DRAFT

MAG 2017 EIGHT-HOUR OZONE MODERATE AREA PLAN FOR THE MARICOPA NONATTAINMENT AREA

APPENDICES

VOLUME TWO

SEPTEMBER 2016

MARICOPA ASSOCIATION of GOVERNMENTS

DRAFT

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APPENDIX A

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2014 Periodic Emissions Inventory for Ozone Precursors for the Maricopa County, Arizona, Eight-Hour Ozone Nonattainment Area. Maricopa County Air Quality Department. September 2016.

Maricopa County
Air Quality Department

2014 Periodic Emissions Inventory for Ozone Precursors

for the
Maricopa County, Arizona, Eight-Hour Ozone Nonattainment Area

September 2016

2014 Periodic Emissions Inventory for Ozone Precursors for the Maricopa County 8-hour Ozone Nonattainment Area

September 2016

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MOVES2014a RunSpec (Maricopa County, November 2015)
MOVES2014a Local Input Data (Maricopa County, November 2015)

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1. Introduction

1.1 Overview

This 2014 periodic emissions inventory for ozone precursors has been developed to meet requirements set forth in Title I of the Clean Air Act Amendments of 1990 (CAAA), which requires the development of a baseline emissions inventory and periodic revisions for areas that fail to meet the National Ambient Air Quality Standards (NAAQS). A portion of Maricopa County is classified as nonattainment for the 8-hour ozone standard.

This inventory includes emission estimates for three ozone precursors: volatile organic compounds (VOCs), carbon monoxide (CO) and nitrogen oxides (NO_x). VOC is defined by Maricopa County's Rule 100 as "any organic compound which participates in atmospheric photochemical reactions, except the non-precursor organic compounds". The inventory provides emission estimates from point, area, nonroad mobile, onroad mobile, and biogenic sources. Note that totals shown in 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 2014 Periodic Emissions Inventory for Ozone Precursors for Maricopa County. Point, area, and some nonroad mobile source emission estimates were prepared by MCAQD. The Maricopa Association of Governments (MAG) prepared the emission estimates for onroad mobile, biogenic, and the majority of nonroad mobile sources. 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. Chapter authors and quality assurance/quality control (QA/QC) contacts.

Chapter	Author(s)	QA/QC contact person(s)
2. Point sources	Bob Downing, MCAQD 602-506-6790	Eric Raisanen, MCAQD 602-506-6790 Matt Poppen, MAG 602-254-6300
3. Area (nonpoint) sources	Eric Raisanen, Tom Ekren and Dena Konopka, MCAQD 602-506-6790	Bob Downing, MCAQD 602-506-6790 Matt Poppen, MAG 602-254-6300
4. Nonroad mobile sources	Taejoo Shin, MAG 602-254-6300 Bob Downing, MCAQD 602-506-6790	Bob Downing, MCAQD 602-506-6790 Matt Poppen, MAG 602-254-6300
5. Onroad mobile sources	Taejoo Shin, MAG 602-254-6300	Matt Poppen, MAG 602-254-6300
6. Biogenic sources	Taejoo Shin, MAG 602-254-6300	Matt Poppen, MAG 602-254-6300

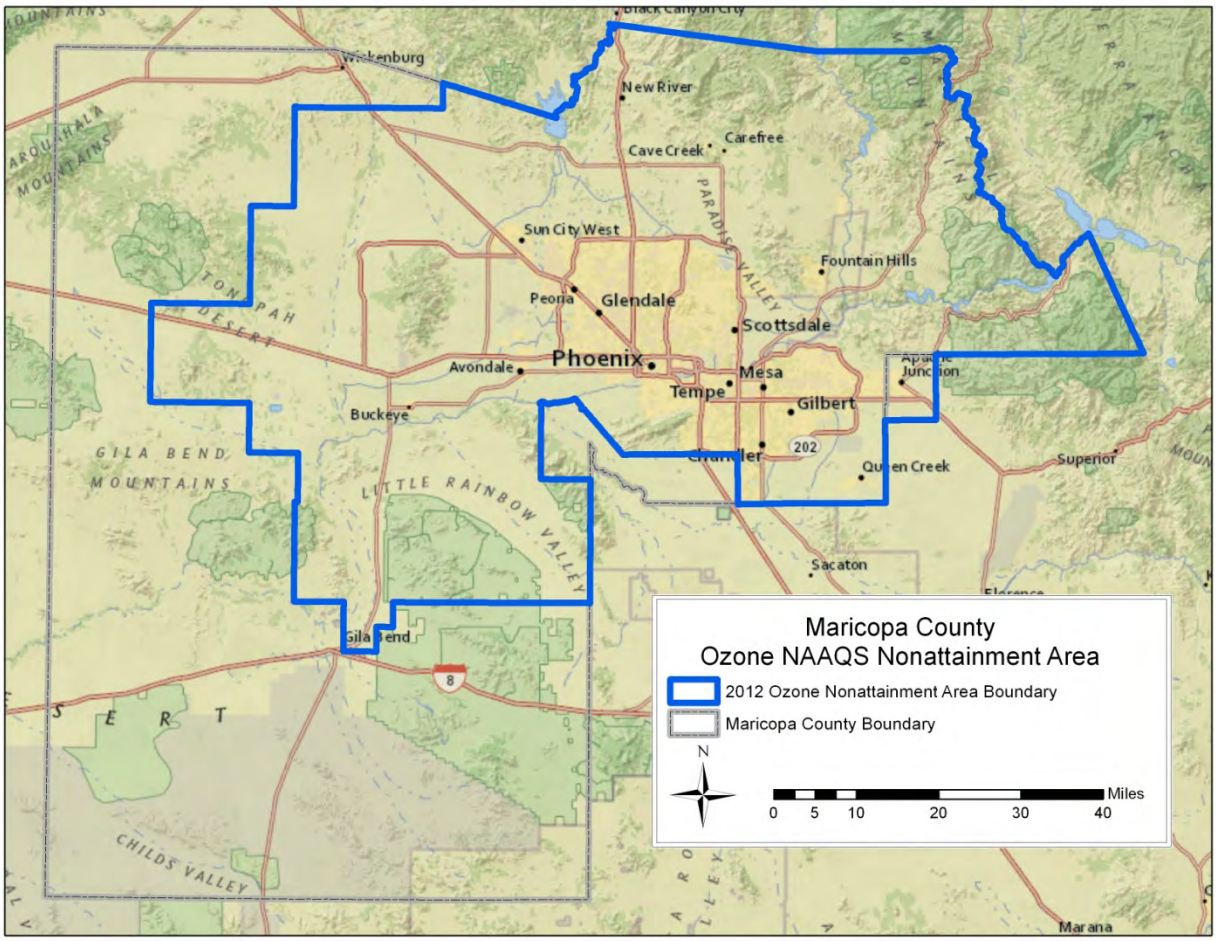
1.3 Temporal scope

Both annual and ozone season-day emissions were estimated for the year 2014, for both Maricopa County and the 8-hour ozone nonattainment area (NAA). The 3-month peak ozone season for the Maricopa County nonattainment area has been defined as the June–August timeframe, which encompasses the period during which the region experiences the highest monitored ozone concentrations, the highest average Air Quality Index (AQI) values, and the most frequent exceedances of the 8-hour ozone NAAQS.

1.4 Geographic scope

This inventory includes emission estimates for Maricopa County and for the Maricopa County 8-hour ozone nonattainment area. Maricopa County encompasses approximately 9,223 square miles of land area, while the Maricopa County 8-hour ozone nonattainment area is approximately 5,018 square miles or about 54 percent of the Maricopa County land area.[1] A portion of the southeastern boundary of the 8-hour ozone nonattainment area includes areas of Pinal County totaling 48 square miles or 0.96% of the nonattainment area. A map of Maricopa County and the 8-hour ozone nonattainment area is provided in Figure 1.4–1.

Figure 1.4–1. Map of Maricopa County and the 8-hour ozone nonattainment area.



1. In May 2012, EPA designated a new 8-hour ozone nonattainment area based on the 2008 8-hour ozone NAAQS (***77 FR 30088***, May 12, 2012). The previous 8-hour ozone nonattainment area was based on the 1997 8-hour ozone NAAQS. The 2012 nonattainment area boundary was used for the 2011 and this 2014 inventory, as it is expected to be used as a base-year inventory for a future State Implementation Plan.

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 nonattainment area and vice versa. (For example, county-level emissions from residential natural gas usage in Maricopa County were apportioned to the nonattainment area using the ratio of total population 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 profile

The demographic data provided by MAG included population, employment data, and single family/multi-family splits for calendar year 2014, for both Maricopa County and the 8-hour ozone nonattainment area. Table 1.5–1 provides an overview of the key demographic data used in this report. As noted throughout the text, these data are frequently used to derive estimates of activity or emissions within the 8-hour ozone nonattainment area from county-level calculations. It is important to note, however, that the nonattainment area includes a portion of Pinal County, AZ as shown in Figure 1.4–1. Thus in some cases (e.g., those source categories calculated based on total population), the multiplier used to derive nonattainment area estimates from County-level values may be greater than 1, and thus the resulting NAA emission totals are larger than the County-level estimates from which they are derived.

Table 1.5–1. Demographic profile of Maricopa County and the 8-hour ozone NAA.

Demographic variable	Maricopa County	8-hr ozone NAA	NAA% relative to County
1. Population:			
Resident population	4,008,651	4,040,182	100.79%
Non-resident population	319,784	324,968	101.62%
Total population:	**4,328,435**	**4,365,150**	**100.85%**
2. Employment:			
–Retail employment *	385,678	385,426	99.93%
–Office employment *	462,139	461,824	99.93%
–Public employment *	132,436	133,352	100.69%
–Other employment *	181,060	179,924	99.37%
All commercial/institutional employment:	***1,161,313***	***1,160,526***	***99.93%***
Industrial employment	334,326	331,137	99.37%
Construction	24,808	24,583	99.09%
Work at home	101,244	101,653	100.40%
Non site-based	128,193	128,068	99.90%
Total employment:	**1,749,884**	**1,746,474**	**99.81%**
3. Household split:			
Single-family	77%	77%	
Multi-family	23%	23%	
Total households:	**100%**	**100%**	

* These four categories comprise the "commercial/institutional" employment sector.

1.5.2 Land-use data

The land-use data used in this report have been developed by the Maricopa Association of Governments (MAG), which provided 2014 land-use data. Table 1.5–2 presents a listing of the land use categories used, and the acreages of each land-use type within Maricopa County and the 8-hour ozone nonattainment area.

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

Land use category	Acreage within Maricopa County	Acreage within 8-hour ozone NAA	% relative to County
General/active open space/golf course (e.g., parks)	212,662	213,795	100.53%
Passive/restricted open space, washes	2,602,364	1,175,442	45.17%
Lakes	12,286	12,286	100.00%
Agriculture	267,894	157,478	58.78%
Vacant (e.g., developable land)	2,053,015	918,426	44.74%

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 8-hour ozone nonattainment area, respectively. Since all facilities identified as point sources are located within the 8-hour ozone nonattainment area, the emission values for the two areas are equal. A detailed breakdown of emissions calculations for all point sources is contained in Chapter 2.

Table 1.6–1. Annual and season-day emissions from point sources in Maricopa County and the 8-hour ozone nonattainment area (including emission reduction credits).

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	1,041.8	1,647.6	1,375.1	6,281	14,074	12,163
8-hr ozone NAA	1,041.8	1,647.6	1,375.1	6,281	14,074	12,163

1.6.2 Area (nonpoint) 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. Emissions from stationary sources that were not identified as point sources in this report have

been included in the area source inventory. Examples of area source categories include residential wood burning, commercial cooking, waste incineration and wildfires.

Tables 1.6–2 and 1.6–3 summarize annual and season-day emissions of the chief area source categories, for Maricopa County and the 8-hour ozone nonattainment area, respectively. A detailed breakdown of emissions calculations for each area source category is contained in Chapter 3.

Table 1.6–2. Annual and season-day emissions from area sources in Maricopa County.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Fuel combustion	1,679.8	4,931.9	10,710.0	1,806	30,016	14,997
Industrial processes	1,723.9	531.6	1,619.1	12,484	3,095	11,160
Solvent use	29,522.2	0.0	0.0	172,914	0	0
Storage/transport	3,594.9	0.0	0.0	19,734	0	0
Waste treatmt/disposal	124.0	41.5	225.6	881	249	1,596
Misc. area sources	132.1	128.1	3,060.5	736	800	17,410
All area sources:	**36,777.0**	**5,633.2**	**15,615.2**	**208,555**	**34,160**	**45,163**

Table 1.6–3. Annual and season-day emissions from area sources in the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Fuel combustion	1,689.7	4,916.2	10,769.1	1,783	29,505	14,839
Industrial processes	1,715.6	531.6	1,624.3	12,412	3,100	11,127
Solvent use	29,510.2	0.0	0.0	172,431	0	0
Storage/transport	3,592.9	0.0	0.0	19,718	0	0
Waste treatmt/disposal	196.6	40.5	76.9	1,499	226	421
Misc. area sources	132.8	128.5	3,079.4	761	828	17,859
All area sources:	**36,837.9**	**5,616.9**	**15,549.7**	**208,605**	**33,660**	**44,246**

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. Tables 1.6–4 and 1.6–5 summarize annual and season-day emissions from nonroad mobile sources, for Maricopa County and the 8-hour ozone nonattainment area, respectively. A detailed breakdown of emissions calculations for each source category is contained in Chapter 4.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Agricultural equipment	5.7	286.9	262.2	49	2,473	2,311
Airport GSE (+APU)	77.3	293.7	2,211.4	409	1,575	11,710
Commercial equipment	1,144.0	1,175.6	29,670.3	7,851	7,198	198,568
Construction & mining	454.4	10,495.7	12,531.9	3,203	72,485	88,728
Industrial equipment	115.1	1,263.3	3,956.0	733	7,645	25,053
Lawn & garden	2,937.5	589.9	44,389.3	25,208	4,194	403,992
Pleasure craft	382.3	98.3	1,154.8	7,477	2,428	29,686
Railway maintenance	0.3	7.7	15.2	2	53	108
Recreational equipment	1,271.8	62.4	6,501.1	15,408	713	84,058
Aircraft	1,761.8	2,391.1	10,688.0	9,284	12,603	57,583
Locomotives	137.5	2,478.3	421.8	754	13,580	2,311
All nonroad sources:	**8,287.7**	**19,143.1**	**111,801.8**	**70,378**	**124,946**	**904,107**

Table 1.6–5. Annual and season-day emissions from nonroad mobile sources in the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Agricultural equipment	3.3	168.7	154.1	29	1,454	1,358
Airport GSE (+APU)	76.1	290.5	2,174.9	404	1,559	11,526
Commercial equipment	1,134.9	1,166.2	29,432.3	7,788	7,140	196,975
Construction & mining	450.3	10,400.5	12,418.3	3,174	71,827	87,923
Industrial equipment	114.1	1,253.1	3,924.2	727	7,584	24,852
Lawn & garden	2,962.4	594.9	44,765.8	25,422	4,229	407,419
Pleasure craft	382.3	98.3	1,154.8	7,477	2,428	29,686
Railway maintenance	0.3	7.8	15.3	2	53	109
Recreational equipment	572.0	28.1	2,924.0	6,930	321	37,807
Aircraft	1,719.2	2,384.3	10,494.4	9,080	12,571	56,545
Locomotives	91.0	1,621.2	265.3	498	8,883	1,454
All nonroad sources:	**7,505.9**	**18,013.6**	**107,723.4**	**61,531**	**118,049**	**855,654**

1.6.4 Onroad mobile sources

Emissions from onroad mobile sources were calculated for Maricopa County and the 8-hour ozone nonattainment area. A detailed description of emissions calculations is contained in Chapter 5. Table 1.6–6 summarizes annual and season-day emissions from onroad mobile sources in Maricopa County and the 8-hour ozone nonattainment area, respectively.

Table 1.6–6. Annual and season-day emissions from onroad mobile sources in Maricopa County and the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	19,308.7	34,219.1	210,239.1	118,683	182,273	1,279,788
8-hr ozone NAA	19,162.5	32,380.6	209,281.7	117,999	172,963	1,273,697

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 8-hour ozone nonattainment 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 MEGAN2.1. MEGAN2.1 was used to compute biogenic emissions in Maricopa County and the 8-hour ozone nonattainment area. Annual and season-day emissions from biogenic sources are shown in Table 1.6–7 for Maricopa County and the 8-hour ozone nonattainment area.

Table 1.6–7. Annual and season-day emissions from biogenic sources in Maricopa County and the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	187,065.9	987.9	23,099.4	2,380,298	11,235	300,222
8-hr ozone NAA	102,301.8	587.2	13,154.5	1,321,018	6,768	173,438

1.6.6 Summary of all source categories

Tables 1.6–8 and 1.6–9 provide summary totals of annual and season-day emissions from all emission sources in Maricopa County and the 8-hour ozone nonattainment area, respectively.

Table 1.6–8. Annual and season-day emissions from all source categories in Maricopa County.

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
POINT SOURCES:	702.3	1,604.6	1,360.8	4,421	13,839	12,084
Emission reduction credits (ERCs)	266.1	14.1	14.3	1,458	77	78
Potential ERCs	73.3	28.8		402	158	
ALL POINT SOURCES:	**1,041.8**	**1,647.6**	**1,375.1**	**6,281**	**14,074**	**12,163**
AREA (NONPOINT) SOURCES:						
Fuel combustion:						
Industrial distillate oil: boilers	1.0	96.1	24.0	6	616	154
Industrial distillate oil: engines	134.5	1,934.4	416.3	862	12,400	2,669
Industrial natural gas	40.7	740.1	621.7	261	4,744	3,985
Industrial liquefied petroleum gas	1.9	52.1	29.2	12	334	187
Comm./inst. distillate oil: boilers	0.0	2.8	0.7	0	18	4
Comm./inst. distillate oil: engines	0.3	4.4	1.0	2	28	6
Comm./inst. natural gas	62.0	1,126.8	946.5	397	7,223	6,068
Residential distillate oil	0.0	0.3	0.1	0	3	1
Residential natural gas	45.5	777.0	330.7	249	4,258	1,812
Residential LPG	1.6	41.5	11.8	15	391	111
Residential wood combustion	1,392.2	156.3	8,328.1	0	0	0
All Fuel Combustion:	**1,679.8**	**4,931.9**	**10,710.0**	**1,806**	**30,016**	**14,997**

Table 1.6–8. Annual and season-day emissions from all source categories in Maricopa County (continued).

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Industrial Processes:						
Chemical manufacturing	69.1			535		
Commercial cooking	233.5		666.3	1,279		3,651
Bakeries	112.4			661		
Secondary metal production	65.9	55.1	671.6	467	482	5,936
Rubber/plastic product manufacturing	928.8			7,763		
Fabricated metal product mfg.	19.2			92		
Electrical equipment manufacturing	223.6	24.3	7.5	1,280	135	41
Industrial processes, NEC	71.4	452.2	273.7	407	2,478	1,532
All Industrial Processes:	**1,723.9**	**531.6**	**1,619.1**	**12,484**	**3,095**	**11,160**
Solvent Use:						
Architectural coatings	5,215.8			31,748		
Auto refinishing	958.3			5,251		
Traffic markings	441.0			4,478		
Factory finished wood	193.6			1,616		
Wood furniture	666.4			1,052		
Metal furniture: SIC 25	59.8			3,622		
Paper: SIC 26	51.3			325		
Metal cans: SIC 341	183.2			279		
Machinery and equipment: SIC 35	58.2			996		
Large appliances: SIC 363	35.5			316		
Electronic/other electrical: SIC 36	4.2			193		
Motor vehicles: SIC 371	183.0			23		
Aircraft surface coating	65.8			473		
Marine: SIC 373	3.5			358		
Railroad: SIC 374	5.1			19		
Miscellaneous surface coating	160.9			1,309		
Industrial maintenance coatings	301.0			875		
Other special-purpose coatings	12.0			1,636		
Degreasing	291.9			1,923		
Dry cleaning	10.3			79		
Graphics arts	297.4			2,308		
Miscellaneous industrial solvent use	201.1			1,443		
Personal care products	4,013.2			21,990		
Household products	4,414.5			24,189		
Automotive aftermarket products	2,729.0			14,950		
Coatings and related products	1,906.3			10,445		
Adhesives and sealants	1,143.8			6,257		
FIFRA-regulated products	3,571.7			19,571		
Miscellaneous products, NEC	140.5			770		
Cutback asphalt	1,004.8			21,844		
Emulsified asphalt	828.2			18,004		
Agricultural pesticides	371.0			2,033		
All Solvent Use:	**29,522.2**			**172,914**		

Table 1.6–8. Annual and season-day emissions from all source categories in Maricopa County (continued).

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Storage/Transport:						
Residential portable gas cans	443.1			2,428		
Commercial portable gas cans	382.0			2,093		
Bulk terminals	91.0			493		
Bulk plants	36.2			229		
Gas stations Stage I:submerged fill	369.9			2,027		
Gas stations Stage I:bal. submerged fill	646.9			3,545		
Underground tank breathing/emptying	764.8			4,191		
Airports: aviation gasoline Stage I	673.6			3,691		
Airports: aviation gasoline Stage II	33.3			182		
Truck: gasoline (tank trucks in transit)	50.0			274		
Pipeline gasoline	66.2			363		
Volatile organic liquids storage/transpt	37.8			218		
All Storage/Transport:	**3,594.9**			**19,734**		
Waste Treatment/Disposal:						
On-site incineration	0.2	3.0	0.7	1	19	5
Open burning	18.2	8.1	172.2	140	62	1,325
Landfills	36.6	9.9	14.6	158	54	80
Publicly owned treatment works	58.9			453		
Leaking underground storage tanks	2.5			75		
Other waste	7.7	20.6	38.1	54	113	186
All Waste Treatment/Disposal:	**124.0**	**41.5**	**225.6**	**881**	**249**	**1,596**
Miscellaneous Area Sources:						
Backyard barbeques	52.8	60.5	2,819.9	289	332	15,451
Structure fires	15.5	2.0	84.5	76	11	414
Aircraft engine testing	4.6	45.5	16.9	27	260	98
Vehicle fires	10.6	1.3	41.2	58	7	226
Crematories, human	0.4	10.7	0.6	3	77	5
Crematories, animal	0.1	5.6	0.3	1	49	3
Accidental releases	10.1	0.2	0.4	2	0	0
Hospitals	33.4			201		
Wildfires	4.5	2.0	94.8	29	13	606
Prescribed fires	0.2	0.2	1.8	51	51	607
All Miscellaneous Area Sources:	**132.1**	**128.1**	**3,060.5**	**736**	**800**	**17,410**
ALL AREA SOURCES:	**36,777.0**	**5,633.2**	**15,615.2**	**208,555**	**34,160**	**45,163**

Table 1.6–8. Annual and season-day emissions from all source categories in Maricopa County (continued).

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
NONROAD MOBILE SOURCES:						
Agricultural equipment	5.7	286.9	262.2	49	2,473	2,311
Airport GSE (+APU)	77.3	293.7	2,211.4	409	1,575	11,710
Commercial equipment	1,144.0	1,175.6	29,670.3	7,851	7,198	198,568
Construction & mining equipment	454.4	10,495.7	12,531.9	3,203	72,485	88,728
Industrial equipment	115.1	1,263.3	3,956.0	733	7,645	25,053
Lawn and garden equipment	2,937.5	589.9	44,389.3	25,208	4,194	403,992
Pleasure craft	382.3	98.3	1,154.8	7,477	2,428	29,686
Railway maintenance equipment	0.3	7.7	15.2	2	53	108
Recreational equipment	1,271.8	62.4	6,501.1	15,408	713	84,058
Aircraft	1,761.8	2,391.1	10,688.0	9,284	12,603	57,583
Locomotives	137.5	2,478.3	421.8	754	13,580	2,311
ALL NONROAD MOBILE:	**8,287.7**	**19,143.1**	**111,801.8**	**70,378**	**124,946**	**904,107**
ALL ONROAD MOBILE:	**19,308.7**	**34,219.1**	**210,239.1**	**118,683**	**182,273**	**1,279,788**
ALL BIOGENIC SOURCES:	**187,065.9**	**987.9**	**23,099.4**	**2,380,298**	**11,235**	**300,222**
TOTAL, ALL SOURCE CATEGORIES:	**252,480.9**	**61,630.9**	**362,130.7**	**2,784,194**	**366,687**	**2,541,442**

Table 1.6–9. Annual and season-day emissions from all sources in the 8-hour ozone NAA.

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
POINT SOURCES:	702.3	1,604.6	1,360.8	4,421	13,839	12,084
Emission Reduction Credits (ERCs)	266.1	14.1	14.3	1,458	77	78
Potential ERCs	73.3	28.8		402	158	
ALL POINT SOURCES:	**1,041.8**	**1,647.6**	**1,375.1**	**6,281**	**14,074**	**12,163**
AREA (NONPOINT) SOURCES:						
Fuel combustion:						
Industrial distillate oil: boilers	1.0	95.3	23.8	6	611	153
Industrial distillate oil: engines	133.4	1,918.9	413.0	855	12,301	2,647
Industrial natural gas	40.4	734.2	616.7	259	4,706	3,953
Industrial liquefied petroleum gas	1.9	51.7	29.0	12	332	186
Comm./inst. distillate oil: boilers	0.0	2.8	0.7	0	18	4
Comm./inst. distillate oil: engines	0.3	4.4	1.0	2	28	6
Comm./inst. natural gas	61.9	1,126.0	945.9	397	7,218	6,063
Residential distillate oil	0.0	0.3	0.1	0	0	0
Residential natural gas	45.8	783.2	333.3	251	4,291	1,826
Residential LPG	1.6	41.8	11.8	0	0	0
Residential wood combustion	1,403.2	157.6	8,393.8	0	0	0
All Fuel Combustion:	**1,689.7**	**4,916.2**	**10,769.1**	**1,783**	**29,505**	**14,839**
Industrial processes:						
Chemical manufacturing	68.6			531		
Commercial cooking	235.3		671.5	1,289		3,680
Bakeries	111.5			656		
Secondary metal production	65.9	55.1	671.6	467	482	5,936

Table 1.6–9. Annual and season-day emissions from all sources in the 8-hr ozone NAA (continued).

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Industrial processes (continued):						
Rubber/plastic product manufacturing	921.4			7,701		
Fabricated metal product mfg.	19.0			91		
Electrical equipment manufacturing	223.6	24.3	7.5	1,280	140	42
Industrial processes, NEC	70.3	452.2	273.7	397	2,478	1,470
All Industrial Processes:	**1,715.6**	**531.6**	**1,624.3**	**12,412**	**3,100**	**11,127**
Solvent use:						
Architectural coatings	5,260.0			32,017		
Auto refinishing	950.6			5,209		
Traffic markings	437.5			4,442		
Factory finished wood	192.1			1,603		
Wood furniture	661.1			5,085		
Metal furniture: SIC 25	59.3			456		
Paper: SIC 26	50.8			391		
Metal cans: SIC 341	181.8			1,398		
Machinery and equipment: SIC 35	57.7			444		
Large appliances: SIC 363	35.2			271		
Electronic/other electrical: SIC 36	4.2			32		
Motor vehicles: SIC 371	181.5			1,396		
Aircraft surface coating	65.8			473		
Marine: SIC 373	3.4			26		
Railroad: SIC 374	5.1			39		
Miscellaneous surface coating	159.6			1,299		
Industrial maintenance coatings	298.6			2,297		
Other special-purpose coatings	11.9			92		
Degreasing	289.5			1,908		
Dry cleaning	10.4			80		
Graphics arts	295.1			1,908		
Miscellaneous industrial solvent use	199.5			1,431		
Personal care products	4,047.3			22,177		
Household products	4,452.0			24,395		
Automotive aftermarket products	2,752.1			15,080		
Coatings and related products	1,922.5			10,534		
Adhesives and sealants	1,153.5			6,320		
FIFRA-regulated products	3,602.1			19,737		
Miscellaneous products, NEC	141.7			776		
Cutback asphalt	992.3			5,437		
Emulsified asphalt	817.9			4,482		
Agricultural pesticides	218.1			1,195		
All Solvent Use:	**29,510.2**			**172,431**		
Storage/transport:						
Residential portable gas cans	446.6			2,447		
Commercial portable gas cans	385.1			2,110		
Bulk terminals	91.0			493		
Bulk plants	36.2			229		
Gas stations Stage I:submerged fill	369.9			2,027		
Gas stations Stage I:bal. submerged fill	646.9			3,545		
Underground tank breathing/emptying	764.8			4,191		

Table 1.6–9. Annual and season-day emissions from all sources in the 8-hr ozone nonattainment area (continued).

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Storage/transport (cont'd):						
Airports: aviation gasoline Stage I	667.5			3,658		
Airports: aviation gasoline Stage II	33.0			181		
Truck: gasoline (tank trucks in transit)	50.0			274		
Pipeline gasoline	66.2			363		
Volatile organic liquids storage/transpt	35.7			201		
All Storage/Transport:	**3,592.9**			**19,718**		
Waste treatment/disposal:						
On-site incineration	0.1	2.9	0.7	1	19	5
Open burning	90.4	4.3	9.6	695	33	74
Landfills	36.6	12.7	28.5	217	70	157
Publicly owned treatment works	59.3			456		
Leaking underground storage tanks	2.5			75		
Other waste	7.7	20.6	38.1	54	105	186
All Waste Treatment/Disposal:	**196.6**	**40.5**	**76.9**	**1,499**	**226**	**421**
Misc. area sources:						
Backyard barbeques	53.2	61.0	2,842.1	291	334	15,573
Structure fires	15.6	2.0	85.2	77	10	418
Aircraft engine testing	4.6	45.5	16.9	27	260	98
Vehicle fires	10.6	1.3	41.6	58	7	228
Crematories, human	0.4	10.7	0.6	3	73	4
Crematories, animal	0.1	5.6	0.3	1	49	3
Accidental releases	10.1	0.2	0.4	2	16	0
Hospitals	33.7			202		
Wildfires	4.3	1.9	90.4	37	17	792
Prescribed fires	0.2	0.2	1.8	63	62	743
All Miscellaneous Area Sources:	**132.8**	**128.5**	**3,079.4**	**761**	**828**	**17,859**
ALL AREA SOURCES:	**36,837.9**	**5,616.9**	**15,549.7**	**208,605**	**33,660**	**44,246**
NONROAD MOBILE SOURCES:						
Agricultural equipment	3.3	168.7	154.1	29	1,454	1,358
Airport GSE (+APU)	76.1	290.5	2,174.9	404	1,559	11,526
Commercial equipment	1,134.9	1,166.2	29,432.3	7,788	7,140	196,975
Construction & mining equipment	450.3	10,400.5	12,418.3	3,174	71,827	87,923
Industrial equipment	114.1	1,253.1	3,924.2	727	7,584	24,852
Lawn and garden equipment	2,962.4	594.9	44,765.8	25,422	4,229	407,419
Pleasure craft	382.3	98.3	1,154.8	7,477	2,428	29,686
Railway maintenance equipment	0.3	7.8	15.3	2	53	109
Recreational equipment	572.0	28.1	2,924.0	6,930	321	37,807
Aircraft	1,719.2	2,384.3	10,494.4	9,080	12,571	56,545
Locomotives	91.0	1,621.2	265.3	498	8,883	1,454
ALL NONROAD MOBILE:	**7,505.9**	**18,013.6**	**107,723.4**	**61,531**	**118,049**	**855,654**
ALL ONROAD MOBILE:	**19,162.5**	**32,380.6**	**209,281.7**	**117,999**	**172,963**	**1,273,697**
BIOGENIC SOURCES:	**102,301.8**	**587.2**	**13,154.5**	**1,321,018**	**6,768**	**173,438**
TOTAL, ALL SOURCE CATEGORIES:	**166,849.8**	**58,245.8**	**347,084.4**	**1,715,433**	**345,514**	**2,359,198**

2. Point Sources

2.1 Introduction and scope

This inventory of ozone precursors (VOC, NO_x, and CO) is one of two 2014 emissions inventory reports being prepared to meet US EPA reporting requirements. This inventory has been developed concurrently with a similar inventory for PM_{10} and related pollutants ($PM_{2.5}$, NO_x, SO_x, and NH_3) as part of Maricopa County's requirements under the respective State Implementation Plans (SIPs).

In addition to preparing a periodic emissions inventory for the 8-hour ozone nonattainment area (NAA) as a commitment under the current 8-hour ozone SIP, the federal Air Emission Reporting Requirements (AERR; US EPA, 2015) rule 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 Emissions Inventory (NEI) for calendar year 2014.

2.2 Identifying point sources

In order to provide consistency among various inventories, it was decided to standardize the definition of a "point source" by adopting the designation of point sources as outlined in the *Federal Register* notice for the original 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… [T]his 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)

This chapter contains several tables that provide information on emissions from large stationary point sources. Table 2.2–1 provides an alphabetical listing of all point sources and their location. Table 2.4–1 shows the annual and ozone season-day emissions of VOC, NO_x and CO for those point sources that reported emissions of one or more of these pollutants in 2014. Table 2.5–1 lists emission reduction credits for the area, while Table 2.7–1 summarizes point source emission totals for both Maricopa County and the 8-hour ozone nonattainment area. Note that the totals shown in tables may not equal the sum of individual values due to independent rounding.

The Maricopa County Air Quality Department (MCAQD) identified point sources within the county through its electronic permit system database, EMS, and the 2014 annual emissions reports submitted to the department. A total of 19 stationary sources were identified as point sources using the definition described in Section 2.1 above. 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
3313	221112	APS West Phoenix Power Plant	4606 W Hadley St	Phoenix	85043
43063	221112	Arlington Valley LLC	39027 W Elliot Rd	Arlington	85322
1218	562212	Butterfield Station Facility	40404 S 99th Ave	Mobile	85239
127771	331111	CMC Steel Fabricators Inc.	11444 E Germann Rd	Mesa	85212
44439	221112	Gila River Power Station	1250 E Watermelon	Gila Bend	85337
4173	562212	Glendale Mun Sanitary Landfill	11480 W Glendale Av	Glendale	85301
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
1879	562212	Northwest Regional Landfill	19401 W Deer Valley	Surprise	85387
1331	337122	Oak Canyon Manufacturing Inc.	3021 N 29th Dr.	Phoenix	85017
52382	221112	Ocotillo Power Plant	1500 E University Dr.	Tempe	85281
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 Av	Glendale	85303
3317	221112	SRP Kyrene Generating Station	7005 S Kyrene Rd	Tempe	85283
1210	337122	Trendwood Inc.	2402 S 15th Ave	Phoenix	85007

Note: All facilities listed above are also located within the 8-hour ozone nonattainment area.

2.3 Procedures for estimating emissions from point sources

Annual and season-day emission estimates were calculated from annual source emissions 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 source tests, AP–42, engineering calculations, or manufacturers' specifications.

MCAQD distributes annual emissions survey forms to most facilities for which MCAQD has issued an operating permit, including all Title V and synthetic minor facilities. All facilities are required to report detailed information on stacks, control devices, operating schedules, and process-level information concerning their annual activities. Detailed instructions accompany the emissions reporting forms, and include examples and explanations on how to complete the annual emissions reporting forms that facilities must submit to MCAQD. (See Appendix A for a copy of the instructions accompanying the annual emissions inventory forms.)

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 ("RE") 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 emissions inventory has evolved from the observation that regulatory programs may be less than 100 percent effective for some source categories. Rule effectiveness 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 rule effectiveness for a variety of emissions sources and source categories. For processes that claimed emissions reductions through the use of a control device, rule effectiveness was quantified separately for Title V and non-Title V sources. Overall RE values of 90.44% (for Title V processes) and 89.00% (for non-Title V processes) were calculated, and applied to 2014 process-level emissions information where applicable. Appendix B provides further details on the methods and data used in computing these rule effectiveness rates.

2.4 Detailed overview of point source emissions

Table 2.4–1 provides a summary of annual and season-day emissions from all 19 facilities that have been categorized as point sources (all of which are located within the 8-hour ozone nonattainment area). Sources for which rule effectiveness has been applied are noted. Emissions values of "0.0" and "0" for annual and season-day emissions denote quantities below the level of significance (0.05 tons/yr and 0.5 lbs/day, respectively).

Table 2.4–1. Annual and season-day emissions from point sources, by facility.

			Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
ID #	**Business name**		**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
3313	APS West Phoenix Power Plant	*	17.9	441.5	81.5	136	3,200	684
43063	Arlington Valley LLC	*	12.7	75.8	33.5	138	825	366
1218	Butterfield Station Facility	*	5.0	16.7	25.3	28	103	141
127771	CMC Steel Fabricators Inc.	*	25.5	42.7	561.0	243	405	5,377
44439	Gila River Power Station	*	12.6	216.3	68.5	109	1,900	614
4173	Glendale Mun. Sanitary Landfill	*	2.3	13.0	74.5	4	71	409
44186	Mesquite Power Operations LLC		22.1	190.5	56.8	151	1,362	428
43530	New Harquahala Gen Co.		4.5	38.8	28.1	79	707	521
20706	New Wincup Holdings Inc.		156.5	11.4	2.6	860	66	15
1879	Northwest Regional Landfill	*	48.5	21.1	96.4	89	116	530
1331	Oak Canyon Inc.		100.6			774		
52382	Ocotillo Power Plant		4.5	76.4	13.0	32	609	103
42956	Redhawk Generating Facility		6.0	153.5	156.8	48	1,072	1,104
303	Rexam Beverage Can Co.	*	117.3	4.8	4.1	670	25	21
3315	Santan Generating Station		7.9	211.8	100.5	71	2,174	937
4175	SFPP LP Phoenix Terminal	*	114.2	3.6	8.2	627	23	48
3316	SRP Agua Fria Generating Stn.		2.0	44.6	29.5	38	765	581
3317	SRP Kyrene Generating Station		1.6	42.0	20.4	11	415	204
1210	Trendwood Inc.	*	40.6			313		
	Totals:		**702.3**	**1,604.6**	**1,360.8**	**4,421**	**13,839**	**12,084**

* = Facility for which rule effectiveness has been applied to one or more reported processes.

2.5 Emission reduction credits (ERCs)

A major source or major modification planned in a nonattainment 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 increased emissions 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.

In order for these emission reductions to be available in the future for offsetting, they must: (1) be explicitly included and quantified as growth in projection-year inventories required in rate of progress plans or attainment demonstrations that were based on 1990 actual inventories, and (2) meet the requirements outlined in MCAQD Rule 240 (renamed "Federal Major New Source Review [NSR]" in early 2016). Table 2.5–1 provides a list of emission reduction credits for VOC, NO_x, and CO.

Table 2.5–1. Available Emissions Reduction Credits (ERCs) as of December 31, 2014.

		Emission reduction credits (tons/yr)		
Facility name	**Reduction date**	**VOC**	**NO_x**	**CO**
Freescale Semiconductor, Inc.	3/1/2004	17.1	9.8	14.3
Intel Corporation	3/4/2005	178.33		
Madison 51, LLC (Thornwood)	10/8/2012	53.1		
Penn Racquet Sports Inc.	3/6/2009		4.34	
Woodstuff Manufacturing Inc.	11/30/2007	17.6		
Totals:		**266.13**	**14.14**	**14.3**

A number of facilities have been identified as potential sources of ERCs for NO_x or VOC, in addition to those listed in Table 2.5–1. The companies listed in Table 2.5–2 below are permitted facilities that have permanently closed since 2011, and whose annual emissions history indicates that the facility is a potential source of the source of additional ERCs. This list is provided here in order to maintain the availability of these emissions in this periodic inventory in the event that sufficient documentation can be secured to confirm the emissions reductions.

Table 2.5–2. Potential sources of emission reduction credits for VOC or NO_x.

Permit no.	Facility name	City, ZIP	Potential ERCs (tons/yr) VOC	NO_x
100087	Di-Matrix Precision Manufacturing	Phoenix, 85040	17.4	
110178	Saint Gobain Solar Glass Facility	Goodyear, 85338	9.9	
020005	Jabil	Tempe, 85281	8.5	
010233	All Pro Industrial Finishes	Tempe, 85281	8.4	
150049	Artisan Natural Stone Products LLP	Phoenix, 85034	7.8	
010240	Wells Cargo Inc./Haulmark Industries Inc.	Phoenix, 85043	6.0	
110195	Crown Custom Millwork LLC	Phoenix, 85085	5.0	
990152	Wickenburg Oil Company LLC	Wickenburg, 85390	4.2	
020189	American Case & Pedestal Mfg. Co.	Phoenix, 85009	4.0	
990254	Benchmark Electronics Phoenix, Inc.	Phoenix, 85023	2.1	
090003	Phoenix San-Man Inc.	Buckeye, 85326		9.9
010143	Gro-Well Brands Inc.	Phoenix, 85009		8.3
970349	Cemex – Central Ave. Plant	Phoenix, 85041		7.5
090298	Phoenix Brick Yard	Phoenix, 85007		3.1
	Totals:		**73.3**	**28.8**

2.6 Quality assurance/quality control procedures

2.6.1 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 Emissions 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 A). The EI Unit asks sources to verify and update the data. The EI Unit also holds numerous workshops each spring to assist businesses in completing EI forms. The general data flow for data collection and inventory preparation is shown in Figure 2.6–1.

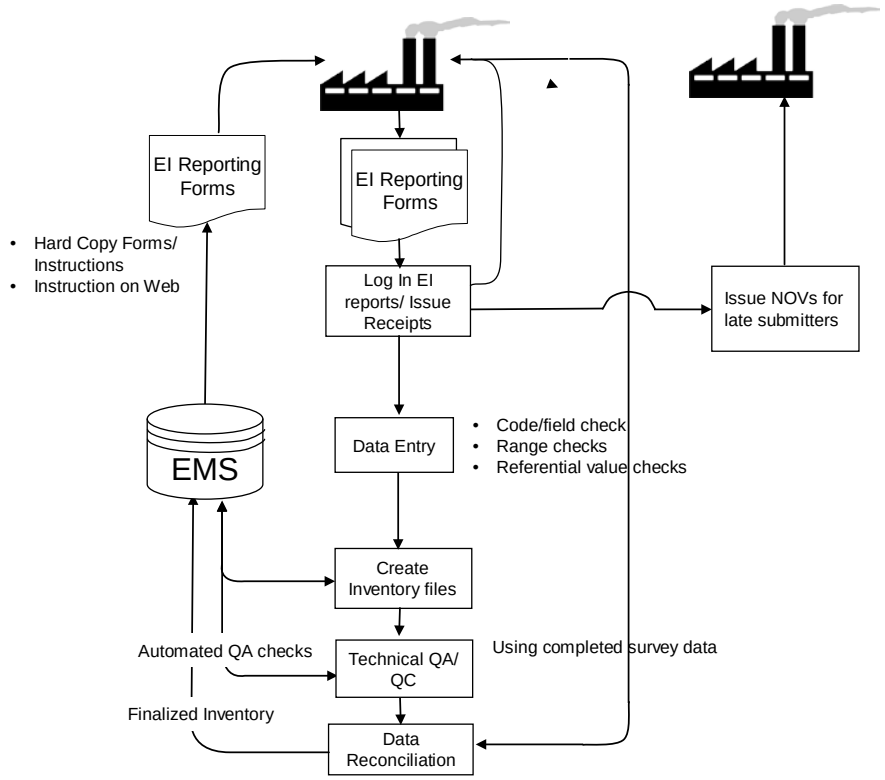


Figure 2.6–1. Data flow for annual point source emissions inventory reporting.

2.6.2 Submission processing

Submitted EI reports are logged in as they are received, and receipts are issued for any emissions fees paid. The data are input "as received" into the department's data base. During data entry, a variety of 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 completeness of required data, and
- checking the report for calculation errors. This includes annual throughput, emission factors, unit conversion factors (e.g., therms to MMCF), capture efficiency, primary / secondary control device efficiency, and any offsite recycling credits claimed.

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 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 EPA.

To prepare the inventory for submittal to the National Emissions Inventory (NEI), the EI Unit has developed a series of MS-Access queries to extract data from EMS; and to append or convert codes, units of measure, etc., in order to create staging tables that adhere to the EPA's Consolidated Emissions Reporting Schema (CERS). These tables are then converted to XML files using EPA's Bridge conversion tool for submittal to the EPA's Emissions Inventory System (EIS).

2.6.3 Analysis of annual point source emissions data for this inventory

Air quality planning staff 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. Quality assurance checks were conducted by checking all emissions reports submitted to MCAQD for the year 2014 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 2014 annual emissions report.

2.7 Summary of all point source emissions

Table 2.7–1 below summarizes annual and season-day emissions from all point sources, including the existing and potential emission reduction credits listed above in Tables 2.5–1 and 2.5–2 respectively, for both Maricopa County and the 8-hour ozone nonattainment area.

Table 2.7–1. Annual and season-day point source emissions (including all emission reduction credits).

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1,041.8	1,647.6	1,375.1	6,281	14,074	12,163
8-hr ozone NAA	1,041.8	1,647.6	1,375.1	6,281	14,074	12,163

2.8 References

US EPA, 2008. Air Emissions Reporting Requirements. 73 Fed. Reg. 76539 (Dec. 17, 2008). *https://federalregister.gov/a/E8-29737*

US EPA, 2015. Revisions to the Air Emissions Reporting Requirements: Revisions to Lead (Pb) Reporting Threshold and Clarifications to Technical Reporting Details. 80 Fed. Reg. 8787 (Feb. 19, 2015). *https://federalregister.gov/a/2015-03470*

3. Area (Nonpoint) 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. A variety of US EPA guidance materials were evaluated to identify area source categories meriting inclusion in this inventory, including the 2014 National Emissions Inventory (NEI) website (US EPA, 2016); documentation of the development of the previous NEI in 2011 (US EPA, 2015); and the document "Introduction to Area Source Inventory Development" (US EPA, 2001a). In addition, permit and emissions data in the MCAQD's Environmental Management System (EMS) database were analyzed to identify critical point and area source categories. Some source categories were deemed "insignificant" because there are no large production facilities and/or very few small sources, and thus emissions from these categories were not quantified.

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

- For those source categories with detailed emissions data available from most or all of the significant sources in the category (e.g., aircraft engine testing), annual and season-day emissions were calculated based on detailed process-level and operational data provided by these sources.
- 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 those source categories in which some representative facilities submit annual emissions reports (e.g., bakeries), these detailed data were used to develop a per-employee emission factor, which was then used along with County-level employment data from the US Census to "scale up" those emissions reported from the subset of surveyed facilities, to reflect emissions from the entire source category.
- For a small number of particularly ubiquitous or diverse categories (e.g., consumer solvent use), emissions estimated using published or recommended per-capita (or per-employee) emission factors.
- Emissions estimates for some categories were obtained from County-level emissions estimates developed by US EPA for use in the 2014 National Emissions Inventory, or by using related emissions estimation tools developed by US EPA (e.g., residential wood combustion).

The specific emissions estimation method(s) used for each source category, including the derivation and application of rule effectiveness, are described in greater detail in the respective sections. Emissions estimates for several source categories were conducted by staff from the consulting firm ERG (www.erg.com) under a contract with MCAQD.

3.2 Fuel combustion

3.2.1 Industrial fuel combustion

3.2.1.1 Industrial distillate oil

Annual emissions from industrial distillate oil combustion were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). US EPA developed separate estimates for emissions from external combustion sources (boilers) and internal combustion engines, for each county nationwide. Annual emissions for the 8-hour ozone nonattainment area were estimated by apportioning Maricopa

County's emissions to the nonattainment area, using the ratio of industrial employment (99.20%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual emissions for Maricopa County and 8-hour ozone nonattainment area are presented in Table 3.2–1.

Table 3.2–1. Annual emissions (tons/yr) from area-source industrial distillate oil combustion.

	Maricopa County			8-hr ozone nonattainment area		
Equipment type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Boilers	1.0	96.1	24.0	1.0	95.3	23.8
Engines	134.5	1,934.4	416.3	133.4	1,918.9	413.0
Totals:	**135.5**	**2,030.5**	**440.3**	**134.4**	**2,014.2**	**436.8**

To calculate season-day emissions, it was assumed that industrial combustion of distillate oil occurs six days per week, and is relatively uniform throughout the year. Thus annual emissions were divided by 312 (= 6 days/week × 52 weeks/year) to derive emissions for an ozone season day. Season-day emissions for Maricopa County and the 8-hour ozone nonattainment area are presented in Table 3.2–2.

Table 3.2–2. Season-day emissions (lbs/day) from area-source industrial distillate oil combustion.

	Maricopa County			8-hr ozone nonattainment area		
Equipment type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Boilers	6	616	154	6	611	153
Engines	862	12,400	2,669	855	12,301	2,647
Totals:	**868**	**13,016**	**2,823**	**861**	**12,912**	**2,800**

3.2.1.2 Industrial natural gas

Annual emissions from industrial natural gas combustion were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). To calculate season-day emissions, it was assumed that industrial natural gas combustion occurs six days per week, and is relatively uniform throughout the year. Thus annual emissions were divided by 312 (= 6 days/week × 52 weeks/year) to derive emissions for an ozone season day.

Emissions for the 8-hour ozone nonattainment area were estimated by apportioning County-level emissions to the nonattainment area, using the ratio of industrial employment (99.20%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual and season-day emissions for Maricopa County and the 8-hour ozone NAA are shown in Table 3.2–3.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	40.7	740.1	621.7	261	4,744	3,985
8-hr ozone nonattainment area	40.4	734.2	616.7	259	4,706	3,953

3.2.1.3 Industrial liquefied petroleum gas (LPG)

Annual emissions from industrial LPG combustion were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). To calculate season-day emissions, it was assumed that industrial LPG combustion occurs six days per week, and is relatively uniform throughout the year. Thus annual emissions were divided by 312 (= 6 days/week × 52 weeks/year) to derive emissions for an ozone season day.

Emissions for the 8-hour ozone nonattainment area were estimated by apportioning County-level emissions to the nonattainment area, using the ratio of industrial employment (99.20%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual and season-day emissions for Maricopa County and the 8-hour ozone NAA are shown in Table 3.2–4.

Table 3.2–4. Annual and season-day emissions from area-source industrial LPG combustion.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1.9	52.1	29.2	12	334	187
8-hr ozone nonattainment area	1.9	51.7	29.0	12	332	186

3.2.2 Commercial/institutional fuel combustion

3.2.2.1 Commercial/institutional distillate oil

Annual emissions from commercial/institutional distillate oil combustion were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). US EPA develops separate estimates for emissions from external combustion sources (boilers) and internal combustion engines, for each county nationwide.

Annual emissions for the 8-hour ozone nonattainment area were estimated by apportioning Maricopa County's emissions to the nonattainment area, using the ratio of commercial/ institutional employment (99.93%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual emissions for Maricopa County and 8-hour ozone nonattainment area are presented in Table 3.2–5.

Table 3.2–5. Annual emissions (tons/yr) from area-source commercial/institutional distillate oil combustion.

	Maricopa County			8-hr ozone nonattainment area		
Equipment type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Boilers	0.0	2.8	0.7	0.0	2.8	0.7
Engines	0.3	4.4	1.0	0.3	4.4	1.0
Totals:	**0.3**	**7.2**	**1.7**	**0.3**	**7.2**	**1.7**

To calculate season-day emissions, it was assumed that industrial combustion of distillate oil occurs six days per week, and is relatively uniform throughout the year. Thus annual emissions were divided by 312 (= 6 days/week × 52 weeks/year) to derive emissions for an ozone season day. Season-day emissions for Maricopa County and the 8-hour ozone nonattainment area are presented in Table 3.2–6.

Table 3.2–6. Season-day emissions (lbs/day) from area-source commercial/institutional distillate oil combustion.

	Maricopa County			8-hr ozone nonattainment area		
Equipment type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Boilers	0	18	4	0	18	4
Engines	2	28	6	2	28	6
Totals:	**2**	**46**	**10**	**2**	**46**	**10**

3.2.2.2 Commercial/institutional natural gas

Annual emissions from commercial/institutional natural gas combustion were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). To calculate ozone season-day emissions, it was assumed that commercial/institutional natural gas combustion occurs six days per week, and is relatively uniform throughout the year. Thus annual emissions were divided by 312 (= 6 days/week × 52 weeks/year) to derive emissions for an ozone season day.
Emissions for the 8-hour ozone nonattainment area were estimated by apportioning County-level emissions to the nonattainment area, using the ratio of commercial/institutional employment (99.93%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual and season-day emissions for Maricopa County and the 8-hour ozone nonattainment area are presented in Table 3.2–7.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	62.0	1,126.8	946.5	397	7,223	6,068
8-hr ozone nonattainment area	61.9	1,126.0	945.9	397	7,218	6,063

3.2.3 Residential fuel combustion

3.2.3.1 Residential distillate oil

Annual emissions from residential distillate oil combustion were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). The 2014 NEI utilized 2013 state-level fuel consumption data from Energy Information Administration's (EIA) State Energy Data System (SEDS) (EIA, 2016). State-level emissions were calculated using the EIA data and allocated to the counties based on state-level and county-level data on number of housing units using a specific type of fuel for residential heating from the U.S. Census Bureau. ERG reviewed potential sources of activity data for 2014

to update the emission estimates for Maricopa County. Fuel consumption data for 2014 are available from EIA's SEDS, but the 2014 residential distillate fuel consumption data for Arizona were unchanged from the 2013 data that were used in the 2014 NEI.

Ozone season-day emissions would normally be calculated by dividing ozone season emissions by heating degree days (i.e. the number of degrees per day that the daily average temperature is below 65 °F). However, data obtained from National Oceanic and Atmospheric Administration (NOAA, 2016) indicated that there were no heating degree days reported during the 2014 ozone season (June–August). Therefore, ozone season-day emissions from residential distillate oil combustion are assumed to be zero.

Annual and season-day emissions within the 8-hour ozone nonattainment area were calculated by multiplying county totals by the ratio of total resident population in the nonattainment area to the total resident population in the county (100.79%). See Section 1.5.1 for a discussion of the population data used. The resulting annual and season-day emissions estimates are presented in Table 3.2–8.

Table 3.2–8. Annual and season-day emissions from residential distillate oil combustion.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.0	0.3	0.1	0	3	1
8-hr ozone nonattainment area	0.0	0.3	0.1	0	0	0

3.2.3.2 Residential natural gas

All natural gas suppliers in Maricopa County were surveyed to gather information regarding the volume of natural gas sold in 2014, by user category, within the county. Annual emissions from residential natural gas combustion were calculated by multiplying residential natural gas sales in 2014 (16,532.9 MMCF) by EPA-recommended emission factors from WebFIRE (US EPA, 2015).

Ozone season-day emissions were calculated by first summing monthly reported natural gas usage during the ozone season months (June–August; 1,979.5 MMCF) to derive a total ozone season emissions value. Activity for this source category was assumed to occur evenly, both on a weekly and annual basis. Total ozone-season emissions were thus divided by the total days (92) during the ozone season to derive season-day emissions.

Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying county-level emissions by the ratio of total resident population in the nonattainment area to the total resident population in the county (100.79%). See Section 1.5.1 for a discussion of the population data used. Table 3.2–9 below summarizes annual and ozone season-day emissions from residential natural gas combustion for both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.2–9. Annual and season-day emissions from residential natural gas combustion.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	45.5	777.0	330.7	118	2,023	861
8-hr ozone nonattainment area	45.8	783.2	333.3	119	2,038	867

3.2.3.3 Residential liquefied petroleum gas (LPG)

Annual emissions from residential LPG combustion were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). The 2014 NEI utilized 2013 state-level fuel consumption data from Energy Information Administration's (EIA) State Energy Data System (SEDS). ERG reviewed potential sources of activity data for 2014 to update the emission estimates for Maricopa County. Fuel consumption data for 2014 are available from EIA's SEDS (EIA 2016) and indicate 1,004,000 barrels of LPG consumed in the residential sector in Arizona. State-level emissions were then allocated to Maricopa County based on the ratio of housing units that utilize LPG at the county-level to state-level. Data used in the 2014 NEI indicate that approximately 15% of all households using LPG in the state of Arizona are located in Maricopa County.

Ozone season emissions would normally be calculated by applying the ratio of heating degree days (HDD) in the ozone season (June-August) to total annual HDD. However, data obtained from National Oceanic and Atmospheric Administration (NOAA, 2016) indicated that there were no heating degree days reported during the 2014 ozone season (June–August). Thus, ozone season-day emissions from residential LPG combustion are assumed to be zero.

Annual and season-day emissions within the 8-hour ozone nonattainment area were calculated by multiplying county-level emission estimates by the nonattainment-area/county ratio of total resident population (100.79%). See Section 1.5.1 for a discussion of the population data used. Table 3.2–10 summarizes annual and ozone season-day emissions from residential LPG combustion for both the county and the 8-hour ozone nonattainment area.

Table 3.2–10. Annual and season-day emissions from residential LPG combustion.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1.6	41.5	11.8	15	391	111
8-hr ozone nonattainment area	1.6	41.8	11.8	0	0	0

3.2.3.4 Residential kerosene

County-level emission estimates that were developed for use in US EPA's 2014 National Emissions Inventory (NEI) were obtained and reviewed (US EPA, 2016). The 2014 NEI utilized 2013 state-level fuel consumption data from Energy Information Administration's (EIA) State Energy Data System (SEDS) (EIA, 2016). The 2013 fuel consumption data for Arizona indicated no kerosene consumption in the residential sector; therefore, the 2014 NEI emission estimates for Arizona and Maricopa County were also zero.

ERG reviewed available activity data sources for 2014 at the state-level and county-level. Review of Arizona data downloaded from SEDS for 2014 (EIA 2016) indicated zero consumption of kerosene in the residential sector for the entire state of Arizona (and Maricopa County). Since the available activity data indicates that there is no kerosene consumption in the residential sector for Arizona, the emissions from this source category are considered to be zero.

3.2.3.5 Residential wood combustion

Annual emissions from residential wood combustion were derived from the county-level estimates prepared by EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). County-level annual emissions by appliance type are shown in Table 3.2–11.

Table 3.2–11. Annual emissions from residential wood combustion (RWC) in Maricopa County, by appliance type (from EPA's RWC emissions-estimation tool).

		Annual emissions (tons/yr)		
SCC	**Appliance type**	**VOC**	**NO_x**	**CO**
2104008210	Woodstove: fireplace inserts; non-EPA certified	143.5	19.7	1,130.9
2104008220	–Fireplace inserts; EPA certified; non-catalytic	198.4	10.5	864.2
2104008230	–Fireplace inserts; EPA certified; catalytic	29.4	5.6	345.3
2104008310	–Freestanding, non-EPA certified	10.9	1.5	75.8
2104008320	–Freestanding, EPA certified, non-catalytic	592.0	31.3	2,578.0
2104008330	–Freestanding, EPA certified, catalytic	166.2	31.6	1,950.3
2104008400	–Pellet-fired, general	138.5	18.5	964.0
2104008610	Hydronic heater: outdoor	10.4	18.0	75.3
2104008700	Outdoor wood burning device, NEC	4.0	0.6	31.5
2104009000	Residential firelog	98.9	19.2	312.6
Totals:		**1,392.2**	**156.3**	**8,328.1**

Ozone season-day emissions would normally be calculated by dividing ozone season emissions by heating degree days (i.e. the number of degrees per day that the daily average temperature is below 65 °F). However, data obtained from National Oceanic and Atmospheric Administration (NOAA, 2016) indicated that there were no heating degree days reported during the 2014 ozone season (June–August). Therefore, ozone season-day emissions from residential wood combustion are assumed to be zero.

Annual and season-day emissions within the 8-hour ozone nonattainment area were calculated by multiplying county-level emissions totals by the ratio of total population in the nonattainment area to the total population in the county (100.79%). See Section 1.5.1 for a further discussion of the population data used. Table 3.2–12 summarizes annual and season-day emissions from residential wood combustion for both the county and the 8-hour ozone nonattainment area.

Table 3.2–12. Annual and season-day emissions from residential wood combustion.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1,392.2	156.3	8,328.1	0	0	0
8-hr ozone nonattainment area	1,403.2	157.6	8,393.8	0	0	0

3.3 Industrial processes

3.3.1 Chemical manufacturing

Historically, emissions from chemical manufacturing were calculated for the periodic emissions inventory by the "scaling up" method as described elsewhere in this report. However, the sample size for the 2014 periodic emissions inventory was not large enough to calculate an accurate and reliable result. Therefore, data from the 2011 periodic emissions inventory (MCAQD, 2014) were grown to 2014 based on industrial employment levels for those two years.

Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used. Table 3.3–1 summarizes annual and season-day emissions from chemical manufacturing in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.3–1. Annual and season-day VOC emissions from area-source chemical manufacturing.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	69.1	535
8-hr ozone nonattainment area	68.6	531

3.3.2 Food and kindred products

3.3.2.1 Commercial cooking

Emissions from commercial cooking were estimated for five types of commercial cooking equipment using county-level estimates prepared for use in U.S. EPA's 2014 National Emissions Inventory (NEI) data and documentation (U.S. EPA, 2016). The 2014 NEI estimates were developed using 2013 activity data from the U.S. Census Bureau. The equipment types for which emissions were estimated included: chain-driven charbroilers, under-fired charbroilers, deep-fat fryers, flat griddles, and clamshell griddles.

Maricopa County population data for 2013 and 2014 were obtained from the Arizona Department of Administration (ADOA, 2016). The population data indicated population growth of 1.6% from 2013 to 2014. This growth factor was then applied to the county-level estimates from the 2014 NEI to develop emission estimates for Maricopa County for 2014. The 2014 NEI estimates for the commercial cooking source category did not include NO_x.

Commercial cooking activity is assumed to occur uniformly throughout the year. Therefore, average season-day emissions were developed by dividing the annual emissions by 365 (i.e., ozone season-day emissions are the same as average season-day emissions). The results are shown in Table 3.3–2.

Table 3.3–2. Annual and season-day emissions from commercial cooking equipment in Maricopa County.

	Annual emissions (tons/yr)		Ozone season-day emissions (lbs/day)	
Equipment type	**VOC**	**CO**	**VOC**	**CO**
Chain-driven charbroilers	44.3	148.1	243	811
Under-fired charbroilers	146.3	478.4	801	2,622
Deep-fat fryers	22.9		125	
Flat griddles	19.3	39.8	106	218
Clamshell griddles	0.8		4	
Totals:	**233.5**	**666.3**	**1,279**	**3,651**

Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the county totals by the ratio of total resident population in the nonattainment area to the total resident population in the county (100.79%). 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 the 8-hour ozone nonattainment area.

Table 3.3–3. Annual and season-day emissions from commercial cooking equipment in the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)		Ozone season-day emissions (lbs/day)	
Equipment type	**VOC**	**CO**	**VOC**	**CO**
Chain-driven charbroilers	44.7	149.2	245	818
Under-fired charbroilers	147.4	482.2	808	2,642
Deep-fat fryers	23.0		126	
Flat griddles	19.4	40.1	106	220
Clamshell griddles	0.8		4	
Totals:	**235.3**	**671.5**	**1,289**	**3,680**

3.3.2.2 Bakeries

Emissions from area-source bakeries were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources and County-level employment data from the US Census Bureau (2013) to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category.

The most recent data from the US Census Bureau's County Business Patterns (CBP) for 2013 employment were used. (Where employment estimates were provided as a range of values, the midpoint was used.) CBP estimates for Maricopa County employment in NAICS codes 311812 and 31183 (Commercial Bakeries and Tortilla Manufacturing) to total 2,401 persons. There were no point sources in this category, thus all emissions from this source category are reported as area sources. Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals.

Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county. Results are summarized in Table 3.3–4. See section 1.5.1 for a discussion of the employment data used.

Table 3.3–4. Annual and season-day VOC emissions from area-source bakeries.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	112.4	661
8-hr ozone nonattainment area	111.5	656

3.3.3 Secondary metal production

Annual and season-day emissions from secondary metal production facilities were derived from annual emissions reports from permitted sources. As this category consists primarily of foundries, it was assumed that there were no significant unpermitted sources within Maricopa County. Since all facilities considered in this section are located within the 8-hour ozone nonattainment area, total emission values for the county and the nonattainment area from secondary metal production are equal. Annual and season-day emissions are shown in Table 3.3–5.

Table 3.3–5. Annual and season-day emissions from area-source secondary metal production.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	65.9	55.1	671.6	467	482	5,936
8-hr ozone nonattainment area	65.9	55.1	671.6	467	482	5,936

3.3.4 Rubber and plastic product manufacturing

Emissions from area-source rubber and plastic product manufacturing facilities were calculated by the “scaling up” method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2013) to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category. The most recent data from the US Census Bureau’s County Business Patterns (CBP) for 2013 employment were used. Where CBP employment estimates were presented as a range, the midpoint values were chosen for these calculations. Table 3.3–6 lists the NAICS codes and employment data used to calculate emissions from rubber and plastic product manufacturing facilities.

Table 3.3–6. County employment for rubber and plastic product manufacturing, by NAICS code.

NAICS	NAICS description	Employment
325211	Plastics material and resin manufacturing	199
326199	All other plastic product manufacturing	2,120
326212	Tire retreading	61
326299	All other rubber product manufacturing	140
332313	Plate work manufacturing	85
336413	Other aircraft parts and aux. equipment manufacturing	1,257
339113	Surgical appliance and supplies manufacturing	372
339115	Ophthalmic goods manufacturing	90
42313	Tire and tube merchant wholesalers	397
42393	Recyclable material merchant wholesalers	1,558
44131	Automotive parts and accessories stores	3,613
44132	Tire dealers	2,455
Total:		**12,347**

Some facilities in this category have been categorized as point sources, and thus their emissions are accounted for in Chapter 2. To avoid double-counting, reported total employment at individual point sources is subtracted from estimated County employment levels.
Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county. See Section 1.5.1 for a discussion of the employment data used. Table 3.3–7 below summarizes annual and season-day emissions from area source rubber and plastic product manufacturing.

Table 3.3–7. Annual and season-day VOC emissions from area-source rubber and plastic product manufacturing.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	928.8	7,763
8-hr ozone nonattainment area	921.4	7,701

3.3.5 Fabricated metal products manufacturing

Emissions from fabricated metal products manufacturing were calculated by the "scaling up" method as described in EPA emission inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources and county-level employment data from the US Census Bureau (2013) to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category.

The most recent data from the US Census Bureau's County Business Patterns (CBP) for 2013 employment were used. CBP employment data for NAICS code 332 (fabricated metal products manufacturing) indicated that there were 14,662 employees in this industry in Maricopa County.

Since there were no point sources in this category, an area-source employment estimate of 14,662 was used to "scale up" emissions reported from those facilities surveyed in 2014.

Season-day emissions are calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage of industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used. Table 3.3–8 summarizes annual and season-day emissions from fabricated metal products manufacturing in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.3–8. Annual and season day VOC emissions from area-source fabricated metal products manufacturing.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	19.2	92
8-hr ozone nonattainment area	19.0	91

3.3.6 Electrical equipment manufacturing

Annual and season-day emissions from electric equipment manufacturing were derived from annual emissions 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.

As all facilities addressed in this source category are located within the 8-hour ozone nonattainment area, emission totals for both areas are equal. Annual and season-day emissions are shown in Table 3.3–9.

Table 3.3–9. Annual and season-day emissions from area-source electric equipment manufacturing.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	223.6	24.3	7.5	1,280	135	41
8-hr ozone nonattainment area	223.6	24.3	7.5	1,280	140	42

3.3.7 Industrial processes not elsewhere classified

Annual area-source emissions from other industrial processes not elsewhere classified (NEC) were derived primarily 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. Ozone season-day emissions were calculated based on operating schedule information provided by individual facilities through MCAQD's annual emissions reporting

program. Emissions estimates for the 8-hour ozone nonattainment area were derived using data on the location of the facilities that report other industrial processes.

In addition, emissions from ADEQ-permitted sources are included in this category due to a lack of specificity regarding the nature of the reported emissions. As a conservative estimate, all of these emissions were assumed to occur within the 8-hour ozone nonattainment area. Estimates of total emissions from this source category are presented in Table 3.3–10.

Table 3.3–10. Annual and season-day emissions from industrial processes not elsewhere classified.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	71.4	452.2	273.7	407	2,478	1,532
8-hr ozone nonattainment area	70.3	452.2	273.7	397	2,478	1,470

3.4 Solvent use

3.4.1 Surface coating

3.4.1.1 Architectural coatings

VOC emissions from architectural coatings were calculated using a per-capita emission factor developed and used by EPA for the 2008 NEI (US EPA, Date. 2008 NEI Version 3 Technical Support Documentation, supporting Data and Summaries). Because Maricopa County Rule 335 contains an emission limit for coatings, the "controlled" VOC emission factor (2.41 lbs/person) was used.

Annual VOC emissions for architectural coating for both Maricopa County and the 8-hour ozone nonattainment area were calculated by multiplying the per-capita emission factor by the county and nonattainment area population values. See Section 1.5.1 for a discussion of the population data used.

Ozone season-day emissions were developed using default assumptions from EIIP (US EPA, 1995a). The seasonal factor for ozone season architectural coating activity was assumed to be 28 percent of annual activity. In addition, it was assumed that coating use may take place 7 days a week during the ozone season. Thus, season-day emissions were calculated by multiplying annual VOC emissions by the seasonal factor and then dividing the results by 92 days per season. Table 3.4–1 presents the assumptions used as well as annual and season-day VOC emissions from architectural coatings for Maricopa County and the 8-hour ozone nonattainment area.

Table 3.4–1. Annual and season-day VOC emissions from architectural coating.

Geographic area	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Maricopa County	5,215.8	31,748
8-hr ozone nonattainment area	5,260.0	32,017

3.4.1.2 Auto refinishing

Annual emissions from auto refinishing were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). Activity for this source category is assumed to occur uniformly throughout the year and take place 7 days per week. Thus, season-day emissions were estimated by dividing annual emissions by 365 days/year. Annual and season-day emissions for the 8-hour ozone nonattainment area were derived by applying the ratio of industrial employment in the nonattainment area and Maricopa County (99.20%). (See Section 1.5.1 for a discussion of the employment data used). Emissions for both Maricopa County and the nonattainment area are shown in Table 3.4–2.

Table 3.4–2. Annual and season-day VOC emissions from auto refinishing.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	958.3	5,251
8-hr ozone nonattainment area	950.6	5,209

3.4.1.3 Traffic markings

Annual emissions from traffic markings were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). Ozone season-day emissions during the ozone season for Maricopa County and the 8-hour ozone nonattainment area were calculated assuming 33 percent of annual activity occurred during the ozone season (13 weeks per year) and a typical activity level of 5 days per week (US EPA, 1997). Annual and season-day emissions in the 8-hour ozone nonattainment area were calculated by applying the ratio of industrial employment in the nonattainment area to county-level emission calculations (99.20%). (See Section 1.5.1 for a discussion of employment data used).

Table 3.4–3. Annual and season-day VOC emissions from traffic markings.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	441.0	4,478
8-hr ozone nonattainment area	437.5	4,442

3.4.1.4 Factory-finished wood

Emissions from factory-finished wood coating were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2013) to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category.

The most recent data from the US Census Bureau's County Business Patterns (CBP) for 2013 employment were used. Where CBP employment estimates were presented as a range, the midpoint value was chosen for these calculations. Table 3.4–4 shows the NAICS codes and employment data used to calculate emissions from factory-finished wood surface coating.

Table 3.4–4. County employment for factory-finished wood coating, by NAICS code.

NAICS	NAICS description (and employment range)	Employment
321911	Wood window & door manufacturing	283
321918	Other millwork	129
337212	Custom architectural woodwork & millwork mfg.	591
337215	Showcase, partition, shelving & locker manufacturing	233
337920	Blind & shade manufacturing (100–249)	175
Total:		**1,411**

Since there were no point sources in this category, the area-source employment estimate was used to "scale up" emissions reported from those facilities surveyed in 2014.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county (99.20%). See Section 1.5.1 for a discussion of the employment data used. Table 3.4–5 summarizes annual and season-day VOC emissions from factory-finished wood surface coating in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.4–5. Annual and season-day VOC emissions from area-source factory-finished wood surface coating.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	193.6	1,616
8-hr ozone nonattainment area	192.1	1,603

3.4.1.5 Industrial surface coating

Annual emissions from industrial surface coating were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016).

Industrial surface coating is assumed to occur uniformly throughout the year, therefore, it was assumed that 25% of annual activity occurs during the ozone season, and that activity occurs 7 days/week. Thus, season-day emissions were estimated by multiplying annual emissions by 25% then dividing the result by 92 days. Annual and season-day emissions in the 8-hour ozone nonattainment area were calculated by applying the ratio of industrial employment in the non-attainment area to county-level emission calculations (99.20%). (See Section 1.5.1 for a discussion of the employment data used). Results are shown in Table 3.4–6 below.

Table 3.4–6. Annual and season-day VOC emissions from industrial surface coating.

	Maricopa County		8-hour ozone NAA	
Product category	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Wood furniture	666.4	1,052	661.1	1,044
Metal furniture: SIC 25	59.8	3,622	59.3	3,593
Paper: SIC 26	51.3	325	50.8	322
Metal cans: SIC 341	183.2	279	181.8	276
Machinery and equipment: SIC 35	58.2	996	57.7	988
Large appliances: SIC 363	35.5	316	35.2	314
Electronic & other electrical: SIC 36	4.2	193	4.2	191
Motor vehicles: SIC 371	183.0	23	181.5	23
Marine: SIC 373	3.5	358	3.4	355
Railroad: SIC 374	5.1	19	5.1	19

3.4.1.6 Aircraft surface coating

Emissions from aircraft surface coating facilities were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2013) to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category.

The most recent data from the US Census Bureau's County Business Patterns (CBP) for 2013 employment were used. CBP employment data for NAICS code 3364 (Aerospace Product and Parts Manufacturing) indicated that there were 12,272 employees in this industry in Maricopa County. Since there were no point sources in this category, an area-source employment estimate of 12,272 was used to "scale up" emissions reported from those facilities surveyed in 2014.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county (99.57%). See Section 1.5.1 for a discussion of the employment data used.

Table 3.4–7 summarizes annual and season-day emissions from aircraft surface coating in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.4–7. Annual and season-day VOC emissions from area-source aircraft surface coating.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	65.8	473
8-hr ozone nonattainment area	65.8	473

3.4.1.7 Miscellaneous surface coating

Area-source VOC emissions from miscellaneous surface coating were estimated by a "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions and employment data from Maricopa County permitted facilities to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category

The typical "scale-up" methodology was revised slightly for this source category for a number of reasons. First, miscellaneous surface coating activity occurs, at some level, across an exceptionally broad spectrum of industries, both industrial and commercial/institutional. Additionally, annual emissions reports may be inconsistent in how activities are reported, and it is uncertain if all relevant activities are categorized as "miscellaneous surface coating" vs. some other category (e.g., manufacturing). Estimating total emissions from miscellaneous surface coating based on county employment by NAICS code (for which employment data are often presented only as a broad range), or all industrial employment (including industries which have little or no miscellaneous surface coating activities) would therefore be misleading and lead to an over-estimate of area-source emissions from this source category. Instead, the list of Standard Industrial Classification (SIC) codes used by facilities that reported miscellaneous surface coating activities was conservatively assumed to represent the "universe" of businesses that could possibly have significant miscellaneous surface coating activity. To avoid double-counting, employment at point sources was subtracted from total employment within these SIC categories.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county (99.2%). See Section 1.5.1 for a discussion of the employment data used.

Table 3.4–8 summarizes annual and season-day VOC emissions from area-source miscellaneous surface coating in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.4–8. Annual and season-day VOC emissions from miscellaneous surface coating.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	201.1	1,443
8-hr ozone nonattainment area	159.6	1,299

3.4.2 Degreasing

Area-source VOC emissions from degreasing were estimated by a "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions and employment data from Maricopa County permitted facilities to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category.

The typical "scale-up" methodology was revised slightly for this source category for a number of reasons. First, degreasing activity occurs at some level across a wide spectrum of industries, both industrial and commercial/ institutional. Additionally, annual emissions reports may be inconsistent in how activities are reported and it is uncertain if all relevant activities are categorized as "degreasing" vs. some other category (e.g., manufacturing). Estimating total emissions from degreasing based on county employment by NAICS code (for which employment data are often presented only as a broad range), or all industrial employment (including industries which have little or no degreasing activities) would therefore be misleading and lead to an over-estimate of area-source emissions from this source category.

Instead, the list of SIC codes used by businesses that reported degreasing activities was conservatively assumed to represent the "universe" of businesses that could possibly have significant degreasing activity. To avoid double-counting, employment at point sources was subtracted from total employment within these SIC.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage of industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used.

Table 3.4–9 summarizes annual and season-day emissions from area-source degreasing in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.4–9. Annual and season-day VOC emissions from area-source degreasing.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	291.9	1,923
8-hr ozone nonattainment area	289.5	1,908

3.4.3 Dry cleaning

Annual emissions from dry cleaning facilities were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). Based on operating schedule information provided in the facilities' historic annual emissions reports, it is assumed that operations occur evenly throughout the year, 5 days per week, thus season-day emissions were derived by dividing the annual total emissions by 260 (= 5 days/week × 52 weeks/yr).

Annual and season-day emissions estimates for the 8-hour ozone nonattainment area were calculated by multiplying county-level emissions by the ratio of Maricopa County population to nonattainment area population. See Section 1.5.1 for a discussion of the population data used. Table 3.4–10 summarizes the annual and season-day VOC emissions from dry cleaning.

Table 3.4–10. Annual and season-day VOC emissions from dry cleaning.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	10.3	79
8-hr ozone nonattainment area	10.4	80

3.4.4 Graphic arts

Emissions from graphic arts were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2013) to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category.

The most recent data from the US Census Bureau's County Business Patterns (CBP), covering employment in 2013, were used. The CBP employment data for NAICS code 32311 (printing) indicated that there were 3,265 employees in this industry in Maricopa County. Since there were no point sources in this category, an area-source employment estimate of 3,265 was used to "scale up" emissions reported from those facilities surveyed in 2014.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county (99.2%). See Section 1.5.1 for a discussion of the employment data used. Table 3.4–11 summarizes annual and season-day emissions from graphic arts in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.4–11. Annual and season-day VOC emissions from area-source graphic arts sources.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	297.4	2,308
8-hr ozone nonattainment area	295.1	1,908

3.4.5 Miscellaneous industrial solvent use

Area-source VOC emissions from miscellaneous industrial solvent use were estimated by a "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions and employment data from Maricopa County permitted facilities to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category.

The typical "scale-up" methodology was revised slightly for this source category for a number of reasons. First, miscellaneous industrial solvent use occurs at some level across a wide spectrum of industries. Additionally, annual emissions reports may be inconsistent in how activities are reported, and it is uncertain if all relevant activities are categorized as "miscellaneous industrial solvent use" vs. some other category (e.g., manufacturing of a specific product). Estimating total emissions from miscellaneous industrial solvent use based on county employment by NAICS code (for which employment data are often presented only as a broad range), or all industrial employment (including industries which have little or no solvent use activities) would therefore be misleading and lead to an significant under- or overestimates of area-source emissions from this source category.

Instead, the list of SIC codes used by businesses that reported miscellaneous industrial solvent use activities was conservatively assumed to represent the "universe" of businesses that could possibly have significant miscellaneous industrial solvent use activity. To avoid double-counting, employment at facilities treated as point sources (and addressed in Chapter 2) was subtracted from total employment within these SICs.

Ozone season-day emissions were calculated in the same method as annual emissions, using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county. See Section 1.5.1 for a discussion of the employment data used. Table 3.4–12 summarizes annual and season-day VOC emissions from area-source miscellaneous industrial solvent use in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.4–12. Annual and season-day VOC emissions from area-source miscellaneous industrial solvent use.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	201.1	1,443
8-hr ozone nonattainment area	199.5	1,431

3.4.6 Consumer and commercial products

Annual emissions from consumer and commercial products were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). Consumer and commercial products include the following seven product categories: personal care products, household products, automotive aftermarket products, adhesives and sealants, products regulated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), coatings and related products, and miscellaneous products. Emissions from consumer and commercial products were assumed to occur uniformly throughout the year, and occurs 7 days per week. Thus season-day emissions were estimated by dividing annual emissions by 365.

Emissions in the 8-hour ozone nonattainment were based on County-level emissions estimates, and then applying the ratio of total resident population in the nonattainment area to that of Maricopa County (100.85%). See Section 1.5.1 of this report for a discussion of the population data used. Results are shown in Table 3.4–13.

Table 3.4–13. Annual and season-day VOC emissions from consumer and commercial products.

	Maricopa County		8-hour ozone NAA	
Product category	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Personal care	4,013.2	21,990	4,047.3	22,177
Household	4,414.5	24,189	4,452.0	24,395
Automotive aftermarket	2,729.0	14,953	2,752.1	15,080
Coatings and related	1,906.3	10,445	1,922.5	10,534
Adhesives/sealants	1,143.8	6,267	1,153.5	6,320
FIFRA-regulated	3,571.7	19,571	3,602.1	19,737
Miscellaneous	140.5	770	141.7	776
Totals:	**17,918.8**	**98,185**	**18,071.1**	**99,020**

3.4.7 Asphalt application

Asphalt is applied to pave, seal, and repair surfaces such as roads, parking lots, drives, walk-ways, roofs, and airport runways. Asphalt application emissions were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016).

Ozone season-day emissions were calculated by multiplying annual emissions for the ozone-season (June–August) then dividing by 92 days. As a conservative assumption, annual and season-day emissions for the 8-hour ozone nonattainment area are assumed to be equal to Maricopa County emissions.

Table 3.4–14. Annual and season-day VOC emissions from asphalt use, by type.

	Maricopa County		Eight-hour ozone NAA	
Asphalt type	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Cutback	1,004.8	21,844	992.3	21,572
Emulsified	828.2	18,004	817.9	17,780

3.4.8 Agricultural pesticides

Annual emissions from agricultural pesticide usage within Maricopa County were obtained directly from the county-level emission estimates developed for use in the US Environmental Protection Agency's 2014 National Emissions Inventory (NEI) data and documentation (US EPA, 2016). US EPA estimated that 371.0 tons of VOCs were emitted from agricultural pesticide usage in Maricopa County in 2014.

The 2014 NEI used activity data obtained from USGS for 2012 (i.e., county-level pesticide usage for 2012). The 2014 NEI data indicated that approximately 1,589,288 lbs of active ingredient in agricultural pesticides were applied in Maricopa County in 2012. Due to a lack of available data

on temporal resolution, ozone season-day emissions for Maricopa County were calculated by dividing annual emissions by 365 days as activity is assumed to occur uniformly throughout the year.

Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying county totals by the ratio of agricultural land acreage in the nonattainment area to the agricultural land acreage in Maricopa County (58.8%). See Section 1.5.2 for a discussion of the land-use data used to allocate emissions to the 8-hour ozone nonattainment area. Table 3.4–15 presents the annual and ozone season-day VOC estimates for Maricopa County and the 8-hour ozone nonattainment area.

Table 3.4–15. Annual and season-day VOC emissions from agricultural pesticide application.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	371.0	2,033
8-hr ozone nonattainment area	218.1	1,195

3.5 Storage and transport

3.5.1 Portable fuel containers

Annual Maricopa County emissions from area source portable fuel containers (PFCs) were initially obtained from the county-level emission estimates developed for use in the U.S. Environmental Protection Agency's 2014 National Emissions Inventory (NEI) (US EPA, 2016). These calculations identify a total of seven mechanisms by which emissions can be generated from PFCs:

- Emissions associated with filling PFCs at the gas pump:
  - Displacement of the vapor within the PFCs, and
  - Spillage of gasoline while filling the PFCs
- Emissions associated with transporting PFCs:
  - Spillage of gasoline during transport
- Emissions (adjusted for changes in ambient temperature) associated with storage of the gasoline in PFCs:
  - Emissions due to evaporation (i.e., diurnal emissions), and
  - Emissions due to permeation.

Two additional sources of emissions associated with using PFCs to refuel pieces of nonroad equipment are considered by the NONROAD model (described in Chapter 4) and thus not addressed here:

– Displacement of the vapor within nonroad equipment, and
– Spillage of gasoline while filling nonroad equipment.

During review of the 2014 NEI documentation for the portable fuel containers source category, it was identified that the state-level emissions were allocated to counties based on the ratio of county fuel consumption to state fuel consumption. ERG reviewed potential data sources and identified recent county-level motor gasoline sales data available through the Arizona Department of Transportation (ADOT, 2016). These data are developed for every fiscal year (July 1

through June 30) starting from 1990 to present (2015 is the most recent year for which data are available). Using these data, the state-level emissions were re-allocated to the counties. The ADOT motor gasoline fuel sales data indicated that approximately 59.1% of Arizona state motor gasoline sales occurred in Maricopa County.

Ozone season-day emissions for the county were calculated by dividing annual emissions by 365 days as activity is assumed to occur uniformly throughout the year. Annual and ozone season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the county totals by the ratio of total resident population in the nonattainment area to total resident population in the county. See Section 1.5.1 for a discussion of the population data used. Table 3.5–1 presents the annual and season-day VOC estimates for Maricopa County and for the 8-hour ozone nonattainment area.

Table 3.5–1. Annual and season-day VOC emissions from portable fuel containers (PFCs).

	Maricopa County		8-hour ozone NAA	
Emissions source	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Residential PFCs:				
Permeation	99.0	542	99.7	546
Evaporation/diurnal	111.0	608	111.9	613
Spillage during transport	192.6	1,055	194.1	1,064
Vapor displacement in PFCs	34.9	191	35.2	193
Spillage at pump	5.6	31	5.7	31
Subtotal, residential PFCs	**443.1**	**2,428**	**446.6**	**2,447**
Commercial PFCs:				
Permeation	4.3	24	4.4	24
Evaporation/diurnal	3.5	19	3.6	20
Spillage during transport	262.7	1,440	264.8	1,451
Vapor displacement in PFCs	100.6	551	101.4	556
Spillage at pump	10.8	59	10.9	60
Displacement during refueling of nonroad equipment*				
Spillage during refueling of nonroad equipment*				
Subtotal, commercial PFCs	**382.0**	**2,093**	**385.1**	**2,110**
Totals:	**825.2**	**4,522**	**831.7**	**4,557**

*These activities are included in the MOVES2014a model emissions calculations, described in Chapter 4.

3.5.2 Bulk plants

Emissions from this source category were calculated from annual emissions inventory reports from all bulk plants located within the county. It is assumed that there are no unpermitted bulk plants in Maricopa County. Bulk plants are characterized as having a throughput below 7.2 MMgal/year. Ozone season-day emissions were calculated based on operating schedule

information provided in the facilities' annual emissions reports. Since all facilities considered in this section are located within the 8-hour ozone nonattainment area, total emission values for the county and the 8-hour ozone nonattainment area are equal.

Table 3.5–2. Annual and season-day VOC emissions from bulk plants.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	36.2	229
8-hr ozone nonattainment area	36.2	229

3.5.3 Bulk terminals

Emissions from this source category were calculated from annual emissions inventory reports from all bulk terminals located within the county. Bulk terminals are characterized as having a throughput above 7.2 MMgal/year. It is assumed that there are no unpermitted bulk terminals in Maricopa County. To avoid double-counting, emissions from bulk terminals that were treated as point sources (totaling 118.8 tons/yr) are reported in Chapter 2. Ozone season-day emissions were calculated based on operating schedule information provided in the facilities annual emissions reports. Since all facilities considered in this section are located within the 8-hour ozone nonattainment area, total emission values for the county and the 8-hour ozone nonattainment area are equal.

Table 3.5–3. Annual and season-day VOC emissions from bulk terminals.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	91.0	493
8-hr ozone nonattainment area	91.0	493

3.5.4 Gasoline service stations

Stage I emissions from gasoline distribution emissions can be characterized as "Stage I" emissions, which are generated when gasoline vapors are displaced from storage tanks during unloading of gasoline from tank trucks at service stations. Stage II emissions are the refueling emissions that occur during the transfer of gasoline from storage tanks at service stations to vehicle fuel tanks (i.e., vehicle refueling and spillage emissions). The MOVES2010b model that was used to calculate onroad emissions includes estimation of these Stage II emissions. Therefore, these emissions are addressed in Chapter 5 as part of the onroad mobile sources emissions and are not addressed here as an area source.

Stage I VOC emissions from gasoline service station unloading were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016).

Ozone season-day emissions were calculated by multiplying annual emissions for the ozone-season (June–August) then dividing by 92 days. As a conservative assumption, annual and season-day emissions for the 8-hour ozone nonattainment area are assumed to be equal to

Maricopa County emissions. Table 3.5–4 summarizes Stage I annual and season-day emissions in Maricopa County and the 8-hour ozone nonattainment area.

Table 3.5–4. Annual and season-day VOC emissions from gas service stations (Stage I), by fill type.

	Maricopa County		8-hour ozone NAA	
Fill type	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Submerged filling	369.9	8,041	369.9	8,041
Balanced submerged filling	646.9	14,063	646.9	14,063
Totals:	**1,016.8**	**22,104**	**1,016.8**	**22,104**

3.5.5 Gasoline stations underground tanks, breathing/emptying

Breathing losses are the expulsion of vapor from a tank vapor space that has expanded or contracted because of daily changes in temperature and barometric pressure; these emissions occur in the absence of any liquid level change in the tank. Emptying losses occur when the air that is drawn into the tank during liquid removal saturates with hydrocarbon vapor and expands, thus exceeding the fixed capacity of the vapor space and overflowing through the pressure vacuum valve.

Gasoline stations underground tanks, breathing/emptying emissions from gasoline service station unloading were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016).

Ozone season-day emissions were calculated by multiplying annual emissions for the ozone-season (June–August) then dividing by 92 days. As a conservative assumption, annual and season-day emissions for the 8-hour ozone nonattainment area are assumed to be equal to Maricopa County emissions.

Table 3.5–5. Annual and season-day VOC emissions from gasoline service stations underground tank, breathing and emptying.

Geographic area	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Maricopa County	764.8	16,327
8-hr ozone nonattainment area	764.8	16,327

3.5.6 Aviation gasoline

Aviation gasoline is used by small reciprocating, piston-engine aircraft in civil aviation. Commercial and military aviation rarely use aviation gasoline. Aviation gasoline is shipped to airports and is filled into bulk terminals, and then into tanker trucks. The displacement of vapors during the transfer of gasoline from tank trucks to storage tanks, and vice versa falls under the definition of Stage I. Stage II involves the transfer of fuel from the tanker trucks into general aviation aircraft.

Annual emissions from aviation gasoline Stage I and Stage II were initially obtained from the U.S. Environmental Protection Agency's county-level emissions estimates prepared for use in the 2014 National Emissions Inventory (US EPA, 2016). Table 3.5–6 shows US EPA 2014 estimated VOC emissions from aviation gasoline for Maricopa County. During review of the 2014 NEI documentation, it was observed that aviation gasoline consumption data used in EPA's estimates for the NEI had been obtained from U.S. Energy Information Administration's (EIA) State Energy Data System (SEDS). These data included state-level aviation gasoline consumption for 2013 (i.e., aviation gasoline consumption for Arizona was 139,000 bbls).

ERG identified updated state-level aviation gasoline consumption data for 2014 from EIA's SEDS (EIA, 2015). ERG modified EPA's calculation spreadsheet for aviation gasoline Stage I and Stage II source categories using the updated EIA data for 2014 (i.e., aviation gasoline consumption for Arizona was 206,000 bbls). Due to a lack of available data on temporal resolution, daily emissions were assumed to be equal throughout the year and were calculated by dividing annual emissions by 365 days/year. Annual and season-day VOC emissions estimates for aviation gasoline Stage I and Stage II sources in Maricopa County are presented in Table 3.5–6.

Table 3.5–6. Annual and season-day VOC emissions from aviation gasoline for Maricopa County.

Fueling stage	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Aviation Gasoline Stage I	673.6	3,691
Aviation Gasoline Stage II	33.3	182

Annual and season-day emission in the 8-hour ozone nonattainment area were calculated by multiplying county totals by the percentage of general aviation operations that occurred within the nonattainment area in 2014 (99.1%). (See Table 4.11–1 of this report for general aviation aircraft operational data used.) Annual and season-day emissions from aviation gasoline for both Maricopa County and the 8-hour ozone nonattainment area are presented in Table 3.5–7.

Table 3.5–7. Annual and season-day VOC emissions from aviation gasoline (avgas).

	Maricopa County		Eight-hour ozone NAA	
Emissions source	Annual emissions (tons/yr)	Season-day emissions (lbs/day)	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Avgas Stage I	673.6	3,691	667.5	3,658
Avgas Stage II	33.3	182	33.0	181
Totals:	**706.9**	**3,873**	**700.5**	**3,839**

3.5.7 Gasoline tank trucks in transit

Emissions from tank trucks in transit occur when gasoline vapor evaporates from (1) loaded tank trucks during transportation of gasoline from bulk terminals/plants to service stations, and (2) empty tank trucks returning from service stations to bulk terminals/plants. Annual VOC

emissions from gasoline trucks in transit were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016).

Ozone season-day emissions were calculated by multiplying annual emissions for the ozone-season (June–August) then dividing by 92 days. As a conservative assumption, annual and season-day emissions for the 8-hour ozone nonattainment area are assumed to be equal to Maricopa County emissions. Results are shown in Table 3.5–8.

Table 3.5–8. Annual and season-day VOC emissions from gasoline trucks in transit.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	50.0	1,087
8-hr ozone nonattainment area	50.0	1,087

3.5.8 Pipeline gasoline

Pipeline emissions result from the valves and pumps found at pipeline pumping stations and from the valves, pumps, and storage tanks at pipeline breakout stations. Annual VOC emissions from gasoline pipelines were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016).

Ozone season-day emissions were calculated by multiplying annual emissions for the ozone-season (June–August) then dividing by 92 days. As a conservative assumption, annual and season-day emissions for the 8-hour ozone nonattainment area are assumed to be equal to Maricopa County emissions.

Table 3.5–9. Annual and season-day VOC emissions from pipeline gasoline.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	66.2	1,439
8-hr ozone nonattainment area	66.2	1,439

3.5.9 Volatile organic liquid (VOL) storage and transport

Emissions from this source category were calculated by summing reported VOC emissions from volatile organic liquid storage/transfer emissions inventory reports. It is assumed that there are no significant unpermitted volatile organic liquid storage/transfer facilities in Maricopa County. To avoid double-counting, emissions from those facilities treated as point sources (totaling 2.5 tons/yr) are addressed in Chapter 2. Ozone season-day emissions were calculated based on operating schedule information provided in the facilities annual emissions reports.

Table 3.5–10. Annual and season-day VOC emissions from volatile organic liquid storage and transport.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	37.8	218
8-hr ozone nonattainment area	35.7	201

3.6 Waste treatment and disposal

3.6.1 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 3.7.5.

Historically, emissions from on-site incinerator were determined from annual emissions inventory reports. It was assumed that all incinerators were surveyed and emissions accounted for, since all permitted incinerators received surveys in 2011, but not 2014. Thus, data from the 2011 periodic emissions inventory (MCAQD, 2014) were grown to 2014 based on industrial employment rates.

Annual and season-day emissions estimates for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used. Results are shown in Table 3.6–1.

Table 3.6–1. Annual and season-day emissions from on-site incineration.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	0.2	3.0	0.7	1	19	5
8-hr ozone nonattainment area	0.1	2.9	0.7	1	19	5

3.6.2 Open burning

Emissions from controlled open burning are regulated by Maricopa County Rule 314 (Open Outdoor Fires and Indoor Fireplaces at Commercial and Institutional Establishments), which requires a burn permit for open burning in Maricopa County. Burn permits are issued primarily for purposes of agricultural ditch bank and fence row burning, tumbleweed burning, land clearance, and firefighting training. MCAQD's burn permit data base was used to identify all burn permits issued in 2014. A total of 43 open burn permits were issued during the year. The quantity and reported activity for the open burn permits (except for firefighting burn permits) are shown in Table 3.6–2.

Table 3.6–2. Maricopa County burn permit activity in 2014.

Permit subtype	Permits issued	Total reported activity	Activity unit of measure
Ditchbank & fence row	23	617,007	Linear feet
Land clearance	13	240	Acres
Firefighting instruction	5	12	Structures

Activity data for all categories were converted to tons of material burned using fuel loading factor for "weeds, unspecified" from AP-42 (US EPA, 1992). Activity data were multiplied by the 3.2 tons/acre fuel loading factor to derive the total mass of material burned. Annual emissions were then calculated by multiplying the amount of material burned by the AP-42 emission factors for "weeds, unspecified".

The reported dates of activity from all open burn permits issued were reviewed in order to estimate the total open burn activity occurring during the June–August ozone season. To estimate season-day emissions, it was assumed that activity in all categories listed above normally occurs, on average, 5 days per week. Thus, season-day emissions were calculated by dividing total ozone-season emissions by 65 (=5 days/week × 13 weeks/ozone season).

MCAQD's records of citizen complaints received during 2014 regarding suspected open or illegal outside burning were reviewed to assess the potential extent of unpermitted open burning activity. Emissions estimates from permitted burn activity were multiplied by a factor of 2.87 to account for unpermitted outdoor burning.

Annual and season-day emissions for the nonattainment area were calculated by multiplying the percentage of vacant land use located in the 8-hour ozone nonattainment area (44.74%) by the Maricopa County emissions estimates. See Section 1.5.2 for a discussion of the land-use data used. Table 3.6–3 summarizes 2014 annual and season-day emissions from open burning, for both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.6–3. Annual and season-day emissions from open burning.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	18.2	8.1	172.2	140	62	1,325
8-hr ozone nonattainment area	90.4	4.3	9.6	695	33	74

3.6.3 Landfills

Emissions from municipal solid waste (MSW) landfills come from uncontrolled landfill gas emissions as well as from combustion from control measures, such as a flare. Total emissions were calculated from annual emissions inventory reports from all landfills located within the county. Butterfield Station Facility, Glendale Municipal Sanitary Landfill and Northwest Regional Landfill were considered as point sources; all other MSW landfills (including the Apache Junction landfill, located in the Pinal County portion of the 8-hour ozone nonattainment area) are reported here as an area-source category.

Geographic data on the location of each landfill was used to identify whether each landfill was located inside or outside of the 8-hour ozone nonattainment area. Annual and season-day emissions for Maricopa County and the nonattainment area are summarized in Table 3.6–4.

Table 3.6–4. Annual and season-day emissions from landfills.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	36.6	9.9	14.6	158	54	80
8-hr ozone nonattainment area	36.6	12.7	28.5	217	70	157

3.6.4 Publicly owned treatment works

Annual emissions from publicly owned treatment works (POTWs) in Maricopa County were obtained from the US Environmental Protection Agency's 2014 National Emissions Inventory (US EPA, 2012c). EPA estimated 58.9 tons of VOC were emitted from POTWs in Maricopa County in 2014. There were no point sources in this category that needed to be subtracted. Ozone season-day emissions were calculated by multiplying annual emissions by a 35% season adjustment factor and then dividing by 91 days per season (US EPA, 2001a).

Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage of total population in the nonattainment area to the total population in the county (100.85%). See Section 1.5.1 for a discussion of the population data used. Resulting emissions estimates are shown in Table 3.6–5 below.

Table 3.6–5. Annual and season-day VOC emissions from publicly owned treatment works.

Geographic area	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Maricopa County	58.9	453
8-hr ozone nonattainment area	59.3	456

3.6.5 Leaking underground storage tanks

Leaking underground storage tanks (LUST) are normally not considered a quantifiable source of air emissions until excavation and remediation efforts begin. The majority of air emissions from LUST site remediation occur during the initial site activity, which is typically removal of the tank. Emissions from soil occur as the tank is being removed and when soil is deposited on the ground before treatment and disposal occur (US EPA, 2001c).

A default emission rate of 28 lbs/day per remediation event was used to estimate VOC emissions from LUST remediation (US EPA, 2001c). Data obtained from the Leaking Underground Storage Tank Section of the Arizona Department of Environmental Quality indicated that 35 leaking underground storage tanks opened in Maricopa County in 2014 (N. Giuntoli, pers. commun., July 7, 2016). As data was not available on the numbers of tanks or date of remediation that occurred in 2014, it was conservatively assumed that all 35 tanks were remediated

during the 2014 ozone season. It was also assumed that an initial site action (tank and soil removal) for an average LUST remediation lasts five days.

Ozone season-day emissions were calculated by dividing annual values by 65 (5 days/week × 13 weeks/ozone season). As precise data was not available on the location of each tank, it was conservatively assumed that assumed that all 35 LUST occurrences were located within the 8-hour ozone nonattainment area. Thus, both annual and season-day emissions within the NAA are equal to the Maricopa County totals. Results are shown in Table 3.6–6 below.

Table 3.6–6. Annual and season-day VOC emissions from remediation of leaking underground storage tanks.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	2.5	75
8-hr ozone nonattainment area	2.5	75

3.6.6 Other waste

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. Ozone season-day emissions were calculated based on operating schedule information provided by the facilities in their annual emissions reports.

Since all surveyed facilities for this area source category are located inside the 8-hour ozone nonattainment area, emissions for Maricopa County and the 8-hour ozone nonattainment area are equal. Table 3.6–7 summarizes annual and season-day emissions estimates.

Table 3.6–7. Annual and season-day emissions from other waste.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	7.7	20.6	38.1	54	113	186
8-hr ozone nonattainment area	7.7	20.6	38.1	54	105	186

3.7 Miscellaneous area sources

3.7.1 Backyard barbeques

Annual emission estimates from backyard barbeques (i.e., residential charcoal grilling) for Maricopa County in 2014 were taken directly from the county-level estimates prepared for use in US EPA's 2014 National Emissions Inventory (NEI) data and documentation (US EPA, 2016).

ERG downloaded and reviewed the Temporal Allocation Factor File (TAFF) that is available with US EPA's 2011 Air Emissions Modeling Platform (version 6.2). The temporal allocation

data (US EPA, 2015) indicates equal allocation across the year for residential charcoal grilling source category (SCC 2810025000). Based on this information, ERG calculated ozone season-day emissions by dividing the 2014 annual emissions by 365.

Maricopa County emissions were then allocated to the 8-hour ozone nonattainment area by multiplying the county totals to the ratio of total resident population in the 8-hour ozone nonattainment area to the total resident population in Maricopa County (100.79%). See Section 1.5.1 for a discussion of the population data used. Table 3.7–1 presents a summary of annual and season-day emissions for Maricopa County and the 8-hour ozone nonattainment area.

Table 3.7–1. Annual and season-day emissions from backyard barbeques.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	52.8	60.5	2,819.9	289	332	15,451
8-hr ozone nonattainment area	53.2	61.0	2,842.1	291	334	15,573

3.7.2 Structure fires

Emissions from structure fires in Maricopa County were estimated based on 2011 data, which were projected to 2014, based on county population growth over the 2011–2014 period (4.81%). Annual emissions for the 8-hour ozone nonattainment area were derived by multiplying annual county emissions by the percentage of total population within the nonattainment area (100.85%). See Section 1.5.1 for a discussion of the population data used.

In the absence of sufficient data on the temporal distribution of structure fires in 2014, activity for this source category was assumed to occur evenly throughout the year. Thus, ozone season-day emissions were derived by dividing annual emissions by 365 days/year. The results are shown in Table 3.7−2 below.

Table 3.7–2. Annual and season-day emissions from structure fires.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	15.5	2.0	84.5	76	11	414
8-hr ozone nonattainment area	15.6	2.0	85.2	77	10	418

3.7.3 Aircraft engine testing

Annual emissions from engine testing facilities were derived from annual emissions 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. Ozone season-day emissions were calculated based on operating schedule information provided in the facilities' annual emissions reports.

Since all facilities considered in this section are located within the 8-hour ozone nonattainment area, total emission values for the county and the nonattainment area are equal. Results are shown in Table 3.7–3.

Table 3.7–3. Annual and season-day emissions from aircraft engine testing.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	4.6	45.5	16.9	27	260	98
8-hr ozone nonattainment area	4.6	45.5	16.9	27	260	98

3.7.4 Vehicle fires

Emissions from vehicle fires in Maricopa County were estimated based on 2011 data, which were grown to 2014 based on county population growth over the 2011–2014 period (4.81%). Annual emissions for the 8-hour ozone nonattainment area were derived by multiplying annual county emissions by the percentage of total population within the nonattainment area (100.85%). See Section 1.5.1 for a discussion of the population data used.

It was assumed that vehicle fires occur evenly throughout the year. Thus, ozone season-day emissions were derived by dividing the Maricopa County and nonattainment area annual emissions by 365 days/year. The results are shown in Table 3.7−4 below.

Table 3.7–4. Annual and season-day emissions from vehicle fires.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	10.6	1.3	41.2	58	7	226
8-hr ozone nonattainment area	10.6	1.3	41.6	58	7	228

3.7.5 Crematories

Annual and season-day emissions from human and animal crematories were derived from annual emissions reports submitted by permitted sources. It was assumed that there were no significant unpermitted sources within Maricopa County. There were no point sources in this category.

Ozone season-day emissions were calculated based on reported activity data (days per week) for each individual process, and then summed. Table 3.7–5 summarizes annual emissions from crematories in both Maricopa County and the 8-hour ozone nonattainment area and season day emissions in Table 3.7.6.

Table 3.7–5. Annual emissions (tons/yr) from crematories.

	Maricopa County			8-hr ozone nonattainment area		
Type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Human	0.4	10.7	0.6	0.4	10.7	0.6
Animal	0.1	5.6	0.3	0.1	5.6	0.3

Table 3.7–6. Season-day emissions (lbs/day) from crematories.

	Maricopa County			8-hr ozone nonattainment area		
Type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Human	3	77	5	3	73	4
Animal	1	49	3	1	49	3

3.7.6 Accidental releases

As part of its air quality permit compliance program, MCAQD keeps an "upset log" for each calendar year that records excess emissions and accidental releases at permitted facilities. Annual emissions inventory reports also provide for recording of accidental releases. Data from these two sources were reviewed to estimate emissions from all accidental releases in 2014.

Ozone season-day emissions were calculated based on the whether the reported release occurred during the ozone season. Emissions within the 8-hour ozone nonattainment area are calculated based on locations of facilities that reported releases. Results are shown in Table 3.7–7.

Table 3.7–7. Annual and season-day emissions from accidental releases.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	10.1	0.2	0.4	2	0	0
8-hr ozone nonattainment area	10.1	0.2	0.4	2	16	0

3.7.7 Hospitals

Emissions from hospitals were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources and county-level employment data from the US Census Bureau (2013) to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category. The most recent data from the US Census Bureau's County Business Patterns (CBP) for 2013 employment were used. CBP employment data for NAICS code 662110 (general medical and surgical hospitals) indicated 54,653 employees in this industry in Maricopa County.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed season-day emissions instead of annual totals. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of population in the nonattainment area to population in the county. See Section 1.5.1 for a discussion of the employment data used. Table 3.7–8 summarizes annual and season-day emissions from hospitals in both Maricopa County and the 8-hour ozone nonattainment area.

Table 3.7–8. Annual and season-day VOC emissions from hospitals.

Geographic area	**Annual emissions (tons/yr)**	**Season-day emissions (lbs/day)**
Maricopa County	33.4	201
8-hr ozone nonattainment area	33.7	202

3.7.8 Wildfires

Data on the incidence of wildfires in Maricopa County in 2014 were obtained from the Arizona State Forestry Division (ASFD, 2015). ASFD provides for the prevention and suppression of wildfires on state trust land and private lands located outside of incorporated communities. The wildfire data provided includes wildfires that occur outside of local fire districts and municipalities on State, private, and U.S. Bureau of Land Management (BLM) land. The ASFD supplied data on 1,299 reported wildfire incidents in Maricopa County, encompassing 146 acres. In supplying this data, the Forestry Division noted a significant increase in the number of fires reported compared with prior years, due to a new State Forestry requirement that the local government fire departments and districts now report their fires to State Forestry.

In addition, data from Incident Status Summary reports (ICS-209) on the US Forest Service's website Monitoring Trends in Burn Severity (MTBS) website (USFS, 2016) were reviewed in order to identify any additional wildfires that may have occurred outside of ASFD jurisdiction. No additional wildfires within the area of interest were identified.

Estimates of the material burned were derived by multiplying the acres burned for each category by an assigned fuel loading factor. Since there was insufficient information concerning the land use or vegetation types for each reported fire, a fuel loading factor of 4.5 tons/acre (reflecting e.g., "agriculture" or "sagebrush" categories), was used as a conservative estimate.

Latitude and longitude data were used to determine the number of acres burned inside of the nonattainment area. Table 3.7–9 shows the number of wildfires and acreage burned for Maricopa County and the 8-hour ozone nonattainment area, as well as the estimated total material burned.

Table 3.7–9. Wildfire incidence, acreage burned, and material burned in 2014.

Geographic area	No. of fires	Acreage burned	Fuel loading factor (tons/acre)	Material burned (tons/yr)
Maricopa County	1,299	145.8	4.5	656.1
8-hr ozone nonattainment area	1,286	139.1	4.5	626.0

Annual emissions from wildfires for each geographic area were calculated by multiplying the material burned for each area by the emission factors obtained from the Western Regional Air Partnership's (WRAP) 2002 Fire Emissions Inventory (WGA/WRAP, 2005). Ozone season-day emissions were estimated by multiplying the material burned during ozone season by the appropriate emission factor and dividing the result by the number of ozone season burn days. In 2014, wildfire activity was reported on a total of 87 separate days during the June–August ozone season. Table 3.7–10 shows annual and season-day emissions from wildfires in Maricopa County and the nonattainment area.

Table 3.7–10. Annual and season-day emissions from wildfires.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	4.5	2.0	94.8	29	13	606
8-hr ozone nonattainment area	4.3	1.9	90.4	37	17	792

3.7.9 Prescribed fires

Emissions from prescribed fires were estimated using data obtained from the Arizona Department of Environmental Quality (ADEQ, 2015), which reported that a total of six (6) prescribed fires occurred in Maricopa County during 2014, only one of which was located within the 8-hour ozone nonattainment area. Because all 2014 prescribed fires were piled fuels, material burned was derived by multiplying the number of acres burned by tons of piles per acre for each fire. Table 3.7–11 shows the data provided by the ADEQ, the amount of material burned for each fire, whether the fire occurred within the nonattainment area and during the ozone season.

Table 3.7–11. Prescribed fires in Maricopa County during 2014.

Date	Burn location	Tons/ acre	Acres burned	Material burned (tons)	Within 8-hr NAA?	During ozone season?
02/27/2014	T3N,R8E,S33	1	5	5	Y	N
03/03/2014	T3N,R11E,S2	2	3	6	Y	N
03/14/2014	T3N,R8E,S33	1	10	10	Y	N
07/21/2014	T2N,R9E,S4	1	10	10	Y	Y
09/02/2014	T6N,R10E,S10	2	4	8	Y	N
10/01/2014	T3N,R11E,S2	2	5	10	Y	N
Totals:			**37**	**49**		

To estimate emissions, emission factors for “piled fuels” the Western Regional Air Partnership’s (WRAP) 2002 Fire Emissions Inventory (WGA/WRAP, 2005) were used. Annual emissions from prescribed fires in Maricopa County were derived by multiplying material burned by the emission factor then dividing by 2,000 lbs/ton.

The prescribed fire data provided by ADEQ indicated that all six of the reported prescribed fires were within the 8-hour ozone nonattainment area; thus annual emissions for both areas are equal. Only one of the six prescribed fires occurred during the June–August ozone season. As it was assumed that each prescribed fire lasted one day, all emissions from this fire were assumed to be generated on a single ozone season-day. Table 3.7–12 shows the annual and season-day from prescribed fires.

Table 3.7–12. Annual and season-day emissions from prescribed fires.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.2	0.2	1.8	51	51	607
8-hr ozone nonattainment area	0.2	0.2	1.8	63	62	743

3.8 Quality assurance/quality control procedures

Quality assurance and quality control (QA/QC) activities for the area source emissions inventory were designed to create a comprehensive, accurate, representative and comparable inventory of area source emissions for Maricopa County and the nonattainment 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 identified for inclusion in the inventory based on the latest Emissions Inventory Improvement Program (EIIP) guidance available. In addition, recent EPA activities to develop county-level emissions estimates for newly created source categories (such as portable fuel containers) or refined source classification codes were also reviewed, and incorporated where relevant. Prior-year inventories for the region were also examined to identify possible additional categories for inclusion in the present inventory. 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, oil and natural gas production, and snowmobile use).

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 nonattainment area. When local data was not available, state data from state agencies (e.g., Arizona Department of Transportation [ADOT]) and regional bodies (such as the Western Regional Air Partnership, WRAP) were used. National-level data (such as those from 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.

3.9 Summary of all area source emissions

Tables 3.9–1 and 3.9–2 summarize the total annual and average season-day emissions from all area sources addressed in this chapter, for both Maricopa County and the 8-hour ozone NAA, respectively.

Table 3.9–1. Annual and season-day emissions from all area sources in Maricopa County.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Fuel combustion:						
Industrial distillate oil: boilers	1.0	96.1	24.0	6	616	154
Industrial distillate oil: engines	134.5	1,934.4	416.3	862	12,400	2,669
Industrial natural gas	40.7	740.1	621.7	261	4,744	3,985
Industrial LPG	1.9	52.1	29.2	12	334	187
Comm./inst. distillate oil: boilers	0.0	2.8	0.7	0	18	4
Comm./inst. distillate oil: engines	0.3	4.4	1.0	2	28	6
Comm./inst. natural gas	62.0	1,126.8	946.5	397	7,223	6,068
Residential distillate oil	0.0	0.3	0.1	0	3	1
Residential natural gas	45.5	777.0	330.7	118	2,023	861
Residential LPG	1.6	41.5	11.8	15	391	111
Residential wood combustion	1,392.2	156.3	8,328.1	0.0	0.0	0.0
All Fuel Combustion:	**1,679.8**	**4,931.9**	**10,710.0**	**1,675**	**27,781**	**14,046**
Industrial processes:						
Chemical manufacturing	69.1			535		
Commercial cooking	233.5		666.3	1,279		3,651
Bakeries	112.4			661		
Secondary metal production	65.9	55.1	671.6	467	482	5,936
Rubber/plastic product manufacturing	928.8			7,763		
Fabricated metal product manufacturing	19.2			92		
Electrical equipment manufacturing	223.6	24.3	7.5	1,280	135	41
Industrial processes, NEC	71.4	452.2	273.7	407	2,478	1,532
All Industrial Processes:	**987.3**	**531.6**	**1,619.1**	**12,484**	**3,095**	**11,160**
Solvent use:						
Architectural coatings	5,215.8			31,748		
Auto refinishing	958.3			5,251		
Traffic markings	441.0			4,478		
Factory finished wood	193.6			1,616		
Wood furniture	666.4			5,126		
Metal furniture: SIC 25	59.8			460		
Paper: SIC 26	51.3			394		
Metal cans: SIC 341	183.2			1,410		
Machinery and equipment: SIC 35	58.2			448		
Large appliances: SIC 363	35.5			273		
Electronic/other elec.: SIC 36–363	4.2			32		
Motor vehicles: SIC 371	183.0			1,407		
Aircraft surface coating	65.8			473		
Marine: SIC 373	3.5			27		
Railroad: SIC 374	5.1			39		
Miscellaneous surface coating	160.9			1,309		
Industrial maintenance coatings	301.0			2,315		
Other special purpose coatings	12.0			93		
Degreasing	291.9			1,923		
Dry cleaning	10.3			79		
Graphics arts	297.4			2,308		
Misc. industrial solvent use	201.1			1,443		
Personal care products	4,013.2			21,990		
Household products	4,414.5			24,189		

Table 3.9–1. Annual and season-day emissions from all area sources in Maricopa County (continued).

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Solvent use (continued):						
Automotive aftermarket products	2,729.0			14,950		
Coatings and related products	1,906.3			10,445		
Adhesives and sealants	1,143.8			6,257		
FIFRA-regulated products	3,571.7			19,571		
Miscellaneous products, NEC	140.5			770		
Cutback asphalt	1,004.8			21,844		
Emulsified asphalt	828.2			18,004		
Agricultural pesticides	371.0			2,033		
All Solvent Use:	**29,522.2**			**172,914**		
Storage/transport:						
Residential portable gas cans	443.1			2,428		
Commercial portable gas cans	382.0			2,093		
Bulk terminals	91.0			493		
Bulk plants	36.2			229		
Gas stations Stage I: Submerged fill	369.9			2,027		
Gas stations Stage I: Bal. submerged fill	646.9			3,545		
Underground tanks: Breathing/emptying	764.8			4,191		
Airports: aviation gasoline Stage I	673.6			3,691		
Airports: aviation gasoline Stage II	33.3			182		
Truck: gasoline (tank trucks in transit)	50.0			274		
Pipeline gasoline	66.2			363		
Volatile organic liquids storage/transport	37.8			218		
All Storage/Transport:	**3,594.9**			**19,734**		
Waste treatment/disposal:						
On-site incineration	0.2	3.0	0.7	1	19	5
Open burning	18.2	8.1	172.2	140	62	1,325
Landfills	36.6	9.9	14.6	158	54	80
Publicly owned treatment works	58.9			453		
Leaking underground storage tanks	2.5			75		
Other waste	7.7	20.6	38.1	54	113	186
All Waste Treatment/Disposal:	**124.0**	**41.5**	**225.6**	**881**	**249**	**1,596**
Miscellaneous area sources:						
Backyard barbeques	52.8	60.5	2,819.9	289	332	15,451
Structure fires	15.5	2.0	84.5	76	11	414
Aircraft engine testing	4.6	45.5	16.9	27	260	98
Vehicle fires	10.6	1.3	41.2	58	7	226
Crematories, human	0.4	10.7	0.6	3	77	5
Crematories, animal	0.1	5.6	0.3	1	49	3
Accidental releases	10.1	0.2	0.4	2	0	0
Hospitals	33.4			201		
Wildfires	4.5	2.0	94.8	29	13	606
Prescribed fires	0.2	0.2	1.8	51	51	607
All Miscellaneous Area Sources:	**132.1**	**128.1**	**3,060.5**	**736**	**800**	**17,410**
Total, All Area Sources:	**36,040.4**	**5,633.2**	**15,615.2**	**208,424**	**31,925**	**44,212**

Table 3.9–2. Annual and season-day emissions from all area sources in the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Fuel combustion:						
Industrial distillate oil: Boilers	1.0	95.3	23.8	6	611	153
Industrial distillate oil: Engines	133.4	1,918.9	413.0	855	12,301	2,647
Industrial natural gas	40.4	734.2	616.7	259	4,706	3,953
Industrial LPG	1.9	51.7	29.0	12	332	186
Comm./inst. distillate oil: Boilers	0.0	2.8	0.7	0	18	4
Comm./inst. distillate oil: Engines	0.3	4.4	1.0	2	28	6
Comm./inst. natural gas	61.9	1,126.0	945.9	397.0	7,218.2	6,063.3
Residential distillate oil	0.0	0.3	0.1	0	0	0
Residential natural gas	45.8	783.2	333.3	119	2,038	867
Residential LPG	1.6	41.8	11.8	0	0	0
Residential wood combustion	1,403.2	157.6	8,393.8	0.0	0.0	0.0
All Fuel Combustion:	**1,689.7**	**4,916.2**	**10,769.1**	**1,651**	**27,252**	**13,881**
Industrial processes:						
Chemical manufacturing	1.0			531		
Commercial cooking	235.3		671.5	1,289		3,680
Bakeries	111.5			656		
Secondary metal production	65.9	55.1	671.6	467	482	5,936
Rubber/plastic product manufacturing	928.8			7,701		
Fabricated metal product manufacturing	19.0			91		
Electrical equipment manufacturing	223.6	24.3	7.5	1,280	140	42
Industrial processes, NEC	70.3	452.2	273.7	397	2,478	1,470
All Industrial Processes:	**917.3**	**531.6**	**1,624.3**	**12,412**	**3,100**	**11,127**
Solvent use:						
Architectural coatings	5,260.0			32,017		
Auto refinishing	950.6			5,209		
Traffic markings	437.5			4,442		
Factory finished wood	192.1			1,603		
Wood furniture	661.1			5,085		
Metal furniture: SIC 25	59.3			456		
Paper: SIC 26	50.8			391		
Metal cans: SIC 341	181.8			1,398		
Machinery and equipment: SIC 35	57.7			444		
Large appliances: SIC 363	35.2			271		
Electronic/other electrical: SIC 36-363	4.2			32		
Motor vehicles: SIC 371	181.5			1,396		
Aircraft surface coating	65.8			473		
Marine: SIC 373	3.4			26		
Railroad: SIC 374	5.1			39		
Miscellaneous surface coating	159.6			1,299		
Industrial maintenance coatings	298.6			2,297		
Other special purpose coatings	11.9			92		
Degreasing	289.5			1,908		
Dry cleaning	10.4			80		
Graphics arts	295.1			1,908		
Miscellaneous industrial solvent use	199.5			1,431		
Personal care products	4,047.3			22,177		
Household products	4,452.0			24,395		
Automotive aftermarket products	2,752.1			15,080		
Coatings and related products	1,922.5			10,534		
Adhesives and sealants	1,153.5			6,320		
FIFRA-regulated products	3,602.1			19,737		

Table 3.9–2. Annual and season-day emissions from all area sources in the 8-hour ozone nonattainment area (continued).

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Solvent use (continued):						
Miscellaneous products, NEC	141.7			776		
Cutback asphalt	992.3			21,572		
Emulsified asphalt	817.9			17,780		
Agricultural pesticides	218.1			1,195		
All Solvent Use:	**29,510.2**			**172,431**		
Storage/transport:						
Residential portable gas cans	446.6			2,447		
Commercial portable gas cans	385.1			2,110		
Bulk terminals	91.0			493		
Bulk plants	36.2			229		
Gas stations Stage I: submerged fill	369.9			2,027		
Gas stations Stage I: bal. submerged fill	646.9			3,545		
Underground tanks: breathing/emptying	764.8			4,191		
Airports: aviation gasoline Stage I	667.5			3,658		
Airports: aviation gasoline Stage II	33.0			181		
Truck: gasoline (tank trucks in transit)	50.0			274		
Pipeline gasoline	66.2			363		
Volatile organic liquids storage/transport	35.7			201		
All Storage/Transport:	**3,592.9**			**19,718**		
Waste treatment/disposal:						
On-site incineration	0.1	2.9	0.7	1	19	5
Open burning	90.4	4.3	9.6	695	33	74
Landfills	36.6	12.7	28.5	217	70	157
Publicly owned treatment works	59.3			456		
Leaking underground storage tanks	2.5			75		
Other waste	7.7	20.6	38.1	54	105	186
All Waste Treatment/Disposal:	**196.6**	**40.5**	**76.9**	**1,499**	**226**	**421**
Misc. area sources:						
Backyard barbeques	53.2	61.0	2,842.1	291	334	15,573
Structure fires	15.6	2.0	85.2	77	10	418
Aircraft engine testing	4.6	45.5	16.9	27	260	98
Vehicle fires	10.6	1.3	41.6	58	7	228
Crematories, human	0.4	10.7	0.6	3	73	4
Crematories, animal	0.1	5.6	0.3	1	49	3
Accidental releases	10.1	0.2	0.4	2	16	0
Hospitals	33.7			202		
Wildfires	4.3	1.9	90.4	37	17	792
Prescribed fires	0.2	0.2	1.8	63	62	743
All Misc. Area Sources	**132.8**	**128.5**	**3,079.4**	**761**	**828**	**17,859**
ALL AREA SOURCES:	**36,039.6**	**5,616.9**	**15,549.7**	**208,473**	**31,407**	**43,287**

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4. Nonroad Mobile Sources

4.1 Introduction

Nonroad mobile sources are defined as those 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-engine planes; and
- Locomotives, such as switching and line-haul trains.

EPA released MOVES2014a in November 2015 as a replacement for its prior NONROAD2008 model. EPA announced that it would no longer support NONROAD2008, and instead recommended using MOVES2014a to model nonroad mobile source emissions. The MOVES2014a model allows for the use of consistent fuel and meteorology inputs for both onroad and nonroad mobile sources. While the same NONROAD2008 core code is still utilized, the inputs and outputs are controlled with MySQL databases that are more efficient to maintain. Procedures for updating local activity and population data have also improved and now require less run time. An update to the VOC emission calculation was implemented in the post-processing stage of MOVES2014a, resulting in different (generally lower) emissions calculations for VOC compared to values previously calculated with NONROAD2008.

Emission calculations for most nonroad mobile source categories except aircraft, airport ground support equipment (GSE) and locomotives were derived using the MOVES2014a model. Aircraft and airport GSE emission estimates were made using the Federal Aviation Administration's EDMS (Emissions Dispersion Modeling System) model, ver. 5.1.4. 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 to run the MOVES2014a model. The prior NONROAD2008 model required manual user input of monthly temperatures (minimum, maximum and average); Reid Vapor Pressure (RVP); gasoline and diesel sulfur content; and information on local gasoline ethanol blends (volume percentage, market share percentage and total oxygen weight percentage).

For the MOVES2014a model, hourly observed temperature data for a typical day in each month were obtained from Phoenix Sky Harbor Airport. Fuel data were provided by the Arizona

Department of Weights and Measures, and are identical to the fuel data used in modeling onroad mobile emissions. Stage II Vapor Recovery program effectiveness for 2014 (66.1%) was used to replace the default value in the model.

EPA recommends adjusting default model input files (such as equipment population and activity levels) where local data are available, as the default values in the model are derived from national averages. For commercial lawn and garden equipment, model defaults were adjusted based on 2003 survey results of the commercial lawn and garden industry performed by ENVIRON 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, populations in 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 inputs.

Ozone season-day emissions were estimated based on a 3-month average of the typical weekday, or typical weekend, emissions in each ozone season month (June – August) as generated by the MOVES2014a model. To be conservative, the typical day with the highest emissions (weekday or weekend) was selected to represent ozone season-day emissions for each nonroad emissions category. For example, typical daily emissions from agricultural equipment are highest on weekdays as compared to weekends. As such, weekday emissions are selected to be representative of ozone season-day emissions for agricultural equipment. (Other categories, such as recreational equipment, have higher emissions on weekends as compared to weekdays).

Annual emissions are first calculated by multiplying the month-specific MOVES2014a model typical weekday and weekend emissions by the number of weekdays and weekends in each month. The product of the weekday and weekend emissions in each month is then summed to produce month-specific emissions. Lastly, monthly emissions are summed to produce annual emissions.

Spatial allocation factors were developed to apportion Maricopa County-level annual and ozone season-day nonroad emissions to the 8-hour ozone nonattainment area. The approaches used are described in each section of this chapter.

4.2 Agricultural equipment

Annual and season-day emissions from agricultural equipment in Maricopa County were calculated using EPA's MOVES2014a model, as discussed above. Annual and season-day emissions for the 8-hour ozone nonattainment area were calculated based on the Emission Inventory Guidance for Implementation of Ozone [and Particulate Matter] National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations (US EPA, 2014) and Geographical Allocation (GA) guidance (US EPA, 2002) which recommends using the ratio of agricultural land inside the nonattainment area (157,478 acres) to agricultural land within the county (267,894 acres). See Section 1.5.2 for a discussion of the land-use data used. The resulting annual and season-day emissions are presented in Table 4.2–1.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	5.7	286.9	262.2	49	2,473	2,311
8-hr ozone NAA	3.3	168.7	154.1	29	1,454	1,358

4.3 Airport ground support equipment

Annual and season-day emissions from airport ground support equipment (GSE) and auxiliary power units (APUs) were calculated using the Emissions Dispersion Modeling System (EDMS, v. 5.1.4) from the U.S. Federal Aviation Administration (FAA). Activity data on 2014 aircraft operations and GSE use for eight major airports were obtained from FAA's Operations and Performance Data System and MAG's 2014 survey data. In addition, 2014 activity data for six small general-aviation airports were obtained from FAA's 2015 Terminal Area Forecast (TAF) dataset and MAG's 2009 and 2014 survey data. (Further details concerning the modeling input data and results are described in Section 4.11, Aircraft).Emissions from GSE and APUs at Luke Air Force Base (AFB) for the year 2014 are grouped together with aircraft emissions at Luke AFB in Section 4.11. The resulting annual and season-day emissions are shown in Tables 4.3–1 and 4.3–2, respectively.

Table 4.3–1. Annual emissions (tons/year) from airport ground support equipment (GSE) and auxiliary power units (APUs).

	Maricopa County			8-hr. ozone nonattainment area		
Equipment type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
GSE	70.8	211.1	2,116.7	69.7	208.1	2,081.7
APUs	6.4	82.7	94.7	6.4	82.4	93.2
Totals:	**77.3**	**293.7**	**2,211.4**	**76.1**	**290.5**	**2,174.9**

Table 4.3–2. Season-day emissions (lbs/day) from airport GSE and APUs.

	Maricopa County			8-hr. ozone nonattainment area		
Equipment type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
GSE	374	1,121	11,194	369	1,106	11,018
APUs	35	454	516	35	453	508
Totals:	**409**	**1,575**	**11,710**	**404**	**1,559**	**11,526**

4.4 Commercial equipment

Annual and season-day emissions from commercial equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and season-day emissions for the 8-hour ozone nonattainment area for this category were derived by applying the ratio of industrial employment in the nonattainment area to Maricopa County-level employment, as data on the number of wholesale establishments recommended by EPA guidance (US EPA, 2002) was not available. See Section 1.5.1 for a discussion of the industrial employment data used. The resulting annual and season-day emissions are shown in Table 4.4–1 below.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1,144.0	1,175.6	29,670.3	7,851	7,198	198,568
8-hr ozone NAA	1,134.9	1,166.2	29,432.3	7,788	7,140	196,975

4.5 Construction and mining equipment

Annual and season-day emissions from construction and mining equipment in Maricopa County were calculated using EPA's MOVES2014a model as described in Section 4.1. Annual and season-day emissions for the 8-hour ozone nonattainment area for this category were derived by applying the ratio of construction employment in the nonattainment area to Maricopa County-level employment as a conservative estimate, as the EPA-recommended allocation factor (the total dollar value of all construction) was unavailable (US EPA, 2002). See Section 1.5.1 for a discussion of the employment data used. The resulting annual and season-day emissions are presented in Table 4.5–1.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	454.4	10,495.7	12,531.9	3,203	72,485	88,728
8-hr ozone NAA	450.3	10,400.5	12,418.3	3,174	71,827	87,923

4.6 Industrial equipment

Annual and season-day emissions from industrial equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and season-day emissions for the 8-hour ozone nonattainment area for this category were derived by applying the ratio of industrial employment in the nonattainment area to Maricopa County-level employment as a conservative estimate, as the number of employees in manufacturing recommended by EPA guidance (US EPA, 2002) was unavailable. See Section 1.5.1 for a discussion of the industrial employment data used. The resulting annual and season-day emissions estimates are shown in Table 4.6–1 below.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	115.1	1,263.3	3,956.0	733	7,645	25,053
8-hr ozone NAA	114.1	1,253.1	3,924.2	727	7,584	24,852

4.7 Lawn and garden equipment

Annual and season-day emissions from lawn and garden equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. These results reflect 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 and season-day emissions for the 8-hour ozone nonattainment area for this category were derived by applying the ratio of population in the nonattainment area to Maricopa County-level population, since housing units was not available, as recommended by EPA guidance (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used. The resulting annual and season-day emissions estimates are shown in Table 4.7–1 below.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	2,937.5	589.9	44,389.3	25,208	4,194	403,992
8-hr ozone NAA	2,962.4	594.9	44,765.8	25,422	4,229	407,419

4.8 Pleasure craft

Annual and season-day emissions from pleasure craft equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and season-day emissions for the 8-hour ozone nonattainment area for this category were derived by applying the ratio of water surface area in the nonattainment area to Maricopa County-level water surface area, as recommended by EPA guidance (US EPA, 2002). See Section 1.5.2 for a discussion of the land-use data used. The resulting annual and season-day emissions estimates are shown in Table 4.8–1 below.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	382.3	98.3	1,154.8	7,477	2,428	29,686
8-hr ozone NAA	382.3	98.3	1,154.8	7,477	2,428	29,686

4.9 Railway maintenance equipment

Annual and season-day emissions from railway maintenance equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and season-day emissions for the 8-hour ozone nonattainment area for this category were derived by applying the ratio of population in the nonattainment area to Maricopa County-level population, as recommended by EPA guidance (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used. The resulting annual and season-day emissions are shown in Table 4.9–1 below.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.3	7.7	15.2	2	53	108
8-hr ozone NAA	0.3	7.8	15.3	2	53	109

4.10 Recreational equipment

Annual emissions from recreational equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and season-day emissions for the 8-hour ozone nonattainment area were derived by applying the ratio of passive open space and vacant land use within the nonattainment area to Maricopa County-level land use, as recommended by EPA guidance (US EPA, 2002). See Section 1.5.2 for a discussion of the land use data used. The resulting annual and season-day emissions are shown in Table 4.10–1 below.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1,271.8	62.4	6,501.1	15,408	713	84,058
8-hr ozone NAA	572.0	28.1	2,924.0	6,930	321	37,807

4.11 Aircraft

Emissions from aircraft at the airports in Maricopa County were estimated using the Federal Aviation Administration's Emissions and Dispersion Model (EDMS, v. 5.1.4). The FAA EDMS model combines atmospheric mixing heights and aircraft-specific activity data with default emissions factors in order to estimate annual emissions inventories for a specific airport. The model calculates emissions of sulfur oxides (SO_x), oxides of nitrogen (NO_x), particulate matter (only for certain categories of airframes and engines), carbon monoxide (CO), and hydrocarbons (HC). The model also estimate emissions from ground support equipment (GSE) and auxiliary power units (APUs), using either default profiles or user-specified information about these components. The emissions from GSE and APUs at all airports other than Luke Air Force Base have been addressed and reported in Section 4.3 above.

One required meteorological input for EDMS is atmospheric mixing height, which is defined as the height (or depth) above ground where relatively vigorous vertical mixing occurs due to convection. To calculate the time-varying mixing height, the latest version of the EPA AERMOD Meteorological Preprocessor (AERMET version 15181) was employed. Both the 2014 hourly surface meteorological data and the 2014 one-minute Automated Surface Observing System (ASOS) wind data from the National Weather Service (NWS) station at Phoenix Sky Harbor were used (NCDC, 2015). Upper-air data for all of 2014 for the Tucson station (#23160) were obtained from the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory Radiosonde Database (ESRL, 2015). Ultimately, a single mixing height dataset in 2014 is used for all airports other than Luke Air Force Base.

Aircraft emissions have been 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.

Within each of these four main categories, many combinations of specific aircraft and engines are modeled and aggregated by EDMS to produce overall emissions for each of the four categories.

Three databases from the Federal Aviation Administration (FAA) provide annual aircraft activity, aircraft type fleet mix, and hourly/weekly/monthly operational profiles for the eight major airports in the 8-hour ozone nonattainment area (Chandler Municipal, Falcon Field, Glendale Municipal, Phoenix Deer Valley, Phoenix Goodyear, Phoenix-Mesa Gateway, Phoenix Sky Harbor, and Scottsdale airports). The three FAA databases are:

- Operational Network (OPSNET) database (FAA, 2015a),
- Enhanced Traffic Management System Counts (ETMSC) database, and
- Aviation System Performance Metrics (ASPM) database (FAA, 2015b).

In addition, the Traffic Flow Management System Counts (TFMSC) database provides taxi-in and taxi-out time for Phoenix Sky Harbor Airport, while MAG's survey of year 2014 data quantifies touch-and-go operations from Phoenix Deer Valley Airport and Phoenix Goodyear Airport.

To supplement the FAA's database for the eight major airports, another three datasets were used for the six small general-aviation airports:

- FAA's Terminal Area Forecast (TAF) database (FAA, 2015c) for year 2014 activity data at Gila Bend Municipal and Wickenburg Municipal airports;
- MAG's survey of 2014 activity at Buckeye Municipal Airport; and
- MAG's survey of 2008 data on aircraft activity (landing and take-off,or LTOs) in Pleasant Valley, Sky Ranch at Carefree, and Stellar Airpark airports.

Data for the year 2008 for the remaining three small general-aviation airports are assumed to be representative of 2014 activity, since updated aircraft activity data for these airports were not available. Table 4.11–1 below summarizes the activity level for each aircraft category for each airport included in the modeling, and indicates the data sources for each airport's activity (reported number of operations) and fleet mix.

The following section describes how activity and emissions were estimated for a representative airport, Chandler Municipal (CHD). The FAA's Operational Network (OPSNET) database provided 2014 activity by aircraft type category, as listed in Table 4.11–1. While OPSNET reported a total of 215,589 general aviation operations at this airport in 2014, further information on the aircraft types for this activity was needed so that 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 Chandler Municipal Airport (CHD) in 2014 comprises 86 different aircraft types, totaling 3,063 operations. The aircraft-specific activity data were ranked in the decreasing order. Activity data for the predominant aircraft was then grown to represent all general aviation activity. This process for the general aviation activity at Chandler Municipal Airport is depicted in Table 4.11–2.

The processes of ranking reported activity and growing this subset of data typically resulted in 10 to 30 aircraft types for each airport/aircraft class combination, representing 85 to 100% of all reported activity.

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

Airport	Code	Operations data source[1]	Fleet mix data source[2]	Aircraft type[3]	2014 operations
Buckeye Municipal	BXK	Survey response	generic GA profile	GA	37,114
Chandler Municipal	CHD	FAA/OPSNET	FAA/ETMSC	AT	1,852
				GA	215,589
				ML	108
Falcon Field	FFZ	FAA/OPSNET	FAA/ETMSC	AC	18
				AT	38,805
				GA	194,557
				ML	3,043
Gila Bend Municipal	E63	FAA/TAF	generic GA profile	GA	3,550
Glendale Municipal	GEU	FAA/OPSNET	FAA/ETMSC	AT	882
				GA	64,033
				ML	138
Luke Air Force Base	LUF	[Aircraft emissions in 2014 were estimates through scaling based on the numbers of F-16s and F-35s]			
Phoenix Deer Valley	DVT	FAA/OPSNET, Survey response	Survey response, FAA/ETMSC	AC	15
				AT	5,368
				GA	334,024 *
				ML	86
Phoenix Goodyear	GYR	FAA/OPSNET, Survey response	Survey response, FAA/ETMSC	AC	234
				AT	3,930
				GA	75,354 *
				ML	3,998
Phoenix-Mesa Gateway (formerly Williams Gateway)	IWA	FAA/OPSNET	FAA/ETMSC	AC	10,134
				AT	22,867
				GA	186,488
				ML	8,879
Phoenix Sky Harbor	PHX	FAA/OPSNET	FAA/ETMSC	AC	352,732
				AT	54,599
				GA	20,579
				ML	2,551
Pleasant Valley	P48	Survey Response	generic GA profile	GA	6,010
Scottsdale	SDL	FAA/OPSNET	FAA/ETMSC	AC	76
				AT	15,518
				GA	133,540
				ML	1,285
Sky Ranch/Carefree	18AZ	Survey response	generic GA profile	GA	3,030
Stellar Airpark	P19	airnav.com	generic GA profile	GA	39,056
Wickenburg Mun.	E25	FAA/TAF	generic GA profile	GA	36,030

1. **FAA/OPSNET:** Federal Aviation Administration's Operations Network (database); aspm.faa.gov.
   FAA/TAF:. FAA's Terminal Area Forecast; taf.faa.gov
2. **FAA/ETMSC:** FAA's Enhanced Traffic Management System Counts (database); aspm.faa.gov.
3. **AC:** Air Commercial; **AT:** Air Taxi; **GA:** General Aviation; **ML:** Military

* The number of operations includes touch-and-go operations reported by airport.

Table 4.11–2. Aircraft-specific activity growth for EDMS modeling input for Chandler Municipal airport.

Rank	Aircraft type	ETMSC-reported operations	% total reported operations	Cumulative percent	Operations grown for EDMS modeling
1	P28A: Piper Cherokee	490	16.00%	16.00%	40,568
2	BE20: Beech 200 Super King	177	5.78%	21.78%	14,654
3	C172: Cessna Skyhawk 172/Cutlass	168	5.48%	27.26%	13,909
4	BE58: Beech 58	162	5.29%	32.55%	13,412
5	C25C: Cessna Citation CJ4	152	4.96%	37.51%	12,584
6	R22: Robinson R-22 Mariner	135	4.41%	41.92%	11,177
7	C182: Cessna Skylane 182	131	4.28%	46.20%	10,846
8	C560: Cessna Citation V/Ultra	119	3.89%	50.08%	9,852
9	BE36: Beech Bonanza 36	104	3.40%	53.48%	8,610
10	P46T: Piper Malibu Meridian	89	2.91%	56.38%	7,368
11	C510: Cessna Citation Mustang	84	2.74%	59.13%	6,955
12	AC90: Gulfstream Commander	79	2.58%	61.70%	6,541
13	SR22: Cirrus SR 22	79	2.58%	64.28%	6,541
14	PC12: Pilatus PC-12	78	2.55%	66.83%	6,458
15	BE33: Beech Bonanza 33	73	2.38%	69.21%	6,044
16	PA46: Piper Malibu	70	2.29%	71.50%	5,795
17	BE35: Beech Bonanza 35	68	2.22%	73.72%	5,630
18	C525: Cessna CitationJet/CJ1	58	1.89%	75.61%	4,802
19	PA28: Piper Cherokee	42	1.37%	76.98%	3,477
20	M20P: Mooney M-20C Ranger	38	1.24%	78.22%	3,146
21	BE9L: Beech King Air 90	37	1.21%	79.43%	3,063
22	M20T: Turbo Mooney M20K	37	1.21%	80.64%	3,063
23	PA44: Piper Seminole	36	1.18%	81.82%	2,981
24	C340: Cessna 340	34	1.11%	82.93%	2,815
25	C210: Cessna 210 Centurion	32	1.04%	83.97%	2,649
26	DA40: Diamond Star DA40	32	1.04%	85.01%	2,649
⋮	⋮	⋮	⋮	⋮	
86	H25B: BAe HS125/7-800/Hawker	2	< 0.1%	100.00%	(n/a)
	Total:	**3,063**			**215,589**

Aircraft emissions at Luke Air Force Base (AFB) are based upon three types of aircraft: F-16, F-35, and "transient" aircraft, and also includes emissions from associated ground support equipment (GSE). F-16 aircraft emissions and associated GSE emissions were scaled using a ratio of the number of F-16s in 2014 to the number of F-16s in 2008 (Weston, 2010). Emissions from F-35 aircraft and their associated GSE were scaled using a ratio of the number of F-35 aircraft in 2014 to the future total number (144) of F-35 aircraft in the L6 scenario emissions as obtained from the base's 2012 environmental impact statement report (USAF, 2012). "Transient" aircraft emissions in 2014 were assumed to be the same as those in 2008 based on discussions with Luke AFB personnel. Emissions from F-16 aircraft, F-35 aircraft, "transient" aircraft, and GSE were all summed into the single "ML" category for Luke Air Force Base.

Tables 4.11–3 and 4.11–4 present total annual and season-day emissions by airport and aircraft type for airports inside and outside the 8-hour ozone nonattainment area, respectively. Ozone

season-day emissions are calculated by summing monthly emissions in the ozone season (June–August), and then dividing the sum by the number of days in the ozone season (92).

Table 4.11–3. Annual and season-day emissions for airports in the 8-hour ozone nonattainment area, by airport and aircraft type.

		Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Facility	**Type***	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Buckeye Municipal	GA	4.1	1.7	176.7	21	8	951
Chandler Municipal	AT	6.6	1.2	7.3	40	7	45
	GA	142.3	24.1	1,351.0	726	117	7,480
	ML	0.0	0.0	1.4	0	0	8
	Total	**149.0**	**25.3**	**1,359.7**	**766**	**124**	**7,533**
Falcon Field	AC	0.0	0.0	0.4	0	0	1
	AT	136.7	27.9	171.89	1,019	205	1,294
	GA	146.7	24.7	1,198.0	547	84	5,001
	ML	3.0	0.8	15.2	16	4	86
	Total	**286.4**	**53.4**	**1,385.5**	**1,583**	**292**	**6,382**
Gila Bend Municipal	GA	**0.4**	**0.2**	**16.8**	**2**	**1**	**89**
Glendale Municipal	AT	2.9	0.9	3.9	8	2	11
	GA	95.5	11.5	489.3	414	46	2,277
	ML	0.1	0.0	0.7	1	0	7
	Total	**98.5**	**12.4**	**494.0**	**424**	**49**	**2,295**
Luke AF Base	ML	**101.0**	**244.8**	**456.6**	**777**	**1,883**	**3,513**
Phoenix Deer Valley	AC	0.0	0.0	0.1	0	0	1
	AT	10.8	5.6	18.1	48	24	81
	GA	115.9	49.0	2,021.5	608	251	11,863
	ML	0.0	0.0	0.4	0	0	3
	Total	**126.8**	**54.6**	**2,040.1**	**656**	**275**	**11,948**
Phoenix Goodyear	AC	0.3	0.7	1.5	1	2	4
	AT	13.9	3.8	19.2	79	20	109
	GA	28.7	39.1	507.7	137	184	2,704
	ML	5.6	23.5	20.3	24	95	87
	Total	**48.6**	**67.1**	**548.8**	**240**	**301**	**2,905**
Phoenix Sky Harbor Intl	AC	258.5	1,567.1	1,483.7	1,407	7,939	8,005
	AT	22.3	109.2	124.2	120	554	673
	GA	30.0	9.3	114.4	138	40	561
	ML	3.9	29.01	24.1	17	113	102
	Total	**314.7**	**1,714.6**	**1,746.4**	**1,682**	**8,645**	**9,341**
Phoenix-Mesa Gateway	AC	5.4	39.04	42.9	29	201	231
	AT	104.5	13.13	119.4	600	74	694
	GA	186.8	47.80	1,073.2	839	193	5,224
	ML	23.5	17.30	75.8	153	102	495
	Total	**320.1**	**117.27**	**1,311.3**	**1,621**	**570**	**6,643**
Pleasant Valley	GA	**0.1**	**0.38**	**1.1**	**1**	**2**	**56**
Scottsdale	AC	0.1	0.07	0.3	0	0	0
	AT	47.3	13.10	65.4	187	50	261
	GA	211.3	76.64	641.5	1,066	359	3,338
	ML	1.3	0.49	9.5	6	2	47
	Total	**260.0**	**90.30**	**716.7**	**1,259**	**410**	**3,646**
Skyranch at Carefree	GA	**1.7**	**0.3**	**16.3**	**10**	**2**	**116**
Stellar Airpark	GA	**8.0**	**2.3**	**224.5**	**40**	**10**	**1,178**
8–hr ozone NAA totals:		**1,719.2**	**2,384.3**	**10,494.4**	**9,080**	**12,571**	**56,545**

***Type**: 'AC' = Air Commercial; 'AT' = Air Taxi; 'GA" = General Aviation; 'ML' = Military

Table 4.11–4. Annual and season-day emissions for airports outside the 8-hour ozone nonattainment area, by airport and aircraft type.

		Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Facility	**Type**	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Wickenburg Municipal	GA	42.6	6.8	193.6	204	32	1,038
County totals:		**1,761.8**	**2,391.1**	**10,688.0**	**9,284**	**12,603**	**57,583**

4.12 Locomotives

Annual emissions from locomotives were calculated based on diesel fuel usage data provided by Burlington Northern/Santa Fe Railway (BNSF), Union Pacific Railway (UP) and Amtrak. Railway operations from these companies fall into three categories: Class I haul lines, passenger trains, and yard/switching operations. Annual emissions were calculated by multiplying diesel fuel usage by emission factors published by US EPA (2009). Ozone season-day emissions were calculated by dividing annual totals by 365 days per year, as locomotive activity is assumed to be uniform throughout the year. The resulting annual and season-day emissions from each of the categories in Maricopa County are presented in Table 4.12–1.

Table 4.12–1. Annual and season-day emissions from locomotives in Maricopa County.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Locomotive type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Class I haul line	115.7	2,126.8	389.5	634	11,654	2,134
Yard/switch ops.	20.7	329.7	28.8	113	1,807	158
Passenger trains	1.1	21.8	3.5	6	119	19
Totals:	**137.5**	**2,478.3**	**421.8**	**754**	**13,580**	**2,311**

To calculate emissions within the 8-hour ozone nonattainment area, County-level emissions were multiplied by the percentage of track miles inside the nonattainment area, determined by GIS mapping. The resulting annual and season-day emissions are shown in Table 4.12–2.

Table 4.12–2. Annual and season-day emissions from locomotives in the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Locomotive type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Class I haul line	70.2	1,289.9	236.2	385	7,068	1,294
Yard/switch ops.	20.7	329.7	28.8	113	1,807	158
Passenger trains	0.1	1.5	0.2	0	8	1
Totals:	**91.0**	**1,621.2**	**265.3**	**498**	**8,883**	**1,454**

4.13 Quality assurance procedures

Established procedures were used to check, and correct when necessary, the nonroad mobile sources emissions estimates. All 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 under review. In addition, the emissions estimates were reviewed for reasonableness by external agency staff.

4.14 Summary of all nonroad mobile source emissions

Table 4.14–1 summarizes annual and season-day emissions of VOC, NO_x, and CO from nonroad mobile sources in Maricopa County. Table 4.14–2 shows annual and season-day emissions for these pollutants for the 8-hour ozone nonattainment area.

Table 4.14–1. Annual and season-day emissions from nonroad mobile sources in Maricopa County.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Agricultural	5.7	286.9	262.2	49	2,473	2,311
Airport GSE+APUs	77.3	293.7	2,211.4	409	1,575	11,710
Commercial	1,144.0	1,175.6	29,670.3	7,851	7,198	198,568
Construction & mining	454.4	10,495.7	12,531.9	3,203	72,485	88,728
Industrial	115.1	1,263.3	3,956.0	733	7,645	25,053
Lawn & garden	2,937.5	589.9	44,389.3	25,208	4,194	403,992
Pleasure craft	382.3	98.3	1,154.8	7,477	2,428	29,686
Railway maintenance	0.3	7.7	15.2	2	53	108
Recreational	1,271.8	62.4	6,501.1	15,408	713	84,058
Aircraft	1,761.8	2,391.1	10,688.0	9,284	12,603	57,583
Locomotives	137.5	2,478.3	421.8	754	13,580	2,311
Total:	**8,287.7**	**19,143.1**	**111,801.8**	**70,378**	**124,946**	**904,107**

Table 4.14–2. Annual and season-day emissions from nonroad mobile sources in the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Agricultural	3.3	168.7	154.1	29	1,454	1,358
Airport GSE+APUs	76.1	290.5	2,174.9	404	1,559	11,526
Commercial	1,134.9	1,166.2	29,432.3	7,788	7,140	196,975
Construction & mining	450.3	10,400.5	12,418.3	3,174	71,827	87,923
Industrial	114.1	1,253.1	3,924.2	727	7,584	24,852
Lawn & garden	2,962.4	594.9	44,765.8	25,422	4,229	407,419
Pleasure craft	382.3	98.3	1,154.8	7,477	2,428	29,686
Railway maintenance	0.3	7.8	15.3	2	53	109
Recreational	572.0	28.1	2,924.0	6,930	321	37,807
Aircraft	1,719.2	2,384.3	10,494.4	9,080	12,571	56,545
Locomotives	91.0	1,621.2	265.3	498	8,883	1,454
Totals:	**7,505.9**	**18,013.6**	**107,723.4**	**61,531**	**118,049**	**855,654**

4.15 References

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5. Onroad Mobile Sources

5.1 Introduction

Onroad mobile source emissions for ozone precursors, such as volatile organic compounds (VOCs), oxides of nitrogen (NO_x), and carbon monoxide (CO), have been calculated for the 8-hour ozone nonattainment area (NAA) and Maricopa County for the 2014 Periodic Emissions Inventory (PEI).

Motor Vehicle Emission Simulator (MOVES2014a) 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 MOVES2014a inputs were developed using local data from multiple sources such as the Arizona Department of Transportation (ADOT), the Arizona Department of Weights and Measures (ADWM), the Maricopa Association of Governments (MAG) Transportation Division, and the National Climatic Data Center (NCDC).

The main references for preparing the onroad mobile source portion of the 2014 emissions inventory were:

- Emission Inventory Requirements for Ozone State Implementation Plans (US EPA, 1991);
- Procedures for Emission Inventory Preparation Volume IV: Mobile Sources (US EPA, 1992a);
- Quality Review Guidelines for 1990 Base Year Emission Inventories (US EPA, 1992b);
- Emissions Inventory Guidance for Implementation of Ozone [and Particulate Matter] National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations (US EPA, 2014a);
- Policy Guidance on the Use of MOVES2014 for State Implementation Plan Development, Transportation Conformity, and Other Purposes (US EPA, 2014b);
- MOVES2014a User Guide (US EPA, 2015a);
- MOVES2014a User Interface Reference Manual (US EPA, 2015b);
- MOVES2014a Software Design Reference Manual (US EPA, 2015c); and
- MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity (US EPA, 2015d);

5.2 Onroad emissions

Onroad exhaust, evaporative, refueling, and extended idling emissions were estimated by MOVES2014a.

5.2.1 MOVES2014a model

Onroad mobile source emissions were calculated using the EPA state-of-the-art emissions modeling tool, MOVES2014a. MOVES2014a is intended for official use to estimate national, state, and county level inventories of criteria air pollutants from highway vehicles. The user of MOVES2014a 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 2014, MOVES2014a was executed using local input data for each geographical area (Maricopa County and the 8-hour ozone nonattainment area). Each scenario was created using the county scale setting and the inventory calculation type. The specific MOVES2014a model RunSpec and RunSpec summaries are described in Appendix C.

5.2.2 Local input data used with the MOVES2014a model

MOVES2014a requires local data such as the presence of inspection and maintenance (I/M) programs, meteorological data, vehicle populations, source type age distribution, annual vehicle miles traveled (VMT), monthly/daily/hourly fractions, road type distribution, average speed distribution, ramp fraction, fuel data, and alternative vehicle and fuel technologies (AVFT).

5.2.2.1 Fuel data

Regarding the fuel local input data, MOVES2014a provides three MOVES tables, which are [fuelsupply], [fuelformulation], and [fuelusagefraction]. The fuel data for each month were derived from the 2014 fuel inspection results in Maricopa County provided by ADWM. The fuel data for Maricopa County were also applied to the 8-hour ozone nonattainment area. The specific MOVES tables for fuel data are presented in Appendix C.

5.2.2.2 I/M programs

MOVES2014a has an [IMCoverage] table for I/M programs, which 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 Area A, with the exception of certain model years and vehicle classes. However, it is assumed that 91.6 percent of the vehicles operating within the 8-hour ozone nonattainment area and Maricopa County participate in the I/M program, while 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 Maricopa County and the 8-hour ozone nonattainment area. The specific MOVES table for I/M programs is presented in Appendix C.

5.2.2.3 Meteorological data

MOVES2014a requires hourly temperature and relative humidity data by specific month of the year. Meteorological data for the Phoenix Sky Harbor International Airport in 2014 were obtained from the National Climatic Data Center (http://www.ncdc.noaa.gov/IPS/lcd/lcd.html). The same hourly average temperature and relative humidity data for each month were applied for

Maricopa County and the 8-hour ozone nonattainment area. The specific MOVES table [ZoneMonthHour] for meteorological data is presented in Appendix C.

5.2.2.4 Vehicle population

In MOVES2014a, off-network emissions including start, evaporative, and extended idle emissions are directly determined by population of vehicles in an area. The vehicle population in Maricopa County was obtained from the July 2014 vehicle registration data provided by ADOT. The vehicle population data were allocated to the 13 MOVES source types based on MOVES default vehicle population fractions for Maricopa County in 2014. The vehicle population in the 8-hour ozone nonattainment area was estimated by applying the population ratio of the two geographical areas to the vehicle population in Maricopa County. The population ratio for 2014 was derived from the MAG socioeconomic data, which are 4,022,310 people for the 8-hour ozone nonattainment area and 3,989,980 people for Maricopa County. The specific MOVES table [SourceTypeYear] for vehicle population is presented in Appendix C.

5.2.2.5 Source type age distribution

MOVES2014a categorizes vehicles according to vehicle classes and model years. The source type age distribution input table was prepared using EPA MOVES data converter and the vehicle registration data from ADOT. The same source type age distribution was applied for Maricopa County and the 8-hour ozone nonattainment area. The specific MOVES table [SourceTypeAgeDistribution] for source type age distribution is presented in Appendix C.

5.2.2.6 Annual VMT

The 2014 annual VMTs were used to estimate onroad exhaust and evaporative emissions. The 2014 annual average daily VMTs by HPMS vehicle type for Maricopa County and the 8-hour ozone nonattainment area were derived from the 2014 traffic assignment data provided by the MAG Transportation Modeling Group in July 2015. The annual average daily VMTs were multiplied by 365 days to obtain the annual VMTs. The specific MOVES table [HPMSvTypeYear] for annual VMT is presented in Appendix C.

5.2.2.7 Road type distribution

MOVES2014a requires the distribution of VMTs by road type as a local input. The road type VMT distribution by HPMS vehicle type was derived with the 2014 traffic assignment data and the MOVES default VMT fractions for the HPMS vehicle types. MOVES source types belonging to the same HPMS vehicle class applied the same road type distribution assigned for the HPMS vehicle class. The specific MOVES table [RoadTypeDistribution] for road type distribution is presented in Appendix C.

5.2.2.8 VMT fraction

Since VMT varies by month, day of week, and hour, MOVES2014a 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) in 2007. The specific MOVES tables [MonthVMTFraction], [DayVMTFraction], and [HourVMTFraction] for VMT fractions are presented in Appendix C.

5.2.2.9 Average speed distribution

In MOVES2014a, vehicle power, speed, and acceleration have a significant effect on vehicle emissions for all pollutants. MOVES2014a estimates those emission effects by assigning activity to operating mode distributions, which are determined by the distribution of vehicle hours traveled (VHT) in sixteen speed bins. Local estimates of average speed were developed by post-processing the output from the 2014 traffic assignment data. 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 8-hour ozone nonattainment area. The specific MOVES table [AvgSpeedDistribution] for the average speed distribution is presented in Appendix C.

5.2.2.10 Ramp fraction

MOVES2014a requires the ramp fraction, which represents the percent of vehicle hours traveled (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 2014 traffic assignment. The specific MOVES table [RoadType] for ramp fractions is shown in Appendix C.

5.2.2.11 Alternative vehicle and fuel technologies (AVFT) strategy

MOVES2014a 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 was provided by Valley Metro and used to prepare the AVFT input. Since the fleet data are available only for specific model years, MOVES2014a 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 shown in Appendix C.

5.2.2.12 Stage II refueling control programs

To account for the impact of Stage II refueling control programs on refueling losses, MOVES2014a requires the control efficiency for the local area. The control efficiency for the refueling displacement vapor losses in 2014 were provided by Arizona Department of Weights and Measures. The same program efficiency of 66.1% was applied to Maricopa County and the 8-hour ozone nonattainment area. The specific MOVES table [CountyYear] for Stage II refueling control programs is presented in Appendix C.

5.2.3 MOVES2014a outputs

MOVES2014a was executed with the RunSpec files described in Appendix C to obtain exhaust and evaporative emissions for VOC, NO_x, and CO. These values were obtained for the following categories:

- Source types: motorcycle, passenger car, passenger truck, light commercial truck, intercity bus, transit bus, school bus, refuse truck, single unit short-haul truck, single unit long-haul truck, motor home, combination short-haul truck, and combination long-haul truck.
- Road types: off-network, rural restricted access, rural unrestricted access, urban restricted access, and urban unrestricted access.

5.2.4 MOVES2014a emission estimates

MOVES2014a was used to generate onroad emissions by vehicle class, facility type, weekday/ weekend day, and month. By specifying the output time aggregate level as month, MOVES2014a produces monthly emissions including weekday and weekend emissions for a given month. The annual emissions were calculated by aggregating monthly onroad emissions derived by MOVES2014a. The ozone season-day emissions were calculated by dividing the three-month peak ozone season emissions from June through August by 92 days.

Tables 5.2–1 and 5.2–2 show the calculated annual and ozone season-day VOC, NO_x, and CO emissions by road and vehicle type in Maricopa County and the 8-hour ozone nonattainment area, respectively.

Table 5.2–1. Annual and season-day onroad mobile source emissions in Maricopa County, by road and vehicle type.

Road type	Source type	Annual emissions (tons/year)			Ozone season-day emissions (lbs/day)		
		VOC	NOx	CO	VOC	NOx	CO
Off-Network	Motorcycle	347.4	2.9	84.1	2,490	13	375
	Passenger car	8,583.4	3,947.7	35,951.9	55,043	21,035	182,111
	Passenger truck	3,321.3	1,785.2	21,645.3	20,733	9,605	114,641
	Light commercial truck	836.9	494.5	6,136.9	5,158	2,665	32,609
	Intercity bus	0.0	0.1	1.5	0	0	8
	Transit bus	0.1	0.0	12.1	0	0	66
	School bus	4.8	2.3	206.5	23	13	1,126
	Refuse truck	0.3	0.1	10.9	1	1	60
	Single unit short-haul truck	93.1	88.0	2,416.2	530	479	13,113
	Single unit long-haul truck	2.7	2.3	84.6	15	13	459
	Motor home	12.6	4.9	256.5	90	26	1,396
	Combination short-haul truck	1.1	0.0	56.6	0	0	310
	Combination long-haul truck	374.7	2,030.6	891.3	1,966	10,215	4,701
Rural Restricted Access	Motorcycle	4.9	4.8	73.1	27	24	382
	Passenger car	51.8	225.5	2,150.5	300	1,255	14,357
	Passenger truck	31.7	154.9	1,104.4	183	856	7,277
	Light commercial truck	7.8	40.1	259.9	45	222	1,714
	Intercity bus	0.7	15.3	3.0	4	77	16
	Transit bus	1.8	24.2	19.7	10	125	104
	School bus	3.4	37.8	18.6	18	190	98
	Refuse truck	0.7	15.4	4.2	4	78	22
	Single unit short-haul truck	16.9	153.0	196.5	92	776	1,040
	Single unit long-haul truck	1.0	8.2	10.6	5	42	56
	Motor home	0.9	5.7	16.8	5	29	89
	Combination short-haul truck	19.1	431.8	80.5	102	2,177	424
	Combination long-haul truck	48.4	1,172.9	214.6	257	5,913	1,129
Rural Un-restricted Access	Motorcycle	21.6	12.8	213.8	121	64	1,117
	Passenger car	165.5	502.1	4,399.3	955	2,804	29,206
	Passenger truck	95.8	324.1	2,208.6	551	1,796	14,436
	Light commercial truck	25.3	90.1	561.2	146	502	3,673
	Intercity bus	0.4	6.8	1.8	2	34	9
	Transit bus	1.0	9.1	7.8	5	47	41
	School bus	2.0	13.9	8.1	10	70	43
	Refuse truck	1.2	19.1	6.8	7	96	36
	Single unit short-haul truck	31.1	204.3	296.7	168	1,036	1,570
	Single unit long-haul truck	1.7	11.1	15.6	9	56	82
	Motor home	1.4	6.5	20.2	8	33	107
	Combination short-haul truck	6.6	109.2	27.1	35	551	142
	Combination long-haul truck	16.2	300.8	70.6	86	1,518	371

Table 5.2–1. Annual and ozone season-day onroad mobile source emissions in Maricopa County, by road and source type (continued).

Road type	Source type	Annual emissions (tons/year) VOC	NOx	CO	Season-day emissions (lbs/day) VOC	NOx	CO
Urban Restricted Access	Motorcycle	63.0	54.0	833.5	351	267	4,354
	Passenger car	812.3	3,150.3	35,925.7	4,693	17,530	239,761
	Passenger truck	478.6	2,102.2	17,539.1	2,765	11,618	115,526
	Light commercial truck	118.9	543.9	3,991.9	686	3,015	26,314
	Intercity bus	2.3	43.8	9.7	12	221	51
	Transit bus	6.2	71.7	61.1	33	370	321
	School bus	12.0	112.9	61.9	64	569	328
	Refuse truck	8.5	156.1	48.2	45	787	254
	Single unit short-haul truck	219.9	1,776.2	2,519.3	1,199	9,008	13,341
	Single unit long-haul truck	12.5	97.7	136.9	68	496	725
	Motor home	11.5	62.0	203.2	65	315	1,078
	Combination short-haul truck	41.7	811.4	173.5	222	4,091	913
	Combination long-haul truck	103.7	2,205.7	457.9	551	11,120	2,410
Urban Un-restricted Access	Motorcycle	173.9	72.7	1,374.4	976	360	7,181
	Passenger car	1,580.9	4,131.7	39,802.3	9,115	23,151	263,742
	Passenger truck	904.0	2,578.9	19,594.4	5,197	14,339	127,747
	Light commercial truck	242.3	732.6	4,993.0	1,392	4,111	32,588
	Intercity bus	2.7	37.6	10.7	14	190	56
	Transit bus	5.7	39.6	34.3	30	204	180
	School bus	11.2	68.3	38.0	60	345	201
	Refuse truck	8.7	123.1	46.1	47	621	243
	Single unit short-haul truck	232.4	1,347.8	2,015.6	1,261	6,830	10,666
	Single unit long-haul truck	12.7	73.1	102.6	69	371	543
	Motor home	11.0	40.1	136.3	61	203	723
	Combination short-haul truck	27.9	412.3	106.9	148	2,081	563
	Combination long-haul truck	67.1	1,115.5	278.7	356	5,629	1,466

Summary, all vehicle types:

	Motorcycle	610.8	147.2	2,578.9	3,965	728	13,409
	Passenger car	11,193.9	11,957.3	118,229.7	70,106	65,775	729,177
	Passenger truck	4,831.4	6,945.3	62,091.8	29,429	38,214	379,627
	Light commercial truck	1,231.2	1,901.2	15,942.9	7,427	10,515	96,898
	Intercity bus	6.1	103.6	26.7	32	522	140
	Transit bus	14.8	144.6	135.0	78	746	712
	School bus	33.4	235.2	333.1	175	1,187	1,796
	Refuse truck	19.4	313.8	116.2	104	1,583	615
	Single unit short-haul truck	593.4	3,569.3	7,444.3	3,250	18,129	39,730
	Single unit long-haul truck	30.6	192.4	350.3	166	978	1,865
	Motor home	37.4	119.2	633.0	229	606	3,393
	Combination short-haul truck	96.4	1,764.7	444.6	507	8,900	2,352
	Combination long-haul truck	610.1	6,825.5	1,913.1	3,216	34,395	10,077
	Totals:	**19,308.7**	**34,219.1**	**210,239.1**	**118,683**	**182,273**	**1,279,788**

Table 5.2–2. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone nonattainment area, by road and source type.

Road type	Source type	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
		VOC	NOx	CO	VOC	NOx	CO
Off-Network	Motorcycle	351.4	3.0	85.0	2,519	13	380
	Passenger car	8,638.8	3,972.5	36,177.6	55,399	21,167	183,254
	Passenger truck	3,345.1	1,797.8	21,797.8	20,883	9,673	115,449
	Light commercial truck	842.9	498.0	6,180.3	5,195	2,684	32,839
	Intercity bus	0.0	0.1	1.5	0	0	8
	Transit bus	0.1	0.0	12.2	0	0	67
	School bus	4.8	2.3	208.4	23	13	1,136
	Refuse truck	0.3	0.1	11.1	1	1	60
	Single unit short-haul truck	94.1	88.9	2,442.0	536	484	13,253
	Single unit long-haul truck	2.8	2.3	85.5	16	13	464
	Motor home	12.7	4.9	258.8	90	27	1,408
	Combination short-haul truck	1.1	0.0	57.4	0	0	314
	Combination long-haul truck	214.0	1,157.7	533.0	1,121	5,824	2,816
Rural Restricted Access	Motorcycle	3.6	3.5	53.0	20	17	277
	Passenger car	37.6	164.2	1,590.6	217	914	10,620
	Passenger truck	23.0	112.8	814.3	133	623	5,366
	Light commercial truck	5.6	29.1	191.2	33	161	1,261
	Intercity bus	0.4	8.8	1.7	2	44	9
	Transit bus	1.0	13.9	11.3	5	71	60
	School bus	1.9	21.7	10.7	10	109	56
	Refuse truck	0.4	9.2	2.5	2	46	13
	Single unit short-haul truck	10.0	91.8	117.9	55	466	624
	Single unit long-haul truck	0.6	4.9	6.3	3	25	34
	Motor home	0.5	3.4	10.1	3	17	54
	Combination short-haul truck	10.9	246.5	45.8	58	1,243	241
	Combination long-haul truck	27.6	669.7	122.1	146	3,376	642
Rural Un-restricted Access	Motorcycle	19.6	11.7	194.3	110	58	1,015
	Passenger car	149.5	452.9	3,974.1	862	2,529	26,384
	Passenger truck	86.5	292.4	1,995.3	498	1,620	13,043
	Light commercial truck	22.9	81.3	507.0	132	453	3,318
	Intercity bus	0.4	5.5	1.4	2	28	7
	Transit bus	0.8	7.4	6.3	4	38	33
	School bus	1.6	11.2	6.5	8	57	34
	Refuse truck	1.1	16.4	5.8	6	83	31
	Single unit short-haul truck	26.6	175.0	254.3	144	888	1,345
	Single unit long-haul truck	1.5	9.5	13.3	8	48	71
	Motor home	1.2	5.5	17.3	7	28	92
	Combination short-haul truck	5.3	87.8	21.7	28	443	114
	Combination long-haul truck	13.0	242.2	56.8	69	1,222	299

Table 5.2–2. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone nonattainment area, by road and source type (continued).

Road type	Source type	Annual emissions (tons/year) VOC	NOx	CO	Season-day emissions (lbs/day) VOC	NOx	CO
Urban Restricted Access	Motorcycle	63.3	54.2	837.6	353	268	4,376
	Passenger car	816.7	3,168.2	36,195.1	4,719	17,629	241,560
	Passenger truck	481.5	2,115.5	17,677.4	2,782	11,692	116,437
	Light commercial truck	119.6	547.2	4,022.1	690	3,033	26,513
	Intercity bus	2.3	43.9	9.7	12	221	51
	Transit bus	6.3	71.8	61.2	33	370	322
	School bus	12.0	113.2	62.0	64	571	328
	Refuse truck	8.5	157.2	48.6	46	793	256
	Single unit short-haul truck	220.8	1,784.0	2,530.7	1,204	9,048	13,401
	Single unit long-haul truck	12.5	98.1	137.6	69	498	728
	Motor home	11.6	62.2	203.9	65	316	1,082
	Combination short-haul truck	41.7	812.2	173.6	222	4,095	914
	Combination long-haul truck	103.9	2,208.8	458.5	552	11,136	2,412
Urban Un-restricted Access	Motorcycle	175.1	73.3	1,384.5	982	363	7,234
	Passenger car	1,590.7	4,159.3	40,053.3	9,172	23,305	265,408
	Passenger truck	910.4	2,598.5	19,735.2	5,233	14,447	128,667
	Light commercial truck	244.1	738.1	5,029.0	1,402	4,142	32,824
	Intercity bus	2.7	37.7	10.7	14	190	56
	Transit bus	5.7	39.7	34.4	30	205	181
	School bus	11.3	68.5	38.1	60	346	201
	Refuse truck	8.8	124.0	46.4	47	626	245
	Single unit short-haul truck	233.3	1,353.1	2,023.5	1,266	6,857	10,708
	Single unit long-haul truck	12.7	73.4	103.0	69	372	545
	Motor home	11.0	40.2	136.6	61	204	725
	Combination short-haul truck	27.9	413.4	107.2	148	2,086	564
	Combination long-haul truck	67.3	1,119.1	279.6	357	5,647	1,471

Summary, all road types:

	Motorcycle	613.0	145.7	2,554.4	3,984	719	13,282
	Passenger car	11,233.3	11,917.1	117,990.7	70,369	65,544	727,226
	Passenger truck	4,846.5	6,917.0	62,020.0	29,529	38,055	378,962
	Light commercial truck	1,235.1	1,893.7	15,929.6	7,452	10,473	96,755
	Intercity bus	5.8	96.0	25.0	30	483	131
	Transit bus	13.9	132.8	125.4	72	684	663
	School bus	31.6	216.9	325.7	165	1,096	1,755
	Refuse truck	19.1	306.9	114.4	102	1,549	605
	Single unit short-haul truck	584.8	3,492.8	7,368.4	3,205	17,743	39,331
	Single unit long-haul truck	30.1	188.2	345.7	165	956	1,842
	Motor home	37.0	116.2	626.7	226	592	3,361
	Combination short-haul truck	86.9	1,559.9	405.7	456	7,867	2,147
	Combination long-haul truck	425.8	5,397.5	1,450.0	2,245	27,205	7,640
	Totals:	**19,162.9**	**32,380.6**	**209,281.7**	**117,999**	**172,963**	**1,273,697**

5.3 Quality assurance process

5.3.1 VMT estimates

Normal quality assurance procedures, including automated and manual consistency checks, were conducted by MAG in developing the 2014 TransCAD traffic assignment network used to generate the VMT data. The VMT estimates using the MAG travel demand model have been validated by the MAG transportation modeling group.

5.3.2 Emission estimates

The quality assurance process performed on the MOVES2014a 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.

5.3.3 Draft emissions inventory for ozone precursors

The draft onroad mobile source portion of the 2014 periodic emissions inventory for ozone precursors was reviewed using published EPA quality review guidelines for base year emission inventories (US EPA, 1992b). The procedure review (Levels I, II, and III) included checks for completeness, consistency, and the correct use of appropriate procedures.

5.4 Summary of all onroad mobile source emissions

Tables 5.4–1 and 5.4–2 summarize annual and season-day onroad mobile source emissions, by road type, for Maricopa County and the 8-hour ozone nonattainment area, respectively.

Table 5.4–1. Annual and ozone season-day onroad mobile source emissions in Maricopa County, by road type.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Road type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Off-network	13,578.2	8,358.6	67,754.4	86,049	44,064	350,974
Rural restricted access	189.0	2,289.5	4,152.3	1,051	11,762	26,707
Rural unrestricted access	369.8	1,609.9	7,837.3	2,104	8,607	50,833
Urban restricted access	1,891.1	11,187.9	61,961.9	10,754	59,405	405,375
Urban unrestricted access	3,280.6	10,773.3	68,533.2	18,726	58,434	445,899
Totals:	**19,308.7**	**34,219.1**	**210,239.1**	**118,683**	**182,273**	**1,279,788**

Table 5.4–2. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone nonattainment area, by road type.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Road type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Off-network	13,508.0	7,527.6	67,850.7	85,782	39,898	351,449
Rural restricted access	123.1	1,379.5	2,977.5	688	7,113	19,256
Rural unrestricted access	329.9	1,398.8	7,054.2	1,878	7,494	45,785
Urban restricted access	1,900.6	11,236.5	62,417.8	10,809	59,669	408,380
Urban unrestricted access	3,301.0	10,838.3	68,981.5	18,842	58,790	448,827
Totals:	**19,162.5**	**32,380.6**	**209,281.7**	**117,999**	**172,963**	**1,273,697**

Likewise, Tables 5.4–3 and 5.4–4 also summarize annual and season-day emissions from onroad mobile sources, by vehicle type.

Table 5.4–3. Annual and ozone season-day onroad mobile source emissions in Maricopa County, by vehicle type.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Vehicle type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Motorcycle	610.7	147.3	2,578.9	3,965	726	13,410
Passenger car	11,194.1	11,957.3	118,229.7	70,106	65,775	729,177
Passenger truck	4,831.3	6,945.3	62,091.7	29,429	38,214	379,627
Light commercial truck	1,231.2	1,901.2	15,942.8	7,427	10,514	96,897
Intercity bus	6.1	103.6	26.6	32	523	140
Transit bus	14.8	144.6	134.9	78	745	712
School bus	33.3	235.2	333.1	175	1,187	1,795
Refuse truck	19.4	313.7	116.2	104	1,583	615
Single unit short-haul truck	593.3	3,569.3	7,444.3	3,251	18,129	39,730
Single unit long-haul truck	30.5	192.4	350.2	167	977	1,865
Motor home	37.4	119.1	633.1	228	606	3,393
Combination short-haul truck	96.4	1,764.7	444.6	507	8,899	2,351
Combination long-haul truck	610.1	6,825.6	1,913.2	3,216	34,395	10,077
Totals:	**19,308.7**	**34,219.1**	**210,239.1**	**118,683**	**182,273**	**1,279,788**

Table 5.4–4. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone nonattainment area, by vehicle type.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Vehicle type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Motorcycle	612.9	145.6	2,554.4	3,983	718	13,281
Passenger car	11,233.3	11,917.0	117,990.7	70,369	65,544	727,225
Passenger truck	4,846.5	6,916.9	62,020.0	29,529	38,055	378,962
Light commercial truck	1,235.1	1,893.8	15,929.7	7,452	10,473	96,755
Intercity bus	5.8	95.9	25.0	30	484	132
Transit bus	13.8	132.8	125.3	73	684	662
School bus	31.6	217.0	325.8	165	1,095	1,756
Refuse truck	19.1	306.9	114.3	102	1,549	605
Single unit short-haul truck	584.8	3,492.9	7,368.4	3,205	17,742	39,332
Single unit long-haul truck	30.0	188.3	345.7	165	956	1,841
Motor home	37.0	116.2	626.7	226	591	3,360
Combination short-haul truck	86.9	1,560.0	405.7	456	7,867	2,147
Combination long-haul truck	425.7	5,397.5	1,450.0	2,245	27,205	7,640
Totals:	**19,162.5**	**32,380.6**	**209,281.7**	**117,999**	**172,963**	**1,273,697**

Table 5.4–5 summarizes the annual and ozone season-day emissions for VOC, NO_x, and CO from all onroad mobile sources in Maricopa County and the 8-hour ozone nonattainment area in 2014.

Table 5.4–5. Annual and ozone season-day emissions from all onroad mobile sources in Maricopa County and the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	19,308.7	34,219.1	210,239.1	118,683	182,273	1,279,788
8-hr ozone NAA	19,162.5	32,380.6	209,281.7	117,999	172,963	1,273,697

5.5 References

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6. Biogenic Sources

6.1 Introduction

Biogenic emissions have been estimated for the 2014 Periodic Emissions Inventory (PEI) for ozone precursors in Maricopa County and the 8-hour ozone nonattainment area (NAA) 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 important corrections and improvements were made in the latest version of MEGAN2.1 (Jiang et al., 2011; Guenther et al., 2012) compared to its previous versions (Guenther, 2006a, 2006b, and 2007; Guenther et al., 2006). Volatile organic compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NO_x) emissions are reported in the ozone precursor emission inventory.

In an effort to improve biogenic emission estimates, the methodology used to calculate biogenic emissions for the 2014 PEI has been updated from the methodology in the 2011 PEI. In the 2014 PEI, Weather Research and Forecasting Model (WRF) meteorology input data were generated using reanalysis data based on observational data from multiple weather stations. WRF data are hour-by-hour for the entire year of 2014 and spatially gridded using a 4km × 4km resolution with 56 × 44 grid cells. The 365 day-specific gridded biogenic emissions at each grid cell were calculated by MEGAN based on WRF meteorology data. These gridded emissions were summed together to calculate monthly and annual total emissions.

In contrast, meteorology data measured at the Southwest Solar Research Park were applied to all grid cells of the modeling domain in the 2011 PEI. The biogenic emissions were estimated for one representative day of each month using the monthly average diurnal cycle of the meteorological data at the site. The daily emissions were then multiplied by the number of days for each month to calculate the monthly total emissions. The monthly total emissions were summed together for annual emissions.

The methodology used in the 2011 PEI limited a realistic representation of the natural meteorological variability, and thereby reduced the overall biogenic emission magnitudes. Since daily biogenic emissions have a large range of temporal and spatial variability depending on the day-to-day weather conditions, the use of more dynamic values provided by the WRF meteorology resulted in a large increase in the monthly and annual biogenic emissions in the 2014 PEI.

For example, daily biogenic VOC emissions in June 2014 ranged from 905 to 1,369 tons per day in Maricopa County using day-to-day gridded WRF meteorology and totaled 36,382 tons for the entire month of June in the 2014 PEI. The biogenic VOC emissions for a representative day in June 2011 in the 2011 PEI were estimated at 498 tons per day in Maricopa County using monthly average meteorology data applied to all grid cells, and were multiplied by 30 days to estimate a total of 14,947 tons for the entire month of June. Since the 2011 PEI depended on the time- and space-averaged meteorological assumptions, the emissions total for a typical day was effectively smoothed to a value lower than the day-to-day range achievable with the more representative gridded data available to the 2014 PEI. As a result, the monthly and annual VOC emissions in the 2014 PEI are approximately two times larger than those in the 2011 PEI.

6.2 Modeling domain

MEGAN inputs and outputs are based on the user-defined two-dimensional grid cells. A 4-km grid modeling domain covering the entire area of Maricopa County and portions of neighboring counties are employed to develop biogenic emissions with MEGAN. The target areas for the development of biogenic emissions are the 8-hour ozone nonattainment area and Maricopa County within the 4-km domain. The modeling domain is defined with a Lambert Conformal Conic Projection (LCP) coordinate system presented in Table 6.2–1. Additional input files that mask areas covered by the 8-hour ozone nonattainment area and Maricopa County are developed by using Geographic Information Systems (GIS) software to calculate emissions for those two target areas. 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 (e.g., boundaries of Maricopa County or the 8-hour ozone nonattainment area), and 0.0 for grid cells outside the target area. As shown in Figure 6.2–1, biogenic emissions for the nonattainment area and Maricopa County are extracted from MEGAN simulations using the masked grid cells in the 4-km modeling domain.

Table 6.2–1. The modeling domain defined in the LCP coordinate system.

Grid horizontal resolution	Grid size	LCP range (km)	Target area
4 km	56 × 44	(32.4989, –113.3869) to (34.07317, –111.0435)	8-hour ozone NAA and Maricopa County

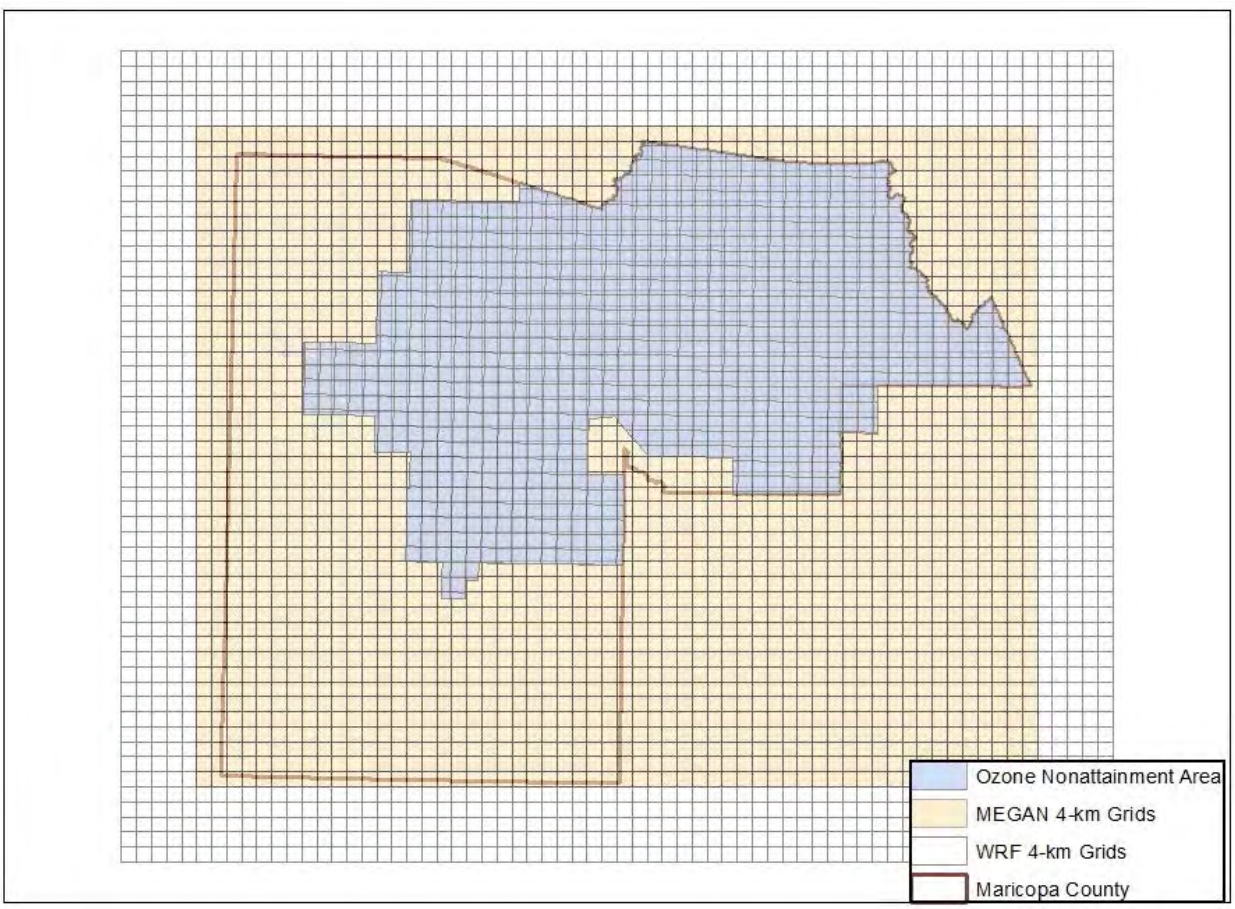

Figure 6.2–1. The masked grid cells in the 4-km modeling domain.

6.3 Input data

MEGAN requires that both land cover data and meteorological data be prepared as inputs to calculate biogenic emissions.

6.3.1 Land cover data

Land cover datasets released with MEGAN v2.1 include eight-day average leaf area index (LAI), percentages of 16 plant functional types (PFT), and emission factors (EF). The LAI data are based on a resolution of 30 arc-seconds (approximately 1 km) dataset from the North America Leaf Index (version 2011); the PFT data are 30 arc-seconds resolution from the North America Plant Functional Type (version 2011); and the EF data are from a 30 arc-seconds resolution global emission factor dataset.

6.3.2 Meteorological data

Meteorological data are obtained from WRF version 3.7 model runs after processing by the Meteorology-Chemistry Interface Processor (MCIP). The output of MCIP is then used as input to MET2MEG, a component program of MEGAN to generate meteorological input data for the biogenic emission model. The MET2MEG outputs include photosynthetically active radiation (PAR) at the surface, air temperature at 2 meters above surface, air pressure, humidity, wind speed, top-layer soil moisture and temperature, and accumulated precipitation for each hour.

Biogenic emissions of VOC and CO are mainly affected by temperature and solar radiation. Isoprene (a specific VOC) emissions are also dependent upon soil moisture. NOx emissions from soils depend upon soil temperature and water-filled pore space, which are determined by soil types and precipitation. Wind speed and humidity influence leaf temperature. Figure 6.3–1 shows daily mean air temperature, PAR, wind speed, air pressure, water vapor mixing ratio, 24-hour accumulated precipitation, and surface soil moisture and temperature. The highest daily mean temperature was recorded in July, while the maximum daily average PAR was observed in June, indicating the peak daily mean temperature occurred one month after the highest radiation.

In order to examine the reliability of WRF model results, temperature, the water vapor mixing ratio, wind speed, and solar radiation were validated using hourly observational datasets from the National Weather Service (NWS; DS472.0) and the Arizona Meteorological Network (AZMET) stations. There are 12 NWS stations and 13 AZMET stations within the 4-km grid modeling domain. The model validation results are illustrated in Figure 6.3–2. The temperature and water vapor mixing ratio are well replicated with coefficients of determination (R^2) of 0.97 and 0.89, respectively. The positive bias of solar radiation indicates the overestimation of PAR and solar radiation by WRF, likely due to inaccurately modeled cloud data.

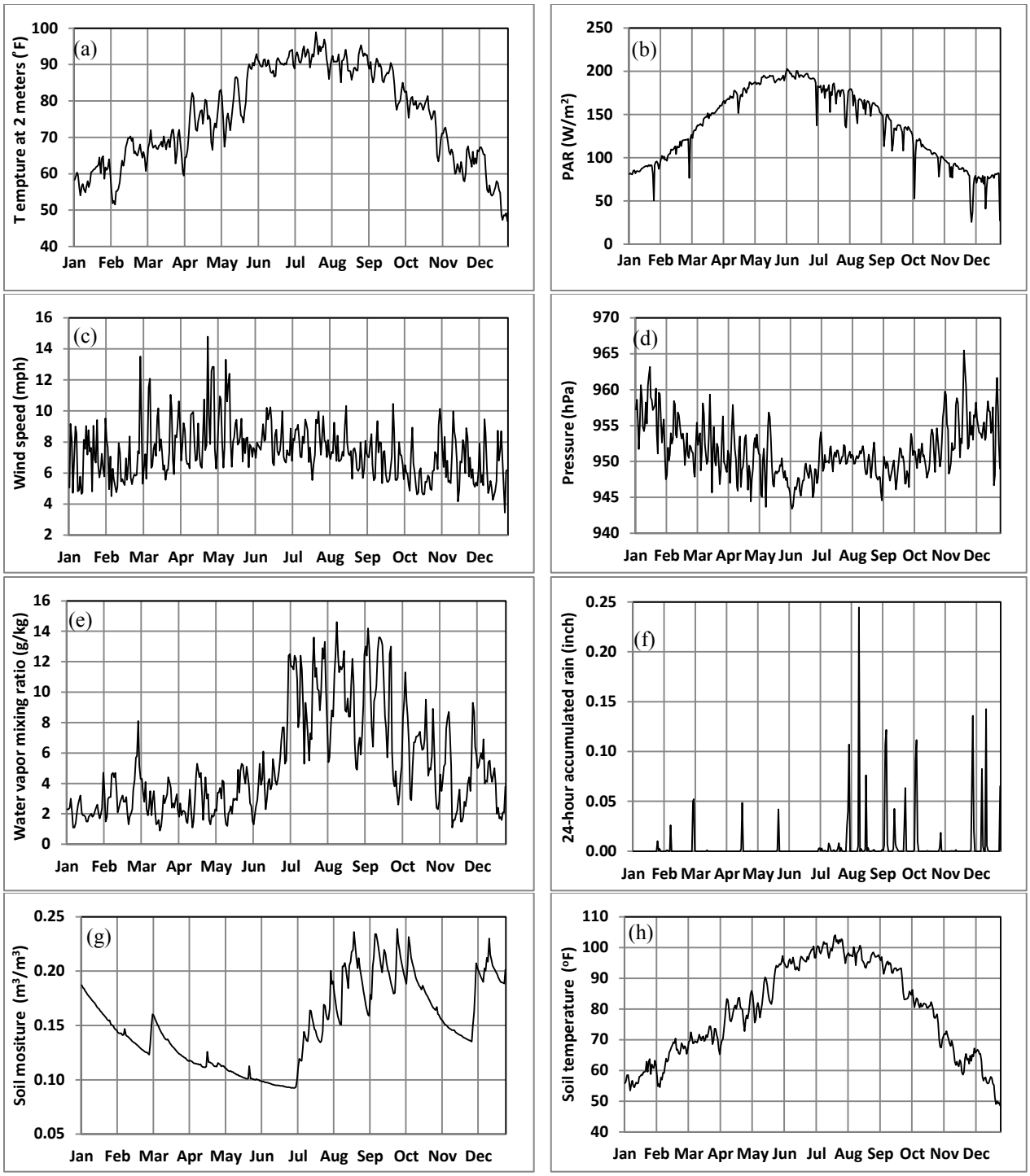

Figure 6.3–1. Daily averages of meteorological variables derived from WRF simulations for 2014. (a) air temperature at 2-m height, (b) PAR, (c) wind speed, (d) air pressure, (e) water vapor mixing ratio, (f) 24-hour accumulated precipitation, (g) soil moisture, and (h) soil temperature.

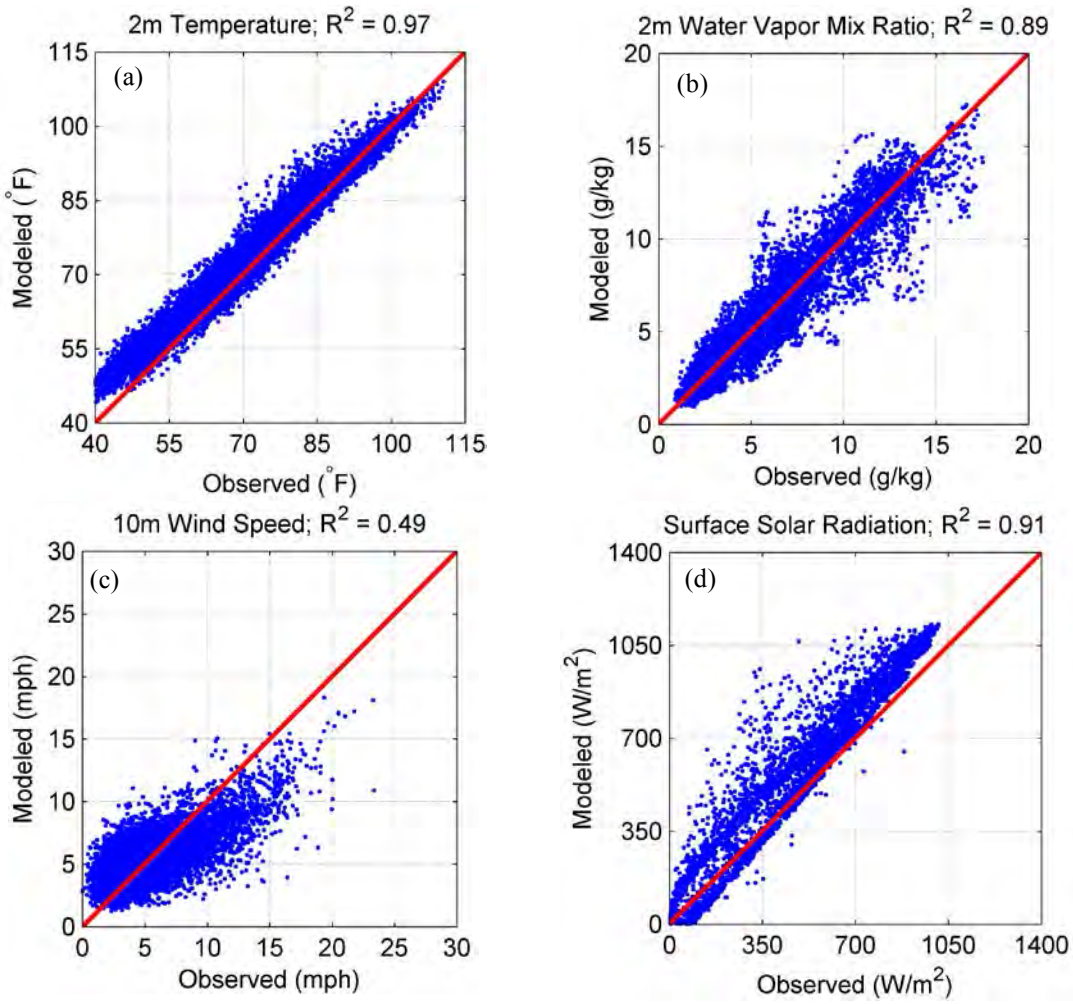

Figure 6.3–2. Validation results of WRF model simulations using hourly observational data from NWS and AZMET: (a) air temperature at 2-m height, (b) water vapor mixing ratio, (c) wind speed, and (d) surface solar radiation. Results are based on paired hourly modeled and observed data for all of 2014. R^2 = coefficient of determination.

6.4 Emission estimation

Daily average emissions for each month in 2014 are provided in Table 6.4–1 for the 8-hour ozone nonattainment area and Maricopa County. Daily average emissions in 2014 (left panel) and diurnal emission cycles (right panel) of ozone precursors (VOC, NO_x, and CO) for Maricopa County and the 8-hour ozone nonattainment area are illustrated in Figure 6.4–1. Monthly biogenic emissions for the 8-hour ozone nonattainment area and Maricopa County are presented in Table 6.4–2. The maximum emissions occurred the ozone season (June–August), as temperature and solar radiation reached their highest levels during these summer months.

Table 6.4–1. Average daily biogenic emissions (lbs/day) for Maricopa County and the 8-hour ozone nonattainment area, by month.

	Maricopa County			8-hour ozone NAA		
Month	**VOC**	**NO_X**	**CO**	**VOC**	**NO_X**	**CO**
January	123,683	1,068	11,735	66,808	621	6,544
February	284,837	2,147	29,906	152,442	1,248	16,531
March	445,427	3,021	52,792	246,449	1,816	30,112
April	664,032	3,905	84,399	358,515	2,311	47,388
May	1,327,969	6,425	169,625	741,132	3,900	97,962
June	2,425,520	10,360	309,840	1,338,130	6,243	178,099
July	2,715,657	12,531	342,128	1,541,904	7,637	201,635
August	1,999,716	10,813	248,697	1,083,019	6,425	140,580
September	1,388,472	8,297	168,139	716,631	4,811	91,042
October	606,096	4,021	68,960	310,059	2,230	36,916
November	173,151	1,166	17,788	90,108	655	9,592
December	91,809	954	7,886	50,424	558	4,398

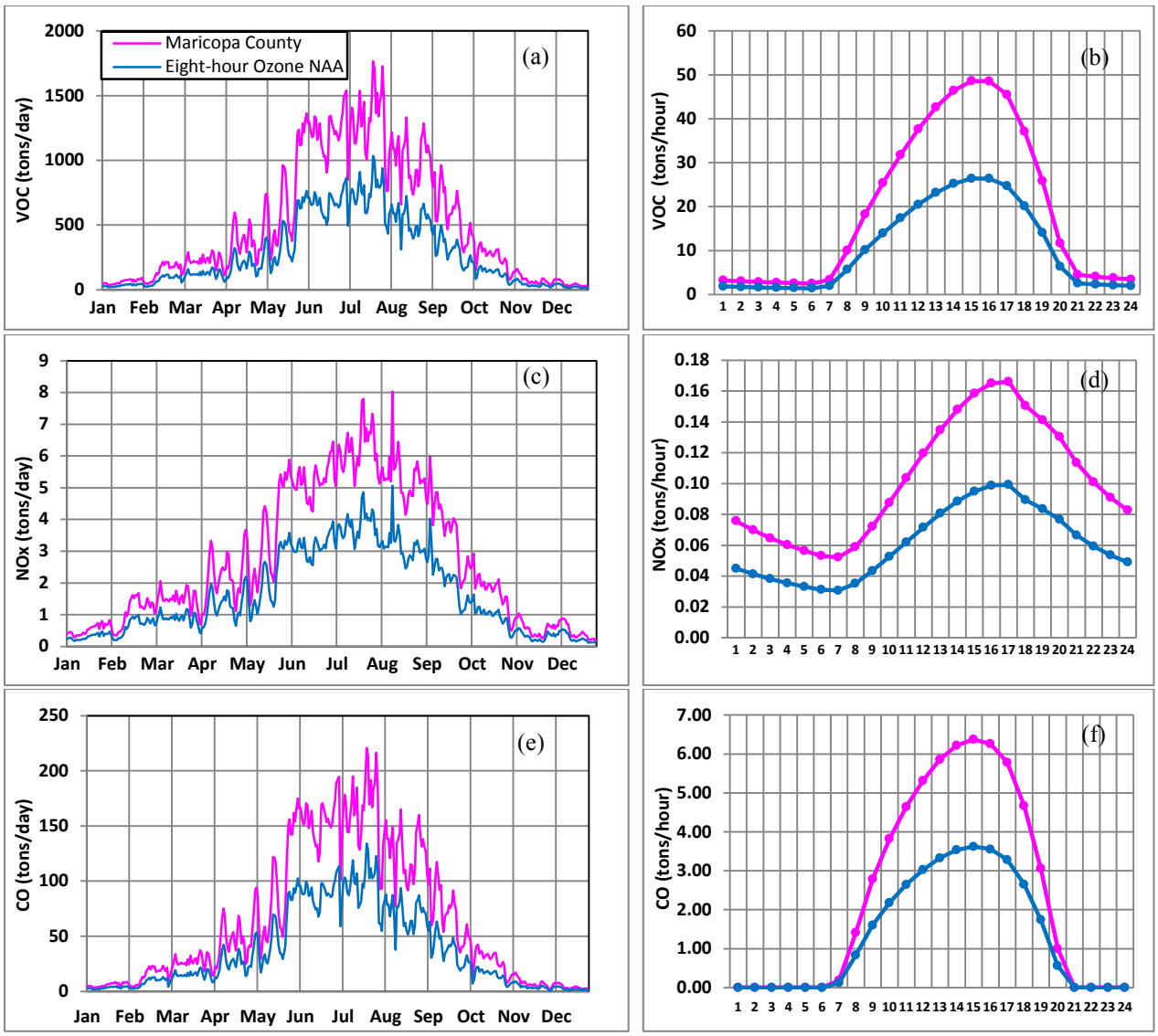

Figure 6.4–1. Average daily biogenic emissions, by month (left) and annual diurnal emission cycle (right) of VOC (top), NO_x (center), and CO (bottom), for both Maricopa County (pink line) and the 8-hour ozone nonattainment area (blue line).

Table 6.4–2. Biogenic emissions (tons/month) for Maricopa County in 2014 for Maricopa County and the 8-hour ozone nonattainment area, by month.

	Maricopa County			8-hour ozone NAA		
Month	**VOC**	**NO_X**	**CO**	**VOC**	**NO_X**	**CO**
January	1,917.1	16.6	181.9	1,035.5	9.6	101.4
February	3,987.7	30.1	418.7	2,134.2	17.5	231.4
March	6,904.1	46.8	818.3	3,820.0	28.1	466.7
April	9,960.5	58.6	1,266.0	5,377.7	34.7	710.8
May	20,583.5	99.6	2,629.2	11,487.5	60.4	1,518.4
June	36,382.8	155.4	4,647.6	20,072.0	93.7	2,671.5
July	42,092.7	194.2	5,303.0	23,899.5	118.4	3,125.3
August	30,995.6	167.6	3,854.8	16,786.8	99.6	2,179.0
September	20,827.1	124.5	2,522.1	10,749.5	72.2	1,365.6
October	9,394.5	62.3	1,068.9	4,805.9	34.6	572.2
November	2,597.3	17.5	266.8	1,351.6	9.8	143.9
December	1,423.1	14.8	122.2	781.6	8.6	68.2
Totals:	**187,065.9**	**987.9**	**23,099.4**	**102,301.8**	**587.2**	**13,154.5**

6.5 Summary of all biogenic source emissions

Annual and ozone season-day (June–August) emissions from biogenic sources for both Maricopa County and the 8-hour ozone nonattainment area are provided in Table 6.5–1.

Table 6.5–1. Annual and season-day biogenic emissions for Maricopa County and the 8-hour ozone nonattainment area.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	187,065.9	987.9	23,099.4	2,380,298	11,235	300,222
8-hr ozone NAA	102,301.8	587.2	13,154.5	1,321,018	6,768	173,438

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Appendix A. Instructions for Reporting 2014 Annual Air Pollution Emissions

Maricopa County
Air Quality Department

INSTRUCTIONS

FOR REPORTING 2014

ANNUAL AIR POLLUTION EMISSIONS

revised
January 2015

Emissions Inventory Unit
1001 North Central Avenue, Suite 125
Phoenix, Arizona 85004

Phone: (602) 506-6790
Fax: (602) 506-6179
Email: *EmisInv@mail.maricopa.gov*

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

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APPENDIX. List of Valid Control Device Codes for 2014

WHAT'S NEW FOR 2014?

Emission factors, codes, etc.:

- U.S. EPA has revised (i.e., retired, replaced, and/or combined) many **Control Device Codes**. If you report control devices please verify the current "Control Type Code" (col. 4 on the Control Device Form) to ensure that your control equipment has been properly (re)assigned. For your convenience, we have included a complete 2-page list of all currently valid Control Device Codes as an appendix to this document.

- We have standardized the reporting of several types of **PM_{10}-generating processes** that use watering to reduce emissions (e.g., unpaved road travel, stockpiles, and certain activities at sand/gravel operations and concrete batch plants). For those processes that use an emission factor that already incorporates this control measure (i.e., **"Controlled EF?"** is "**Y**" in Col. 18 on the General Process Form), values for capture and control efficiencies are no longer pre-printed, to avoid double-counting the emission reductions achieved by watering.

- The PM_{10} emission factor for **certain crematory processes** has been updated (from 0.8 lb/ton to 5.92 lb/ton) to reflect current EPA guidance, and to be consistent with the values that MCAQD uses to establish emission limits when issuing permits.

Reporting forms:

- Some **preprinted information** on your report may be different from last year's version. Please review the enclosed forms carefully, and **VERIFY THOROUGHLY that the information you provide on all reporting forms match the information presented on the preprinted forms from MCAQD.**

- Many of our reporting forms have changed in past years. If you develop 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.

Miscellaneous:

- **Non-operational facilities**: Any facility that has been issued an air quality permit, but that did NOT operate at any time during 2014, must still respond in writing to this request for annual emissions information, as a condition of its air quality permit. Please provide ALL information requested on both the "Business Form" and the "Data Certification Form", and submit these forms, along with a letter certifying that there were no operations at the facility during calendar year 2014, by the due date shown on the Business Form.

- **Emissions fees for Title V facilities:** In accordance with Maricopa County Air Pollution Control Rule 280 (Fees), the 2014 annual emission fee for Title V sources is $42.21/ton. **NOTE:** Only emissions from 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 2014 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 those major sources with a **Title V** permit are required to pay annual emissions fees, and thus 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:

Maricopa County Air Quality Department
Emissions Inventory Unit
1001 North Central Avenue, Suite 125
Phoenix, AZ 85004

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 described in Arizona Revised Statutes and Maricopa County Rules. Applicable excerpts concerning confidentiality of data are reproduced below.

A.R.S. § 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.

NOTE: No data can be held confidential without proper justification. We will reply in writing to all requests for confidentiality, detailing which individual data elements for each process have been deemed confidential.

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 Business Assistance Program at (602) 506-5102 or the Engineering & Permitting Division at (602) 506-6094 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 call (602) 506-6790, or visit our web site at:
http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx

- 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 or email at EmisInv@mail.maricopa.gov.

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: Making a change on the Business Form will **NOT** transfer the permit ownership or location. You must contact the Department's Business Assistance Program at (602) 506-5102 or the Engineering & Permitting Division at (602) 506-6094 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.

11 Who should receive the Annual Emissions Inventory Form next year?: This should be a person who is directly employed with the business. This person should not be a consultant for the business.

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: N33.5277 Long: W112.2626***
2	***V***	***14*** ft	***200*** ^{o}F		***19,186***	***40***			***thermal oxidizer, Bldg. 2 Lat:N33.5259 Long:W112.2613***

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

** 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	***217***	***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 is unique and 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 2014. 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 2014.

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 2014

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 20 % Mar-May 25 % Jun-Aug 30 % 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 **2014**

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		90	6	2400 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 2014. 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 are unique and 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 information on the type 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* 2014** 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	Toro-Red Paint	707	gl	VOC	7.0	gal		%		%		4,949
803	1	Toro-Red Paint	707	gl	HAP&NON	0.5	gal		%		%		354
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 2014

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 2014

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 2014? 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	2014 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 2014

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 2014 Annual Emissions:	(1) Totals from Process Forms	(2) + Accidental Releases	(3) = TOTAL 2014 Emissions
CO	2,113	0	2,113
NH_x	0	0	0
Lead	0	0	0
HAP&NON	354	0	354
VOC	24,220	0	24,220
NO_x	9,815	0	9,815
SO_x	645	0	645
PM_{10}	3,091	0	3,091

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 Dept., Emissions Inventory Unit,1001 North Central Avenue, Suite 125, Phoenix, AZ 85004.
- 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
30300834	Industrial Processes	Primary Metal Production	Iron Production	Paved Road Travel
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
30502012	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 **$42.21**, and enter the result on line 8. This is your 2014 emission fee.

EXAMPLE (for Title V sources only)

Data Certification/Fee Calculation Form 2014

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 2014 Annual Emissions:	(1) Totals from Process Forms	(2) + Accidental Releases	(3) = TOTAL 2014 Emissions
CO	2,113	0	2,113
NH_x	0	0	0
Lead	0	0	0
PM_{10} (non-billable; see page 22)	2,400	0	2,400

Emissions fees are based on your emissions of the following pollutants ONLY:

1	HAP&NON	354	0	354
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:**			35,725 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 **$ 42.21**. This is your **2014 ANNUAL EMISSION FEE**.			$ 759.78

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, Emissions Inventory Unit,1001 North Central Avenue, Suite 125, Phoenix, AZ 85004.
- 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 B. Rule Effectiveness (RE) Studies

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 following example illustrates how the application of rule effectiveness can significantly affect the resulting emission estimates. The calculations below reflect a process whose reported emissions are controlled via a control device with a nominal 90% control efficiency (CE). In the second equation, an RE rate of 83% is applied to the controlled process.

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

Uncontrolled emissions × [1 – (*CE*)] = *Emissions after control*

100 tons × [1 – (0.90)] = **10.0 tons**

B. Emissions <u>including</u> the application of an 83% rule effectiveness (RE):

Uncontrolled emissions × [1 – (*CE* × ***RE***)] = *Emissions after control* ***<u>and</u>*** *RE*

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, and unrealistic, 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.

2. Calculating Rule Effectiveness Rates for Title V 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 B–2 and B–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 B–2 and B–3.

The data and methods used to develop RE rates for Title V and non-Title V permitted facilities are described below. The resulting rule effectiveness values for 2014 are summarized in Table B–1 below.

Table B–1. Rates of compliance and rule effectiveness for 2014, by permit category.

Source category	Compliance rate *	Rule Effectiveness (RE) rate
Title V facilities	88.45%	90.44%
Non-Title V facilities	85.94%	89.00%

** Compliance rates for both Title V and Non-Title V facilities are based upon 2013–14 inspection data, and reflect compliance self-monitoring recordkeeping practices, in addition to violation data.*

For the remaining emission processes that include a control device or technique that limits ozone formation, 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 both Title V and non-Title V facilities are based on two full years of data (2013 and 2014), since compliance information for these sources tends to be more 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 combined scores of the monitoring data and inspection data divided by the 70% of the overall RE rate comprise the "compliance rate" portion of the RE calculation matrix, as shown in Tables B–2 and B–3 below.

3. References

US EPA, 1992. Guidelines for Estimating and Applying Rule Effectiveness for Ozone/CO State Implementation Plan Base Year Inventories. EPA Rep. 452/R-92-010, November 1992.

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 B–2. Rule Effectiveness Matrix for Title V Facilities

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

Factor	Range		Midpoint 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 6–9 months.	35%	90%	**31.50%**
	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%	8 of 16 facilities	**16.98%**
	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 16 facilities	**13.13%**
		< 70%	35%	High Priority Violator (HPV): the facility is in significant violation of one or more applicable requirement of the CAA.			

Overall compliance rate for Title V facilities: 88.45%

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%	**2.91%**
	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.	3%	97%	**2.91%**
	87%	93%	90%	Control equipment operators follow daily O&M instructions.			
	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.			

Table B–2. Rule Effectiveness Matrix for Title V Facilities (continued)

Factor	Range		Midpoint 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.	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.			

Table B–2. Rule Effectiveness Matrix for Title V Facilities (continued)

Factor	Range		Midpoint value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
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.			
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.			

Table B–2. Rule Effectiveness Matrix for Title V Facilities (continued)

Factor	Range		Midpoint value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Inspector Training	94%	100%	97%	Inspectors must undergo 2 weeks of comprehensive basic training, and 1–2 weeks of source-specific training, and such training is updated each year.	2%	97%	**1.94%**
	87%	93%	90%	Inspectors must undergo 1–2 weeks of basic training and 1 week of source-specific training and such training is updated every 1–2 years.			
	81%	86%	84%	Inspectors must undergo 1–2 weeks of basic training and 3–5 days of source-specific training, and such training is updated every 1–2 years.			
	70%	80%	75%	Inspectors must undergo 1–2 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.			
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: 90.44%

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

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

Factor	Range		Midpoint 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 6–9 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%	**26.25%**
		< 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%	82 of 137 facilities	**20.32%**
	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.		2 of 137 facilities	**0.46%**
	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.		57 of 137 facilities	**13.13%**
		< 70%	35%	High Priority Violator (HPV): the facility is in significant violation of one or more applicable requirement of the CAA.			

Overall compliance rate for Non-Title V facilities: 85.94%

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%	**2.91%**
	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.	3%	97%	**2.91%**
	87%	93%	90%	Control equipment operators follow daily O&M instructions.			
	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.			

Table B–3. Rule Effectiveness Matrix for Non-Title V Facilities (continued)

Factor	Range		Midpoint 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.	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) 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.			

Table B–3. Rule Effectiveness Matrix for Non-Title V Facilities (continued)

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
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.			
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.	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. The implementing agency mails regulatory information packages infrequently, if ever.			

Table B–3. Rule Effectiveness Matrix for Non-Title V Facilities (continued)

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score(= weight × value)
Inspector Training	94%	100%	97%	Inspectors must undergo 2 weeks of comprehensive basic training, and 1–2 weeks of source-specific training, and such training is updated each year.	2%	97%	**1.94%**
	87%	93%	90%	Inspectors must undergo 1–2 weeks of basic training and 1 week of source-specific training and such training is updated every 1–2 years.			
	81%	86%	84%	Inspectors must undergo 1–2 weeks of basic training and 3–5 days of source-specific training, and such training is updated every 1–2 years.			
	70%	80%	75%	Inspectors must undergo 1–2 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.			
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: 89.00%

Appendix C. MOVES2014a Local Input Data and RunSpecs

To calculate 2014 annual and typical daily emissions from onroad sources, MOVES2014a was executed using local input data for each month of the year and each geographic area analyzed (Maricopa County and the 8-hour ozone nonattainment area).

A portion of the MOVES2014a RunSpec Summary, RunSpec, and local input data for Maricopa County are provided in this appendix as an example.

MOVES2014a RunSpec Summary (Maricopa County)

* Output Database Server Name: [using default]

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

* Time Spans:
    Time Aggregation Level: Hour
    Years: 2014
    Months: January - 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: c04013y2014_20151118

* Vehicles/Equipment
    On Road Vehicle Equipment:
        Compressed natural Gas (CNG) - Transit Bus
        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 - 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
        Electricity - Light Commercial Truck
        Electricity - Passenger Car
        Electricity - Passenger Truck
        Ethanol (E-85) - Light Commercial Truck
        Ethanol (E-85) - Passenger Car
        Ethanol (E-85) - Passenger Truck
        Gasoline - Combination Short-haul Truck
        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

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

* Pollutants and Processes
    Total Gaseous Hydrocarbons - Running Exhaust
    Total Gaseous Hydrocarbons - Start Exhaust
    Total Gaseous Hydrocarbons - Evap Permeation
    Total Gaseous Hydrocarbons - Evap Fuel Vapor Venting
    Total Gaseous Hydrocarbons - Evap Fuel Leaks
    Total Gaseous Hydrocarbons - Crankcase Running Exhaust
    Total Gaseous Hydrocarbons - Crankcase Start Exhaust
    Total Gaseous Hydrocarbons - Crankcase Extended Idle Exhaust
    Total Gaseous Hydrocarbons - Refueling Displacement Vapor Loss
    Total Gaseous Hydrocarbons - Refueling Spillage Loss
    Total Gaseous Hydrocarbons - Extended Idle Exhaust
    Total Gaseous Hydrocarbons - Auxiliary Power Exhaust
    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
    Carbon Monoxide (CO) - Auxiliary Power Exhaust
    Oxides of Nitrogen (NOx) - Running Exhaust
    Oxides of Nitrogen (NOx) - Start Exhaust
    Oxides of Nitrogen (NOx) - Crankcase Running Exhaust
    Oxides of Nitrogen (NOx) - Crankcase Start Exhaust
    Oxides of Nitrogen (NOx) - Crankcase Extended Idle Exhaust
    Oxides of Nitrogen (NOx) - Extended Idle Exhaust
    Oxides of Nitrogen (NOx) - Auxiliary Power Exhaust
    Methane (CH4) - Running Exhaust
    Methane (CH4) - Start Exhaust
    Methane (CH4) - Crankcase Running Exhaust
    Methane (CH4) - Crankcase Start Exhaust
    Methane (CH4) - Crankcase Extended Idle Exhaust
    Methane (CH4) - Extended Idle Exhaust
    Methane (CH4) - Auxiliary Power Exhaust
    Non-Methane Hydrocarbons - Running Exhaust
    Non-Methane Hydrocarbons - Start Exhaust
    Non-Methane Hydrocarbons - Evap Permeation
    Non-Methane Hydrocarbons - Evap Fuel Vapor Venting
    Non-Methane Hydrocarbons - Evap Fuel Leaks
    Non-Methane Hydrocarbons - Crankcase Running Exhaust
    Non-Methane Hydrocarbons - Crankcase Start Exhaust
    Non-Methane Hydrocarbons - Crankcase Extended Idle Exhaust
    Non-Methane Hydrocarbons - Refueling Displacement Vapor Loss
    Non-Methane Hydrocarbons - Refueling Spillage Loss
    Non-Methane Hydrocarbons - Extended Idle Exhaust
    Non-Methane Hydrocarbons - Auxiliary Power Exhaust
    Non-Methane Organic Gases - Running Exhaust
    Non-Methane Organic Gases - Start Exhaust
    Non-Methane Organic Gases - Evap Permeation
    Non-Methane Organic Gases - Evap Fuel Vapor Venting
    Non-Methane Organic Gases - Evap Fuel Leaks
    Non-Methane Organic Gases - Crankcase Running Exhaust
    Non-Methane Organic Gases - Crankcase Start Exhaust
    Non-Methane Organic Gases - Crankcase Extended Idle Exhaust

Non-Methane Organic Gases - Refueling Displacement Vapor Loss
Non-Methane Organic Gases - Refueling Spillage Loss
Non-Methane Organic Gases - Extended Idle Exhaust
Non-Methane Organic Gases - Auxiliary Power Exhaust
Total Organic Gases - Running Exhaust
Total Organic Gases - Start Exhaust
Total Organic Gases - Evap Permeation
Total Organic Gases - Evap Fuel Vapor Venting
Total Organic Gases - Evap Fuel Leaks
Total Organic Gases - Crankcase Running Exhaust
Total Organic Gases - Crankcase Start Exhaust
Total Organic Gases - Crankcase Extended Idle Exhaust
Total Organic Gases - Refueling Displacement Vapor Loss
Total Organic Gases - Refueling Spillage Loss
Total Organic Gases - Extended Idle Exhaust
Total Organic Gases - Auxiliary Power Exhaust
Volatile Organic Compounds - Running Exhaust
Volatile Organic Compounds - Start Exhaust
Volatile Organic Compounds - Evap Permeation
Volatile Organic Compounds - Evap Fuel Vapor Venting
Volatile Organic Compounds - Evap Fuel Leaks
Volatile Organic Compounds - Crankcase Running Exhaust
Volatile Organic Compounds - Crankcase Start Exhaust
Volatile Organic Compounds - Crankcase Extended Idle Exhaust
Volatile Organic Compounds - Refueling Displacement Vapor Loss
Volatile Organic Compounds - Refueling Spillage Loss
Volatile Organic Compounds - Extended Idle Exhaust
Volatile Organic Compounds - Auxiliary Power Exhaust

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

* Output
General Output:
Output Database: c04013y2014_20151118_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 (COUNTY) | Pollutant
For All Vehicle/Equipment Categories: Fuel Type | Emission Process
On Road: SCC

MOVES2014a RunSpec (Maricopa County)


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      <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21" sourcetypename="Passenger Car"/>
      <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
      <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse Truck"/>
      <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School Bus"/>
      <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single Unit Long-haul
Truck"/>
      <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single Unit Short-haul
Truck"/>
      <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
      <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
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      <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="11" sourcetypename="Motorcycle"/>
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      <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="51" sourcetypename="Refuse Truck"/>
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      <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
      <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
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   <offroadvehicleselections>
   </offroadvehicleselections>
   <offroadvehiclesccs>
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      <roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access" modelCombination="M1"/>
      <roadtype roadtypeid="4" roadtypename="Urban Restricted Access" modelCombination="M1"/>
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Exhaust"/>
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Exhaust"/>
      <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
      <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="90" processname="Extended Idle
Exhaust"/>
      <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="91" processname="Auxiliary Power
Exhaust"/>
      <pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="1" processname="Running Exhaust"/>
      <pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="2" processname="Start Exhaust"/>
      <pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="15" processname="Crankcase Running
Exhaust"/>
      <pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="16" processname="Crankcase Start
Exhaust"/>
      <pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
      <pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="90" processname="Extended Idle Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Exhaust"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="11" processname="Evap
Permeation"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="12" processname="Evap Fuel
Vapor Venting"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="13" processname="Evap Fuel
Leaks"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="15" processname="Crankcase
Running Exhaust"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="16" processname="Crankcase
Start Exhaust"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="18" processname="Refueling
Displacement Vapor Loss"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="19" processname="Refueling
Spillage Loss"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="90" processname="Extended
Idle Exhaust"/>
      <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="91" processname="Auxiliary
Power Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Permeation"/>
      <pollutantprocessassociation pollutantkey="80" pollutantname="Non-Methane Organic Gases" processkey="12" processname="Evap Fuel
Vapor Venting"/>
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Leaks"/>
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Running Exhaust"/>
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Start Exhaust"/>
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Extended Idle Exhaust"/>
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Displacement Vapor Loss"/>
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Spillage Loss"/>
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Idle Exhaust"/>
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Power Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Running Exhaust"/>
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Start Exhaust"/>
      <pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
      <pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="90" processname="Extended Idle
Exhaust"/>
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Power Exhaust"/>
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Exhaust"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="11" processname="Evap
Permeation"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="12" processname="Evap Fuel
Vapor Venting"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="13" processname="Evap Fuel
Leaks"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="15" processname="Crankcase
Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="16" processname="Crankcase
Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="18" processname="Refueling
Displacement Vapor Loss"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="19" processname="Refueling
Spillage Loss"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="90" processname="Extended
Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="91" processname="Auxiliary
Power Exhaust"/>
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     <pollutantprocessassociation pollutantkey="86" pollutantname="Total Organic Gases" processkey="2" processname="Start Exhaust"/>
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Permeation"/>
     <pollutantprocessassociation pollutantkey="86" pollutantname="Total Organic Gases" processkey="12" processname="Evap Fuel Vapor
Venting"/>
     <pollutantprocessassociation pollutantkey="86" pollutantname="Total Organic Gases" processkey="13" processname="Evap Fuel
Leaks"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="86" pollutantname="Total Organic Gases" processkey="16" processname="Crankcase Start
Exhaust"/>
     <pollutantprocessassociation pollutantkey="86" pollutantname="Total Organic Gases" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="86" pollutantname="Total Organic Gases" processkey="18" processname="Refueling
Displacement Vapor Loss"/>
     <pollutantprocessassociation pollutantkey="86" pollutantname="Total Organic Gases" processkey="19" processname="Refueling
Spillage Loss"/>
     <pollutantprocessassociation pollutantkey="86" pollutantname="Total Organic Gases" processkey="90" processname="Extended Idle
Exhaust"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="1" processname="Running
Exhaust"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="2" processname="Start
Exhaust"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="11" processname="Evap
Permeation"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="12" processname="Evap Fuel
Vapor Venting"/>
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Leaks"/>
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Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="16" processname="Crankcase
Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="18" processname="Refueling
Displacement Vapor Loss"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="19" processname="Refueling
Spillage Loss"/>
     <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="90" processname="Extended
Idle Exhaust"/>
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Power Exhaust"/>
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[
useParameters                 No

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   </internalcontrolstrategies>
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   <uncertaintyparameters uncertaintymodeenabled="false" numberofrunspersimulation="0" numberofsimulations="0"/>
   <geographicoutputdetail description="COUNTY"/>
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      <modelyear selected="false"/>
      <fueltype selected="true"/>
      <emissionprocess selected="true"/>
      <onroadoffroad selected="true"/>
      <roadtype selected="true"/>
      <sourceusetype selected="true"/>
      <movesvehicletype selected="true"/>
      <onroadscc selected="true"/>
      <estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>
      <sector selected="false"/>
      <engtechid selected="false"/>
      <hpclass selected="false"/>
      <regclassid selected="false"/>
   </outputemissionsbreakdownselection>
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   <outputtimestep value="Month"/>
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  <outputsho value="true"/>
  <outputsh value="true"/>
  <outputshp value="true"/>
  <outputshidling value="true"/>
  <outputstarts value="true"/>
  <outputpopulation value="true"/>
  <scaleinputdatabase servername="localhost" databasename="c04013y2014_20151118" description=""/>
  <pmsize value="0"/>
  <outputfactors>
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    <distancefactors selected="true" units="Miles"/>
    <massfactors selected="true" units="Grams" energyunits="Joules"/>
  </outputfactors>
  <savedata>

  </savedata>

  <donotexecute>

  </donotexecute>

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    <donotperformfinalaggregation selected="false"/>
  <lookuptableflags scenarioid="c04013y2014_20151118" truncateoutput="true" truncateactivity="true" truncatebaserates="true"/>
</runspec>
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MOVES2014a Local Input Data (Maricopa County)

[HPMSvTypeYear]

HPMSVtypeID	yearID	HPMSBaseYearVMT
10	2014	183,419,188
25	2014	30,173,627,159
40	2014	78,456,880
50	2014	1,183,539,915
60	2014	971,500,384

[SourceTypeYear]

yearID	sourceTypeID	sourceTypePopulation
2014	11	90,699
2014	21	2,221,072
2014	31	531,215
2014	32	132,419
2014	41	238
2014	42	888
2014	43	7,962
2014	51	1,049
2014	52	37,271
2014	53	1,567
2014	54	9,785
2014	61	6,503
2014	62	7,070

[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	BioDiesel Ester	Cetane Index	PAH Content	T50	T90
10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
90	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199.816	329.40
97	10	6.6	150	0	11.758	0	0	24	11	0.8	52	84	0	0	0	195.735	324.86
98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
3190	12	6.83	18.5	10.0	0	0	0	21.964	4.8161	0.53	44.256	88.711	0	0	0	211.53	303.44
3191	12	8.61708	14.8	10.3	0	0	0	21.894	4.6848	0.53	46.808	89.670	0	0	0	206.33	299.09
3192	12	7.885	19	10.1	0	0	0	21.917	4.9097	0.53	45.779	89.313	0	0	0	208.42	300.71
25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0	0
27001	51	10.5	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
28001	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[FuelUsageFraction]

countyID	fuelYearID	modelYearGroupID	sourceBinFuelTypeID	fuelSupplyFuelTypeID	usageFraction
4013	2014	0	1	1	1
4013	2014	0	2	2	1
4013	2014	0	3	3	1
4013	2014	0	5	1	0.982134
4013	2014	0	5	5	0.017866
4013	2014	0	9	9	1

[FuelSupply]

fuelRegionID	fuelYearID	monthGroupID	fuelFormulationID	marketShare	marketShareCV
1570011000	2014	5	3190	1	0.5
1570011000	2014	6	3190	1	0.5
1570011000	2014	7	3190	1	0.5
1570011000	2014	8	3190	1	0.5
1570011000	2014	9	3190	1	0.5
1570011000	2014	1	3191	1	0.5
1570011000	2014	2	3191	1	0.5
1570011000	2014	3	3191	1	0.5
1570011000	2014	11	3191	1	0.5
1570011000	2014	12	3191	1	0.5
1570011000	2014	4	3192	1	0.5
1570011000	2014	10	3192	1	0.5
1570011000	2014	1	25005	1	0.5
1570011000	2014	2	25005	1	0.5
1570011000	2014	3	25005	1	0.5
1570011000	2014	4	25005	1	0.5
1570011000	2014	5	25005	1	0.5
1570011000	2014	6	25005	1	0.5
1570011000	2014	7	25005	1	0.5
1570011000	2014	8	25005	1	0.5
1570011000	2014	9	25005	1	0.5
1570011000	2014	10	25005	1	0.5
1570011000	2014	11	25005	1	0.5
1570011000	2014	12	25005	1	0.5
1570011000	2014	1	27001	1	0.5
1570011000	2014	2	27001	1	0.5
1570011000	2014	3	27001	1	0.5
1570011000	2014	11	27001	1	0.5
1570011000	2014	12	27001	1	0.5
1570011000	2014	4	27002	1	0.5
1570011000	2014	5	27002	1	0.5
1570011000	2014	6	27002	1	0.5
1570011000	2014	7	27002	1	0.5
1570011000	2014	8	27002	1	0.5
1570011000	2014	9	27002	1	0.5
1570011000	2014	10	27002	1	0.5
1570011000	2014	1	28001	1	0.5
1570011000	2014	2	28001	1	0.5
1570011000	2014	3	28001	1	0.5
1570011000	2014	4	28001	1	0.5
1570011000	2014	5	28001	1	0.5
1570011000	2014	6	28001	1	0.5
1570011000	2014	7	28001	1	0.5
1570011000	2014	8	28001	1	0.5
1570011000	2014	9	28001	1	0.5
1570011000	2014	10	28001	1	0.5
1570011000	2014	11	28001	1	0.5
1570011000	2014	12	28001	1	0.5
1570011000	2014	1	90	1	0.5
1570011000	2014	2	90	1	0.5
1570011000	2014	3	90	1	0.5
1570011000	2014	4	90	1	0.5
1570011000	2014	5	90	1	0.5
1570011000	2014	6	90	1	0.5
1570011000	2014	7	90	1	0.5
1570011000	2014	8	90	1	0.5
1570011000	2014	9	90	1	0.5
1570011000	2014	10	90	1	0.5
1570011000	2014	11	90	1	0.5
1570011000	2014	12	90	1	0.5

[ZoneMonthHour]

monthID	zoneID	HourID	temperature	relHumidity
1	40130	1	53	41
1	40130	2	52	43
1	40130	3	51	44
1	40130	4	51	44
1	40130	5	50	46
1	40130	6	49	47
1	40130	7	49	46
1	40130	8	49	46
1	40130	9	52	39
1	40130	10	57	31
1	40130	11	62	25
1	40130	12	66	21
1	40130	13	68	18
1	40130	14	70	16
1	40130	15	71	15
1	40130	16	72	15
1	40130	17	71	16
1	40130	18	69	18

monthID	zoneID	HourID	temperature	relHumidity
1	40130	19	65	22
1	40130	20	63	26
1	40130	21	61	28
1	40130	22	58	33
1	40130	23	56	36
1	40130	24	55	39
2	40130	1	59	35
2	40130	2	58	38
2	40130	3	57	39
2	40130	4	56	40
2	40130	5	55	41
2	40130	6	54	42
2	40130	7	54	43
2	40130	8	54	43
2	40130	9	58	37
2	40130	10	62	31
2	40130	11	67	26
2	40130	12	70	23

monthID	zoneID	HourID	temperature	relHumidity
2	40130	13	72	21
2	40130	14	74	19
2	40130	15	75	18
2	40130	16	75	18
2	40130	17	75	18
2	40130	18	74	18
2	40130	19	72	20
2	40130	20	69	23
2	40130	21	67	26
2	40130	22	65	29
2	40130	23	63	32
2	40130	24	61	34
3	40130	1	65	34
3	40130	2	64	35
3	40130	3	62	37
3	40130	4	61	40
3	40130	5	59	43
3	40130	6	59	44

monthID	zoneID	HourID	temperature	relHumidity
3	40130	7	58	44
3	40130	8	61	41
3	40130	9	64	34
3	40130	10	68	29
3	40130	11	71	25
3	40130	12	74	22
3	40130	13	77	19
3	40130	14	78	17
3	40130	15	79	16
3	40130	16	80	16
3	40130	17	80	16
3	40130	18	78	17
3	40130	19	76	19
3	40130	20	74	21
3	40130	21	72	23
3	40130	22	70	24
3	40130	23	68	27
3	40130	24	66	30
4	40130	1	72	19
4	40130	2	70	20
4	40130	3	68	23
4	40130	4	66	25
4	40130	5	65	26
4	40130	6	64	27
4	40130	7	64	27
4	40130	8	67	24
4	40130	9	72	20
4	40130	10	75	18
4	40130	11	78	15
4	40130	12	81	13
4	40130	13	83	11
4	40130	14	84	10
4	40130	15	85	10
4	40130	16	86	10
4	40130	17	86	10
4	40130	18	85	10
4	40130	19	83	10
4	40130	20	81	12
4	40130	21	78	14
4	40130	22	77	15
4	40130	23	75	16
4	40130	24	73	18
5	40130	1	80	15
5	40130	2	78	17
5	40130	3	76	19
5	40130	4	74	21
5	40130	5	73	21
5	40130	6	72	22
5	40130	7	74	21
5	40130	8	77	19
5	40130	9	81	16
5	40130	10	84	14
5	40130	11	87	12
5	40130	12	90	11
5	40130	13	91	10
5	40130	14	92	9
5	40130	15	94	9
5	40130	16	94	9
5	40130	17	94	9
5	40130	18	93	9
5	40130	19	92	9
5	40130	20	90	10
5	40130	21	87	11
5	40130	22	85	12
5	40130	23	84	13
5	40130	24	83	14
6	40130	1	90	13
6	40130	2	88	15
6	40130	3	85	18
6	40130	4	84	19
6	40130	5	82	20
6	40130	6	81	21
6	40130	7	83	20
6	40130	8	86	18
6	40130	9	90	15
6	40130	10	94	13
6	40130	11	98	10
6	40130	12	100	9
6	40130	13	102	8
6	40130	14	103	8
6	40130	15	104	8
6	40130	16	105	7
6	40130	17	105	7

monthID	zoneID	HourID	temperature	relHumidity
6	40130	18	104	7
6	40130	19	103	8
6	40130	20	101	8
6	40130	21	98	9
6	40130	22	95	11
6	40130	23	93	11
6	40130	24	92	12
7	40130	1	92	33
7	40130	2	91	34
7	40130	3	90	36
7	40130	4	89	37
7	40130	5	88	37
7	40130	6	87	38
7	40130	7	88	37
7	40130	8	90	35
7	40130	9	93	31
7	40130	10	95	28
7	40130	11	98	25
7	40130	12	100	22
7	40130	13	102	20
7	40130	14	104	19
7	40130	15	105	18
7	40130	16	105	17
7	40130	17	105	17
7	40130	18	104	19
7	40130	19	102	21
7	40130	20	100	22
7	40130	21	98	25
7	40130	22	96	27
7	40130	23	95	29
7	40130	24	93	32
8	40130	1	88	41
8	40130	2	87	44
8	40130	3	86	46
8	40130	4	84	47
8	40130	5	83	49
8	40130	6	83	50
8	40130	7	83	50
8	40130	8	85	47
8	40130	9	88	42
8	40130	10	91	37
8	40130	11	93	34
8	40130	12	95	30
8	40130	13	97	29
8	40130	14	99	26
8	40130	15	100	24
8	40130	16	100	23
8	40130	17	100	23
8	40130	18	99	26
8	40130	19	97	26
8	40130	20	96	27
8	40130	21	93	31
8	40130	22	91	36
8	40130	23	90	37
8	40130	24	89	39
9	40130	1	85	44
9	40130	2	84	47
9	40130	3	83	50
9	40130	4	82	52
9	40130	5	81	54
9	40130	6	80	56
9	40130	7	80	55
9	40130	8	83	50
9	40130	9	86	45
9	40130	10	89	38
9	40130	11	92	34
9	40130	12	94	32
9	40130	13	95	31
9	40130	14	96	29
9	40130	15	96	30
9	40130	16	96	30
9	40130	17	96	29
9	40130	18	95	29
9	40130	19	94	30
9	40130	20	92	34
9	40130	21	90	38
9	40130	22	88	40
9	40130	23	88	40
9	40130	24	86	44
10	40130	1	74	45
10	40130	2	73	46
10	40130	3	72	49
10	40130	4	71	51

monthID	zoneID	HourID	temperature	relHumidity
10	40130	5	70	50
10	40130	6	70	51
10	40130	7	70	50
10	40130	8	73	46
10	40130	9	76	40
10	40130	10	80	35
10	40130	11	83	31
10	40130	12	85	28
10	40130	13	87	26
10	40130	14	89	24
10	40130	15	90	22
10	40130	16	90	21
10	40130	17	89	22
10	40130	18	87	24
10	40130	19	85	28
10	40130	20	82	34
10	40130	21	80	36
10	40130	22	79	37
10	40130	23	77	41
10	40130	24	75	43
11	40130	1	61	36
11	40130	2	59	39
11	40130	3	58	40
11	40130	4	57	41
11	40130	5	56	42
11	40130	6	56	42
11	40130	7	56	44
11	40130	8	57	41
11	40130	9	61	34
11	40130	10	66	29
11	40130	11	69	26
11	40130	12	72	23
11	40130	13	75	20
11	40130	14	76	19
11	40130	15	77	18
11	40130	16	77	18
11	40130	17	76	18
11	40130	18	73	20
11	40130	19	71	24
11	40130	20	68	27
11	40130	21	67	31
11	40130	22	65	32
11	40130	23	63	34
11	40130	24	61	35
12	40130	1	54	63
12	40130	2	53	65
12	40130	3	52	67
12	40130	4	51	70
12	40130	5	50	72
12	40130	6	50	72
12	40130	7	50	72
12	40130	8	50	72
12	40130	9	53	66
12	40130	10	56	55
12	40130	11	60	49
12	40130	12	62	43
12	40130	13	64	40
12	40130	14	65	38
12	40130	15	66	36
12	40130	16	66	36
12	40130	17	65	37
12	40130	18	63	44
12	40130	19	61	48
12	40130	20	58	55
12	40130	21	58	55
12	40130	22	57	57
12	40130	23	55	61
12	40130	24	54	63

[SourceTypeAgeDistribution]

Source TypeID	YearID	AgeID	AgeFraction
11	2014	0	0.038851
11	2014	1	0.067568
11	2014	2	0.058699
11	2014	3	0.042019
11	2014	4	0.030300
11	2014	5	0.065139
11	2014	6	0.067779
11	2014	7	0.085198
11	2014	8	0.082981
11	2014	9	0.069257
11	2014	10	0.051098
11	2014	11	0.058594
11	2014	12	0.047297
11	2014	13	0.040646
11	2014	14	0.033995
11	2014	15	0.028188
11	2014	16	0.020165
11	2014	17	0.015836
11	2014	18	0.014886
11	2014	19	0.012352
11	2014	20	0.009713
11	2014	21	0.009185
11	2014	22	0.006651
11	2014	23	0.004962
11	2014	24	0.004540
11	2014	25	0.004540
11	2014	26	0.004540
11	2014	27	0.005068
11	2014	28	0.007285
11	2014	29	0.006334
11	2014	30	0.006334
21	2014	0	0.050100
21	2014	1	0.076900
21	2014	2	0.064800
21	2014	3	0.052400
21	2014	4	0.047600
21	2014	5	0.037500
21	2014	6	0.059700
21	2014	7	0.068800
21	2014	8	0.068900
21	2014	9	0.063700
21	2014	10	0.058600
21	2014	11	0.052300
21	2014	12	0.048500
21	2014	13	0.042500
21	2014	14	0.039500
21	2014	15	0.031400
21	2014	16	0.024400
21	2014	17	0.020300
21	2014	18	0.014700
21	2014	19	0.013100
21	2014	20	0.009600
21	2014	21	0.007300
21	2014	22	0.005500
21	2014	23	0.004800
21	2014	24	0.003900
21	2014	25	0.003100
21	2014	26	0.002500
21	2014	27	0.002200
21	2014	28	0.001800
21	2014	29	0.001500
21	2014	30	0.022100
31	2014	0	0.081695
31	2014	1	0.055524
31	2014	2	0.040539
31	2014	3	0.038378
31	2014	4	0.026072
31	2014	5	0.019801
31	2014	6	0.051019
31	2014	7	0.065069
31	2014	8	0.072258
31	2014	9	0.059254
31	2014	10	0.062216
31	2014	11	0.051430
31	2014	12	0.047464
31	2014	13	0.051500
31	2014	14	0.045435
31	2014	15	0.034062
31	2014	16	0.027786
31	2014	17	0.027765
31	2014	18	0.019702
31	2014	19	0.019161
31	2014	20	0.016728
31	2014	21	0.011136
31	2014	22	0.007571
31	2014	23	0.006589
31	2014	24	0.005906
31	2014	25	0.006023
31	2014	26	0.004523
31	2014	27	0.003103
31	2014	28	0.004077
31	2014	29	0.003106
31	2014	30	0.035108
32	2014	0	0.086135
32	2014	1	0.057941
32	2014	2	0.043586
32	2014	3	0.039447
32	2014	4	0.026124
32	2014	5	0.020848
32	2014	6	0.052503
32	2014	7	0.069230
32	2014	8	0.076084
32	2014	9	0.059563
32	2014	10	0.059391
32	2014	11	0.048796
32	2014	12	0.044650
32	2014	13	0.048787
32	2014	14	0.045632
32	2014	15	0.033340
32	2014	16	0.026629
32	2014	17	0.026523
32	2014	18	0.018772
32	2014	19	0.018280
32	2014	20	0.015767
32	2014	21	0.010524
32	2014	22	0.007161
32	2014	23	0.006290
32	2014	24	0.005669
32	2014	25	0.005703
32	2014	26	0.004298
32	2014	27	0.002944
32	2014	28	0.003834
32	2014	29	0.002913
32	2014	30	0.032635
41	2014	0	0.072300
41	2014	1	0.059200
41	2014	2	0.063100
41	2014	3	0.040900
41	2014	4	0.017800
41	2014	5	0.026300
41	2014	6	0.053200
41	2014	7	0.112200
41	2014	8	0.107200
41	2014	9	0.073800
41	2014	10	0.050800
41	2014	11	0.036000
41	2014	12	0.027200
41	2014	13	0.038000
41	2014	14	0.046600
41	2014	15	0.042000
41	2014	16	0.022600
41	2014	17	0.021700
41	2014	18	0.018500
41	2014	19	0.018700
41	2014	20	0.011200
41	2014	21	0.007400
41	2014	22	0.005400
41	2014	23	0.004700
41	2014	24	0.006300
41	2014	25	0.004100
41	2014	26	0.003200
41	2014	27	0.002500
41	2014	28	0.002000
41	2014	29	0.001300
41	2014	30	0.003800
42	2014	0	0.072300
42	2014	1	0.059200
42	2014	2	0.063100
42	2014	3	0.040900
42	2014	4	0.017800
42	2014	5	0.026300
42	2014	6	0.053200
42	2014	7	0.112200
42	2014	8	0.107200
42	2014	9	0.073800
42	2014	10	0.050800
42	2014	11	0.036000
42	2014	12	0.027200
42	2014	13	0.038000
42	2014	14	0.046600
42	2014	15	0.042000
42	2014	16	0.022600
42	2014	17	0.021700
42	2014	18	0.018500
42	2014	19	0.018700
42	2014	20	0.011200
42	2014	21	0.007400
42	2014	22	0.005400
42	2014	23	0.004700
42	2014	24	0.006300
42	2014	25	0.004100
42	2014	26	0.003200
42	2014	27	0.002500
42	2014	28	0.002000
42	2014	29	0.001300
42	2014	30	0.003800
43	2014	0	0.126012
43	2014	1	0.081608
43	2014	2	0.075807
43	2014	3	0.050205
43	2014	4	0.026602
43	2014	5	0.032103
43	2014	6	0.068206
43	2014	7	0.114311
43	2014	8	0.118011
43	2014	9	0.063606
43	2014	10	0.030203
43	2014	11	0.021602
43	2014	12	0.015701
43	2014	13	0.020802
43	2014	14	0.048605
43	2014	15	0.026302
43	2014	16	0.014801
43	2014	17	0.013801
43	2014	18	0.009201
43	2014	19	0.009201
43	2014	20	0.005801
43	2014	21	0.004100
43	2014	22	0.002900
43	2014	23	0.003200
43	2014	24	0.003200
43	2014	25	0.002300
43	2014	26	0.001900
43	2014	27	0.001300
43	2014	28	0.001300
43	2014	29	0.000900
43	2014	30	0.006407
51	2014	0	0.126000
51	2014	1	0.081600
51	2014	2	0.075800
51	2014	3	0.050200
51	2014	4	0.026600
51	2014	5	0.032100
51	2014	6	0.068200
51	2014	7	0.114300
51	2014	8	0.118000
51	2014	9	0.063600
51	2014	10	0.030200
51	2014	11	0.021600
51	2014	12	0.015700
51	2014	13	0.020800
51	2014	14	0.048600
51	2014	15	0.026300
51	2014	16	0.014800
51	2014	17	0.013800
51	2014	18	0.009200
51	2014	19	0.009200
51	2014	20	0.005800
51	2014	21	0.004100
51	2014	22	0.002900
51	2014	23	0.003200
51	2014	24	0.003200
51	2014	25	0.002300
51	2014	26	0.001900
51	2014	27	0.001300
51	2014	28	0.001300
51	2014	29	0.000900
51	2014	30	0.006500
52	2014	0	0.116089
52	2014	1	0.074980
52	2014	2	0.065956
52	2014	3	0.047090
52	2014	4	0.026475
52	2014	5	0.028604
52	2014	6	0.063398

Source TypeID	YearID	AgeID	AgeFraction
52	2014	7	0.100180
52	2014	8	0.104724
52	2014	9	0.062119
52	2014	10	0.038902
52	2014	11	0.029700
52	2014	12	0.024288
52	2014	13	0.029128
52	2014	14	0.047409
52	2014	15	0.028261
52	2014	16	0.018284
52	2014	17	0.017559
52	2014	18	0.012040
52	2014	19	0.011898
52	2014	20	0.008784
52	2014	21	0.006045
52	2014	22	0.004177
52	2014	23	0.004124
52	2014	24	0.003943
52	2014	25	0.003346
52	2014	26	0.002635
52	2014	27	0.001793
52	2014	28	0.002062
52	2014	29	0.001505
52	2014	30	0.014500
53	2014	0	0.127928
53	2014	1	0.081924
53	2014	2	0.075332
53	2014	3	0.050230
53	2014	4	0.026607
53	2014	5	0.031870
53	2014	6	0.067955
53	2014	7	0.113257
53	2014	8	0.116866
53	2014	9	0.063248
53	2014	10	0.030347
53	2014	11	0.021731
53	2014	12	0.015805
53	2014	13	0.020928
53	2014	14	0.048227
53	2014	15	0.026176
53	2014	16	0.014812
53	2014	17	0.013827
53	2014	18	0.009234
53	2014	19	0.009236
53	2014	20	0.005866
53	2014	21	0.004166
53	2014	22	0.002929
53	2014	23	0.003218
53	2014	24	0.003220
53	2014	25	0.002353
53	2014	26	0.001935

Source TypeID	YearID	AgeID	AgeFraction
53	2014	27	0.001312
53	2014	28	0.001321
53	2014	29	0.000916
53	2014	30	0.007224
54	2014	0	0.126042
54	2014	1	0.081627
54	2014	2	0.075825
54	2014	3	0.050217
54	2014	4	0.026609
54	2014	5	0.032111
54	2014	6	0.068223
54	2014	7	0.114338
54	2014	8	0.118039
54	2014	9	0.063621
54	2014	10	0.030210
54	2014	11	0.021607
54	2014	12	0.015705
54	2014	13	0.020807
54	2014	14	0.048616
54	2014	15	0.026309
54	2014	16	0.014805
54	2014	17	0.013805
54	2014	18	0.009203
54	2014	19	0.009203
54	2014	20	0.005802
54	2014	21	0.004101
54	2014	22	0.002901
54	2014	23	0.003201
54	2014	24	0.003201
54	2014	25	0.002301
54	2014	26	0.001901
54	2014	27	0.001300
54	2014	28	0.001300
54	2014	29	0.000900
54	2014	30	0.006171
61	2014	0	0.126005
61	2014	1	0.081603
61	2014	2	0.075803
61	2014	3	0.050202
61	2014	4	0.026601
61	2014	5	0.032101
61	2014	6	0.068203
61	2014	7	0.114304
61	2014	8	0.118004
61	2014	9	0.063602
61	2014	10	0.030201
61	2014	11	0.021601
61	2014	12	0.015701
61	2014	13	0.020801
61	2014	14	0.048602
61	2014	15	0.026301

Source TypeID	YearID	AgeID	AgeFraction
61	2014	16	0.014801
61	2014	17	0.013801
61	2014	18	0.009200
61	2014	19	0.009200
61	2014	20	0.005800
61	2014	21	0.004100
61	2014	22	0.002900
61	2014	23	0.003200
61	2014	24	0.003200
61	2014	25	0.002300
61	2014	26	0.001900
61	2014	27	0.001300
61	2014	28	0.001300
61	2014	29	0.000900
61	2014	30	0.006462
62	2014	0	0.126002
62	2014	1	0.081601
62	2014	2	0.075801
62	2014	3	0.050201
62	2014	4	0.026600
62	2014	5	0.032100
62	2014	6	0.068201
62	2014	7	0.114302
62	2014	8	0.118002
62	2014	9	0.063601
62	2014	10	0.030200
62	2014	11	0.021600
62	2014	12	0.015700
62	2014	13	0.020800
62	2014	14	0.048601
62	2014	15	0.026300
62	2014	16	0.014800
62	2014	17	0.013800
62	2014	18	0.009200
62	2014	19	0.009200
62	2014	20	0.005800
62	2014	21	0.004100
62	2014	22	0.002900
62	2014	23	0.003200
62	2014	24	0.003200
62	2014	25	0.002300
62	2014	26	0.001900
62	2014	27	0.001300
62	2014	28	0.001300
62	2014	29	0.000900
62	2014	30	0.006485

[IMCoverage]

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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101	4	4013	2014	21	1	110	1996	2010	2	51	N	90.0428
101	4	4013	2014	31	1	103	1967	1980	1	13	N	57.6164
101	4	4013	2014	31	1	106	1981	1995	2	31	N	64.12
101	4	4013	2014	31	1	110	1996	2010	2	51	N	90.0428
101	4	4013	2014	32	1	103	1967	1980	1	13	N	57.6164
101	4	4013	2014	32	1	106	1981	1995	2	31	N	64.12
101	4	4013	2014	32	1	110	1996	2010	2	51	N	90.0428
101	4	4013	2014	52	1	103	1967	2010	1	13	N	87.2032
102	4	4013	2014	21	1	103	1967	1980	1	13	N	57.6164
102	4	4013	2014	21	1	106	1981	1995	2	31	N	64.12
102	4	4013	2014	21	1	110	1996	2010	2	51	N	90.0428
102	4	4013	2014	31	1	103	1967	1980	1	13	N	57.6164
102	4	4013	2014	31	1	106	1981	1995	2	31	N	64.12
102	4	4013	2014	31	1	110	1996	2010	2	51	N	90.0428
102	4	4013	2014	32	1	103	1967	1980	1	13	N	57.6164
102	4	4013	2014	32	1	106	1981	1995	2	31	N	64.12
102	4	4013	2014	32	1	110	1996	2010	2	51	N	90.0428
102	4	4013	2014	52	1	103	1967	2010	1	13	N	87.2032
112	4	4013	2014	21	1	108	1996	2010	2	43	N	83.814
112	4	4013	2014	21	1	109	1981	1995	2	44	N	64.12
112	4	4013	2014	31	1	108	1996	2010	2	43	N	83.814
112	4	4013	2014	31	1	109	1981	1995	2	44	N	64.12
112	4	4013	2014	32	1	108	1996	2010	2	43	N	83.814
112	4	4013	2014	32	1	109	1981	1995	2	44	N	64.12
112	4	4013	2014	52	1	107	1981	2010	1	41	N	86.2872
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201	4	4013	2014	52	1	103	1967	2010	1	13	N	87.2032
202	4	4013	2014	21	1	103	1967	1980	1	13	N	57.6164
202	4	4013	2014	21	1	106	1981	1995	2	31	N	64.12
202	4	4013	2014	21	1	110	1996	2010	2	51	N	90.0428
202	4	4013	2014	31	1	103	1967	1980	1	13	N	57.6164
202	4	4013	2014	31	1	106	1981	1995	2	31	N	64.12
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101	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
101	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
101	4	4013	2014	32	5	310	1996	2010	2	51	N	90.0428
101	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032
102	4	4013	2014	21	5	303	1967	1980	1	13	N	57.6164
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102	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
102	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
102	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
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102	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032
112	4	4013	2014	21	5	308	1996	2010	2	43	N	83.814
112	4	4013	2014	21	5	309	1981	1995	2	44	N	64.12
112	4	4013	2014	31	5	308	1996	2010	2	43	N	83.814
112	4	4013	2014	31	5	309	1981	1995	2	44	N	64.12

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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112	4	4013	2014	52	5	307	1981	2010	1	41	N	86.2872
201	4	4013	2014	21	5	303	1967	1980	1	13	N	57.6164
201	4	4013	2014	21	5	306	1981	1995	2	31	N	64.12
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201	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
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202	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
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301	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032
302	4	4013	2014	21	5	303	1967	1980	1	13	N	57.6164
302	4	4013	2014	21	5	306	1981	1995	2	31	N	64.12
302	4	4013	2014	21	5	310	1996	2010	2	51	N	90.0428
302	4	4013	2014	31	5	303	1967	1980	1	13	N	57.6164
302	4	4013	2014	31	5	306	1981	1995	2	31	N	64.12
302	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
302	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
302	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
302	4	4013	2014	32	5	310	1996	2010	2	51	N	90.0428
302	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032
101	4	4013	2014	21	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	21	1	6	1981	1995	2	31	Y	63.6192
101	4	4013	2014	21	1	10	1996	2010	2	51	Y	83.1594
101	4	4013	2014	31	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	31	1	6	1981	1995	2	31	Y	63.6192
101	4	4013	2014	31	1	10	1996	2010	2	51	Y	78.1699
101	4	4013	2014	32	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	32	1	6	1981	1995	2	31	Y	63.6192
101	4	4013	2014	32	1	10	1996	2010	2	51	Y	73.1802
101	4	4013	2014	41	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	42	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	43	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	51	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	52	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	53	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	54	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	61	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	62	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	21	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	21	1	6	1981	1995	2	31	Y	63.6192
102	4	4013	2014	21	1	10	1996	2010	2	51	Y	83.1594
102	4	4013	2014	31	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	31	1	6	1981	1995	2	31	Y	63.6192
102	4	4013	2014	31	1	10	1996	2010	2	51	Y	78.1699
102	4	4013	2014	32	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	32	1	6	1981	1995	2	31	Y	63.6192
102	4	4013	2014	32	1	10	1996	2010	2	51	Y	73.1802
102	4	4013	2014	41	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	42	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	43	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	51	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	52	1	3	1967	1980	1	13	Y	57.2079
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112	4	4013	2014	21	1	9	1981	1995	2	44	Y	63.6192
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112	4	4013	2014	31	1	11	1967	1980	1	41	Y	86.7668
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112	4	4013	2014	32	1	9	1981	1995	2	44	Y	55.9849
112	4	4013	2014	32	1	11	1967	1980	1	41	Y	86.7668
112	4	4013	2014	41	1	7	1981	2010	1	41	Y	85.6133
112	4	4013	2014	41	1	11	1967	1980	1	41	Y	86.7668
112	4	4013	2014	42	1	7	1981	2010	1	41	Y	85.6133
112	4	4013	2014	42	1	11	1967	1980	1	41	Y	86.7668
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polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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112	4	4013	2014	62	1	11	1967	1980	1	41	Y	86.7668
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113	4	4013	2014	21	1	11	1967	1980	1	41	Y	86.7668
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113	4	4013	2014	31	1	9	1981	1995	2	44	Y	59.8021
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301	4	4013	2014	31	1	3	1967	1980	1	13	Y	57.2079
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101	4	4013	2014	21	5	510	1996	2010	2	51	Y	83.1594
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101	4	4013	2014	62	5	503	1967	1980	1	13	Y	57.2079
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polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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112	4	4013	2014	32	5	508	1996	2010	2	45	Y	78.6188
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polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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302	4	4013	2014	51	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	52	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	53	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	54	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	61	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	62	5	503	1967	1980	1	13	Y	57.2079
101	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
301	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221

[RoadType]

roadTypeID	rampFraction
2	0.071069
4	0.132624

[RoadTypeDistribution]

sourceTypeID	roadTypeID	roadTypeVMTFraction
11	1	0.00000
11	2	0.02599
11	3	0.08524
11	4	0.30636
11	5	0.58240
21	1	0.00000
21	2	0.02645
21	3	0.06762
21	4	0.37328
21	5	0.53265
31	1	0.00000
31	2	0.02645
31	3	0.06762
31	4	0.37328
31	5	0.53265
32	1	0.00000
32	2	0.02645
32	3	0.06762
32	4	0.37328
32	5	0.53265
41	1	0.00000
41	2	0.15058
41	3	0.07218
41	4	0.44269
41	5	0.33456
42	1	0.00000
42	2	0.15058
42	3	0.07218
42	4	0.44269
42	5	0.33456
43	1	0.00000
43	2	0.15058
43	3	0.07218
43	4	0.44269
43	5	0.33456
51	1	0.00000
51	2	0.05298
51	3	0.06458
51	4	0.53405
51	5	0.34840
52	1	0.00000
52	2	0.05298
52	3	0.06458
52	4	0.53405
52	5	0.34840
53	1	0.00000
53	2	0.05298
53	3	0.06458
53	4	0.53405
53	5	0.34840
54	1	0.00000
54	2	0.05298
54	3	0.06458
54	4	0.53405
54	5	0.34840
61	1	0.00000
61	2	0.25094
61	3	0.06567
61	4	0.48229
61	5	0.20111
62	1	0.00000
62	2	0.25094
62	3	0.06567
62	4	0.48229
62	5	0.20111

[MonthVMTFraction]

sourceTypeID	monthID	monthVMTFraction
11	1	0.083175
21	1	0.083175
31	1	0.083175
32	1	0.083175
41	1	0.083175
42	1	0.083175
43	1	0.083175
51	1	0.083175
52	1	0.083175
53	1	0.083175
54	1	0.083175
61	1	0.083175
62	1	0.083175
11	2	0.085878
21	2	0.085878
31	2	0.085878
32	2	0.085878
41	2	0.085878
42	2	0.085878
43	2	0.085878
51	2	0.085878
52	2	0.085878
53	2	0.085878
54	2	0.085878
61	2	0.085878
62	2	0.085878
11	3	0.086154
21	3	0.086154
31	3	0.086154
32	3	0.086154
41	3	0.086154
42	3	0.086154
43	3	0.086154
51	3	0.086154
52	3	0.086154
53	3	0.086154
54	3	0.086154
61	3	0.086154
62	3	0.086154
11	4	0.085796
21	4	0.085796
31	4	0.085796
32	4	0.085796
41	4	0.085796
42	4	0.085796
43	4	0.085796
51	4	0.085796
52	4	0.085796
53	4	0.085796
54	4	0.085796
61	4	0.085796
62	4	0.085796
11	5	0.084240
21	5	0.084240
31	5	0.084240
32	5	0.084240
41	5	0.084240
42	5	0.084240
43	5	0.084240
51	5	0.084240
52	5	0.084240
53	5	0.084240
54	5	0.084240
61	5	0.084240
62	5	0.084240
11	6	0.082456
21	6	0.082456
31	6	0.082456
32	6	0.082456
41	6	0.082456
42	6	0.082456
43	6	0.082456
51	6	0.082456
52	6	0.082456
53	6	0.082456
54	6	0.082456
61	6	0.082456
62	6	0.082456
11	7	0.078756
21	7	0.078756
31	7	0.078756
32	7	0.078756
41	7	0.078756
42	7	0.078756
43	7	0.078756
51	7	0.078756
52	7	0.078756
53	7	0.078756
54	7	0.078756
61	7	0.078756
62	7	0.078756
11	8	0.080695
21	8	0.080695
31	8	0.080695
32	8	0.080695
41	8	0.080695
42	8	0.080695
43	8	0.080695
51	8	0.080695
52	8	0.080695
53	8	0.080695
54	8	0.080695
61	8	0.080695
62	8	0.080695
11	9	0.082213
21	9	0.082213
31	9	0.082213
32	9	0.082213
41	9	0.082213
42	9	0.082213
43	9	0.082213
51	9	0.082213
52	9	0.082213
53	9	0.082213
54	9	0.082213
61	9	0.082213
62	9	0.082213
11	10	0.083410
21	10	0.083410
31	10	0.083410
32	10	0.083410
41	10	0.083410
42	10	0.083410
43	10	0.083410
51	10	0.083410
52	10	0.083410
53	10	0.083410
54	10	0.083410
61	10	0.083410
62	10	0.083410
11	11	0.083996
21	11	0.083996
31	11	0.083996
32	11	0.083996
41	11	0.083996
42	11	0.083996
43	11	0.083996
51	11	0.083996
52	11	0.083996
53	11	0.083996
54	11	0.083996
61	11	0.083996
62	11	0.083996
11	12	0.083232
21	12	0.083232
31	12	0.083232
32	12	0.083232
41	12	0.083232
42	12	0.083232
43	12	0.083232
51	12	0.083232
52	12	0.083232
53	12	0.083232
54	12	0.083232
61	12	0.083232
62	12	0.083232

[DayVMTFraction] (July 2014)

Source TypeID	Month ID	Road TypeID	dayID	Day VMTFraction
11	7	1	5	0.780932
21	7	1	5	0.780932
31	7	1	5	0.780932
32	7	1	5	0.780932
41	7	1	5	0.780932
42	7	1	5	0.780932
43	7	1	5	0.780932
51	7	1	5	0.780932
52	7	1	5	0.780932
53	7	1	5	0.780932
54	7	1	5	0.780932
61	7	1	5	0.780932
62	7	1	5	0.780932
11	7	2	5	0.783228
21	7	2	5	0.783228
31	7	2	5	0.783228
32	7	2	5	0.783228
41	7	2	5	0.783228
42	7	2	5	0.783228
43	7	2	5	0.783228
51	7	2	5	0.783228
52	7	2	5	0.783228
53	7	2	5	0.783228
54	7	2	5	0.783228
61	7	2	5	0.783228
62	7	2	5	0.783228
11	7	3	5	0.778523
21	7	3	5	0.778523
31	7	3	5	0.778523
32	7	3	5	0.778523
41	7	3	5	0.778523
42	7	3	5	0.778523
43	7	3	5	0.778523
51	7	3	5	0.778523
52	7	3	5	0.778523
53	7	3	5	0.778523
54	7	3	5	0.778523
61	7	3	5	0.778523
62	7	3	5	0.778523
11	7	4	5	0.783228
21	7	4	5	0.783228
31	7	4	5	0.783228
32	7	4	5	0.783228
41	7	4	5	0.783228
42	7	4	5	0.783228
43	7	4	5	0.783228
51	7	4	5	0.783228
52	7	4	5	0.783228
53	7	4	5	0.783228
54	7	4	5	0.783228
61	7	4	5	0.783228
62	7	4	5	0.783228
11	7	5	5	0.778523
21	7	5	5	0.778523
31	7	5	5	0.778523
32	7	5	5	0.778523
41	7	5	5	0.778523
42	7	5	5	0.778523
43	7	5	5	0.778523
51	7	5	5	0.778523
52	7	5	5	0.778523
53	7	5	5	0.778523
54	7	5	5	0.778523
61	7	5	5	0.778523
62	7	5	5	0.778523
11	7	1	2	0.219068
21	7	1	2	0.219068
31	7	1	2	0.219068
32	7	1	2	0.219068
41	7	1	2	0.219068
42	7	1	2	0.219068
43	7	1	2	0.219068
51	7	1	2	0.219068
52	7	1	2	0.219068
53	7	1	2	0.219068
54	7	1	2	0.219068
61	7	1	2	0.219068
62	7	1	2	0.219068
11	7	2	2	0.216772
21	7	2	2	0.216772
31	7	2	2	0.216772
32	7	2	2	0.216772
41	7	2	2	0.216772
42	7	2	2	0.216772
43	7	2	2	0.216772
51	7	2	2	0.216772
52	7	2	2	0.216772
53	7	2	2	0.216772
54	7	2	2	0.216772
61	7	2	2	0.216772
62	7	2	2	0.216772
11	7	3	2	0.221477
21	7	3	2	0.221477
31	7	3	2	0.221477
32	7	3	2	0.221477
41	7	3	2	0.221477
42	7	3	2	0.221477
43	7	3	2	0.221477
51	7	3	2	0.221477
52	7	3	2	0.221477
53	7	3	2	0.221477
54	7	3	2	0.221477
61	7	3	2	0.221477
62	7	3	2	0.221477
11	7	4	2	0.216772
21	7	4	2	0.216772
31	7	4	2	0.216772
32	7	4	2	0.216772
41	7	4	2	0.216772
42	7	4	2	0.216772
43	7	4	2	0.216772
51	7	4	2	0.216772
52	7	4	2	0.216772
53	7	4	2	0.216772
54	7	4	2	0.216772
61	7	4	2	0.216772
62	7	4	2	0.216772
11	7	5	2	0.221477
21	7	5	2	0.221477
31	7	5	2	0.221477
32	7	5	2	0.221477
41	7	5	2	0.221477
42	7	5	2	0.221477
43	7	5	2	0.221477
51	7	5	2	0.221477
52	7	5	2	0.221477
53	7	5	2	0.221477
54	7	5	2	0.221477
61	7	5	2	0.221477
62	7	5	2	0.221477

[HourVMTFraction] (SourceTypeID 21: Passenger Car)

Source TypeID	Road TypeID	dayID	hourID	hourVMT Fraction
21	1	2	1	0.0216
21	1	2	2	0.0156
21	1	2	3	0.0139
21	1	2	4	0.0110
21	1	2	5	0.0142
21	1	2	6	0.0215
21	1	2	7	0.0289
21	1	2	8	0.0354
21	1	2	9	0.0413
21	1	2	10	0.0489
21	1	2	11	0.0551
21	1	2	12	0.0592
21	1	2	13	0.0634
21	1	2	14	0.0639
21	1	2	15	0.0627
21	1	2	16	0.0623
21	1	2	17	0.0627
21	1	2	18	0.0613
21	1	2	19	0.0581
21	1	2	20	0.0505
21	1	2	21	0.0453
21	1	2	22	0.0417
21	1	2	23	0.0356
21	1	2	24	0.0257
21	1	5	1	0.0080
21	1	5	2	0.0055
21	1	5	3	0.0052
21	1	5	4	0.0077
21	1	5	5	0.0223
21	1	5	6	0.0376
21	1	5	7	0.0536
21	1	5	8	0.0654
21	1	5	9	0.0602
21	1	5	10	0.0518
21	1	5	11	0.0501
21	1	5	12	0.0534
21	1	5	13	0.0565
21	1	5	14	0.0595
21	1	5	15	0.0637
21	1	5	16	0.0670
21	1	5	17	0.0688
21	1	5	18	0.0691
21	1	5	19	0.0568
21	1	5	20	0.0408
21	1	5	21	0.0334
21	1	5	22	0.0288
21	1	5	23	0.0211
21	1	5	24	0.0137
21	2	2	1	0.0219
21	2	2	2	0.0162
21	2	2	3	0.0144
21	2	2	4	0.0116
21	2	2	5	0.0159
21	2	2	6	0.0231
21	2	2	7	0.0297
21	2	2	8	0.0358
21	2	2	9	0.0413
21	2	2	10	0.0484
21	2	2	11	0.0545
21	2	2	12	0.0587
21	2	2	13	0.0628
21	2	2	14	0.0632
21	2	2	15	0.0618
21	2	2	16	0.0613
21	2	2	17	0.0617
21	2	2	18	0.0600
21	2	2	19	0.0571
21	2	2	20	0.0503
21	2	2	21	0.0461
21	2	2	22	0.0423
21	2	2	23	0.0358
21	2	2	24	0.0260
21	2	5	1	0.0097
21	2	5	2	0.0069
21	2	5	3	0.0069
21	2	5	4	0.0110
21	2	5	5	0.0339
21	2	5	6	0.0484
21	2	5	7	0.0579
21	2	5	8	0.0612
21	2	5	9	0.0573
21	2	5	10	0.0531
21	2	5	11	0.0504
21	2	5	12	0.0520
21	2	5	13	0.0548
21	2	5	14	0.0609
21	2	5	15	0.0635
21	2	5	16	0.0615
21	2	5	17	0.0599
21	2	5	18	0.0581
21	2	5	19	0.0503
21	2	5	20	0.0387
21	2	5	21	0.0331
21	2	5	22	0.0299
21	2	5	23	0.0239
21	2	5	24	0.0165
21	3	2	1	0.0213
21	3	2	2	0.0151
21	3	2	3	0.0135
21	3	2	4	0.0103
21	3	2	5	0.0124
21	3	2	6	0.0199
21	3	2	7	0.0281
21	3	2	8	0.0349
21	3	2	9	0.0414
21	3	2	10	0.0493
21	3	2	11	0.0558
21	3	2	12	0.0598
21	3	2	13	0.0640
21	3	2	14	0.0646
21	3	2	15	0.0637
21	3	2	16	0.0634
21	3	2	17	0.0638
21	3	2	18	0.0627
21	3	2	19	0.0592
21	3	2	20	0.0508
21	3	2	21	0.0445
21	3	2	22	0.0410
21	3	2	23	0.0354
21	3	2	24	0.0254
21	3	5	1	0.0061
21	3	5	2	0.0040
21	3	5	3	0.0034
21	3	5	4	0.0040
21	3	5	5	0.0096
21	3	5	6	0.0257
21	3	5	7	0.0489
21	3	5	8	0.0700
21	3	5	9	0.0633
21	3	5	10	0.0503
21	3	5	11	0.0498
21	3	5	12	0.0550
21	3	5	13	0.0584
21	3	5	14	0.0580
21	3	5	15	0.0640
21	3	5	16	0.0730
21	3	5	17	0.0785
21	3	5	18	0.0812
21	3	5	19	0.0639
21	3	5	20	0.0430
21	3	5	21	0.0338
21	3	5	22	0.0275
21	3	5	23	0.0179
21	3	5	24	0.0107
21	4	2	1	0.0219
21	4	2	2	0.0162
21	4	2	3	0.0144
21	4	2	4	0.0116
21	4	2	5	0.0159
21	4	2	6	0.0231
21	4	2	7	0.0297
21	4	2	8	0.0358
21	4	2	9	0.0413
21	4	2	10	0.0484
21	4	2	11	0.0545
21	4	2	12	0.0587
21	4	2	13	0.0628
21	4	2	14	0.0632
21	4	2	15	0.0618
21	4	2	16	0.0613
21	4	2	17	0.0617
21	4	2	18	0.0600
21	4	2	19	0.0571
21	4	2	20	0.0503
21	4	2	21	0.0461
21	4	2	22	0.0423
21	4	2	23	0.0358
21	4	2	24	0.0260
21	4	5	1	0.0097
21	4	5	2	0.0069
21	4	5	3	0.0069
21	4	5	4	0.0110
21	4	5	5	0.0339
21	4	5	6	0.0484
21	4	5	7	0.0579
21	4	5	8	0.0612
21	4	5	9	0.0573
21	4	5	10	0.0531
21	4	5	11	0.0504
21	4	5	12	0.0520
21	4	5	13	0.0548
21	4	5	14	0.0609
21	4	5	15	0.0635
21	4	5	16	0.0615
21	4	5	17	0.0599
21	4	5	18	0.0581
21	4	5	19	0.0503
21	4	5	20	0.0387
21	4	5	21	0.0331
21	4	5	22	0.0299
21	4	5	23	0.0239
21	4	5	24	0.0165
21	5	2	1	0.0213
21	5	2	2	0.0151
21	5	2	3	0.0135
21	5	2	4	0.0103
21	5	2	5	0.0124
21	5	2	6	0.0199
21	5	2	7	0.0281
21	5	2	8	0.0349
21	5	2	9	0.0414
21	5	2	10	0.0493
21	5	2	11	0.0558
21	5	2	12	0.0598
21	5	2	13	0.0640
21	5	2	14	0.0646
21	5	2	15	0.0637
21	5	2	16	0.0634
21	5	2	17	0.0638
21	5	2	18	0.0627
21	5	2	19	0.0592
21	5	2	20	0.0508
21	5	2	21	0.0445
21	5	2	22	0.0410
21	5	2	23	0.0354
21	5	2	24	0.0254
21	5	5	1	0.0061
21	5	5	2	0.0040
21	5	5	3	0.0034
21	5	5	4	0.0040
21	5	5	5	0.0096
21	5	5	6	0.0257
21	5	5	7	0.0489
21	5	5	8	0.0700
21	5	5	9	0.0633
21	5	5	10	0.0503
21	5	5	11	0.0498
21	5	5	12	0.0550
21	5	5	13	0.0584
21	5	5	14	0.0580
21	5	5	15	0.0640
21	5	5	16	0.0730
21	5	5	17	0.0785
21	5	5	18	0.0812
21	5	5	19	0.0639
21	5	5	20	0.0430
21	5	5	21	0.0338
21	5	5	22	0.0275
21	5	5	23	0.0179
21	5	5	24	0.0107

[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	0.00000
21	2	15	2	0.00000
21	2	15	3	0.00000
21	2	15	4	0.00000
21	2	15	5	0.00000
21	2	15	6	0.00000
21	2	15	7	0.00000
21	2	15	8	0.00000
21	2	15	9	0.00000
21	2	15	10	0.00000
21	2	15	11	0.00000
21	2	15	12	0.00000
21	2	15	13	0.00000
21	2	15	14	0.04740
21	2	15	15	0.95259
21	2	15	16	0.00000
21	2	25	1	0.00000
21	2	25	2	0.00000
21	2	25	3	0.00000
21	2	25	4	0.00000
21	2	25	5	0.00000
21	2	25	6	0.00000
21	2	25	7	0.00000
21	2	25	8	0.00000
21	2	25	9	0.00000
21	2	25	10	0.00000
21	2	25	11	0.00000
21	2	25	12	0.00000
21	2	25	13	0.00000
21	2	25	14	0.04740
21	2	25	15	0.95259
21	2	25	16	0.00000
21	2	35	1	0.00000
21	2	35	2	0.00000
21	2	35	3	0.00000
21	2	35	4	0.00000
21	2	35	5	0.00000
21	2	35	6	0.00000
21	2	35	7	0.00000
21	2	35	8	0.00000
21	2	35	9	0.00000
21	2	35	10	0.00000
21	2	35	11	0.00000
21	2	35	12	0.00000
21	2	35	13	0.00000
21	2	35	14	0.04740
21	2	35	15	0.95259
21	2	35	16	0.00000
21	2	45	1	0.00000
21	2	45	2	0.00000
21	2	45	3	0.00000
21	2	45	4	0.00000
21	2	45	5	0.00000
21	2	45	6	0.00000
21	2	45	7	0.00000
21	2	45	8	0.00000
21	2	45	9	0.00000
21	2	45	10	0.00000
21	2	45	11	0.00000
21	2	45	12	0.00000
21	2	45	13	0.00000
21	2	45	14	0.04740
21	2	45	15	0.95259
21	2	45	16	0.00000
21	2	55	1	0.00000
21	2	55	2	0.00000
21	2	55	3	0.00000
21	2	55	4	0.00000
21	2	55	5	0.00000
21	2	55	6	0.00000
21	2	55	7	0.00000
21	2	55	8	0.00000
21	2	55	9	0.00000
21	2	55	10	0.00000
21	2	55	11	0.00000
21	2	55	12	0.00000
21	2	55	13	0.00000
21	2	55	14	0.04740
21	2	55	15	0.95259
21	2	55	16	0.00000
21	2	65	1	0.00000
21	2	65	2	0.00000
21	2	65	3	0.00000
21	2	65	4	0.00000
21	2	65	5	0.00000
21	2	65	6	0.00000
21	2	65	7	0.00000
21	2	65	8	0.00000
21	2	65	9	0.00000
21	2	65	10	0.00000
21	2	65	11	0.00000
21	2	65	12	0.00000
21	2	65	13	0.00000
21	2	65	14	0.04740
21	2	65	15	0.95259
21	2	65	16	0.00000
21	2	75	1	0.00000
21	2	75	2	0.00000
21	2	75	3	0.00000
21	2	75	4	0.00000
21	2	75	5	0.00000
21	2	75	6	0.00000
21	2	75	7	0.00000
21	2	75	8	0.02627
21	2	75	9	0.00000
21	2	75	10	0.00000
21	2	75	11	0.05723
21	2	75	12	0.02975
21	2	75	13	0.10615
21	2	75	14	0.20489
21	2	75	15	0.56656
21	2	75	16	0.00915
21	2	85	1	0.00000
21	2	85	2	0.00000
21	2	85	3	0.00000
21	2	85	4	0.00000
21	2	85	5	0.00000
21	2	85	6	0.00000
21	2	85	7	0.00000
21	2	85	8	0.02627
21	2	85	9	0.00000
21	2	85	10	0.00000
21	2	85	11	0.05723
21	2	85	12	0.02975
21	2	85	13	0.10615
21	2	85	14	0.20489
21	2	85	15	0.56656
21	2	85	16	0.00915
21	2	95	1	0.00000
21	2	95	2	0.00000
21	2	95	3	0.00000
21	2	95	4	0.00000
21	2	95	5	0.00000
21	2	95	6	0.00000
21	2	95	7	0.00000
21	2	95	8	0.02627
21	2	95	9	0.00000
21	2	95	10	0.00000
21	2	95	11	0.05723
21	2	95	12	0.02975
21	2	95	13	0.10615
21	2	95	14	0.20489
21	2	95	15	0.56656
21	2	95	16	0.00915
21	2	105	1	0.00000
21	2	105	2	0.00000
21	2	105	3	0.00000
21	2	105	4	0.00000
21	2	105	5	0.00000
21	2	105	6	0.00000
21	2	105	7	0.00000
21	2	105	8	0.00000
21	2	105	9	0.00000
21	2	105	10	0.00000
21	2	105	11	0.00000
21	2	105	12	0.00000
21	2	105	13	0.00849
21	2	105	14	0.04656
21	2	105	15	0.94495
21	2	105	16	0.00000
21	2	115	1	0.00000
21	2	115	2	0.00000
21	2	115	3	0.00000
21	2	115	4	0.00000
21	2	115	5	0.00000
21	2	115	6	0.00000
21	2	115	7	0.00000
21	2	115	8	0.00000
21	2	115	9	0.00000
21	2	115	10	0.00000
21	2	115	11	0.00000
21	2	115	12	0.00000
21	2	115	13	0.00849
21	2	115	14	0.04656
21	2	115	15	0.94495
21	2	115	16	0.00000
21	2	125	1	0.00000
21	2	125	2	0.00000
21	2	125	3	0.00000
21	2	125	4	0.00000
21	2	125	5	0.00000
21	2	125	6	0.00000
21	2	125	7	0.00000
21	2	125	8	0.00000
21	2	125	9	0.00000
21	2	125	10	0.00000
21	2	125	11	0.00000
21	2	125	12	0.00000
21	2	125	13	0.00849
21	2	125	14	0.04656
21	2	125	15	0.94495
21	2	125	16	0.00000
21	2	135	1	0.00000
21	2	135	2	0.00000
21	2	135	3	0.00000
21	2	135	4	0.00000
21	2	135	5	0.00000
21	2	135	6	0.00000
21	2	135	7	0.00000
21	2	135	8	0.00000
21	2	135	9	0.00000
21	2	135	10	0.00000
21	2	135	11	0.00000
21	2	135	12	0.00000
21	2	135	13	0.00849
21	2	135	14	0.04656
21	2	135	15	0.94495
21	2	135	16	0.00000
21	2	145	1	0.00000
21	2	145	2	0.00000
21	2	145	3	0.00000
21	2	145	4	0.00000
21	2	145	5	0.00000
21	2	145	6	0.00000
21	2	145	7	0.00000
21	2	145	8	0.00000
21	2	145	9	0.00000
21	2	145	10	0.00000
21	2	145	11	0.00000
21	2	145	12	0.00000
21	2	145	13	0.00849
21	2	145	14	0.04656
21	2	145	15	0.94495
21	2	145	16	0.00000
21	2	155	1	0.00000
21	2	155	2	0.00000
21	2	155	3	0.00000
21	2	155	4	0.00000
21	2	155	5	0.00000
21	2	155	6	0.00000
21	2	155	7	0.00000
21	2	155	8	0.00000
21	2	155	9	0.01914
21	2	155	10	0.00000
21	2	155	11	0.00000
21	2	155	12	0.05332
21	2	155	13	0.08409
21	2	155	14	0.22279
21	2	155	15	0.61647
21	2	155	16	0.00419
21	2	165	1	0.00000
21	2	165	2	0.00000
21	2	165	3	0.00000
21	2	165	4	0.00000
21	2	165	5	0.00000
21	2	165	6	0.00000
21	2	165	7	0.00000
21	2	165	8	0.00000
21	2	165	9	0.01914
21	2	165	10	0.00000
21	2	165	11	0.00000
21	2	165	12	0.05332
21	2	165	13	0.08409
21	2	165	14	0.22279
21	2	165	15	0.61647

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	165	16	0.00419
21	2	175	1	0.00000
21	2	175	2	0.00000
21	2	175	3	0.00000
21	2	175	4	0.00000
21	2	175	5	0.00000
21	2	175	6	0.00000
21	2	175	7	0.00000
21	2	175	8	0.00000
21	2	175	9	0.01914
21	2	175	10	0.00000
21	2	175	11	0.00000
21	2	175	12	0.05332
21	2	175	13	0.08409
21	2	175	14	0.22279
21	2	175	15	0.61647
21	2	175	16	0.00419
21	2	185	1	0.00000
21	2	185	2	0.00000
21	2	185	3	0.00000
21	2	185	4	0.00000
21	2	185	5	0.00000
21	2	185	6	0.00000
21	2	185	7	0.00000
21	2	185	8	0.00000
21	2	185	9	0.01914
21	2	185	10	0.00000
21	2	185	11	0.00000
21	2	185	12	0.05332
21	2	185	13	0.08409
21	2	185	14	0.22279
21	2	185	15	0.61647
21	2	185	16	0.00419
21	2	195	1	0.00000
21	2	195	2	0.00000
21	2	195	3	0.00000
21	2	195	4	0.00000
21	2	195	5	0.00000
21	2	195	6	0.00000
21	2	195	7	0.00000
21	2	195	8	0.00000
21	2	195	9	0.00000
21	2	195	10	0.00000
21	2	195	11	0.00000
21	2	195	12	0.00000
21	2	195	13	0.00000
21	2	195	14	0.04740
21	2	195	15	0.95259
21	2	195	16	0.00000
21	2	205	1	0.00000
21	2	205	2	0.00000
21	2	205	3	0.00000
21	2	205	4	0.00000
21	2	205	5	0.00000
21	2	205	6	0.00000
21	2	205	7	0.00000
21	2	205	8	0.00000
21	2	205	9	0.00000
21	2	205	10	0.00000
21	2	205	11	0.00000
21	2	205	12	0.00000
21	2	205	13	0.00000
21	2	205	14	0.04740
21	2	205	15	0.95259
21	2	205	16	0.00000
21	2	215	1	0.00000
21	2	215	2	0.00000
21	2	215	3	0.00000
21	2	215	4	0.00000
21	2	215	5	0.00000
21	2	215	6	0.00000
21	2	215	7	0.00000
21	2	215	8	0.00000
21	2	215	9	0.00000
21	2	215	10	0.00000
21	2	215	11	0.00000
21	2	215	12	0.00000
21	2	215	13	0.00000
21	2	215	14	0.04740
21	2	215	15	0.95259
21	2	215	16	0.00000
21	2	225	1	0.00000
21	2	225	2	0.00000
21	2	225	3	0.00000
21	2	225	4	0.00000
21	2	225	5	0.00000
21	2	225	6	0.00000

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	225	7	0.00000
21	2	225	8	0.00000
21	2	225	9	0.00000
21	2	225	10	0.00000
21	2	225	11	0.00000
21	2	225	12	0.00000
21	2	225	13	0.00000
21	2	225	14	0.04740
21	2	225	15	0.95259
21	2	225	16	0.00000
21	2	235	1	0.00000
21	2	235	2	0.00000
21	2	235	3	0.00000
21	2	235	4	0.00000
21	2	235	5	0.00000
21	2	235	6	0.00000
21	2	235	7	0.00000
21	2	235	8	0.00000
21	2	235	9	0.00000
21	2	235	10	0.00000
21	2	235	11	0.00000
21	2	235	12	0.00000
21	2	235	13	0.00000
21	2	235	14	0.04740
21	2	235	15	0.95259
21	2	235	16	0.00000
21	2	245	1	0.00000
21	2	245	2	0.00000
21	2	245	3	0.00000
21	2	245	4	0.00000
21	2	245	5	0.00000
21	2	245	6	0.00000
21	2	245	7	0.00000
21	2	245	8	0.00000
21	2	245	9	0.00000
21	2	245	10	0.00000
21	2	245	11	0.00000
21	2	245	12	0.00000
21	2	245	13	0.00000
21	2	245	14	0.04740
21	2	245	15	0.95259
21	2	245	16	0.00000
21	2	12	1	0.00000
21	2	12	2	0.00000
21	2	12	3	0.00000
21	2	12	4	0.00000
21	2	12	5	0.00000
21	2	12	6	0.00000
21	2	12	7	0.00000
21	2	12	8	0.00000
21	2	12	9	0.00000
21	2	12	10	0.00000
21	2	12	11	0.00000
21	2	12	12	0.00000
21	2	12	13	0.00000
21	2	12	14	0.04740
21	2	12	15	0.95259
21	2	12	16	0.00000
21	2	22	1	0.00000
21	2	22	2	0.00000
21	2	22	3	0.00000
21	2	22	4	0.00000
21	2	22	5	0.00000
21	2	22	6	0.00000
21	2	22	7	0.00000
21	2	22	8	0.00000
21	2	22	9	0.00000
21	2	22	10	0.00000
21	2	22	11	0.00000
21	2	22	12	0.00000
21	2	22	13	0.00000
21	2	22	14	0.04740
21	2	22	15	0.95259
21	2	22	16	0.00000
21	2	32	1	0.00000
21	2	32	2	0.00000
21	2	32	3	0.00000
21	2	32	4	0.00000
21	2	32	5	0.00000
21	2	32	6	0.00000
21	2	32	7	0.00000
21	2	32	8	0.00000
21	2	32	9	0.00000
21	2	32	10	0.00000
21	2	32	11	0.00000
21	2	32	12	0.00000
21	2	32	13	0.00000

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	32	14	0.04740
21	2	32	15	0.95259
21	2	32	16	0.00000
21	2	42	1	0.00000
21	2	42	2	0.00000
21	2	42	3	0.00000
21	2	42	4	0.00000
21	2	42	5	0.00000
21	2	42	6	0.00000
21	2	42	7	0.00000
21	2	42	8	0.00000
21	2	42	9	0.00000
21	2	42	10	0.00000
21	2	42	11	0.00000
21	2	42	12	0.00000
21	2	42	13	0.00000
21	2	42	14	0.04740
21	2	42	15	0.95259
21	2	42	16	0.00000
21	2	52	1	0.00000
21	2	52	2	0.00000
21	2	52	3	0.00000
21	2	52	4	0.00000
21	2	52	5	0.00000
21	2	52	6	0.00000
21	2	52	7	0.00000
21	2	52	8	0.00000
21	2	52	9	0.00000
21	2	52	10	0.00000
21	2	52	11	0.00000
21	2	52	12	0.00000
21	2	52	13	0.00000
21	2	52	14	0.04740
21	2	52	15	0.95259
21	2	52	16	0.00000
21	2	62	1	0.00000
21	2	62	2	0.00000
21	2	62	3	0.00000
21	2	62	4	0.00000
21	2	62	5	0.00000
21	2	62	6	0.00000
21	2	62	7	0.00000
21	2	62	8	0.00000
21	2	62	9	0.00000
21	2	62	10	0.00000
21	2	62	11	0.00000
21	2	62	12	0.00000
21	2	62	13	0.00000
21	2	62	14	0.04740
21	2	62	15	0.95259
21	2	62	16	0.00000
21	2	72	1	0.00000
21	2	72	2	0.00000
21	2	72	3	0.00000
21	2	72	4	0.00000
21	2	72	5	0.00000
21	2	72	6	0.00000
21	2	72	7	0.00000
21	2	72	8	0.02627
21	2	72	9	0.00000
21	2	72	10	0.00000
21	2	72	11	0.05723
21	2	72	12	0.02975
21	2	72	13	0.10615
21	2	72	14	0.20489
21	2	72	15	0.56656
21	2	72	16	0.00915
21	2	82	1	0.00000
21	2	82	2	0.00000
21	2	82	3	0.00000
21	2	82	4	0.00000
21	2	82	5	0.00000
21	2	82	6	0.00000
21	2	82	7	0.00000
21	2	82	8	0.02627
21	2	82	9	0.00000
21	2	82	10	0.00000
21	2	82	11	0.05723
21	2	82	12	0.02975
21	2	82	13	0.10615
21	2	82	14	0.20489
21	2	82	15	0.56656
21	2	82	16	0.00915
21	2	92	1	0.00000
21	2	92	2	0.00000
21	2	92	3	0.00000
21	2	92	4	0.00000

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	92	5	0.00000
21	2	92	6	0.00000
21	2	92	7	0.00000
21	2	92	8	0.02627
21	2	92	9	0.00000
21	2	92	10	0.00000
21	2	92	11	0.05723
21	2	92	12	0.02975
21	2	92	13	0.10615
21	2	92	14	0.20489
21	2	92	15	0.56656
21	2	92	16	0.00915
21	2	102	1	0.00000
21	2	102	2	0.00000
21	2	102	3	0.00000
21	2	102	4	0.00000
21	2	102	5	0.00000
21	2	102	6	0.00000
21	2	102	7	0.00000
21	2	102	8	0.00000
21	2	102	9	0.00000
21	2	102	10	0.00000
21	2	102	11	0.00000
21	2	102	12	0.00000
21	2	102	13	0.00849
21	2	102	14	0.04656
21	2	102	15	0.94495
21	2	102	16	0.00000
21	2	112	1	0.00000
21	2	112	2	0.00000
21	2	112	3	0.00000
21	2	112	4	0.00000
21	2	112	5	0.00000
21	2	112	6	0.00000
21	2	112	7	0.00000
21	2	112	8	0.00000
21	2	112	9	0.00000
21	2	112	10	0.00000
21	2	112	11	0.00000
21	2	112	12	0.00000
21	2	112	13	0.00849
21	2	112	14	0.04656
21	2	112	15	0.94495
21	2	112	16	0.00000
21	2	122	1	0.00000
21	2	122	2	0.00000
21	2	122	3	0.00000
21	2	122	4	0.00000
21	2	122	5	0.00000
21	2	122	6	0.00000
21	2	122	7	0.00000
21	2	122	8	0.00000
21	2	122	9	0.00000
21	2	122	10	0.00000
21	2	122	11	0.00000
21	2	122	12	0.00000
21	2	122	13	0.00849
21	2	122	14	0.04656
21	2	122	15	0.94495
21	2	122	16	0.00000
21	2	132	1	0.00000
21	2	132	2	0.00000
21	2	132	3	0.00000
21	2	132	4	0.00000
21	2	132	5	0.00000
21	2	132	6	0.00000
21	2	132	7	0.00000
21	2	132	8	0.00000
21	2	132	9	0.00000
21	2	132	10	0.00000
21	2	132	11	0.00000
21	2	132	12	0.00000
21	2	132	13	0.00849
21	2	132	14	0.04656
21	2	132	15	0.94495
21	2	132	16	0.00000
21	2	142	1	0.00000
21	2	142	2	0.00000
21	2	142	3	0.00000
21	2	142	4	0.00000
21	2	142	5	0.00000
21	2	142	6	0.00000
21	2	142	7	0.00000
21	2	142	8	0.00000
21	2	142	9	0.00000
21	2	142	10	0.00000
21	2	142	11	0.00000

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	142	12	0.00000
21	2	142	13	0.00849
21	2	142	14	0.04656
21	2	142	15	0.94495
21	2	142	16	0.00000
21	2	152	1	0.00000
21	2	152	2	0.00000
21	2	152	3	0.00000
21	2	152	4	0.00000
21	2	152	5	0.00000
21	2	152	6	0.00000
21	2	152	7	0.00000
21	2	152	8	0.00000
21	2	152	9	0.01914
21	2	152	10	0.00000
21	2	152	11	0.00000
21	2	152	12	0.05332
21	2	152	13	0.08409
21	2	152	14	0.22279
21	2	152	15	0.61647
21	2	152	16	0.00419
21	2	162	1	0.00000
21	2	162	2	0.00000
21	2	162	3	0.00000
21	2	162	4	0.00000
21	2	162	5	0.00000
21	2	162	6	0.00000
21	2	162	7	0.00000
21	2	162	8	0.00000
21	2	162	9	0.01914
21	2	162	10	0.00000
21	2	162	11	0.00000
21	2	162	12	0.05332
21	2	162	13	0.08409
21	2	162	14	0.22279
21	2	162	15	0.61647
21	2	162	16	0.00419
21	2	172	1	0.00000
21	2	172	2	0.00000
21	2	172	3	0.00000
21	2	172	4	0.00000
21	2	172	5	0.00000
21	2	172	6	0.00000
21	2	172	7	0.00000
21	2	172	8	0.00000
21	2	172	9	0.01914
21	2	172	10	0.00000
21	2	172	11	0.00000
21	2	172	12	0.05332
21	2	172	13	0.08409
21	2	172	14	0.22279
21	2	172	15	0.61647
21	2	172	16	0.00419
21	2	182	1	0.00000
21	2	182	2	0.00000
21	2	182	3	0.00000
21	2	182	4	0.00000
21	2	182	5	0.00000
21	2	182	6	0.00000
21	2	182	7	0.00000
21	2	182	8	0.00000
21	2	182	9	0.01914
21	2	182	10	0.00000
21	2	182	11	0.00000
21	2	182	12	0.05332
21	2	182	13	0.08409
21	2	182	14	0.22279
21	2	182	15	0.61647
21	2	182	16	0.00419
21	2	192	1	0.00000
21	2	192	2	0.00000
21	2	192	3	0.00000
21	2	192	4	0.00000
21	2	192	5	0.00000
21	2	192	6	0.00000
21	2	192	7	0.00000
21	2	192	8	0.00000
21	2	192	9	0.00000
21	2	192	10	0.00000
21	2	192	11	0.00000
21	2	192	12	0.00000
21	2	192	13	0.00000
21	2	192	14	0.04740
21	2	192	15	0.95259
21	2	192	16	0.00000
21	2	202	1	0.00000
21	2	202	2	0.00000

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	202	3	0.00000
21	2	202	4	0.00000
21	2	202	5	0.00000
21	2	202	6	0.00000
21	2	202	7	0.00000
21	2	202	8	0.00000
21	2	202	9	0.00000
21	2	202	10	0.00000
21	2	202	11	0.00000
21	2	202	12	0.00000
21	2	202	13	0.00000
21	2	202	14	0.04740
21	2	202	15	0.95259
21	2	202	16	0.00000
21	2	212	1	0.00000
21	2	212	2	0.00000
21	2	212	3	0.00000
21	2	212	4	0.00000
21	2	212	5	0.00000
21	2	212	6	0.00000
21	2	212	7	0.00000
21	2	212	8	0.00000
21	2	212	9	0.00000
21	2	212	10	0.00000
21	2	212	11	0.00000
21	2	212	12	0.00000
21	2	212	13	0.00000
21	2	212	14	0.04740
21	2	212	15	0.95259
21	2	212	16	0.00000
21	2	222	1	0.00000
21	2	222	2	0.00000
21	2	222	3	0.00000
21	2	222	4	0.00000
21	2	222	5	0.00000
21	2	222	6	0.00000
21	2	222	7	0.00000
21	2	222	8	0.00000
21	2	222	9	0.00000
21	2	222	10	0.00000
21	2	222	11	0.00000
21	2	222	12	0.00000
21	2	222	13	0.00000
21	2	222	14	0.04740
21	2	222	15	0.95259
21	2	222	16	0.00000
21	2	232	1	0.00000
21	2	232	2	0.00000
21	2	232	3	0.00000
21	2	232	4	0.00000
21	2	232	5	0.00000
21	2	232	6	0.00000
21	2	232	7	0.00000
21	2	232	8	0.00000
21	2	232	9	0.00000
21	2	232	10	0.00000
21	2	232	11	0.00000
21	2	232	12	0.00000
21	2	232	13	0.00000
21	2	232	14	0.04740
21	2	232	15	0.95259
21	2	232	16	0.00000
21	2	242	1	0.00000
21	2	242	2	0.00000
21	2	242	3	0.00000
21	2	242	4	0.00000
21	2	242	5	0.00000
21	2	242	6	0.00000
21	2	242	7	0.00000
21	2	242	8	0.00000
21	2	242	9	0.00000
21	2	242	10	0.00000
21	2	242	11	0.00000
21	2	242	12	0.00000
21	2	242	13	0.00000
21	2	242	14	0.04740
21	2	242	15	0.95259
21	2	242	16	0.00000

[AVFT] (SourceTypeID 42: Transit Bus)

Source TypeID	Model YearID	Fuel TypeID	Eng TechID	fuelEng Fraction
42	1960	1	1	0.009615
42	1960	2	1	0.990385
42	1960	3	1	0.000000
42	1961	1	1	0.009615
42	1961	2	1	0.990385
42	1961	3	1	0.000000
42	1962	1	1	0.009615
42	1962	2	1	0.990385
42	1962	3	1	0.000000
42	1963	1	1	0.009615
42	1963	2	1	0.990385
42	1963	3	1	0.000000
42	1964	1	1	0.009615
42	1964	2	1	0.990385
42	1964	3	1	0.000000
42	1965	1	1	0.009615
42	1965	2	1	0.990385
42	1965	3	1	0.000000
42	1966	1	1	0.009615
42	1966	2	1	0.990385
42	1966	3	1	0.000000
42	1967	1	1	0.009615
42	1967	2	1	0.990385
42	1967	3	1	0.000000
42	1968	1	1	0.009615
42	1968	2	1	0.990385
42	1968	3	1	0.000000
42	1969	1	1	0.009615
42	1969	2	1	0.990385
42	1969	3	1	0.000000
42	1970	1	1	0.009615
42	1970	2	1	0.990385
42	1970	3	1	0.000000
42	1971	1	1	0.009615
42	1971	2	1	0.990385
42	1971	3	1	0.000000
42	1972	1	1	0.009615
42	1972	2	1	0.990385
42	1972	3	1	0.000000
42	1973	1	1	0.009615
42	1973	2	1	0.990385
42	1973	3	1	0.000000
42	1974	1	1	0.009615
42	1974	2	1	0.990385
42	1974	3	1	0.000000
42	1975	1	1	0.009615
42	1975	2	1	0.990385
42	1975	3	1	0.000000
42	1976	1	1	0.009615
42	1976	2	1	0.990385
42	1976	3	1	0.000000
42	1977	1	1	0.009615
42	1977	2	1	0.990385
42	1977	3	1	0.000000
42	1978	1	1	0.009615
42	1978	2	1	0.990385
42	1978	3	1	0.000000
42	1979	1	1	0.009615
42	1979	2	1	0.990385
42	1979	3	1	0.000000
42	1980	1	1	0.009615
42	1980	2	1	0.990385
42	1980	3	1	0.000000
42	1981	1	1	0.008696
42	1981	2	1	0.991304
42	1981	3	1	0.000000
42	1982	1	1	0.011321
42	1982	2	1	0.988679
42	1982	3	1	0.000000
42	1983	1	1	0.008081
42	1983	2	1	0.991919
42	1983	3	1	0.000000
42	1984	1	1	0.009671
42	1984	2	1	0.990329
42	1984	3	1	0.000000
42	1985	1	1	0.010448
42	1985	2	1	0.989552
42	1985	3	1	0.000000
42	1986	1	1	0.010243
42	1986	2	1	0.989757
42	1986	3	1	0.000000
42	1987	1	1	0.009825
42	1987	2	1	0.990175
42	1987	3	1	0.000000
42	1988	1	1	0.009990
42	1988	2	1	0.990010
42	1988	3	1	0.000000
42	1989	1	1	0.009441
42	1989	2	1	0.990559
42	1989	3	1	0.000000
42	1990	1	1	0.010174
42	1990	2	1	0.982645
42	1990	3	1	0.007181
42	1991	1	1	0.009632
42	1991	2	1	0.971979
42	1991	3	1	0.018389
42	1992	1	1	0.009752
42	1992	2	1	0.944149
42	1992	3	1	0.046099
42	1993	1	1	0.009238
42	1993	2	1	0.914550
42	1993	3	1	0.076212
42	1994	1	1	0.010211
42	1994	2	1	0.904914
42	1994	3	1	0.084876
42	1995	1	1	0.010022
42	1995	2	1	0.836860
42	1995	3	1	0.153118
42	1996	1	1	0.009941
42	1996	2	1	0.892002
42	1996	3	1	0.098057
42	1997	1	1	0.000000
42	1997	2	1	1.000000
42	1997	3	1	0.000000
42	1998	1	1	0.000000
42	1998	2	1	0.000000
42	1998	3	1	1.000000
42	1999	1	1	0.000000
42	1999	2	1	0.000000
42	1999	3	1	1.000000
42	2000	1	1	0.000000
42	2000	2	1	0.000000
42	2000	3	1	1.000000
42	2001	1	1	0.000000
42	2001	2	1	0.000000
42	2001	3	1	1.000000
42	2002	1	1	0.000000
42	2002	2	1	0.000000
42	2002	3	1	1.000000
42	2003	1	1	0.000000
42	2003	2	1	0.000000
42	2003	3	1	1.000000
42	2004	1	1	0.000000
42	2004	2	1	0.327869
42	2004	3	1	0.672131
42	2005	1	1	0.000000
42	2005	2	1	1.000000
42	2005	3	1	0.000000
42	2006	1	1	0.000000
42	2006	2	1	0.075758
42	2006	3	1	0.924242
42	2007	1	1	0.000000
42	2007	2	1	1.000000
42	2007	3	1	0.000000
42	2008	1	1	0.000000
42	2008	2	1	0.385542
42	2008	3	1	0.614458
42	2009	1	1	0.108108
42	2009	2	1	0.135135
42	2009	3	1	0.756757
42	2010	1	1	0.000000
42	2010	2	1	1.000000
42	2010	3	1	0.000000
42	2011	1	1	0.000000
42	2011	2	1	0.048780
42	2011	2	11	0.414634
42	2011	3	1	0.536585
42	2012	1	1	0.000000
42	2012	2	1	0.000000
42	2012	3	1	1.000000
42	2013	1	1	0.045455
42	2013	2	1	0.054545
42	2013	2	11	0.118182
42	2013	3	1	0.781818
42	2014	1	1	0.010417
42	2014	2	1	0.114583
42	2014	3	1	0.875000
42	2015	1	1	0.024619
42	2015	2	1	0.817351
42	2015	3	1	0.158030
42	2016	1	1	0.024619
42	2016	2	1	0.817351
42	2016	3	1	0.158030
42	2017	1	1	0.024619
42	2017	2	1	0.817351
42	2017	3	1	0.158030
42	2018	1	1	0.024619
42	2018	2	1	0.817351
42	2018	3	1	0.158030
42	2019	1	1	0.024619
42	2019	2	1	0.817351
42	2019	3	1	0.158030
42	2020	1	1	0.024619
42	2020	2	1	0.817351
42	2020	3	1	0.158030
42	2021	1	1	0.024619
42	2021	2	1	0.817351
42	2021	3	1	0.158030
42	2022	1	1	0.024619
42	2022	2	1	0.817351
42	2022	3	1	0.158030
42	2023	1	1	0.024619
42	2023	2	1	0.817351
42	2023	3	1	0.158030
42	2024	1	1	0.024619
42	2024	2	1	0.817351
42	2024	3	1	0.158030
42	2025	1	1	0.024619
42	2025	2	1	0.817351
42	2025	3	1	0.158030
42	2026	1	1	0.024619
42	2026	2	1	0.817351
42	2026	3	1	0.158030
42	2027	1	1	0.024619
42	2027	2	1	0.817351
42	2027	3	1	0.158030
42	2028	1	1	0.024619
42	2028	2	1	0.817351
42	2028	3	1	0.158030
42	2029	1	1	0.024619
42	2029	2	1	0.817351
42	2029	3	1	0.158030
42	2030	1	1	0.024619
42	2030	2	1	0.817351
42	2030	3	1	0.158030
42	2031	1	1	0.024619
42	2031	2	1	0.817351
42	2031	3	1	0.158030
42	2032	1	1	0.024619
42	2032	2	1	0.817351
42	2032	3	1	0.158030
42	2033	1	1	0.024619
42	2033	2	1	0.817351
42	2033	3	1	0.158030
42	2034	1	1	0.024619
42	2034	2	1	0.817351
42	2034	3	1	0.158030
42	2035	1	1	0.024619
42	2035	2	1	0.817351
42	2035	3	1	0.158030
42	2036	1	1	0.024619
42	2036	2	1	0.817351
42	2036	3	1	0.158030
42	2037	1	1	0.024619
42	2037	2	1	0.817351
42	2037	3	1	0.158030
42	2038	1	1	0.024619
42	2038	2	1	0.817351
42	2038	3	1	0.158030
42	2039	1	1	0.024619
42	2039	2	1	0.817351
42	2039	3	1	0.158030
42	2040	1	1	0.024619
42	2040	2	1	0.817351
42	2040	3	1	0.158030
42	2041	1	1	0.024619
42	2041	2	1	0.817351
42	2041	3	1	0.158030
42	2042	1	1	0.024619
42	2042	2	1	0.817351
42	2042	3	1	0.158030
42	2043	1	1	0.024619
42	2043	2	1	0.817351
42	2043	3	1	0.158030
42	2044	1	1	0.024619
42	2044	2	1	0.817351
42	2044	3	1	0.158030
42	2045	1	1	0.024619
42	2045	2	1	0.817351
42	2045	3	1	0.158030
42	2046	1	1	0.024619
42	2046	2	1	0.817351
42	2046	3	1	0.158030
42	2047	1	1	0.024619
42	2047	2	1	0.817351
42	2047	3	1	0.158030
42	2048	1	1	0.024619

Source TypeID	Model YearID	Fuel TypeID	Eng TechID	fuelEng Fraction
42	2048	2	1	0.817351
42	2048	3	1	0.158030
42	2049	1	1	0.024619
42	2049	2	1	0.817351

Source TypeID	Model YearID	Fuel TypeID	Eng TechID	fuelEng Fraction
42	2049	3	1	0.158030
42	2050	1	1	0.024619
42	2050	2	1	0.817351
42	2050	3	1	0.158030

[CountyYear]

countyID	yearID	refuelingVaporProgramAdjust	refuelingSpillProgramAdjust
4013	2014	0.661	0.000

Appendix D. Emissions from Facilities Treated as Area Sources in the 2014 Periodic Emissions Inventory for Ozone Precursors

The table below lists those facilities whose reported 2014 emissions have been included in the area source categories of this 2014 Periodic Emissions Inventory for Ozone Precursors.

Table D-1. Emissions (tons/yr) from facilities whose emissions are reflected in area source categories in the 2014 Periodic Emissions Inventory.

ID	Business name	Street address and city	VOC	NO_X	CO
1074	23RD AVE WASTEWATER TREATMENT PLANT	2470 S 22ND AVE, PHOENIX	0.3	2.8	29.8
133843	A LEGACY FUNERAL HOME LLC	1722 N BANNING #101, MESA	0.0	0.2	0.0
132976	ABEL FUNERAL SERVICES INC	1544 W GRANT ST, PHOENIX	0.0	1.1	0.1
1387	ABLE STEEL FABRICATORS	4150 E QUARTZ CIR, MESA	3.7		
130432	ADVANCED LINING SOLUTIONS INC	1903 S 11TH AVE, PHOENIX	0.2		
72104	AEROTURBINE	1658 S LITCHFIELD RD, GOODYEAR	5.3		
969	AF LORTS MANUFACTURING COMPANY INC	15836 W EDDIE ALBERT WAY, GOODYEAR	21.4		
125823	AFFORDABLE CREMATION & BURIAL CHAPEL	1130 S HORNE, MESA	0.0	0.0	0.0
3291	AIRLINE TRAINING CTR AZ INC	1658 S LITCHFIELD RD, GOODYEAR	2.3		
133089	ALL IN ONE TRUCK REPAIR INC	5703 W DOBBINS RD, PHOENIX	0.4		
107220	ALL PETS GREAT AND SMALL	1110 S HORNE ST #103, MESA	0.0	0.6	0.0
90012	ALL STATE CREMATORY	1110 S HORNE #108, MESA	0.0	1.5	0.1
34139	ALL WOOD TREASURES CO	2063 E CEDAR ST, TEMPE	9.1		
131474	ALLIED PACKAGING CORPORATION	5640 S 16TH ST, PHOENIX	5.2	0.2	0.1
35541	ALLIED TUBE AND CONDUIT	2525 N 27TH AVE, PHOENIX	30.8	0.1	0.1
4397	AMBER STEEL FABRICATION, INC	11331 E GERMANN RD, CHANDLER	9.8		
27925	AMERICAN CASE & PEDESTAL MFG CO	2022 N 22ND AVE, PHOENIX	2.7		
132483	AMERICAN FENCE & SECURITY CO INC	2737 W VIRGINIA AVE, PHOENIX	6.1		
54414	AMERICAN SAND & ROCK	PORTABLE	0.1	1.7	0.4
42432	AMERIPRIDE LINEN & APPAREL SERVICE	6025 W VAN BUREN ST, PHOENIX	0.8	1.3	1.1
199	AMERON WATER TRANSMISSION GROUP, LLC	2325 S 7TH ST, PHOENIX	1.7	0.1	0.1
129545	AMES DIVERSIFIED SERVICES	3015 W CLARENDON AVE, PHOENIX	0.0	1.8	0.1
133188	ANIMAL CREMATION SERVICES	5348 W BETHANY HOME RD, GLENDALE	0.0	0.6	0.0
129550	ARIZONA AIRCRAFT PAINTING LLC	4911 E FALCON DR, MESA	1.0		
84	ARIZONA BRAKE & CLUTCH SUPPLY INC	2211 N BLACK CANYON HWY, PHOENIX	0.1	0.0	0.0
3938	ARIZONA GALVANIZING INC	15775 W ELWOOD ST, GOODYEAR	0.2	4.4	3.7
130470	ARIZONA LANDFILL LLC	2750 S 11TH AVE, PHOENIX	0.5	10.8	1.7
131021	ARIZONA NUTRITIONAL SUPPLEMENTS LLC	210 S BECK AVE, CHANDLER	7.8		
69409	ARIZONA POLYMER FLOORING INC	7731 N 68TH AVE, GLENDALE	5.2		
4364	ARIZONA STATE UNIVERSITY	1551 S RURAL RD, TEMPE	2.4	13.5	7.2
134108	ARMORWORKS ENTERPRISES LLC	901 E MADISON ST, PHOENIX	0.1		
341	ARTISAN NATURAL STONE PRODUCTS LLP	813 E UNIVERSITY DR, PHOENIX	2.9		
30112	ASM AMERICA INC	3440 E UNIVERSITY DR, PHOENIX	0.1		
36898	ASPC-LEWIS	26700 S HWY 85, BUCKEYE	6.5	9.6	4.9
4328	ASU MACROTECHNOLOGY WORKS	7700 S RIVER PKWY, TEMPE	1.3	3.0	1.1
1502	ATLAS ROOFING CORPORATION	40 S 45TH AVE, PHOENIX	5.7	0.5	2.0
2656	AVIATION DEPT - PHOENIX SKY HARBOR	3400 E SKY HARBOR BLVD, PHOENIX	0.5	3.2	1.0
50422	BAE SYSTEMS AEROSPACE & DEFENSE GROUP	7822 S 46TH ST, PHOENIX	5.4	0.0	0.0

ID	Business name	Street address and city	VOC	NO_X	CO
1449	BAKER COMMODITIES	3602 W ELWOOD ST, PHOENIX	3.8	2.1	
31585	BANK OF AMERICA	2500 W FRYE RD, CHANDLER	0.1	3.4	0.5
781	BANNER GOOD SAMARITAN MEDICAL CENTER	1111 E MCDOWELL RD, PHOENIX	0.5	7.6	5.1
29946	BANNER THUNDERBIRD MEDICAL CENTER	5555 W THUNDERBIRD RD, GLENDALE	1.5	3.3	1.0
129595	BARREL O' FUN SNACK FOOD SOUTHWEST	7330 W SHERMAN ST, PHOENIX	0.3	6.1	5.1
110901	BAY FOAM PRODUCTS INC	2240 W PEORIA AVE, PHOENIX	0.0	0.3	0.1
42102	BENCHMARK ELECTRONICS PHOENIX, INC	2401 W GRANDVIEW RD, PHOENIX	2.4		
607	BEST FUNERAL SERVICES INC	9380 W PEORIA AVE, PEORIA	0.0	0.6	0.0
961	BIG SURF WATERPARK	1500 N MCCLINTOCK DR, TEMPE	0.1	2.6	0.4
74058	BILTMORE SHUTTERS INC	1138 W WATKINS ST, PHOENIX	3.9		
3305	BIMBO BAKERIES USA, INC	738 W VAN BUREN ST, PHOENIX	13.0	1.8	1.5
226	BORAL ROOFING LLC	1832 S 51ST AVE, PHOENIX	2.9	0.3	0.2
80207	BROKEN ARROW CONSTRUCTION	PORTABLE #1, MESA	0.1		
56105	BURDETTE CABINET CO INC	3941 N HIGLEY RD, MESA	10.0		
131634	CAFE VALLEY INC	7000 W BUCKEYE RD, PHOENIX	16.5	3.2	2.7
131208	CALGON CARBON CORPORATION	521 S BUTTERFIELD TR, GILA BEND	0.2	2.5	7.0
3442	CALJET	125 N 53RD AVE, PHOENIX	38.3	0.1	0.3
108199	CALJET OF AMERICA LLC	57 N 57TH AVE, PHOENIX	6.8		
131966	CALPORTLAND	4830 S 43RD AVE, PHOENIX	0.0	0.4	0.3
133365	CALPORTLAND	3410 E VIRGINIA ST, MESA	0.0	0.0	0.0
3296	CALVERT OIL CO	214 E ARIZONA EASTERN AVE, BUCKEYE	8.5		
898	CAMINO DEL SOL FUNERAL CHAPEL	13738 W CAMINO DEL SOL, SUN CITY WEST	0.0	0.2	0.0
44182	CANAM STEEL CORPORATION	22253 W SOUTHERN AVE, BUCKEYE	2.1		
130156	CASE FURNITURE & DESIGN, LLC	1502 E HADLEY ST #100, PHOENIX	3.4		
776	CASE SANDBLASTING INC	1018 S 27TH AVE, PHOENIX	1.9		
1318	CAVCO INDUSTRIES INC	1366 S LITCHFIELD RD #6, GOODYEAR	12.2		
1316	CAVCO INDUSTRIES LLC/DURANGO PLANT	2502 W DURANGO ST, PHOENIX	11.1		
260	CEMEX - 19TH AVE PLANT	3640 S 19TH AVE, PHOENIX	0.7	3.4	15.7
98591	CEMEX - 7TH STREET PLANT	PORTABLE #4, PHOENIX	0.0	0.1	0.0
98492	CEMEX - BUCKEYE PLANT	22625 W BELOAT RD, BUCKEYE	0.0	0.0	0.0
63	CEMEX - EL MIRAGE PLANT	8635 N EL MIRAGE RD, EL MIRAGE	0.0	0.1	0.0
213	CEMEX - GLENDALE PLANT	11920 W GLENDALE AVE, GLENDALE	2.1	1.8	10.7
1266	CEMEX - WEST PLANT	11701 W INDIAN SCHOOL RD, PHOENIX	0.7	8.7	1.9
579	CEMEX - WEST VALLEY PLANT	11550 W NORTHERN AVE, GLENDALE	0.5	6.4	1.4
1310	CENTURY GRAPHICS LLC	2960 GRAND AVE, PHOENIX	6.3	0.3	0.2
823	CHEMRESEARCH CO INC	1130 W HILTON AVE, PHOENIX	3.1	0.4	0.3
127623	CINTAS CORPORATION	2425 W NEVADA ST, CHANDLER	0.8	0.8	0.7
61573	CIRCLE H SAND & ROCK	6400 S EL MIRAGE RD, TOLLESON	0.3	4.1	0.9
3441	CIRCLE K TERMINAL LLC	5333 W VAN BUREN ST, PHOENIX	40.2		
3403	CITY OF PHOENIX 19TH AVE LANDFILL	1701 W LOWER BUCKEYE RD, PHOENIX	0.6	0.4	0.8
29919	CITY OF PHOENIX 27TH AVE LANDFILL	2800 S 27TH AVE, PHOENIX	1.4	1.2	2.1
1075	CO PHX 91ST AVE WWTP	5615 S 91ST AVE #1, TOLLESON	2.9	19.8	9.0
105317	COMMON MARKET EQUIPMENT EAST	26700 S HWY 85, BUCKEYE	2.3		
113723	CONTRACTORS LANDFILL & RECYCLING	2425 N CENTER ST, MESA	0.7	8.8	1.9
31570	COPPER STATE RUBBER OF ARIZONA	750 S 59TH AVE, PHOENIX	8.6	0.5	0.4
1054	COPPERSTATE CABINET CO INC	1932 W NORTH LN, PHOENIX	5.8		
399	CORESLAB STRUCTURES (ARIZ) INC	5026 S 43RD AVE, PHOENIX	9.6		
227	CORROSION ENGINEERING INC	145 S NINA CIR, MESA	21.5	0.4	0.4

ID	Business name	Street address and city	VOC	NO_X	CO
128232	COSTCO GASOLINE #1028	7525 E HAMPTON RD, MESA	10.6		
43917	COSTCO GASOLINE #490	19001 N 27TH AVE, PHOENIX	14.9		
43916	COSTCO GASOLINE #665	1646 W MONTEBELLO AVE, PHOENIX	10.4		
106288	COSTCO GASOLINE #738	2454 E BEARDSLEY RD, PHOENIX	12.9		
129936	COSTCO GASOLINE FACILITY NO 1058	4550 E CACTUS RD PV MALL, PHOENIX	14.6		
127537	COSTCO GASOLINE LOC 827 (AIR)	3801 N 33RD AVE, PHOENIX	4.7		
104505	COSTCO WHOLESALE	2887 S MARKET ST, GILBERT	13.7		
4339	COSTCO WHOLESALE #427	15255 N HAYDEN RD, SCOTTSDALE	15.1		
16027	COSTCO WHOLESALE #436	1445 W ELLIOT RD, TEMPE	12.6		
18490	COSTCO WHOLESALE #465	4502 E OAK ST, PHOENIX	12.4		
41080	COSTCO WHOLESALE #481	1415 N ARIZONA AVE, GILBERT	12.7		
51068	COSTCO WHOLESALE #674	17550 N 79TH AVE, GLENDALE	15.6		
60765	COSTCO WHOLESALE #691	10000 W MCDOWELL RD, AVONDALE	11.6		
99731	COSTCO WHOLESALE #736	595 S GALLERIA WAY, CHANDLER	14.1		
1198	COURIER GRAPHICS CORP	2621 S 37TH ST, PHOENIX	8.6	0.4	0.4
289	COURTHOUSE AG HOLDINGS LLC	51040 W VALLEY RD, AGUILA	2.1	0.0	0.0
132333	COYOTE TIRE RETREADING, INC	1802 N 23RD AVE, PHOENIX	0.1	0.1	0.1
4368	CRAFTSMEN IN WOOD MFG	5441 W HADLEY ST, PHOENIX	6.3	0.0	0.0
1407	CRANE ELECTRONICS, INC	340 N ROOSEVELT AVE, CHANDLER	0.3	0.1	0.1
100059	CRM OF AMERICA (NEW AIR)	11400 E PECOS RD, MESA	0.2	0.3	0.1
129	CROTHALL LAUNDRY SERVICES	4445 S 36TH ST, PHOENIX	0.2	4.2	3.5
134012	CROWN CUSTOM MILLWORK, LLC	2740 W DEER VALLEY RD, PHOENIX	9.6		
131179	CSE OPERATING I, LLC	29115 W BROADWAY RD, BUCKEYE		0.1	0.0
134236	CURTISS WRIGHT CONTROLS	1150 N FIESTA BLVD, GILBERT	0.4		
130790	CUSTOM FAB INC	3065 S 43RD AVE, PHOENIX	6.0	0.6	0.5
87	DECA CREMATION SERVICES INC	2237 S 15TH ST, PHOENIX	0.0	0.7	0.0
45027	DEER VALLEY TRANSFER STATION	2120 W ADOBE DR, PHOENIX	0.0	0.1	0.0
1342	DEL RIO LANDFILL	1150 E ELWOOD ST, PHOENIX	0.1	0.0	0.0
50725	DESERT POWDER COATING	4409 S 35TH AVE, PHOENIX	0.8	0.3	0.3
51073	DIGITAL REALTY TRUST CHANDLER, LLC	2121 S PRICE RD, CHANDLER	0.8	12.5	5.5
36	DON SANDERSON FORD INC	6400 N 51ST AVE, GLENDALE	3.8		
127094	DOUBLETREE PAPER MILL LLC	31201 W THAYER RD, GILA BEND	6.0	4.0	10.4
299	DPC ENTERPRISES INC GP	4909 W PASADENA AVE, GLENDALE	1.6		
51062	DURANGO CORRECTIONAL FACILITY	3225 W DURANGO ST, PHOENIX	0.1	0.9	0.6
48771	EAGLE ROOFING PRODUCTS	4602 W ELWOOD ST, PHOENIX	1.4	2.3	1.9
35018	EARL'S FIBERGLASS INC	128 W MARICOPA FWY, PHOENIX	4.6		
1383	EAST VALLEY CREMATORY	9642 E APACHE TR, MESA	0.0	0.2	0.0
109938	EBAY INC	4010 N 3RD ST, PHOENIX	0.7	49.2	2.8
26	EMPIRE MACHINERY CO	1725 S COUNTRY CLUB DR, MESA	2.3	8.9	2.2
130260	ENTRUSTED PETS, INC	2237 S 15TH ST, PHOENIX	0.0	0.1	0.0
1505	EXECUTIVE DOOR COMPANY	3939 W CLARENDON AVE, PHOENIX	0.3		
1488	FARMER'S GIN INC	8400 S TURNER RD, BUCKEYE	0.0	0.3	0.0
59426	FEDERAL EXPRESS-PHXR	3002 E OLD TOWER RD #100, PHOENIX	0.4	0.8	0.2
132911	FINECRAFT CUSTOM WOODWORKS LLC	5775 N 51ST AVE, GLENDALE	2.5		
107758	FIREBIRD PRODUCTS, LLC	6010 N 53RD DR, GLENDALE	8.4		
128991	FISHER SAND & GRAVEL	PORTABLE #3	2.7	12.1	9.8
85509	FISHER SAND & GRAVEL COMPANY	PORTABLE #2	1.3	15.4	3.3
1087	FLEX FOAM DIVISION	617 N 21ST AVE, PHOENIX	1.8	0.2	0.2

ID	Business name	Street address and city	VOC	NO_X	CO
27728	FLIPCHIP INTERNATIONAL LLC	3701 E UNIVERSITY DR, PHOENIX	17.4	0.4	0.4
1375	FOREST DESIGNS	3230 E ROESER RD #10, PHOENIX	3.9		
4206	FUJI FILM ELECTRONIC MATERIALS USA	6550 S MOUNTAIN RD, MESA	3.2	1.5	1.2
36258	G & K SERVICES	4804 W ROOSEVELT ST, PHOENIX	5.3	1.0	0.8
132482	G & L POWERS INC	1483 W HARVARD ST, GILBERT	0.5		
41751	GCR TIRE CENTERS	2815 N 32ND AVE, PHOENIX	0.3		
902	GENERAL DYNAMICS C4 SYSTEMS	8201 E MCDOWELL RD, SCOTTSDALE	3.1	1.4	0.7
73110	GLENN WEINBERGER TOPSOIL INC	39500 S 99TH AVE, MOBILE	0.0	0.2	0.0
2411	GLENROSA SERVICE CENTER	4019 W GLENROSA AVE, PHOENIX	0.3		
1418	GOODRICH CORPORATION	3414 S 5TH ST, PHOENIX	15.0	0.0	0.0
515	GOODYEAR COMMERCIAL TIRE SERVICE CTR	3007 N 31ST AVE, PHOENIX	0.7		
131841	GRANITE EXPRESS	, MORRISTOWN	0.5	6.3	1.3
10	GREEN ACRES MORTUARIES & CEMETERIES	401 N HAYDEN RD, SCOTTSDALE	0.0	0.0	0.0
1182	GREENWOOD MEMORY LAWN MORTUARY	2300 W VAN BUREN ST, PHOENIX	0.0	0.9	0.1
141	GRO-WELL BRANDS INC	2807 S 27TH AVE, PHOENIX	0.2		
28393	HAMILTON SUNDSTRAND/UTC AEROSPACE SYS	1007 E UNIVERSITY DR, PHOENIX	1.2		
699	HANSON AGGREGATES OF ARIZONA INC	4002 S 51ST AVE, PHOENIX	2.9	3.6	4.1
131334	HELIAE DEVELOPMENT LLC	614 E GERMANN RD, GILBERT	4.9	0.2	0.0
31565	HENRY PRODUCTS INC	302 S 23RD AVE, PHOENIX	10.9	0.4	0.4
129711	HERITAGE CREMATORY	12525 NW GRAND AVE, EL MIRAGE	0.0	0.4	0.0
3536	HOLSUM BAKERY INC	2322 W LINCOLN ST, PHOENIX	25.6	3.6	3.1
39213	HOLSUM OF TOLLESON LLC	9600 W BUCKEYE RD, TOLLESON	23.3	2.9	2.4
1059	HONEYWELL ENGINES SYS & SERVICE PHX R&O	1944 E SKY HARBOR CIR, PHOENIX	12.2	1.4	2.6
355	HONEYWELL INTERNATIONAL INC	111 S 34TH ST, PHOENIX	32.9	42.0	13.7
247	HONEYWELL INTERNATIONAL INC (TEMPE, AZ)	1300 W WARNER RD, TEMPE	7.4	3.3	2.3
348	HONEYWELL PHOENIX AVIONICS DEER VALLEY	21111 N 19TH AVE, PHOENIX	2.6	1.4	0.6
131198	IMPERIAL WOODWORKING LLC	4012 W TURNEY AVE #6, PHOENIX	1.9		
354	IMSAMET OF ARIZONA	3829 S ESTRELLA PKWY, GOODYEAR	10.4	6.4	63.9
4444	INFINEON TECHNOLOGIES EPI SERVICES INC	550 W JUANITA AVE, MESA	0.6	0.1	0.0
777	INSULFOAM	3401 W COCOPAH ST, PHOENIX	29.4	0.6	0.5
31617	INTEL CORP CHANDLER CAMPUS (FAB 6)	5000 W CHANDLER BLVD, CHANDLER	8.1	14.5	7.8
3966	INTEL CORP-OCOTILLO CAMPUS	4500 S DOBSON RD, CHANDLER	91.2	27.0	37.5
89885	INTERCO PRINT	4501 W POLK ST, PHOENIX	1.5	0.2	0.2
130597	INTERNATIONAL FLORA TECHNOLOGIES	28633 W PATTERSON RD, BUCKEYE	21.5	0.1	0.1
43832	INTERNATIONAL PAPER	660 S 83RD AVE, TOLLESON	6.9	0.9	2.3
131226	INTERSAN MANUFACTURING	1746 W FILLMORE ST, PHOENIX	0.1		
130265	IO PHOENIX ONE, LLC	615 N 48TH ST, PHOENIX	0.4	7.6	0.7
40471	IRONWOOD CUSTOM FINISHING	1822 E MADISON ST, PHOENIX	6.1		
983	ISOLA GROUP S A R L	165 S PRICE RD, CHANDLER	11.8	10.6	3.2
732	JABIL	615 S RIVER DR, TEMPE	1.0		
121	JACKS TIRE & OIL	5925 W MONROE ST, PHOENIX	0.3	0.0	0.0
121873	JAMES EDWARD FURNITURE	1555 E JACKSON ST, PHOENIX	4.7		
101	JBS TOLLESON INC	651 S 91ST AVE, TOLLESON	11.5	12.4	5.2
25823	JOY GLOBAL - SURFACE MINING	112 W IRON AVE, MESA	1.3	0.0	0.0
1027	JPCI SERVICES	PORTABLE	6.0	3.3	0.7
130981	KELLER ELECTRICAL INDUSTRIES INC	1881 E UNIVERSITY DR, PHOENIX	0.6	0.1	0.1
114904	KILAUEA CRUSHERS INC	16402 S TUTHILL RD, BUCKEYE	0.1	1.0	0.2
128509	KILAUEA CRUSHERS INC	SR 85 & BUCKEYE HILLS DR, BUCKEYE	0.1	0.8	0.2

ID	Business name	Street address and city	VOC	NO_X	CO
857	L-3 COMMUNICATIONS CORPORATION	1215 S 52ND ST, TEMPE	15.2	0.3	0.1
121236	LANDMARK AVIATION	14600 N AIRPORT DR, SCOTTSDALE	0.4		
30357	LARON INC	3550 S 16TH ST, PHOENIX	0.6	0.1	0.1
96886	LEGENDS FURNITURE	10300 W BUCKEYE RD, TOLLESON	55.7		
131339	LGS AZ, LLC DBA LOOK TRAILERS	8230 N EL MIRAGE RD, EL MIRAGE	16.1		
130111	LIFEPLAN CREMATORY INC	1216 N 17TH AVE, PHOENIX	0.0	0.7	0.0
39914	LOVE'S COUNTRY STORE #296	820 W PIMA RD, GILA BEND	13.3		
3300	LUKE AFB - 56TH FIGHTER WING	14002 W MARAUDER ST, GLENDALE	13.9	7.7	3.5
744	M E GLOBAL INC	5857 S KYRENE RD, TEMPE	22.3	11.5	49.5
1248	MAAX SPAS INDUSTRIES CORP	25605 S ARIZONA AVE, CHANDLER	50.0		
31261	MADISON GRANITE SUPPLIES	29925 N NORTH VALLEY PKWY, PHOENIX	0.5	25.9	4.0
148	MAGELLAN AEROSPACE, GLENDALE INC	5440 W MISSOURI AVE, GLENDALE	10.4	1.0	0.8
353	MARLAM INDUSTRIES INC	834 E HAMMOND LN, PHOENIX	14.9	0.0	0.0
15445	MAYO CLINIC ARIZONA	13400 E SHEA BLVD, SCOTTSDALE	4.1	2.6	2.1
1200	MEDTRONIC - TEMPE	2343 W MEDTRONIC WAY, TEMPE	5.1	0.5	0.4
244	MELCHER MISSION CHAPEL AND CREMATORY	6625 E MAIN ST, MESA	0.0	0.8	0.0
596	MELDRUM MORTUARY & CREMATORY	52 N MACDONALD, MESA	0.0	0.1	0.0
128760	MERIDIAN OPTICAL	3711 E ATLANTA AVE, PHOENIX	0.8		
82244	MESA COMMUNITY COLLEGE MORTUARY SCI	7440 E TAHOE AVE, MESA	0.0	0.0	0.0
3326	MESA FULLY FORMED LLC	1111 S SIRRINE ST, MESA	8.1		
1203	MICROCHIP TECHNOLOGY INC	2355 W CHANDLER BLVD, CHANDLER	0.4	0.9	0.5
1875	MICROCHIP TECHNOLOGY INC	1200 S 52ND ST, TEMPE	10.8	11.6	6.4
53593	MICROSEMI CORP	3601 E UNIVERSITY DR, PHOENIX	2.1		
3724	MISSION FOODS-TEMPE	5860 S ASH AVE, TEMPE	2.7	2.8	2.4
882	MORTON SALT, INC	13000 W GLENDALE AVE, GLENDALE	0.6	8.0	2.3
264	MOUNTAIN VIEW FUNERAL HOME & CEMETERY	7900 E MAIN ST, MESA	0.2	0.1	0.0
132523	MOUNTAINVIEW CUSTOM CABINETS	23306 N 15TH AVE, PHOENIX	6.9		
128379	MURPHY WALL PRODUCTS INTERNATIONAL INC	228 E ARIZONA EASTERN AVE, BUCKEYE	0.0		
121682	MUSKET CORPORATION	816 N 19TH AVE, PHOENIX	0.0	0.0	0.0
34197	NATIONAL GYPSUM COMPANY	1414 E HADLEY ST, PHOENIX	8.3	9.8	13.8
114015	NATIONAL SPECIALTY AGGREGATES LLC	4310 S 80TH ST, MESA	0.0	0.0	0.0
910	NELTEC INC	1420 W 12TH PL, TEMPE	9.4	3.6	1.3
128696	NIELS ANDERSEN SCULPTURES LLC	2630 E MOHAWK LN SUITE 124, PHOENIX	0.7		
590	NK ASPHALT PARTNERS	7110 W NORTHERN AVE, GLENDALE	3.7	5.9	5.0
129677	NO WASTE GRINDINGS	PORTABLE #1, PHOENIX	0.5	6.2	1.3
620	NORTHWEST WATER RECLAMATION PLANT	960 N RIVERVIEW, MESA	1.3	3.5	3.1
881	NXP SEMICONDUCTORS	1300 N ALMA SCHOOL RD, CHANDLER	34.4	12.9	15.0
56506	OAK CREEK FURNITURE INC	5355 N 51ST AVE #7, GLENDALE	1.6		
3953	OAKCRAFT INC	7733 W OLIVE AVE, PEORIA	45.0	0.1	0.1
31637	OLAM COTTON	25500 W SOUTHERN AVE, BUCKEYE	0.0	0.1	0.0
53	OLDCASTLE PRECAST INC	411 E FRYE RD, CHANDLER	5.1	1.9	0.4
4147	OPT CO	PORTABLE	0.5	6.1	1.3
101348	ORBITAL SCIENCES CORPORATION	1721 W ELLIOT RD, GILBERT	0.4	0.5	0.4
528	PACKAGING CORPORATION OF AMERICA INC	441 S 53RD AVE, PHOENIX	2.6	1.5	1.3
98	PALO VERDE NUCLEAR GENERATING STATION	5801 S WINTERSBURG RD, TONOPAH	11.0	48.7	12.8
428	PALOMA GIN PROPERTIES LLC	57525 S POTATOE RD, GILA BEND	0.0	0.1	0.1
130656	PALOMA READY MIX & MATERIALS LLC	PORTABLE #1, (blank)	0.0	0.4	0.1
733	PAN GLO SERVICES LLC	2401 W SHERMAN ST, PHOENIX	17.7	0.5	0.4

ID	Business name	Street address and city	VOC	NO_X	CO
4004	PAN JIT	2502 W HUNTINGTON DR, TEMPE	2.0	0.0	0.0
49047	PARADISE MEMORIAL CREMATORY	9300 E SHEA BLVD BLDG C, SCOTTSDALE	0.0	1.2	0.1
1055	PARAMOUNT PETROLEUM CORP OF AZ INC	1935 W MCDOWELL RD, PHOENIX	5.1	9.3	7.8
419	PARKER HANNIFIN CORP	7777 N GLEN HARBOR BLVD, GLENDALE	22.3		
1398	PATRICIAN MARBLE CO	3333 W OSBORN RD, PHOENIX	2.3		
4241	PEPSICO	409 S 104TH AVE, TOLLESON	3.7	10.0	16.6
29244	PET & ANIMAL LOVERS SERVICE (PALS)	3629 N 40TH AVE, PHOENIX	0.0	2.5	0.1
69	PHOENIX HEAT TREATING INC	2405 W MOHAVE RD, PHOENIX	3.7	1.9	1.6
1491	PHOENIX METALCRAFT INC	3845 N 29TH AVE, PHOENIX	3.5		
27946	PHOENIX-MESA GATEWAY AIRPORT AUTHORITY	5835 S SOSSAMAN RD, MESA	3.7	0.2	0.2
1154	PING INC	2201 W DESERT COVE AVE, PHOENIX	8.8	0.1	0.1
132990	PRECISE METAL PRODUCTS	4534 N 44TH AVE, PHOENIX	0.6		
4007	PRECISION TRUCK PAINTING & REPAIR INC	2212 N 27TH AVE, PHOENIX	2.6		
116742	PREFERRED PACKAGING & CONTAINER	3330 W COCOPAH ST #1, PHOENIX	4.4	0.1	0.1
108860	PRISMA GRAPHIC CORPORATION	2937 E BROADWAY RD, PHOENIX	9.4	0.2	0.1
75998	PRO PETROLEUM PHOENIX TERMINAL	408 S 43RD AVE, PHOENIX	2.3	0.0	0.0
60889	PURCELLS WESTERN STATES TIRE	420 S 35TH AVE, PHOENIX	6.2	0.1	0.1
1335	QUALITY BLOCK INC	3035 S 35TH AVE, PHOENIX	0.0	0.4	0.3
3307	QUIKJET LLC	5119 W MONROE ST, PHOENIX	25.5		
131898	QUIKTRIP DISTRIBUTION - PHOENIX	8501 W LATHAM ST, TOLLESON	1.8	1.1	0.6
537	RED MOUNTAIN MINING INC	4520 N POWER RD, MESA	0.5	6.2	1.3
54	REDBURN TIRE CO	3801 W CLARENDON AVE, PHOENIX	1.1		
131795	REDSTONE INDUSTRIES, INC	13770 W PEORIA AVE, SURPRISE	2.9		
128324	REGENCY MORTUARY SERVICES INC	9850 W THUNDERBIRD RD, SUN CITY	0.0	0.1	0.0
44356	RITCHIE BROS AUCTIONEERS (AMERICA) INC	5410 W LOWER BUCKEYE RD, PHOENIX	0.5	0.0	0.0
4318	RIVER RANCH PLANT #40	5159 N EL MIRAGE RD, LITCHFIELD PK	0.1	0.1	0.0
131080	ROBERTSON FUEL SYSTEMS LLC	800 W CARVER RD #101, TEMPE	2.4	0.1	0.1
133058	ROCK SOLID INC	11500 W BEARDSLEY RD, SUN CITY	0.0	0.0	0.0
133589	ROCK SOLID INC	6204 W SOUTHERN AVE, PHOENIX	0.0	0.0	0.0
759	ROGERS CORP/ADVANCED CIRCUIT MATERIALS	100 S ROOSEVELT AVE, CHANDLER	15.3	6.5	2.9
4174	ROGERS CORPORATION	2225 W CHANDLER BLVD, CHANDLER	0.0	0.3	0.1
4543	ROHRER CORPORATION	159 W 1ST AVE, MESA	8.6		
29474	SA RECYCLING LLC	3640 S 35TH AVE, PHOENIX	0.1		
132784	SAM'S CLUB #6605	1225 N GILBERT RD, GILBERT	7.8	0.1	0.0
403	SAPA EXTRUSIONS NORTH AMERICA, LLC	249 S 51ST AVE, PHOENIX	21.6	10.9	9.9
132227	SCHAUMAPLAST PRECISION FOAM MOLDING LP	21 N 39TH AVE, PHOENIX	9.8	0.5	0.4
4072	SCHREIBER FOODS INC	2122 S HARDY DR, TEMPE	1.4	4.2	12.8
266	SCHUFF STEEL CO	420 S 19TH AVE, PHOENIX	18.2	9.3	2.0
246	SCHULT HOMES	231 N APACHE RD, BUCKEYE	11.9		
39309	SENERGY PETROLEUM LLC	622 S 56TH AVE, PHOENIX	2.5		
3528	SENERGY PETROLEUM, LLC	306 S COUNTRY CLUB DR, MESA	9.6		
1351	SERENITY MORTUARY SERV INC	2514 S 6TH AVE, PHOENIX	0.0	1.3	0.1
1169	SHAMROCK FOODS CO	2228 N BLACK CANYON HWY, PHOENIX	0.6	10.8	9.1
4050	SIGNATURE BREADS INC	1120 W FAIRMONT DR STE #6-12, TEMPE	4.5	0.3	0.3
27933	SKUNK CREEK LANDFILL	3165 W HAPPY VALLEY RD, PHOENIX	3.5	3.6	3.4
39980	S-L SNACKS AZ, LLC	1200 N BULLARD AVE, GOODYEAR	11.5	6.3	5.3
131682	SOLJET, LLC	5601 W VAN BUREN ST, PHOENIX	2.2	0.1	0.1
4086	SOUTH BAY CIRCUITS INC	6409 W COMMONWEALTH PL, CHANDLER	2.6		

ID	Business name	Street address and city	VOC	NO_X	CO
2108	SOUTHWEST AIRLINES CO	4153 E SKY HARBOR BLVD, PHOENIX	4.3	0.3	0.1
131861	SOUTHWEST ARCHITECTURAL CASTINGS	5343 W MOHAVE ST, PHOENIX	0.2		
52776	SOUTHWEST BAKING COMPANY	9604 W BUCKEYE RD, TOLLESON	0.0	0.0	0.0
31643	SOUTHWEST REGIONAL LANDFILL	24427 S HWY 85, BUCKEYE	0.7	8.2	1.7
2110	SPECIAL DEVICES INC	3431 N RESEDA CIR, MESA	11.9		0.0
80437	SR 85 LANDFILL	28633 W PATTERSON RD, BUCKEYE	4.7	4.0	8.2
582	STONE CREEK INC	4221 E RAYMOND ST #102, PHOENIX	15.2		
388	STOROPACK INC	77 N 45TH AVE #2, PHOENIX	2.5	0.1	0.1
131720	STP PERFORMANCE COATING LLC	406 E PIONEER ST, PHOENIX	0.6	0.1	0.1
827	STP PERFORMANCE COATING, LLC	1131 W WATKINS ST, PHOENIX	2.0	0.5	0.4
1214	SULZER EMS INC	2412 W DURANGO ST, PHOENIX	1.4	0.0	0.0
4400	SUMCO SOUTHWEST CORPORATION	19801 N TATUM BLVD, PHOENIX	9.0	13.9	6.0
71801	SUMIKA ELECTRONIC MATERIALS INC	3832 E WATKINS ST, PHOENIX	0.2	0.3	0.1
31	SUNLAND MEMORIAL PARK/MORT/CREM CTR	15826 N DEL WEBB BLVD, SUN CITY	0.0	0.0	0.0
41431	SUPER RADIATOR COILS LTD	2610 S 21ST ST, PHOENIX	0.0	0.3	0.3
37546	SUPERLITE BLOCK	4626 N 42ND AVE, PHOENIX	2.0	1.1	0.9
39376	SWIFT TRANSPORTATION CO INC	2200 S 75TH AVE, PHOENIX	3.5		
131377	SWIM PLATFORMS INC	3220 S 38TH ST, PHOENIX	6.0		
131453	SYSCO ARIZONA INC	611 S 80TH AVE, TOLLESON	0.0	1.0	0.2
249	THE BOEING COMPANY	5000 E MCDOWELL RD, MESA	26.9	2.1	1.8
133082	TRANSWESTERN PIPELINE COMPANY, LLC	W TABLE MESA RD, NEW RIVER	1.1	1.7	3.2
1122	TRIUMPH MANUFACTURING LLC	2130 S INDUSTRIAL PARK AVE, TEMPE	1.9		
819	TRW VEHICLE SAFETY SYSTEMS INC	11202 E GERMANN RD, MESA	2.8	0.3	0.4
234	UNITED DAIRYMEN OF ARIZONA	2008 S HARDY DR, TEMPE	2.4	27.0	38.2
132907	UNITED METAL PRODUCTS, INC	1920 E ENCANTO DR, TEMPE	2.8	0.6	0.5
63962	UPPER CRUST BAKERY	3655 W WASHINGTON ST, PHOENIX	9.4	1.7	1.4
131506	USAA (UNITED SERVICES AUTOMOBILE ASSOC)	1 N NORTERRA DR, PHOENIX	0.0	1.4	0.2
187	VERCO DECKING INC	4340 N 42ND AVE, PHOENIX	0.5	0.1	0.1
1415	VULCAN MATERIALS CO	7845 W BROADWAY RD, PHOENIX	6.9	12.2	27.5
132528	VULCAN MATERIALS COMPANY	3410 E VIRGINIA ST, MESA	1.6	3.0	2.2
2	VULCAN MATERIALS CO-WESTERN DIVISION	14521 N 115TH AVE, EL MIRAGE	0.8	3.0	36.4
90	VULCAN MATERIALS CO-WESTERN DIVISION	4830 S 43RD AVE, PHOENIX	0.8	4.6	3.8
131642	W L GORE ASSOCIATES, INC	32340 N NORTH VALLEY PKWY, PHOENIX	2.7	0.8	1.0
130002	WASTE MGMT 7TH AVE TRANSFER & LANDFILL	3000 S 7TH AVE, PHOENIX	0.3	3.9	0.9
113519	WASTE MGMT PHX HAUL CONTAINER SHOP	2441 S 40TH ST, PHOENIX	1.6		
134014	WASTEBUILT SOUTHWEST LLC	4020 S 15TH AVE, PHOENIX	4.9		
1149	WEAVER QUALITY SHUTTERS INC	218 S 15TH ST, PHOENIX	2.4		
131585	WEST COAST SAND AND GRAVEL	13333 W SOUTHERN AVE, AVONDALE	0.9	10.5	2.3
1240	WESTERN MILLWORK INC	2525 W CORONADO RD, PHOENIX	3.9		
1339	WESTERN REFINING TERMINALS, LLC	3050 S 19TH AVE, PHOENIX	0.3	1.2	0.6
2703	WESTERN STATES PETROLEUM	450 S 15TH AVE, PHOENIX	11.5		
820	WESTSIDE CREMATORY	11211 W MICHIGAN AVE, YOUNGTOWN	0.0	0.4	0.0
121588	WICKENBURG FUNERAL HOMES INC	187 N ADAMS ST, WICKENBURG	0.0	0.1	0.0
128707	WOOD UNLIMITED INC (AIR)	9801 N LITCHFIELD RD, EL MIRAGE	1.8	9.1	5.0
1382	WOODCASE FINE CABINETRY INC	3255 W OSBORN RD, PHOENIX	26.3		