTE: Review specific requirements for data confidentiality on page 5. We cannot hold any data confidential without the required documentation.

TO COMPLETE YOUR EMISSIONS INVENTORY REPORT:

- Include a check (made payable to Maricopa County Air Quality Department) for the amount calculated on line 8 above.
- Complete the Confidentiality Statement below.
- Sign and date this form below where indicated.
- Send the **original** copy of your completed forms, along with any emission fee due to: Maricopa County Air Quality Department, One Stop Shop, Emissions Inventory Intake, 501 N. 44th Street, Suite 200, Phoenix, AZ 85008-6538. Keep a copy of all forms for your records.

CONFIDENTIALITY STATEMENT:

This annual emissions report contains requests to keep some data confidential. ☐ YES ☒ NO
If you check "YES", you must submit documentation and meet certain requirements before your data can be deemed confidential. See enclosed instructions for further details.

NOTE: The Data Certification form must be signed by a responsible company official.

CERTIFICATION STATEMENT:

I declare under penalty of perjury that the data (e.g. inputs, emission factors, controls, and annual emissions) presented herein represents the best available information and is true, accurate and complete to the best of my knowledge.

Signature of owner/business officer | Date of signature | Telephone number

Type or print full name of owner/business officer | Type or print full title

Appendix 2. Calculating Rule Effectiveness (RE) Studies for Controlled Title V and Non-Title V Point Source Processes

A2.1 Introduction

Rule effectiveness (RE) studies are designed to assess the success of regulatory rules at controlling their targeted emissions. It is acknowledged that facilities and source categories subject to control techniques and devices mandated by rules do not always achieve 100% compliance with those requirements. Given this reality, the US EPA recommends the use of rule effectiveness studies to improve the quality of emission estimates presented in emission inventories.

Once an RE rate has been calculated, its value is applied to relevant sources at an individual process level, thus adjusting (i.e., increasing) emission estimates to reflect a lower degree of control efficiency. The formulas below illustrate how inclusion of rule effectiveness can significantly affect the resulting emission estimates:

Emissions <u>before</u> the application of rule effectiveness:

Uncontrolled Emissions	×	[1 – (Control Efficiency)]	=	Emissions with Control
100 tons	×	**[1 – (0.90)]**	=	**10.0 tons**

Emissions <u>including</u> the application of rule effectiveness:

Uncontrolled Emissions	×	[1 – (Control Efficiency × RE)]	=	Emissions with Control
100 tons	×	**[1 – (0.90 × 0.83)]**	=	**25.3 tons**

In general, the RE rate is applied to all processes where a control device or control technique is in use. There are however some limitations to this blanket rule, as expressed in US EPA's most recent guidance:

> *…not all emission estimates involving use of a control device or technique need to be adjusted to account for RE…For example, a state or local agency may conclude that a control device that operates in conjunction with a continuous emissions monitor, or is equipped with an automatic shutdown device, may provide a sufficient level of assurance that intended emission reductions will be achieved, and therefore an adjustment for rule effectiveness is not necessary. Another example would be in instances where a direct determination of emissions, such as via a mass balance calculation, can be made.* (US EPA, 2005)

Another complication in any attempt to apply a blanket RE percentage rate occurs where control device efficiencies are extremely high. Some categories of control devices routinely operate at efficiencies of 99% or greater (e.g., baghouses, thermal oxidizers). For these activities, even small adjustments through the application of RE can cause a dramatic increase in reported emissions. As an example, a process with a control device of 99.9% efficiency may report controlled emissions of 10 tons. If an RE rate of 85% were applied to this process, the adjusted emissions would total 1,508.5 tons (an increase of nearly 15,000%). In these types of instances, the department evaluated the affected processes on a case-by-case basis to determine the appropriateness of applying an RE adjustment.

A2.2 Calculating Rule Effectiveness Rates for Title V Facilities and Non-Title V Facilities

The observed compliance rate in some cases, such as multi-source Title V and non-Title V facilities, can be better described as a rate at which inspection staff issue violations. Inspection staff has a range of experience and training which influences their proficiency in issuing appropriate violations. There may be instances when a rule violation goes unnoticed by staff, or conversely a violation may be issued in error. Even when a compliance rate has a high statistical measure of accuracy, it can fail to reflect a number of programmatic measures that affect overall rule effectiveness; measures like the strength of rule language, departmental enforcement and penalty actions, inspector training programs, educational and public outreach efforts, etc. This reality is reflected in earlier US EPA guidance:

> *A percentage effectiveness rating is not enough to describe the compliance effectiveness of a rule for a source category. An SSCD [Stationary Source Compliance Division] study should attempt to link the rating to a regulatory agency's overall effort. The study should address the factors that affect the percentage effectiveness rating such as the compliance rate of the sources in a category, inspection frequency and thoroughness, the language of the rule (i.e., whether or not it has loopholes), and the reporting and recordkeeping by the regulatory agency. Evaluating these factors will provide a more complete evaluation of the effectiveness of a rule.* (US EPA, 1994)

In order to incorporate all the salient factors described above, a matrix was created to produce a final RE rate. US EPA's latest guidance (2005) provides a listing of factors that can impact rule effectiveness rates (e.g., inspector training, frequency of inspections, media outreach, enforcement policies, recordkeeping requirements, etc.), grouped into major categories such as most important factors, important factors and other factors. The department used these suggested factors as the basis for developing the RE matrices contained in Tables A2–2 and A2–3.

In brief, the compliance rate developed from inspection data accounts for 70% of the overall RE rate, while all other factors account for the remaining 30%. Each factor is scored individually, based upon the department's success in implementing that factor. As an example, the score for the factor "Compliance History" is the compliance rate developed from the study period inspection data, while the score for "Enforcement Penalties" is based upon the department's timely response to, and settlement of, observed violations associated with the subject rule or source category. The complete matrices for each applicable rule or source category for which rule effectiveness was addressed, are contained in Tables A2–2 and A2–3.

The following sections describe in further detail the data and methods used in the development of the remaining RE factors for Title V and non-Title V permitted facilities; results are summarized in Table A2–1 below.

Table A2–1. Compliance and rule effectiveness rates, by source category analyzed.

Source Category	Compliance Rate	Rule Effectiveness (RE) Rate
Title V Facilities	89.14% *	90.94%
Non-Title V Facilities	81.00% *	84.27%

** Compliance rates for both Title V and Non-Title V facilities are based upon 2008-2009 inspection data, and reflect compliance self-monitoring recordkeeping practice, in addition to violation data.*

For the emission processes that include a control device or technique that limits carbon monoxide, separate multi-rule RE rates have been calculated for permitted Title V and non-Title V facilities. Factor-based matrices have been utilized to develop RE rates for Title V and non-Title V facilities. Compliance rates for these sources are based upon two full years of data (2008 through 2009), as compliance information for these sources tends to be detailed (as reflected in the matrix). The compliance rate for these facilities also includes data on self-monitoring recordkeeping practices in addition to inspection data. The combination of monitoring data and inspection data comprise the 'compliance rate' section of the RE calculation matrix, and still account for 70% of the overall RE rate. The combined compliance rate for Title V facilities is 89.14% and 81.00% for non-Title V facilities, resulting in RE rates of 90.94% and 84.27% for Title V and non-Title V facilities, respectively, as shown in Tables A2–2 and A2–3 below.

A2.3 References

US EPA, 1994. Rule Effectiveness Guidance: Integration of Inventory, Compliance and Assessment Applications. EPA Rep. 452/R-94-001, January 1994.

US EPA, 2005. Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations. EPA Rep. 454/R-05-001, November 2005.

Table A2–2. Rule Effectiveness Matrix for Title V Facilities

A. Most important factors (2 criteria, each assigned weighting of 35% of total):

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Monitoring	94%	100%	97%	Source specific monitoring used for compliance purposes, and monitoring records filed with regulatory agency at least every 4 months.			
	87%	93%	90%	Source specific monitoring used as an indicator of compliance, and monitoring records filed with regulatory agency every 6 to 9 months.	35%	90%	**31.5%**
	81%	86%	84%	Source specific monitoring used as an indicator of compliance, and monitoring records filed with regulatory agency each year.			
	70%	80%	75%	General guidance exists for source specific enhanced monitoring, and monitoring records required but aren't submitted to regulatory agency.			
		< 70%	35%	No requirements for any type of monitoring.			
Compliance History	94%	100%	97%	The facility has been in compliance for the past eight quarters.	35%	10 of 19 facilities	**17.9%**
	87%	93%	90%	The facility is believed to have been in compliance for the past eight quarters, although inspection frequency is such that this can't be positively confirmed.			
	81%	86%	84%	On schedule; the facility is meeting its compliance schedule.			
	70%	80%	75%	In Violation; facility is in violation of emissions and/or procedural requirements.		8 of 19 facilities	**12.4%**
		< 70%	35%	High Priority Violator (HPV): the facility is in significant violation of one or more applicable requirement of the CAA.		1 of 19 facilities	**0.6%**
						Sum:	**30.9%**

B. Other important factors (4 criteria, each assigned weighting of 3% of total):

Type of Inspection	94%	100%	97%	Inspections involve compliance test methods with a high degree of accuracy, such as stack testing or other types of precise emissions measurement.	3%	97%	**2.9%**
	87%	93%	90%	Inspections involve detailed review of process parameters & inspection of control equipment.			
	81%	86%	84%	Inspections involve review of process and inspection of control equipment.			
	70%	80%	75%	Inspections generally consist of only a records review.			
		< 70%	35%	Inspections most likely consist of visual inspection (e.g., opacity), or drive by.			
Operation & Maintenance	94%	100%	97%	Control equipment operators follow and sign daily O&M instructions.			
	87%	93%	90%	Control equipment operators follow daily O&M instructions.	3%	90%	**2.7%**
	81%	86%	84%	Control equipment operators follow daily or weekly O&M instructions.			
	70%	80%	75%	O&M requirements exist, but on no specific schedule.			
		< 70%	35%	No specific O&M requirements.			

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Unannounced Inspections	94%	100%	97%	Routinely conducted.	3%	97%	**2.9%**
	87%	93%	90%	Sometimes done.			
	81%	86%	84%	Done, but infrequently.			
	70%	80%	75%	Rarely done.			
		< 70%	35%	Never done.			

Enforcement Penalties	94%	100%	97%	Agency has the authority to impose punitive measures, including monetary fines, towards violators such as in delegated Title V Operating Permit programs.	3%	97%	**2.91%**
	87%	93%	90%	Agency has the authority to impose punitive measures, including monetary fines, towards violators such as in delegated Title V Operating Permit programs.			
	81%	86%	84%	Agency has the authority to impose punitive measures, including monetary fines, towards violators such as in delegated Title V Operating Permit programs.			
	70%	80%	75%	Agency has the authority to impose punitive measures, including monetary fines, towards violators such as in delegated Title V Operating Permit programs.			
		< 70%	35%	Agency does not have sufficient authority to impose punitive measures towards violators.			

C. Other factors (9 criteria, each assigned weighting of 2% of total):

Compliance Certifications	94%	100%	97%	Source subject to Title V or other type of compliance certification.	2%	97%	**1.94%**
	87%	93%	90%	Source subject to Title V or other type of compliance certification.			
	81%	86%	84%	Source not subject to any type of compliance certification.			
	70%	80%	75%	Source not subject to any type of compliance certification.			
		< 70%	35%	Source not subject to any type of compliance certification.			

Inspection Frequency	94%	100%	97%	Source(s) are inspected once every 2 years or more frequently.	2%	97%	**1.94%**
	87%	93%	90%	Source(s) are inspected once every 3 years or more frequently.			
	81%	86%	84%	Source(s) are inspected once every 5 years or more frequently.			
	70%	80%	75%	Inspection of source(s) infrequent; > every 5 years.			
		< 70%	35%	Inspections rarely, if ever, performed.			

EPA HPV Enforcement	94%	100%	97%	Agency has sufficient resources to implement EPA's 12/22/98 HPV policy.	2%	97%	**1.94%**
	87%	93%	90%	Agency's resources allow it to implement EPA's 12/22/98 HPV policy in most instances.			
	81%	86%	84%	Agency's resources allow it to implement EPA's 12/22/98 HPV policy in most instances.			
	70%	80%	75%	Agency's resources allow it to implement EPA's 12/22/98 HPV policy more often than not.			
		< 70%	35%	Resource constraints prohibit agency from implementing EPA's 12/22/98 HPV policy in most instances.			

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Operator Training	94%	100%	97%	Control equipment operators complete a formal training program on use of the equipment, and such program is kept up to date and has been reviewed by the regulatory agency.			
	87%	93%	90%	Control equipment operators complete formal training program, and such program is kept up to date and available for review by the regulatory agency upon request.			
	81%	86%	84%	Control equipment operators complete some amount of formal training.	2%	84%	**1.68%**
	70%	0.8	75%	Control equipment operators receive only on the job training.			
		< 70%	35%	Control equipment operators receive no specific training.			
Media Publicity	94%	100%	97%	Media publicity of enforcement actions.	2%	97%	**1.94%**
	87%	93%	90%	Media publicity of enforcement actions.			
	81%	86%	84%	Media publicity of enforcement actions.			
	70%	80%	75%	Media publicity of enforcement actions.			
		< 70%	35%	No media publicity of enforcement actions.			
Regulatory Workshops	94%	100%	97%	Regulatory workshops are available annually, and/or the implementing agency mails regulatory information packages each year.	2%	97%	**1.94%**
	87%	93%	90%	Regulatory workshops are available every 1-2 years, and/or the implementing agency mails regulatory information packages every 1-2 years.			
	81%	86%	84%	Regulatory workshops are available every 2-3 years, and/or the implementing agency mails regulatory information packages once every 2-3 years.			
	70%	80%	75%	Regulatory workshop not routinely available, but implementing agency mails regulatory information packages out about once every 2-3 years.			
		< 70%	35%	Regulatory workshops not routinely available. Implementing agency mails regulatory information packages infrequently, if ever.			
Inspector Training	94%	100%	97%	Inspectors must undergo 2 weeks of comprehensive basic training, and 1 to 2 weeks of source specific training, and such training is updated each year.			
	87%	93%	90%	Inspectors must undergo 1 to 2 weeks of basic training and 1 week of source specific training and such training is updated every 1-2 years.	2%	90%	**1.80%**
	81%	86%	84%	Inspectors must undergo 1 to 2 weeks of basic training and 3 to 5 days of source specific training, and such training is updated every 1-2 years.			
	70%	80%	75%	Inspectors must undergo 1 to 2 weeks of basic training and 1 to 3 days of source specific training, and such training is updated every 1-2 years.			
		< 70%	35%	Inspectors must undergo less than 5 days of basic training less than 3 days of source specific training, and such training is updated only every 2 years or less frequently.			

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Testing Guidelines	94%	100%	97%	Specific guidelines and schedule for testing and test methods exist.	2%	97%	**1.94%**
	87%	93%	90%	Specific guidelines on testing and test methods exist, but no schedule for testing.			
	81%	86%	84%	Specific guidelines on testing and test methods exist, but no schedule for testing.			
	70%	80%	75%	Specific guidelines on testing and test methods, but no schedule for testing.			
		< 70%	35%	Only general guidance on testing, or no mention of testing requirements.			

Follow-up Inspections	94%	100%	97%	Follow-up inspections always or almost always conducted (90 % of the time or more).	2%	97%	**1.94%**
	87%	93%	90%	Follow-up inspections usually conducted (approximately 75% of the time).			
	81%	86%	84%	Follow-up inspections sometimes conducted (approximately 50% of the time).			
	70%	80%	75%	Follow-up inspections infrequently conducted (approximately 25% of the time).			
		< 70%	35%	Follow-up inspections rarely or never conducted (10% of the time or less).			

Overall rule effectiveness score for Title V facilities: **90.94%**

Table A2–3. Rule Effectiveness Matrix for Non-Title V Facilities

A. Most important factors (2 criteria, each assigned weighting of 35% of total):

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Monitoring	94%	100%	97%	Source specific monitoring used for compliance purposes, and monitoring records filed with regulatory agency at least every 4 months.			
	87%	93%	90%	Source specific monitoring used as an indicator of compliance, and monitoring records filed with regulatory agency every 6 to 9 months.			
	81%	86%	84%	Source specific monitoring used as an indicator of compliance, and monitoring records filed with regulatory agency each year.			
	70%	80%	75%	General guidance exists for source specific enhanced monitoring, and monitoring records required but aren't submitted to regulatory agency.	35%	75%	**26.3%**
		< 70%	35%	No requirements for any type of monitoring.			
Compliance History	94%	100%	97%	The facility has been in compliance for the past eight quarters.	35%	156 of 298 facilities	**17.8%**
	87%	93%	90%	The facility is believed to have been in compliance for the past eight quarters, although inspection frequency is such that this can't be positively confirmed.		10 of 298 facilities	**1.1%**
	81%	86%	84%	On schedule; the facility is meeting its compliance schedule.			
	70%	80%	75%	In Violation; facility is in violation of emissions and/or procedural requirements.		130 of 298 facilities	**11.5%**
		< 70%	35%	High Priority Violator (HPV): the facility is in significant violation of one or more applicable requirement of the CAA.		2 of 298 facilities	**0.1%**
						Sum:	**30.4%**

B. Other important factors (4 criteria, each assigned weighting of 3% of total):

Type of Inspection	94%	100%	97%	Inspections involve compliance test methods with a high degree of accuracy, such as stack testing or other types of precise emissions measurement.			
	87%	93%	90%	Inspections involve detailed review of process parameters & inspection of control equipment.	3%	90%	**2.7%**
	81%	86%	84%	Inspections involve review of process and inspection of control equipment.			
	70%	80%	75%	Inspections generally consist of only a records review.			
		< 70%	35%	Inspections most likely consist of visual inspection (e.g., opacity), or drive by.			
Operation & Maintenance	94%	100%	97%	Control equipment operators follow and sign daily O&M instructions.			
	87%	93%	90%	Control equipment operators follow daily O&M instructions.	3%	90%	**2.7%**
	81%	86%	84%	Control equipment operators follow daily or weekly O&M instructions.			
	70%	80%	75%	O&M requirements exist, but on no specific schedule.			
		< 70%	35%	No specific O&M requirements.			

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Unannounced Inspections	94%	100%	97%	Routinely conducted.	3%	97%	**2.91%**
	87%	93%	90%	Sometimes done.			
	81%	86%	84%	Done, but infrequently.			
	70%	80%	75%	Rarely done.			
		< 70%	35%	Never done.			

Enforcement Penalties	94%	100%	97%	Agency has the authority to impose punitive measures, including monetary fines, towards violators such as in delegated Title V Operating Permit programs.	3%	97%	**2.91%**
	87%	93%	90%	Agency has the authority to impose punitive measures, including monetary fines, towards violators such as in delegated Title V Operating Permit programs.			
	81%	86%	84%	Agency has the authority to impose punitive measures, including monetary fines, towards violators such as in delegated Title V Operating Permit programs.			
	70%	80%	75%	Agency has the authority to impose punitive measures, including monetary fines, towards violators such as in delegated Title V Operating Permit programs.			
		< 70%	35%	Agency does not have sufficient authority to impose punitive measures towards violators.			

C. Other factors (9 criteria, each assigned weighting of 2% of total):

Compliance Certifications	94%	100%	97%	Source subject to Title V or other type of compliance certification.			
	87%	93%	90%	Source subject to Title V or other type of compliance certification.			
	81%	86%	84%	Source not subject to any type of compliance certification.			
	70%	80%	75%	Source not subject to any type of compliance certification.	2%	75%	**1.5%**
		< 70%	35%	Source not subject to any type of compliance certification.			

Inspection Frequency	94%	100%	97%	Source(s) are inspected once every 2 years or more frequently.	2%	97%	**1.94%**
	87%	93%	90%	Source(s) inspected every 3 years or more frequently.			
	81%	86%	84%	Source(s) inspected every 5 years or more frequently.			
	70%	80%	75%	Inspection of source(s) infrequent; > every 5 years.			
		< 70%	35%	Inspections rarely, if ever, performed.			

EPA HPV Enforcement	94%	100%	97%	Agency has sufficient resources to implement EPA's 12/22/98 HPV policy.	2%	97%	**1.94%**
	87%	93%	90%	Agency's resources allow it to implement EPA's 12/22/98 HPV policy in most instances.			
	81%	86%	84%	Agency's resources allow it to implement EPA's 12/22/98 HPV policy in most instances.			
	70%	80%	75%	Agency's resources allow it to implement EPA's 12/22/98 HPV policy more often than not.			
		< 70%	35%	Resource constraints prohibit agency from implementing EPA's 12/22/98 HPV policy in most instances.			

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score(= weight × value)
Operator Training	94%	100%	97%	Control equipment operators complete a formal training program on use of the equipment; the program is kept up to date and has been reviewed by the regulatory agency.			
	87%	93%	90%	Control equipment operators complete formal training program, and such program is kept up to date and available for review by the regulatory agency upon request.			
	81%	86%	84%	Control equipment operators complete some amount of formal training.			
	70%	0.8	75%	Control equipment operators receive only on the job training.	2%	75%	**1.5%**
		< 70%	35%	Control equipment operators receive no specific training.			
Media Publicity	94%	100%	97%	Media publicity of enforcement actions.	2%	97%	**1.94%**
	87%	93%	90%	Media publicity of enforcement actions.			
	81%	86%	84%	Media publicity of enforcement actions.			
	70%	80%	75%	Media publicity of enforcement actions.			
		< 70%	35%	No media publicity of enforcement actions.			
Regulatory Workshops	94%	100%	97%	Regulatory workshops are available annually, and/or the implementing agency mails regulatory information packages each year.	2%	97%	**1.94%**
	87%	93%	90%	Regulatory workshops are available every 1-2 years, and/or the implementing agency mails regulatory information packages every 1-2 years.			
	81%	86%	84%	Regulatory workshops are available every 2-3 years, and/or the implementing agency mails regulatory information packages once every 2-3 years.			
	70%	80%	75%	Regulatory workshop not routinely available, but implementing agency mails regulatory information packages out about once every 2-3 years.			
		< 70%	35%	Regulatory workshops not routinely available. The implementing agency mails regulatory information packages infrequently, if ever.			
Inspector Training	94%	100%	97%	Inspectors must undergo 2 weeks of comprehen-sive basic training, and 1 to 2 weeks of source specific training, and such training is updated each year.			
	87%	93%	90%	Inspectors must undergo 1 to 2 weeks of basic training and 1 week of source specific training and such training is updated every 1-2 years.	2%	90%	**1.80%**
	81%	86%	84%	Inspectors must undergo 1 to 2 weeks of basic training and 3 to 5 days of source specific training, and such training is updated every 1-2 years.			
	70%	80%	75%	Inspectors must undergo 1 to 2 weeks of basic training and 1 to 3 days of source specific training, and such training is updated every 1-2 years.			
		< 70%	35%	Inspectors must undergo less than 5 days of basic training less than 3 days of source specific training, and such training is updated only every 2 years or less frequently.			

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score(= weight × value)
Testing Guidelines	94%	100%	97%	Specific guidelines and schedule for testing and test methods exist.	2%	97%	**1.94%**
	87%	93%	90%	Specific guidelines on testing and test methods exist, but no schedule for testing.			
	81%	86%	84%	Specific guidelines on testing and test methods exist, but no schedule for testing.			
	70%	80%	75%	Specific guidelines on testing and test methods, but no schedule for testing.			
		< 70%	35%	Only general guidance on testing, or no mention of testing requirements.			
Follow-up Inspections	94%	100%	97%	Follow-up inspections always or almost always conducted (90 % of the time or more).	2%	97%	**1.94%**
	87%	93%	90%	Follow-up inspections usually conducted (approximately 75% of the time).			
	81%	86%	84%	Follow-up inspections sometimes conducted (approximately 50% of the time).			
	70%	80%	75%	Follow-up inspections infrequently conducted (approximately 25% of the time).			
		< 70%	35%	Follow-up inspections rarely or never conducted (10% of the time or less)			

Overall rule effectiveness score for non-Title V facilities: **84.27%**

Appendix 3. MOVES2010b Local Input Data and RunSpecs

In order to calculate the 2008 annual and CO season-day onroad source emissions, MOVES2010b was executed using local input data for each month of the year and each geographical area (the CO maintenance area and Maricopa County).

A portion of the MOVES2010b RunSpec Summary, RunSpec, and local input data for Maricopa County are provided in this appendix as an example.

MOVES2010b RunSpec Summary (Maricopa County, December 2008)

* Output Database Server Name: [using default]

* Scale:
  Domain/Scale: County
  Calculation Type: Inventory

* Time Spans:
  Time Aggregation Level: Hour
  Years: 2008
  Months: December
  Days: Weekend & Weekdays
  Hours: Start Hour 00:00 - 00:59 | End Hour 23:00 - 23:59

* Geographic Bounds:
  Region: County
  Selections: ARIZONA - Maricopa County
  Domain Input Database: mag_MC_2008PEI_in

* Vehicles/Equipment
  On Road Vehicle Equipment:
    Diesel Fuel - Combination Long-haul Truck
    Diesel Fuel - Combination Short-haul Truck
    Diesel Fuel - Intercity Bus
    Diesel Fuel - Light Commercial Truck
    Diesel Fuel - Motor Home
    Diesel Fuel - Motorcycle
    Diesel Fuel - Passenger Car
    Diesel Fuel - Passenger Truck
    Diesel Fuel - Refuse Truck
    Diesel Fuel - School Bus
    Diesel Fuel - Single Unit Long-haul Truck
    Diesel Fuel - Single Unit Short-haul Truck
    Diesel Fuel - Transit Bus
    Gasoline - Combination Long-haul Truck
    Gasoline - Combination Short-haul Truck
    Gasoline - Intercity Bus
    Gasoline - Light Commercial Truck
    Gasoline - Motor Home
    Gasoline - Motorcycle
    Gasoline - Passenger Car
    Gasoline - Passenger Truck
    Gasoline - Refuse Truck
    Gasoline - School Bus
    Gasoline - Single Unit Long-haul Truck
    Gasoline - Single Unit Short-haul Truck
    Gasoline - Transit Bus
    Compressed natural Gas (CNG) - Combination Long-haul Truck
    Compressed natural Gas (CNG) - Combination Short-haul Truck
    Compressed natural Gas (CNG) - Intercity Bus
    Compressed natural Gas (CNG) - Light Commercial Truck
    Compressed natural Gas (CNG) - Motor Home
    Compressed natural Gas (CNG) - Motorcycle
    Compressed natural Gas (CNG) - Passenger Car
    Compressed natural Gas (CNG) - Passenger Truck
    Compressed natural Gas (CNG) - Refuse Truck
    Compressed natural Gas (CNG) - School Bus
    Compressed natural Gas (CNG) - Single Unit Long-haul Truck
    Compressed natural Gas (CNG) - Single Unit Short-haul Truck
    Compressed natural Gas (CNG) - Transit Bus

* Road Type
  Off-Network
  Rural Restricted Access
  Rural Unrestricted Access
  Urban Restricted Access
  Urban Unrestricted Access

* Pollutants and Processes
  Carbon Monoxide (CO) - Running Exhaust
  Carbon Monoxide (CO) - Start Exhaust
  Carbon Monoxide (CO) - Crankcase Running Exhaust
  Carbon Monoxide (CO) - Crankcase Start Exhaust
  Carbon Monoxide (CO) - Crankcase Extended Idle Exhaust
  Carbon Monoxide (CO) - Extended Idle Exhaust

* Manage Input Data Sets
  Selections: / StageII_Input / Stage II Refueling Input

* Output
  General Output:
    Output Database: mag_MC_2008PEI_out
    Units: Mass Units (Grams) | Energy Units (Joules) | Distance Units (Miles)
    Activity: Distance Traveled | Source Hours | Source Hours Idling | Source Hours Operating | Source Hours Parked | Population | Starts
  Output Emissions Detail:
    Always: Time (Month) | Location (NATION) | Pollutant
    For All Vehicle/Equipment Categories: Fuel Type | Emission Process
    On Road: SCC

MOVES2010b RunSpec (Maricopa County, December 2008)

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MOVES2010b Local Input Data (Maricopa County, December 2008)

[FuelFormulation]

Fuel Formulation ID	Fuel Subtype ID	RVP	Sulfur Level	ETOH Volume	MTBE Volume	ETBE Volume	TAME Volume	Aromatic Content	Olefin Content	Benzene Content	e200	e300	volToWt PercentOxy	BioDiesel Ester Volume	Cetane Index	PAH Content	T50	T90
10801	12	8 76	35 00	9 5	0	0	0	14 4	4 9	1 0	53 0	91 0	3 4933	0	0	0	190 333	292 333
10802	12	8 42	23 14	9 2	0	0	0	12 8	3 9	0 9	50 3	91 1	3 4229	0	0	0	196 286	291 286
10803	12	8 40	49 00	9 2	0	0	0	12 0	4 0	0 8	50 3	92 0	3 4075	0	0	0	197 250	285 500
10804	14	7 77	23 00	5 6	0	0	0	17 7	6 0	1 0	45 5	88 5	2 0567	0	0	0	205 833	304 833
10805	14	6 95	26 04	1 3	0	0	0	16 8	7 6	0 8	40 2	88 4	0 5086	0	0	0	213 954	307 884
10806	11	6 64	25 20	0 0	0	0	0	16 3	7 0	0 7	38 4	86 4	0 0000	0	0	0	217 000	321 400
10807	14	7 07	18 83	0 7	0	0	0	16 6	7 3	0 8	37 9	89 0	0 3367	0	0	0	216 917	304 667
10808	14	6 81	28 59	0 4	0	0	0	15 0	7 4	0 8	38 9	89 2	0 1495	0	0	0	215 518	302 768
10809	11	6 48	34 56	0 0	0	0	0	18 2	10 1	0 9	40 3	88 8	0 0000	0	0	0	214 500	305 750
10810	13	7 91	24 95	6 8	0	0	0	17 1	8 0	0 9	46 5	89 5	2 5173	0	0	0	204 600	302 467
10811	12	8 41	15 17	9 5	0	0	0	16 1	5 9	1 1	53 3	90 9	3 5425	0	0	0	185 500	294 333
10812	13	8 38	29 45	8 8	0	0	0	14 5	5 3	0 9	50 7	90 9	3 2767	0	0	0	194 794	293 184
30801	20	0	6 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30802	20	0	6 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30803	20	0	6 65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30804	20	0	6 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30805	20	0	5 78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30806	20	0	5 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30807	20	0	4 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30808	20	0	6 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30809	20	0	6 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30810	20	0	6 49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30811	20	0	6 49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30812	20	0	6 85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[FuelSupply]

countyID	fuelYearID	monthGroupID	fuelFormulationID	marketShare	marketShareCV
4013	2008	1	10801	1	0 5
4013	2008	2	10802	1	0 5
4013	2008	3	10803	1	0 5
4013	2008	4	10804	1	0 5
4013	2008	5	10805	1	0 5
4013	2008	6	10806	1	0 5
4013	2008	7	10807	1	0 5
4013	2008	8	10808	1	0 5
4013	2008	9	10809	1	0 5
4013	2008	10	10810	1	0 5
4013	2008	11	10811	1	0 5
4013	2008	12	10812	1	0 5
4013	2008	1	30801	1	0 5
4013	2008	2	30802	1	0 5
4013	2008	3	30803	1	0 5
4013	2008	4	30804	1	0 5
4013	2008	5	30805	1	0 5
4013	2008	6	30806	1	0 5
4013	2008	7	30807	1	0 5
4013	2008	8	30808	1	0 5
4013	2008	9	30809	1	0 5
4013	2008	10	30810	1	0 5
4013	2008	11	30811	1	0 5
4013	2008	12	30812	1	0 5
4013	2008	1	30	1	0 5
4013	2008	2	30	1	0 5
4013	2008	3	30	1	0 5
4013	2008	4	30	1	0 5
4013	2008	5	30	1	0 5
4013	2008	6	30	1	0 5
4013	2008	7	30	1	0 5
4013	2008	8	30	1	0 5
4013	2008	9	30	1	0 5
4013	2008	10	30	1	0 5
4013	2008	11	30	1	0 5
4013	2008	12	30	1	0 5

[HPMSvTypeYear]

HPMSVtypeID	yearID	VMTGrowthFactor	HPMSBaseYearVMT	baseYearOffNetVMT
10	2008	0	137,684,495	0
20	2008	0	17,967,179,969	0
30	2008	0	11,891,041,958	0
40	2008	0	79,229,536	0
50	2008	0	1,602,088,402	0
60	2008	0	1,722,837,641	0

[SourceTypeYear]

yearID	sourceTypeID	sourceTypePopulation
2008	11	72,411
2008	21	2,056,832
2008	31	475,013
2008	32	183,701
2008	41	1,147
2008	42	703
2008	43	7,041
2008	51	828
2008	52	27,030
2008	53	1,745
2008	54	3,531
2008	61	13,884
2008	62	11,439

[ZoneMonthHour]

monthID	zoneID	HourID	temperature	relHumidity
12	40130	1	51 0	65 0
12	40130	2	51 0	66 0
12	40130	3	50 0	68 0
12	40130	4	49 0	69 0
12	40130	5	49 0	68 0
12	40130	6	48 0	67 0
12	40130	7	48 0	68 0
12	40130	8	48 0	67 0
12	40130	9	51 0	60 0
12	40130	10	54 0	52 0
12	40130	11	57 0	45 0
12	40130	12	60 0	39 0
12	40130	13	61 0	38 0
12	40130	14	63 0	36 0
12	40130	15	64 0	35 0
12	40130	16	64 0	33 0
12	40130	17	63 0	35 0
12	40130	18	61 0	41 0
12	40130	19	59 0	47 0
12	40130	20	57 0	51 0
12	40130	21	55 0	54 0
12	40130	22	54 0	56 0
12	40130	23	54 0	59 0
12	40130	24	52 0	61 0
7	40130	24	91 0	38 0

[SourceTypeAgeDistribution]

SourceTypeID	YearID	AgeID	AgeFraction
11	2008	0	0 097639
11	2008	1	0 153685
11	2008	2	0 124466
11	2008	3	0 088073
11	2008	4	0 100239
11	2008	5	0 075075
11	2008	6	0 060726
11	2008	7	0 050223
11	2008	8	0 041801
11	2008	9	0 030675
11	2008	10	0 024748
11	2008	11	0 023188
11	2008	12	0 019341
11	2008	13	0 014557
11	2008	14	0 013518
11	2008	15	0 009462
11	2008	16	0 006967
11	2008	17	0 006863
11	2008	18	0 006447
11	2008	19	0 006239
11	2008	20	0 006551
11	2008	21	0 01019
11	2008	22	0 008734
11	2008	23	0 006239
11	2008	24	0 004456
11	2008	25	0 003183
11	2008	26	0 002274
11	2008	27	0 001624
11	2008	28	0 00116
11	2008	29	0 000829
11	2008	30	0 000829
21	2008	0	0 0586
21	2008	1	0 0898
21	2008	2	0 0909
21	2008	3	0 0847
21	2008	4	0 0786
21	2008	5	0 071
21	2008	6	0 069
21	2008	7	0 0639
21	2008	8	0 0628
21	2008	9	0 0539
21	2008	10	0 044
21	2008	11	0 0383
21	2008	12	0 0297
21	2008	13	0 0294
21	2008	14	0 023
21	2008	15	0 0187
21	2008	16	0 0147
21	2008	17	0 0129
21	2008	18	0 0106
21	2008	19	0 0088
21	2008	20	0 0066
21	2008	21	0 0056
21	2008	22	0 0043
21	2008	23	0 0036
21	2008	24	0 003014
21	2008	25	0 002523
21	2008	26	0 002113
21	2008	27	0 001769
21	2008	28	0 001481
21	2008	29	0 00124
21	2008	30	0 014461
31	2008	0	0 056148
31	2008	1	0 089988
31	2008	2	0 092916
31	2008	3	0 074872
31	2008	4	0 076932
31	2008	5	0 063022
31	2008	6	0 057914
31	2008	7	0 065833
31	2008	8	0 06192
31	2008	9	0 048255
31	2008	10	0 042507
31	2008	11	0 042947
31	2008	12	0 031419
31	2008	13	0 030928
31	2008	14	0 028403
31	2008	15	0 018757
31	2008	16	0 012649
31	2008	17	0 011138
31	2008	18	0 010056
31	2008	19	0 011393
31	2008	20	0 008919
31	2008	21	0 005793
31	2008	22	0 007552
31	2008	23	0 005668
31	2008	24	0 004272
31	2008	25	0 003242
31	2008	26	0 002452
31	2008	27	0 001919
31	2008	28	0 001515
31	2008	29	0 001206
31	2008	30	0 029464
32	2008	0	0 059763
32	2008	1	0 095684
32	2008	2	0 099128
32	2008	3	0 077088
32	2008	4	0 074825
32	2008	5	0 060022
32	2008	6	0 054098
32	2008	7	0 061759
32	2008	8	0 062509
32	2008	9	0 047608
32	2008	10	0 041619
32	2008	11	0 043153
32	2008	12	0 031489
32	2008	13	0 031005
32	2008	14	0 029429
32	2008	15	0 019239
32	2008	16	0 011888
32	2008	17	0 010528
32	2008	18	0 009695
32	2008	19	0 011148
32	2008	20	0 008679
32	2008	21	0 005441
32	2008	22	0 007091
32	2008	23	0 005301
32	2008	24	0 004014
32	2008	25	0 003071
32	2008	26	0 002418
32	2008	27	0 001846
32	2008	28	0 001426
32	2008	29	0 001119
32	2008	30	0 027915
41	2008	0	0 0544
41	2008	1	0 127
41	2008	2	0 1378
41	2008	3	0 1142
41	2008	4	0 0624
41	2008	5	0 042
41	2008	6	0 0312
41	2008	7	0 0413
41	2008	8	0 0576
41	2008	9	0 0536
41	2008	10	0 0309
41	2008	11	0 0297
41	2008	12	0 0305
41	2008	13	0 0291
41	2008	14	0 0546
41	2008	15	0 0142
41	2008	16	0 0082
41	2008	17	0 0076
41	2008	18	0 0148
41	2008	19	0 0231
41	2008	20	0 0175
41	2008	21	0 0045
41	2008	22	0 0035
41	2008	23	0 0023
41	2008	24	0 001511
41	2008	25	0 000993
41	2008	26	0 000653
41	2008	27	0 000429
41	2008	28	0 000282
41	2008	29	0 000185
41	2008	30	0 003947
42	2008	0	0 0544
42	2008	1	0 127
42	2008	2	0 1378
42	2008	3	0 1142
42	2008	4	0 0624
42	2008	5	0 042
42	2008	6	0 0312
42	2008	7	0 0413
42	2008	8	0 0576
42	2008	9	0 0536
42	2008	10	0 0309
42	2008	11	0 0297
42	2008	12	0 0305
42	2008	13	0 0291
42	2008	14	0 0546
42	2008	15	0 0142
42	2008	16	0 0082
42	2008	17	0 0076
42	2008	18	0 0148
42	2008	19	0 0231
42	2008	20	0 0175
42	2008	21	0 0045
42	2008	22	0 0035
42	2008	23	0 0023
42	2008	24	0 001511
42	2008	25	0 000993
42	2008	26	0 000653
42	2008	27	0 000429
42	2008	28	0 000282
42	2008	29	0 000185
42	2008	30	0 003947
43	2008	0	0 091684
43	2008	1	0 148636
43	2008	2	0 157944
43	2008	3	0 09869
43	2008	4	0 056752
43	2008	5	0 03343
43	2008	6	0 020118
43	2008	7	0 025423
43	2008	8	0 069363
43	2008	9	0 042739
43	2008	10	0 034531
43	2008	11	0 046342
43	2008	12	0 03293
43	2008	13	0 031173
43	2008	14	0 038212
43	2008	15	0 02194
43	2008	16	0 004822
43	2008	17	0 004813
43	2008	18	0 00647
43	2008	19	0 009141
43	2008	20	0 006922
43	2008	21	0 002448
43	2008	22	0 002714
43	2008	23	0 001715
43	2008	24	0 001077
43	2008	25	0 000681
43	2008	26	0 00043
43	2008	27	0 00029
43	2008	28	0 000183
43	2008	29	0 000115
43	2008	30	0 008269
51	2008	0	0 091611
51	2008	1	0 148519
51	2008	2	0 15782
51	2008	3	0 098612
51	2008	4	0 056707
51	2008	5	0 033404
51	2008	6	0 020103
51	2008	7	0 025403
51	2008	8	0 069309
51	2008	9	0 042705
51	2008	10	0 034504
51	2008	11	0 046306
51	2008	12	0 032904
51	2008	13	0 031602
51	2008	14	0 038601
51	2008	15	0 022601
51	2008	16	0 004899
51	2008	17	0 0049
51	2008	18	0 006499
51	2008	19	0 009099
51	2008	20	0 006797
51	2008	21	0 0024
51	2008	22	0 0027

Source TypeID	YearID	AgeID	AgeFraction
51	2008	23	0 0017
51	2008	24	0 00107
51	2008	25	0 000674
51	2008	26	0 000424
51	2008	27	0 000267
51	2008	28	0 000168
51	2008	29	0 000106
51	2008	30	0 007586
52	2008	0	0 082905
52	2008	1	0 133171
52	2008	2	0 140432
52	2008	3	0 091977
52	2008	4	0 061324
52	2008	5	0 040558
52	2008	6	0 029326
52	2008	7	0 03528
52	2008	8	0 066813
52	2008	9	0 043674
52	2008	10	0 036113
52	2008	11	0 04492
52	2008	12	0 032191
52	2008	13	0 031518
52	2008	14	0 036333
52	2008	15	0 022117
52	2008	16	0 006913
52	2008	17	0 006552
52	2008	18	0 007429
52	2008	19	0 00972
52	2008	20	0 007356
52	2008	21	0 003264
52	2008	22	0 004084
52	2008	23	0 002855
52	2008	24	0 002131
52	2008	25	0 001652
52	2008	26	0 001562
52	2008	27	0 001023
52	2008	28	0 000676
52	2008	29	0 000468
52	2008	30	0 015661
53	2008	0	0 090873
53	2008	1	0 146351
53	2008	2	0 155089
53	2008	3	0 097122
53	2008	4	0 056197
53	2008	5	0 033312
53	2008	6	0 020196
53	2008	7	0 025496
53	2008	8	0 068212
53	2008	9	0 042125
53	2008	10	0 034022
53	2008	11	0 04548
53	2008	12	0 032373
53	2008	13	0 033217
53	2008	14	0 040496
53	2008	15	0 025464
53	2008	16	0 00539
53	2008	17	0 005435

Source TypeID	YearID	AgeID	AgeFraction
53	2008	18	0 006778
53	2008	19	0 009212
53	2008	20	0 006638
53	2008	21	0 002389
53	2008	22	0 00301
53	2008	23	0 001941
53	2008	24	0 0014
53	2008	25	0 001053
53	2008	26	0 001075
53	2008	27	0 000559
53	2008	28	0 00031
53	2008	29	0 000179
53	2008	30	0 008605
54	2008	0	0 092048
54	2008	1	0 149226
54	2008	2	0 158572
54	2008	3	0 099082
54	2008	4	0 056977
54	2008	5	0 033563
54	2008	6	0 020198
54	2008	7	0 025524
54	2008	8	0 069639
54	2008	9	0 042909
54	2008	10	0 034669
54	2008	11	0 046526
54	2008	12	0 033061
54	2008	13	0 030138
54	2008	14	0 036854
54	2008	15	0 020274
54	2008	16	0 004587
54	2008	17	0 004591
54	2008	18	0 006362
54	2008	19	0 009049
54	2008	20	0 007043
54	2008	21	0 002525
54	2008	22	0 002703
54	2008	23	0 001719
54	2008	24	0 001069
54	2008	25	0 000675
54	2008	26	0 000432
54	2008	27	0 000338
54	2008	28	0 000212
54	2008	29	0 000131
54	2008	30	0 009302
61	2008	0	0 092019
61	2008	1	0 14918
61	2008	2	0 158522
61	2008	3	0 099051
61	2008	4	0 056959
61	2008	5	0 033553
61	2008	6	0 020192
61	2008	7	0 025516
61	2008	8	0 069617
61	2008	9	0 042895
61	2008	10	0 034658
61	2008	11	0 046512
61	2008	12	0 033051

Source TypeID	YearID	AgeID	AgeFraction
61	2008	13	0 031559
61	2008	14	0 037665
61	2008	15	0 022381
61	2008	16	0 004788
61	2008	17	0 004864
61	2008	18	0 006421
61	2008	19	0 008694
61	2008	20	0 006439
61	2008	21	0 002319
61	2008	22	0 00261
61	2008	23	0 001634
61	2008	24	0 001022
61	2008	25	0 000627
61	2008	26	0 000397
61	2008	27	0 000256
61	2008	28	0 000154
61	2008	29	9 03E-05
61	2008	30	0 006355
62	2008	0	0 091775
62	2008	1	0 148783
62	2008	2	0 158101
62	2008	3	0 098788
62	2008	4	0 056808
62	2008	5	0 033464
62	2008	6	0 020138
62	2008	7	0 025448
62	2008	8	0 069432
62	2008	9	0 042781
62	2008	10	0 034566
62	2008	11	0 046388
62	2008	12	0 032963
62	2008	13	0 031586
62	2008	14	0 03824
62	2008	15	0 022517
62	2008	16	0 004855
62	2008	17	0 004882
62	2008	18	0 006464
62	2008	19	0 00894
62	2008	20	0 006652
62	2008	21	0 002363
62	2008	22	0 002658
62	2008	23	0 00167
62	2008	24	0 001049
62	2008	25	0 000654
62	2008	26	0 000412
62	2008	27	0 000262
62	2008	28	0 000162
62	2008	29	9 96E-05
62	2008	30	0 007099

[IMCoverage]

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
101	4	4013	2008	21	1	3	1967	1980	1	13	N	95 8845
101	4	4013	2008	21	1	6	1981	1995	2	33	N	95 8845
101	4	4013	2008	21	1	10	1996	2002	2	51	N	95 8845
101	4	4013	2008	31	1	3	1967	1980	1	13	N	95 8845
101	4	4013	2008	31	1	6	1981	1995	2	33	N	95 8845
101	4	4013	2008	31	1	10	1996	2002	2	51	N	95 8845
101	4	4013	2008	32	1	3	1967	1980	1	13	N	95 8845
101	4	4013	2008	32	1	6	1981	1995	2	33	N	95 8845
101	4	4013	2008	32	1	10	1996	2002	2	51	N	95 8845
101	4	4013	2008	52	1	3	1967	2002	1	13	N	95 8845
102	4	4013	2008	21	1	3	1967	1980	1	13	N	95 8845
102	4	4013	2008	21	1	6	1981	1995	2	33	N	95 8845
102	4	4013	2008	21	1	10	1996	2002	2	51	N	95 8845
102	4	4013	2008	31	1	3	1967	1980	1	13	N	95 8845
102	4	4013	2008	31	1	6	1981	1995	2	33	N	95 8845
102	4	4013	2008	31	1	10	1996	2002	2	51	N	95 8845
102	4	4013	2008	32	1	3	1967	1980	1	13	N	95 8845
102	4	4013	2008	32	1	6	1981	1995	2	33	N	95 8845
102	4	4013	2008	32	1	10	1996	2002	2	51	N	95 8845
102	4	4013	2008	52	1	3	1967	2002	1	13	N	95 8845
112	4	4013	2008	21	1	8	1996	2002	2	43	N	95 8845
112	4	4013	2008	21	1	9	1981	1995	1	44	N	95 8845
112	4	4013	2008	31	1	8	1996	2002	2	43	N	95 8845
112	4	4013	2008	31	1	9	1981	1995	1	44	N	95 8845
112	4	4013	2008	32	1	8	1996	2002	2	43	N	95 8845
112	4	4013	2008	32	1	9	1981	1995	1	44	N	95 8845
112	4	4013	2008	52	1	7	1967	2002	1	41	N	95 8845
113	4	4013	2008	21	1	8	1996	2002	2	43	N	95 8845
113	4	4013	2008	21	1	9	1981	1995	1	44	N	95 8845
113	4	4013	2008	31	1	8	1996	2002	2	43	N	95 8845
113	4	4013	2008	31	1	9	1981	1995	1	44	N	95 8845
113	4	4013	2008	32	1	8	1996	2002	2	43	N	95 8845
113	4	4013	2008	32	1	9	1981	1995	1	44	N	95 8845
113	4	4013	2008	52	1	7	1967	2002	1	41	N	95 8845
201	4	4013	2008	21	1	3	1967	1980	1	13	N	95 8845
201	4	4013	2008	21	1	6	1981	1995	2	33	N	95 8845
201	4	4013	2008	21	1	10	1996	2002	2	51	N	95 8845
201	4	4013	2008	31	1	3	1967	1980	1	13	N	95 8845
201	4	4013	2008	31	1	6	1981	1995	2	33	N	95 8845
201	4	4013	2008	31	1	10	1996	2002	2	51	N	95 8845
201	4	4013	2008	32	1	3	1967	1980	1	13	N	95 8845
201	4	4013	2008	32	1	6	1981	1995	2	33	N	95 8845
201	4	4013	2008	32	1	10	1996	2002	2	51	N	95 8845
201	4	4013	2008	52	1	3	1967	2002	1	13	N	95 8845
202	4	4013	2008	21	1	3	1967	1980	1	13	N	95 8845
202	4	4013	2008	21	1	6	1981	1995	2	33	N	95 8845
202	4	4013	2008	21	1	10	1996	2002	2	51	N	95 8845
202	4	4013	2008	31	1	3	1967	1980	1	13	N	95 8845
202	4	4013	2008	31	1	6	1981	1995	2	33	N	95 8845
202	4	4013	2008	31	1	10	1996	2002	2	51	N	95 8845
202	4	4013	2008	32	1	3	1967	1980	1	13	N	95 8845
202	4	4013	2008	32	1	6	1981	1995	2	33	N	95 8845
202	4	4013	2008	32	1	10	1996	2002	2	51	N	95 8845
202	4	4013	2008	52	1	3	1967	2002	1	13	N	95 8845
301	4	4013	2008	21	1	3	1967	1980	1	13	N	95 8845
301	4	4013	2008	21	1	6	1981	1995	2	33	N	95 8845
301	4	4013	2008	21	1	10	1996	2002	2	51	N	95 8845
301	4	4013	2008	31	1	3	1967	1980	1	13	N	95 8845
301	4	4013	2008	31	1	6	1981	1995	2	33	N	95 8845
301	4	4013	2008	31	1	10	1996	2002	2	51	N	95 8845
301	4	4013	2008	32	1	3	1967	1980	1	13	N	95 8845
301	4	4013	2008	32	1	6	1981	1995	2	33	N	95 8845
301	4	4013	2008	32	1	10	1996	2002	2	51	N	95 8845
301	4	4013	2008	52	1	3	1967	2002	1	13	N	95 8845
302	4	4013	2008	21	1	3	1967	1980	1	13	N	95 8845
302	4	4013	2008	21	1	6	1981	1995	2	33	N	95 8845
302	4	4013	2008	21	1	10	1996	2002	2	51	N	95 8845
302	4	4013	2008	31	1	3	1967	1980	1	13	N	95 8845
302	4	4013	2008	31	1	6	1981	1995	2	33	N	95 8845
302	4	4013	2008	31	1	10	1996	2002	2	51	N	95 8845
302	4	4013	2008	32	1	3	1967	1980	1	13	N	95 8845
302	4	4013	2008	32	1	6	1981	1995	2	33	N	95 8845
302	4	4013	2008	32	1	10	1996	2002	2	51	N	95 8845
302	4	4013	2008	52	1	3	1967	2002	1	13	N	95 8845
101	4	4013	2008	21	1	103	1967	1980	1	13	Y	57 62
101	4	4013	2008	21	1	106	1981	1995	2	31	Y	64 12
101	4	4013	2008	21	1	110	1996	2004	2	51	Y	90 04
101	4	4013	2008	31	1	103	1967	1980	1	13	Y	57 62
101	4	4013	2008	31	1	106	1981	1995	2	31	Y	64 12
101	4	4013	2008	31	1	110	1996	2004	2	51	Y	90 04
101	4	4013	2008	32	1	103	1967	1980	1	13	Y	57 62
101	4	4013	2008	32	1	106	1981	1995	2	31	Y	64 12
101	4	4013	2008	32	1	110	1996	2004	2	51	Y	90 04
101	4	4013	2008	52	1	103	1967	2004	1	13	Y	87 20
102	4	4013	2008	21	1	103	1967	1980	1	13	Y	57 62
102	4	4013	2008	21	1	106	1981	1995	2	31	Y	64 12

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
102	4	4013	2008	21	1	110	1996	2004	2	51	Y	90 04
102	4	4013	2008	31	1	103	1967	1980	1	13	Y	57 62
102	4	4013	2008	31	1	106	1981	1995	2	31	Y	64 12
102	4	4013	2008	31	1	110	1996	2004	2	51	Y	90 04
102	4	4013	2008	32	1	103	1967	1980	1	13	Y	57 62
102	4	4013	2008	32	1	106	1981	1995	2	31	Y	64 12
102	4	4013	2008	32	1	110	1996	2004	2	51	Y	90 04
102	4	4013	2008	52	1	103	1967	2004	1	13	Y	87 20
112	4	4013	2008	21	1	108	1996	2004	2	43	Y	83 81
112	4	4013	2008	21	1	109	1981	1995	2	44	Y	64 12
112	4	4013	2008	31	1	108	1996	2004	2	43	Y	83 81
112	4	4013	2008	31	1	109	1981	1995	2	44	Y	64 12
112	4	4013	2008	32	1	108	1996	2004	2	43	Y	83 81
112	4	4013	2008	32	1	109	1981	1995	2	44	Y	64 12
112	4	4013	2008	52	1	107	1981	2004	1	41	Y	86 29
113	4	4013	2008	21	1	108	1996	2004	2	43	Y	83 81
113	4	4013	2008	21	1	109	1981	1995	2	44	Y	64 12
113	4	4013	2008	31	1	108	1996	2004	2	43	Y	83 81
113	4	4013	2008	31	1	109	1981	1995	2	44	Y	64 12
113	4	4013	2008	32	1	108	1996	2004	2	43	Y	83 81
113	4	4013	2008	32	1	109	1981	1995	2	44	Y	64 12
113	4	4013	2008	52	1	107	1981	2004	1	41	Y	86 29
201	4	4013	2008	21	1	103	1967	1980	1	13	Y	57 62
201	4	4013	2008	21	1	106	1981	1995	2	31	Y	64 12
201	4	4013	2008	21	1	110	1996	2004	2	51	Y	90 04
201	4	4013	2008	31	1	103	1967	1980	1	13	Y	57 62
201	4	4013	2008	31	1	106	1981	1995	2	31	Y	64 12
201	4	4013	2008	31	1	110	1996	2004	2	51	Y	90 04
201	4	4013	2008	32	1	103	1967	1980	1	13	Y	57 62
201	4	4013	2008	32	1	106	1981	1995	2	31	Y	64 12
201	4	4013	2008	32	1	110	1996	2004	2	51	Y	90 04
201	4	4013	2008	52	1	103	1967	2004	1	13	Y	87 20
202	4	4013	2008	21	1	103	1967	1980	1	13	Y	57 62
202	4	4013	2008	21	1	106	1981	1995	2	31	Y	64 12
202	4	4013	2008	21	1	110	1996	2004	2	51	Y	90 04
202	4	4013	2008	31	1	103	1967	1980	1	13	Y	57 62
202	4	4013	2008	31	1	106	1981	1995	2	31	Y	64 12
202	4	4013	2008	31	1	110	1996	2004	2	51	Y	90 04
202	4	4013	2008	32	1	103	1967	1980	1	13	Y	57 62
202	4	4013	2008	32	1	106	1981	1995	2	31	Y	64 12
202	4	4013	2008	32	1	110	1996	2004	2	51	Y	90 04
202	4	4013	2008	52	1	103	1967	2004	1	13	Y	87 20
301	4	4013	2008	21	1	103	1967	1980	1	13	Y	57 62
301	4	4013	2008	21	1	106	1981	1995	2	31	Y	64 12
301	4	4013	2008	21	1	110	1996	2004	2	51	Y	90 04
301	4	4013	2008	31	1	103	1967	1980	1	13	Y	57 62
301	4	4013	2008	31	1	106	1981	1995	2	31	Y	64 12
301	4	4013	2008	31	1	110	1996	2004	2	51	Y	90 04
301	4	4013	2008	32	1	103	1967	1980	1	13	Y	57 62
301	4	4013	2008	32	1	106	1981	1995	2	31	Y	64 12
301	4	4013	2008	32	1	110	1996	2004	2	51	Y	90 04
301	4	4013	2008	52	1	103	1967	2004	1	13	Y	87 20
302	4	4013	2008	21	1	103	1967	1980	1	13	Y	57 62
302	4	4013	2008	21	1	106	1981	1995	2	31	Y	64 12
302	4	4013	2008	21	1	110	1996	2004	2	51	Y	90 04
302	4	4013	2008	31	1	103	1967	1980	1	13	Y	57 62
302	4	4013	2008	31	1	106	1981	1995	2	31	Y	64 12
302	4	4013	2008	31	1	110	1996	2004	2	51	Y	90 04
302	4	4013	2008	32	1	103	1967	1980	1	13	Y	57 62
302	4	4013	2008	32	1	106	1981	1995	2	31	Y	64 12
302	4	4013	2008	32	1	110	1996	2004	2	51	Y	90 04
302	4	4013	2008	52	1	103	1967	2004	1	13	Y	87 20

[RoadType]

roadTypeID	rampFraction
2	0 045682
4	0 083288

[RoadTypeDistribution]

sourceTypeID	roadTypeID	roadTypeVMTFraction
11	1	0 00000
11	2	0 02735
11	3	0 05584
11	4	0 32284
11	5	0 59397
21	1	0 00000
21	2	0 03230
21	3	0 05044
21	4	0 31932
21	5	0 59794
31	1	0 00000
31	2	0 03350
31	3	0 05453
31	4	0 31647
31	5	0 59550
32	1	0 00000
32	2	0 03350
32	3	0 05453
32	4	0 31647
32	5	0 59550
41	1	0 00000
41	2	0 03009
41	3	0 06747
41	4	0 34506
41	5	0 55738
42	1	0 00000
42	2	0 03009
42	3	0 06747
42	4	0 34506
42	5	0 55738
43	1	0 00000
43	2	0 03009
43	3	0 06747
43	4	0 34506
43	5	0 55738
51	1	0 00000
51	2	0 04027
51	3	0 03530
51	4	0 49257
51	5	0 43186
52	1	0 00000
52	2	0 04027
52	3	0 03530
52	4	0 49257
52	5	0 43186
53	1	0 00000
53	2	0 04027
53	3	0 03530
53	4	0 49257
53	5	0 43186
54	1	0 00000
54	2	0 04027
54	3	0 03530
54	4	0 49257
54	5	0 43186
61	1	0 00000
61	2	0 07566
61	3	0 04041
61	4	0 50755
61	5	0 37638
62	1	0 00000
62	2	0 07566
62	3	0 04041
62	4	0 50755
62	5	0 37638

[MonthVMTFraction]

sourceTypeID	isLeapYear	monthID	monthVMTFraction
11	Y	12	0 083229
21	Y	12	0 083229
31	Y	12	0 083229
32	Y	12	0 083229
41	Y	12	0 083229
42	Y	12	0 083229
43	Y	12	0 083229
51	Y	12	0 083229
52	Y	12	0 083229
53	Y	12	0 083229
54	Y	12	0 083229
61	Y	12	0 083229
62	Y	12	0 083229

[DayVMTFraction]

Source TypeID	Month ID	Road TypeID	dayID	Day VMTFraction
11	12	1	5	0 767488
21	12	1	5	0 767488
31	12	1	5	0 767488
32	12	1	5	0 767488
41	12	1	5	0 767488
42	12	1	5	0 767488
43	12	1	5	0 767488
51	12	1	5	0 767488
52	12	1	5	0 767488
53	12	1	5	0 767488
54	12	1	5	0 767488
61	12	1	5	0 767488
62	12	1	5	0 767488
11	12	2	5	0 768458
21	12	2	5	0 768458
31	12	2	5	0 768458
32	12	2	5	0 768458
41	12	2	5	0 768458
42	12	2	5	0 768458
43	12	2	5	0 768458
51	12	2	5	0 768458
52	12	2	5	0 768458
53	12	2	5	0 768458
54	12	2	5	0 768458
61	12	2	5	0 768458
62	12	2	5	0 768458
11	12	3	5	0 766507
21	12	3	5	0 766507
31	12	3	5	0 766507
32	12	3	5	0 766507
41	12	3	5	0 766507
42	12	3	5	0 766507
43	12	3	5	0 766507
51	12	3	5	0 766507
52	12	3	5	0 766507
53	12	3	5	0 766507
54	12	3	5	0 766507
61	12	3	5	0 766507
62	12	3	5	0 766507
11	12	4	5	0 768458
21	12	4	5	0 768458
31	12	4	5	0 768458
32	12	4	5	0 768458
41	12	4	5	0 768458
42	12	4	5	0 768458
43	12	4	5	0 768458

Source TypeID	Month ID	Road TypeID	dayID	Day VMTFraction
51	12	4	5	0 768458
52	12	4	5	0 768458
53	12	4	5	0 768458
54	12	4	5	0 768458
61	12	4	5	0 768458
62	12	4	5	0 768458
11	12	5	5	0 766507
21	12	5	5	0 766507
31	12	5	5	0 766507
32	12	5	5	0 766507
41	12	5	5	0 766507
42	12	5	5	0 766507
43	12	5	5	0 766507
51	12	5	5	0 766507
52	12	5	5	0 766507
53	12	5	5	0 766507
54	12	5	5	0 766507
61	12	5	5	0 766507
62	12	5	5	0 766507
11	12	1	2	0 232512
21	12	1	2	0 232512
31	12	1	2	0 232512
32	12	1	2	0 232512
41	12	1	2	0 232512
42	12	1	2	0 232512
43	12	1	2	0 232512
51	12	1	2	0 232512
52	12	1	2	0 232512
53	12	1	2	0 232512
54	12	1	2	0 232512
61	12	1	2	0 232512
62	12	1	2	0 232512
11	12	2	2	0 231542
21	12	2	2	0 231542
31	12	2	2	0 231542
32	12	2	2	0 231542
41	12	2	2	0 231542
42	12	2	2	0 231542
43	12	2	2	0 231542
51	12	2	2	0 231542
52	12	2	2	0 231542
53	12	2	2	0 231542
54	12	2	2	0 231542
61	12	2	2	0 231542
62	12	2	2	0 231542
11	12	3	2	0 233493

Source TypeID	Month ID	Road TypeID	dayID	Day VMTFraction
21	12	3	2	0 233493
31	12	3	2	0 233493
32	12	3	2	0 233493
41	12	3	2	0 233493
42	12	3	2	0 233493
43	12	3	2	0 233493
51	12	3	2	0 233493
52	12	3	2	0 233493
53	12	3	2	0 233493
54	12	3	2	0 233493
61	12	3	2	0 233493
62	12	3	2	0 233493
11	12	4	2	0 231542
21	12	4	2	0 231542
31	12	4	2	0 231542
32	12	4	2	0 231542
41	12	4	2	0 231542
42	12	4	2	0 231542
43	12	4	2	0 231542
51	12	4	2	0 231542
52	12	4	2	0 231542
53	12	4	2	0 231542
54	12	4	2	0 231542
61	12	4	2	0 231542
62	12	4	2	0 231542
11	12	5	2	0 233493
21	12	5	2	0 233493
31	12	5	2	0 233493
32	12	5	2	0 233493
41	12	5	2	0 233493
42	12	5	2	0 233493
43	12	5	2	0 233493
51	12	5	2	0 233493
52	12	5	2	0 233493
53	12	5	2	0 233493
54	12	5	2	0 233493
61	12	5	2	0 233493
62	12	5	2	0 233493

[HourVMTFraction] (SourceTypeID 21: Passenger Car)

Source TypeID	Road TypeID	dayID	hourID	hourVMT Fraction
21	1	5	1	0 007957
21	1	5	2	0 005448
21	1	5	3	0 004973
21	1	5	4	0 006014
21	1	5	5	0 013468
21	1	5	6	0 034281
21	1	5	7	0 054676
21	1	5	8	0 06466
21	1	5	9	0 060292
21	1	5	10	0 052697
21	1	5	11	0 050973
21	1	5	12	0 054873
21	1	5	13	0 057626
21	1	5	14	0 059009
21	1	5	15	0 064762
21	1	5	16	0 06924
21	1	5	17	0 070039
21	1	5	18	0 07009
21	1	5	19	0 05904
21	1	5	20	0 04192
21	1	5	21	0 033428
21	1	5	22	0 029157
21	1	5	23	0 02144
21	1	5	24	0 013936
21	2	5	1	0 009807
21	2	5	2	0 006923
21	2	5	3	0 00651
21	2	5	4	0 007961
21	2	5	5	0 017302
21	2	5	6	0 042783
21	2	5	7	0 060321
21	2	5	8	0 059377
21	2	5	9	0 057361
21	2	5	10	0 055026
21	2	5	11	0 052104
21	2	5	12	0 05478
21	2	5	13	0 05683
21	2	5	14	0 059985
21	2	5	15	0 065538
21	2	5	16	0 065523
21	2	5	17	0 061668
21	2	5	18	0 059173
21	2	5	19	0 054281
21	2	5	20	0 040837
21	2	5	21	0 033031
21	2	5	22	0 030836
21	2	5	23	0 024921
21	2	5	24	0 017121
21	3	5	1	0 006081
21	3	5	2	0 003952
21	3	5	3	0 003413
21	3	5	4	0 004039
21	3	5	5	0 009578
21	3	5	6	0 025656
21	3	5	7	0 04895
21	3	5	8	0 07002
21	3	5	9	0 063264
21	3	5	10	0 050335
21	3	5	11	0 049826
21	3	5	12	0 054967
21	3	5	13	0 058433
21	3	5	14	0 058019
21	3	5	15	0 063976
21	3	5	16	0 073011
21	3	5	17	0 07853
21	3	5	18	0 081166
21	3	5	19	0 063868
21	3	5	20	0 043018
21	3	5	21	0 033831
21	3	5	22	0 027454
21	3	5	23	0 017909
21	3	5	24	0 010705
21	4	5	1	0 009807
21	4	5	2	0 006923
21	4	5	3	0 00651
21	4	5	4	0 007961
21	4	5	5	0 017302
21	4	5	6	0 042783
21	4	5	7	0 060321
21	4	5	8	0 059377
21	4	5	9	0 057361
21	4	5	10	0 055026
21	4	5	11	0 052104
21	4	5	12	0 05478
21	4	5	13	0 05683
21	4	5	14	0 059985
21	4	5	15	0 065538
21	4	5	16	0 065523
21	4	5	17	0 061668
21	4	5	18	0 059173
21	4	5	19	0 054281
21	4	5	20	0 040837
21	4	5	21	0 033031
21	4	5	22	0 030836
21	4	5	23	0 024921
21	4	5	24	0 017121
21	5	5	1	0 006081
21	5	5	2	0 003952
21	5	5	3	0 003413
21	5	5	4	0 004039
21	5	5	5	0 009578
21	5	5	6	0 025656
21	5	5	7	0 04895
21	5	5	8	0 07002
21	5	5	9	0 063264
21	5	5	10	0 050335
21	5	5	11	0 049826
21	5	5	12	0 054967
21	5	5	13	0 058433
21	5	5	14	0 058019
21	5	5	15	0 063976
21	5	5	16	0 073011
21	5	5	17	0 07853
21	5	5	18	0 081166
21	5	5	19	0 063868
21	5	5	20	0 043018
21	5	5	21	0 033831
21	5	5	22	0 027454
21	5	5	23	0 017909
21	5	5	24	0 010705
21	1	2	1	0 020872
21	1	2	2	0 014804
21	1	2	3	0 013016
21	1	2	4	0 010079
21	1	2	5	0 011715
21	1	2	6	0 018691
21	1	2	7	0 027033
21	1	2	8	0 033174
21	1	2	9	0 040089
21	1	2	10	0 048519
21	1	2	11	0 05524
21	1	2	12	0 060009
21	1	2	13	0 064796
21	1	2	14	0 06555
21	1	2	15	0 064719
21	1	2	16	0 064355
21	1	2	17	0 064852
21	1	2	18	0 064713
21	1	2	19	0 061678
21	1	2	20	0 050477
21	1	2	21	0 043519
21	1	2	22	0 040777
21	1	2	23	0 035718
21	1	2	24	0 025605
21	2	2	1	0 020431
21	2	2	2	0 014508
21	2	2	3	0 012577
21	2	2	4	0 009828
21	2	2	5	0 011013
21	2	2	6	0 01751
21	2	2	7	0 025995
21	2	2	8	0 031456
21	2	2	9	0 038799
21	2	2	10	0 047714
21	2	2	11	0 054712
21	2	2	12	0 060251
21	2	2	13	0 065575
21	2	2	14	0 066506
21	2	2	15	0 065746
21	2	2	16	0 065312
21	2	2	17	0 065948
21	2	2	18	0 066767
21	2	2	19	0 064137
21	2	2	20	0 050196
21	2	2	21	0 042573
21	2	2	22	0 040589
21	2	2	23	0 036012
21	2	2	24	0 025845
21	3	2	1	0 021315
21	3	2	2	0 015101
21	3	2	3	0 013457
21	3	2	4	0 010331
21	3	2	5	0 01242
21	3	2	6	0 019876
21	3	2	7	0 028075
21	3	2	8	0 034899
21	3	2	9	0 041383
21	3	2	10	0 049326
21	3	2	11	0 05577
21	3	2	12	0 059766
21	3	2	13	0 064014
21	3	2	14	0 064591
21	3	2	15	0 063689
21	3	2	16	0 063394
21	3	2	17	0 063753
21	3	2	18	0 062652
21	3	2	19	0 05921
21	3	2	20	0 050759
21	3	2	21	0 044469
21	3	2	22	0 040966
21	3	2	23	0 035423
21	3	2	24	0 025364
21	4	2	1	0 020431
21	4	2	2	0 014508
21	4	2	3	0 012577
21	4	2	4	0 009828
21	4	2	5	0 011013
21	4	2	6	0 01751
21	4	2	7	0 025995
21	4	2	8	0 031456
21	4	2	9	0 038799
21	4	2	10	0 047714
21	4	2	11	0 054712
21	4	2	12	0 060251
21	4	2	13	0 065575
21	4	2	14	0 066506
21	4	2	15	0 065746
21	4	2	16	0 065312
21	4	2	17	0 065948
21	4	2	18	0 066767
21	4	2	19	0 064137
21	4	2	20	0 050196
21	4	2	21	0 042573
21	4	2	22	0 040589
21	4	2	23	0 036012
21	4	2	24	0 025845
21	5	2	1	0 021315
21	5	2	2	0 015101
21	5	2	3	0 013457
21	5	2	4	0 010331
21	5	2	5	0 01242
21	5	2	6	0 019876
21	5	2	7	0 028075
21	5	2	8	0 034899
21	5	2	9	0 041383
21	5	2	10	0 049326
21	5	2	11	0 05577
21	5	2	12	0 059766
21	5	2	13	0 064014
21	5	2	14	0 064591
21	5	2	15	0 063689
21	5	2	16	0 063394
21	5	2	17	0 063753
21	5	2	18	0 062652
21	5	2	19	0 05921
21	5	2	20	0 050759
21	5	2	21	0 044469
21	5	2	22	0 040966
21	5	2	23	0 035423
21	5	2	24	0 025364

[AvgSpeedDistribution] (SourceTypeID 21: Passenger Car and RoadTypeID 2: Rural Restricted Access)

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	15	1	0
21	2	15	2	0
21	2	15	3	0
21	2	15	4	0
21	2	15	5	0
21	2	15	6	0 01422
21	2	15	7	0 053944
21	2	15	8	0 132021
21	2	15	9	0 214344
21	2	15	10	0 212627
21	2	15	11	0 017683
21	2	15	12	0 090462
21	2	15	13	0 057688
21	2	15	14	0 062161
21	2	15	15	0 062758
21	2	15	16	0 082091
21	2	25	1	0
21	2	25	2	0
21	2	25	3	0
21	2	25	4	0
21	2	25	5	0
21	2	25	6	0 01422
21	2	25	7	0 053944
21	2	25	8	0 132021
21	2	25	9	0 214344
21	2	25	10	0 212627
21	2	25	11	0 017683
21	2	25	12	0 090462
21	2	25	13	0 057688
21	2	25	14	0 062161
21	2	25	15	0 062758
21	2	25	16	0 082091
21	2	35	1	0
21	2	35	2	0
21	2	35	3	0
21	2	35	4	0
21	2	35	5	0
21	2	35	6	0 01422
21	2	35	7	0 053944
21	2	35	8	0 132021
21	2	35	9	0 214344
21	2	35	10	0 212627
21	2	35	11	0 017683
21	2	35	12	0 090462
21	2	35	13	0 057688
21	2	35	14	0 062161
21	2	35	15	0 062758
21	2	35	16	0 082091
21	2	45	1	0
21	2	45	2	0
21	2	45	3	0
21	2	45	4	0
21	2	45	5	0
21	2	45	6	0 01422
21	2	45	7	0 053944
21	2	45	8	0 132021
21	2	45	9	0 214344
21	2	45	10	0 212627
21	2	45	11	0 017683
21	2	45	12	0 090462
21	2	45	13	0 057688
21	2	45	14	0 062161
21	2	45	15	0 062758
21	2	45	16	0 082091
21	2	55	1	0
21	2	55	2	0
21	2	55	3	0
21	2	55	4	0
21	2	55	5	0
21	2	55	6	0 01422
21	2	55	7	0 053944
21	2	55	8	0 132021
21	2	55	9	0 214344
21	2	55	10	0 212627
21	2	55	11	0 017683
21	2	55	12	0 090462
21	2	55	13	0 057688
21	2	55	14	0 062161
21	2	55	15	0 062758
21	2	55	16	0 082091
21	2	65	1	0
21	2	65	2	0
21	2	65	3	0
21	2	65	4	0
21	2	65	5	0
21	2	65	6	0 01422
21	2	65	7	0 053944
21	2	65	8	0 132021
21	2	65	9	0 214344
21	2	65	10	0 212627
21	2	65	11	0 017683
21	2	65	12	0 090462
21	2	65	13	0 057688
21	2	65	14	0 062161
21	2	65	15	0 062758
21	2	65	16	0 082091
21	2	75	1	0
21	2	75	2	0
21	2	75	3	0
21	2	75	4	0
21	2	75	5	0
21	2	75	6	0 001175
21	2	75	7	0 024471
21	2	75	8	0
21	2	75	9	0 028037
21	2	75	10	0 157024
21	2	75	11	0 229013
21	2	75	12	0 175926
21	2	75	13	0 121128
21	2	75	14	0 0313
21	2	75	15	0 098442
21	2	75	16	0 133484
21	2	85	1	0
21	2	85	2	0
21	2	85	3	0
21	2	85	4	0
21	2	85	5	0
21	2	85	6	0 001175
21	2	85	7	0 024471
21	2	85	8	0
21	2	85	9	0 028037
21	2	85	10	0 157024
21	2	85	11	0 229013
21	2	85	12	0 175926
21	2	85	13	0 121128
21	2	85	14	0 0313
21	2	85	15	0 098442
21	2	85	16	0 133484
21	2	95	1	0
21	2	95	2	0
21	2	95	3	0
21	2	95	4	0
21	2	95	5	0
21	2	95	6	0 001175
21	2	95	7	0 024471
21	2	95	8	0
21	2	95	9	0 028037
21	2	95	10	0 157024
21	2	95	11	0 229013
21	2	95	12	0 175926
21	2	95	13	0 121128
21	2	95	14	0 0313
21	2	95	15	0 098442
21	2	95	16	0 133484
21	2	105	1	0
21	2	105	2	0
21	2	105	3	0
21	2	105	4	0
21	2	105	5	0
21	2	105	6	0
21	2	105	7	0
21	2	105	8	0 031691
21	2	105	9	0 07915
21	2	105	10	0 241444
21	2	105	11	0 173603
21	2	105	12	0 036762
21	2	105	13	0 09423
21	2	105	14	0 147891
21	2	105	15	0 079495
21	2	105	16	0 115733
21	2	115	1	0
21	2	115	2	0
21	2	115	3	0
21	2	115	4	0
21	2	115	5	0
21	2	115	6	0
21	2	115	7	0
21	2	115	8	0 031691
21	2	115	9	0 07915
21	2	115	10	0 241444
21	2	115	11	0 173603
21	2	115	12	0 036762
21	2	115	13	0 09423
21	2	115	14	0 147891
21	2	115	15	0 079495
21	2	115	16	0 115733
21	2	125	1	0
21	2	125	2	0
21	2	125	3	0
21	2	125	4	0
21	2	125	5	0
21	2	125	6	0
21	2	125	7	0
21	2	125	8	0 031691
21	2	125	9	0 07915
21	2	125	10	0 241444
21	2	125	11	0 173603
21	2	125	12	0 036762
21	2	125	13	0 09423
21	2	125	14	0 147891
21	2	125	15	0 079495
21	2	125	16	0 115733
21	2	135	1	0
21	2	135	2	0
21	2	135	3	0
21	2	135	4	0
21	2	135	5	0
21	2	135	6	0
21	2	135	7	0
21	2	135	8	0 031691
21	2	135	9	0 07915
21	2	135	10	0 241444
21	2	135	11	0 173603
21	2	135	12	0 036762
21	2	135	13	0 09423
21	2	135	14	0 147891
21	2	135	15	0 079495
21	2	135	16	0 115733
21	2	145	1	0
21	2	145	2	0
21	2	145	3	0
21	2	145	4	0
21	2	145	5	0
21	2	145	6	0
21	2	145	7	0
21	2	145	8	0 031691
21	2	145	9	0 07915
21	2	145	10	0 241444
21	2	145	11	0 173603
21	2	145	12	0 036762
21	2	145	13	0 09423
21	2	145	14	0 147891
21	2	145	15	0 079495
21	2	145	16	0 115733
21	2	155	1	0
21	2	155	2	0
21	2	155	3	0
21	2	155	4	0
21	2	155	5	0
21	2	155	6	0
21	2	155	7	0
21	2	155	8	0 031691
21	2	155	9	0 07915
21	2	155	10	0 241444
21	2	155	11	0 173603
21	2	155	12	0 036762
21	2	155	13	0 09423
21	2	155	14	0 147891
21	2	155	15	0 079495
21	2	155	16	0 115733

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	165	1	0
21	2	165	2	0
21	2	165	3	0
21	2	165	4	0
21	2	165	5	0
21	2	165	6	0
21	2	165	7	0
21	2	165	8	0
21	2	165	9	0
21	2	165	10	0
21	2	165	11	0
21	2	165	12	0 03945
21	2	165	13	0 172863
21	2	165	14	0 286538
21	2	165	15	0 263991
21	2	165	16	0 237157
21	2	175	1	0
21	2	175	2	0
21	2	175	3	0
21	2	175	4	0
21	2	175	5	0
21	2	175	6	0
21	2	175	7	0
21	2	175	8	0
21	2	175	9	0
21	2	175	10	0
21	2	175	11	0
21	2	175	12	0 03945
21	2	175	13	0 172863
21	2	175	14	0 286538
21	2	175	15	0 263991
21	2	175	16	0 237157
21	2	185	1	0
21	2	185	2	0
21	2	185	3	0
21	2	185	4	0
21	2	185	5	0
21	2	185	6	0
21	2	185	7	0
21	2	185	8	0
21	2	185	9	0
21	2	185	10	0
21	2	185	11	0
21	2	185	12	0 03945
21	2	185	13	0 172863
21	2	185	14	0 286538
21	2	185	15	0 263991
21	2	185	16	0 237157
21	2	195	1	0
21	2	195	2	0
21	2	195	3	0
21	2	195	4	0
21	2	195	5	0
21	2	195	6	0 01422
21	2	195	7	0 053944
21	2	195	8	0 132021
21	2	195	9	0 214344
21	2	195	10	0 212627
21	2	195	11	0 017683
21	2	195	12	0 090462
21	2	195	13	0 057688
21	2	195	14	0 062161
21	2	195	15	0 062758
21	2	195	16	0 082091
21	2	205	1	0
21	2	205	2	0
21	2	205	3	0
21	2	205	4	0
21	2	205	5	0
21	2	205	6	0 01422
21	2	205	7	0 053944
21	2	205	8	0 132021
21	2	205	9	0 214344
21	2	205	10	0 212627
21	2	205	11	0 017683
21	2	205	12	0 090462
21	2	205	13	0 057688
21	2	205	14	0 062161
21	2	205	15	0 062758
21	2	205	16	0 082091
21	2	215	1	0
21	2	215	2	0
21	2	215	3	0
21	2	215	4	0
21	2	215	5	0
21	2	215	6	0 01422
21	2	215	7	0 053944
21	2	215	8	0 132021
21	2	215	9	0 214344
21	2	215	10	0 212627
21	2	215	11	0 017683
21	2	215	12	0 090462
21	2	215	13	0 057688
21	2	215	14	0 062161
21	2	215	15	0 062758
21	2	215	16	0 082091
21	2	225	1	0
21	2	225	2	0
21	2	225	3	0
21	2	225	4	0
21	2	225	5	0
21	2	225	6	0 01422
21	2	225	7	0 053944
21	2	225	8	0 132021
21	2	225	9	0 214344
21	2	225	10	0 212627
21	2	225	11	0 017683
21	2	225	12	0 090462
21	2	225	13	0 057688
21	2	225	14	0 062161
21	2	225	15	0 062758
21	2	225	16	0 082091
21	2	235	1	0
21	2	235	2	0
21	2	235	3	0
21	2	235	4	0
21	2	235	5	0
21	2	235	6	0 01422
21	2	235	7	0 053944
21	2	235	8	0 132021
21	2	235	9	0 214344
21	2	235	10	0 212627
21	2	235	11	0 017683
21	2	235	12	0 090462
21	2	235	13	0 057688
21	2	235	14	0 062161
21	2	235	15	0 062758
21	2	235	16	0 082091
21	2	245	1	0
21	2	245	2	0
21	2	245	3	0
21	2	245	4	0
21	2	245	5	0
21	2	245	6	0 01422
21	2	245	7	0 053944
21	2	245	8	0 132021
21	2	245	9	0 214344
21	2	245	10	0 212627
21	2	245	11	0 017683
21	2	245	12	0 090462
21	2	245	13	0 057688
21	2	245	14	0 062161
21	2	245	15	0 062758
21	2	245	16	0 082091
21	2	12	1	0
21	2	12	2	0
21	2	12	3	0
21	2	12	4	0
21	2	12	5	0
21	2	12	6	0 01422
21	2	12	7	0 053944
21	2	12	8	0 132021
21	2	12	9	0 214344
21	2	12	10	0 212627
21	2	12	11	0 017683
21	2	12	12	0 090462
21	2	12	13	0 057688
21	2	12	14	0 062161
21	2	12	15	0 062758
21	2	12	16	0 082091
21	2	22	1	0
21	2	22	2	0
21	2	22	3	0
21	2	22	4	0
21	2	22	5	0
21	2	22	6	0 01422
21	2	22	7	0 053944
21	2	22	8	0 132021
21	2	22	9	0 214344
21	2	22	10	0 212627
21	2	22	11	0 017683
21	2	22	12	0 090462
21	2	22	13	0 057688
21	2	22	14	0 062161
21	2	22	15	0 062758
21	2	22	16	0 082091
21	2	32	1	0
21	2	32	2	0
21	2	32	3	0
21	2	32	4	0
21	2	32	5	0
21	2	32	6	0 01422
21	2	32	7	0 053944
21	2	32	8	0 132021
21	2	32	9	0 214344
21	2	32	10	0 212627
21	2	32	11	0 017683
21	2	32	12	0 090462
21	2	32	13	0 057688
21	2	32	14	0 062161
21	2	32	15	0 062758
21	2	32	16	0 082091
21	2	42	1	0
21	2	42	2	0
21	2	42	3	0
21	2	42	4	0
21	2	42	5	0
21	2	42	6	0 01422
21	2	42	7	0 053944
21	2	42	8	0 132021
21	2	42	9	0 214344
21	2	42	10	0 212627
21	2	42	11	0 017683
21	2	42	12	0 090462
21	2	42	13	0 057688
21	2	42	14	0 062161
21	2	42	15	0 062758
21	2	42	16	0 082091
21	2	52	1	0
21	2	52	2	0
21	2	52	3	0
21	2	52	4	0
21	2	52	5	0
21	2	52	6	0 01422
21	2	52	7	0 053944
21	2	52	8	0 132021
21	2	52	9	0 214344
21	2	52	10	0 212627
21	2	52	11	0 017683
21	2	52	12	0 090462
21	2	52	13	0 057688
21	2	52	14	0 062161
21	2	52	15	0 062758
21	2	52	16	0 082091
21	2	62	1	0
21	2	62	2	0
21	2	62	3	0
21	2	62	4	0
21	2	62	5	0
21	2	62	6	0 01422
21	2	62	7	0 053944
21	2	62	8	0 132021
21	2	62	9	0 214344
21	2	62	10	0 212627
21	2	62	11	0 017683
21	2	62	12	0 090462
21	2	62	13	0 057688
21	2	62	14	0 062161
21	2	62	15	0 062758
21	2	62	16	0 082091
21	2	72	1	0
21	2	72	2	0
21	2	72	3	0
21	2	72	4	0
21	2	72	5	0
21	2	72	6	0 01422

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	72	7	0 053944
21	2	72	8	0 132021
21	2	72	9	0 214344
21	2	72	10	0 212627
21	2	72	11	0 017683
21	2	72	12	0 090462
21	2	72	13	0 057688
21	2	72	14	0 062161
21	2	72	15	0 062758
21	2	72	16	0 082091
21	2	82	1	0
21	2	82	2	0
21	2	82	3	0
21	2	82	4	0
21	2	82	5	0
21	2	82	6	0 01422
21	2	82	7	0 053944
21	2	82	8	0 132021
21	2	82	9	0 214344
21	2	82	10	0 212627
21	2	82	11	0 017683
21	2	82	12	0 090462
21	2	82	13	0 057688
21	2	82	14	0 062161
21	2	82	15	0 062758
21	2	82	16	0 082091
21	2	92	1	0
21	2	92	2	0
21	2	92	3	0
21	2	92	4	0
21	2	92	5	0
21	2	92	6	0 01422
21	2	92	7	0 053944
21	2	92	8	0 132021
21	2	92	9	0 214344
21	2	92	10	0 212627
21	2	92	11	0 017683
21	2	92	12	0 090462
21	2	92	13	0 057688
21	2	92	14	0 062161
21	2	92	15	0 062758
21	2	92	16	0 082091
21	2	102	1	0
21	2	102	2	0
21	2	102	3	0
21	2	102	4	0
21	2	102	5	0
21	2	102	6	0 01422
21	2	102	7	0 053944
21	2	102	8	0 132021
21	2	102	9	0 214344
21	2	102	10	0 212627
21	2	102	11	0 017683
21	2	102	12	0 090462
21	2	102	13	0 057688
21	2	102	14	0 062161
21	2	102	15	0 062758
21	2	102	16	0 082091
21	2	112	1	0
21	2	112	2	0
21	2	112	3	0
21	2	112	4	0
21	2	112	5	0
21	2	112	6	0 01422
21	2	112	7	0 053944
21	2	112	8	0 132021
21	2	112	9	0 214344
21	2	112	10	0 212627
21	2	112	11	0 017683
21	2	112	12	0 090462
21	2	112	13	0 057688
21	2	112	14	0 062161
21	2	112	15	0 062758
21	2	112	16	0 082091
21	2	122	1	0
21	2	122	2	0
21	2	122	3	0
21	2	122	4	0
21	2	122	5	0
21	2	122	6	0 01422
21	2	122	7	0 053944
21	2	122	8	0 132021
21	2	122	9	0 214344
21	2	122	10	0 212627
21	2	122	11	0 017683
21	2	122	12	0 090462
21	2	122	13	0 057688
21	2	122	14	0 062161
21	2	122	15	0 062758
21	2	122	16	0 082091
21	2	132	1	0
21	2	132	2	0
21	2	132	3	0
21	2	132	4	0
21	2	132	5	0
21	2	132	6	0 01422
21	2	132	7	0 053944
21	2	132	8	0 132021
21	2	132	9	0 214344
21	2	132	10	0 212627
21	2	132	11	0 017683
21	2	132	12	0 090462
21	2	132	13	0 057688
21	2	132	14	0 062161
21	2	132	15	0 062758
21	2	132	16	0 082091
21	2	142	1	0
21	2	142	2	0
21	2	142	3	0
21	2	142	4	0
21	2	142	5	0
21	2	142	6	0 01422
21	2	142	7	0 053944
21	2	142	8	0 132021
21	2	142	9	0 214344
21	2	142	10	0 212627
21	2	142	11	0 017683
21	2	142	12	0 090462
21	2	142	13	0 057688
21	2	142	14	0 062161
21	2	142	15	0 062758
21	2	142	16	0 082091
21	2	152	1	0
21	2	152	2	0
21	2	152	3	0
21	2	152	4	0
21	2	152	5	0
21	2	152	6	0 01422
21	2	152	7	0 053944
21	2	152	8	0 132021
21	2	152	9	0 214344
21	2	152	10	0 212627
21	2	152	11	0 017683
21	2	152	12	0 090462
21	2	152	13	0 057688
21	2	152	14	0 062161
21	2	152	15	0 062758
21	2	152	16	0 082091
21	2	162	1	0
21	2	162	2	0
21	2	162	3	0
21	2	162	4	0
21	2	162	5	0
21	2	162	6	0 01422
21	2	162	7	0 053944
21	2	162	8	0 132021
21	2	162	9	0 214344
21	2	162	10	0 212627
21	2	162	11	0 017683
21	2	162	12	0 090462
21	2	162	13	0 057688
21	2	162	14	0 062161
21	2	162	15	0 062758
21	2	162	16	0 082091
21	2	172	1	0
21	2	172	2	0
21	2	172	3	0
21	2	172	4	0
21	2	172	5	0
21	2	172	6	0 01422
21	2	172	7	0 053944
21	2	172	8	0 132021
21	2	172	9	0 214344
21	2	172	10	0 212627
21	2	172	11	0 017683
21	2	172	12	0 090462
21	2	172	13	0 057688
21	2	172	14	0 062161
21	2	172	15	0 062758
21	2	172	16	0 082091
21	2	182	1	0
21	2	182	2	0
21	2	182	3	0
21	2	182	4	0
21	2	182	5	0
21	2	182	6	0 01422
21	2	182	7	0 053944
21	2	182	8	0 132021
21	2	182	9	0 214344
21	2	182	10	0 212627
21	2	182	11	0 017683
21	2	182	12	0 090462
21	2	182	13	0 057688
21	2	182	14	0 062161
21	2	182	15	0 062758
21	2	182	16	0 082091
21	2	192	1	0
21	2	192	2	0
21	2	192	3	0
21	2	192	4	0
21	2	192	5	0
21	2	192	6	0 01422
21	2	192	7	0 053944
21	2	192	8	0 132021
21	2	192	9	0 214344
21	2	192	10	0 212627
21	2	192	11	0 017683
21	2	192	12	0 090462
21	2	192	13	0 057688
21	2	192	14	0 062161
21	2	192	15	0 062758
21	2	192	16	0 082091
21	2	202	1	0
21	2	202	2	0
21	2	202	3	0
21	2	202	4	0
21	2	202	5	0
21	2	202	6	0 01422
21	2	202	7	0 053944
21	2	202	8	0 132021
21	2	202	9	0 214344
21	2	202	10	0 212627
21	2	202	11	0 017683
21	2	202	12	0 090462
21	2	202	13	0 057688
21	2	202	14	0 062161
21	2	202	15	0 062758
21	2	202	16	0 082091
21	2	212	1	0
21	2	212	2	0
21	2	212	3	0
21	2	212	4	0
21	2	212	5	0
21	2	212	6	0 01422
21	2	212	7	0 053944
21	2	212	8	0 132021
21	2	212	9	0 214344
21	2	212	10	0 212627
21	2	212	11	0 017683
21	2	212	12	0 090462
21	2	212	13	0 057688
21	2	212	14	0 062161
21	2	212	15	0 062758
21	2	212	16	0 082091
21	2	222	1	0
21	2	222	2	0
21	2	222	3	0
21	2	222	4	0
21	2	222	5	0
21	2	222	6	0 01422
21	2	222	7	0 053944
21	2	222	8	0 132021
21	2	222	9	0 214344
21	2	222	10	0 212627
21	2	222	11	0 017683
21	2	222	12	0 090462

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	222	13	0 057688
21	2	222	14	0 062161
21	2	222	15	0 062758
21	2	222	16	0 082091
21	2	232	1	0
21	2	232	2	0
21	2	232	3	0
21	2	232	4	0
21	2	232	5	0
21	2	232	6	0 01422
21	2	232	7	0 053944
21	2	232	8	0 132021

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	232	9	0 214344
21	2	232	10	0 212627
21	2	232	11	0 017683
21	2	232	12	0 090462
21	2	232	13	0 057688
21	2	232	14	0 062161
21	2	232	15	0 062758
21	2	232	16	0 082091
21	2	242	1	0
21	2	242	2	0
21	2	242	3	0
21	2	242	4	0

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	242	5	0
21	2	242	6	0 01422
21	2	242	7	0 053944
21	2	242	8	0 132021
21	2	242	9	0 214344
21	2	242	10	0 212627
21	2	242	11	0 017683
21	2	242	12	0 090462
21	2	242	13	0 057688
21	2	242	14	0 062161
21	2	242	15	0 062758
21	2	242	16	0 082091

[AVFT] (SourceTypeID 42: Transit Bus)

Source TypeID	Model YearID	Fuel TypeID	Eng TechID	fuelEng Fraction
42	1960	2	1	1
42	1961	2	1	1
42	1962	2	1	1
42	1963	2	1	1
42	1964	2	1	1
42	1965	2	1	1
42	1966	2	1	1
42	1967	2	1	1
42	1968	2	1	1
42	1969	2	1	1
42	1970	2	1	1
42	1971	2	1	1
42	1972	2	1	1
42	1973	2	1	1
42	1974	2	1	1
42	1975	2	1	1
42	1976	2	1	1
42	1977	2	1	1
42	1978	2	1	1
42	1979	2	1	1
42	1980	2	1	1
42	1981	2	1	1
42	1982	2	1	1
42	1983	2	1	1
42	1984	2	1	1
42	1985	2	1	1
42	1986	2	1	1
42	1987	2	1	1
42	1988	2	1	1
42	1989	2	1	1
42	1990	2	1	0 993
42	1990	3	1	0 007
42	1991	2	1	0 982
42	1991	3	1	0 018
42	1992	1	1	0 01
42	1992	2	1	0 944
42	1992	3	1	0 046
42	1993	1	1	0 01
42	1993	2	1	0 914
42	1993	3	1	0 076
42	1994	1	1	0 01
42	1994	2	1	0 905
42	1994	3	1	0 085
42	1995	1	1	0 01
42	1995	2	1	0 837
42	1995	3	1	0 153
42	1996	1	1	0 01
42	1996	2	1	0 892
42	1996	3	1	0 098
42	1997	1	1	0
42	1997	2	1	1
42	1997	3	1	0
42	1998	1	1	0
42	1998	2	1	0
42	1998	3	1	1
42	1999	1	1	0
42	1999	2	1	0
42	1999	3	1	1
42	2000	1	1	0
42	2000	2	1	0
42	2000	3	1	1
42	2001	1	1	0
42	2001	2	1	0
42	2001	3	1	1
42	2002	1	1	0
42	2002	2	1	0
42	2002	3	1	1
42	2003	1	1	0
42	2003	2	1	0 08
42	2003	3	1	0 92
42	2004	1	1	0
42	2004	2	1	0 397059
42	2004	3	1	0 602941
42	2005	1	1	0
42	2005	2	1	1
42	2005	3	1	0
42	2006	1	1	0 089744
42	2006	2	1	0 128205
42	2006	3	1	0 782051
42	2007	1	1	0 149533
42	2007	2	1	0 850467
42	2007	3	1	0
42	2008	1	1	0
42	2008	2	1	0 479592
42	2008	3	1	0 520408
42	2009	1	1	0 121212
42	2009	2	1	0 030303
42	2009	3	1	0 848485
42	2010	1	1	0
42	2010	2	1	1
42	2010	3	1	0
42	2011	1	1	0
42	2011	2	1	1
42	2011	3	1	0
42	2012	1	1	0
42	2012	2	1	1
42	2012	3	1	0
42	2013	1	1	0
42	2013	2	1	1
42	2013	3	1	0
42	2014	1	1	0
42	2014	2	1	1
42	2014	3	1	0
42	2015	1	1	0
42	2015	2	1	1
42	2015	3	1	0
42	2016	1	1	0
42	2016	2	1	1
42	2016	3	1	0
42	2017	1	1	0
42	2017	2	1	1
42	2017	3	1	0
42	2018	1	1	0
42	2018	2	1	1
42	2018	3	1	0
42	2019	1	1	0
42	2019	2	1	1
42	2019	3	1	0
42	2020	1	1	0
42	2020	2	1	1
42	2020	3	1	0
42	2021	1	1	0
42	2021	2	1	1
42	2021	3	1	0
42	2022	1	1	0
42	2022	2	1	1
42	2022	3	1	0
42	2023	1	1	0
42	2023	2	1	1
42	2023	3	1	0
42	2024	1	1	0
42	2024	2	1	1
42	2024	3	1	0
42	2025	1	1	0
42	2025	2	1	1
42	2025	3	1	0
42	2026	1	1	0
42	2026	2	1	1
42	2026	3	1	0
42	2027	1	1	0
42	2027	2	1	1
42	2027	3	1	0
42	2028	1	1	0
42	2028	2	1	1
42	2028	3	1	0
42	2029	1	1	0
42	2029	2	1	1
42	2029	3	1	0
42	2030	1	1	0
42	2030	2	1	1
42	2030	3	1	0
42	2031	1	1	0
42	2031	2	1	1
42	2031	3	1	0
42	2032	1	1	0
42	2032	2	1	1
42	2032	3	1	0
42	2033	1	1	0
42	2033	2	1	1
42	2033	3	1	0
42	2034	1	1	0
42	2034	2	1	1
42	2034	3	1	0
42	2035	1	1	0
42	2035	2	1	1
42	2035	3	1	0
42	2036	1	1	0
42	2036	2	1	1
42	2036	3	1	0
42	2037	1	1	0
42	2037	2	1	1
42	2037	3	1	0
42	2038	1	1	0
42	2038	2	1	1
42	2038	3	1	0
42	2039	1	1	0
42	2039	2	1	1
42	2039	3	1	0
42	2040	1	1	0
42	2040	2	1	1
42	2040	3	1	0
42	2041	1	1	0
42	2041	2	1	1
42	2041	3	1	0
42	2042	1	1	0
42	2042	2	1	1
42	2042	3	1	0
42	2043	1	1	0
42	2043	2	1	1
42	2043	3	1	0
42	2044	1	1	0
42	2044	2	1	1
42	2044	3	1	0
42	2045	1	1	0
42	2045	2	1	1
42	2045	3	1	0
42	2046	1	1	0
42	2046	2	1	1
42	2046	3	1	0
42	2047	1	1	0
42	2047	2	1	1
42	2047	3	1	0
42	2048	1	1	0
42	2048	2	1	1
42	2048	3	1	0
42	2049	1	1	0
42	2049	2	1	1
42	2049	3	1	0
42	2050	1	1	0
42	2050	2	1	1
42	2050	3	1	0