2017 PERIODIC EMISSIONS INVENTORY FOR OZONE PRECURSORS

For the Maricopa County, Arizona, 2008 & 2015 Eight-Hour Ozone Nonattainment Areas

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Table of Contents

List of Figures

List of Tables

List of Appendices

Introduction

1.1 Overview

This 2017 periodic emissions inventory (PEI) 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 2008 and the 2015 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 that 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 Comparison between PEIs

This section provides an analysis between PEI years to show changes in emissions and explain differences. It is important to note that methodologies to calculate emissions and emissions models can change substantially over time. There will always be slight variations in emissions that are due to the changes in assumptions and estimation methodology. Emission estimation methodologies will continue to improve over time as we obtain more accurate local information and emissions models are refined.

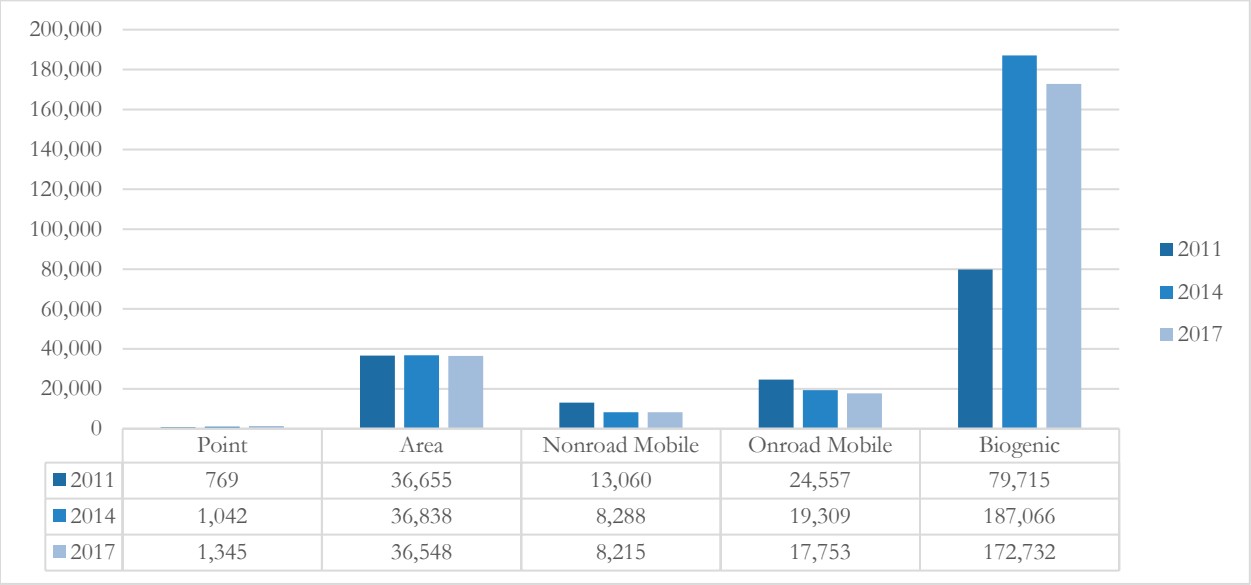
- VOC
  - PEI from 2011 to 2014 showed a 63% increase in VOC emissions (97,787 tons), and 6% decrease in VOC emissions (15,950 tons) from the 2014 to 2017 PEI.
  - VOC point source emissions from 2014 to 2017 increased by 29%.
  - VOC area source emissions from 2014 to 2017 decreased by 1%.
- NO_x
  - Decrease in NO_x emissions from both 2011 to 2014 (31% or 28,242 ton reduction) and 2014 to 2017 (13% or 8,106 ton reduction).
  - 63% increase in NO_x emissions from the point source category from 2014 to 2017 – but this represents a relatively small portion of the overall NO_x inventory at 5% of the total 2017 NO_x emissions.
  - Area source emissions from 2014 to 2017 from NO_x decreased by 8%.

The large increase in total VOC emission levels between 2011 and 2014 are due to a 135% increase in biogenic VOC (BVOC) emission sources. In an effort to improve BVOC emission estimates, the methodology used to calculate these emissions was updated from the methodology used in the 2011 PEI to a new methodology for 2014 and 2017. The BVOC methodology used in the 2011 PEI limited realistic representation of the natural meteorology variability, and thereby reduced the overall biogenic emission magnitudes relative to the improved BVOC meteorology methodology used in 2014 and 2017. In 2017

BVOC comprised 73% of the total VOC emissions. More information on the calculation methodology used to determine biogenic emissions can be found in Chapter 5 of this report.

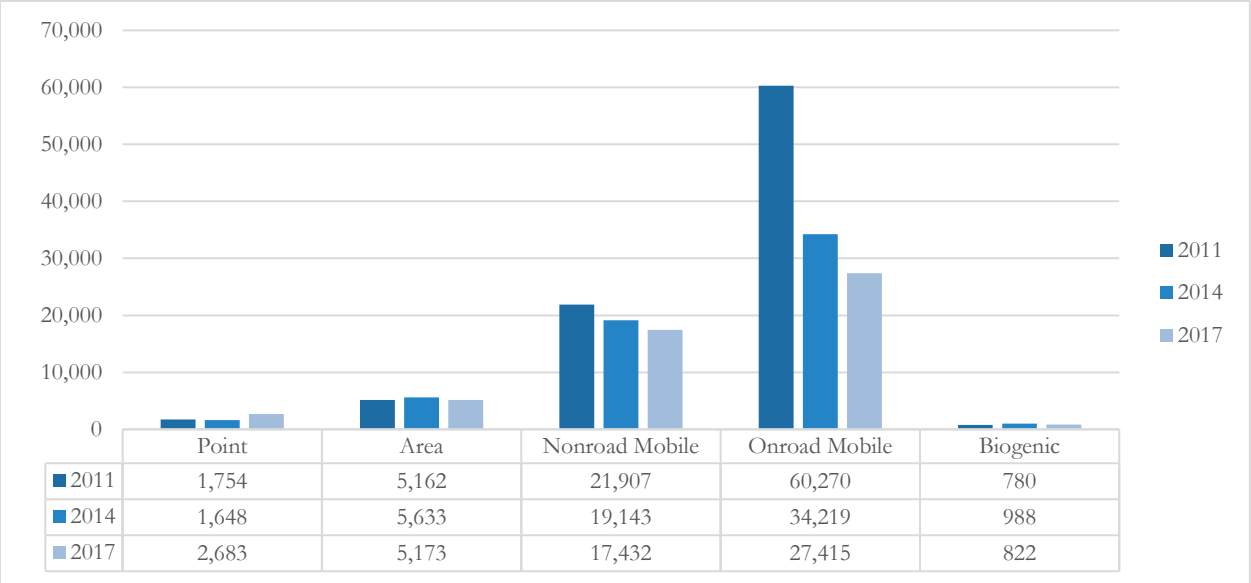
In the 2017 PEI, the VOC emissions from nonroad mobile sources decreased by 1%, and onroad mobile sources decreased by 8%, as compared to 2014. Similarly, from 2014 to 2017, NO_x nonroad mobile source emissions decreased by 9%, and onroad mobile source emissions decreased by 20%. Figures 1.2-1 and 1.2-2 present the VOC and NO_x emissions for all emission sources in Maricopa County from the 2011, 2014, and 2017 PEIs. The 2017 onroad mobile sources and nonroad mobile sources emissions were calculated using Motor Vehicle Emissions Simulator (MOVES2014b), which is the latest model developed by the U.S. Environmental Protection Agency (EPA) for estimating onroad and nonroad motor vehicle emissions. The MOVES2014b model improves nonroad engine population growth rates, nonroad Tier 4 engine emission rates, and sulfur levels of nonroad diesel fuels. More information on the calculation methodology for nonroad and onroad emissions can be found in Chapter 4 and 5, respectively.

Figure 1.2–1. Chart of VOC emissions (tons/year) within Maricopa County by source category in 2011, 2014, and 2017.



	Point	Area	Nonroad Mobile	Onroad Mobile	Biogenic
2011	769	36,655	13,060	24,557	79,715
2014	1,042	36,838	8,288	19,309	187,066
2017	1,345	36,548	8,215	17,753	172,732

Figure 1.2–2. Chart of NOx emissions (tons/year) within Maricopa County by source category in 2011, 2014, and 2017.



	Point	Area	Nonroad Mobile	Onroad Mobile	Biogenic
2011	1,754	5,162	21,907	60,270	780
2014	1,648	5,633	19,143	34,219	988
2017	2,683	5,173	17,432	27,415	822

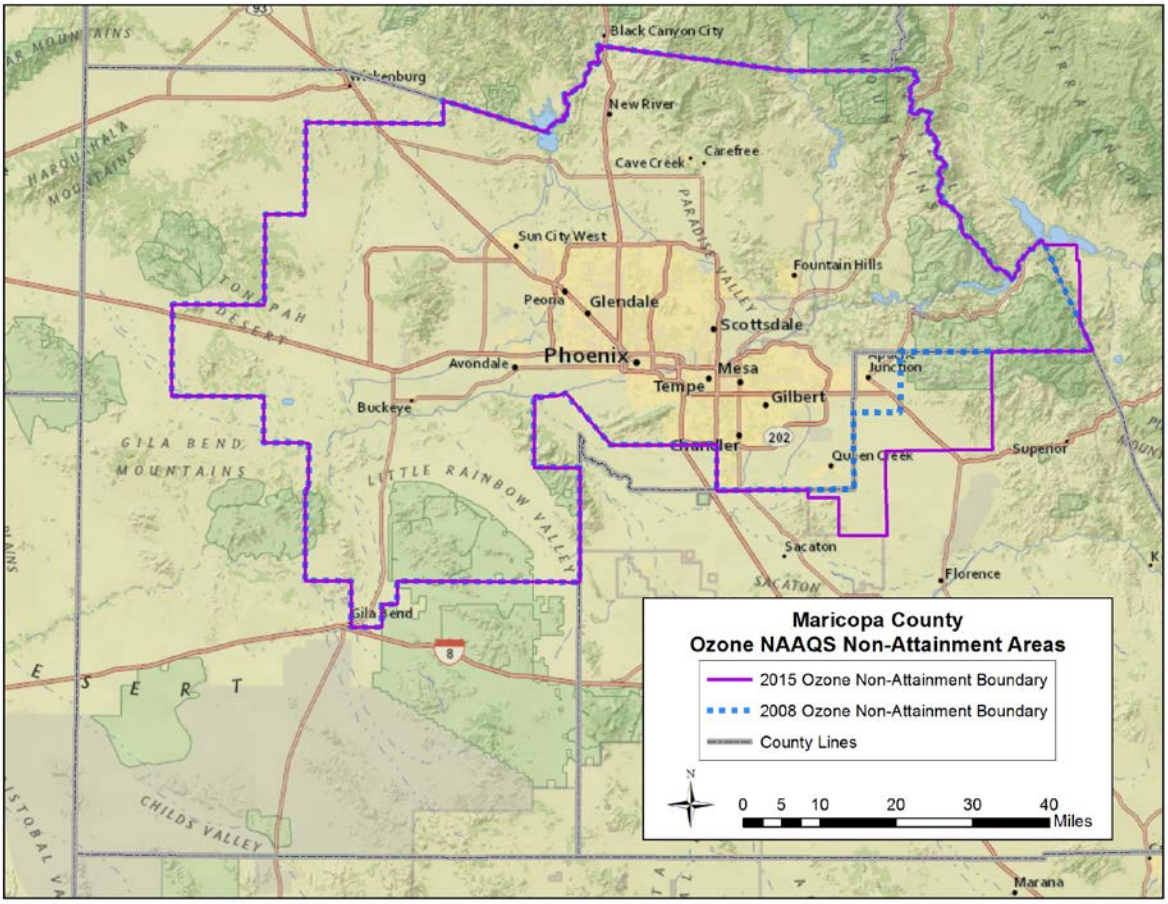
1.3 Temporal scope

Both annual and ozone season-day emissions were estimated for the year 2017 for both Maricopa County and the 2008 and 2015 ozone nonattainment areas (NAA). The 3-month peak ozone season for the Maricopa County NAA 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 2008 and 2015 8-hour ozone NAAQS.

1.4 Geographic scope

This inventory includes emission estimates for Maricopa County and for the Maricopa County 2008 and 2015 8-hour ozone NAAs. Maricopa County encompasses approximately 9,223 square miles of land area, while the 2008 ozone NAA is approximately 5,018 square miles or about 54 percent of the Maricopa County land area, and the 2015 ozone NAA is about 5,288 square miles or about 57 percent of Maricopa County land area. A portion of the southeastern boundary of the 2008 ozone NAA includes areas of Pinal County totaling 48 square miles or 0.96% of the 2008 NAA, while the Pinal County portion of the southeastern boundary of the 2015 ozone NAA includes 296 square miles or 5.6% of the 2015 NAA. A map of Maricopa County and the 2008 and 2015 8-hour ozone NAAs is provided in Figure 1.4–1.

Figure 1.4–1. Map of Maricopa County and the 2008 and 2015 8-hour ozone NAAs.



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 NAAs and vice versa. (For example, county-level emissions from residential natural gas usage in Maricopa County were apportioned to the NAAs 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 2017 for both Maricopa County and the 8-hour ozone NAAs. 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 2008 and 2015 8-hour ozone NAAs from county-level calculations. It is important to note, however, that the 2008 8-hour ozone NAA includes a portion of Pinal County, AZ and the 2015 8-hour ozone NAA also contains a portion of Gila County, AZ as shown in Figure 1.4–1. For example, the population of NAAs that extend beyond the boundaries of Maricopa County may contain more people than the county itself, therefore the percentage multiplier to derive the per person pollution level would be greater than 100% from the county to the NAA.

This is because Maricopa County is the reference at 100% and the NAA population can exceed that Maricopa County based reference level.

Table 1.5–1. Demographic profile of Maricopa County, the 2008, and 2015 ozone NAA.

Demographic variable	Maricopa County	2008 ozone NAA	2015 ozone NAA
1. Population:			
Resident population	4,307,033	4,334,143	4,440,154
Non-resident population	375,210	380,372	387,947
Total population:	**4,682,243**	**4,714,515**	**4,828,101**
2. Employment:			
–Retail employment *	493,145	491,022	493,682
–Office employment *	625,002	624,184	624,361
–Public employment *	128,630	130,028	131,725
–Other employment *	231,722	229,604	230,171
Total commercial/institutional employment:	**1,478,499**	**1,474,838**	**1,479,939**
Industrial employment	274,824	274,415	274,706
Construction	21,250	21,033	21,045
Work at home	125,288	125,530	126,604
Non site-based	125,989	125,859	126,513
Total, all employment:	**2,025,850**	**2,021,675**	**2,028,807**
3. Household split:			
Single-family	80%	80%	80%
Multi-family	20%	20%	20%
Total households:	**100%**	**100%**	**100%**

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

1.5.2 Land use data

MAG provided 2017 land use data which are developed from using satellite and Geographic Information System (GIS) techniques. Table 1.5–2 presents a listing of the land use categories used, the acreages of each land use type within Maricopa County, and the 2008 and 2015 8-hour ozone NAAs.

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

Land use category	Acreage within Maricopa County	Acreage within 2008 ozone NAA	Acreage within 2015 ozone NAA
General/active open space/golf course (e.g., parks)	223,776	223,256	226,189
Passive/restricted open space, washes	3,471,524	1,309064	1,361,388
Lakes	12,286	12,286	12,468
Agriculture	262,814	153,955	165,088
Vacant (e.g., developable land)	1,163,556	765,851	852,121

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. The Maricopa County Air Quality Department (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 2008 and 2015 8-hour ozone NAAs. Since all facilities identified as point sources are located within the 2008 and 2015 8-hour ozone NAAs, the emission values for the three 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 2008 and 2015 8-hour ozone NAAs (including emission reduction credits (ERCs)).

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Facility totals	978.6	2,622.5	1,515.4	6,617	23,947	12,818
Emission reduction credits	272.6	14.1	14.3	1,494	77	78
Potential ERCs (pERCs)	93.9	46.0		515	252	
Total point sources:	**1,345.1**	**2,682.6**	**1,529.7**	**8,626**	**24,276**	**12,896**

1.6.2 Nonpoint (area) sources

Nonpoint sources are facilities or activities whose individual emissions do not qualify them as point sources. Nonpoint 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 nonpoint source inventory. Examples of nonpoint source categories include residential wood burning, commercial cooking, and wildfires.

Tables 1.6–2, 1.6–3, and 1.6–4 summarize annual and season-day emissions of the chief nonpoint source categories for Maricopa County and the 2008 and 2015 8-hour ozone NAAs, respectively. A detailed breakdown of emissions calculations for each nonpoint source category is contained in Chapter 3.

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

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Fuel combustion	1,614.8	4,885.0	10,308.5	1,780	29,175	14,287
Industrial processes	1,548.6	83.1	605.2	10,837	514	3,317
Solvent use	28,136.5	-	-	160,290	-	-
Storage/transport	3,350.6	-	-	18,750	-	-
Waste treatmt/disposal	98.9	39.2	333.7	746	246	2,454
Misc. area sources	1,798.9	166.0	6,640.4	15,307	2,742	119,473
Total nonpoint sources:	**36,548.3**	**5,173.3**	**17,887.8**	**207,708**	**32,677**	**139,531**

Table 1.6–3. Annual and season-day emissions from nonpoint sources in the 2008 8-hour ozone NAA.

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Fuel combustion	1,623.0	4,883.7	10,357.3	1,778	29,140	14,266
Industrial processes	1,547.6	83.0	607.6	10,828	525	3,330
Solvent use	28,061.4	-	-	159,885	-	-
Storage/transport	3,341.9	-	-	18,347	-	-
Waste treatmt/disposal	98.4	37.7	237.4	839	276	2,819
Misc. area sources	1,491.2	165.9	6,572.7	13,885	2,827	123,750
Total nonpoint sources:	**36,163.5**	**5,170.3**	**17,775.0**	**205,563**	**32,768**	**144,165**

Table 1.6–4. Annual and season-day emissions from nonpoint sources in the 2015 8-hour ozone NAA.

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Fuel combustion	1,657.3	4,915.2	10,567.8	1,784	29,238	14,317
Industrial processes	1,552.8	83.1	617.9	10,859	525	3,387
Solvent use	28,675.6	-	-	163,313	-	-
Storage/transport	3,883.4	-	-	18,860	-	-
Waste treatmt/disposal	101.6	38.4	252.9	869	285	2,999
Misc. area sources	1,542.0	166.7	6,611.2	14,201	2,832	123,956
Total nonpoint sources:	**37,412.7**	**5,203.4**	**18,049.8**	**209,885**	**32,880**	**144,659**

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 1.6–5, 1.6–6 and 1.6–7 summarize annual and season-day emissions from nonroad mobile sources for Maricopa County and the 2008 and 2015 8-hour ozone NAAs, respectively. A detailed breakdown of emissions calculations for each source category is contained in Chapter 4.

Table 1.6–5. Annual and season-day emissions from nonroad mobile sources in Maricopa County.

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Agricultural equipment	28.3	279.7	271.9	244	2,404	2,389
Airport GSE+APUs[1]	54.7	230.5	1,507.0	283	1,215	7,778
Commercial equipment	961.7	866.0	25,846.8	6,499	5,312	172,752
Construction & mining	1,697.1	10,108.5	15,523.6	11,815	69,850	110,325
Industrial equipment	139.0	917.9	3,543.2	878	5,516	22,925
Lawn & garden	2,832.0	520.9	47,666.5	26,757	4,570	489,078
Pleasure craft	227.4	66.9	795.9	4,361	1,676	20,620
Railway maintenance	1.2	5.9	14.7	9	41	105
Recreational equipment	512.5	46.5	5,379.2	6,203	530	69,785
Aircraft	1,698.8	2,961.7	9,361.7	8,643	16,575	48,164
Locomotives	62.3	1,427.0	328.4	342	7,819	1,799
Total nonroad sources:	**8,215.0**	**17,431.5**	**110,238.9**	**66,034**	**115,508**	**945,720**

Table 1.6–6. Annual and season-day emissions from nonroad mobile sources in the 2008 8-hour ozone NAA.

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Agricultural equipment	16.6	163.8	159.3	143	1,408	1,399
Airport GSE+APUs	53.8	228.1	1,480.3	279	1,202	7,632
Commercial equipment	960.2	864.7	25,808.3	6,490	5,304	172,495
Construction & mining	1,679.7	10,005.3	15,365.1	11,695	69,136	109,199
Industrial equipment	138.8	916.5	3,537.9	877	5,507	22,891
Lawn & garden	2,848.4	524.0	47,943.2	26,911	4,597	491,907
Pleasure craft	227.4	66.9	795.9	4,361	1,676	20,620
Railway maintenance	0.9	4.4	11.0	6	30	78
Recreational equipment	269.5	33.2	4,317.5	3,273	375	56,107
Aircraft	1,673.5	2,952.0	9,228.7	8,506	16,522	47,438
Locomotives	47.9	1,088.4	249.4	263	5,964	1,366
Total nonroad sources:	**7,916.7**	**16,847.3**	**108,896.6**	**62,804**	**111,721**	**931,132**

[1] Airport Ground Support Equipment (GSE) + Auxiliary Power Units (APUs)

Table 1.6–7. Annual and season-day emissions from nonroad mobile sources in the 2015 8-hour ozone NAA.

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Agricultural equipment	17.8	175.7	170.8	153	1,510	1,501
Airport GSE+APUs	53.8	228.1	1,480.3	279	1,202	7,632
Commercial equipment	961.2	865.6	25,835.7	6,497	5,310	172,678
Construction & mining	1,680.7	10,011.0	15,373.8	11,701	69,176	109,261
Industrial equipment	138.9	917.5	3,541.6	878	5,513	22,915
Lawn & garden	2,902.7	530.7	48,784.6	27,473	4,665	501,847
Pleasure craft	230.8	67.9	807.7	4,425	1,701	20,927
Railway maintenance	0.9	4.5	11.2	7	31	80
Recreational equipment	286.2	35.0	4,540.3	3,475	395	59,001
Aircraft	1,673.5	2,952.0	9,228.7	8,506	16,522	47,438
Locomotives	48.8	1108.7	254.1	267	6,075	1,392
Total nonroad sources:	**7,995.3**	**16,896.7**	**110,028.8**	**63,661**	**112,100**	**944,672**

1.6.4 Onroad mobile sources

Emissions from onroad mobile sources were calculated for Maricopa County, and the 2008 and 2015 8-hour ozone NAAs. A detailed description of emissions calculations is contained in Chapter 5. Table 1.6–8 summarizes annual and season-day emissions from onroad mobile sources in Maricopa County and the 2008 and 2015 8-hour ozone NAAs.

Table 1.6–8. Annual and season-day emissions from onroad mobile sources in Maricopa County, and the 2008 and 2015 8-hour ozone NAAs.

Geographic area	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Maricopa County	17,752.5	27,415.2	191,996.3	111,077	146,500	1,191,804
2008 ozone NAA	17,620.0	25,782.9	191,016.3	110,451	138,273	1,185,528
2015 ozone NAA	17,982.4	26,129.9	194,001.4	112,746	140,154	1,203,419

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 NAAs. 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 2008 and 2015 ozone NAAs. Annual and season-day emissions from biogenic sources are shown in Table 1.6–9 for Maricopa County and the 2008 and 2015 ozone NAAs.

Table 1.6–9. Annual and season-day emissions from biogenic sources in Maricopa County, 2008 and 2015 ozone NAAs.

Geographic area	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Maricopa County	172,731.8	822.4	20,710.2	2,324,365	9,959	284,251
2008 ozone NAA	89,471.7	459.7	11,262.9	1,208,359	5,601	155,135
2015 ozone NAA	95,311.6	484.4	11,916.8	1,283,539	5,896	163,704

1.7 Summary of all source categories

Tables 1.7–1, 1.7–2, and 1.7–3 provide summary totals of annual and season-day emissions from all emission sources in Maricopa County and the 2008 and 2015 ozone NAAs, respectively. Figures 1.7–1 through 1.7–4 show a breakdown of the 2017 VOC and NO_x emissions in the 2008 and 2015 ozone NAAs.

Table 1.7–1. Annual and season-day emissions from all sources in Maricopa County (including emission reduction credits).

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Point	1,345.1	2,682.6	1,529.7	8,625	24,277	12,896
Nonpoint (area)	36,548.3	5,173.3	17,887.8	207,708	32,677	139,531
Nonroad mobile	8,215.0	17,431.5	110,238.9	66,034	115,508	945,720
Onroad mobile	17,752.5	27,415.2	191,996.3	111,077	146,500	1,191,804
Biogenic	172,731.8	822.4	20,710.2	2,324,365	9,959	284,251
Total, all source categories:	**236,592.7**	**53,525.0**	**342,362.9**	**2,717,809**	**328,920**	**2,574,202**

Table 1.7–2. Annual and season-day emissions from all sources in the 2008 8-hour ozone NAA (including emission reduction credits).

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Point	1,345.1	2,682.6	1,529.7	8,625	24,277	12,896
Nonpoint (area)	36,163.5	5,170.3	17,775.0	205,563	32,768	144,165
Nonroad mobile	7,916.7	16,847.3	108,896.6	62,804	111,721	931,132
Onroad mobile	17,620.0	25,782.9	191,016.3	110,451	138,273	1,185,528
Biogenic	89,471.7	459.7	11,262.9	1,208,359	5,601	155,135
Total, all source categories:	**152,517.0**	**50,942.8**	**330,480.5**	**1,595,802**	**312,640**	**2,428,857**

Table 1.7–3. Annual and season-day emissions from all sources in the 2015 8-hour ozone NAA (including emission reduction credits).

Source category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Point	1,345.1	2,682.6	1,529.7	8,625	24,277	12,896
Nonpoint (area)	37,412.7	5,203.4	18,049.8	209,885	32,880	144,659
Nonroad mobile	7,995.3	16,896.7	110,028.8	63,661	112,100	944,672
Onroad mobile	17,982.4	26,129.9	194,001.4	112,746	140,154	1,203,419
Biogenic	95,311.6	484.4	11,916.8	1,283,539	5,896	163,704
Total, all source categories:	**160,047.1**	**51,397.0**	**335,526.5**	**1,678,457**	**315,307**	**2,469,351**

1.8 Agencies responsible for the emissions inventory

MCAQD has primary responsibility for preparing and submitting the 2017 Periodic Emissions Inventory for Ozone Precursors for Maricopa County. Point, area, and some nonroad mobile source emission estimates were prepared by MCAQD. MAG prepared the emission estimates for onroad mobile, biogenic, and the majority of nonroad mobile sources. Table 1.8–1 lists those responsible for inventory preparation and quality assurance/quality control activities which are described in the respective chapters.

Table 1.8–1. Chapter authors and quality assurance/quality control (QA/QC) contacts.

Chapter	Author(s)	QA/QC contact person(s)
2. Point sources	Hanna Valenzuela, MCAQD 602-506-6790	Eric Raisanen, and Joshua Uebelherr, MCAQD 602-506-6790 Matt Poppen, MAG 602-254-6300
3. Nonpoint (area) sources	Eric Raisanen, and Joshua Uebelherr, MCAQD 602-506-6790	Hanna Valenzuela, MCAQD 602-506-6790 Matt Poppen, MAG 602-254-6300
4. Nonroad mobile sources	Taejoo Shin, MAG 602-254-6300	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

Point Sources

2.1 Introduction and scope

This inventory of ozone precursors (VOC, NO_x, and CO) is one of two 2017 emissions inventory reports being prepared to meet US EPA reporting requirements. This inventory has been developed concurrently with a similar inventory for particulate matter less than 10 microns (PM_{10}) and related pollutants ($PM_{2.5}$, NO_x, sulfur oxides (SO_x), and ammonia (NH_3) as part of Maricopa County's requirements under the respective State Implementation Plans (SIPs).

In addition to preparing a PEI for the 8-hour ozone NAA as a commitment under the current 8-hour ozone SIP, the federal 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 2017.

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 NAA. Note that the totals shown in tables may not equal the sum of individual values due to independent rounding.

MCAQD identified point sources within the county through its electronic permit system database, Environmental Management System (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, North American Industry Classification System code (NAICS), 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
355	336412	Honeywell International Inc	111 S 34th St	Phoenix	85034
3966	334413	Intel Corp-Ocotillo Campus	4500 S Dobson Rd	Chandler	85248
3300	92811	Luke AFB - 56th Fighter Wing	14002 W Marauder St	Glendale	85309
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 NAA.

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 (synthetic minor facilities are those that voluntarily reduce emissions below the level which would classify them as Title V). All facilities are required to report detailed information on stacks, control devices, operating schedules, and process-level information concerning its 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 94.29% (for Title V processes) and 91.37% (for non-Title V processes) were calculated and applied to 2017 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 22 facilities that have been categorized as point sources (all of which are located within both 8-hour ozone NAAs). 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.

ID #	Business name		Annual emissions (tons/yr) VOC	NOx	CO	Season-day emissions (lbs/day) VOC	NOx	CO
3313	APS West Phoenix Power Plant	*	20.2	857.7	95.9	156	6,832	756
43063	Arlington Valley LLC	*	0.0	55.7	14.0	0	593	152
1218	Butterfield Station Facility	*	109.9	18.1	21.1	604	113	119
127771	CMC Steel Fabricators Inc.	*	27.9	48.0	570.4	155	452	5,467
44439	Gila River Power Station	*	7.2	117.8	21.7	53	833	147
4173	Glendale Mun. Sanitary Landfill	*	1.8	9.2	50.1	10	51	275
355	Honeywell International Inc		22.1	25.8	9.3	165	144	51
3966	Intel Corp-Ocotillo Campus		45.8	56.7	120.3	252	312	661
3300	Luke AFB - 56th Fighter Wing		7.0	6.7	3.5	47	36	15
44186	Mesquite Power Operations LLC		14.5	156.7	43.3	123	1,329	369
43530	New Harquahala Gen Co.		3.5	41.9	1.9	53	648	33
20706	New Wincup Holdings Inc.		120.5	4.6	0.1	993	26	0
1879	Northwest Regional Landfill	*	124.8	20.1	114.7	794	110	630
1331	Oak Canyon Inc.		93.7			603		
52382	Ocotillo Power Plant		7.8	226.1	47.3	282	2,194	462
42956	Redhawk Generating Facility		4.9	178.1	157.6	34	1,254	1,112
303	Rexam Beverage Can Co.	*	145.4	4.8	4.0	877	25	21
3315	Santan Generating Station		4.8	274.2	114.8	45	2,493	1,082
4175	SFPP LP Phoenix Terminal	*	145.7	5.6	19.8	793	42	114
3316	SRP Agua Fria Generating Stn.		7.2	472.5	100.6	89	6,139	1,320
3317	SRP Kyrene Generating Station		1.0	42.3	5.2	7	322	30
1210	Trendwood Inc.	*	62.8			483		
	Totals:		**978.6**	**2,622.5**	**1,515.4**	**6,617**	**23,947**	**12,818**

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

2.5 Emission Reduction Credits

A major source or major modification planned in a NAA 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 NAAQS 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. Table 2.5–1 provides a list of certified emission reduction credits that are available in the Arizona Voluntary Emissions Bank for VOC, NO_x, and CO by ownership (the actual, certified emissions reductions may have been purchased from the source from which they were generated).

Table 2.5–1. Available certified ERCs in the Arizona Emissions Bank.

Facility name	Reduction Date	Emission reduction credits (tons/yr) VOC	NO_x	CO
Freescale Semiconductor, Inc.	3/1/2004	9.1	6.8	14.3
Intel Corporation	3/4/2005	203.9	7.0	
Madison 51, LLC (Thornwood)	10/8/2012	53.1		
Penn Racquet Sports Inc.	3/6/2009		0.34	
Marathon Equipment	08/01/2018	6.5		
Totals:		**272.6**	**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 are 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 ERCs for VOC or NO_x.

Permit no.	Facility name	City, ZIP	Potential ERCs (tons/yr) VOC	NOx
100087	Di-Matrix Precision Manufacturing	Phoenix, 85040	17.4	
110178	Saint Gobain Solar Glass Facility	Goodyear, 85338	9.9	
20005	Jabil	Tempe, 85281	8.5	
10233	All Pro Industrial Finishes	Tempe, 85281	8.4	
150049	Artisan Natural Stone Products LLP	Phoenix, 85034	7.8	
140050	BBB Industries, LLC	Phoenix, 85031	7.8	
10240	Wells Cargo Inc./Haulmark Industries Inc.	Phoenix, 85043	6.0	
60033	Preferred Packaging & Container	Phoenix, 85009	4.4	
990502	Bryant Industries	Phoenix, 85041	4.4	
990152	Wickenburg Oil Company LLC	Wickenburg, 85390	4.2	
20189	American Case & Pedestal Mfg. Co.	Phoenix, 85009	4.0	
990525	Heraeus Materials Technology North Ameri	Chandler, 85226	3.3	
110056	Redstone Industries, Inc.	Surprise, 85379	2.9	
30055	Biltmore Shutters Inc	Phoenix, 85007	2.8	
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
990571	Southwest Airlines	Phoenix, 85034		6.0
070022	Costco	Phoenix, 85017		6.0
990378	Opt Co	Phoenix, 85120		5.2
090298	Phoenix Brick Yard	Phoenix, 85007		3.1
	Totals:		**93.9**	**46.0**

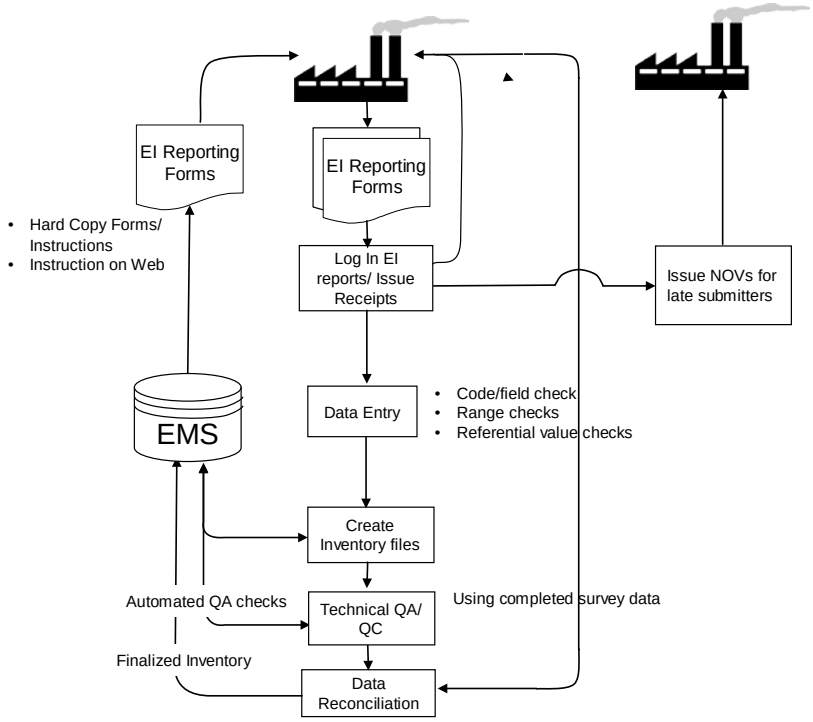
2.6 Quality assurance/quality control procedures

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 database. 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. These data elements are flagged during data entry and are not transmitted to EPA. Pollutant emissions cannot be designated as CBI.

To prepare the inventory for submittal to the 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, reasonableness, and assured that all point sources had been identified. Staff also assured that the methodology applied to calculate emissions was appropriate and that the calculations were correct. Other reasonableness checks were conducted by recalculating emissions using methods other than those used to make the initial emissions calculations and then comparing results. QA checks were conducted by reviewing all emissions reports submitted to MCAQD for the year 2017 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 2017 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 Maricopa County and both of the 8-hour ozone NAAs.

Table 2.7–1. Annual and season-day point source emissions for Maricopa County, and 2008 and 2015 ozone NAAs (including all emission reduction credits).

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Facility totals	978.6	2,622.5	1,515.4	6,617	23,947	12,818
Emission reduction credits	272.6	14.1	14.3	1,494	77	78
Potential ERCs (pERCs)	93.9	46.0		515	252	
Total:	**1,345.1**	**2,682.7**	**1,529.7**	**8,625**	**24,277**	**12,896**

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*

Nonpoint Sources

3.1 Introduction and scope

This chapter considers all stationary sources that 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 2017 NEI website (US EPA, 2018); documentation of the development of the previous NEI in 2014 (US EPA, 2016); and the document "Introduction to Area Source Inventory Development" (US EPA, 2001a). In addition, permit and emissions data in the MCAQD's 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. Annual emissions for Maricopa County, as well as the 2008 and 2015 8-hour ozone NAAs are presented in Tables 3.5–1, 3.5–2, and 3.5-3.

3.2 Emission Calculation Methodology

The specific emissions estimation methods that MCAQD used to estimate the annual and season-day nonpoint emission inventory for Maricopa County are summarized in Table 3.2-1. The methodologies associated with these calculation methods are described in the following sub-sections.

Table 3.2–1. Calculation method for all nonpoint (area) sources.

Source	Annual Method	Season-Day Method
Fuel combustion:		
Industrial distillate oil: boilers	2017 EPA NEMO	Operating Schedule
Industrial distillate oil: engines	2017 EPA NEMO	Operating Schedule
Industrial natural gas	2017 EPA NEMO	Operating Schedule
Industrial LPG	2017 EPA NEMO	Operating Schedule
Comm./inst. distillate oil: boilers	2017 EPA NEMO	Operating Schedule
Comm./inst. distillate oil: engines	2017 EPA NEMO	Operating Schedule
Comm./inst. natural gas	2017 EPA NEMO	Operating Schedule
Residential distillate oil	2017 EPA NEMO	Heating Degree Days
Residential LPG	2014 Emissions Extrapolation	Heating Degree Days
Residential natural gas	2017 EPA NEMO	Seasonal Factor
Residential wood combustion	2017 EPA NEMO	Heating Degree Days
Industrial processes:		
Commercial cooking	2017 EPA NEMO	Uniform Usage
Electrical equipment manufacturing	2014 Emissions Extrapolation	2014 Emissions Extrapolation
Industrial processes, NEC	Annual Emission Reports	Annual Emission Reports
Secondary metal production	Annual Emission Reports	Annual Emission Reports
Chemical manufacturing	Scaling Up	Scaling Up
Bakeries	Scaling Up	Scaling Up
Fabricated metal product manufacturing	Scaling Up	Scaling Up
Rubber/plastic product manufacturing	Scaling Up	Scaling Up

Table 3.2–1. Calculation method for all nonpoint (area) sources (continued).

Source	Annual Method	Season-Day Method
Misc. area sources:		
Backyard barbeques	2017 EPA NEMO	Uniform Usage
Aircraft engine testing	Annual Emission Reports	Annual Emission Reports
Crematories, human	Annual Emission Reports	Annual Emission Reports
Crematories, animal	Annual Emission Reports	Annual Emission Reports
Structure fires	Fire Database & Burn Permits	Seasonal Factor
Vehicle fires	Fire Database	Uniform Usage
Prescribed fires	Prescribed Fires	Prescribed Fires
Accidental releases	Self-Reported	Self-Reported
Wildfires	Wildfires	Wildfires
Composting	2017 EPA NEMO	Uniform Usage
Livestock	2017 EPA NEMO	Uniform Usage
Solvent use:		
Auto refinishing	Scaling Up	Uniform Usage
Traffic markings	2017 EPA NEMO	Seasonal Factor
Industrial surface coating	Scaling Up	Uniform Usage
Dry cleaning	2017 EPA NEMO	Operating Schedule
Consumer and commercial products	2017 EPA NEMO	Uniform Usage
Asphalt application	2008 Asphalt Use Extrapolation	Uniform Usage
Agricultural pesticides	2017 EPA NEMO	Uniform Usage
Architectural coatings	2017 EPA NEMO	Seasonal Factor
Factory finished wood	2017 EPA NEMO	Uniform Usage
Aircraft surface coating	Scaling Up	Scaling Up
Miscellaneous surface coating	Scaling Up	Scaling Up
Degreasing	Scaling Up	Scaling Up
Graphics arts	Scaling Up	Scaling Up
Misc. industrial solvent use	Scaling Up	Scaling Up
Storage and transport:		
Portable fuel containers	2017 EPA NEMO	Uniform Usage
Gas stations Stage I: Submerged fill	2017 EPA NEMO	2017 EPA NEMO
Gas stations Stage I: Bal. submerged fill	2017 EPA NEMO	2017 EPA NEMO
Underground tanks: Breathing/emptying	2017 EPA NEMO	2017 EPA NEMO
Airports: aviation gasoline Stage I	2017 EPA NEMO	Uniform Usage
Airports: aviation gasoline Stage II	2017 EPA NEMO	Uniform Usage
Truck: gasoline (tank trucks in transit)	2017 EPA NEMO	2017 EPA NEMO
Pipeline gasoline	2017 EPA NEMO	2017 EPA NEMO
Bulk plants	Annual Emission Reports	Annual Emission Reports
Bulk terminals	Annual Emission Reports	Annual Emission Reports
Volatile organic liquids storage/transport	Annual Emission Reports	Annual Emission Reports

Table 3.2–1. Calculation method for all nonpoint (area) sources (continued).

Source	Annual Method	Season-Day Method
Waste Disposal:		
Publicly owned treatment works (POTW)	Per-Capita	Seasonal Factor
Landfills	Annual Emission Reports	Annual Emission Reports
Other waste	Annual Emission Reports	Annual Emission Reports
Open burning	Burn Permits	Burn Permits
Leaking underground storage tanks	LUST Remediation	LUST Remediation

3.2.1 2017 EPA NEMO

Annual emissions for these source categories were derived using county specific data with the 2017 EPA Nonpoint Emissions Methodologies and Operator Instructions (NEMO), which are the methodologies used by US EPA for the 2017 NEI.

3.2.2 Operating Schedule

In order to calculate the season-day emissions, it is assumed the activity occurs a certain number of days a week and is relatively uniform throughout the year. Thus, the annual emissions were divided by the days per week it operated multiplied by 52 weeks per year.

3.2.3 Heating Degree Days

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, 2018) indicated that there were no heating degree days reported during the 2017 ozone season (June–August).

3.2.4 Uniform Usage

For certain categories usage 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).

3.2.5 2014 Emissions Extrapolation

For electrical equipment manufacturing, the data from the 2014 ozone precursor periodic emissions inventory (MCAQD, 2016) were extrapolated to 2017 based on the ratio of industrial employment levels for those two years. Residential LPG fuel use was extrapolated from the 2014 ozone precursor periodic emissions inventory (MCAQD, 2016) to 2017 based on the ratio of Maricopa County population for those two years.

3.2.6 Annual Emission Reports

Annual and season-day emissions from facilities were derived by using annual emissions reports from permitted sources. For these categories, it was assumed that there were no significant unpermitted sources within Maricopa County. When all facilities in a given source category are considered to only be located within the 2008 and 2015 ozone NAAs, total emission values for the county and the NAA are equal.

3.2.7 Scaling Up

Emissions 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 (2018) 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 2017 employment were used. Where employment estimates were provided as a range of values, the midpoint was used. 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.

3.2.8 Fire Database

2017 structure and vehicle fire data were from the Arizona Department of Forestry and Fire Management (ADFFM pers. commun.: B. Kimball, October 19, 2018). The ADFFM coordinates reporting to the National Fire Incident Reporting System (NFIRS) for Arizona fire departments. The NFIRS is a national reporting system used by fire departments to report fires and other incidents to which they respond and to maintain records of these incidents in a uniform manner. Twenty-one of forty fire departments in Maricopa County reported over 10,000 fires to NFIRS in 2017. This included 2,027 reported structure fires. Because the ADFFM data only included data reported by twenty-one out of forty fire departments in Maricopa County, the number of structure fires reported were scaled up to the entire inventory area based on population of the included and excluded fire department districts. The most recent estimates for Maricopa County city populations were used to scale up the number of structure and vehicle fires from the Arizona Office of Economic Opportunity (AOEO; 2018). Estimates of material burned in a structure fire were determined by multiplying the number of structure fires by a fuel loading factor of 1.15 tons of material per fire to yield tons of material burned per year, which factors in the estimated percentage of structural loss and content loss (US EPA, 2001). Annual emissions from vehicle fires were calculated by first multiplying the number of vehicle fires by a fuel loading factor of 0.25 tons per vehicle fire to estimate the annual amount of material burned in vehicle fires (US EPA, 2000).

3.4.9 Seasonal Factor

Residential natural gas ozone season day was calculated by apportioning the total annual residential natural gas consumption by the percentage used in June, July and August of 12%, and then divided by the total number of days in those three months (92 days).

Structure fires vary seasonally and may increase during cold weather. Because local season-specific data were not readily available, seasonal occurrences of residential and non-residential structure fires reported by the Federal Emergency Management Agency (FEMA) were used to derive a seasonal adjustment factor for the ozone season (US EPA, 2001). FEMA reported that 21.8% of residential structure fires and 25.2% of non-residential structural fires occurred during July, August, and September 1994. Thus, an average occurrence of 23.5% [(21.8% + 25.2%) ÷ 2] was used as a seasonal adjustment factor to estimate ozone season-day emissions.

Architectural coating 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 a 28% of annual activity. In addition, it was assumed that the activity may take place seven days a week during the ozone season. Thus, season-day emissions were calculated by multiplying annual emissions by the seasonal factor and then dividing the results by 92 days per season.

Publicly owned treatment works (POTW) ozone season-day emissions were calculated by multiplying annual emissions by a 35% season adjustment factor and then dividing by 92 days per season (US EPA, 2001a).

3.2.10 Prescribed fires

Emissions from prescribed fires were estimated using data obtained from ADEQ (2018), which reported that a total of two prescribed fires occurred in Maricopa County during 2017 (M. Pace, pers. commun., Oct. 16, 2018), both of which were within the 2008 and 2015 8-hour ozone NAAs. Because both 2017 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 3.2–2 shows the data provided by ADEQ, the amount of material burned for each fire, and whether the fire occurred within the NAAs and during the ozone season.

Table 3.2–2. Prescribed fires in Maricopa County during 2017.

Date	Burn ID	Tons/ acre	Acres burned	Material burned (tons)	Within 2008 & 2015 8-hr NAA?	During ozone season?
03/07/2017	PHD205P	5	50	250	Y	N
03/09/2017	TNF0301P	1	2	2	Y	N
Total:			**52**	**252**		

To estimate emissions, emission factors for "piled fuels" from 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 both of the reported prescribed fires were within the 2008 and 2015 8-hour ozone NAAs; thus, annual emissions for both areas are equal. Ozone season-day emissions were evaluated by determining the dates of the prescribed burns, none of which were within the ozone season in 2017.

3.2.11 Self-Reported

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.

3.2.12 Wildfires

Data on the incidence of wildfires in Maricopa County were obtained from the ADFFM (ADFFM, pers. commun.: B. Kimball, October 19, 2018) and data reported in the Geospatial Multi-Agency Coordination

Group (GeoMAC) GIS Wildland Fire Support database (USGS, 2018). The ADFFM provides for the prevention and suppression of wildfires on state trust land and private lands located outside of incorporated communities; the wildfire data provided by ADFFM includes wildfires reported by local fire departments. The ADFFM and GeoMAC datasets were crosschecked and there was no overlap in the fires contained in these two databases, which respectively reported 828 and seven fires, covering 1,110 and 7,358 acres for Maricopa County.

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 NAAs. Table 3.2–3 shows the number of wildfires and acreage burned for Maricopa County and the 8-hour ozone NAA, as well as the estimated total material burned.

Table 3.2–3. Wildfire incidence, acreage burned, and material burned in 2017.

Geographic area	No. of fires	Acreage burned	Fuel loading factor (tons/acre)	Material burned (tons/yr)
Maricopa County	835	8,468	4.5	38,107
2018 ozone NAA	799	8,372	4.5	37,674
2015 ozone NAA	805	8,373	4.5	37,678

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 WRAP 2002 Fire Emissions Inventory (WGA/WRAP, 2005). Typical daily emissions were estimated by multiplying the total material burned during the year by the emission factor. This result was divided by the number of separate days on which wildfire activity was reported for Maricopa County, the 2008 ozone NAA, and the 2015 ozone NAA – 283, 79, and 79 days respectively.

3.2.13 2008 Asphalt Use Extrapolation

The Asphalt Institute no longer compiles asphalt usage data by state. Therefore, 2017 emissions from asphalt applications were calculated by extrapolating 2008 asphalt emissions to 2017 based on vehicle miles traveled (VMT). A VMT-based growth factor was used to grow 2008 cutback and emulsified asphalt emissions to 2017. This was done for each asphalt type by multiplying the 2008 statewide asphalt usage by the ratio of 2017 to 2008 annual state VMT. This state-level asphalt use was then apportioned to Maricopa County by multiplying the extrapolated 2017 asphalt usage by the ratio of Maricopa County to statewide annual VMT. The extrapolated quantity of asphalt use for each type was then multiplied by an emission factor to derive the annual VOC emissions in tons/year.

3.2.14 Per-Capita

The change from the 2012 to 2017 US population proportion was used to extrapolate the 2012 POTW annual flow rate to 2017 values. Then the proportion of Maricopa County population to US population in

2017 was used to apportion the amount of POTW flow rate to Maricopa County. The flow rate was then used to calculate emissions based on an emissions factor.

3.2.15 Burn Permits

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 database was used to identify all burn permits issued in 2017. A total of 25 open burn permits were issued during the year. The quantity and reported activity for the open burn permits are shown in Table 3.2–4.

Table 3.2–4. Maricopa County burn permit activity in 2017.

Permit subtype	Permits issued	Total reported activity	Activity unit of measure
Ditch bank & fence row	16	107,450	Linear feet
Land clearance	1	90.9	Acres
Air Curtain	1	79.96	Tons of Material Burned
Tumbleweeds	1	0.1	Piles
Firefighting instruction	6	65	Structures

The above activity data (excluding firefighting instruction) were converted to tons material burned using fuel loading factors from AP-42, Table 2.5–5 (US EPA, 1992) and assumptions made based on previous Maricopa County emission inventories (MCAQD, 2008). The emission and loading factors used are shown in Table 3.2–5.

Table 3.2–5. Emission and fuel loading factors for open burning.

	Emission factors (lbs/ton burned)			Fuel loading factor
Category	VOC	NOx	CO	(tons/acre)
Weeds, unspecified	9	4	85	3.2
Russian Thistle (tumbleweeds)	1.5	4	309	0.1
Orchard crops: Citrus	9	4	81	1.0

MCAQD's records of citizen complaints received during 2017 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 34.11 to account for unpermitted outdoor burning.

The reported dates of activity from all open burn permits issued were reviewed 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, five days per week. Thus, season-day emissions were calculated by dividing total ozone-season emissions by 65 (five days/week × 13 weeks/ozone season).

Annual and season-day emissions for the NAA were calculated by multiplying the percentage of vacant land use located in the 2008 and 2015 8-hour ozone NAAs by the Maricopa County emissions estimates. See Section 1.5.2 for a discussion of the land use data used.

3.2.16 Leaking underground storage tanks remediation

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). It was assumed that an initial site action (tank and soil removal) for an average LUST remediation lasts five days. Data for 2017 obtained from the ADEQ LUST section indicated that 62 LUST remediation projects opened in Maricopa County, and seven outside of Maricopa County but within both the 2008 and 2015 ozone NAAs (T. Yee, pers. commun., Sept. 7, 2018). The LUST closure dates were used to determine whether the emissions occurred within the ozone season or not.

3.3 Emission Allocation Methodology

County-level annual emissions for each of the calculation methods are allocated for the 2008 and 2015 ozone NAAs using the methodology presented in this section. In instances where all of a given source category are considered to be located within the 2008 and 2015 ozone NAAs, total emission values for the county and the NAA are considered equal and are listed as "Assumed Same" in Table 3.3-1.

Table 3.3–1. Calculation and allocation method for all nonpoint sources.

Source	Allocation Method
Fuel combustion:	
Industrial distillate oil: boilers	Employment
Industrial distillate oil: engines	Employment
Industrial natural gas	Employment
Industrial LPG	Employment
Comm./inst. distillate oil: boilers	Employment
Comm./inst. distillate oil: engines	Employment
Comm./inst. natural gas	Employment
Residential distillate oil	Population
Residential LPG	Population
Residential natural gas	Population
Residential wood combustion	Population
Industrial processes:	
Commercial cooking	Population
Electrical equipment manufacturing	Assumed Same
Industrial processes, NEC	Assumed Same

Secondary metal production	Assumed Same
Chemical manufacturing	Employment
Bakeries	Employment
Fabricated metal product manufacturing	Employment
Rubber/plastic product manufacturing	Employment

Table 3.3–1. Calculation and allocation method for all nonpoint sources (continued).

Source	Allocation Method
Misc. area sources:	
Backyard barbeques	Assumed Same
Aircraft engine testing	Population
Crematories, human	Population
Crematories, animal	Location Data
Structure fires	Facility Location
Vehicle fires	Location Data
Prescribed fires	Population
Accidental releases	Assumed Same
Wildfires	Population
Composting	Population
Livestock	Land Use
Solvent use:	
Auto refinishing	Employment
Traffic markings	Employment
Industrial surface coating	Employment
Dry cleaning	Population
Consumer and commercial products	Population
Asphalt application	Assumed Same
Agricultural pesticides	Land Use
Architectural coatings	Population
Factory finished wood	Employment
Aircraft surface coating	Employment
Miscellaneous surface coating	Employment
Degreasing	Employment
Graphics arts	Employment
Misc. industrial solvent use	Employment
Storage and transport:	
Portable fuel containers	Population
Gas stations Stage I: Submerged fill	Assumed Same
Gas stations Stage I: Bal. submerged fill	Assumed Same
Underground tanks: Breathing/emptying	Assumed Same

Airports: aviation gasoline Stage I	General Aviation Operations
Airports: aviation gasoline Stage II	General Aviation Operations
Truck: gasoline (tank trucks in transit)	Assumed Same
Pipeline gasoline	Assumed Same
Bulk plants	Assumed Same
Bulk terminals	Assumed Same
Volatile organic liquids storage/transport	Location Data

Table 3.3–1. Calculation and allocation method for all nonpoint sources (continued).

Source	Allocation Method
Waste Disposal:	
Publicly owned treatment works (POTW)	Population
Landfills	Location Data
Other waste	Assumed Same
Open burning	Land Use
Leaking underground storage tanks	Assumed Same

3.3.1 Employment

Annual emissions for the 2008 and 2015 ozone NAAs were estimated by apportioning Maricopa County's emissions to the NAAs, using the ratio of employment, based on the source category. See Section 1.5.1 of this report for a discussion of the employment data used.

3.3.2 Population

Annual emissions for the 2008 and 2015 ozone NAAs were estimated by apportioning Maricopa County's emissions to the NAAs, using the ratio of total resident population in the NAAs to that of Maricopa County. See Section 1.5.1 of this report for a discussion of the population data used.

3.3.3 Land use

The annual emissions for the 2008 and 2015 ozone NAAs were calculated by multiplying county emission totals by the ratio of a specific land use acreage in the NAAs for the land use acreage in Maricopa County. See Section 1.5.2 for a discussion of the land use data used to allocate emissions to the 2008 and 2015 ozone NAAs.

3.3.4 General Aviation Operations

For the category aviation gasoline Stage I and Stage II, the annual and season-day emissions for the 2008 and 2015 ozone NAA emissions were calculated by multiplying county totals by the percentage of general aviation operations that occurred within the NAAs in 2017 (98.0%). See Table 4.11–1 of this report for general aviation aircraft operational data used.

3.3.5 Location Data

Geographic data on the location of each permitted source or incident were used to identify whether they were located inside or outside of the 2008 and 2015 ozone NAAs.

3.4 QA/QC control procedures

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 NAAs. 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 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) were used as these data best reflect activity in the county and the NAAs. 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) were 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 two 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 ADEQ, ADOT, and MAG for a quality assurance review. These agencies provided comments that 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.

3.5 Summary of all area source emissions

Tables 3.5–1, 3.5–2, and 3.5–3 summarize the total annual and average season-day emissions from all area sources addressed in this chapter for Maricopa County as well as the 2008 and 2015 ozone NAA, respectively.

Table 3.5–1. Annual and season-day emissions from all nonpoint sources in Maricopa County.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Fuel combustion:						
Industrial distillate oil: boilers	1.0	101.1	25.3	7	702	175
Industrial distillate oil: engines	141.5	2,035.1	438.0	983	14,132	3,042
Industrial natural gas	36.1	656.7	551.7	251	4,561	3,831
Industrial LPG	1.5	41.1	23.0	10	285	160
Comm./inst. distillate oil: boilers	0.1	3.5	0.9	0	24	6
Comm./inst. distillate oil: engines	0.4	5.6	1.2	3	39	8
Comm./inst. natural gas	58.3	1,060.0	890.4	405	7,361	6,183
Residential distillate oil	0.0	0.2	0.0	0	0	0
Residential natural gas	46.4	793.8	337.8	121	2,071	881
Residential LPG	1.7	44.5	12.6	0	0	0
Residential wood combustion	1,327.7	143.4	8,027.6	0	0	0
Total fuel combustion:	**1,614.8**	**4,885.0**	**10,308.5**	**1,780**	**29,175**	**14,287**
Industrial processes:						
Chemical manufacturing	37.4			45		
Commercial cooking	152.7	0.0	414.0	830	0	2,274
Bakeries	130.0			736		
Secondary metal production	44.1	28.7	124.0	306	206	683
Rubber/plastic product manufacturing	841.1			6,834		
Fabricated metal product manufacturing	100.2			648		
Electrical equipment manufacturing	183.8	20.0	6.2	1,052	111	34
Industrial processes, NEC	59.2	34.4	61.1	386	197	326
Total industrial processes:	**1,548.6**	**83.1**	**605.2**	**10,837**	**514**	**3,317**

Table 3.5–1. Annual and season-day emissions from all nonpoint sources in Maricopa County (continued).

Source	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Misc. area sources:						
Backyard barbeques	66.5	20.9	1,011.4	364	115	5,542
Structure fires	14.9	1.9	81.0	76	10	414
Aircraft engine testing	0.1	1.0	2.7	1	7	1
Vehicle fires	7.1	0.9	27.9	35	4	137
Crematories, human	0.5	15.7	0.9	3	120	6
Crematories, animal	0.1	6.6	0.4	1	54	3
Prescribed fires	0.8	0.8	9.4	0	0	0
Accidental releases	13.5	0.1	0.4	32	0	0
Wildfires	259.1	118.1	5,506.4	5,335	2,432	113,371
Composting	718.3			5,525		
Livestock	718.1			3,935		
Total misc. area sources:	**1,798.9**	**166.0**	**6,640.4**	**15,307**	**2,742**	**119,473**
Solvent use:						
Architectural coatings	3,772.4			22,962		
Auto refinishing	1,121.1			6,143		
Traffic markings	201.3			2,044		
Factory finished wood	706.0			5,462		
Wood furniture	509.9			2,794		
Metal furniture: SIC 25	59.8			328		
Paper: SIC 26	51.3			281		
Metal cans: SIC 341	38.1			209		
Machinery and equipment: SIC 35	58.1			319		
Large appliances: SIC 363	35.5			195		
Electronic/other elec.: SIC 36–363	4.2			23		
Motor vehicles: SIC 371	183.0			1,002		
Aircraft surface coating	23.8			150		
Marine: SIC 373	3.5			19		
Railroad: SIC 374	5.1			28		
Miscellaneous surface coating	123.9			961		
Industrial maintenance coatings	301.0			1,649		
Other special purpose coatings	12.0			66		
Degreasing	357.6			2,498		
Dry cleaning	13.2			102		
Graphics arts	162.4			1,216		
Misc. industrial solvent use	64.9			452		
Personal care products	4,013.2			21,990		
Household products	4,414.5			24,189		

Table 3.5–1. Annual and season-day emissions from all nonpoint sources in Maricopa County (continued).

Source	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Solvent use (continued):						
Coatings and related products	1,906.3			10,445		
Adhesives and sealants	1,143.8			6,267		
FIFRA-regulated products	3,571.7			19,571		
Miscellaneous products, NEC	140.5			770		
Cutback asphalt	1,029.9			5,643		
Emulsified asphalt	848.8			4,651		
Agricultural pesticides	530.7			2,908		
Total solvent use:	**28,136.5**			**160,290**		
Storage/transport:						
Residential portable gas cans	631.7			3,461		
Commercial portable gas cans	535.2			2,932		
Bulk terminals	103.1			629		
Bulk plants	43.2			235		
Gas stations Stage I: Submerged fill	96.0			609		
Gas stations Stage I: Bal. submerged fill	259.2			1,643		
Underground tanks: Breathing/emptying	877.1			4,765		
Airports: aviation gasoline Stage I	659.9			3,616		
Airports: aviation gasoline Stage II	1.6			9		
Truck: gasoline (tank trucks in transit)	57.4			364		
Pipeline gasoline	69.2			379		
Volatile organic liquids storage/transport	10.8			75		
Total storage/transport:	**3,350.6**			**18,750**		
Waste treatment/disposal:						
Open burning	31.0	13.8	287.0	238	106	2,207
Landfills	2.6	6.8	5.2	17	38	29
Publicly owned treatment works	60.2			458		
Leaking underground storage tanks	4.3			28		
Other waste	0.8	18.7	41.5	4	102	218
Total waste disposal:	**98.9**	**39.2**	**333.7**	**746**	**246**	**2,454**
Total, all nonpoint sources:	**36,548.3**	**5,173.3**	**17,887.8**	**207,708**	**32,677**	**139,531**

Table 3.5–2. Annual and season-day emissions from all area sources in the 2008 8-hour ozone NAA.

Source	Annual emission (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Fuel combustion:						
Industrial distillate oil: boilers	1.0	100.9	25.2	7	701	175
Industrial distillate oil: engines	141.3	2,032.0	437.4	981	14,111	3,037
Industrial natural gas	36.1	655.8	550.8	250	4,554	3,825
Industrial LPG	1.5	41.0	23.0	10	285	159
Comm./inst. distillate oil: boilers	0.1	3.5	0.9	0	24	6
Comm./inst. distillate oil: engines	0.4	5.6	1.2	3	39	8
Comm./inst. natural gas	58.2	1,057.3	888.1	404	7,342	6,168
Residential distillate oil	0.0	0.2	0.0	0	0	0
Residential natural gas	46.7	798.8	339.9	122	2,084	887
Residential LPG	1.7	44.3	12.6	0	0	0
Residential wood combustion	1,336.1	144.4	8,078.2	0	0	0
Total fuel combustion:	**1,623.0**	**4,883.7**	**10,357.3**	**1,778**	**29,140**	**14,266**
Industrial processes:						
Chemical manufacturing	37.4			45		
Commercial cooking	153.7	0.0	416.6	835	0	2,289
Bakeries	129.8			735		
Secondary metal production	44.1	28.7	123.8	306	203	682
Rubber/plastic product manufacturing	839.8			6,824		
Fabricated metal product manufacturing	100.0			647		
Electrical equipment manufacturing	183.6	19.9	6.2	1,051	111	34
Industrial processes, NEC	59.2	34.4	61.1	386	211	326
Total industrial processes:	**1,547.6**	**83.0**	**607.6**	**10,828**	**525**	**3,330**

Table 3.5–2. Annual and season-day emissions from all area sources in the 2008 8-hour ozone NAA (continued).

Source	Annual emission (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Misc. area sources:						
Backyard barbeques	66.1	20.8	1,005.5	362	114	5,509
Structure fires	15.0	1.9	81.6	76	10	417
Aircraft engine testing	0.1	1.0	2.7	1	7	1
Vehicle fires	7.2	0.9	28.1	35	4	138
Crematories, human	0.5	15.7	0.9	3	114	6
Crematories, animal	0.1	6.6	0.4	1	54	3
Accidental releases	1.4	1.4	0.4	0	0	0
Wildfires	256.2	116.8	5,443.9	5,538	2,525	117,676
Prescribed fires	0.8	0.8	9.4	0	0	0
Composting	723.3			5,564		
Livestock	420.7			2,305		
Total misc. area sources:	**1,491.2**	**165.9**	**6,572.7**	**13,885**	**2,827**	**123,750**
Solvent use:						
Architectural coatings	3,796.1			23,107		
Auto refinishing	1,119.5			6,134		
Traffic markings	201.0			2,041		
Factory finished wood	704.9			5,454		
Wood furniture	509.1			2,790		
Metal furniture: SIC 25	59.7			327		
Paper: SIC 26	51.2			280		
Metal cans: SIC 341	38.1			209		
Machinery and equipment: SIC 35	58.1			318		
Large appliances: SIC 363	35.5			194		
Electronic/other elec.: SIC 36–363	4.2			23		
Motor vehicles: SIC 371	182.7			1,001		
Aircraft surface coating	23.8			150		
Marine: SIC 373	3.5			19		
Railroad: SIC 374	5.1			28		
Miscellaneous surface coating	123.7			959		
Industrial maintenance coatings	302.9			1,660		
Other special purpose coatings	12.1			66		
Degreasing	357.0			2,494		
Dry cleaning	13.2			102		
Graphics arts	162.2			1,214		
Misc. industrial solvent use	64.8			451		
Personal care products	4,038.4			22,128		
Household products	4,442.3			24,341		
Automotive aftermarket products	2,746.1			15,047		

Table 3.5–2. Annual and season-day emissions from all area sources in the 2008 8-hour ozone NAA (continued).

Source	Annual emission (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Solvent use (continued):						
Coatings and related products	1,918.3			10,511		
Adhesives and sealants	1,151.0			6,307		
FIFRA-regulated products	3,594.2			19,694		
Miscellaneous products, NEC	141.3			774		
Cutback asphalt	1,036.3			5,679		
Emulsified asphalt	854.2			4,680		
Agricultural pesticides	310.9			1,703		
Total solvent use:	**28,061.4**			**159,885**		
Storage/transport:						
Residential portable gas cans	635.7			3,568		
Commercial portable gas cans	544.8			3,058		
Bulk terminals	103.1			629		
Bulk plants	43.2			235		
Gas stations Stage I: Submerged fill	96.0			96		
Gas stations Stage I: Bal. submerged fill	259.2			1,643		
Underground tanks: Breathing/emptying	877.1			4,765		
Airports: aviation gasoline Stage I	644.3			3,530.3		
Airports: aviation gasoline Stage II	1.5			8.4		
Truck: gasoline (tank trucks in transit)	57.4			364		
Pipeline gasoline	69.2			379		
Volatile organic liquids storage/transport	10.4			71		
Total storage/transport:	**3,341.9**			**18,347**		
Waste treatment/disposal:						
Waste Disposal	19.0	8.4	175.8	264	117	2,491
Landfills	13.2	10.6	20.1	75	58	110
Publicly owned treatment works	60.6			461		
Leaking underground storage tanks	4.8			34		
Other waste	0.8	18.7	41.5	4	101	218
Total waste treatment/disposal:	**98.4**	**37.7**	**237.4**	**839**	**276**	**2,819**
Total, all nonpoint sources:	**36,163.5**	**5,170.3**	**17,775.0**	**205,563**	**32,768**	**144,165**

Table 3.5–3. Annual and season-day emissions from all area sources in the 2015 8-hour ozone NAA

Source	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Fuel combustion:						
Industrial distillate oil: boilers	1.0	101.0	25.3	7	702	175
Industrial distillate oil: engines	141.5	2,034.2	437.8	982	14,127	3,041
Industrial natural gas	36.1	656.5	551.4	251	4,559	3,829
Industrial LPG	1.5	41.0	23.0	10	285	160
Comm./inst. distillate oil: boilers	0.1	3.5	0.9	0	24	6
Comm./inst. distillate oil: engines	0.4	5.6	1.2	3	39	8
Comm./inst. natural gas	58.4	1,061.0	891.2	405	7,368	6,189
Residential distillate oil	0.0	0.2	0.0	0	0	0
Residential natural gas	47.9	818.4	348.2	125	2,135	908
Residential LPG	1.8	45.8	13.0	0	0	0
Residential wood combustion	1,368.7	147.9	8,275.7	0	0	0
Total fuel combustion:	**1,657.3**	**4,915.2**	**10,567.8**	**1,784**	**29,238**	**14,317**
Industrial sources:						
Chemical manufacturing	37.4			45		
Commercial cooking	157.5	0.0	426.7	856	0	2,345
Bakeries	129.9			736		
Secondary metal production	44.1	28.7	123.9	306	203	683
Rubber/plastic product manufacturing	840.7			6,831		
Fabricated metal product manufacturing	100.2			648		
Electrical equipment manufacturing	183.8	20.0	6.2	1,052	111	34
Industrial processes, NEC	59.2	34.4	61.1	386	211	326
Total industrial processes:	**1,552.8**	**83.1**	**617.9**	**10,859**	**525**	**3,387**
Misc. area sources:						
Backyard barbeques	68.4	21.5	1,040.6	375	118	5,702
Structure fires	15.3	1.9	83.5	78	10	427
Aircraft engine testing	0.1	1.0	2.7	1	7	1
Vehicle fires	7.4	0.9	28.8	36	5	141
Crematories, human	0.5	15.7	0.9	3	114	6
Crematories, animal	0.1	6.6	0.4	1	54	3
Accidental releases	1.4	1.4	0.4	0	0	0
Wildfires	256.2	116.8	5,444.6	5,538	2,525	117,676
Prescribed fires	0.8	0.8	9.4	0	0	0
Composting	740.7			5,698		
Livestock	451.1			2,472		
Total misc. area sources:	**1,542.0**	**166.7**	**6,611.2**	**14,201**	**2,832**	**123,956**

Table 3.5–3. Annual and season-day emissions from all area sources in the 2015 8-hour ozone NAA (continued).

Source	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Solvent use:						
Auto refinishing	1,120.6			6,141		
Traffic markings	201.2			2,043		
Factory finished wood	705.7			5,460		
Wood furniture	509.7			2,793		
Metal furniture: SIC 25	59.8			328		
Paper: SIC 26	51.2			281		
Metal cans: SIC 341	38.1			209		
Machinery and equipment: SIC 35	58.1			318		
Large appliances: SIC 363	35.5			195		
Electronic/other elec.: SIC 36–363	4.2			23		
Motor vehicles: SIC 371	182.9			1,002		
Aircraft surface coating	23.8			150		
Marine: SIC 373	3.5			19		
Railroad: SIC 374	5.1			28		
Miscellaneous surface coating	123.9			960		
Industrial maintenance coatings	310.3			1,700		
Other special purpose coatings	12.4			68		
Degreasing	357.4			2,497		
Dry cleaning	13.2			102		
Graphics arts	162.4			1,215		
Misc. industrial solvent use	64.9			452		
Personal care products	4,137.2			22,670		
Household products	4,550.9			24,937		
Automotive aftermarket products	2,813.3			15,415		
Coatings and related products	1,965.2			10,768		
Adhesives and sealants	1,179.1			6,461		
FIFRA-regulated products	3,682.1			20,176		
Miscellaneous products, NEC	144.8			793		
Cutback asphalt	1,061.7			5,818		
Emulsified asphalt	875.1			4,795		
Agricultural pesticides	333.3			1,827		
Total solvent use:	**28,675.6**			**163,316**		
Storage/transport:						
Residential portable gas cans	651.2			3,568		
Commercial portable gas cans	558.1			3,058		
Bulk terminals	103.1			629		
Bulk plants	43.2			235		
Gas stations Stage I: Submerged fill	608.7			609		

Table 3.5–3. Annual and season-day emissions from all area sources in the 2015 8-hour ozone NAA (continued).

Source Category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NOx	CO	VOC	NOx	CO
Storage/transport (continued):						
Gas stations Stage I: Bal. submerged fill	259.2			1,643		
Underground tanks: Breathing/emptying	877.1			4,765		
Airports: aviation gasoline Stage I	644.3			3,530		
Airports: aviation gasoline Stage II	1.5			8		
Truck: gasoline (tank trucks in transit)	57.4			364		
Pipeline gasoline	69.2			379		
Volatile organic liquids storage/transport	10.4			71		
Total storage/transport:	**3,883.4**			**18,860**		
Waste treatment/disposal:						
Open burning	20.7	9.2	191.3	283	126	2,671
Landfills	13.2	10.6	20.1	75	58	110
Publicly owned treatment works	62.0			472		
Leaking underground storage tanks	4.8			34		
Other waste	0.8	18.7	41.5	4	101	218
Total waste disposal:	**101.6**	**38.4**	**252.9**	**869**	**285**	**2,999**
Total, all nonpoint sources:	**37,412.7**	**5,203.3**	**18,049.8**	**209,885**	**32,880**	**144,659**

3.6 References

ADA, 2013. Arizona Department of Agriculture, 1080 database. http://www.azda.gov/Search1080/Search.aspx

ADOT, 2012. Arizona Department of Transportation, Motor Vehicle Division, County Distribution Summary Report and Adjusted County MVF Distribution Report, for Jan. through December 2011.

GOEP, 2013.Governor's Office of Energy Policy, Arizona Energy Statistics, Heating and Cooling Degree Days. Internet address: http://www.azenergy.gov/doclib/Degreedays.pdf.

MCAQD, 2016. 2013 Periodic Emissions Inventory for Ozone Precursors. Maricopa County Air Quality Department, Phoenix AZ, September 2016.

AOEO, 2018. July 1, 2018 2017 State, County, Place Level Population Estimates, Arizona Office of Economic Opportunity (AOEO), September 20, 2018. Internet address: https://population.az.gov/sites/default/files/documents/files/pop-estimates2017-04pla.pdf

Pechan, 2012.Pechan Environmental Consulting.2008 Nonpoint Emission Estimates. Solvent Usage – Surface Coatings. Solvent Utilization Documentation. Internet address: http://cert.pechan.com/epa/npee2008/index.html

Pechan, 2012a. Pechan Environmental Consulting. 2008 Nonpoint Emission Estimates. Internet address: http://cert.pechan.com/epa/npee2008/index.html#CommercialCooking

Pechan, 2012b. 2008 Nonpoint Emission Estimates. Pechan Environmental Consulting. Gasoline Distribution: Stage I: Tank Trucks in Transit, Internet address: http://cert.pechan.com/epa/npee2008/index.html

Pechan, 2012c. 2008 Nonpoint Emission Estimates. Pechan Environmental Consulting. Solvent Usage – Other. Solvent Utilization Documentation, Table 2. Internet address: http://cert.pechan.com/epa/npee2008/index.html

US Census Bureau, 2018. 2017 County Business Patterns (NAICS and SIC). Internet address: https://factfinder.census.gov

US EPA, 1992.Compilation of Air Pollution Emission Factors (AP-42). Volume I: Stationary Point and Area Sources. Fifth ed. Chapter 2: Solid Waste Disposal, 2.5 Open Burning, Table 2.5–5. US EPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC.

US EPA, 1995a.Architectural Surface Coating. Emissions Inventory Improvement Program (EIIP) Vol. III, Chap. 1. Nov. 1995. Prepared by Eastern Research Group, Inc. for the Area Source Committee, EIIP. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/ volume03/archsfc.pdf

US EPA, 1995b.Compilation of Air Pollution Emission Factors (AP-42). Fifth Ed., Volume I, Chapter 5: Petroleum Industry, 5.2, Transportation and Marketing of Petroleum Liquids. Table 5.2-7. Jan. 1995. http://www.epa.gov/ttn/chief/ap42/ch05/final/c05s02.pdf

US EPA, 1997.Traffic Markings. Emissions Inventory Improvement Program (EIIP) Vol. III, Chap. 14. May 1997. Prepared by Eastern Research Group, Inc. for the Area Source Committee, EIIP. Internet address: http://www.epa.gov/ttnchie1/eiip/techreport/volume03/ iii14.pdf

US EPA, 1998.Compilation of Air Pollution Emission Factors (AP-42). Fifth Ed., Volume 1, Chapter 1: External Combustion Sources. Natural Gas Combustion. Internet address: http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

US EPA, 2000. Area Source Category Method Abstract: Vehicle Fires. Emission Inventory Improvement Program (EIIP), May 2000. Internet address: https://www.epa.gov/sites/production/files/2015-08/documents/vehclf13.pdf

US EPA, 2001a.Introduction to Area Source Emission Inventory Development. Emission Inventory Improvement Program (EIIP) Vol. III, Chapter 1. Revised Final, January 2001.Prepared by Eastern Research

Group, Inc. for the Area Source Committee, EIIP. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii01_apr2001.pdf

US EPA, 2001b.Gasoline Marketing (Stage I and Stage II). Emissions Inventory Improvement Program (EIIP) Vol. III, Chap 11. Revised Final, January 2001.Prepared by Eastern Research Group, Inc. for the Area Source Committee, EIIP. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii11_apr2001.pdf

US EPA, 2001c.Leaking Underground Storage Tanks. Emission Inventory Improvement Program Vol. III, Area Source Method Abstract. May 2001. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/ust2_dec2000.pdf

US EPA, 2001d.Structure Fires. Emission Inventory Improvement Program (EIIP) Vol. III, Chap. 18. Revised Final, Jan. 2001.Prepared by Eastern Research Group, Inc. for the Area Sources Committee, EIIP. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii18_apr2001.pdf

US EPA, 2012a.WebFIRE. EPA's online emissions factor repository, retrieval, and development tool. Internet address: http://www.epa.gov/ttn/chief/webfire/index.html

US EPA, 2012b.Residential Wood Combustion (RWC) Estimation Tool. Internet address: ftp://ftp.epa.gov/EmisInventory/2011nei/doc/

US EPA, 2012c. 2011 National Emissions Inventory Information, Data and documentation. Internet address:ftp://ftp.epa.gov/EmisInventory/2011nei/doc/

US EPA, 2015. 2011 National Emissions Inventory, version 2: Technical Support Document. Office of Air Quality Planning and Standards, Research Triangle Park, NC. August 2015. Internet address: https://www.epa.gov/sites/production/files/2015-10/documents/ nei2011v2_tsd_14aug2015.pdf.

USGS, 2018. United States Geological Survey, GeoMAC (Geospatial Multi-Agency Coordination) Wildland Fire Support database. Internet address: http://www.geomac.gov/

USFA, 2012. United States Fire Administration, National Fire Data Center, National Fire Incident Reporting System (NFIRS), Data Archives: 2011 Public Data Release CD, December 11, 2012.

WGA/WRAP, 2005.2002 Fire Emission Inventory for the WRAP Region – Phase II. Project No. 178-6. Western Governors Association/Western Regional Air Partnership. July 22, 2005. Tables 5 and 6. Internet address: http://www.wrapair.org/forums/fejf/documents/ WRAP_2002_PhII_EI_Report_20050722.pdf.

Nonroad Mobile Sources

4.1 Introduction

Nonroad mobile sources are vehicles or equipment that move (or are moved) within the 12-month period and are not licensed or certified as highway vehicles. Nonroad vehicles and equipment fall into the following categories:

- Agricultural equipment, such as tractors, combines and balers;
- Airport GSE, such as baggage tugs and terminal tractors, and APUs;
- Commercial equipment, such as generators and pumps;
- Construction equipment, such as graders, back hoes and trenchers;
- Industrial equipment, such as forklifts and sweepers;
- Lawn and garden equipment, such as leaf blowers and lawn mowers;
- Logging equipment (not present in Maricopa County);
- Oil field 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 equipment (not present in Maricopa County);
- Aircraft, such as jet- and piston-engine planes; and
- Locomotives, such as switching and line-haul trains.

For most nonroad mobile source categories (except aircraft, APUs, GSE, and locomotives), the EPA MOVES2014b model was used to produce emission estimates. EPA released MOVES2014b in August 2018. It updates the growth estimates for equipment populations, which results in changes to equipment population estimates for all years. It also updates emissions estimates for nonroad equipment meeting Tier 4 standards and corrects errors in characteristics of nonroad diesel fuel.

For aircraft, APUs, and airport GSE categories, the Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT) Version 2d computed emissions related to aircraft operations at airports. As of May 2015, AEDT replaced the Emissions and Dispersion Modeling System (EDMS) as the required model for aviation sources. In addition, a local survey of the three railroad companies having operations within the county (Burlington Northern Santa Fe, Union Pacific and Amtrak) provided locomotive emissions estimates.

This document reports annual and ozone season average daily nonroad mobile source emissions in 2017 for Maricopa County, the ozone NAA for the 2008 standard, and the expanded ozone NAA for the 2015 standard. The expanded area for the 2015 standard includes a small section of Gila County containing the Tonto National Monument monitor and an additional section of Pinal County containing the Queen Valley monitor and San Tan Valley. Spatial surrogates based on land use and demographics in each county allocate the annual and ozone season-day emissions to the NAAs. The sections below describe the different

approaches used to allocate emissions for the different equipment categories to Maricopa County and the two NAAs.

4.2 Emission calculation methodology

Table 4.2-1 summarizes the specific emissions estimation methods used to generate the annual and ozone season-day nonroad mobile sources emission inventory. The following subsections describe the methodologies associated with these calculation methods.

Table 4.2–1. Calculation method for all nonroad mobile sources.

Category	Annual Method	Season-Day Method
Agricultural	MOVES2014b	MOVES2014b
Airport GSE+APUs	AEDT 2d	AEDT 2d
Commercial	MOVES2014b	MOVES2014b
Construction	MOVES2014b	MOVES2014b
Industrial	MOVES2014b	MOVES2014b
Lawn & garden	MOVES2014b	MOVES2014b
Pleasure craft	MOVES2014b	MOVES2014b
Railway maintenance	MOVES2014b	MOVES2014b
Recreational	MOVES2014b	MOVES2014b
Aircraft	AEDT 2d	AEDT 2d
Locomotives	Survey Data	Survey Data

4.2.1 MOVES2014b

The MOVES2014b model calculated emissions for nonroad sources in Maricopa County using local inputs as described below.

The NOAA National Centers for Environmental Information (NCEI) Local Climatological Data website (NCEI, 2018) provided hourly profiles of monthly average temperature observations at Phoenix Sky Harbor Airport. The Arizona Department of Agriculture (AZDA) Weights & Measures Services Division provided fuel specifications for 2017, identical to the fuel data used in modeling onroad mobile source emissions. The Stage II vapor recovery program effectiveness for 2017 (50.0%) was used in place of the default model value.

EPA recommends adjusting default model input files (such as equipment population and activity levels) where local data are available to replace the default values derived from national averages. A local survey performed by ENVIRON as part of an inventory developed to study the impact of visibility-impairing pollutants (ENVIRON et al., 2003) was used to replace the default population and activity levels for commercial lawn and garden equipment in Maricopa County. Survey results showed that for most categories of commercial lawn and garden equipment, populations in Maricopa County are significantly lower than EPA default values, while the average annual hours of operations for most equipment types are slightly higher than EPA's values. Using this local data results in a considerable decrease in emissions from commercial lawn and garden equipment, compared with earlier results using EPA default inputs. Default equipment populations

for oil field equipment based on employment were set to zero, as there is no oil and gas production in Maricopa County (AZOGCC, 2018).

The MOVES2014b nonroad model output consists of typical weekday and weekend emissions for each month of the year. The typical weekday emissions multiplied by the number of weekdays in each month added to the typical weekend emissions multiplied by the number of weekend days in the month represents the total emissions for the month. The sum of the monthly emissions over the year represents the total annual emissions.

Ozone season-day emissions are a three-month average of the typical weekday, or typical weekend, emissions over the ozone season months (June-August). To be conservative, the typical day type with the highest emissions (weekday or weekend) represents ozone season-day emissions for each nonroad emissions category. For example, typical daily emissions from agricultural equipment are higher on weekdays than on weekends. As such, weekday emissions are representative of ozone season-day emissions for agricultural equipment. Other categories, such as recreational equipment, have higher emissions on weekends rather than weekdays.

Spatial surrogates, based on land use and demographics, proportionally allocate the annual and ozone season-day emissions computed for Maricopa County to the NAAs, as described in Section 4.3.

4.2.2 Airport ground support equipment

The AEDT model produced emission estimates for GSE and APUs at airports. Section 4.2.3 below describes the modeling input data used. GSE and APU emissions for Luke Air Force Base (AFB) and aircraft emissions for Luke AFB are a single grouped emissions estimate.

4.2.3 Aircraft

The AEDT model produced emission estimates for aircraft at 14 airports in Maricopa County. The AEDT model is a software system that models aircraft performance in space and time to estimate noise, fuel consumption, emissions, and air quality consequences. AEDT leverages GIS and relational database technology to support individual studies ranging in scope from a single flight at an airport to scenarios at the regional, national and global levels. AEDT is actively used by the U.S. government for regulatory studies, research, domestic aviation system planning, and aviation environmental policy analysis.

The AEDT model calculates aircraft, GSE, and APU emissions of VOC, NO_x, and CO using operational data for 2017 as discussed below. The model computes emissions individually for each combination of aircraft and engine type, and reports aggregated emissions for four main aircraft categories:

- Air carriers (AC): Larger commercial aircraft with at least 60 seats or 18,000 pounds of 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 pounds of 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.

The AEDT model utilizes three main input databases to estimate annual or seasonal emission inventories at each airport:

- Airport database: Relevant airport information, such as latitude, longitude, runway, taxi-in and taxi-out time, country, and weather data;
- Fleet database: Aircraft/engine models and flight tracking profiles for arrival, departure, and touch-and-go (T&G) operations; and
- Local activity database: Number of aircraft operations for landing/takeoffs (LTO), and fleet mix at each airport.

Local aircraft activity data (number of LTO or T&G operations) is a critical input to the AEDT model. The FAA Operations Network (OPSNET) database (FAA, 2018a) provided daily activity data on 2017 aircraft operations for the eight larger commercial and general aviation airports in Maricopa County (Chandler Municipal, Falcon Field, Glendale Municipal, Phoenix Deer Valley, Phoenix Goodyear, Phoenix-Mesa Gateway, Phoenix Sky Harbor, and Scottsdale airports). Additionally, AirNav (airnav.com) provided operations data for the six small general aviation airports included in the inventory (Buckeye Municipal, Gila Bend Municipal, Pleasant Valley, Sky Ranch at Carefree, Stellar Airpark, and Wickenburg Municipal airports). Base personnel provided the number of F-16 and F-35 military aircraft based at Luke AFB in 2017. The FAA Traffic Flow Management System Counts (TFMSC) database provided aircraft fleet mix for 11 of the 14 commercial and general aviation airports (see Table 4.2.3-1), and the FAA 5010 Airport Master Records database provided verification of the AirNav operations data.

To supplement the FAA data, MAG conducted a survey of the general aviation airports in the area to obtain the number of LTOs for 2017 (including any T&G operations) along with fleet mix where available. Table 4.2.3-1 summarizes the activity level for each aircraft category at each airport included in the inventory and indicates the data sources for activity and fleet mix.

Table 4.2.3–1. Annual airport operations (by aircraft category) and related data sources.

Airport Name	FAA LID	Operations Data Source[1]	Fleet Mix Data Source[2]	2017 Operations: Air Carrier (AC)	Air Taxi (AT)	General Aviation (GA)	Military (ML)
Buckeye Municipal	BXK	AirNav	County-wide profile	0	100	52,800	100
Chandler Municipal	CHD	OPSNET	TFMSC	17	3,215	190,644	348
Falcon Field	FFZ	OPSNET	TFMSC	9	65,668	221,706	4,074
Gila Bend Municipal	E63	AirNav	County-wide profile	0	540	35,700	50
Glendale Municipal	GEU	OPSNET	TFMSC	1	394	74,478	132
Luke Air Force Base	LUF	[Emissions for 2017 were estimated by scaling based on numbers of F-16 and F-35 fighter jets, see text for details]					
Phoenix Deer Valley	DVT	OPSNET, Survey	TFMSC	12	4,670	373,961*	134
Phoenix Goodyear	GYR	OPSNET, Survey	TFMSC	199	5,208	102,359*	3,397
Phoenix-Mesa Gateway	IWA	OPSNET	TFMSC	11,503	38,202	233,248	7,503
Phoenix Sky Harbor	PHX	OPSNET	TFMSC	378,911	28,747	21,014	2,296
Pleasant Valley	P48	Survey	Survey	0	0	20,000*	0
Scottsdale	SDL	OPSNET	TFMSC	10	14,990	152,492	639
Sky Ranch at Carefree	18AZ	Survey	TFMSC	0	0	4,291	0
Stellar Airpark	P19	AirNav	TFMSC	0	0	40,000	0
Wickenburg Municipal	E25	AirNav	TFMSC	0	400	35,700	50

1. ***AirNav:*** *online database of FAA Form 5010 information (http://airnav.com)*
   OPSNET: *Operational Network (FAA, 2018a)*
   Survey: *MAG Airport Survey (2017 operations and fleet mix, conducted via email and telephone, 2018)*
2. ***TFMSC:*** *Traffic Management System Counts (FAA, 2018b)*
   County-wide profile: *representative fleet mix derived from reported data for 11 airports in Maricopa County*

** The number of operations includes T and G operations reported by airport.*

Note that T&G operations for fixed wing aircraft consist of an approach, brief ground roll (landing), an immediate takeoff, and a climb-out—all of which occur without exiting the runway. Specifically, a T&G operation counts as two operations in FAA procedures, because both a landing and a takeoff occur.

The following section describes the derivation of activity and emission estimates for general aviation activity at a representative airport: Chandler Municipal (CHD). The OPSNET database reported 190,644 general aviation operations at this airport in 2017, as listed in Table 4.2.3–1. The TFMSC database of general aviation activity and fleet mix at Chandler Municipal airport in 2017 comprised 97 different aircraft types, with a combined 2,133 operations. The smaller numbers reported in TFMSC are a representative sample of the total general aviation operations. The number of operations for each type in the sample divided by the combined number of operations in the sample gives a relative frequency distribution of aircraft types at this airport. This frequency distribution, multiplied by the total number of operations reported by OPSNET, provides the number of operations allocated to each aircraft type for input to the AEDT model. Table 4.2.3-2 demonstrates this calculation for the general aviation activity at Chandler Municipal Airport. When applied to each aircraft category at each airport, this procedure typically resulted in ten to 100 aircraft types representing 98.8 to 100% of all reported activity.

Table 4.2.3–2. Aircraft type activity distribution at Chandler Municipal airport.

Rank	Aircraft Type	TFMSC Reported Operations	Relative Frequency	Cumulative Frequency	Total Operations for AEDT*
1	BE20 - Beech 200 Super King	184	8.626%	8.626%	16,450
2	C172 - Cessna Skyhawk 172/Cutlass	151	7.079%	15.706%	13,496
3	C25C - Cessna Citation CJ4	148	6.939%	22.644%	13,228
4	P46T - Piper Malibu Meridian	133	6.235%	28.880%	11,888
5	AC90 - Gulfstream Commander	112	5.251%	34.130%	10,010
6	C525 - Cessna CitationJet/CJ1	108	5.063%	39.194%	9,652
7	LJ45 - Bombardier Learjet 45	92	4.313%	43.507%	8,222
8	R22 - Robinson R-22 Mariner	70	3.282%	46.789%	6,256
9	BE36 - Beech Bonanza 36	68	3.188%	49.977%	6,078
10	BE9L - Beech King Air 90	63	2.954%	52.930%	5,630
11	C182 - Cessna Skylane 182	61	2.860%	55.790%	5,452
12	C56X - Cessna Excel/XLS	60	2.813%	58.603%	5,362
13	P28A - Piper Cherokee	57	2.672%	61.275%	5,094
14	C560 - Cessna Citation V/Ultra/Encore	51	2.391%	63.666%	4,558
15	BE58 - Beech 58	45	2.110%	65.776%	4,022
16	SR22 - Cirrus SR 22	42	1.969%	67.745%	3,754
17	M20T - Turbo Mooney M20K	39	1.828%	69.573%	3,486
18	PC12 - Pilatus PC-12	34	1.594%	71.167%	3,038
19	C425 - Cessna 425 Corsair	32	1.500%	72.668%	2,860
20	C421 - Cessna Golden Eagle 421	28	1.313%	73.980%	2,502
21	M20P - Mooney M-20C Ranger	25	1.172%	75.152%	2,234
22	HDJT - HONDA HA-420 HondaJet	24	1.125%	76.278%	2,146
⋮	⋮	⋮	⋮	⋮	⋮
91	BT36 – Beech Bonanza A36TC/B36TC	1	0.047%	99.719%	90
92	C177 - Cessna 177 Cardinal	1	0.047%	99.766%	90
93	C25M - Cessna Citation M2	1	0.047%	99.812%	90
94	CL35 - Bombardier Challenger 300	1	0.047%	99.859%	90
95	LR25 - Bombardier Learjet 25	1	0.047%	99.906%	90
96	RV10 - Experimental	1	0.047%	99.953%	90
97	RV6 - AIEP Air Beetle	1	0.047%	100.000%	90
	Total:	**2,133**			**190,644**

** Computations rounded to produce even multiples of LTO, with adjustments to account for accumulated rounding error added to the dominant aircraft type.*

There are three types of aircraft with emissions at Luke AFB: F-16 fighter jets, F-35 fighter jets and transient aircraft. There are also emissions from associated GSE. The ratio of 0.52 between the number of F-16s based at Luke AFB in 2017 and the number of F-16s based there in 2008 (Weston, 2010) provides an estimate of aircraft and associated GSE emissions. Emissions from F-35 aircraft and their associated GSE were scaled using a ratio of 0.42 between the number of F-35 aircraft based at Luke AFB in 2017 and the future total number 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 for 2017 are similar to those for 2008 based on discussions with Luke AFB personnel.

4.2.4 Locomotives

There are three railway companies operating within the 2008 and 2015 8-hour ozone NAAs. Burlington Northern/Santa Fe Railway (BNSF), Union Pacific Railway (UP) and Amtrak each provided diesel fuel usage for the computation of annual emissions from locomotives. Railway operations from these companies fall into three categories: Class I haul lines, passenger trains, and yard/switching operations. Diesel fuel usage multiplied by emission factors published by ENVIRON and EPA (ENVIRON, 2007; US EPA, 1997, 2009)

produced the annual emission totals. Assuming that locomotive activity is uniform throughout the year, the annual totals divided by 365 days per year represent the ozone season-day emissions.

4.3 Emission allocation methodology

Spatial surrogates allocated the county-level annual and ozone season-day emissions for each of the categories to the 8-hour ozone NAAs using the methodology presented in this section. Table 4.3-1 summarizes the specific allocation methods used. The following sub-sections describe the methodologies.

Table 4.3–1. Calculation and allocation method for nonroad mobile sources.

Category	Allocation
Agricultural	Land Use (Agricultural)
Airport GSE+APUs	Location Data
Commercial	Employment (Industrial)
Construction	Employment (Construction)
Industrial	Employment (Industrial)
Lawn & garden	Employment (Landscaping) and Housing
Pleasure craft	Land Use (Lakes)
Railway maintenance	Railroad Track Miles
Recreational	Land Use (Passive Open + Vacant, Golf Courses)
Aircraft	Location Data
Locomotives	Railroad Track Miles

4.3.1 Land use

The acreages of specific land use categories are the spatial surrogates for the allocation of emissions to the 2008 and 2015 8-hour ozone NAAs for the agriculture, pleasure craft, and recreational sectors. Maricopa County annual and ozone season-day emissions, multiplied by the ratio of the category acreage in the NAA to the category acreage in Maricopa County, represent the annual and ozone season-day emissions for the NAA.

4.3.2 Location data

The geographic location of each source identifies whether it is located inside or outside of an 8-hour ozone NAA. Annual and ozone season-day emissions for each source located inside a NAA are included in NAA totals.

4.3.3 Employment

The number of employees in specific employment sectors are spatial surrogates for the allocation of county emissions to the 2008 and 2015 8-hour ozone NAAs for the commercial, construction and industrial sectors, as well as the commercial portion of the lawn and garden sector. Maricopa County annual and ozone season-day emissions, multiplied by the ratio of employees in the NAA to the number of employees in Maricopa County, represents the annual and ozone season-day emissions for the NAA.

4.3.4 Housing

The number of residential houses (single family and duplex) is the spatial surrogate for the allocation of county emissions to the 2008 and 2015 8-hour ozone NAAs for the residential portion of the lawn and garden sector. Maricopa County annual and ozone season-day emissions, multiplied by the ratio of the number of houses in the NAA to the number of houses in Maricopa County, represent the annual and ozone season-day emissions for the NAA

4.3.5 Railroad Track Miles

The number of miles of active railroad track is the spatial surrogate for the allocation of Maricopa County emissions to the 2008 and 2015 8-hour ozone NAAs for the railway maintenance sector. ArcGIS computed the number of track miles in Maricopa County, Pinal County, Gila County, and the 2008 and 2015 NAAs. Maricopa County annual and ozone season-day emissions, multiplied by the number of track miles in the NAA to the number of track miles in Maricopa County, represents the annual and ozone season-day emissions for the NAA.

4.4 Quality assurance procedures

A comparison of the 2017 nonroad mobile sources emission estimates to previous emissions inventories (2014 and 2011) provided a quality check of the results. Any unexpected changes (large increases or decreases in source emissions) triggered investigations to identify the reasons for the changes. Inspection of annual emissions totals computed individually for each source served as additional validation. Personnel who were not involved in the development of the results reviewed the input/output files and calculations for accuracy. In addition, external agency staff reviewed the emissions estimates.

4.5 Summary of nonroad mobile source emissions

Table 4.5–1 summarizes annual and ozone season-day emissions of VOC, NO_x, and CO from nonroad mobile sources in Maricopa County. Tables 4.5–2 and 4.5-3 show the annual and ozone season-day emissions for these pollutants for the 2008 and 2015 8-hour ozone NAAs.

Table 4.5–1. Annual and ozone 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	28.3	279.7	271.9	244	2,404	2,389
Airport GSE+APUs	54.7	230.5	1,507.0	283	1,215	7,778
Commercial	961.7	866.0	25,846.8	6,499	5,312	172,752
Construction	1,697.1	10,108.5	15,523.6	11,815	69,850	110,325
Industrial	139.0	917.9	3,543.2	878	5,516	22,925
Lawn & garden	2,832.0	520.9	47,666.5	26,757	4,570	489,078
Pleasure craft	227.4	66.9	795.9	4,361	1,676	20,620
Railway maintenance	1.2	5.9	14.7	9	41	105
Recreational	512.5	46.5	5,379.2	6,203	530	69,785
Aircraft	1,698.8	2,961.7	9,361.7	8,643	16,575	48,164
Locomotives	62.3	1,427.0	328.4	342	7,819	1,799
Total:	**8,215.0**	**17,431.5**	**110,238.9**	**66,034**	**115,508**	**945,720**

Table 4.5–2. Annual and ozone season-day emissions from nonroad mobile sources in the 2008 8-hour ozone NAA.

Category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Agricultural	16.6	163.8	159.3	143	1,408	1,399
Airport GSE+APUs	53.8	228.1	1,480.3	279	1,202	7,632
Commercial	960.2	864.7	25,808.3	6,490	5,304	172,495
Construction	1,679.7	10,005.3	15,365.1	11,695	69,136	109,199
Industrial	138.8	916.5	3,537.9	877	5,507	22,891
Lawn & garden	2,848.4	524.0	47,943.2	26,911	4,597	491,907
Pleasure craft	227.4	66.9	795.9	4,361	1,676	20,620
Railway maintenance	0.9	4.4	11.0	6	30	78
Recreational	269.5	33.2	4,317.5	3,273	375	56,107
Aircraft	1,673.5	2,952.0	9,228.7	8,506	16,522	47,438
Locomotives	47.9	1,088.4	249.4	263	5,964	1,366
Total:	**7,916.7**	**16,847.3**	**108,896.6**	**62,804**	**111,721**	**931,132**

Table 4.5–3. Annual and ozone season-day emissions from nonroad mobile sources in the 2015 8-hour ozone NAA.

Category	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Agricultural	17.8	175.7	170.8	153	1,510	1,501
Airport GSE+APUs	53.8	228.1	1,480.3	279	1,202	7,632
Commercial	961.2	865.6	25,835.7	6,497	5,310	172,678
Construction	1,680.7	10,011.0	15,373.8	11,701	69,176	109,261
Industrial	138.9	917.5	3,541.6	878	5,513	22,915
Lawn & garden	2,902.7	530.7	48,784.6	27,473	4,665	501,847
Pleasure craft	230.8	67.9	807.7	4,425	1,701	20,927
Railway maintenance	0.9	4.5	11.2	7	31	80
Recreational	286.2	35.0	4,540.3	3,475	395	59,001
Aircraft	1,673.5	2,952.0	9,228.7	8,506	16,522	47,438
Locomotives	48.8	1,108.7	254.1	267	6,075	1,392
Total:	**7,995.3**	**16,896.7**	**110,028.8**	**63,661**	**112,100**	**944,672**

4.6 References

AZOGCC, 2018. Production Reports. Arizona Oil and Gas Conservation Commission. http://www.azogcc.az.gov/production_reports

ENVIRON et al., 2003. Maricopa County 2002 Comprehensive Emission Inventory for the Cap and Trade Oversight Committee, Final Rep. Oct. 9, 2003. Prepared for Arizona Department of Environmental Quality.

ENVIRON, 2007. LADCO 2005 Locomotive Emissions. Draft Rep. Feb. 2007. Prepared for the Lake Michigan Air Directors Consortium.

FAA, 2018a. Operational Network (OPSNET) database. Federal Aviation Administration. https://aspm.faa.gov/opsnet/sys/Airport.asp.

FAA, 2018b. Traffic Flow Management System Counts (TFMSC) database. Federal Aviation Administration. https://aspm.faa.gov/tfms/sys/Airport.asp.

FAA, 2018c. Terminal Area Forecast (TAF) database. Federal Aviation Administration. https://taf.faa.gov.

NCEI, 2018. Local Climatological Data. NOAA National Centers for Environmental Information. https://www.ncdc.noaa.gov/IPS/lcd.

USAF, 2012. Final F-35A Training Basing Environmental Impact Statement. http://www.dtic.mil/dtic/tr/fulltext/u2/a612501.pdf.

US EPA, 1997. Emission Factors for Locomotives. Office of Mobile Sources. Rep. EPA-420-F09-025, December 1997.

US EPA, 2009. Emission Factors for Locomotives. Office of Transportation and Air Quality. Rep. EPA-420-F09-025, April 2009.

Weston, 2010. 2008 Mobile Source Air Emissions Inventory for Luke Air Force Base. Weston Solutions, Inc. Prepared for Air Education and Training Command (AETC), US Air Force, Randolph AFB, TX. June 2010.

Onroad Mobile Sources

5.1 Introduction

The 2017 PEI calculates onroad mobile source emissions for ozone precursors, such as VOCs, NO_x, and CO for Maricopa County and the 2008 and 2015 8-hour ozone NAAs.

MOVES2014b is the latest model developed by the US EPA for the purpose of estimating onroad and off-network motor vehicle emission factors.

MOVES2014b inputs were developed using local data from multiple sources such as ADOT, AZDA, MAG Transportation Divison, and NCEI. .

The main references for preparing the onroad mobile source portion of the 2017 emissions inventory were:

- Policy Guidance on the Use of MOVES2014 for State Implementation Plan Development, Transportation Conformity, and Other Purposes (US EPA, 2014);
- MOVES2014a User Guide (US EPA, 2015a);
- MOVES2014a Software Design Reference Manual (US EPA, 2015b);
- MOVES2014a User Interface Reference Manual (US EPA, 2016);
- Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standard (NAAQS) and Regional Haze Regulations (US EPA, 2017);
- MOVES2014 User Interface Reference Manual Appendix: MOVES2014b (US EPA, 2018a); and
- MOVES2014, MOVES2014a, and MOVES2014b Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity (US EPA, 2018b).

5.2 Onroad mobile source emissions

Exhaust, evaporative, refueling, and extended idling emissions from onroad mobile sources were calculated using the EPA state-of-the-art emissions modeling tool, MOVES2014b. MOVES2014b is intended for official use to estimate national, state, and county level inventories of criteria air pollutants from highway vehicles. The user of MOVES2014b 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 2017, MOVES2014b was executed using local input data for each geographical area (Maricopa County, the 8-hour ozone NAA for the 2008 standard, and the 8-hour ozone NAA for the 2015 standard). Each scenario was created using the county scale setting and the inventory calculation type. The specific MOVES2014b model RunSpec and RunSpec summaries are described in Appendix C.

5.2.1 Local input data used with the MOVES2014b model

MOVES2014b requires local data such as the presence of inspection and maintenance (I/M) programs, meteorological data, vehicle populations, source type age distribution, annual VMT, monthly/daily/hourly fractions, road type distribution, average speed distribution, ramp fraction, fuel data, and alternative vehicle and fuel technologies (AVFT).

5.2.1.1 Fuel data

Regarding the fuel local input data, MOVES2014b provides three MOVES tables, which are [fuelsupply], [fuelformulation], and [fuelusagefraction]. The fuel data for each month were derived from the 2017 fuel inspection results in Maricopa County provided by AZDA. The fuel data for Maricopa County were also applied to the 8-hour ozone NAAs. The specific MOVES tables for fuel data are presented in Appendix C.

5.2.1.2 I/M programs

MOVES2014b 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 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 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 Area A participate in the I/M program, while 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 specific MOVES table for I/M programs is presented in Appendix C.

5.2.1.3 Meteorological data

MOVES2014b requires hourly temperature and relative humidity data by specific month of the year. Meteorological data for the Phoenix Sky Harbor International Airport in 2017 were obtained from the NCEI (https://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 NAAs. The specific MOVES table [ZoneMonthHour] for meteorological data is presented in Appendix C.

5.2.1.4 Vehicle population

In MOVES2014b, 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 and Pinal County was obtained from the July 2017 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 each county in 2017. For the 8-hour ozone NAAs, the vehicle population was estimated by merging the vehicle population in the NAA portion of each county. The population ratio of the NAA portion and county was applied to estimate the vehicle population in each NAA portion. The population ratios for 2017 were derived from the MAG socioeconomic data. The specific MOVES table [SourceTypeYear] for vehicle population is presented in Appendix C.

5.2.1.5 Source type age distribution

MOVES2014b 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 July 2017 vehicle registration data from ADOT. The same source/type/age distribution was applied for Maricopa County and the 8-hour ozone NAAs. The specific MOVES table [SourceTypeAgeDistribution] for source/type/age distribution is presented in Appendix C.

5.2.1.6 Annual VMT

The 2017 annual VMTs were used to estimate onroad exhaust and evaporative emissions. The 2017 annual average daily VMTs for Maricopa County and the 8-hour ozone NAAs were derived from the 2017 traffic assignment data provided by the MAG Transportation Modeling Group. The annual average daily VMTs were multiplied by 365 days to obtain the annual VMTs. The specific MOVES table [HPMS[2]vTypeYear] for annual VMT is presented in Appendix C.

5.2.1.7 Road type distribution

MOVES2014b 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 2017 traffic assignment data and the MOVES default VMT fractions for the HPMS vehicle types. The road type distribution assigned to the HPMS vehicle class was applied to all MOVES source types in the class. The specific MOVES table [RoadTypeDistribution] for road type distribution is presented in Appendix C.

5.2.1.8 VMT fraction

Since VMT varies by month, day of week, and hour, MOVES2014b 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.

5.2.1.9 Average speed distribution

In MOVES2014b, vehicle power, speed, and acceleration have a significant effect on vehicle emissions for all pollutants. MOVES2014b 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 2017 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 NAAs. The specific MOVES table [AvgSpeedDistribution] for the average speed distribution is presented in Appendix C.

5.2.1.10 Ramp fraction

[2] Highway Performance Monitoring System

MOVES2014b requires the ramp fraction, which represents the percent of VHT on ramps, on both rural and urban restricted roads. 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 2017 traffic assignment. The specific MOVES table [RoadType] for ramp fractions is shown in Appendix C.

5.2.1.11 Alternative vehicle and fuel technologies (AVFT) strategy

MOVES2014b 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, MOVES2014b 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.

5.2.1.12 Stage II refueling control programs

To account for the impact of Stage II refueling control programs on refueling losses, MOVES2014b requires the control efficiency for the local area. The control efficiency of 50% for the refueling displacement vapor losses were provided by AZDA. The same program efficiency was applied to Maricopa County and the 8-hour ozone NAAs. The specific MOVES table [CountyYear] for Stage II refueling control programs is presented in Appendix C.

5.2.2 MOVES2014b outputs

MOVES2014b 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

5.2.3 MOVES2014b emission estimates

MOVES2014b was used to generate onroad emissions by source type, road type, weekday/weekend day, and month. By specifying the output time aggregate level as month, MOVES2014b produces monthly emissions including weekday and weekend emissions for a given month. The annual emissions were calculated by aggregating monthly onroad emissions derived by MOVES2014b. 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 through 5.2-3 show the calculated annual and ozone season-day VOC, NO_x, and CO emissions by road and vehicle type in Maricopa County, the 8-hour ozone NAA for the 2008 standard, and the 8-hour ozone NAA for the 2015 standard, 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/yr)			Ozone season-day emissions (lbs/day)		
		VOC	NO_x	CO	VOC	NO_x	CO
Off-Network	Motorcycle	401.7	3.4	102.6	2,891	15	481
	Passenger car	8,452.6	3,529.0	35,987.6	54,788	18,719	185,165
	Passenger truck	2,892.1	1,695.3	14,856.0	18,413	9,133	78,723
	Light commercial truck	736.8	465.8	4,487.5	4,627	2,512	23,876
	Intercity bus	0.0	0.1	1.6	0	0	9
	Transit bus	0.1	0.0	16.3	0	0	89
	School bus	2.8	1.1	138.3	11	6	757
	Refuse truck	0.3	0.1	11.5	1	0	63
	Single unit short-haul truck	83.7	80.4	2,414.7	478	437	13,117
	Single unit long-haul truck	1.2	1.6	19.9	6	9	109
	Motor home	12.2	4.3	264.8	88	24	1,440
	Combination short-haul truck	1.0	0.0	58.6	0	0	321
	Combination long-haul truck	308.9	1,815.0	837.2	1,629	9,082	4,438
Rural Restricted Access	Motorcycle	3.1	3.0	44.2	18	15	231
	Passenger car	25.6	99.5	1,166.5	151	563	7,907
	Passenger truck	15.0	67.3	532.9	89	377	3,578
	Light commercial truck	3.7	17.6	128.5	22	99	863
	Intercity bus	0.5	11.3	2.2	3	57	12
	Transit bus	0.4	8.9	9.3	2	46	49
	School bus	2.5	28.6	11.6	13	143	61
	Refuse truck	0.4	8.8	2.0	2	44	10
	Single unit short-haul truck	9.8	85.1	102.1	55	433	546
	Single unit long-haul truck	0.5	5.0	2.6	2	25	14
	Motor home	0.7	3.7	10.5	4	19	56
	Combination short-haul truck	12.2	266.8	48.4	65	1,338	256
	Combination long-haul truck	34.0	792.5	142.2	182	3,975	752
Rural Unrestricted Access	Motorcycle	19.4	11.8	186.8	110	58	978
	Passenger car	121.3	323.6	3,653.1	710	1,834	24,672
	Passenger truck	66.3	208.3	1,568.1	389	1,167	10,478
	Light commercial truck	17.6	58.4	406.6	103	330	2,718
	Intercity bus	0.4	5.5	1.4	2	27	8
	Transit bus	0.3	3.8	4.9	2	19	26
	School bus	1.5	11.7	5.7	8	59	30
	Refuse truck	0.8	13.5	3.8	4	68	20
	Single unit short-haul truck	21.5	142.7	193.4	119	725	1,034
	Single unit long-haul truck	1.0	8.9	4.8	5	45	25
	Motor home	1.3	5.3	16.2	7	27	87
	Combination short-haul truck	4.4	73.9	17.9	24	371	94
	Combination long-haul truck	12.2	222.1	51.4	65	1,114	272

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

Road type	Source type	Annual emissions (tons/yr)			Ozone season-day emissions (lbs/day)		
		VOC	NO_x	CO	VOC	NO_x	CO
Urban Restricted Access	Motorcycle	68.5	57.7	854.8	387	283	4,478
	Passenger car	727.0	2,480.8	37,610.8	4,281	14,055	254,968
	Passenger truck	406.6	1,624.6	15,923.9	2,398	9,114	106,901
	Light commercial truck	101.7	424.0	3,658.1	599	2,384	24,565
	Intercity bus	2.2	40.2	9.1	12	202	48
	Transit bus	2.2	33.6	41.7	12	175	221
	School bus	11.0	108.8	48.5	59	546	258
	Refuse truck	6.7	126.9	31.5	36	636	167
	Single unit short-haul truck	185.3	1,433.8	1,926.7	1,034	7,289	10,312
	Single unit long-haul truck	8.2	88.5	45.1	44	444	240
	Motor home	12.7	58.2	189.0	73	298	1,014
	Combination short-haul truck	33.0	628.4	131.0	177	3,152	693
	Combination long-haul truck	90.8	1,864.4	381.3	487	9,353	2,016
Urban Unrestricted Access	Motorcycle	188.0	77.6	1,414.9	1,067	380	7,412
	Passenger car	1,389.8	3,125.4	39,420.5	8,125	17,771	265,899
	Passenger truck	745.3	1,959.3	16,443.3	4,363	11,024	109,648
	Light commercial truck	200.4	562.5	4,279.4	1,173	3,193	28,535
	Intercity bus	2.4	33.0	9.6	13	165	50
	Transit bus	2.1	17.4	23.5	11	90	124
	School bus	9.6	62.8	29.2	51	315	155
	Refuse truck	6.8	101.4	29.5	36	509	156
	Single unit short-haul truck	186.3	1,095.2	1,519.4	1,032	5,547	8,126
	Single unit long-haul truck	8.5	70.9	36.3	46	355	193
	Motor home	11.4	37.9	126.5	65	193	678
	Combination short-haul truck	20.6	307.9	77.1	110	1,545	408
	Combination long-haul truck	55.6	910.3	221.9	298	4,567	1,174

Table 5.2–2. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone NAA for the 2008 standard, by road and source type.

Road type	Source type	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
		VOC	NO_x	CO	VOC	NO_x	CO
Off-Network	Motorcycle	406.4	3.4	103.8	2,925	15	487
	Passenger car	8,500.9	3,548.5	36,186.8	55,102	18,823	186,190
	Passenger truck	2,912.9	1,707.2	14,960.8	18,547	9,197	79,279
	Light commercial truck	742.2	469.1	4,519.4	4,660	2,530	24,045
	Intercity bus	0.0	0.1	1.6	0	0	9
	Transit bus	0.1	0.0	16.2	0	0	89
	School bus	2.8	1.1	139.7	11	6	764
	Refuse truck	0.3	0.1	11.6	1	0	64
	Single unit short-haul truck	84.7	81.3	2,442.4	484	442	13,267
	Single unit long-haul truck	1.2	1.6	20.1	6	9	110
	Motor home	12.4	4.4	267.3	89	24	1,453
	Combination short-haul truck	1.1	0.0	59.5	0	0	326
	Combination long-haul truck	157.7	923.9	456.4	829	4,623	2,425

Table 5.2–2. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone NAA for the 2008 standard, by road and source type (continued).

Road type	Source type	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
		VOC	NO_x	CO	VOC	NO_x	CO
Rural Restricted Access	Motorcycle	1.7	1.7	24.8	10	8	130
	Passenger car	14.1	55.2	652.8	83	313	4,425
	Passenger truck	8.3	37.4	298.7	49	210	2,005
	Light commercial truck	2.1	9.8	71.9	12	55	483
	Intercity bus	0.3	5.8	1.1	1	29	6
	Transit bus	0.2	4.5	4.7	1	23	25
	School bus	1.3	14.7	5.9	7	74	31
	Refuse truck	0.2	4.0	0.9	1	20	5
	Single unit short-haul truck	4.4	38.8	46.3	25	197	247
	Single unit long-haul truck	0.2	2.3	1.2	1	11	6
	Motor home	0.3	1.7	4.8	2	9	26
	Combination short-haul truck	6.2	136.1	24.5	33	683	130
	Combination long-haul truck	17.3	404.5	72.1	93	2,029	381
Rural Unrestricted Access	Motorcycle	17.2	10.4	165.6	97	51	868
	Passenger car	106.4	284.3	3,210.5	623	1,611	21,682
	Passenger truck	58.3	183.2	1,379.5	342	1,027	9,218
	Light commercial truck	15.5	51.4	357.8	91	290	2,391
	Intercity bus	0.3	4.3	1.1	1	22	6
	Transit bus	0.2	3.0	3.9	1	15	20
	School bus	1.2	9.4	4.5	7	47	24
	Refuse truck	0.7	11.3	3.2	4	56	17
	Single unit short-haul truck	17.9	118.8	161.1	99	603	862
	Single unit long-haul truck	0.9	7.4	4.0	5	37	21
	Motor home	1.1	4.4	13.5	6	22	72
	Combination short-haul truck	3.5	58.3	14.1	19	292	74
	Combination long-haul truck	9.6	175.3	40.5	51	879	214
Urban Restricted Access	Motorcycle	68.7	58.0	858.4	388	284	4,496
	Passenger car	729.8	2,491.4	37,811.3	4,297	14,115	256,328
	Passenger truck	408.8	1,633.9	16,030.1	2,411	9,166	107,614
	Light commercial truck	102.3	426.4	3,681.9	602	2,397	24,725
	Intercity bus	2.2	40.3	9.1	12	202	48
	Transit bus	2.2	33.1	41.1	12	172	218
	School bus	11.0	108.9	48.5	59	546	258
	Refuse truck	6.7	127.6	31.7	36	640	168
	Single unit short-haul truck	185.7	1,437.1	1,931.3	1,036	7,306	10,337
	Single unit long-haul truck	8.2	88.7	45.2	44	445	240
	Motor home	12.8	58.2	189.1	73	298	1,014
	Combination short-haul truck	32.9	626.3	130.6	176	3,142	691
	Combination long-haul truck	90.6	1,859.0	380.2	486	9,326	2,011
Urban Unrestricted Access	Motorcycle	189.3	78.2	1,425.7	1,074	384	7,469
	Passenger car	1,398.6	3,146.9	39,675.5	8,177	17,892	267,621
	Passenger truck	751.3	1,976.0	16,576.8	4,398	11,117	110,539
	Light commercial truck	202.0	567.3	4,314.3	1,182	3,220	28,768
	Intercity bus	2.5	33.2	9.6	13	167	51
	Transit bus	2.1	17.3	23.3	11	90	123
	School bus	9.7	63.2	29.4	52	317	156
	Refuse truck	6.8	102.2	29.8	37	513	158
	Single unit short-haul truck	187.1	1,099.7	1,525.6	1,036	5,570	8,159
	Single unit long-haul truck	8.6	71.2	36.5	46	357	194
	Motor home	11.5	38.0	126.8	65	194	679
	Combination short-haul truck	20.7	308.8	77.3	111	1,549	409
	Combination long-haul truck	55.8	913.3	222.6	299	4,582	1,177

Table 5.2–3. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone NAA for the 2015 standard, by road and source type.

Road type	Source type	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
		VOC	NO_x	CO	VOC	NO_x	CO
Off-Network	Motorcycle	419.6	3.6	107.2	3,021	15	502
	Passenger car	8,686.2	3,625.6	36,972.6	56,304	19,231	190,233
	Passenger truck	2,984.1	1,748.9	15,325.6	19,000	9,421	81,212
	Light commercial truck	760.3	480.6	4,629.9	4,775	2,592	24,633
	Intercity bus	0.0	0.1	1.7	0	0	9
	Transit bus	0.1	0.0	16.3	0	0	89
	School bus	2.9	1.1	143.8	11	6	787
	Refuse truck	0.3	0.1	12.1	1	0	66
	Single unit short-haul truck	87.5	83.9	2,520.8	499	457	13,693
	Single unit long-haul truck	1.3	1.7	20.7	6	9	114
	Motor home	12.7	4.5	274.9	92	24	1,494
	Combination short-haul truck	1.1	0.0	61.8	0	0	339
	Combination long-haul truck	157.7	924.1	458.9	829	4,624	2,438
Rural Restricted Access	Motorcycle	1.7	1.7	24.8	10	8	130
	Passenger car	14.1	55.2	652.4	83	313	4,422
	Passenger truck	8.3	37.5	299.3	49	210	2,009
	Light commercial truck	2.1	9.8	72.1	12	55	484
	Intercity bus	0.3	5.8	1.1	1	29	6
	Transit bus	0.2	4.4	4.6	1	23	24
	School bus	1.3	14.8	6.0	7	74	32
	Refuse truck	0.2	4.1	0.9	1	20	5
	Single unit short-haul truck	4.4	38.7	46.2	25	197	247
	Single unit long-haul truck	0.2	2.3	1.2	1	11	6
	Motor home	0.3	1.7	4.8	2	9	26
	Combination short-haul truck	6.2	136.0	24.5	33	682	130
	Combination long-haul truck	17.3	404.6	72.1	93	2,030	381
Rural Unrestricted Access	Motorcycle	20.0	11.8	188.7	113	58	988
	Passenger car	124.4	327.0	3,734.4	728	1,853	25,217
	Passenger truck	68.2	210.7	1,603.4	400	1,181	10,711
	Light commercial truck	18.1	59.2	416.0	106	334	2,779
	Intercity bus	0.3	4.8	1.3	2	24	7
	Transit bus	0.3	3.2	4.2	1	17	22
	School bus	1.4	10.4	5.0	7	52	27
	Refuse truck	0.8	12.9	3.7	4	65	19
	Single unit short-haul truck	20.5	135.3	183.8	113	687	983
	Single unit long-haul truck	1.0	8.5	4.5	5	42	24
	Motor home	1.2	5.0	15.3	7	25	82
	Combination short-haul truck	3.9	64.6	15.6	21	324	83
	Combination long-haul truck	10.7	194.4	45.0	57	976	238
Urban Restricted Access	Motorcycle	68.7	58.0	858.4	388	284	4,496
	Passenger car	729.4	2,490.0	37,790.1	4,295	14,107	256,184
	Passenger truck	409.7	1,637.3	16,063.0	2,416	9,185	107,835
	Light commercial truck	102.5	427.3	3,689.7	603	2,402	24,778
	Intercity bus	2.2	40.5	9.2	12	203	49
	Transit bus	2.1	32.5	40.3	11	169	213
	School bus	11.1	109.7	48.9	59	550	260
	Refuse truck	6.8	128.5	31.9	36	645	169
	Single unit short-haul truck	185.6	1,436.9	1,931.0	1,036	7,305	10,335
	Single unit long-haul truck	8.2	88.7	45.2	44	445	240
	Motor home	12.7	58.0	188.4	73	297	1,010
	Combination short-haul truck	32.8	625.9	130.5	176	3,140	690
	Combination long-haul truck	90.6	1,859.5	380.3	486	9,328	2,011

Table 5.2–3. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone NAA for the 2015 standard, by road and source type (continued).

Road type	Source type	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
		VOC	NO_x	CO	VOC	NO_x	CO
Urban Unrestricted Access	Motorcycle	191.5	79.0	1,441.3	1,087	388	7,551
	Passenger car	1,414.4	3,180.6	40,108.7	8,269	18,085	270,542
	Passenger truck	761.7	2,002.3	16,801.4	4,459	11,266	112,035
	Light commercial truck	204.8	574.9	4,373.0	1,198	3,264	29,160
	Intercity bus	2.5	33.5	9.7	13	168	51
	Transit bus	2.1	17.0	22.9	11	88	121
	School bus	9.8	63.9	29.8	52	320	158
	Refuse truck	6.9	103.6	30.2	37	520	160
	Single unit short-haul truck	188.3	1,106.7	1,535.2	1,043	5,606	8,211
	Single unit long-haul truck	8.6	71.6	36.7	46	359	195
	Motor home	11.5	38.1	127.1	65	194	681
	Combination short-haul truck	20.7	309.9	77.6	111	1,555	410
	Combination long-haul truck	56.0	917.4	223.7	300	4,603	1,183

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 2017 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 MOVES2014b analyses included accuracy, completeness, and reasonableness checks. For reasonableness, the 2017 onroad mobile sources emission estimates were compared with previous emissions inventories. For accuracy and completeness, all input/output data and calculations were checked by an independent reviewer. Any errors found were corrected and the corrections were then rechecked by the reviewer.

5.4 Summary of all onroad mobile source emissions

Tables 5.4–1 through 5.4–3 summarize annual and season-day onroad mobile source emissions, by road type, for Maricopa County, the 8-hour ozone NAA for the 2008 standard, and the 8-hour ozone NAA for the 2015 standard, respectively. Tables 5.4–4 through 5.4–6 also summarize annual and season-day emissions from onroad mobile sources, by vehicle type. Table 5.4–7 summarizes the annual and ozone season-day emissions for VOC, NO_x, and CO from all onroad mobile sources in Maricopa County, the 8-hour ozone NAA for the 2008 standard, and the 8-hour ozone NAA for the 2015 standard in 2017.

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

Road type	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Off-network	12,893.4	7,596.1	59,196.6	82,932	39,937	308,588
Rural restricted access	108.4	1,398.1	2,203.0	608	7,134	14,335
Rural unrestricted access	268.0	1,089.5	6,114.1	1,548	5,844	40,442
Urban restricted access	1,655.9	8,969.9	60,851.5	9,599	47,931	405,881
Urban unrestricted access	2,826.8	8,361.6	63,631.1	16,390	45,654	422,558
Totals:	**17,752.5**	**27,415.2**	**191,996.3**	**111,077**	**146,500**	**1,191,804**

Table 5.4–2. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone NAA for the 2008 standard, by road type.

Road type	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Off-network	12,822.7	6,740.7	59,185.6	82,654	35,669	308,508
Rural restricted access	56.6	716.5	1,209.7	318	3,661	7,900
Rural unrestricted access	232.8	921.5	5,359.3	1,346	4,952	35,469
Urban restricted access	1,661.9	8,988.9	61,188.5	9,632	48,039	408,148
Urban unrestricted access	2,846.0	8,415.3	64,073.2	16,501	45,952	425,503
Totals:	**17,620.0**	**25,782.9**	**191,016.3**	**110,451**	**138,273**	**1,185,528**

Table 5.4–3. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone NAA for the 2015 standard, by road type.

Road type	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Off-network	13,113.8	6,874.2	60,546.3	84,538	36,379	315,609
Rural restricted access	56.6	716.6	1,210.0	318	3,661	7,902
Rural unrestricted access	270.8	1,047.8	6,220.9	1,564	5,638	41,180
Urban restricted access	1,662.4	8,992.8	61,206.9	9,635	48,060	408,270
Urban unrestricted access	2,878.8	8,498.5	64,817.3	16,691	46,416	430,458
Totals:	**17,982.4**	**26,129.9**	**194,001.4**	**112,746**	**140,154**	**1,203,419**

Table 5.4–4. Annual and ozone season-day onroad mobile source emissions in Maricopa County, by source type.

Source type	Annual emissions (tons/yr)			Ozone season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Motorcycle	680.7	153.5	2,603.3	4,473	751	13,580
Passenger car	10,716.3	9,558.3	117,838.5	68,055	52,942	738,611
Passenger truck	4,125.3	5,554.8	49,324.2	25,652	30,815	309,328
Light commercial truck	1,060.2	1,528.3	12,960.1	6,524	8,518	80,557
Intercity bus	5.5	90.1	23.9	30	451	127
Transit bus	5.1	63.7	95.7	27	330	509
School bus	27.4	213.0	233.3	142	1,069	1,261
Refuse truck	15.0	250.7	78.3	79	1,257	416
Single unit short-haul truck	486.6	2,837.2	6,156.3	2,718	14,431	33,135
Single unit long-haul truck	19.4	174.9	108.7	103	878	581
Motor home	38.3	109.4	607.0	237	561	3,275
Combination short-haul truck	71.2	1,277.0	333.0	376	6,406	1,772
Combination long-haul truck	501.5	5,604.3	1,634.0	2,661	28,091	8,652
Totals:	**17,752.5**	**27,415.2**	**191,996.3**	**111,077**	**146,500**	**1,191,804**

Table 5.4–5. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone NAA for the 2008 standard, by source type.

Source type	Annual emissions (tons/yr)			Ozone season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Motorcycle	683.3	151.7	2,578.3	4,494	742	13,450
Passenger car	10,749.8	9,526.3	117,536.9	68,282	52,754	736,246
Passenger truck	4,139.6	5,537.7	49,245.9	25,747	30,717	308,655
Light commercial truck	1,064.1	1,524.0	12,945.3	6,547	8,492	80,412
Intercity bus	5.3	83.7	22.5	27	420	120
Transit bus	4.8	57.9	89.2	25	300	475
School bus	26.0	197.3	228.0	136	990	1,233
Refuse truck	14.7	245.2	77.2	79	1,229	412
Single unit short-haul truck	479.8	2,775.7	6,106.7	2,680	14,118	32,872
Single unit long-haul truck	19.1	171.2	107.0	102	859	571
Motor home	38.1	106.7	601.5	235	547	3,244
Combination short-haul truck	64.4	1,129.5	306.0	339	5,666	1,630
Combination long-haul truck	331.0	4,276.0	1,171.8	1,758	21,439	6,208
Totals:	**17,620.0**	**25,782.9**	**191,016.3**	**110,451**	**138,273**	**1,185,528**

Table 5.4–6. Annual and ozone season-day onroad mobile source emissions in the 8-hour ozone NAA for the 2015 standard, by source type.

Source type	Annual emissions (tons/yr)			Ozone season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Motorcycle	701.5	154.1	2,620.4	4,619	753	13,667
Passenger car	10,968.5	9,678.4	119,258.2	69,679	53,589	746,598
Passenger truck	4,232.0	5,636.7	50,092.7	26,324	31,263	313,802
Light commercial truck	1,087.8	1,551.8	13,180.7	6,694	8,647	81,834
Intercity bus	5.3	84.7	23.0	28	424	122
Transit bus	4.8	57.1	88.3	24	297	469
School bus	26.5	199.9	233.5	136	1,002	1,264
Refuse truck	15.0	249.2	78.8	79	1,250	419
Single unit short-haul truck	486.3	2,801.5	6,217.0	2,716	14,252	33,469
Single unit long-haul truck	19.3	172.8	108.3	102	866	579
Motor home	38.4	107.3	610.5	239	549	3,293
Combination short-haul truck	64.7	1,136.4	310.0	341	5,701	1,652
Combination long-haul truck	332.3	4,300.0	1,180.0	1,765	21,561	6,251
Totals:	**17,982.4**	**26,129.9**	**194,001.4**	**112,746**	**140,154**	**1,203,419**

Table 5.4–7. Annual and ozone season-day emissions from all onroad mobile sources in Maricopa County, the 8-hour ozone NAA for the 2008 standard, and the 8-hour ozone NAA for the 2015 standard.

Geographic area	Annual emissions (tons/yr)			Ozone season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	17,752.5	27,415.2	191,996.3	111,077	146,500	1,191,804
8-hour ozone NAA for the 2008 standard	17,620.0	25,782.9	191,016.3	110,451	138,273	1,185,528
8-hour ozone NAA for the 2015 standard	17,982.4	26,129.9	194,001.4	112,746	140,154	1,203,419

5.5 References

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

US EPA, 2014. Policy Guidance on the Use of MOVES2014 for State Implementation Plan Development, Transportation Conformity, and Other Purposes, U.S. Environmental Protection Agency, EPA-420-B-14-008, July 2014.

US EPA, 2015a. MOVES2014a User Guide, U.S. Environmental Protection Agency, EPA-420-B-15-095, November 2015.

US EPA, 2015b. MOVES2014a Software Design Reference Manual, U.S. Environmental Protection Agency, EPA-420-B-15-096, November 2015.

US EPA, 2016. MOVES2014a User Interface Reference Manual, U.S. Environmental Protection Agency, EPA-420-B-16-085, November 2016.

US EPA, 2017. Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations, U.S. Environmental Protection Agency, EPA-454-B-17-003, July 2017.

US EPA, 2018a. MOVES2014 User Interface Reference Manual Appendix: MOVES2014b, U.S. Environmental Protection Agency, EPA-420-B-18-038, August 2018.

US EPA, 2018b. MOVES2014, MOVES2014a, and MOVES2014b Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity, U.S. Environmental Protection Agency, EPA-420-B-18-039, August 2018.

Biogenic Sources

6.1 Introduction

Biogenic emissions have been estimated for the 2017 PEI for ozone precursors in Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards using MEGAN. MEGAN is a state-of-the-art biogenic emissions model developed initially at the NCAR and maintained at the University of California, Irvine. Some 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). VOCs, CO, and NO_x emissions are reported as ozone precursor emissions.

In an effort to improve the meteorology field generated for MEGAN by the Weather Research and Forecasting Model (WRF), WRF Data Assimilation (WRFDA) was implemented for the 2017 PEI using surface observational data and upper-air sounding data obtained from the National Centers for Environmental Prediction (NCEP). The WRF Data Assimilation technique combines observations with WRF outputs (the first guess or background forecast) and their respective error statistics to provide an improved estimate (the analysis) of the atmospheric state. The application of the four-dimensional data assimilation (FDDA) option using surface observations further improved the WRF meteorological modeling performance as described in section 6.3 below.

Gridded biogenic emissions were calculated for each day in 2017 using day-specific hourly WRF meteorology. The gridded daily emissions were aggregated to produce monthly and annual emission totals.

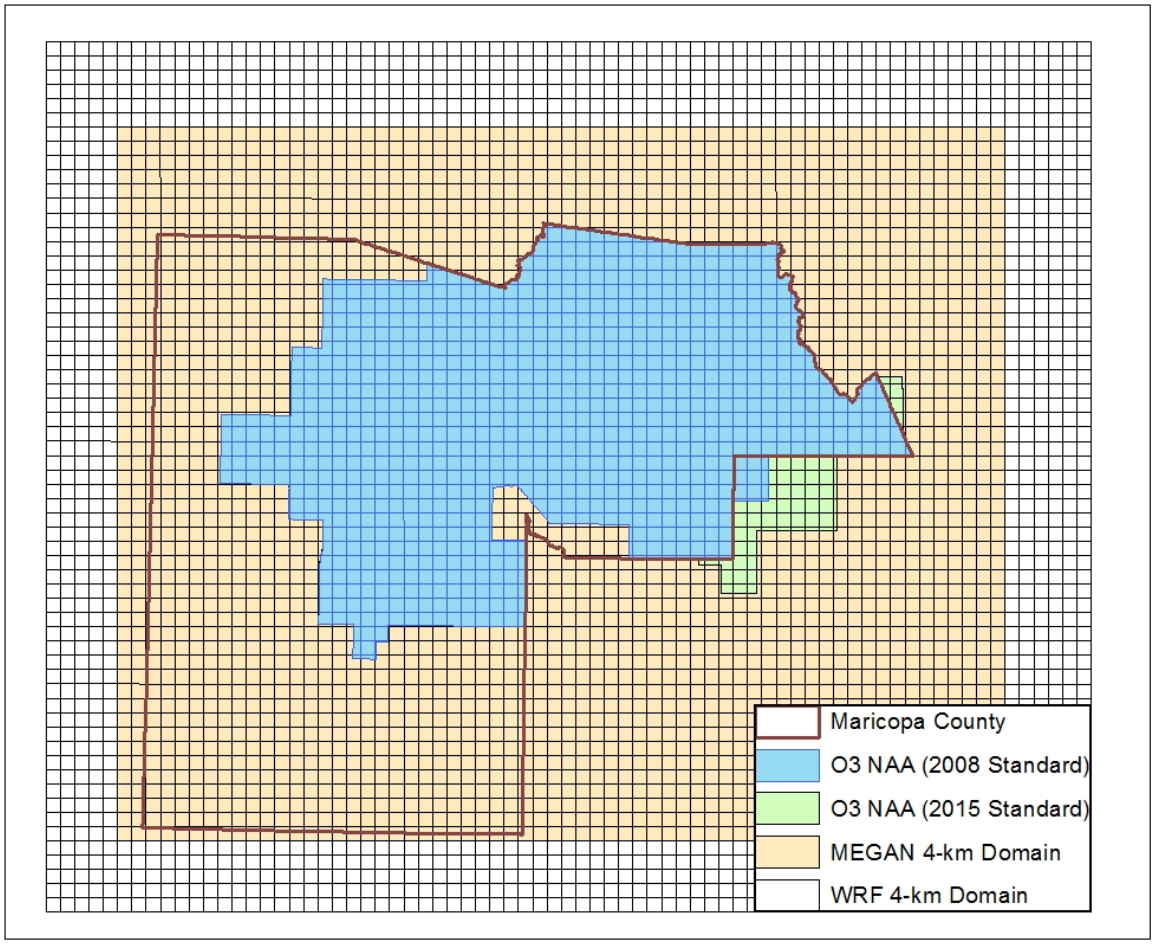
6.2 Modeling domain

MEGAN inputs and outputs for each grid cell are based on a user-defined two-dimensional gridded modeling domain. A 4-km x 4km grid was defined to cover the entire area of Maricopa County and portions of neighboring counties. The target areas for the development of biogenic emissions are Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards within the 4-km domain. The modeling domain is defined with a Lambert Conformal Conic Projection (LCC) coordinate system and the available domain parameters are presented in Table 6.2–1. Additional input files that mask areas covered by Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards were developed using ArcGIS software in order to calculate emissions for those three target areas. The masking value is 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 NAAs), and 0.0 for grid cells outside the target area. As shown in Figure 6.2–1, biogenic emissions for Maricopa County and the 8-hour ozone NAAs were extracted from MEGAN simulations using the mask values from all of corresponding masked grid cells in the 4-km modeling domain as weights.

Table 6.2–1. The 4-km gridded modeling domain in the LCC coordinate system.

Grid horizontal resolution	Grid size	Domain range (Decimal Degrees)	Target area
4 km × 4 km	62 × 50	(32.47, –113.41) to (34.30, –110.76)	8-hour ozone NAAs for 2008 and 2015 standards and Maricopa County

Figure 6.2–1. The WRF 4-km × 4-km grid (white), MEGAN 4-km × 4-km grid (yellow), the 8-hour ozone NAA for the 2008 standard (blue), the 8-hour ozone NAA for the 2015 standard (blue plus green), and Maricopa County (grid cells within the brown boundary).



6.3 Input data

MEGAN requires both land cover and meteorological data as inputs for the calculation of 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 1-km NASA MODIS satellite observations; the PFT data are based on the National Land Cover Dataset with adjustments using additional datasets; and the EF data are based on a global map of species composition and species-specific emission factors or can be derived from PFT distributions and PFT-specific emission factors. For the

2017 PEI, PFT-dependent emission factors were used. This is consistent with the previous 2014 PEI. Within Maricopa County, PFT was adjusted based on the latest land use and land cover data from MAG. In the urban area, LAI and EF data were updated using LAI and EF files that were developed for the old MAG 4-km domain by ENVIRON (Mansell et al., 2006).

6.3.2 Meteorological data

Meteorological data were obtained from WRF version 3.9 model runs by post-processing with the Meteorology-Chemistry Interface Processor (MCIP). The output of MCIP was then used as input to MET2MGN, a component program of MEGAN, which prepares the meteorological data for input to MEGAN. The MET2MGN output includes photosynthetically active radiation (PAR) at the surface, air temperature at two meters above surface, air pressure, humidity, wind speed, top-layer soil moisture, and temperature, and accumulated precipitation for each grid cell for each hour.

Biogenic emissions of VOC and CO are mainly affected by temperature, solar radiation, and soil moisture. NOx emissions from soils depend on 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 and daily maximum air temperature, surface soil temperature, PAR, air pressure, wind speed, water vapor mixing ratio, surface soil moisture, and 24-hour accumulated precipitation in Maricopa County. The highest daily mean temperature and PAR were both recorded in June. The highest daily mean soil temperature and soil moisture both occurred in July. Therefore, the highest NOx emissions from soil are expected to occur in July due to the higher soil temperature and moisture. The soil moisture is generally higher in July due to more rainfalls during the month. In particular, strong pulse NOx emission responses to wet soil can occur in high temperature regions (Bertram et al. 2005; Oikawa, 2015). Higher temperature and higher PAR contribute to elevated biogenic VOC and CO emissions.

In order to validate the WRF model output, the modeled temperature, water vapor mixing ratio, wind speed, and solar radiation were compared to hourly observations from fifteen National Weather Service stations (NWS; DS472.0) and twelve Arizona Meteorological Network (AZMET) stations located within the 4-km modeling domain. Figure 6.3-2 illustrates the locations of the monitoring stations in these two networks. The accuracy of the modeled temperature, water vapor mixing ratio, wind speed, and solar radiation was evaluated by performing a linear regression on the sets of paired modeled and observed hourly meteorological parameters, with a sample size of 7974. For each parameter the coefficient of determination (R^2) was computed, which represents the amount of variability in the observations that is explained by the model. Possible values of R^2 range from 0.0 to 1.0. The R^2 value of 1.0 means that the model explains 100% of the variability in the observations (model predictions perfectly fit observations) while a value of 0.0 means that the model explains none of the variability (model predictions are not correlated to observations at all). Thus, higher values of R^2 represent improvements in model accuracy. As shown in Figure 6.3-3, the R^2 values for temperature, water vapor mixing ratio, wind speed, and solar radiation using WRF FDDA are 0.98, 0.89, 0.63, and 0.92, respectively. This indicates that WRF with FDDA generates a more realistic set of meteorological inputs for use in the estimation of biogenic emissions.

Figure 6.3–1. WRF modeled daily average and daily maximum values of temperature at 2 meters above surface, soil temperature, PAR, air pressure, wind speed at 10 meters above the ground, water vapor mixing ratio at 2 meters above the ground, soil moisture, and 24-hour accumulated precipitation.

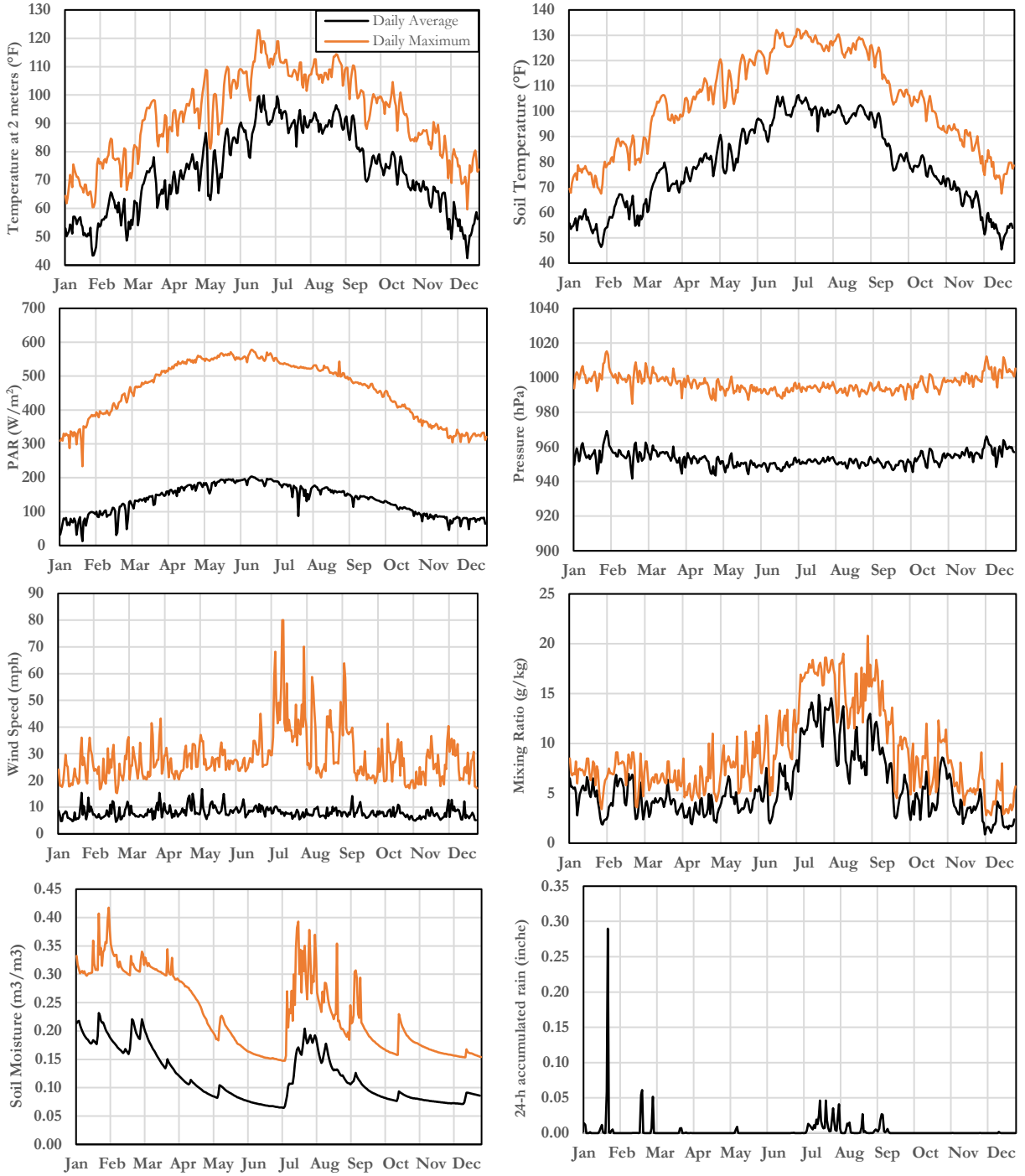


Figure 6.3.-2 Locations of NWS and AZMET meteorological stations.

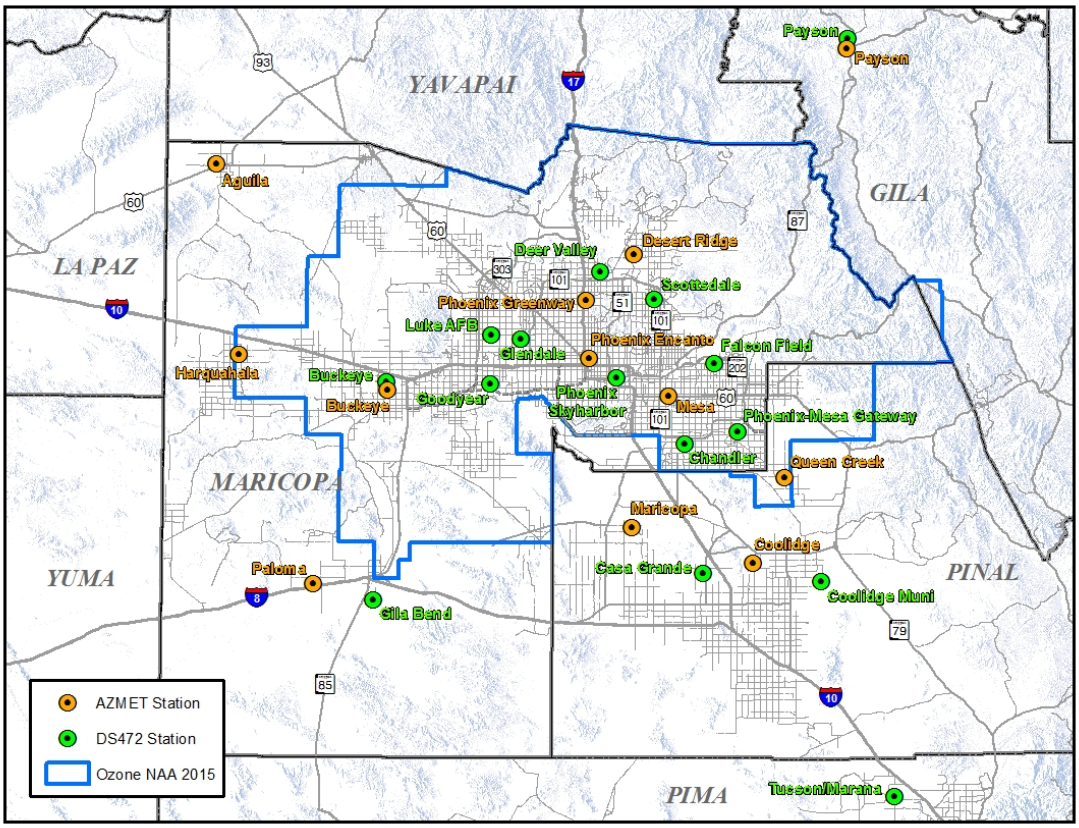
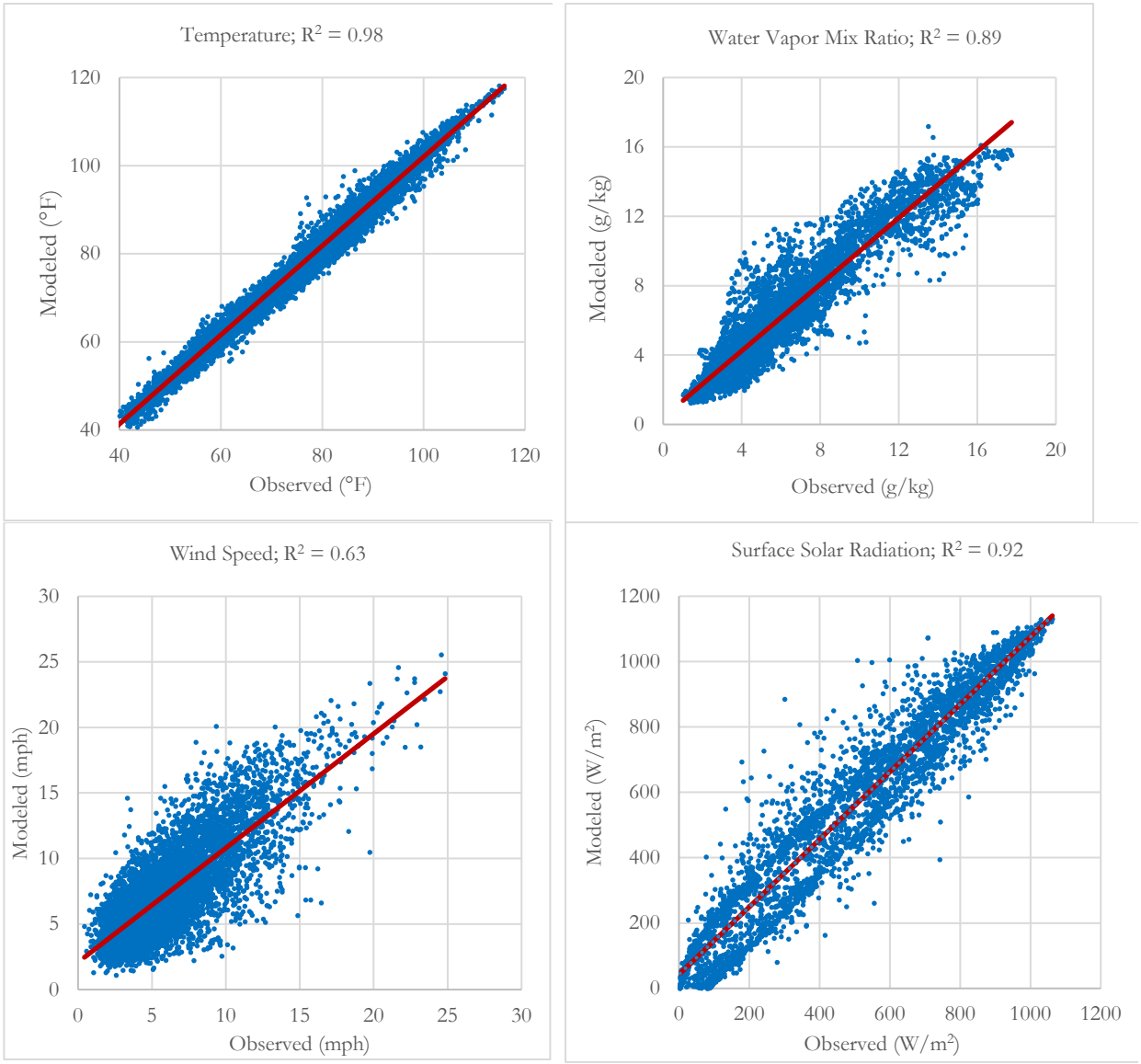


Figure 6.3–3. Paired hourly modeled and observed data in 2017 from NWS and AZMET stations for temperature at 2 meters above the surface, water vapor mixing ratio at 2 meters above the ground, wind speed at 10 meters above the ground, and surface solar radiation.



6.4 Emission estimation

Average daily emissions for each month in 2017 are provided in Table 6.4–1 for Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards. Average daily emissions in 2017 and annual mean diurnal cycles of emissions of ozone precursors including VOC, NO_x, and CO for Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards are illustrated in Figure 6.4–1. Monthly biogenic emissions for Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards are presented in Table 6.4–2. The maximum emissions occurred during the ozone season (June–August), as temperature and solar radiation reached their highest levels during those summer months.

Table 6.4–1. Average daily biogenic emissions (lbs/day) by month in 2017 for Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards.

	Maricopa County			8-hour ozone NAA (2015)			8-hour NAA (2008)		
Month	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
January	63,780	562	5,096	34,487	333	2,806	32,370	316	2,649
February	170,321	1,412	15,900	94,364	849	9,075	87,956	806	8,509
March	463,502	3,113	52,326	265,332	1,918	30,921	246,246	1,809	28,915
April	598,257	3,357	73,029	323,798	1,953	41,180	301,930	1,851	38,687
May	1,160,381	5,330	143,020	665,632	3,217	84,733	625,196	3,056	80,056
June	2,547,929	9,593	312,622	1,453,276	5,782	185,167	1,364,303	5,493	174,977
July	2,383,573	10,698	291,453	1,302,138	6,404	165,716	1,229,423	6,073	157,484
August	2,041,594	9,586	248,678	1,095,202	5,503	140,228	1,031,352	5,236	132,945
September	1,110,926	5,573	132,159	598,401	3,150	75,033	557,938	2,978	70,497
October	504,920	2,740	55,905	264,496	1,518	30,913	247,216	1,437	29,082
November	177,754	1,130	17,676	94,690	631	9,812	88,437	597	9,215
December	80,591	735	7,098	46,148	448	4,157	43,118	424	3,902

Figure 6.4–1. Daily biogenic emissions in 2017, and annual mean diurnal cycles of VOC, NO_x, and CO emissions for Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards.

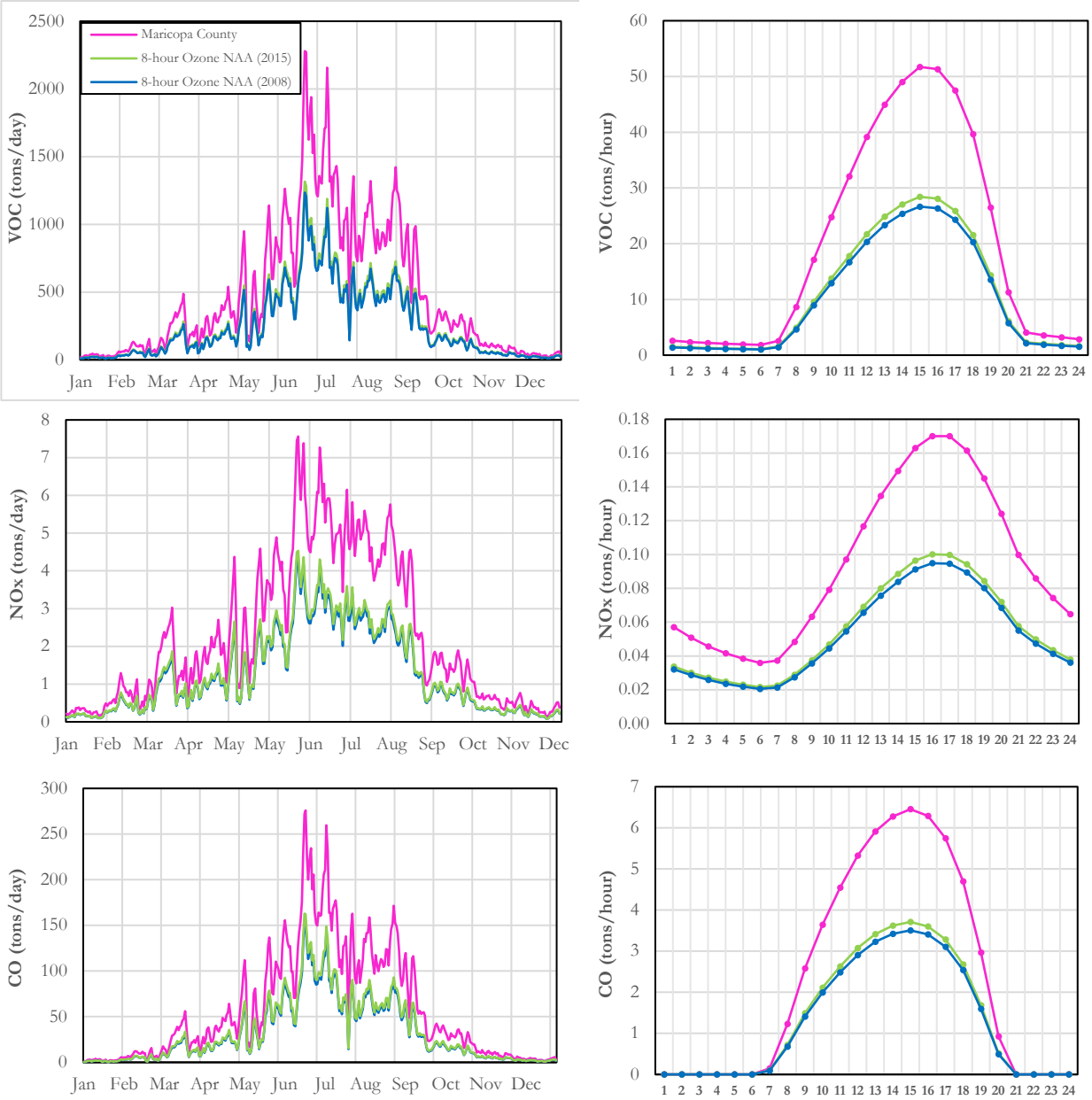


Table 6.4–2. Monthly biogenic emissions (tons/month) in 2017 for Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards.

	Maricopa County			8-hour ozone NAA (2015)			8-hour NAA (2008)		
Month	VOC	NOx	CO	VOC	NOx	CO	VOC	NOx	CO
January	988.6	8.7	79.0	534.5	5.2	43.5	501.7	4.9	41.1
February	2,384.5	19.8	222.6	1,321.1	11.9	127.0	1,231.4	11.3	119.1
March	7,184.3	48.2	811.1	4,112.6	29.7	479.3	3,816.8	28.0	448.2
April	8,973.9	50.4	1,095.4	4,857.0	29.3	617.7	4,529.0	27.8	580.3
May	17,985.9	82.6	2,216.8	10,317.3	49.9	1,313.4	9,690.5	47.4	1,240.9
June	38,218.9	143.9	4,689.3	21,799.1	86.7	2,777.5	20,464.5	82.4	2,624.7
July	36,945.4	165.8	4,517.5	20,183.1	99.3	2,568.6	19,056.0	94.1	2,441.0
August	31,644.7	148.6	3,854.5	16,975.6	85.3	2,173.5	15,985.9	81.2	2,060.6
September	16,663.9	83.6	1,982.4	8,976.0	47.2	1,125.5	8,369.1	44.7	1,057.5
October	7,826.2	42.5	866.5	4,099.7	23.5	479.2	3,831.9	22.3	450.8
November	2,666.3	16.9	265.1	1,420.3	9.5	147.2	1,326.6	9.0	138.2
December	1,249.2	11.4	110.0	715.3	6.9	64.4	668.3	6.6	60.5
Total	**172,731.8**	**822.4**	**20,710.2**	**95,311.6**	**484.4**	**11,916.8**	**89,471.7**	**459.7**	**11,262.9**

6.5 Summary of all biogenic source emissions

Annual and ozone season (June–August) average daily emissions from biogenic sources for Maricopa County and the two 8-hour ozone NAAs are provided in Table 6.5–1.

Table 6.5–1. Annual and season-day biogenic emissions in 2017 for Maricopa County and the 8-hour ozone NAAs for the 2008 and 2015 standards.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic Area	VOC	NOx	CO	VOC	NOx	CO
Maricopa County	172,731.8	822.4	20,710.2	2,324,365	9,959	284,251
2008 ozone NAA	89,471.7	459.7	11,262.9	1,208,359	5,601	155,135
2015 ozone NAA	95,311.6	484.4	11,916.8	1,283,539	5,896	163,704

6.6 References

Bertram, T. H., A. Heckel, A. Richter, J. P. Burrows, and R. C. Cohen, 2005, Satellite measurements of daily variations in soil NOx emissions, Geophys. Res. Lett., 32, L24812, doi:10.1029/2005GL024640.

Gerard E. Mansell, Greg Yarwood (ENVIRON), Alex Guenther (NCAR), and Christine Wiedinmyer (Golden CO), 2006. Final Report Maricopa Association of Governments 2006 Biogenics Study.

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

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

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

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

Guenther, A. B., Jiang, X., Heald, C. L., Sakulyanontvittaya, T., Duhl, T., Emmons, L. K., and Wang, X., 2012. The Model of Emissions of Gases and Aerosols from Nature version 2.1 (MEGAN2.1): an extended and updated framework for modeling biogenic emissions, *Geosci. Model Dev.*, 5, 1471–1492, doi:10.5194/gmd-5-1471-2012.

Jiang, X., A. Guenther, T. Duhl, and T. Sakulyanontvittaya, 2011. MEGAN version 2.10 User's Guide. NCAR Earth Systems Laboratory, Atmosperhic Chemistry Division. www.acom.ucar.edu/webt/MEGAN/MEGAN2.1_User_Guide_05-07-2012.pdf

Oikawa, P.Y., Ge, C., Wang, J., Eberwein, J.R., Liang, L.L., Allsman, L.A., Grantz, D.A. and Jenerette, G.D., 2015. Unusually high soil nitrogen oxide emissions influence air quality in a high-temperature agricultural region. *Nature communications*, *6*, p.8753. http://doi.org/10.1038/ncomms9753.

List of Appendices

Appendix A. Instructions for Reporting 2017 Annual Air Pollution Emissions

INSTRUCTIONS

FOR REPORTING 2017

ANNUAL AIR POLLUTION EMISSIONS

January 2018

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

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

Copies of this document, related forms,
and other reference materials are available online at our web site:
https://www.maricopa.gov/2648/Emissions-Inventory-Instructions-Help-Sh

TABLE OF CONTENTS

WHAT'S NEW FOR 2017?

Miscellaneous:

- **Emissions fees for Title V facilities:** In accordance with Maricopa County Air Pollution Control Rule 280 (Fees), the 2017 annual emission fee for Title V sources is $43.60/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 2017 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 200.129 and 200.80 for a full definition.)

** ***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 304.1).

(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.

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 for 2017. "Homemade" reporting forms that vary significantly from the preprinted forms sent to you will ***not*** be accepted.

NON-OPERATIONAL FACILITIES:

- Any facility that has been issued an air quality permit, but that did NOT operate at any time during 2017, 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 2017, by the due date shown on the Business Form.

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:

§ **200.126 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 Engineering & Permitting Division at (602) 506-6702 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:
https://www.maricopa.gov/2648/Emissions-Inventory-Instructions-Help-Sh

- 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:
https://www.maricopa.gov/2651/Other-Inventory-Resources
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 EmissionsInventory@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 Engineering & Permitting Division at (602) 506-6702 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: https://www.maricopa.gov/2651/Other-Inventory-Resources, 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; **H** = Horizontal unobstructed; **D** = Downward unobstructed; **G** = Gooseneck; **W** = Obstructed vertical (e.g. weather cap)

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

Data fields:

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

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

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

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

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

Control Device Form Instructions

EXAMPLE Control Device Form Information

1	2	3	4	5	6
Control ID	Installation/ Reconstruction* Date	Size or Rated Capacity**	Control Type Code	Control Device Name/Description	Stack ID
1	*05/09/98*	*25,000.0* cfm	*021*	*Thermal oxidizer*	*2*
4	*03/10/97*	cfm	*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: https://www.maricopa.gov/2648/Emissions-Inventory-Instructions-Help-Sh 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 cannot 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 2017. 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 2017.

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 (CEMs) 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 CEMs or test results. Report "1" in this column for CEMs 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 **2017**

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 **2017**

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: https://www.maricopa.gov/2648/Emissions-Inventory-Instructions-Help-Sh 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 2017. 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.

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:

Process without off-site recycling/disposal or control device:
Column 15 = column 9 × column 11

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

Process with control device:
Column 15 = (column 9 × column 11) × (1 – [column 13 × column 14])

*Process with **both** off-site recycling/disposal and control device:*
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 2017

Permit number(s) **V** *99999*

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 2017

Permit number(s) V*99999*

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 2017

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 2017?
Indicate whether this quantity is reported in pounds or gallons. Keep waste company manifests as proof that this amount of waste was taken off-site.

2,400 — *Check one:* ☐ pounds ☒ gallons — disposal

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	2017 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 2017

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 2017 Annual Emissions:	(1) Totals from Process Forms	(2) + Accidental Releases	(3) = TOTAL 2017 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, § 304.2d) 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/Paper & Wood Products	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 2,000 to convert pounds into tons. **Round to the nearest ton**, and enter this value (a whole number) on line 7. Multiply this number by **$43.60**, and enter the result on line 8. This is your 2017 emission fee.

EXAMPLE (for Title V sources only)

Data Certification/Fee Calculation Form 2017

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 2017 Annual Emissions:	(1) Totals from Process Forms	(2) + Accidental Releases	(3) = TOTAL 2017 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 **$ 43.60**. This is your **2017 ANNUAL EMISSION FEE**.			$ *784.80*

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 2017 are summarized in Table B–1 below.

Table B–1. Rates of compliance and rule effectiveness for 2017, by permit category.

Source category	Compliance rate *	Rule Effectiveness (RE) rate
Title V facilities	93.50%	94.29%
Non-Title V facilities	89.33%	91.37%

** Compliance rates for both Title V and Non-Title V facilities are based upon 2016–14 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 (2016 and 2017), 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.	35%	90%	**31.50%**
	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.			
		< 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

MOVES2014b Local Input Data and RunSpecs

In order to calculate the 2017 annual and ozone season-day onroad source emissions, MOVES2014b was executed using local input data for each month of the year and each geographical area (the 8-hour ozone nonattainment area and Maricopa County).

A portion of the MOVES2014b RunSpec Summary, RunSpec, and local input data for Maricopa County are provided in this appendix as an example.

MOVES2014b RunSpec Summary (Maricopa County)

* Output Database Server Name: [using default]

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

* Time Spans:
  Time Aggregation Level: Hour
  Years: 2017
  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: c04013y2017_20180424

* 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
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  Total Organic Gases - Start Exhaust
  Total Organic Gases - Evap Permeation
  Total Organic Gases - Evap Fuel Vapor Venting
  Total Organic Gases - Evap Fuel Leaks
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  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
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  Volatile Organic Compounds - Evap Fuel Leaks
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  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

```
* Output
    General Output:
        Output Database: c04013y2017_20180424_out
        Units: Mass Units (Grams)
               Energy Units (Joules)
               Distance Units (Miles)
        Activity: Distance Traveled
                  Source Hours
                  Hotelling Hours
                  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/Off Road: On Road/Off Road
                          Road Type
                          Source Use Type
                          SCC
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MOVES2014b RunSpec (Maricopa County)

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MOVES2014b Local Input Data (Maricopa County)

[HPMSvTypeYear]

HPMSVtypeID	yearID	HPMSBaseYearVMT
10	2017	194,156,930
25	2017	32,154,500,908
40	2017	86,775,403
50	2017	1,275,034,707
60	2017	1,059,783,258

[SourceTypeYear]

yearID	sourceTypeID	sourceTypePopulation
2017	11	101,931
2017	21	2,447,392
2017	31	510,638
2017	32	128,977
2017	41	251
2017	42	893
2017	43	8,396
2017	51	1,116
2017	52	39,150
2017	53	1,659
2017	54	10,286
2017	61	6,690
2017	62	7,488

[CountyYear]

countyID	yearID	refuelingVaporProgramAdjust	refuelingSpillProgramAdjust
4013	2017	0.5	0.000

[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 Volume	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	11.7581	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
3577	12	6.73	17.07	10.41	0	0	0	21.862	4.66603	0.53	44.9124	88.8208	0	0	0	210.199	302.95
3578	12	8.56	12.48	10.22	0	0	0	21.8745	4.55423	0.53	46.8717	89.6605	0	0	0	206.201	299.13
3579	12	8.05	13.7	10.43	0	0	0	21.7833	4.56239	0.53	46.5506	89.4528	0	0	0	206.856	300.07
25005	21	0	5.67	0	0	0	0	0	0	0	0	0	2.62	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	2017	0	1	1	1
4013	2017	0	2	2	1
4013	2017	0	3	3	1
4013	2017	0	5	1	0.947025
4013	2017	0	5	5	0.052975
4013	2017	0	9	9	1

[FuelSupply]

fuelRegionID	fuelYearID	monthGroupID	fuelFormulationID	marketShare	marketShareCV
1570011000	2017	1	90	1	0.5
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1570011000	2017	4	90	1	0.5
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1570011000	2017	6	90	1	0.5
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1570011000	2017	8	90	1	0.5
1570011000	2017	9	90	1	0.5
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1570011000	2017	11	90	1	0.5
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1570011000	2017	5	3577	1	0.5
1570011000	2017	6	3577	1	0.5
1570011000	2017	7	3577	1	0.5
1570011000	2017	8	3577	1	0.5
1570011000	2017	9	3577	1	0.5
1570011000	2017	1	3578	1	0.5
1570011000	2017	2	3578	1	0.5
1570011000	2017	3	3578	1	0.5
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[ZoneMonthHour]

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1	40130	9	51	64
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1	40130	14	62	41
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1	40130	19	59	48
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1	40130	22	54	60
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10	40130	5	70	31
10	40130	6	69	32
10	40130	7	68	32
10	40130	8	72	29
10	40130	9	76	25
10	40130	10	81	20
10	40130	11	84	18
10	40130	12	87	16
10	40130	13	90	15
10	40130	14	91	13
10	40130	15	92	13
10	40130	16	92	13
10	40130	17	92	13
10	40130	18	90	14

monthID	zoneID	HourID	temperature	relHumidity
10	40130	19	87	16
10	40130	20	84	18
10	40130	21	82	20
10	40130	22	80	22
10	40130	23	78	24
10	40130	24	76	27
11	40130	1	65	42
11	40130	2	64	43
11	40130	3	63	44
11	40130	4	62	45
11	40130	5	61	46
11	40130	6	61	45
11	40130	7	60	47
11	40130	8	62	44
11	40130	9	66	37
11	40130	10	70	33
11	40130	11	74	28
11	40130	12	77	26

monthID	zoneID	HourID	temperature	relHumidity
11	40130	13	79	24
11	40130	14	81	22
11	40130	15	82	21
11	40130	16	82	21
11	40130	17	81	21
11	40130	18	78	24
11	40130	19	75	27
11	40130	20	74	29
11	40130	21	72	32
11	40130	22	70	35
11	40130	23	68	38
11	40130	24	67	40
12	40130	1	54	41
12	40130	2	53	43
12	40130	3	52	43
12	40130	4	51	46
12	40130	5	50	46
12	40130	6	50	47

monthID	zoneID	HourID	temperature	relHumidity
12	40130	7	50	46
12	40130	8	49	47
12	40130	9	53	41
12	40130	10	57	33
12	40130	11	61	28
12	40130	12	65	24
12	40130	13	67	21
12	40130	14	69	19
12	40130	15	70	18
12	40130	16	70	18
12	40130	17	69	19
12	40130	18	66	21
12	40130	19	64	24
12	40130	20	61	29
12	40130	21	59	31
12	40130	22	58	35
12	40130	23	56	38
12	40130	24	55	40

[SourceTypeAgeDistribution]

SourceTypeID	YearID	AgeID	AgeFraction
11	2017	0	0.024416
11	2017	1	0.053866
11	2017	2	0.065539
11	2017	3	0.062005
11	2017	4	0.054616
11	2017	5	0.047226
11	2017	6	0.032234
11	2017	7	0.024952
11	2017	8	0.052795
11	2017	9	0.054401
11	2017	10	0.072821
11	2017	11	0.070893
11	2017	12	0.060291
11	2017	13	0.043371
11	2017	14	0.051403
11	2017	15	0.041765
11	2017	16	0.034804
11	2017	17	0.029664
11	2017	18	0.024952
11	2017	19	0.017670
11	2017	20	0.014136
11	2017	21	0.013065
11	2017	22	0.010602
11	2017	23	0.008460
11	2017	24	0.008139
11	2017	25	0.005890
11	2017	26	0.004498
11	2017	27	0.004069
11	2017	28	0.003962
11	2017	29	0.003748
11	2017	30	0.003748
21	2017	0	0.043300
21	2017	1	0.071600
21	2017	2	0.077400
21	2017	3	0.069900
21	2017	4	0.068600
21	2017	5	0.056200
21	2017	6	0.045900
21	2017	7	0.040500
21	2017	8	0.032800
21	2017	9	0.049400
21	2017	10	0.057600
21	2017	11	0.054600
21	2017	12	0.050900
21	2017	13	0.044500
21	2017	14	0.039200
21	2017	15	0.034000
21	2017	16	0.029100
21	2017	17	0.025900
21	2017	18	0.020300
21	2017	19	0.015000
21	2017	20	0.012400
21	2017	21	0.008500
21	2017	22	0.007600
21	2017	23	0.005500
21	2017	24	0.004100
21	2017	25	0.003200
21	2017	26	0.002900
21	2017	27	0.002300
21	2017	28	0.002000
21	2017	29	0.001600
21	2017	30	0.023200
31	2017	0	0.035158
31	2017	1	0.062192
31	2017	2	0.055434
31	2017	3	0.056503
31	2017	4	0.048126
31	2017	5	0.038142
31	2017	6	0.035713
31	2017	7	0.024063
31	2017	8	0.019443
31	2017	9	0.046363
31	2017	10	0.059500
31	2017	11	0.062020
31	2017	12	0.053038
31	2017	13	0.054190
31	2017	14	0.044888
31	2017	15	0.040283
31	2017	16	0.043877
31	2017	17	0.037444
31	2017	18	0.028221
31	2017	19	0.021563
31	2017	20	0.021812
31	2017	21	0.015086
31	2017	22	0.014732
31	2017	23	0.012193
31	2017	24	0.008158
31	2017	25	0.005702
31	2017	26	0.004727
31	2017	27	0.004281
31	2017	28	0.004462
31	2017	29	0.003285
31	2017	30	0.039401
32	2017	0	0.040066
32	2017	1	0.064156
32	2017	2	0.056935
32	2017	3	0.056635
32	2017	4	0.049370
32	2017	5	0.040652
32	2017	6	0.036535
32	2017	7	0.023959
32	2017	8	0.020252
32	2017	9	0.047249
32	2017	10	0.063102
32	2017	11	0.063436
32	2017	12	0.053418
32	2017	13	0.051482
32	2017	14	0.042465
32	2017	15	0.037822
32	2017	16	0.041487
32	2017	17	0.036690
32	2017	18	0.027156
32	2017	19	0.020501
32	2017	20	0.020659
32	2017	21	0.014414
32	2017	22	0.014056
32	2017	23	0.011531
32	2017	24	0.007767
32	2017	25	0.005420
32	2017	26	0.004532
32	2017	27	0.004117
32	2017	28	0.004238
32	2017	29	0.003134
32	2017	30	0.036763
41	2017	0	0.065200
41	2017	1	0.089500
41	2017	2	0.078900
41	2017	3	0.056200
41	2017	4	0.051800
41	2017	5	0.049500
41	2017	6	0.030400
41	2017	7	0.015500
41	2017	8	0.021100
41	2017	9	0.037800
41	2017	10	0.083200
41	2017	11	0.081100
41	2017	12	0.056100
41	2017	13	0.038000
41	2017	14	0.028000
41	2017	15	0.021200
41	2017	16	0.030100
41	2017	17	0.034100
41	2017	18	0.030800
41	2017	19	0.017300
41	2017	20	0.016600
41	2017	21	0.015200
41	2017	22	0.013500
41	2017	23	0.008500
41	2017	24	0.006000
41	2017	25	0.004200
41	2017	26	0.003200
41	2017	27	0.004400
41	2017	28	0.003200
41	2017	29	0.002200
41	2017	30	0.007200
42	2017	0	0.080627
42	2017	1	0.049272
42	2017	2	0.095185
42	2017	3	0.109742
42	2017	4	0.123180
42	2017	5	0.041433
42	2017	6	0.043673
42	2017	7	0.010078
42	2017	8	0.036954
42	2017	9	0.083987
42	2017	10	0.172452
42	2017	11	0.060470
42	2017	12	0.003359
42	2017	13	0.034714
42	2017	14	0.024636
42	2017	15	0.000000
42	2017	16	0.030235
42	2017	17	0.000000
42	2017	18	0.000000
42	2017	19	0.000000
42	2017	20	0.000000
42	2017	21	0.000000
42	2017	22	0.000000
42	2017	23	0.000000
42	2017	24	0.000000
42	2017	25	0.000000
42	2017	26	0.000000
42	2017	27	0.000000
42	2017	28	0.000000
42	2017	29	0.000000
42	2017	30	0.000000
43	2017	0	0.091712
43	2017	1	0.083511
43	2017	2	0.071610
43	2017	3	0.056508
43	2017	4	0.061108
43	2017	5	0.066809
43	2017	6	0.044706
43	2017	7	0.022803
43	2017	8	0.028804
43	2017	9	0.056408
43	2017	10	0.101714
43	2017	11	0.079111
43	2017	12	0.058108
43	2017	13	0.023603
43	2017	14	0.017602
43	2017	15	0.012602
43	2017	16	0.016902
43	2017	17	0.029204
43	2017	18	0.016302
43	2017	19	0.009601
43	2017	20	0.008801
43	2017	21	0.007501
43	2017	22	0.006802
43	2017	23	0.004550
43	2017	24	0.003298
43	2017	25	0.002360
43	2017	26	0.002356
43	2017	27	0.002387
43	2017	28	0.001907
43	2017	29	0.001627
43	2017	30	0.009684
51	2017	0	0.091701
51	2017	1	0.083501
51	2017	2	0.071601
51	2017	3	0.056500
51	2017	4	0.061100
51	2017	5	0.066800
51	2017	6	0.044700
51	2017	7	0.022800
51	2017	8	0.028800
51	2017	9	0.056400
51	2017	10	0.101701
51	2017	11	0.079101
51	2017	12	0.058100
51	2017	13	0.023600

Source TypeID	YearID	AgeID	AgeFraction
51	2017	14	0.017600
51	2017	15	0.012600
51	2017	16	0.016900
51	2017	17	0.029200
51	2017	18	0.016300
51	2017	19	0.009600
51	2017	20	0.008800
51	2017	21	0.007500
51	2017	22	0.006900
51	2017	23	0.004600
51	2017	24	0.003400
51	2017	25	0.002399
51	2017	26	0.002400
51	2017	27	0.002399
51	2017	28	0.001899
51	2017	29	0.001599
51	2017	30	0.009497
52	2017	0	0.075902
52	2017	1	0.077979
52	2017	2	0.067451
52	2017	3	0.057001
52	2017	4	0.057925
52	2017	5	0.058872
52	2017	6	0.042343
52	2017	7	0.023165
52	2017	8	0.026167
52	2017	9	0.053632
52	2017	10	0.089651
52	2017	11	0.074040
52	2017	12	0.056426
52	2017	13	0.031902
52	2017	14	0.024974
52	2017	15	0.020074
52	2017	16	0.024214
52	2017	17	0.031331
52	2017	18	0.019495
52	2017	19	0.012833
52	2017	20	0.012325
52	2017	21	0.009555
52	2017	22	0.009115
52	2017	23	0.006738
52	2017	24	0.004834
52	2017	25	0.003357
52	2017	26	0.003105
52	2017	27	0.002947
52	2017	28	0.002629
52	2017	29	0.002082
52	2017	30	0.017936
53	2017	0	0.090747
53	2017	1	0.083523
53	2017	2	0.071648
53	2017	3	0.056944
53	2017	4	0.061293
53	2017	5	0.066373
53	2017	6	0.044669
53	2017	7	0.022803
53	2017	8	0.028607
53	2017	9	0.056219

Source TypeID	YearID	AgeID	AgeFraction
53	2017	10	0.100683
53	2017	11	0.078455
53	2017	12	0.057687
53	2017	13	0.023775
53	2017	14	0.017728
53	2017	15	0.012730
53	2017	16	0.017052
53	2017	17	0.029110
53	2017	18	0.016319
53	2017	19	0.009654
53	2017	20	0.008869
53	2017	21	0.007538
53	2017	22	0.007412
53	2017	23	0.004958
53	2017	24	0.003962
53	2017	25	0.002656
53	2017	26	0.002685
53	2017	27	0.002534
53	2017	28	0.001967
53	2017	29	0.001593
53	2017	30	0.009806
54	2017	0	0.091779
54	2017	1	0.083572
54	2017	2	0.071662
54	2017	3	0.056549
54	2017	4	0.061153
54	2017	5	0.066858
54	2017	6	0.044738
54	2017	7	0.022820
54	2017	8	0.028825
54	2017	9	0.056449
54	2017	10	0.101788
54	2017	11	0.079168
54	2017	12	0.058150
54	2017	13	0.023620
54	2017	14	0.017615
54	2017	15	0.012611
54	2017	16	0.016915
54	2017	17	0.029225
54	2017	18	0.016314
54	2017	19	0.009608
54	2017	20	0.008808
54	2017	21	0.007506
54	2017	22	0.006554
54	2017	23	0.004374
54	2017	24	0.003038
54	2017	25	0.002238
54	2017	26	0.002240
54	2017	27	0.002340
54	2017	28	0.001882
54	2017	29	0.001651
54	2017	30	0.009954
61	2017	0	0.091783
61	2017	1	0.083575
61	2017	2	0.071664
61	2017	3	0.056551
61	2017	4	0.061155
61	2017	5	0.066860

Source TypeID	YearID	AgeID	AgeFraction
61	2017	6	0.044740
61	2017	7	0.022821
61	2017	8	0.028826
61	2017	9	0.056451
61	2017	10	0.101792
61	2017	11	0.079171
61	2017	12	0.058152
61	2017	13	0.023621
61	2017	14	0.017616
61	2017	15	0.012611
61	2017	16	0.016915
61	2017	17	0.029226
61	2017	18	0.016315
61	2017	19	0.009609
61	2017	20	0.008808
61	2017	21	0.007507
61	2017	22	0.006866
61	2017	23	0.004472
61	2017	24	0.003355
61	2017	25	0.002337
61	2017	26	0.002374
61	2017	27	0.002362
61	2017	28	0.001809
61	2017	29	0.001510
61	2017	30	0.009148
62	2017	0	0.091735
62	2017	1	0.083532
62	2017	2	0.071627
62	2017	3	0.056522
62	2017	4	0.061123
62	2017	5	0.066826
62	2017	6	0.044717
62	2017	7	0.022809
62	2017	8	0.028811
62	2017	9	0.056422
62	2017	10	0.101739
62	2017	11	0.079130
62	2017	12	0.058122
62	2017	13	0.023609
62	2017	14	0.017607
62	2017	15	0.012605
62	2017	16	0.016906
62	2017	17	0.029211
62	2017	18	0.016306
62	2017	19	0.009604
62	2017	20	0.008803
62	2017	21	0.007503
62	2017	22	0.006886
62	2017	23	0.004550
62	2017	24	0.003382
62	2017	25	0.002374
62	2017	26	0.002388
62	2017	27	0.002383
62	2017	28	0.001864
62	2017	29	0.001563
62	2017	30	0.009340

[IMCoverage]

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
101	4	4013	2017	21	1	103	1967	1980	1	13	N	57.6164
101	4	4013	2017	21	1	106	1981	1995	2	31	N	64.12
101	4	4013	2017	21	1	110	1996	2013	2	51	N	90.0428
101	4	4013	2017	31	1	103	1967	1980	1	13	N	57.6164
101	4	4013	2017	31	1	106	1981	1995	2	31	N	64.12
101	4	4013	2017	31	1	110	1996	2013	2	51	N	90.0428
101	4	4013	2017	32	1	103	1967	1980	1	13	N	57.6164
101	4	4013	2017	32	1	106	1981	1995	2	31	N	64.12
101	4	4013	2017	32	1	110	1996	2013	2	51	N	90.0428
101	4	4013	2017	52	1	103	1967	2013	1	13	N	87.2032
102	4	4013	2017	21	1	103	1967	1980	1	13	N	57.6164
102	4	4013	2017	21	1	106	1981	1995	2	31	N	64.12
102	4	4013	2017	21	1	110	1996	2013	2	51	N	90.0428
102	4	4013	2017	31	1	103	1967	1980	1	13	N	57.6164
102	4	4013	2017	31	1	106	1981	1995	2	31	N	64.12
102	4	4013	2017	31	1	110	1996	2013	2	51	N	90.0428
102	4	4013	2017	32	1	103	1967	1980	1	13	N	57.6164
102	4	4013	2017	32	1	106	1981	1995	2	31	N	64.12
102	4	4013	2017	32	1	110	1996	2013	2	51	N	90.0428
102	4	4013	2017	52	1	103	1967	2013	1	13	N	87.2032
112	4	4013	2017	21	1	108	1996	2013	2	43	N	83.814
112	4	4013	2017	21	1	109	1981	1995	2	44	N	64.12
112	4	4013	2017	31	1	108	1996	2013	2	43	N	83.814
112	4	4013	2017	31	1	109	1981	1995	2	44	N	64.12
112	4	4013	2017	32	1	108	1996	2013	2	43	N	83.814
112	4	4013	2017	32	1	109	1981	1995	2	44	N	64.12
112	4	4013	2017	52	1	107	1981	2013	1	41	N	86.2872
201	4	4013	2017	21	1	103	1967	1980	1	13	N	57.6164
201	4	4013	2017	21	1	106	1981	1995	2	31	N	64.12
201	4	4013	2017	21	1	110	1996	2013	2	51	N	90.0428
201	4	4013	2017	31	1	103	1967	1980	1	13	N	57.6164
201	4	4013	2017	31	1	106	1981	1995	2	31	N	64.12
201	4	4013	2017	31	1	110	1996	2013	2	51	N	90.0428
201	4	4013	2017	32	1	103	1967	1980	1	13	N	57.6164
201	4	4013	2017	32	1	106	1981	1995	2	31	N	64.12
201	4	4013	2017	32	1	110	1996	2013	2	51	N	90.0428
201	4	4013	2017	52	1	103	1967	2013	1	13	N	87.2032
202	4	4013	2017	21	1	103	1967	1980	1	13	N	57.6164
202	4	4013	2017	21	1	106	1981	1995	2	31	N	64.12
202	4	4013	2017	21	1	110	1996	2013	2	51	N	90.0428
202	4	4013	2017	31	1	103	1967	1980	1	13	N	57.6164
202	4	4013	2017	31	1	106	1981	1995	2	31	N	64.12
202	4	4013	2017	31	1	110	1996	2013	2	51	N	90.0428
202	4	4013	2017	32	1	103	1967	1980	1	13	N	57.6164
202	4	4013	2017	32	1	106	1981	1995	2	31	N	64.12
202	4	4013	2017	32	1	110	1996	2013	2	51	N	90.0428
202	4	4013	2017	52	1	103	1967	2013	1	13	N	87.2032
301	4	4013	2017	21	1	103	1967	1980	1	13	N	57.6164
301	4	4013	2017	21	1	106	1981	1995	2	31	N	64.12
301	4	4013	2017	21	1	110	1996	2013	2	51	N	90.0428
301	4	4013	2017	31	1	103	1967	1980	1	13	N	57.6164
301	4	4013	2017	31	1	106	1981	1995	2	31	N	64.12
301	4	4013	2017	31	1	110	1996	2013	2	51	N	90.0428
301	4	4013	2017	32	1	103	1967	1980	1	13	N	57.6164
301	4	4013	2017	32	1	106	1981	1995	2	31	N	64.12
301	4	4013	2017	32	1	110	1996	2013	2	51	N	90.0428
301	4	4013	2017	52	1	103	1967	2013	1	13	N	87.2032
302	4	4013	2017	21	1	103	1967	1980	1	13	N	57.6164
302	4	4013	2017	21	1	106	1981	1995	2	31	N	64.12
302	4	4013	2017	21	1	110	1996	2013	2	51	N	90.0428
302	4	4013	2017	31	1	103	1967	1980	1	13	N	57.6164
302	4	4013	2017	31	1	106	1981	1995	2	31	N	64.12
302	4	4013	2017	31	1	110	1996	2013	2	51	N	90.0428
302	4	4013	2017	32	1	103	1967	1980	1	13	N	57.6164
302	4	4013	2017	32	1	106	1981	1995	2	31	N	64.12
302	4	4013	2017	32	1	110	1996	2013	2	51	N	90.0428
302	4	4013	2017	52	1	103	1967	2013	1	13	N	87.2032
101	4	4013	2017	21	5	303	1967	1980	1	13	N	57.6164
101	4	4013	2017	21	5	306	1981	1995	2	31	N	64.12
101	4	4013	2017	21	5	310	1996	2013	2	51	N	90.0428
101	4	4013	2017	31	5	303	1967	1980	1	13	N	57.6164
101	4	4013	2017	31	5	306	1981	1995	2	31	N	64.12
101	4	4013	2017	31	5	310	1996	2013	2	51	N	90.0428
101	4	4013	2017	32	5	303	1967	1980	1	13	N	57.6164
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101	4	4013	2017	52	5	303	1967	2013	1	13	N	87.2032
102	4	4013	2017	21	5	303	1967	1980	1	13	N	57.6164
102	4	4013	2017	21	5	306	1981	1995	2	31	N	64.12
102	4	4013	2017	21	5	310	1996	2013	2	51	N	90.0428
102	4	4013	2017	31	5	303	1967	1980	1	13	N	57.6164
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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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102	4	4013	2017	32	5	306	1981	1995	2	31	N	64.12
102	4	4013	2017	32	5	310	1996	2013	2	51	N	90.0428
102	4	4013	2017	52	5	303	1967	2013	1	13	N	87.2032
112	4	4013	2017	21	5	308	1996	2013	2	43	N	83.814
112	4	4013	2017	21	5	309	1981	1995	2	44	N	64.12
112	4	4013	2017	31	5	308	1996	2013	2	43	N	83.814
112	4	4013	2017	31	5	309	1981	1995	2	44	N	64.12
112	4	4013	2017	32	5	308	1996	2013	2	43	N	83.814
112	4	4013	2017	32	5	309	1981	1995	2	44	N	64.12
112	4	4013	2017	52	5	307	1981	2013	1	41	N	86.2872
201	4	4013	2017	21	5	303	1967	1980	1	13	N	57.6164
201	4	4013	2017	21	5	306	1981	1995	2	31	N	64.12
201	4	4013	2017	21	5	310	1996	2013	2	51	N	90.0428
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201	4	4013	2017	31	5	310	1996	2013	2	51	N	90.0428
201	4	4013	2017	32	5	303	1967	1980	1	13	N	57.6164
201	4	4013	2017	32	5	306	1981	1995	2	31	N	64.12
201	4	4013	2017	32	5	310	1996	2013	2	51	N	90.0428
201	4	4013	2017	52	5	303	1967	2013	1	13	N	87.2032
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301	4	4013	2017	32	5	303	1967	1980	1	13	N	57.6164
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302	4	4013	2017	32	5	303	1967	1980	1	13	N	57.6164
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302	4	4013	2017	32	5	310	1996	2013	2	51	N	90.0428
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101	4	4013	2017	21	1	10	1996	2013	2	51	Y	83.1594264
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101	4	4013	2017	31	1	6	1981	1995	2	33	Y	63.6192228
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101	4	4013	2017	32	1	6	1981	1995	2	33	Y	63.6192228
101	4	4013	2017	32	1	10	1996	2013	2	51	Y	73.1802476
101	4	4013	2017	41	1	3	1967	1980	1	13	Y	57.207864
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102	4	4013	2017	21	1	6	1981	1995	2	33	Y	63.6192228
102	4	4013	2017	21	1	10	1996	2013	2	51	Y	83.1594264
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102	4	4013	2017	31	1	10	1996	2013	2	51	Y	78.1698828
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102	4	4013	2017	32	1	6	1981	1995	2	33	Y	63.6192228
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102	4	4013	2017	41	1	3	1967	1980	1	13	Y	57.207864
102	4	4013	2017	42	1	3	1967	1980	1	13	Y	57.207864
102	4	4013	2017	43	1	3	1967	1980	1	13	Y	57.207864
102	4	4013	2017	51	1	3	1967	1980	1	13	Y	57.207864
102	4	4013	2017	52	1	3	1967	1980	1	13	Y	57.207864

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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102	4	4013	2017	54	1	3	1967	1980	1	13	Y	57.207864
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102	4	4013	2017	62	1	3	1967	1980	1	13	Y	57.207864
112	4	4013	2017	21	1	8	1996	2013	2	45	Y	89.3395868
112	4	4013	2017	21	1	9	1981	1995	2	44	Y	63.6192228
112	4	4013	2017	21	1	11	1967	1980	1	41	Y	86.7668176
112	4	4013	2017	31	1	8	1996	2013	2	45	Y	83.9791548
112	4	4013	2017	31	1	9	1981	1995	2	44	Y	59.8020676
112	4	4013	2017	31	1	11	1967	1980	1	41	Y	86.7668176
112	4	4013	2017	32	1	8	1996	2013	2	45	Y	78.6188144
112	4	4013	2017	32	1	9	1981	1995	2	44	Y	55.9849124
112	4	4013	2017	32	1	11	1967	1980	1	41	Y	86.7668176
112	4	4013	2017	41	1	7	1981	2013	1	41	Y	85.6132988
112	4	4013	2017	41	1	11	1967	1980	1	41	Y	86.7668176
112	4	4013	2017	42	1	7	1981	2013	1	41	Y	85.6132988
112	4	4013	2017	42	1	11	1967	1980	1	41	Y	86.7668176
112	4	4013	2017	43	1	7	1981	2013	1	41	Y	85.6132988
112	4	4013	2017	43	1	11	1967	1980	1	41	Y	86.7668176
112	4	4013	2017	51	1	7	1981	2013	1	41	Y	85.6132988
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112	4	4013	2017	52	1	7	1981	2013	1	41	Y	85.6132988
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112	4	4013	2017	62	1	7	1981	2013	1	41	Y	85.6132988
112	4	4013	2017	62	1	11	1967	1980	1	41	Y	86.7668176
113	4	4013	2017	21	1	8	1996	2013	2	45	Y	89.3395868
113	4	4013	2017	21	1	9	1981	1995	2	44	Y	63.6192228
113	4	4013	2017	21	1	11	1967	1980	1	41	Y	86.7668176
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113	4	4013	2017	31	1	9	1981	1995	2	44	Y	59.8020676
113	4	4013	2017	31	1	11	1967	1980	1	41	Y	86.7668176
113	4	4013	2017	32	1	8	1996	2013	2	45	Y	78.6188144
113	4	4013	2017	32	1	9	1981	1995	2	44	Y	55.9849124
113	4	4013	2017	32	1	11	1967	1980	1	41	Y	86.7668176
113	4	4013	2017	41	1	7	1981	2013	1	41	Y	85.6132988
113	4	4013	2017	41	1	11	1967	1980	1	41	Y	86.7668176
113	4	4013	2017	42	1	7	1981	2013	1	41	Y	85.6132988
113	4	4013	2017	42	1	11	1967	1980	1	41	Y	86.7668176
113	4	4013	2017	43	1	7	1981	2013	1	41	Y	85.6132988
113	4	4013	2017	43	1	11	1967	1980	1	41	Y	86.7668176
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113	4	4013	2017	51	1	11	1967	1980	1	41	Y	86.7668176
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113	4	4013	2017	62	1	7	1981	2013	1	41	Y	85.6132988
113	4	4013	2017	62	1	11	1967	1980	1	41	Y	86.7668176
201	4	4013	2017	21	1	3	1967	1980	1	13	Y	57.207864
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201	4	4013	2017	31	1	6	1981	1995	2	33	Y	63.6192228
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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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101	4	4013	2017	31	5	506	1981	1995	2	33	Y	63.6192228
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112	4	4013	2017	21	5	511	1967	1980	1	41	Y	86.7668176
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112	4	4013	2017	42	5	507	1981	2013	1	41	Y	85.6132988
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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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polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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[RoadType]

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[RoadTypeDistribution]

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11	3	0.07407
11	4	0.31380
11	5	0.59660
21	1	0.00000
21	2	0.01535
21	3	0.05868
21	4	0.38280
21	5	0.54317
31	1	0.00000
31	2	0.01535
31	3	0.05868
31	4	0.38280
31	5	0.54317
32	1	0.00000
32	2	0.01535
32	3	0.05868
32	4	0.38280
32	5	0.54317
41	1	0.00000
41	2	0.12898
41	3	0.06703
41	4	0.46862
41	5	0.33537
42	1	0.00000
42	2	0.12898
42	3	0.06703
42	4	0.46862
42	5	0.33537
43	1	0.00000
43	2	0.12898
43	3	0.06703
43	4	0.46862
43	5	0.33537
51	1	0.00000
51	2	0.03917
51	3	0.05784
51	4	0.54790
51	5	0.35509
52	1	0.00000
52	2	0.03917
52	3	0.05784
52	4	0.54790
52	5	0.35509
53	1	0.00000
53	2	0.03917
53	3	0.05784
53	4	0.54790
53	5	0.35509
54	1	0.00000
54	2	0.03917
54	3	0.05784
54	4	0.54790
54	5	0.35509
61	1	0.00000
61	2	0.21741
61	3	0.06175
61	4	0.51666
61	5	0.20418
62	1	0.00000
62	2	0.21741
62	3	0.06175
62	4	0.51666
62	5	0.20418

[MonthVMTFraction]

sourceTypeID	monthID	monthVMTFraction
11	1	0.084746
21	1	0.084746
31	1	0.084746
32	1	0.084746
41	1	0.084746
42	1	0.084746
43	1	0.084746
51	1	0.084746
52	1	0.084746
53	1	0.084746
54	1	0.084746
61	1	0.084746
62	1	0.084746
11	2	0.079142
21	2	0.079142
31	2	0.079142
32	2	0.079142
41	2	0.079142
42	2	0.079142
43	2	0.079142
51	2	0.079142
52	2	0.079142
53	2	0.079142
54	2	0.079142
61	2	0.079142
62	2	0.079142
11	3	0.087837
21	3	0.087837
31	3	0.087837
32	3	0.087837
41	3	0.087837
42	3	0.087837
43	3	0.087837
51	3	0.087837
52	3	0.087837
53	3	0.087837
54	3	0.087837
61	3	0.087837
62	3	0.087837
11	4	0.084785
21	4	0.084785
31	4	0.084785
32	4	0.084785
41	4	0.084785
42	4	0.084785
43	4	0.084785
51	4	0.084785
52	4	0.084785
53	4	0.084785
54	4	0.084785
61	4	0.084785
62	4	0.084785
11	5	0.085945
21	5	0.085945
31	5	0.085945
32	5	0.085945
41	5	0.085945
42	5	0.085945
43	5	0.085945
51	5	0.085945
52	5	0.085945
53	5	0.085945
54	5	0.085945
61	5	0.085945
62	5	0.085945
11	6	0.081088
21	6	0.081088
31	6	0.081088
32	6	0.081088
41	6	0.081088
42	6	0.081088
43	6	0.081088
51	6	0.081088
52	6	0.081088
53	6	0.081088
54	6	0.081088
61	6	0.081088
62	6	0.081088
11	7	0.079795
21	7	0.079795
31	7	0.079795
32	7	0.079795
41	7	0.079795
42	7	0.079795
43	7	0.079795
51	7	0.079795
52	7	0.079795
53	7	0.079795
54	7	0.079795
61	7	0.079795
62	7	0.079795
11	8	0.082268
21	8	0.082268
31	8	0.082268
32	8	0.082268
41	8	0.082268
42	8	0.082268
43	8	0.082268
51	8	0.082268
52	8	0.082268
53	8	0.082268
54	8	0.082268
61	8	0.082268
62	8	0.082268
11	9	0.081392
21	9	0.081392
31	9	0.081392
32	9	0.081392
41	9	0.081392
42	9	0.081392
43	9	0.081392
51	9	0.081392
52	9	0.081392
53	9	0.081392
54	9	0.081392
61	9	0.081392
62	9	0.081392
11	10	0.085131
21	10	0.085131
31	10	0.085131
32	10	0.085131
41	10	0.085131
42	10	0.085131
43	10	0.085131
51	10	0.085131
52	10	0.085131
53	10	0.085131
54	10	0.085131
61	10	0.085131
62	10	0.085131
11	11	0.082995
21	11	0.082995
31	11	0.082995
32	11	0.082995
41	11	0.082995
42	11	0.082995
43	11	0.082995
51	11	0.082995
52	11	0.082995
53	11	0.082995
54	11	0.082995
61	11	0.082995
62	11	0.082995
11	12	0.084877
21	12	0.084877
31	12	0.084877
32	12	0.084877
41	12	0.084877
42	12	0.084877
43	12	0.084877
51	12	0.084877
52	12	0.084877
53	12	0.084877
54	12	0.084877
61	12	0.084877
62	12	0.084877

[DayVMTFraction] (July 2017)

Source TypeID	Month ID	Road TypeID	dayID	Day VMTFraction
11	7	1	5	0.780527
21	7	1	5	0.780527
31	7	1	5	0.780527
32	7	1	5	0.780527
41	7	1	5	0.780527
42	7	1	5	0.780527
43	7	1	5	0.780527
51	7	1	5	0.780527
52	7	1	5	0.780527
53	7	1	5	0.780527
54	7	1	5	0.780527
61	7	1	5	0.780527
62	7	1	5	0.780527
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	0.219473
21	7	1	2	0.219473
31	7	1	2	0.219473
32	7	1	2	0.219473
41	7	1	2	0.219473
42	7	1	2	0.219473
43	7	1	2	0.219473
51	7	1	2	0.219473
52	7	1	2	0.219473
53	7	1	2	0.219473
54	7	1	2	0.219473
61	7	1	2	0.219473
62	7	1	2	0.219473
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	5	1	0.007634
21	1	5	2	0.005215
21	1	5	3	0.004896
21	1	5	4	0.006994
21	1	5	5	0.019983
21	1	5	6	0.035384
21	1	5	7	0.052788
21	1	5	8	0.066238
21	1	5	9	0.060727
21	1	5	10	0.051529
21	1	5	11	0.050067
21	1	5	12	0.053712
21	1	5	13	0.056889
21	1	5	14	0.059262
21	1	5	15	0.063777
21	1	5	16	0.068091
21	1	5	17	0.070577
21	1	5	18	0.071309
21	1	5	19	0.058079
21	1	5	20	0.041175
21	1	5	21	0.033501
21	1	5	22	0.028521
21	1	5	23	0.020484
21	1	5	24	0.013169
21	2	5	1	0.009714
21	2	5	2	0.006908
21	2	5	3	0.006883
21	2	5	4	0.010955
21	2	5	5	0.033927
21	2	5	6	0.048421
21	2	5	7	0.057932
21	2	5	8	0.061169
21	2	5	9	0.057327
21	2	5	10	0.053128
21	2	5	11	0.050390
21	2	5	12	0.052030
21	2	5	13	0.054821
21	2	5	14	0.060928
21	2	5	15	0.063510
21	2	5	16	0.061499
21	2	5	17	0.059918
21	2	5	18	0.058100
21	2	5	19	0.050322
21	2	5	20	0.038704
21	2	5	21	0.033058
21	2	5	22	0.029950
21	2	5	23	0.023936
21	2	5	24	0.016469
21	3	5	1	0.006081
21	3	5	2	0.003952
21	3	5	3	0.003413
21	3	5	4	0.004039
21	3	5	5	0.009578
21	3	5	6	0.025656
21	3	5	7	0.048950
21	3	5	8	0.070020
21	3	5	9	0.063264
21	3	5	10	0.050335
21	3	5	11	0.049826
21	3	5	12	0.054967
21	3	5	13	0.058433
21	3	5	14	0.058019
21	3	5	15	0.063976
21	3	5	16	0.073011
21	3	5	17	0.078530
21	3	5	18	0.081166
21	3	5	19	0.063868
21	3	5	20	0.043018
21	3	5	21	0.033831
21	3	5	22	0.027454
21	3	5	23	0.017909
21	3	5	24	0.010705
21	4	5	1	0.009714
21	4	5	2	0.006908
21	4	5	3	0.006883
21	4	5	4	0.010955
21	4	5	5	0.033927
21	4	5	6	0.048421
21	4	5	7	0.057932
21	4	5	8	0.061169
21	4	5	9	0.057327
21	4	5	10	0.053128
21	4	5	11	0.050390
21	4	5	12	0.052030
21	4	5	13	0.054821
21	4	5	14	0.060928
21	4	5	15	0.063510
21	4	5	16	0.061499
21	4	5	17	0.059918
21	4	5	18	0.058100
21	4	5	19	0.050322
21	4	5	20	0.038704
21	4	5	21	0.033058
21	4	5	22	0.029950
21	4	5	23	0.023936
21	4	5	24	0.016469
21	5	5	1	0.006081
21	5	5	2	0.003952
21	5	5	3	0.003413
21	5	5	4	0.004039
21	5	5	5	0.009578
21	5	5	6	0.025656
21	5	5	7	0.048950
21	5	5	8	0.070020
21	5	5	9	0.063264
21	5	5	10	0.050335
21	5	5	11	0.049826
21	5	5	12	0.054967
21	5	5	13	0.058433
21	5	5	14	0.058019
21	5	5	15	0.063976
21	5	5	16	0.073011
21	5	5	17	0.078530
21	5	5	18	0.081166
21	5	5	19	0.063868
21	5	5	20	0.043018
21	5	5	21	0.033831
21	5	5	22	0.027454
21	5	5	23	0.017909
21	5	5	24	0.010705
21	1	2	1	0.021553
21	1	2	2	0.015543
21	1	2	3	0.013842
21	1	2	4	0.010880
21	1	2	5	0.013879
21	1	2	6	0.021227
21	1	2	7	0.028774
21	1	2	8	0.035288
21	1	2	9	0.041332
21	1	2	10	0.048945
21	1	2	11	0.055256
21	1	2	12	0.059308
21	1	2	13	0.063521
21	1	2	14	0.064017
21	1	2	15	0.062895
21	1	2	16	0.062516
21	1	2	17	0.062882
21	1	2	18	0.061531
21	1	2	19	0.058339
21	1	2	20	0.050576
21	1	2	21	0.045160
21	1	2	22	0.041531
21	1	2	23	0.035595
21	1	2	24	0.025611
21	2	2	1	0.021879
21	2	2	2	0.016150
21	2	2	3	0.014371
21	2	2	4	0.011634
21	2	2	5	0.015883
21	2	2	6	0.023085
21	2	2	7	0.029735
21	2	2	8	0.035822
21	2	2	9	0.041262
21	2	2	10	0.048420
21	2	2	11	0.054548
21	2	2	12	0.058679
21	2	2	13	0.062843
21	2	2	14	0.063229
21	2	2	15	0.061805
21	2	2	16	0.061310
21	2	2	17	0.061686
21	2	2	18	0.059991
21	2	2	19	0.057141
21	2	2	20	0.050324
21	2	2	21	0.046109
21	2	2	22	0.042308
21	2	2	23	0.035832
21	2	2	24	0.025951
21	3	2	1	0.021315
21	3	2	2	0.015101
21	3	2	3	0.013457
21	3	2	4	0.010331
21	3	2	5	0.012420
21	3	2	6	0.019876
21	3	2	7	0.028075
21	3	2	8	0.034899
21	3	2	9	0.041383
21	3	2	10	0.049326
21	3	2	11	0.055770
21	3	2	12	0.059766
21	3	2	13	0.064014
21	3	2	14	0.064591
21	3	2	15	0.063689
21	3	2	16	0.063394
21	3	2	17	0.063753
21	3	2	18	0.062652
21	3	2	19	0.059210
21	3	2	20	0.050759
21	3	2	21	0.044469
21	3	2	22	0.040966
21	3	2	23	0.035423
21	3	2	24	0.025364
21	4	2	1	0.021879
21	4	2	2	0.016150
21	4	2	3	0.014371
21	4	2	4	0.011634
21	4	2	5	0.015883
21	4	2	6	0.023085
21	4	2	7	0.029735
21	4	2	8	0.035822
21	4	2	9	0.041262
21	4	2	10	0.048420
21	4	2	11	0.054548
21	4	2	12	0.058679
21	4	2	13	0.062843
21	4	2	14	0.063229
21	4	2	15	0.061805
21	4	2	16	0.061310
21	4	2	17	0.061686
21	4	2	18	0.059991
21	4	2	19	0.057141
21	4	2	20	0.050324
21	4	2	21	0.046109
21	4	2	22	0.042308
21	4	2	23	0.035832
21	4	2	24	0.025951
21	5	2	1	0.021315
21	5	2	2	0.015101
21	5	2	3	0.013457
21	5	2	4	0.010331
21	5	2	5	0.012420
21	5	2	6	0.019876
21	5	2	7	0.028075
21	5	2	8	0.034899
21	5	2	9	0.041383
21	5	2	10	0.049326
21	5	2	11	0.055770
21	5	2	12	0.059766
21	5	2	13	0.064014
21	5	2	14	0.064591
21	5	2	15	0.063689
21	5	2	16	0.063394
21	5	2	17	0.063753
21	5	2	18	0.062652
21	5	2	19	0.059210
21	5	2	20	0.050759
21	5	2	21	0.044469
21	5	2	22	0.040966
21	5	2	23	0.035423
21	5	2	24	0.025364

[AvgSpeedDistribution] (SourceTypeID 21: Passenger Car and RoadTypeID 5: Urban Restricted Access)

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	5	15	1	0.000000
21	5	15	2	0.000182
21	5	15	3	0.006560
21	5	15	4	0.026146
21	5	15	5	0.136614
21	5	15	6	0.263923
21	5	15	7	0.234566
21	5	15	8	0.250808
21	5	15	9	0.077113
21	5	15	10	0.002482
21	5	15	11	0.001245
21	5	15	12	0.000360
21	5	15	13	0.000000
21	5	15	14	0.000000
21	5	15	15	0.000000
21	5	15	16	0.000000
21	5	25	1	0.000000
21	5	25	2	0.000182
21	5	25	3	0.006560
21	5	25	4	0.026146
21	5	25	5	0.136614
21	5	25	6	0.263923
21	5	25	7	0.234566
21	5	25	8	0.250808
21	5	25	9	0.077113
21	5	25	10	0.002482
21	5	25	11	0.001245
21	5	25	12	0.000360
21	5	25	13	0.000000
21	5	25	14	0.000000
21	5	25	15	0.000000
21	5	25	16	0.000000
21	5	35	1	0.000000
21	5	35	2	0.000182
21	5	35	3	0.006560
21	5	35	4	0.026146
21	5	35	5	0.136614
21	5	35	6	0.263923
21	5	35	7	0.234566
21	5	35	8	0.250808
21	5	35	9	0.077113
21	5	35	10	0.002482
21	5	35	11	0.001245
21	5	35	12	0.000360
21	5	35	13	0.000000
21	5	35	14	0.000000
21	5	35	15	0.000000
21	5	35	16	0.000000
21	5	45	1	0.000000
21	5	45	2	0.000182
21	5	45	3	0.006560
21	5	45	4	0.026146
21	5	45	5	0.136614
21	5	45	6	0.263923
21	5	45	7	0.234566
21	5	45	8	0.250808
21	5	45	9	0.077113
21	5	45	10	0.002482
21	5	45	11	0.001245
21	5	45	12	0.000360
21	5	45	13	0.000000
21	5	45	14	0.000000
21	5	45	15	0.000000
21	5	45	16	0.000000
21	5	55	1	0.000000
21	5	55	2	0.000182
21	5	55	3	0.006560
21	5	55	4	0.026146
21	5	55	5	0.136614
21	5	55	6	0.263923
21	5	55	7	0.234566
21	5	55	8	0.250808
21	5	55	9	0.077113
21	5	55	10	0.002482
21	5	55	11	0.001245
21	5	55	12	0.000360
21	5	55	13	0.000000
21	5	55	14	0.000000
21	5	55	15	0.000000
21	5	55	16	0.000000
21	5	65	1	0.000000
21	5	65	2	0.000182
21	5	65	3	0.006560
21	5	65	4	0.026146
21	5	65	5	0.136614
21	5	65	6	0.263923
21	5	65	7	0.234566
21	5	65	8	0.250808
21	5	65	9	0.077113
21	5	65	10	0.002482
21	5	65	11	0.001245
21	5	65	12	0.000360
21	5	65	13	0.000000
21	5	65	14	0.000000
21	5	65	15	0.000000
21	5	65	16	0.000000
21	5	75	1	0.000000
21	5	75	2	0.002060
21	5	75	3	0.020325
21	5	75	4	0.076327
21	5	75	5	0.198773
21	5	75	6	0.309004
21	5	75	7	0.193188
21	5	75	8	0.149650
21	5	75	9	0.047484
21	5	75	10	0.002036
21	5	75	11	0.001041
21	5	75	12	0.000111
21	5	75	13	0.000000
21	5	75	14	0.000000
21	5	75	15	0.000000
21	5	75	16	0.000000
21	5	85	1	0.000000
21	5	85	2	0.002060
21	5	85	3	0.020325
21	5	85	4	0.076327
21	5	85	5	0.198773
21	5	85	6	0.309004
21	5	85	7	0.193188
21	5	85	8	0.149650
21	5	85	9	0.047484
21	5	85	10	0.002036
21	5	85	11	0.001041
21	5	85	12	0.000111
21	5	85	13	0.000000
21	5	85	14	0.000000
21	5	85	15	0.000000
21	5	85	16	0.000000
21	5	95	1	0.000000
21	5	95	2	0.002060
21	5	95	3	0.020325
21	5	95	4	0.076327
21	5	95	5	0.198773
21	5	95	6	0.309004
21	5	95	7	0.193188
21	5	95	8	0.149650
21	5	95	9	0.047484
21	5	95	10	0.002036
21	5	95	11	0.001041
21	5	95	12	0.000111
21	5	95	13	0.000000
21	5	95	14	0.000000
21	5	95	15	0.000000
21	5	95	16	0.000000
21	5	105	1	0.000000
21	5	105	2	0.000361
21	5	105	3	0.006221
21	5	105	4	0.025317
21	5	105	5	0.138786
21	5	105	6	0.265055
21	5	105	7	0.238469
21	5	105	8	0.245854
21	5	105	9	0.075613
21	5	105	10	0.002226
21	5	105	11	0.001767
21	5	105	12	0.000331
21	5	105	13	0.000000
21	5	105	14	0.000000
21	5	105	15	0.000000
21	5	105	16	0.000000
21	5	115	1	0.000000
21	5	115	2	0.000361
21	5	115	3	0.006221
21	5	115	4	0.025317
21	5	115	5	0.138786
21	5	115	6	0.265055
21	5	115	7	0.238469
21	5	115	8	0.245854
21	5	115	9	0.075613
21	5	115	10	0.002226
21	5	115	11	0.001767
21	5	115	12	0.000331
21	5	115	13	0.000000
21	5	115	14	0.000000
21	5	115	15	0.000000
21	5	115	16	0.000000
21	5	125	1	0.000000
21	5	125	2	0.000361
21	5	125	3	0.006221
21	5	125	4	0.025317
21	5	125	5	0.138786
21	5	125	6	0.265055
21	5	125	7	0.238469
21	5	125	8	0.245854
21	5	125	9	0.075613
21	5	125	10	0.002226
21	5	125	11	0.001767
21	5	125	12	0.000331
21	5	125	13	0.000000
21	5	125	14	0.000000
21	5	125	15	0.000000
21	5	125	16	0.000000
21	5	135	1	0.000000
21	5	135	2	0.000361
21	5	135	3	0.006221
21	5	135	4	0.025317
21	5	135	5	0.138786
21	5	135	6	0.265055
21	5	135	7	0.238469
21	5	135	8	0.245854
21	5	135	9	0.075613
21	5	135	10	0.002226
21	5	135	11	0.001767
21	5	135	12	0.000331
21	5	135	13	0.000000
21	5	135	14	0.000000
21	5	135	15	0.000000
21	5	135	16	0.000000
21	5	145	1	0.000000
21	5	145	2	0.000361
21	5	145	3	0.006221
21	5	145	4	0.025317
21	5	145	5	0.138786
21	5	145	6	0.265055
21	5	145	7	0.238469
21	5	145	8	0.245854
21	5	145	9	0.075613
21	5	145	10	0.002226
21	5	145	11	0.001767
21	5	145	12	0.000331
21	5	145	13	0.000000
21	5	145	14	0.000000
21	5	145	15	0.000000
21	5	145	16	0.000000
21	5	155	1	0.000000
21	5	155	2	0.004187
21	5	155	3	0.011052
21	5	155	4	0.071957
21	5	155	5	0.198122
21	5	155	6	0.350335
21	5	155	7	0.218862

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	5	155	8	0.115341
21	5	155	9	0.027730
21	5	155	10	0.001449
21	5	155	11	0.000812
21	5	155	12	0.000153
21	5	155	13	0.000000
21	5	155	14	0.000000
21	5	155	15	0.000000
21	5	155	16	0.000000
21	5	165	1	0.000000
21	5	165	2	0.004187
21	5	165	3	0.011052
21	5	165	4	0.071957
21	5	165	5	0.198122
21	5	165	6	0.350335
21	5	165	7	0.218862
21	5	165	8	0.115341
21	5	165	9	0.027730
21	5	165	10	0.001449
21	5	165	11	0.000812
21	5	165	12	0.000153
21	5	165	13	0.000000
21	5	165	14	0.000000
21	5	165	15	0.000000
21	5	165	16	0.000000
21	5	175	1	0.000000
21	5	175	2	0.004187
21	5	175	3	0.011052
21	5	175	4	0.071957
21	5	175	5	0.198122
21	5	175	6	0.350335
21	5	175	7	0.218862
21	5	175	8	0.115341
21	5	175	9	0.027730
21	5	175	10	0.001449
21	5	175	11	0.000812
21	5	175	12	0.000153
21	5	175	13	0.000000
21	5	175	14	0.000000
21	5	175	15	0.000000
21	5	175	16	0.000000
21	5	185	1	0.000000
21	5	185	2	0.004187
21	5	185	3	0.011052
21	5	185	4	0.071957
21	5	185	5	0.198122
21	5	185	6	0.350335
21	5	185	7	0.218862
21	5	185	8	0.115341
21	5	185	9	0.027730
21	5	185	10	0.001449
21	5	185	11	0.000812
21	5	185	12	0.000153
21	5	185	13	0.000000
21	5	185	14	0.000000
21	5	185	15	0.000000
21	5	185	16	0.000000
21	5	195	1	0.000000
21	5	195	2	0.000182
21	5	195	3	0.006560
21	5	195	4	0.026146
21	5	195	5	0.136614
21	5	195	6	0.263923
21	5	195	7	0.234566
21	5	195	8	0.250808
21	5	195	9	0.077113
21	5	195	10	0.002482
21	5	195	11	0.001245
21	5	195	12	0.000360
21	5	195	13	0.000000
21	5	195	14	0.000000
21	5	195	15	0.000000
21	5	195	16	0.000000
21	5	205	1	0.000000
21	5	205	2	0.000182
21	5	205	3	0.006560
21	5	205	4	0.026146
21	5	205	5	0.136614
21	5	205	6	0.263923

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	5	205	7	0.234566
21	5	205	8	0.250808
21	5	205	9	0.077113
21	5	205	10	0.002482
21	5	205	11	0.001245
21	5	205	12	0.000360
21	5	205	13	0.000000
21	5	205	14	0.000000
21	5	205	15	0.000000
21	5	205	16	0.000000
21	5	215	1	0.000000
21	5	215	2	0.000182
21	5	215	3	0.006560
21	5	215	4	0.026146
21	5	215	5	0.136614
21	5	215	6	0.263923
21	5	215	7	0.234566
21	5	215	8	0.250808
21	5	215	9	0.077113
21	5	215	10	0.002482
21	5	215	11	0.001245
21	5	215	12	0.000360
21	5	215	13	0.000000
21	5	215	14	0.000000
21	5	215	15	0.000000
21	5	215	16	0.000000
21	5	225	1	0.000000
21	5	225	2	0.000182
21	5	225	3	0.006560
21	5	225	4	0.026146
21	5	225	5	0.136614
21	5	225	6	0.263923
21	5	225	7	0.234566
21	5	225	8	0.250808
21	5	225	9	0.077113
21	5	225	10	0.002482
21	5	225	11	0.001245
21	5	225	12	0.000360
21	5	225	13	0.000000
21	5	225	14	0.000000
21	5	225	15	0.000000
21	5	225	16	0.000000
21	5	235	1	0.000000
21	5	235	2	0.000182
21	5	235	3	0.006560
21	5	235	4	0.026146
21	5	235	5	0.136614
21	5	235	6	0.263923
21	5	235	7	0.234566
21	5	235	8	0.250808
21	5	235	9	0.077113
21	5	235	10	0.002482
21	5	235	11	0.001245
21	5	235	12	0.000360
21	5	235	13	0.000000
21	5	235	14	0.000000
21	5	235	15	0.000000
21	5	235	16	0.000000
21	5	245	1	0.000000
21	5	245	2	0.000182
21	5	245	3	0.006560
21	5	245	4	0.026146
21	5	245	5	0.136614
21	5	245	6	0.263923
21	5	245	7	0.234566
21	5	245	8	0.250808
21	5	245	9	0.077113
21	5	245	10	0.002482
21	5	245	11	0.001245
21	5	245	12	0.000360
21	5	245	13	0.000000
21	5	245	14	0.000000
21	5	245	15	0.000000
21	5	245	16	0.000000
21	5	12	1	0.000000
21	5	12	2	0.000182
21	5	12	3	0.006560
21	5	12	4	0.026146
21	5	12	5	0.136614

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	5	12	6	0.263923
21	5	12	7	0.234566
21	5	12	8	0.250808
21	5	12	9	0.077113
21	5	12	10	0.002482
21	5	12	11	0.001245
21	5	12	12	0.000360
21	5	12	13	0.000000
21	5	12	14	0.000000
21	5	12	15	0.000000
21	5	12	16	0.000000
21	5	22	1	0.000000
21	5	22	2	0.000182
21	5	22	3	0.006560
21	5	22	4	0.026146
21	5	22	5	0.136614
21	5	22	6	0.263923
21	5	22	7	0.234566
21	5	22	8	0.250808
21	5	22	9	0.077113
21	5	22	10	0.002482
21	5	22	11	0.001245
21	5	22	12	0.000360
21	5	22	13	0.000000
21	5	22	14	0.000000
21	5	22	15	0.000000
21	5	22	16	0.000000
21	5	32	1	0.000000
21	5	32	2	0.000182
21	5	32	3	0.006560
21	5	32	4	0.026146
21	5	32	5	0.136614
21	5	32	6	0.263923
21	5	32	7	0.234566
21	5	32	8	0.250808
21	5	32	9	0.077113
21	5	32	10	0.002482
21	5	32	11	0.001245
21	5	32	12	0.000360
21	5	32	13	0.000000
21	5	32	14	0.000000
21	5	32	15	0.000000
21	5	32	16	0.000000
21	5	42	1	0.000000
21	5	42	2	0.000182
21	5	42	3	0.006560
21	5	42	4	0.026146
21	5	42	5	0.136614
21	5	42	6	0.263923
21	5	42	7	0.234566
21	5	42	8	0.250808
21	5	42	9	0.077113
21	5	42	10	0.002482
21	5	42	11	0.001245
21	5	42	12	0.000360
21	5	42	13	0.000000
21	5	42	14	0.000000
21	5	42	15	0.000000
21	5	42	16	0.000000
21	5	52	1	0.000000
21	5	52	2	0.000182
21	5	52	3	0.006560
21	5	52	4	0.026146
21	5	52	5	0.136614
21	5	52	6	0.263923
21	5	52	7	0.234566
21	5	52	8	0.250808
21	5	52	9	0.077113
21	5	52	10	0.002482
21	5	52	11	0.001245
21	5	52	12	0.000360
21	5	52	13	0.000000
21	5	52	14	0.000000
21	5	52	15	0.000000
21	5	52	16	0.000000
21	5	62	1	0.000000
21	5	62	2	0.000182
21	5	62	3	0.006560
21	5	62	4	0.026146

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	5	62	5	0.136614
21	5	62	6	0.263923
21	5	62	7	0.234566
21	5	62	8	0.250808
21	5	62	9	0.077113
21	5	62	10	0.002482
21	5	62	11	0.001245
21	5	62	12	0.000360
21	5	62	13	0.000000
21	5	62	14	0.000000
21	5	62	15	0.000000
21	5	62	16	0.000000
21	5	72	1	0.000000
21	5	72	2	0.000182
21	5	72	3	0.006560
21	5	72	4	0.026146
21	5	72	5	0.136614
21	5	72	6	0.263923
21	5	72	7	0.234566
21	5	72	8	0.250808
21	5	72	9	0.077113
21	5	72	10	0.002482
21	5	72	11	0.001245
21	5	72	12	0.000360
21	5	72	13	0.000000
21	5	72	14	0.000000
21	5	72	15	0.000000
21	5	72	16	0.000000
21	5	82	1	0.000000
21	5	82	2	0.000182
21	5	82	3	0.006560
21	5	82	4	0.026146
21	5	82	5	0.136614
21	5	82	6	0.263923
21	5	82	7	0.234566
21	5	82	8	0.250808
21	5	82	9	0.077113
21	5	82	10	0.002482
21	5	82	11	0.001245
21	5	82	12	0.000360
21	5	82	13	0.000000
21	5	82	14	0.000000
21	5	82	15	0.000000
21	5	82	16	0.000000
21	5	92	1	0.000000
21	5	92	2	0.000182
21	5	92	3	0.006560
21	5	92	4	0.026146
21	5	92	5	0.136614
21	5	92	6	0.263923
21	5	92	7	0.234566
21	5	92	8	0.250808
21	5	92	9	0.077113
21	5	92	10	0.002482
21	5	92	11	0.001245
21	5	92	12	0.000360
21	5	92	13	0.000000
21	5	92	14	0.000000
21	5	92	15	0.000000
21	5	92	16	0.000000
21	5	102	1	0.000000
21	5	102	2	0.000182
21	5	102	3	0.006560
21	5	102	4	0.026146
21	5	102	5	0.136614
21	5	102	6	0.263923
21	5	102	7	0.234566
21	5	102	8	0.250808
21	5	102	9	0.077113
21	5	102	10	0.002482
21	5	102	11	0.001245
21	5	102	12	0.000360
21	5	102	13	0.000000
21	5	102	14	0.000000
21	5	102	15	0.000000
21	5	102	16	0.000000
21	5	112	1	0.000000
21	5	112	2	0.000182
21	5	112	3	0.006560
21	5	112	4	0.026146
21	5	112	5	0.136614
21	5	112	6	0.263923
21	5	112	7	0.234566
21	5	112	8	0.250808
21	5	112	9	0.077113
21	5	112	10	0.002482
21	5	112	11	0.001245
21	5	112	12	0.000360
21	5	112	13	0.000000
21	5	112	14	0.000000
21	5	112	15	0.000000
21	5	112	16	0.000000
21	5	122	1	0.000000
21	5	122	2	0.000182
21	5	122	3	0.006560
21	5	122	4	0.026146
21	5	122	5	0.136614
21	5	122	6	0.263923
21	5	122	7	0.234566
21	5	122	8	0.250808
21	5	122	9	0.077113
21	5	122	10	0.002482
21	5	122	11	0.001245
21	5	122	12	0.000360
21	5	122	13	0.000000
21	5	122	14	0.000000
21	5	122	15	0.000000
21	5	122	16	0.000000
21	5	132	1	0.000000
21	5	132	2	0.000182
21	5	132	3	0.006560
21	5	132	4	0.026146
21	5	132	5	0.136614
21	5	132	6	0.263923
21	5	132	7	0.234566
21	5	132	8	0.250808
21	5	132	9	0.077113
21	5	132	10	0.002482
21	5	132	11	0.001245
21	5	132	12	0.000360
21	5	132	13	0.000000
21	5	132	14	0.000000
21	5	132	15	0.000000
21	5	132	16	0.000000
21	5	142	1	0.000000
21	5	142	2	0.000182
21	5	142	3	0.006560
21	5	142	4	0.026146
21	5	142	5	0.136614
21	5	142	6	0.263923
21	5	142	7	0.234566
21	5	142	8	0.250808
21	5	142	9	0.077113
21	5	142	10	0.002482
21	5	142	11	0.001245
21	5	142	12	0.000360
21	5	142	13	0.000000
21	5	142	14	0.000000
21	5	142	15	0.000000
21	5	142	16	0.000000
21	5	152	1	0.000000
21	5	152	2	0.000182
21	5	152	3	0.006560
21	5	152	4	0.026146
21	5	152	5	0.136614
21	5	152	6	0.263923
21	5	152	7	0.234566
21	5	152	8	0.250808
21	5	152	9	0.077113
21	5	152	10	0.002482
21	5	152	11	0.001245
21	5	152	12	0.000360
21	5	152	13	0.000000
21	5	152	14	0.000000
21	5	152	15	0.000000
21	5	152	16	0.000000
21	5	162	1	0.000000
21	5	162	2	0.000182
21	5	162	3	0.006560
21	5	162	4	0.026146
21	5	162	5	0.136614
21	5	162	6	0.263923
21	5	162	7	0.234566
21	5	162	8	0.250808
21	5	162	9	0.077113
21	5	162	10	0.002482
21	5	162	11	0.001245
21	5	162	12	0.000360
21	5	162	13	0.000000
21	5	162	14	0.000000
21	5	162	15	0.000000
21	5	162	16	0.000000
21	5	172	1	0.000000
21	5	172	2	0.000182
21	5	172	3	0.006560
21	5	172	4	0.026146
21	5	172	5	0.136614
21	5	172	6	0.263923
21	5	172	7	0.234566
21	5	172	8	0.250808
21	5	172	9	0.077113
21	5	172	10	0.002482
21	5	172	11	0.001245
21	5	172	12	0.000360
21	5	172	13	0.000000
21	5	172	14	0.000000
21	5	172	15	0.000000
21	5	172	16	0.000000
21	5	182	1	0.000000
21	5	182	2	0.000182
21	5	182	3	0.006560
21	5	182	4	0.026146
21	5	182	5	0.136614
21	5	182	6	0.263923
21	5	182	7	0.234566
21	5	182	8	0.250808
21	5	182	9	0.077113
21	5	182	10	0.002482
21	5	182	11	0.001245
21	5	182	12	0.000360
21	5	182	13	0.000000
21	5	182	14	0.000000
21	5	182	15	0.000000
21	5	182	16	0.000000
21	5	192	1	0.000000
21	5	192	2	0.000182
21	5	192	3	0.006560
21	5	192	4	0.026146
21	5	192	5	0.136614
21	5	192	6	0.263923
21	5	192	7	0.234566
21	5	192	8	0.250808
21	5	192	9	0.077113
21	5	192	10	0.002482
21	5	192	11	0.001245
21	5	192	12	0.000360
21	5	192	13	0.000000
21	5	192	14	0.000000
21	5	192	15	0.000000
21	5	192	16	0.000000
21	5	202	1	0.000000
21	5	202	2	0.000182
21	5	202	3	0.006560
21	5	202	4	0.026146
21	5	202	5	0.136614
21	5	202	6	0.263923
21	5	202	7	0.234566
21	5	202	8	0.250808
21	5	202	9	0.077113
21	5	202	10	0.002482
21	5	202	11	0.001245
21	5	202	12	0.000360
21	5	202	13	0.000000
21	5	202	14	0.000000
21	5	202	15	0.000000
21	5	202	16	0.000000
21	5	212	1	0.000000

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	5	212	2	0.000182
21	5	212	3	0.006560
21	5	212	4	0.026146
21	5	212	5	0.136614
21	5	212	6	0.263923
21	5	212	7	0.234566
21	5	212	8	0.250808
21	5	212	9	0.077113
21	5	212	10	0.002482
21	5	212	11	0.001245
21	5	212	12	0.000360
21	5	212	13	0.000000
21	5	212	14	0.000000
21	5	212	15	0.000000
21	5	212	16	0.000000
21	5	222	1	0.000000
21	5	222	2	0.000182
21	5	222	3	0.006560
21	5	222	4	0.026146
21	5	222	5	0.136614
21	5	222	6	0.263923
21	5	222	7	0.234566

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	5	222	8	0.250808
21	5	222	9	0.077113
21	5	222	10	0.002482
21	5	222	11	0.001245
21	5	222	12	0.000360
21	5	222	13	0.000000
21	5	222	14	0.000000
21	5	222	15	0.000000
21	5	222	16	0.000000
21	5	232	1	0.000000
21	5	232	2	0.000182
21	5	232	3	0.006560
21	5	232	4	0.026146
21	5	232	5	0.136614
21	5	232	6	0.263923
21	5	232	7	0.234566
21	5	232	8	0.250808
21	5	232	9	0.077113
21	5	232	10	0.002482
21	5	232	11	0.001245
21	5	232	12	0.000360
21	5	232	13	0.000000

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	5	232	14	0.000000
21	5	232	15	0.000000
21	5	232	16	0.000000
21	5	242	1	0.000000
21	5	242	2	0.000182
21	5	242	3	0.006560
21	5	242	4	0.026146
21	5	242	5	0.136614
21	5	242	6	0.263923
21	5	242	7	0.234566
21	5	242	8	0.250808
21	5	242	9	0.077113
21	5	242	10	0.002482
21	5	242	11	0.001245
21	5	242	12	0.000360
21	5	242	13	0.000000
21	5	242	14	0.000000
21	5	242	15	0.000000
21	5	242	16	0.000000

[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

Source TypeID	Model YearID	Fuel TypeID	Eng TechID	fuelEng Fraction
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

Source TypeID	Model YearID	Fuel TypeID	Eng TechID	fuelEng Fraction
42	1996	1	1	0.009941
42	1996	2	1	0.892002
42	1996	3	1	0.098057
42	1997	1	1	0.009676
42	1997	2	1	0.816155
42	1997	3	1	0.174169
42	1998	1	1	0.009992
42	1998	2	1	0.840892
42	1998	3	1	0.149116
42	1999	1	1	0.009928
42	1999	2	1	0.877256
42	1999	3	1	0.112816
42	2000	1	1	0.008437
42	2000	2	1	0.915627
42	2000	3	1	0.075935
42	2001	1	1	0.000000
42	2001	2	1	0.000000
42	2001	3	1	1.000000
42	2002	1	1	0.008957
42	2002	2	1	0.891072
42	2002	3	1	0.099971
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	0.000000
42	2004	3	1	1.000000
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	0.092593
42	2006	3	1	0.907407
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	0.320000
42	2008	3	1	0.680000
42	2009	1	1	0.000000
42	2009	2	1	0.151515
42	2009	3	1	0.848485
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	0.000000
42	2011	2	12	0.435897
42	2011	3	1	0.564103
42	2012	1	1	0.000000
42	2012	2	1	0.027027
42	2012	3	1	0.972973
42	2013	1	1	0.100000
42	2013	2	1	0.000000

Source TypeID	Model YearID	Fuel TypeID	Eng TechID	fuelEng Fraction
42	2013	2	12	0.118182
42	2013	3	1	0.781818
42	2014	1	1	0.010204
42	2014	2	1	0.132653
42	2014	3	1	0.857143
42	2015	1	1	0.058824
42	2015	2	1	0.000000
42	2015	3	1	0.941176
42	2016	1	1	0.136364
42	2016	2	1	0.477273
42	2016	3	1	0.386364
42	2017	1	1	0.027778
42	2017	2	1	0.138889
42	2017	3	1	0.833333
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
42	2048	2	1	0.817351
42	2048	3	1	0.158030
42	2049	1	1	0.024619
42	2049	2	1	0.817351
42	2049	3	1	0.158030
42	2050	1	1	0.024619
42	2050	2	1	0.817351
42	2050	3	1	0.158030

Appendix D. Emissions from Facilities Treated as Area Sources in the 2017 Periodic Emissions Inventory

The table below lists those facilities whose reported 2017 emissions have been included in the area source categories of this 2017 Periodic Emissions Inventory for Ozone Precursors.

Table D-1. Emissions (tons/yr) from facilities whose emissions are reflected in area source categories in the 2017 Periodic Emissions Inventory.

ID	Business Name	Address	VOC	NOX	CO
131509	21ST CENTURY INSURANCE	16001 N 28TH AVE	0.0	0.1	0.0
1074	23RD AVE WASTEWATER TREATMENT PLANT	2470 S 22ND AVE	0.3	3.1	35.4
135960	4283929 DELAWARE, LLC- AMES DIVERSIFIED	3131 W CLARENDON AVE	0.0	2.4	0.1
130250	44 MONROE CONDOMINIUM ASSOCIATION	44 W MONROE ST	0.0	0.2	0.0
1330	A FORZANO & SON INC	3020 N CIVIC CENTER PZ	1.4		
133843	A LEGACY FUNERAL HOME LLC	1722 N BANNING #101	0.0	0.7	0.0
120034	A T & T	1301 W UNIVERSITY DR	0.1	3.1	0.7
120036	A T & T	1355 W UNIVERSITY DR	0.0	0.2	0.0
40471	AAH IRONWOOD CUSTOM FINISHING, LLC	1822 E MADISON ST	4.2		
132976	ABEL FUNERAL SERVICES INC	1544 W GRANT ST	0.0	1.4	0.1
1387	ABLE STEEL FABRICATORS	4150 E QUARTZ CIR	2.3		
1952	ADESA PHOENIX LLC	400 N BECK AVE #2	5.2	0.1	0.1
131574	ADLER REALTY INVESTMENTS LLC	2600 N CENTRAL AVE	0.0	0.6	0.1
131397	ADOA	100 N 15TH AVE	0.0	0.5	0.4
126395	ADOT (AIR)	206 S 17TH AVE	0.0	0.0	0.0
72104	AERSALE, INC.	1658 S LITCHFIELD RD	3.7	1.1	0.2
969	AF LORTS MANUFACTURING COMPANY INC	15836 W EDDIE ALBERT WAY	19.1		
132575	AGP ARIZONA CENTER OWNER LLC	400 E VAN BUREN ST	0.0	0.3	0.1
132778	ALASKA USA FEDERAL CREDIT UNION	16325 N 56TH AVE	0.0	0.4	0.2
133228	ALL PRO HYDROJETTING AND PUMPING, LLC	6525 W STATE AVE	0.0	0.1	0.0
90012	ALL STATE CREMATORY	1110 S HORNE #108	0.0	0.6	0.0
34139	ALL WOOD TREASURES CO	2063 E CEDAR ST	0.1		

ID	Business Name	Address	VOC	NOX	CO
131474	ALLIED PACKAGING CORPORATION	5640 S 16TH ST	1.1	3.9	1.7
35541	ALLIED TUBE AND CONDUIT	2525 N 27TH AVE	14.7	0.1	0.1
135582	ALPINE VALLEY BREAD COMPANY	300 W SOUTHERN AVE	1.6	0.7	0.6
131490	ALSCO	4707 W CAMELBACK RD	0.1	1.5	1.3
4397	AMBER STEEL FABRICATION, INC.	11331 E GERMANN RD	10.4		
1504	AMERICAN AIRLINES	4000 E SKY HARBOR BLVD	2.5		
96683	AMERICAN EXPRESS	18850 N 56TH ST	0.1	1.2	0.5
58431	AMERICAN EXPRESS SERVICE CENTER	20022 N 31ST AVE	0.0	1.4	0.3
132483	AMERICAN FENCE & SECURITY CO INC	2737 W VIRGINIA AVE	9.1		
1243	AMERICAN FIBERGLASS	2533 W CYPRESS ST	1.7		
133188	ANIMAL CREMATION SERVICES	5348 W BETHANY HOME RD	0.0	0.4	0.0
135352	APS - ALIGNED ENERGY DATA CENTER	2500 W UNION HILLS DR	1.0	8.5	8.5
129696	ARCHITECTURAL MILLWORK DESIGN INC	330 W MELINDA LN	5.2		
131519	ARE-LEI PHOENIX GATEWAY ASSOCIATES, LLC	432 N 44TH ST	0.0	0.1	0.0
3471	ARIZONA AIR NATIONAL GUARD	3200 E OLD TOWER RD	0.8	0.1	0.1
35372	ARIZONA CUSTOM CABINETS INC	8729 N 78TH AVE	3.3		
131765	ARIZONA DEPARTMENT OF PUBLIC SAFETY	2102 W ENCANTO BLVD	0.1	1.1	0.5
131996	ARIZONA DEPARTMENT OF TRANSPORTATION	I-10 MP146.0 3RD ST	0.0	0.3	0.1
132011	ARIZONA DEPARTMENT OF TRANSPORTATION	NWC OF MCKELLIPS RD & SOSSAMAN RD	0.0	0.0	0.0
132015	ARIZONA DEPARTMENT OF TRANSPORTATION	202 LOOP MP51.5 101 & 202	0.0	0.0	0.0
3938	ARIZONA GALVANIZING INC	15775 W ELWOOD ST	0.2	4.1	3.5
134107	ARIZONA GOLF RESORT & HOTEL LLC	425 S POWER RD	0.1	0.2	0.1
130470	ARIZONA LANDFILL LLC	2750 S 11TH AVE	0.1	6.4	0.3
131310	ARIZONA MILLS LLC	5000 S ARIZONA MILLS CIR	0.1	0.7	0.2

ID	Business Name	Address	VOC	NOX	CO
131021	ARIZONA NUTRITIONAL SUPPLEMENTS LLC	210 S BECK AVE	2.1		
132390	ARIZONA SHUTTERS AND BLINDS LLC	21620 N 26TH AVE #150	0.6		
130834	ARIZONA ST UNIVERSITY DOWNTWN PHX CAMPUS	522 N CENTRAL AVE	0.1	1.0	0.5
4364	ARIZONA STATE UNIVERSITY	1551 S RURAL RD	2.3	9.1	5.6
130835	ARIZONA STATE UNIVERSITY, WEST CAMPUS	4701 W THUNDERBIRD RD	0.0	0.4	0.4
36898	ASPC-LEWIS	26700 S HWY 85	5.0	8.9	4.1
1055	ASPHALT TERMINALS LLC	1935 W MCDOWELL RD	3.7	9.2	7.7
4109	ASSOCIATED CONSTRUCTION ENTERPRISES INC	3645 N 40TH AVE	0.8		
93166	ASSOCIATED WOODWORKS	1401 N 26TH AVE	1.1		
4328	ASU MACROTECHNOLOGY WORKS	7700 S RIVER PKWY	0.7	1.4	1.1
1502	ATLAS ROOFING CORPORATION	40 S 45TH AVE	6.6	0.3	0.1
130526	AVIATION DEPARTMENT - 44TH ST PUMP HOUSE	425 S 44TH ST	0.0	0.6	0.3
134215	AVNET	60 S MCKEMY AVE	0.0	0.2	0.1
131557	AZ DEPARTMENT OF JUVENILE CORRECTIONS	2800 W PINNACLE PEAK RD	0.0	0.4	0.1
50422	BAE SYSTEMS AEROSPACE AND DEFENSE GROUP	7822 S 46TH ST	2.6	0.0	0.0
31585	BANK OF AMERICA	2500 W FRYE RD	0.1	2.8	0.3
128533	BANK OF AMERICA	1825 E BUCKEYE RD	0.0	1.1	0.3
130233	BANK OF AMERICA N.A.	2595 W CHANDLER BLVD	0.0	1.6	0.4
129791	BANNER DEL E. WEBB MEDICAL CENTER	14502 W MEEKER BLVD	0.2	4.4	2.6
781	BANNER GOOD SAMARITAN MEDICAL CENTER	1111 E MCDOWELL RD	0.5	8.0	5.4
121830	BANNER HEALTH	1900 N HIGLEY RD	0.2		2.9
29946	BANNER THUNDERBIRD MEDICAL CENTER	5555 W THUNDERBIRD RD	0.4	6.8	4.0
129595	BARREL O' FUN SNACK FOOD SOUTHWEST	7330 W SHERMAN ST	1.8	18.5	17.2
4511	BARTLETT LAKE MARINA	20808 E BARTLETT DAM RD	2.0	20.5	4.4

ID	Business Name	Address	VOC	NOX	CO
126319	BELLA BEAMS & ARCHITECTURAL PRODUCTS INC	825 N 73RD AVE	0.0		
102954	BERRY GLOBAL, INC.	8400 W WASHINGTON ST	0.0		
607	BEST FUNERAL SERVICES, INC.	9380 W PEORIA AVE	0.0	0.7	0.0
961	BIG SURF WATERPARK	1500 N MCCLINTOCK DR	0.1	2.6	0.4
74058	BILTMORE SHUTTERS INC	1138 W WATKINS ST	2.8		
3305	BIMBO BAKERIES USA, INC	738 W VAN BUREN ST	5.3	1.8	1.5
136591	BIOMEDICAL SCIENCES PARTNERSHIP BUILDING	475 N 5TH ST	0.0	0.7	0.6
129138	BLUE CROSS BLUE SHIELD OF ARIZONA INC	2480 W LAS PALMARITAS DR	0.0	0.5	0.1
130716	BLUE CROSS BLUE SHIELD OF ARIZONA INC	2475 W TOWNLEY AVE	0.4	1.2	0.1
133044	BRIDGESTONE AMERICAS TIRE OPERATIONS,LLC	6533 S MOUNTAIN RD	5.5		
458	BRYANT INDUSTRIES INC	788 W ILLINI ST	4.3		
133099	BUCKEYE GRAIN U LLC	29700 W LOWER RIVER RD	0.1	2.2	1.8
56105	BURDETTE CABINET CO INC	3941 N HIGLEY RD	10.7		
106512	C AND A MFG, LLC	250 E UNIVERSITY DR	0.4		
135009	C.A.S. CORPORATION	901 W MELINDA LN	1.0	0.1	0.1
131634	CAFE VALLEY INC	7000 W BUCKEYE RD	20.3	2.6	2.2
3442	CALJET	125 N 53RD AVE	35.5	0.0	0.0
131966	CALPORTLAND	4830 S 43RD AVE	0.0	0.8	0.6
133365	CALPORTLAND	3410 E VIRGINIA ST	0.0	0.0	0.0
3296	CALVERT OIL CO	214 E ARIZONA EASTERN AVE	8.4		
132495	CAMEO CABINETS & FURNITURE LLC	2601 W CYPRESS ST	1.0		
898	CAMINO DEL SOL FUNERAL CHAPEL&CREMATION	13738 W CAMINO DEL SOL	0.0	0.2	0.0
291	CAPITAL LUMBER COMPANY	11 N 45TH AVE	0.1		
131767	CAREMARK, L.L.C.	9501 E SHEA BLVD	0.1	2.8	0.6
132154	CAREMARK, L.L.C.	4121 E COTTON CENTER BLVD	0.0	0.9	0.2
1317	CAVCO INDUSTRIES INC	2602 S 35TH AVE	0.7		
1318	CAVCO INDUSTRIES INC	1366 S LITCHFIELD RD BLDG #6	14.6		

ID	Business Name	Address	VOC	NOX	CO
1316	CAVCO INDUSTRIES LLC/DURANGO PLANT	2502 W DURANGO ST	12.7		
132126	CB RICHARD ELLIS, INC.	25500 N NORTERRA PKWY	0.0	0.0	0.0
260	CEMEX - 19TH AVE PLANT	3640 S 19TH AVE	0.1	0.1	0.0
98591	CEMEX - 7TH STREET PLANT	23210 N 7TH ST	0.0	0.1	0.0
98492	CEMEX - BUCKEYE PLANT	22625 W BELOAT RD	0.0	0.0	0.0
63	CEMEX - EL MIRAGE PLANT	8635 N EL MIRAGE RD	0.0	0.0	0.0
579	CEMEX - WEST VALLEY PLANT	11550 W NORTHERN AVE	0.0	0.0	0.0
1310	CENTURY GRAPHICS LLC	2960 GRAND AVE	4.3	0.2	0.2
82244	CHANDLER-GILBERT COMM COLLEGE	7440 E TAHOE AVE	0.0	0.0	0.0
128869	CHARLES SCHWAB & CO INC	2423 E LINCOLN DR	0.0	1.0	0.2
823	CHEMRESEARCH CO INC	1130 W HILTON AVE	2.7	0.3	0.2
131471	CHUBB GROUP OF INSURANCE CO.'S	2155 W PINNACLE PEAK RD #400	0.0	1.1	0.2
36258	CINTAS CORPORATION	4804 W ROOSEVELT ST	54.7	928.2	779.8
3441	CIRCLE K TERMINAL LLC	5333 W VAN BUREN ST	26.1		
130851	CITY OF CHANDLER - REVERSE OSMOSIS	3737 S OLD PRICE RD	0.1	0.9	0.7
127616	CITY OF CHANDLER AIRPORT WATER REC FAC	905 E QUEEN CREEK RD	0.0	0.4	0.1
125351	CITY OF GLENDALE - OASIS WATER CAMPUS	7070 W NORTHERN AVE	0.2	1.4	1.8
131042	CITY OF MESA - MESA ARTS CENTER	1 E MAIN ST	0.2	2.9	1.9
111469	CITY OF MESA SIGNAL BUTTE WTP	10950 E ELLIOT RD	0.0	0.3	0.0
130711	CITY OF MESA WATER RESOURCES (WGFPS)	5457 S SOSSAMAN RD	0.0	0.6	0.1
121082	CITY OF PEORIA	8900 N 79TH AVE	2.1	0.6	0.1
127947	CITY OF PEORIA - BUTLER WATER REC. FAC.	8660 N 78TH AVE	0.8	0.8	0.4
85000	CITY OF PHOENIX 24TH ST WTP	6202 N 24TH ST	1.6	0.2	0.1
130308	CITY OF PHX AVIATION DEPT SM OPER SITE	1712 E RENTAL CAR WY	0.6	0.3	0.0
64017	CITY OF SCOTTSDALE	16638 N PIMA RD NPB #40	0.1	2.2	0.5
123979	CITY OF SCOTTSDALE	9065 E VIA LINDA	0.2	0.4	0.1

ID	Business Name	Address	VOC	NOX	CO
127820	CITY OF SCOTTSDALE	7601 E MCKELLIPS RD	0.8	1.1	0.4
86375	CITY OF SCOTTSDALE CHAPARRAL WTP	8111 E MCDONALD DR	0.0	0.8	0.2
38161	CITY OF SCOTTSDALE WATER CAMPUS	8787 E HUALAPAI DR WC101	0.1	1.9	0.4
131410	CITY OF SURPRISE MUNICIPAL PROPERTY CORP	14355 W PARADISE LN	0.0	0.2	0.0
126636	CITY OF SURPRISE SPA 2 REG WATER REC	15667 W PLANADA LN	0.0	0.1	0.0
4403	CLARIANT PLASTICS & COATINGS USA INC-PHX	4425 E ELWOOD ST #104	0.0		
43818	CLASSIC PARTY RENTALS	3103 E BROADWAY RD #400	0.8		
1075	CO PHX 91ST AVE WWTP	5615 S 91ST AVE #1	1.6	18.2	6.6
49636	COFFMAN SPECIALTIES INC	PORTABLE 1	0.1	0.6	0.1
106477	COLLABORATIVE RESEARCH BLDG	13208 E SHEA BLVD	0.1	0.9	0.6
132496	CONCEPT CABINETRY	700 N MONTEREY ST	0.6		
113723	CONTRACTORS LANDFILL & RECYCLING	2425 N CENTER ST	0.0	0.1	0.0
34473	COPLIN MFG INC	7505 W WASHINGTON ST	5.3		
1054	COPPERSTATE CABINET CO INC	1932 W NORTH LN	6.9		
399	CORESLAB STRUCTURES (ARIZ) INC	5026 S 43RD AVE	7.4		
227	CORROSION ENGINEERING INC	145 S NINA CIR	11.5	0.4	0.4
128232	COSTCO GASOLINE #1028	7525 E HAMPTON RD	13.0		
43917	COSTCO GASOLINE #490	19001 N 27TH AVE	14.8		
43916	COSTCO GASOLINE #665	1646 W MONTEBELLO AVE	12.0		
106288	COSTCO GASOLINE #738	2454 E BEARDSLEY RD	16.2		
129936	COSTCO GASOLINE FACILITY NO. 1058	4550 E CACTUS RD PV MALL	15.6		
127537	COSTCO GASOLINE LOC. 827 (AIR)	3801 N 33RD AVE	6.1		
4339	COSTCO WHOLESALE #427	15255 N HAYDEN RD	19.1		
16027	COSTCO WHOLESALE #436	1445 W ELLIOT RD	13.9		
18490	COSTCO WHOLESALE #465	4502 E OAK ST	14.5		

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104505	COSTCO WHOLESALE #644	2887 S MARKET ST	15.6		
51068	COSTCO WHOLESALE #674	17550 N 79TH AVE	16.7		
60765	COSTCO WHOLESALE #691	10000 W MCDOWELL RD	13.7		
99731	COSTCO WHOLESALE #736	595 S GALLERIA WAY	15.1		
1198	COURIER GRAPHICS CORP	2621 S 37TH ST	5.4	0.4	0.3
289	COURTHOUSE AG HOLDINGS LLC	51040 W VALLEY RD	2.9	0.0	0.0
131081	COX COMMUNICATIONS AZ DEER VALLEY CAMPUS	1550 W DEER VALLEY RD	0.0	0.3	0.1
4368	CRAFTSMEN IN WOOD MFG	5441 W HADLEY ST	5.2	0.0	0.0
129	CROTHALL LAUNDRY SERVICES	4445 S 36TH ST	0.3	5.6	4.7
134012	CROWN CUSTOM MILLWORK, LLC	2740 W DEER VALLEY RD	5.8		
131179	CSE OPERATING I, LLC	29115 W BROADWAY RD	0.0	8.8	10.3
130790	CUSTOM FAB INC	3065 S 43RD AVE	4.2	0.6	0.5
131444	CUSTOM LANDSCAPE MATERIALS "BELMONT"	25376 W TONOPAH-SALOME HWY	0.1	0.7	0.2
131392	CUSTOM LANDSCAPE MATERIALS "BIG HORN"	AGUILA RD MILE POST 12	0.3	3.9	0.8
132691	CUSTOM LANDSCAPE MATERIALS, LLC		0.6	6.8	1.5
137795	DECA CREMATION SERVICES, INC.	2139 S 15TH ST	0.0	0.8	0.0
47179	DESERT MILLWORK INC	1702 W ROOSEVELT ST	0.7		
130953	DIFFERENT BY DESIGN	203 W LONE CACTUS DR	0.2		
128167	DIGITAL REALTY TRUST	120 E VAN BUREN ST #120	0.1	3.0	0.7
51073	DIGITAL REALTY TRUST CHANDLER, LLC	2121 S PRICE RD	0.4	6.4	1.9
128029	DIGITAL REALTY TRUST -TEMPE DATA CENTER	2055 E TECHNOLOGY CIR	0.0	0.5	0.0
36	DON SANDERSON FORD INC	6400 N 51ST AVE	3.6		
127094	DOUBLETREE PAPER MILL LLC	31201 W THAYER RD	4.4	10.4	20.0
48771	EAGLE ROOFING PRODUCTS	4602 W ELWOOD ST	4.5	0.4	0.3
128405	EAST VALLEY BUS OPERATIONS & MAINTENANCE	2050 W RIO SALADO PKWY	5.8		

ID	Business Name	Address	VOC	NOX	CO
26	EMPIRE MACHINERY CO	1725 S COUNTRY CLUB DR	3.2	7.1	2.0
130260	ENTRUSTED PETS, INC.	2237 S 15TH ST	0.0	0.2	0.0
54414	EWING HARDSCAPE SUPPLY, LLC	PORTABLE	0.1	1.8	0.4
1505	EXECUTIVE DOOR COMPANY	3939 W CLARENDON AVE	0.3		
137059	F & B MANUFACTURING LLC	4245 N 40TH AVE	0.1		
1488	FARMER'S GIN INC	8400 S TURNER RD	0.0	0.2	0.0
224	FERTIZONA	17102 W OLIVE AVE	0.2		
925	FERTIZONA BUCKEYE LLC	26705 W BASELINE RD	0.5		
35018	FIBERGLASS DESIGNS LLC.	128 W MARICOPA FWY	4.2		
47516	FINE LINE MFG INC	4506 E KERBY AVE	1.5		
132690	FINE WOODS MFG INC	2143 E JONES AVE	1.2		
132911	FINECRAFT CUSTOM WOODWORKS LLC	5775 N 51ST AVE	1.7		
132381	FINISHING TOUCH LLC	5411 W ORANGE DR #15	1.2		
107758	FIREBIRD PRODUCTS, LLC	6010 N 53RD DR	5.3		
130952	FIRST DATA RESOURCES INC	240 N ROOSEVELT AVE	0.1	4.8	0.5
128991	FISHER SAND & GRAVEL	PORTABLE #3	2.3	8.1	8.5
119373	FLEXIBLE TECHNOLOGIES INC	615 S 56TH AVE	0.6		
27728	FLIPCHIP INTERNATIONAL	3701 E UNIVERSITY DR	13.6	0.3	0.3
1375	FOREST DESIGNS	3230 E ROESER RD #10	4.1		
67317	FORTERRA PIPE & PRECAST, LLC	12600 W NORTHERN AVE	0.0	0.4	0.3
134227	FUEL PROCESSING OPERATORS LLC	12126 W OLIVE AVE	7.6	4.0	3.4
132482	G & L POWERS INC	1483 W HARVARD ST	0.1		
3406	GILA BEND AIR FORCE AUX FIELD	HWY 85	0.6	0.5	0.1
561	GLENWOOD CUSTOM CABINETS, LLC	44 E PIONEER ST	2.2		
1418	GOODRICH CORPORATION	3414 S 5TH ST	15.6	0.0	0.1
131046	GOODYEAR BALLPARK	1933 S BALLPARK WAY	0.2	3.6	3.0
131841	GRANITE EXPRESS PIONEER		0.8	10.3	2.2
10	GREEN ACRES MORTUARIES & CEMETERIES INC	401 N HAYDEN RD	0.0	0.0	0.0

ID	Business Name	Address	VOC	NOX	CO
141	GRO-WELL BRANDS INC	2807 S 27TH AVE	0.1		
4498	HANSON AGGREGATES LLC	33500 W INDIAN SCHOOL RD	0.0	0.0	0.0
135004	HANSON AGGREGATES OF ARIZONA INC	11401 W GLENDALE AVE	0.0	0.0	0.0
699	HANSON AGGREGATES, LLC	4002 S 51ST AVE	1.1	4.8	10.5
131334	HELIAE DEVELOPMENT LLC	614 E GERMANN RD	5.9	0.0	0.0
31565	HENRY PRODUCTS INC	302 S 23RD AVE	10.7	0.6	0.5
129711	HERITAGE CREMATORY	12525 NW GRAND AVE	0.0	0.4	0.0
106458	HERTZ RENT A CAR (PHX SKY HARBOR)	1711 E BUCKEYE RD	1.6		
95050	HICKMANS EGG RANCH	32425 W SALOME HWY	0.9	1.2	1.7
134532	HICKMAN'S EGG RANCH, INC.	41625 W INDIAN SCHOOL RD	0.1	0.6	0.3
590	HOLLYFRONTIER ASPHALT COMPANY LLC	7110 W NORTHERN AVE	5.0	6.9	5.8
3536	HOLSUM BAKERY INC	2322 W LINCOLN ST	12.2	3.6	3.1
39213	HOLSUM OF TOLLESON LLC	9600 W BUCKEYE RD	7.2	3.1	2.6
1059	HONEYWELL ENGINES SYS & SERVICE PHX R&O	1944 E SKY HARBOR CIR	11.7	1.7	3.3
247	HONEYWELL INTERNATIONAL INC (TEMPE, AZ)	1300 W WARNER RD	5.0	3.8	2.4
136898	HUHTAMAKI INC.	4320 S COTTON LN	0.3		
168	HYDRO CONDUIT CORP	1011 S 43RD AVE	0.0	0.0	0.0
403	HYDRO EXTRUSION NORTH AMERICA, LLC	249 S 51ST AVE	29.7	12.1	12.5
131198	IMPERIAL WOODWORKING LLC	4012 W TURNEY AVE #6	2.3		
354	IMSAMET OF ARIZONA	3829 S ESTRELLA PKWY	10.2	6.6	71.9
777	INSULFOAM	3401 W COCOPAH ST	47.3	2.4	1.2
31617	INTEL CORP CHANDLER CAMPUS (FAB 6)	5000 W CHANDLER BLVD	11.8		7.9
130597	INTERNATIONAL FLORA TECHNOLOGIES	28633 W PATTERSON RD	0.0	0.1	0.1
43832	INTERNATIONAL PAPER	660 S 83RD AVE	7.2	0.8	2.2
130265	IO PHOENIX ONE, LLC	615 N 48TH ST	0.3	6.5	0.6
983	ISOLA GROUP S A R L	165 S PRICE RD	6.4	9.4	3.4

ID	Business Name	Address	VOC	NOX	CO
101	JBS TOLLESON INC	651 S 91ST AVE	7.6	14.6	2.6
1213	JENSEN PRECAST	2410 W BROADWAY RD	0.0		
93041	JERRY'S OFFICE FURNITURE	1413 E JACKSON ST	0.2		
1027	JPCI SERVICES	PORTABLE	3.7	2.6	0.6
49780	JW MARRIOTT DESERT RIDGE HOTEL	5350 E MARRIOTT DR	0.4	6.8	5.6
811	KROPF WOODWORKING INC	11035 N 22ND AVE	1.3		
857	L3 TECHNOLOGIES	1215 S 52ND ST	16.6	0.3	0.1
3999	LADDER INDUSTRIES INC	1040 S CAMINO ORO	5.5		
96886	LEGENDS FURNITURE	10300 W BUCKEYE RD	42.4		
4336	LENTECH INDUSTRIAL LLC	3309 W LINCOLN ST	0.6		
131339	LGS AZ, LLC DBA LOOK TRAILERS	8230 N EL MIRAGE RD	10.1		
130111	LIFEPLAN CREMATORIUM INC	1216 N 17TH AVE	0.0	0.7	0.0
129796	LITCHFIELD PARK SERVICE CO LIBERTY WATER	6302 N EL MIRAGE RD	0.0	0.5	0.1
39914	LOVE'S COUNTRY STORE #296	820 W PIMA RD	14.7		
744	M E GLOBAL INC	5857 S KYRENE RD	27.3	29.0	56.3
1248	MAAX SPAS INDUSTRIES CORP	25605 S ARIZONA AVE	61.3		
31261	MADISON GRANITE SUPPLIES	29925 N NORTH VALLEY PKWY	0.2	15.7	2.8
148	MAGELLAN AEROSPACE, GLENDALE INC	5440 W MISSOURI AVE	4.5	1.1	0.7
133636	MARATHON EQUIPMENT COMPANY	402 N 44TH AVE	6.9	1.9	0.1
353	MARLAM INDUSTRIES INC	834 E HAMMOND LN	19.2	0.0	0.0
61268	MASTER BLOCK	12620 W BUTLER DR	0.0	0.4	0.3
135887	MCLANE FOODSERVICE	7600 W ROOSEVELT ST	0.0	0.1	0.0
1200	MEDTRONIC - TEMPE	2343 W MEDTRONIC WAY	19.3	0.6	0.7
244	MELCHER MISSION CHAPEL AND CREMATORY	6625 E MAIN ST	0.0	0.7	0.0
3326	MESA FULLY FORMED LLC	1111 S SIRRINE ST	10.2		
64504	MESA FULLY FORMED, LLC	7335 N 108TH AVE	0.4		
4105	MESA INDUSTRIES INC	230 N 48TH AVE	0.1		

ID	Business Name	Address	VOC	NOX	CO
3724	MISSION FOODS-TEMPE	5860 S ASH AVE	2.4	2.9	2.4
882	MORTON SALT, INC.	13000 W GLENDALE AVE	0.8	8.6	2.5
13650	MOUNTAIN RIDGE HIGH SCHOOL	22800 N 67TH AVE	0.0	0.1	0.0
132523	MOUNTAIN VIEW CUSTOM CABINETS, INC.	23306 N 15TH AVE	7.8		
264	MOUNTAIN VIEW FUNERAL HOME AND CEMETERY	7900 E MAIN ST	0.2	0.1	0.0
146	MWM CORPORATION	5650 W BUCKEYE RD	0.5		
34197	NATIONAL GYPSUM COMPANY	1414 E HADLEY ST	11.1	4.1	7.6
114015	NATIONAL SPECIALTY AGGREGATES LLC	4310 S 80TH ST	0.0	0.0	0.0
910	NELTEC INC	1420 W 12TH PL	1.5	2.7	1.4
129677	NO WASTE GRINDINGS	PORTABLE #1	0.7	8.0	1.7
881	NXP SEMICONDUCTORS	1300 N ALMA SCHOOL RD	21.8	15.8	7.7
56506	OAK CREEK FURNITURE INC	5355 N 51ST AVE #7	1.5		
3953	OAKCRAFT INC	7733 W OLIVE AVE	59.7	0.1	0.1
31637	OLAM COTTON	25500 W SOUTHERN AVE	0.0	0.1	0.0
53	OLDCASTLE PRECAST INC	411 E FRYE RD	4.5	4.0	0.9
302	OLSON PRECAST OF ARIZONA INC	3045 S 35TH AVE	1.4		
131719	OPTIMA CAMELVIEW VILLAGE	7141 E RANCHO VISTA DR	0.0	0.5	0.5
108199	OT CALJET LLC	57 N 57TH AVE	6.9		
134521	PALLET MANAGEMENT SERVICES OF AZ, LLC	407 S 107TH AVE BUILDING D	0.3		
98	PALO VERDE NUCLEAR GENERATING STATION	5801 S WINTERSBURG RD	8.8	43.1	9.6
428	PALOMA GIN PROPERTIES LLC	57525 S POTATOE RD	0.0	0.0	0.0
130656	PALOMA READY MIX & MATERIALS LLC	PORTABLE #1	0.0	0.4	0.1
733	PAN GLO SERVICES LLC	2401 W SHERMAN ST	9.3	0.5	0.4
49047	PARADISE MEMORIAL CREMATORY	9300 E SHEA BLVD BLDG C	0.0	1.7	0.1
419	PARKER HANNIFIN CORP	7777 N GLEN HARBOR BLVD	25.7		
1398	PATRICIAN MARBLE CO	3333 W OSBORN RD	3.4		
109938	PAYPAL INC.	4010 N 3RD ST	0.2	17.4	1.2

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4241	PEPSICO	409 S 104TH AVE	1.4	6.2	12.7
29244	PET & ANIMAL LOVERS SERVICE (PALS)	3629 N 40TH AVE	0.1	3.6	0.2
128625	PHOENIX BAPTIST HOSPITAL (NEW AIR)	2000 W BETHANY HOME RD	0.0	0.2	0.1
46123	PHOENIX CABINET COMPANY	2801 N 37TH AVE	1.2		
69	PHOENIX HEAT TREATING INC	2405 W MOHAVE RD	2.6	1.7	1.5
1491	PHOENIX METALCRAFT INC	3845 N 29TH AVE	2.3		
562	PHOENIX NEWSPAPERS INC	22600 N 19TH AVE	3.0	0.5	0.1
1154	PING INC	2201 W DESERT COVE AVE	8.9	0.1	0.1
133798	PLATYPUS DEVELOPMENT LLC	3740 S SIGNAL BUTTE RD	0.2	1.7	0.7
56250	POLY ONE PCC	7601 N GLEN HARBOR BLVD	0.1	0.0	0.0
4007	PRECISION TRUCK PAINTING & REPAIR INC	2212 N 27TH AVE	2.7		
108860	PRISMA GRAPHIC CORPORATION	2937 E BROADWAY RD	4.7	0.2	0.2
60889	PURCELLS WESTERN STATES TIRE	420 S 35TH AVE	0.0	0.1	0.1
1335	QUALITY BLOCK INC	3035 S 35TH AVE	0.0	0.8	0.7
3307	QUIKJET LLC	5119 W MONROE ST	46.4	0.1	0.4
437	QUIKRETE COMPANIES-ARIZONA	26807 W BASELINE RD	0.1	2.6	0.3
131898	QUIKTRIP DISTRIBUTION - PHOENIX	8501 W LATHAM ST	1.0	1.0	0.7
127827	QUINTERO WASTEWATER TREATMENT FACILITY	16752 W STATE ROUTE 74	0.0	0.6	0.1
98541	QWEST	215 E INDIAN SCHOOL RD	0.0	0.5	0.1
132499	R & G CUSTOM CRAFTING LLC	2343 W CYPRESS ST	1.9		
2206	RED EAGLE ENTERPRISES INC	12946 W SANTA FE DR	0.0	0.1	0.1
537	RED MOUNTAIN MINING INC	4520 N POWER RD	0.6	7.7	1.7
128324	REGENCY MORTUARY SERVICES INC	9850 W THUNDERBIRD RD	0.0	0.3	0.0
131605	REGIONAL PUBLIC TRANSPORTATION AUTHORITY	3320 N GREENFIELD RD	0.0	0.2	0.0
126322	RELIANCE CUSTOM CABINETS, INC.	825 N 73RD AVE #144	0.0		

ID	Business Name	Address	VOC	NOX	CO
131816	RENAISSANCE GLENDALE HOTEL & SPA	9495 W COYOTES BLVD	0.1	0.4	0.5
136561	REVOLUTION INDUSTRIAL, LLC	PORTABLE #1	1.2		
44356	RITCHIE BROS AUCTIONEERS (AMERICA) INC	5410 W LOWER BUCKEYE RD	1.8	0.0	0.0
4318	RIVER RANCH PLANT #40	5159 N EL MIRAGE RD	0.0	0.0	0.0
133058	ROCK SOLID INC	11500 W BEARDSLEY RD	0.0	0.1	0.0
133589	ROCK SOLID INC	6204 W SOUTHERN AVE	0.0	0.0	0.0
4543	ROHRER CORPORATION	159 W 1ST AVE	5.8		
1240	RYSSO PETERS	2525 W CORONADO RD	8.6		
132784	SAM'S CLUB #6605	1225 N GILBERT RD	34.2	0.1	0.0
42617	SASCO/SOUTHERN ARIZONA STUD COMPANY	5415 W MOHAVE ST	0.5		
35385	SAWMILL CABINETS, LLC	4712 E VIRGINIA ST	4.5		
132227	SCHAUMAPLAST PRECISION FOAM MOLDING LP	21 N 39TH AVE	10.7	0.6	0.5
4072	SCHREIBER FOODS INC	2122 S HARDY DR	1.3	3.9	12.2
266	SCHUFF STEEL CO	420 S 19TH AVE	3.7		
246	SCHULT HOMES	231 N APACHE RD	10.8		
132688	SCOTTSDALE ART FACTORY	7407 E GREENWAY RD	0.8		
3528	SENERGY PETROLEUM, LLC	306 S COUNTRY CLUB DR	2.3		
1351	SERENITY MORTUARY SERV INC	2514 S 6TH AVE	0.0	1.8	0.1
134841	SFSR MARINA HEIGHTS	500 E RIO SALADO PKWY	0.5	5.3	2.4
1169	SHAMROCK FOODS CO	2228 N BLACK CANYON HWY	0.6	11.3	9.5
130996	SHUTTERZ INC	6655 W FRYE RD	1.8		
18810	SILGAN PLASTIC CLOSURE SOLUTIONS	4 S 84TH AVE STE A	0.5		
27933	SKUNK CREEK LANDFILL	3165 W HAPPY VALLEY RD	1.4	1.7	1.9
39980	S-L SNACKS AZ, LLC	1200 N BULLARD AVE	11.3	19.8	16.7
131686	SOLAR & RENEWABLES MANAGEMENT, LLC	29505 W SOUTHERN AVE	0.0	8.6	11.4
130141	SOUTHWEST ASPHALT	7TH AVE PORTABLE	2.3	4.8	6.3
52776	SOUTHWEST BAKING COMPANY	9604 W BUCKEYE RD	0.0	0.0	0.0

ID	Business Name	Address	VOC	NOX	CO
46277	SOUTHWEST FOREST PRODUCTS INC	2828 S 35TH AVE #1	0.0	0.9	0.1
31643	SOUTHWEST REGIONAL LANDFILL	24427 S HWY 85	0.3	4.0	0.4
36910	SPA-1 WATER RECLAMATION FACILITY	11401 N 136TH AVE	0.0	0.6	0.1
2110	SPECIAL DEVICES INC	3431 N RESEDA CIR	12.2		0.0
122	SPELLMAN HARDWOODS INC	4645 N 43RD AVE	0.1		
80437	SR 85 LANDFILL	28633 W PATTERSON RD	1.2	2.8	3.3
4400	SUMCO SOUTHWEST CORPORATION	19801 N TATUM BLVD	6.2	13.1	2.1
378	SUN LAND MATERIALS	6950 W SOUTHERN AVE	0.1	1.6	0.3
31	SUNLAND MEMORIAL PARK	15826 N DEL WEBB BLVD	0.0		
165	SUPERLITE BLOCK	301 E BASELINE RD	0.0	0.5	0.4
1475	SUPERLITE BLOCK	4021 S 19TH AVE	0.0	0.5	0.4
37546	SUPERLITE BLOCK	4626 N 42ND AVE	3.1	1.2	1.0
131377	SWIM PLATFORMS INC	3220 S 38TH ST	7.4		
126128	THATCHER COMPANY OF ARIZONA	6321 S RAINBOW RD	0.0	0.0	0.0
249	THE BOEING COMPANY	5000 E MCDOWELL RD	23.8	2.0	1.4
129078	THE DIAL CORPORATION A HENKEL COMPANY	7201 E HENKEL LN	0.1	0.6	0.5
35936	THE INVENTURE GROUP INC	3500 S LA COMETA	0.4	6.1	5.2
131502	THE PLAZA LOFTS AT KIERLAND COMMONS	15215 N KIERLAND BLVD	0.0	0.4	0.1
118720	TOWN OF GILBERT - WELL SITE #24	2710 E WILLIAMS FIELD RD	0.0	1.1	0.3
136644	TOWN OF GILBERT SO. AREA SERVICE CENTER	4760 S GREENFIELD RD	2.5		
234	UNITED DAIRYMEN OF ARIZONA	2008 S HARDY DR	2.6	30.8	39.0
124601	UNIVERSITY OF PHOENIX	4025 S RIVERPOINT PKWY	0.0	0.2	0.0
63962	UPPER CRUST BAKERY	3655 W WASHINGTON ST	11.4	1.9	1.6
131506	USAA (UNITED SERVICES AUTOMOBILE ASSOC)	1 N NORTERRA DR	0.0	0.8	0.2
130359	VANGUARD	14321 N NORTHSIGHT BLVD	0.0	0.6	0.1
127833	VERIZON BUSINESS	27826 N 193RD AVE	0.0	1.0	0.1

ID	Business Name	Address	VOC	NOX	CO
64787	VERIZON WIRELESS	429 N 30TH ST	0.0		0.1
102982	VERIZON WIRELESS (VAW) LLC	126 W GEMINI DR	0.0	1.2	0.2
131704	VI AT SILVERSTONE	23005 N 74TH ST	0.2	0.5	0.3
134567	VINTAGE INDUSTRIAL LLC	1301 E JACKSON ST	0.1		
135061	VULCAN ASPHALT LLC	3640 S 19TH AVE	1.5	1.5	11.4
135062	VULCAN ASPHALT LLC	5150 S 27TH AVE	9.6	4.9	27.8
1415	VULCAN MATERIALS CO	7845 W BROADWAY RD	4.9	7.7	11.8
132528	VULCAN MATERIALS COMPANY	3410 E VIRGINIA ST	5.9	9.1	30.2
2	VULCAN MATERIALS CO-WESTERN DIVISION	14521 N 115TH AVE	5.6	8.6	20.0
90	VULCAN MATERIALS CO-WESTERN DIVISION	4830 S 43RD AVE	1.6	8.0	9.1
1149	WEAVER QUALITY SHUTTERS INC	218 S 15TH ST	1.6		
130153	WESTERN REGIONAL MEDICAL CENTER	14200 W CELEBRATE LIFE WAY	0.0	0.3	0.2
2703	WESTERN STATES PETROLEUM	450 S 15TH AVE	8.5		
330	WESTROCK CP, LLC	6902 W NORTHERN AVE	0.6	2.1	1.8
398	WICKENBURG FACILITY	44605 GRAND AVE	0.0	0.1	0.0
121588	WICKENBURG FUNERAL HOMES INC	187 N ADAMS ST	0.0	0.2	0.0
128707	WOOD UNLIMITED INC (AIR)	9801 N LITCHFIELD RD	1.8	23.0	5.0
3976	WOODCASE FINE CABINETRY, INC.	1727 E DEER VALLEY DR BLDG 1 STE 1	18.7	0.0	0.0
35359	WOODESIGN A CORPORATION	3234 E CORONA AVE	0.6		

Appendix E. Responsiveness Summary

RESPONSIVENESS SUMMARY

2017 OZONE PERIODIC EMISSIONS INVENTORY

The 2017 Ozone Periodic Emissions Inventory was made available for public review on August 26, 2019. No requests for a public hearing or formal comments were received during the public comment period.

We received informal comments after the comment period closed. The comments identified a possible error in the season-day fuel combustion emission calculations for Maricopa County, the 2008 and 2015 ozone NAA. The calculation documentation was reviewed, and an error was identified. The VOC, NO_x and CO values for the season-day fuel combustion emissions were updated in Tables 1.6-2, 1.6-3, 1.6-4, 3.5-1, 3.5-2, and 3.5-3. This also required recalculation of the total nonpoint (area) source emissions in each of those tables.

Because the nonpoint (area) source totals were updated in the tables above, these nonpoint season-day VOC, NO_x and CO values were also updated for Maricopa County, and 2008 and 2015 ozone NAA in Tables 1.7-1, 1.7-2, and 1.7-3 including the total for all source categories in each of these tables. Finally, the season-day method describing residential natural gas was changed from Heating Degree Days to Seasonal Factor in Table 3.2-1, with an associated update of the language of the Seasonal Factor in Section 3.4.9 for residential natural gas.

After the comment period closed, EPA asked why the MCAQD had used data from June, July, and August to calculate ozone season-day emissions. To answer this question, the MCAQD drafted an explanation titled Ozone Formation & Ozone Season-Day Emissions in Maricopa County. EPA reviewed this explanation and agreed that June, July and August are the appropriate months for calculating ozone season-day emissions for the 2015 eight-hour ozone nonattainment area. A copy of this explanation has been added to Appendix F.

THE RECORD REPORTER

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NOTICE OF 30-DAY COMMENT PERIOD FOR 2017 PERIODIC OZONE EMISSION INVENTORY (PEI) The draft periodic ozone emission inventory includes emission estimates for three ozone precursors: volatile organic compounds (VOCs), carbon monoxide (CO) and nitrogen oxides (NOx). Emissions are calculated for Maricopa County, the 2008 8-hour ozone nonattainment area, and the 2015 8-hour ozone nonattainment area. The department invites you to review this emission inventory at http//www.maricopa.gov/ 2652 and to submit your comments to Maricopa County Air Quality Department, Emissions Inventory Unit, 3800 N Central Ave, Suite 1400, Phoenix, AZ 85012, or emailed to emisinv@maricopa.gov . Comments must be received no later than September 25, 2019. Questions may be addressed to the emission inventory unit at emisinv@maricopa.gov . Interested persons may request in writing a public hearing; requests must be received prior to September 25, 2019.
8/26, 9/9/19

RR-3286652#

AFFIDAVIT OF PUBLICATION

Reference #: 'Contract PQ1700

Notice Type: MCGPN - GOVERNMENT PUBLIC NOTICE

Ad Description: 2017 OZONE PEI Report

I, Cathy Fisher, am authorized by the publisher as agent to make this affidavit. Under oath, I state that the following is true and correct.

THE RECORD REPORTER is a newspaper of general circulation published Monday, Wednesday and Friday except legal holidays, in the County of Maricopa (also publishing for Pima County), State of Arizona. The copy hereto attached is a true copy of the advertisement as published on the following dates:

08/26/2019, 09/09/2019

Cathy Fisher

State Of Arizona)
)ss.
County Of Maricopa)

Subscribed and sworn to before me on the 9th day of September, 2019

Leona J. Gibson

LEONA J. GIBSON
Notary Public - Arizona
Maricopa Co. / #560597
Expires 04/15/2023

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Email

Appendix F. Ozone Season-Day

Ozone Formation & Ozone Season-Day Emissions in Maricopa County

Introduction

Ozone formation is a complex process that depends on a variety of factors, such as pollution generated by local sources (including biogenic and anthropogenic sources), weather, and transport from other areas. To determine the most appropriate period to be used to evaluate ozone season-day emissions, the Maricopa County Air Quality Department (MCAQD) evaluated ten years of historic monitoring and weather data, point source emissions data for 2017, and methods used to estimate point source emissions. The MCAQD found that:

- There are typically more exceedances of the 2015 ozone standards in June, July, and August, than there are in May or September. No exceedances occurred in September 2016 or September 2018.
- Monthly average exceedance concentrations for 2015-2019 were highest June through August for four of the five years. The May 2018 exceedance average tied with June 2018 but was less than July and August that year.
- The monthly maximum ozone concentration was higher in June, July, and August, than in May or September for the five-year period of 2015-2019.
- Ozone formation and dispersion (or lack thereof) is a function of the amount of sunlight, daily temperatures, synoptic and local wind conditions, and to some extent, relative humidity, all of which converge to result in the highest ozone concentrations occurring in June, July, and August.
- Ozone transport from California and the west into Maricopa County occurs most prominently during the spring months of April and May. Ozone transport occurs less frequently in June and is relatively rare in July and August.
- Recalculating ozone season-day emissions using data from May and/or September will introduce unnecessary error that would make it more difficult to understand the complex dynamics of ozone formation in Maricopa County.
- During 2017, emissions from mobile and biogenic sources were significantly higher in June, July, and August, than in May or September. Due to the magnitude of NO_x emissions from mobile sources and VOC emissions from biogenic sources, ozone-season day emissions will decrease significantly if data from May and/or September is included.

Historical Monitoring Data

The MCAQD evaluated historical data and found that there are typically more exceedances of the 2015 ozone standard in June, July, and August, than there are in May or September. While there are some years where May has more exceedances than June, July, and/or August, the data indicate that over the last ten years, most of the exceedances occurred in June, followed by July and August. Over the most recent 5 years, June, July and August had more exceedances than either May or September, and there were no exceedances in September 2016 or September 2018.

Table 1. Total number of exceedance days per month based on the 2015 ozone NAAQS, 2010 – 2019 and 2015 – 2019.

Month	2010-2019	2015-2019
May	76	26
June	100	51
July	80	39
August	87	42
September	27	14

In addition, the MCAQD evaluated the average ozone concentration on exceedance days (relative to the 2015 ozone NAAQS) and found that although there are exceedances in May and September, the average exceedance day concentration is typically highest during June, July, and August. This calculation did not include data for any calendar months when there were no exceedances of the 2015 ozone standard.

Table 2. Average exceedance day concentration (ppm) per month, 2010 – 2019 and 2015 – 2019.

Month	2010-2019	2015-2019
May	0.074	0.073
June	0.076	0.075
July	0.076	0.076
August	0.076	0.076
September	0.075	0.075

The MCAQD also used historical data to calculate the maximum 8-hour average ozone concentration for each month during the last ten years. The MCAQD averaged this data by month to determine which months typically have the highest maximum 8-hour average ozone concentration. The MCAQD found that typically, the maximum 8-hour ozone concentration is highest in June, July, and August.

Table 3. Maximum exceedance concentration (ppm) per month, 2010 – 2019 and 2015 – 2019.

Month	2010-2019	2015-2019
May	0.084	0.076
June	0.092	0.091
July	0.087	0.087
August	0.090	0.090
September	0.084	0.081

Figure 1. Number of exceedance days per month by year (2010 – 2019) based on the 2015 National Ambient Air Quality Standard (NAAQS) for ozone.

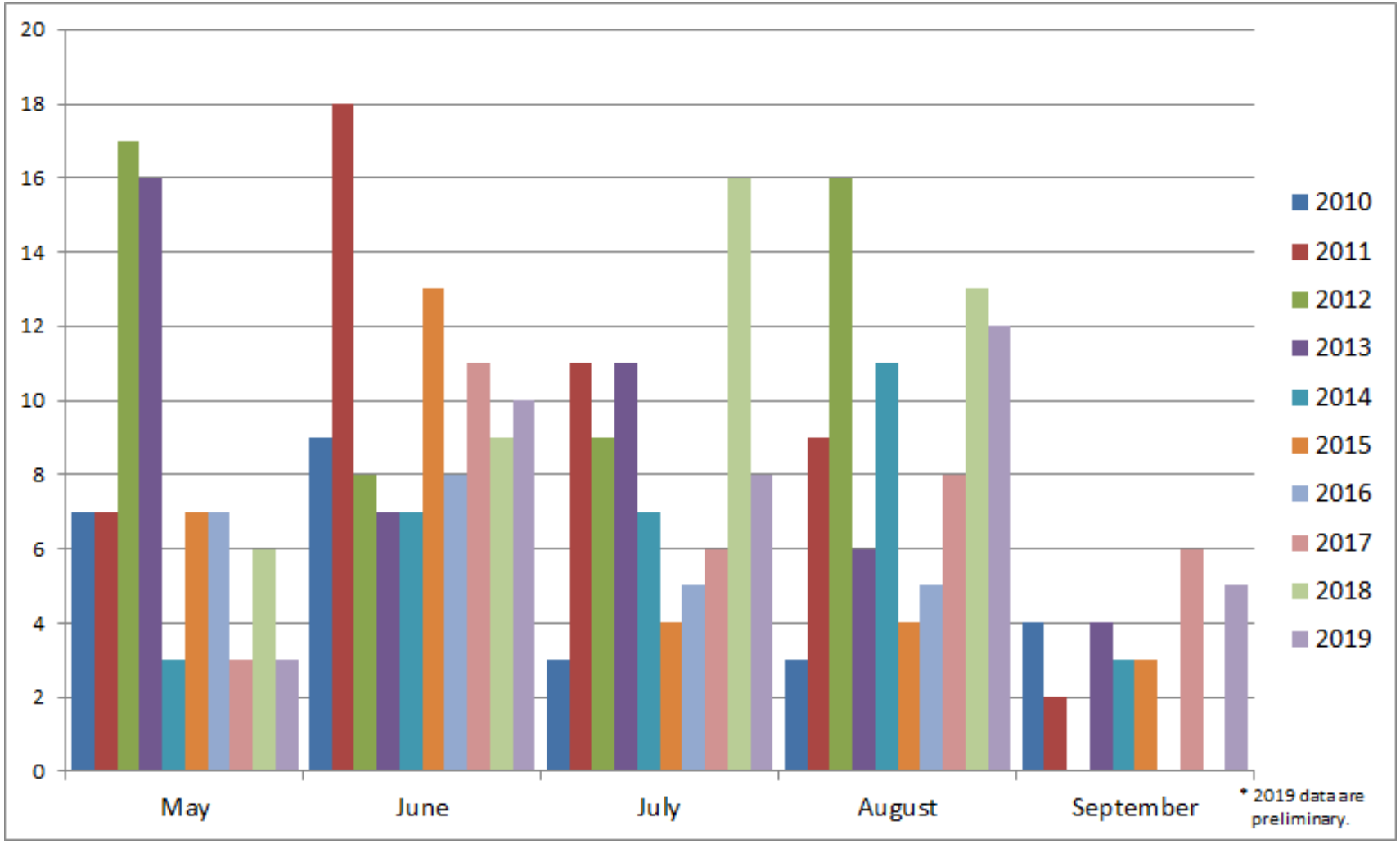


Figure 2. Average exceedance day concentration (ppm) per month by year.

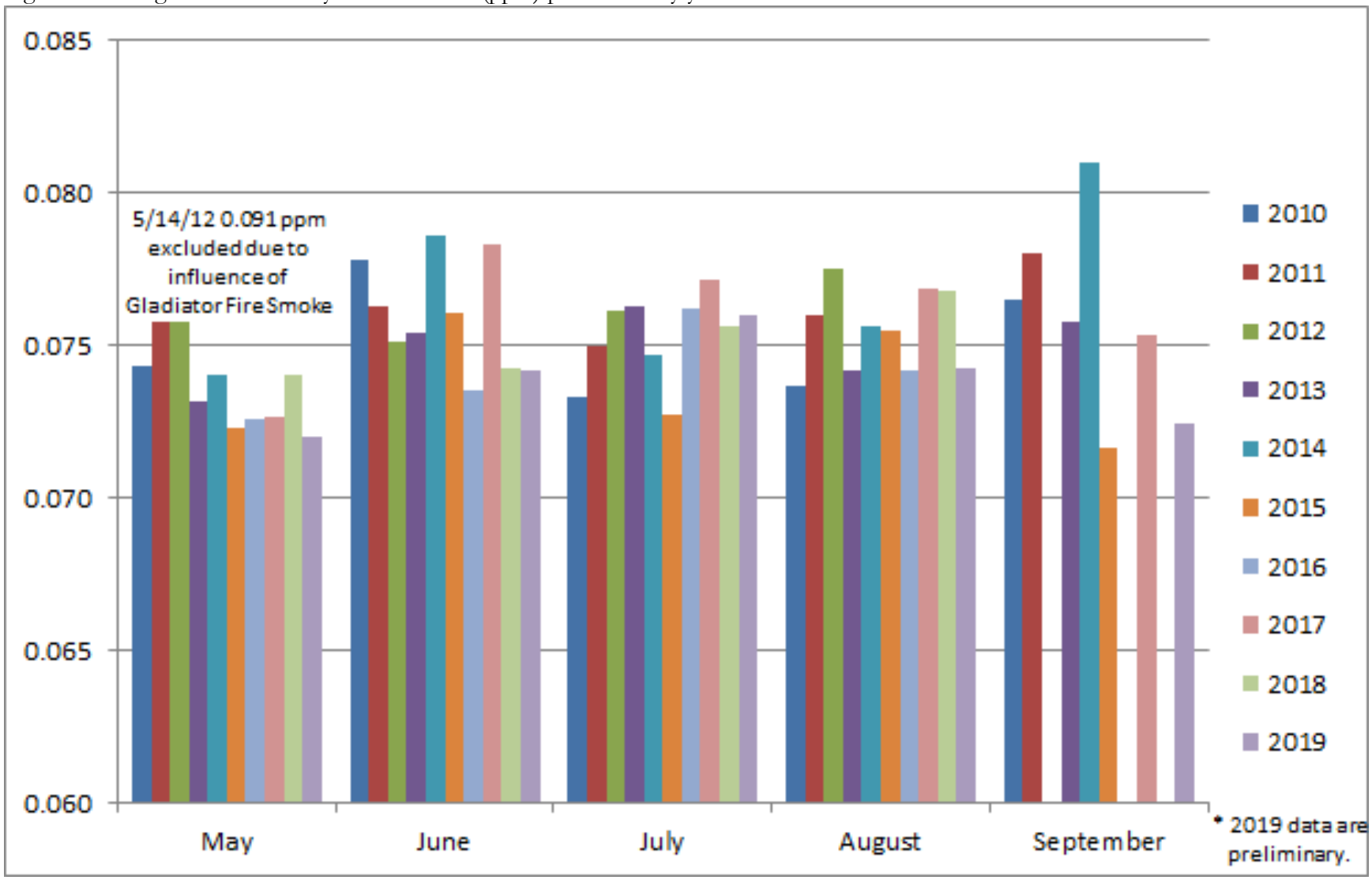
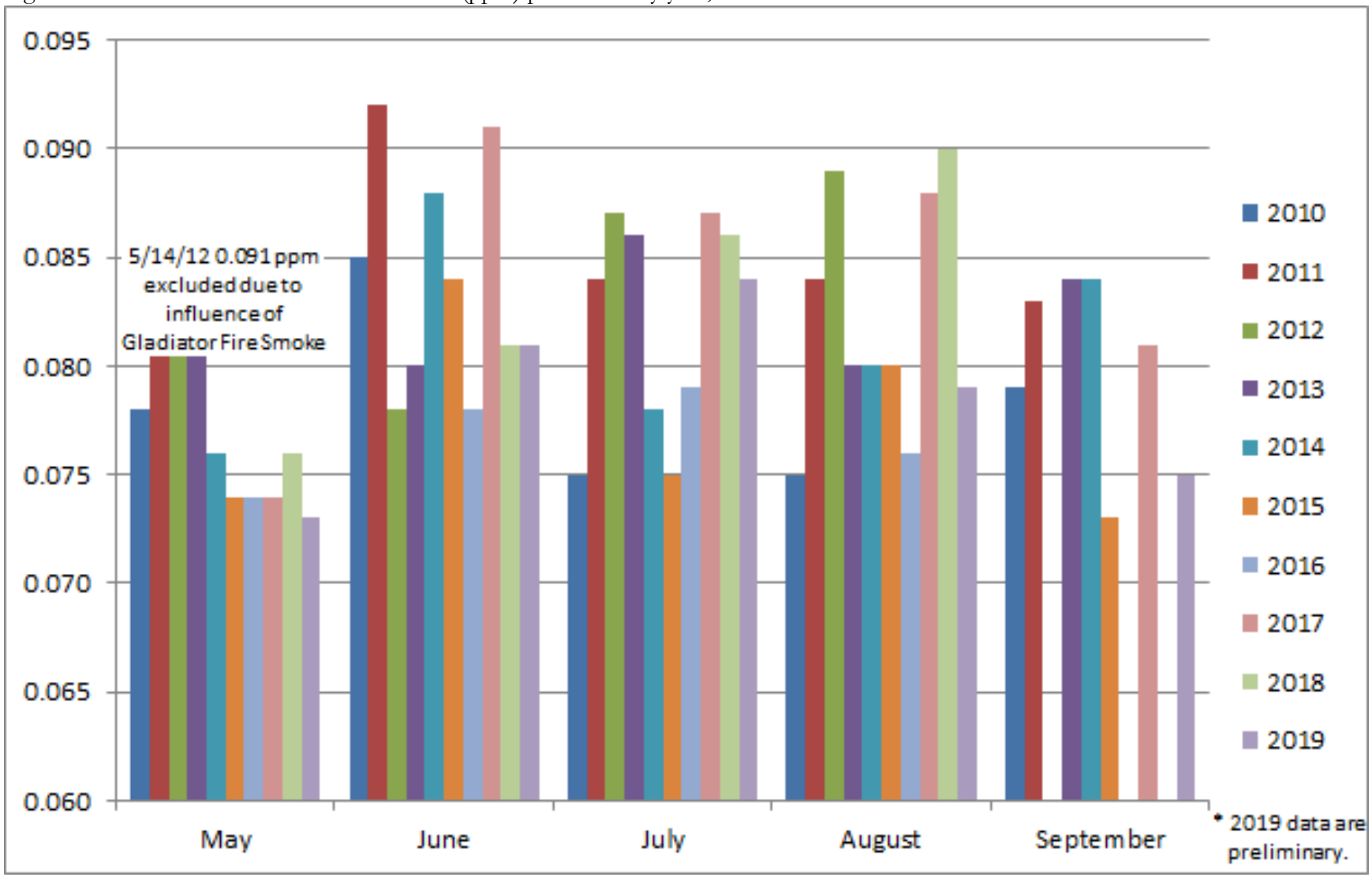


Figure 3. Maximum exceedance concentration (ppm) per month by year, 2010-2019.



Historical Weather Data

Higher ozone concentrations and more frequent exceedances of the ozone NAAQS are expected in June, July, and August because ozone formation and dispersion (or lack thereof) is a function of the daily temperatures, hours of sunlight and amount of ultraviolet light, synoptic and local wind conditions, and to some extent, relative humidity, all of which converge to result in the highest ozone concentrations occurring in June, July, and August. Table 4 demonstrates this for temperature and insolation.

Table 4. Average high temperature (°F), hours of daylight, and UV Index by month in Maricopa County (Source: Weather Atlas, https://www.weather-us.com/en/arizona-usa/phoenix-climate).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High Temperature	67	71	77	85	95	104	106	104	100	89	76	66
Daylight Hours	10.2	11	12	13	13.9	14.3	14.1	13.3	12.4	11.3	10.4	10
UV Index	3	4	6	8	10	10	11	10	8	6	4	3

Another important factor is the synoptic wind conditions, which influence the movement and dispersion of ozone and its precursors. From about mid-September through mid- to late- June, synoptic winds are driven by the jet stream and mid-latitude westerly winds. This tends to provide for better dispersion during the spring and early summer unless a high pressure system pushes the jet stream north and creates stagnant conditions. When the air mass is more stagnant, local light winds are driven by down-valley flow (generally from the north and east) during the morning hours (starting at midnight) and up-valley winds from afternoon into the nighttime hours. The result is that ozone precursors and ozone can accumulate as the air mass sloshes to the west and south in the morning and to north and east in the afternoon and evening. Starting in late June to mid-July, the monsoon season begins. This is the result of persistent high pressure systems occurring, which force the storm track and its westerly winds to the north and draw air from the south and the southeast. This change helps create better conditions for ozone formation and can prevent its dispersion. Theses winds bring moisture from the Gulf of Mexico and Baja, which provides additional water vapor to participate in ozone formation. In addition, these winds frequently counteract easterly flow of locally generated winds, which allows ozone to accumulate in the urban core and eastern portion of the metro area.

One other characteristic of the spring and early summer westerly winds is that they frequently transport ozone and its precursors from the west into Arizona. Aside from wildfire caused exceptional events, this complicates assessing how much locally generated emissions contribute to ozone exceedances, particularly in April and May, before temperature and sunlight reach their annual peaks.

Stationary Source Emissions Data and Emission Estimation Methods

In addition to favorable conditions for ozone formation, emissions of precursors are increased during the hot summer months. This is illustrated by emissions inventory data submitted to the MCAQD. In Maricopa County, stationary sources submit emissions inventory data for the following quarters:

- Winter (December – February)
- Spring (March – May)
- Summer (June – August)
- Fall (September – November)

MCAQD began collecting emissions inventory data based on these reporting periods after EPA asked MCAQD to recalculate ozone season-day emissions for the 2011 periodic emissions inventory (PEI) using data from June through August. There has been some discussion by EPA as to whether it would be possible to use a numerical scheme to calculate ozone season-day emissions for May-September or May – July from the existing quarterly reporting intervals described above. This is problematic because actual emissions data for May and September are not available. Emissions data for these months would have to be calculated as a percentage of the spring and fall quarters. Estimating emissions for May and September in this manner would introduce unnecessary error into the calculation. The amount of error could be significant, because emissions are expected to be lower in March, Aril, October, and November than in May or September. As a result, the calculated ozone season-day emissions will be biased low if data from May and/or September is included.

To highlight this point, the MCAQD estimated ozone season-day emissions of NO_X and VOC from Title V facilities for May – July 2017 and May – September 2017. The results confirm that the highest season-day emissions occur between June and August. The results do not suggest that there would be any benefit to recalculating ozone season-day emissions using data from May 2017 or September 2017.

Table 5. NO_X and VOC emissions (tons) from Title V facilities in Maricopa County by reporting period and estimation period (2017).

	Reporting Periods				Estimation Periods	
	Dec – Feb	Mar – May	Jun – Aug	Sep – Nov	May – Jul*	May – Sept**
TV – NO_X Emissions	370	453	1,085	735	874	1,330
TV – VOC Emissions	188	198	219	194	212	284

* Emissions from May – July were estimated by adding one-third of the emissions reported for the spring quarter (March – May) to two-thirds of the emissions reported for the summer quarter (June – August).

** Emissions from May – September were estimated by adding one-third of the emissions reported for the spring quarter (March – May) and one third of the emissions reported for the fall quarter (September – November) to the total emissions reported for the summer quarter (June – August).

Table 6. Average daily NO_X and VOC emissions (pounds) from Title V facilities in Maricopa County by reporting period and estimation period (2017).

	Reporting Periods				Estimation Periods	
	Dec – Feb	Mar – May	Jun – Aug	Sep – Nov	May – Jul	May – Sept
Average daily NO_X Emissions	8,195	9,848	23,587	16,153	19,007	17,385
Average daily VOC Emissions	4,173	4,301	4,759	4,273	4,607	3,709

Mobile Source Emissions Data

Mobile source emissions in Maricopa County (excluding locomotive emissions) were estimated using the MOVES2014b and AEDT 2d models. The Maricopa Association of Governments provided monthly estimates of NO_X and VOC emissions from each mobile source category for 2017.

Monthly NO_X and VOC emissions generally remain steady throughout the year. During 2017, NO_X emissions from mobile sources (excluding locomotives) averaged 119 $\pm$ 4.5 tons per day, while VOC emissions from this category averaged 71 $\pm$ 8.8 tons per day. When data from May and September is included, ozone season-day emissions of NO_X and VOC decrease by 6.6 tons per day and 9.4 tons per day, respectively. Emissions from locomotives were excluded because emissions from this category are calculated on an annual basis (not by months or seasons).

Table 7. Ozone season-day emissions (tons) of NO_X and VOC from mobile sources (excluding locomotives) in Maricopa County (2017).

	NO_X	VOC
Ozone season-day emissions (June – August)	127.1	88.4
Ozone season-day emissions (May – September)	120.5	79.0

Biogenic Emissions

Biogenic emissions of NO_X and VOC vary widely throughout the year. Biogenic emissions are lowest in December and January, increase during the spring, peak during the hot summer months (June – August), and decrease during the fall. The magnitude of the summer increase is significant; biogenic VOC emissions in June and July of 2017 were more than double the biogenic VOC emissions that occurred in May of 2017. As a result, when data from May and September are included in the calculation, ozone season-day emissions from biogenic sources decrease by more than 237 tons per day.

Table 8. Average daily biogenic emissions (pounds) of NO_X and VOC by month from biogenic sources in Maricopa County (2017).

	NO_X	VOC
January	562	63,780
February	1,412	170,321
March	3,113	463,502
April	3,357	598,257
May	5,330	1,160,381
June	9,593	2,547,929
July	10,698	2,383,573
August	9,586	2,041,594
September	5,573	1,110,926
October	2,740	504,920
November	1,130	177,754
December	735	80,591

Table 9. Percent increase in daily biogenic emissions of NO_X and VOC compared to May (2017).

	NO_X	VOC
June	74%	112%
July	101%	105%
August	80%	76%
September	1%	-7%

Table 10. Ozone season-day emissions (tons) of NO_X and VOC from biogenic sources in Maricopa County (2017).

	NO_X	VOC
Ozone season-day emissions (June – August)	5.0	1,162
Ozone season-day emissions (May – September)	4.1	924.6

Conclusions

Historical monitoring data shows that the most ozone exceedances occur during June, July, and August. In addition, the magnitude of ozone exceedances is highest during June, July, and August. These findings make sense in light of local weather and emission patterns, because the data indicates that emissions are highest during the summer months and conditions for ozone formation are most favorable during that period. These analyses indicate that calculating ozone season-day emissions using data from June through August is the most accurate and conservative approach.

This approach also avoids unnecessary error that would be introduced by attempting to estimate emissions during May and/or September, and avoids using data from May when ozone transport is more likely to affect local ozone concentrations. More to the point, this approach reflects the idea that the most ozone exceedances and the highest ozone concentrations occur between June 1st and

August 30th because there are increased emissions of ozone precursors, higher temperatures, and more sunlight during the summer months. All of this evidence strongly confirms that ozone season-day emissions for the 2017 periodic emissions inventory should be calculated using data from June, July, and August of 2017.