Maricopa County
Air Quality Department

2014 Periodic Emissions Inventory for PM_{10}

for the
Maricopa County, Arizona, PM_{10} Nonattainment Area

September 2016

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1. Introduction

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1.1 Overview

This 2014 periodic PM_{10} emissions inventory was 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 emission 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 serious nonattainment for PM_{10}.

PM_{10} is defined as particulate matter less than or equal to ten micrometers in diameter. This inventory includes primary emissions of PM_{10} and $PM_{2.5}$ as well as three particulate matter precursors: nitrogen oxides (NO_x), sulfur oxides (SO_x) and ammonia (NH_3). The inventory provides emission estimates from point, area, nonroad mobile, onroad mobile and biogenic sources. Note that totals shown in tables may not equal the sum of individual values due to independent rounding.

1.2 Agencies responsible for the emissions inventory

Maricopa County Air Quality Department (MCAQD) has primary responsibility for preparing and submitting the 2014 Periodic PM_{10} Emissions Inventory for Maricopa County. MCAQD prepared the emission estimates for point sources, the majority of area sources, and some nonroad mobile sources. The Maricopa Association of Governments (MAG) prepared the emission estimates for onroad mobile, the majority of nonroad mobile, biogenic, and some area sources. Table 1.2–1 lists those responsible for inventory preparation and quality assurance/ quality control activities, which are described in the respective chapters.

Table 1.2–1. Chapter authors and QA/QC contacts for this report.

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

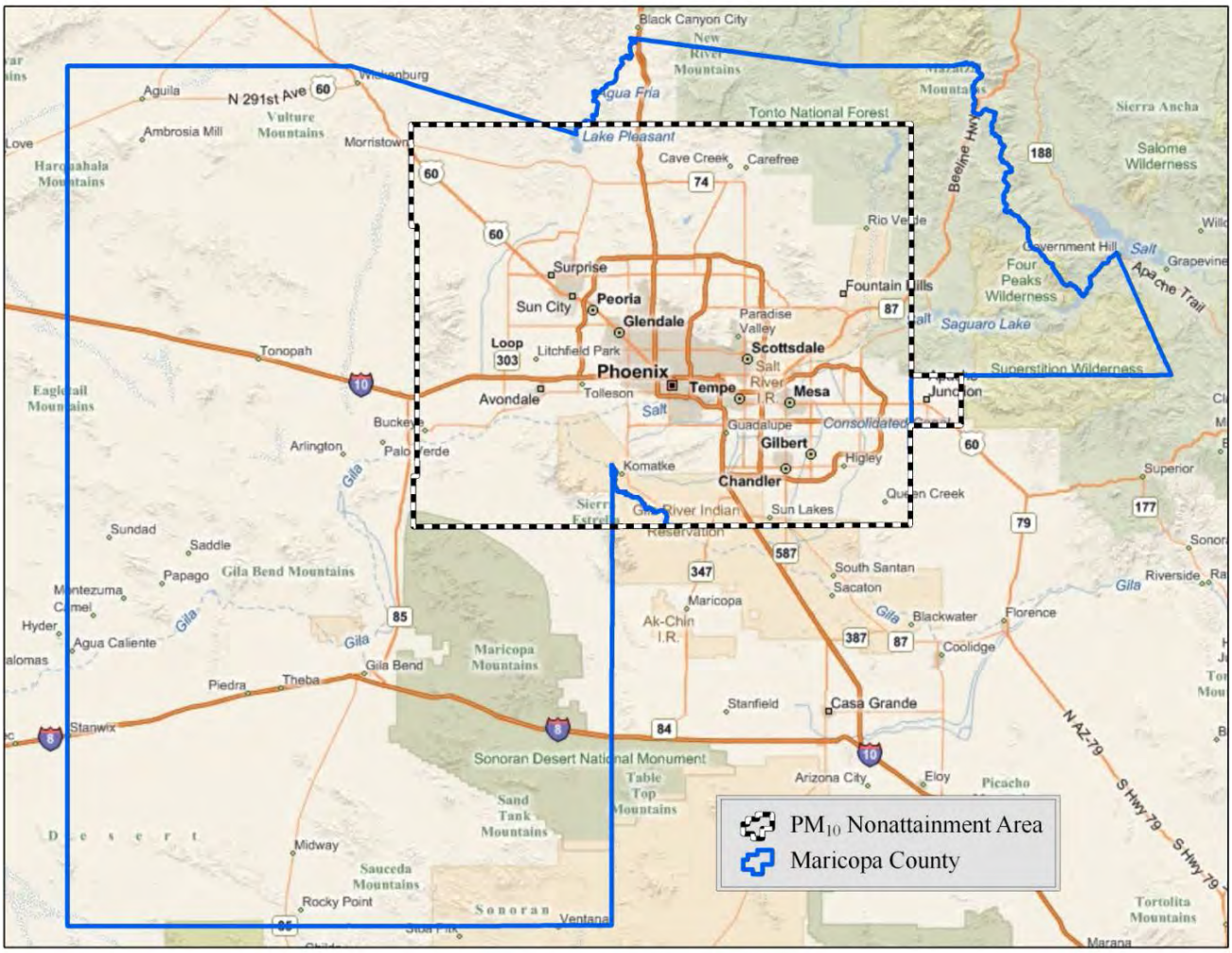
1.3 Temporal scope

Annual and typical daily emissions were estimated for the year 2014, for both Maricopa County and the Phoenix-region PM_{10} nonattainment area (NAA).

1.4 Geographic scope

This inventory includes emission estimates for Maricopa County and for the Maricopa County PM_{10} nonattainment area. Maricopa County encompasses approximately 9,223 square miles of land area, while the Maricopa County PM_{10} nonattainment area is approximately 2,880 square miles or approximately 31 percent of the Maricopa County land area. A map of Maricopa County and the PM_{10} nonattainment area is provided in Figure 1.4–1.

Figure 1.4–1. Map of Maricopa County and the PM_{10} nonattainment area.



1.5 Overview of local demographic and land-use data

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

1.5.1 Demographic profile

The demographic data provided by MAG included population, employment data, and single family/multi-family splits for calendar year 2014, for both Maricopa County and the PM_{10} nonattainment area. Table 1.5–1 provides an overview of the 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 PM_{10} NAA from county-level calculations. It is important to note, however, that the nonattainment area includes a portion of Pinal County, AZ (Apache Junction) as shown in Figure 1.4–1. Thus in some cases (e.g., those source categories calculated based on total population), the multiplier used to derive nonattainment area estimates from County-level values may be greater than 1, and thus the resulting NAA emission totals are larger than the County-level estimates from which they are derived.

Table 1.5–1. Demographic profile of Maricopa County and the PM_{10} NAA.

Demographic variable	Maricopa County	PM_{10} nonattainment area	NAA% relative to County
1. Population:			
Resident population	4,008,651	4,017,803	100.23%
Non-resident population	319,784	323,875	101.28%
Total population:	**4,328,435**	**4,341,678**	**100.31%**
2. Employment:			
–Retail employment *	385,678	385,729	100.01%
–Office employment *	462,139	458,890	99.30%
–Public employment *	132,436	132,835	100.30%
–Other employment *	181,060	180,229	99.54%
All commercial/institutional employment:	***1,161,313***	***1,157,683***	***99.69%***
Industrial employment	334,326	333,137	99.64%
Construction	24,808	23,327	94.03%
Work at home	101,244	100,178	98.95%
Non site-based	128,193	127,656	99.58%
Total employment:	**1,749,884**	**1,741,981**	**99.55%**
3. Household split:			
Single-family	77%	78%	
Multi-family	23%	22%	
Total households:	**100%**	**100%**	

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

1.5.2 Land-use data

The land-use data used in this report have been developed by the Maricopa Association of Governments (MAG), which provided 2014 land-use data. Table 1.5–2 presents a listing of the land use categories used, and the acreages of each land-use type within Maricopa County and the PM_{10} nonattainment area.

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

Land use category	Acreage in Maricopa County	Acreage within PM_{10} NAA	Percentage within PM_{10} NAA
General/active open space/golf course (e.g., parks)	212,662	204,817	96.31%
Passive/restricted open space, washes	2,602,364	420,329	16.15%
Lakes	12,286	7,029	57.21%
Agriculture	267,894	114,722	42.82%
Vacant (e.g., developable land)	2,053,015	409,566	19.95%

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, industrial processes and large manufacturing facilities. MCAQD utilizes the US EPA's Annual Emissions Reporting Requirements (AERR) rule to define which stationary sources are listed as point sources. A detailed definition of a point source can be found in Section 2.1 of Chapter 2.

Table 1.6–1 summarizes annual and typical daily emissions from point sources in Maricopa County and the PM_{10} nonattainment area, respectively. A detailed breakdown of emissions calculations for all point sources is contained in Chapter 2.

Table 1.6–1. Annual and typical daily emissions from point sources in Maricopa County and the PM_{10} nonattainment area (including emission reduction credits).

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	512.5	470.3	1,647.6	77.7	196.8	2,965	2,712	9,246	533	1,081
PM_{10} NAA	197.8	174.5	955.9	41.0	42.1	1,210	1,061	5,422	329	231

1.6.2 Area (nonpoint) sources

Area sources are facilities or activities whose individual emissions do not qualify them as point sources. Area sources represent numerous facilities or activities that individually release small amounts of a given pollutant, but collectively they can release significant amounts of a pollutant. Emissions from stationary sources that were not identified as point sources in this report have been included in the area source inventory. Examples of area source categories include residential wood burning, commercial cooking, waste incineration and wildfires.

Tables 1.6–2 and 1.6–3 summarize annual and typical daily emissions of the chief area source categories, for Maricopa County and the PM_{10} nonattainment area, respectively. A detailed breakdown of emissions calculations for each area source category is contained in Chapter 3.

Table 1.6–2. Annual and typical daily emissions from area sources in Maricopa County.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Source category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Fuel combustion	1,475.1	1,458.6	4,931.9	95.2	101.4	13,181	13,068	31,491	672	846
Industrial processes	9,113.1	2,735.4	531.6	39.0	1,995.7	57,392	17,311	3,102	329	12,775
Waste treatmt/disposal	121.5	107.4	41.5	58.9	11.7	776	677	249	324	64
Misc. area sources	31,108.2	4,158.5	128.1	11.4	10,476.3	214,115	31,255	800	82	57,409
All area sources:	**41,817.9**	**8,459.9**	**5,633.2**	**204.5**	**12,585.1**	**285,464**	**62,311**	**35,641**	**1,407**	**71,094**

Table 1.6–3. Annual and typical daily emissions from area sources in the PM_{10} nonattainment area.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Source category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Fuel combustion	1,477.5	1,461.1	4,920.5	95.0	101.5	13,205	13,092	31,417	671	846
Industrial processes	7,772.9	2,503.8	529.1	38.9	1,985.8	47,961	14,972	3,088	328	12,714
Waste treatmt/disposal	69.7	68.3	31.3	54.6	11.7	421	394	181	301	64
Misc. area sources	10,782.5	1,820.6	127.9	11.3	5,170.4	77,583	13,568	754	69	28,332
All area sources:	**20,102.7**	**5,853.8**	**5,608.8**	**199.7**	**7,269.4**	**139,170**	**42,027**	**35,440**	**1,369**	**41,957**

1.6.3 Nonroad mobile sources

Nonroad mobile sources include off-highway vehicles and engines that move or are moved within a 12-month period. Tables 1.6–4 and 1.6–5 summarize annual and typical day emissions from nonroad mobile sources, for Maricopa County and the PM_{10} nonattainment area, respectively. A detailed breakdown of emissions calculations for each source category is contained in Chapter 4.

Table 1.6–4. Annual and typical daily emissions from nonroad mobile sources in Maricopa County.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Source category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Agricultural equipment	22.9	22.2	286.9	0.0	0.3	146	142	1,832	0	2
Airport GSE (+APU)	17.3	16.9	293.7	18.2	0.0	95	93	1,610	100	0
Commercial equipment	102.6	97.9	1,175.6	1.3	2.4	656	626	7,520	9	15
Construction & mining	925.8	895.6	10,495.7	0.3	15.1	5,920	5,727	67,111	2	97
Industrial equipment	70.9	69.2	1,263.3	0.7	1.3	432	422	7,727	5	8
Lawn and garden	163.9	151.5	589.9	2.0	2.7	904	834	3,370	13	16
Pleasure craft	5.2	4.9	98.3	0.1	0.2	70	64	1,304	1	2
Railway maintenance	0.9	0.9	7.7	0.0	0.0	6	6	53	0	0
Recreational equipment	38.7	35.6	62.4	0.3	0.4	328	302	530	3	4
Aircraft	110.4	110.4	2,391.1	288.5	0.0	689	689	13,644	1,631	0
Locomotives	70.8	68.7	2,478.3	264.0	1.8	388	376	13,580	1,446	10
All nonroad sources:	**1,529.4**	**1,473.8**	**19,143.1**	**575.4**	**24.2**	**9,634**	**9,282**	**118,279**	**3,209**	**154**

Table 1.6–5. Annual and typical daily emissions from nonroad mobile sources in the PM_{10} nonattainment area.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Source category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Agricultural equipment	9.8	9.5	122.9	0.0	0.1	63	61	785	0	1
Airport GSE (+APU)	17.1	16.7	288.6	18.0	0.0	94	92	1,581	98	0
Commercial equipment	102.3	97.6	1,171.5	1.3	2.4	654	624	7,493	9	15
Construction & mining	870.5	842.1	9,869.2	0.3	14.2	5,566	5,385	63,105	2	91
Industrial equipment	70.6	68.9	1,258.8	0.7	1.3	430	420	7,699	5	8
Lawn and garden	164.4	151.9	591.7	2.0	2.7	906	837	3,380	13	17
Pleasure craft	3.0	2.8	56.3	0.1	0.1	40	37	746	1	1
Railway maintenance	0.9	0.9	7.8	0.0	0.0	6	6	54	0	0
Recreational equipment	6.9	6.4	11.1	0.1	0.1	59	54	94	1	1
Aircraft	108.4	108.4	2,382.5	286.1	0.0	678	678	13,597	1,618	0
Locomotives	35.2	34.2	1,271.3	129.0	0.9	193	187	6,966	707	5
All nonroad sources:	**1,389.1**	**1,339.4**	**17,031.5**	**437.5**	**21.7**	**8,689**	**8,380**	**105,499**	**2,452**	**138**

1.6.4 Onroad mobile sources

Emissions from onroad mobile sources were calculated for Maricopa County and the PM_{10} nonattainment area. A detailed breakout of emissions calculations for each area source category is contained in Chapter 5.

Tables 1.6–6 and 1.6–7 summarize annual and typical daily emissions from onroad mobile sources in Maricopa County and the PM_{10} nonattainment area, respectively.

Table 1.6–6. Annual and typical daily emissions from onroad mobile sources in Maricopa County.

Emission	Annual emissions (tons/year)					Typical daily emissions (lbs/day)				
Category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Exhaust, tire wear, and brake wear	844.6	765.7	34,219.1	187.7	1,047.6	4,629	4,196	187,536	1,029	5,742
Paved road fugitive dust	6,578.3	1,627.4	—	—	—	36,046	8,918	—	—	—
Unpaved rd/alley fugitive dust	6,591.2	657.9	—	—	—	36,116	3,605	—	—	—
Totals:	**14,014.2**	**3,051.1**	**34,219.1**	**187.7**	**1,047.6**	**76,791**	**16,719**	**187,536**	**1,029**	**5,742**

Table 1.6–7. Annual and typical daily emissions from onroad mobile sources in the PM_{10} nonattainment area.

Emission	Annual emissions (tons/year)					Typical daily emissions (lbs/day)				
Category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Exhaust, tire wear, and brake wear	763.0	690.7	30,718.6	180.4	1,017.8	4,181	3,785	168,352	989	5,578
Paved road fugitive dust	6,290.5	1,555.8	—	—	—	34,469	8,525	—	—	—
Unpaved rd/alley fugitive dust	6,337.6	632.6	—	—	—	34,726	3,466	—	—	—
Totals:	**13,391.0**	**2,879.1**	**30,718.6**	**180.4**	**1,017.8**	**73,376**	**15,777**	**168,352**	**989**	**5,578**

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 PM_{10} nonattainment area. Emissions were estimated using the Model of Emissions of Gases and Aerosols from Nature (MEGAN). MEGAN is a state-of-the-art biogenic emissions model developed by the National Center for Atmospheric Research (NCAR). Some corrections and improvements were made in the latest version of MEGAN2.1. MEGAN2.1 was used to compute biogenic emissions in Maricopa County and the PM_{10} nonattainment area. Annual and typical daily NO_x emissions from biogenic sources are shown in Table 1.6–8 for Maricopa County and the PM_{10} nonattainment area.

Table 1.6–8. Annual and typical daily emissions from biogenic sources in Maricopa County and the PM_{10} nonattainment area.

Geographic area	Annual NO_x emissions (tons/yr)	Typical daily NO_x emissions (lbs/day)
Maricopa County	987.9	5,392
PM_{10} nonattainment area	378.7	2,067

1.6.6 Summary of all source categories

Tables 1.6–9 and 1.6–10 provide summary totals of annual and typical daily emissions from all emission sources in Maricopa County and the PM_{10} nonattainment area, respectively.

Table 1.6–9. Annual and typical daily emissions from all source categories in Maricopa County.

	Annual emissions (tons/year)					Typical daily emissions (lbs/day)				
Section	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
POINT SOURCES:	507.7	470.3	1,604.6	77.5	196.8	2,939	2,712	9,011	532	1,081
Emission reduction credits	4.8		14.1	0.2		26		77	1	
pERCs			28.8					158		
Totals:	**512.5**	**470.3**	**1,647.6**	**77.7**	**196.8**	**2,965**	**2,712**	**9,246**	**533**	**1,081**
AREA SOURCES:										
Fuel combustion:										
Industrial distillate oil: boilers	11.0	7.4	96.1	34.1	3.8	71	48	616	219	25
Industrial distillate oil: engines	139.3	130.7	1,934.4	22.5	2.6	893	838	12,400	144	16
Industrial natural gas	4.0	3.2	740.1	4.4	23.7	26	20	4,744	28	152
Industrial LPG	0.2	0.1	52.1	0.2	1.1	1	1	334	1	7
Comm./inst. dist. oil: boilers	0.3	0.3	2.8	0.1	0.1	2	2	18	1	1
Comm./inst. dist. oil: engines	0.3	0.3	4.4	0.0	0.0	2	2	28	0	0
Comm./inst. natural gas	5.9	4.8	1,126.8	6.8	5.5	38	31	7,223	43	35
Residential distillate oil	0.0	0.0	0.3	0.8	0.0	0	0	3	8	0
Residential natural gas	62.8	62.8	777.0	5.0		344	344	4,258	27	
Residential LPG	0.2	0.1	41.5	0.2	0.1	1	1	391	2	1
Residential wood combustion	1,251.0	1,248.7	156.3	21.1	64.5	11,802	11,780	1,475	199	608
All Fuel Combustion:	**1,475.1**	**1,458.6**	**4,931.9**	**95.2**	**101.4**	**13,181**	**13,068**	**31,491**	**672**	**846**
Industrial processes:										
Chemical manufacturing	108.5	65.5				1,172	654			
Commercial cooking	1,739.2	1,612.8				9,530	8,837			
Grain handling/processing	178.2	19.0				1,037	1,033			
Ammonia cold storage					1,973.3					12,649

Table 1.6–9. Annual and typical daily emissions from all source categories in Maricopa County (cont'd).

	Annual emissions (tons/year)					Typical daily emissions (lbs/day)				
Section	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Industrial processes (cont'd):										
Secondary metal production	53.6	39.8	55.1	30.6	0.5	411	306	488	282	3
Nonmetallic mineral processes	43.4	18.2				325	134			
Mining/quarrying	66.8	14.9				464	102			
Wood product manufacturing	24.3	23.1				180	172			
Rubber/plastic product mfg.	95.8	80.2				702	614			
Fabricated metals	14.0	12.9				100	92			
Residential construction	1,318.0	131.8				8,448	845			
Commercial construction	3,619.4	361.9				23,201	2,320			
Road construction	1,247.0	124.7				7,993	799			
Construction, other	128.3	12.8				822	82			
Electrical equipment mfg.	26.0	18.5	24.3	0.6	14.3	144	102	135	3	79
Indust. paved/unpaved roads	205.0	87.3				1,476	587			
Industrial processes, NEC	245.7	112.0	452.2	7.9	7.6	1,387	631	2,478	43	44
All Industrial Processes:	**9,113.1**	**2,735.4**	**531.6**	**39.0**	**1,995.7**	**57,392**	**17,311**	**3,102**	**329**	**12,775**
Waste treatment/disposal:										
On-site incineration	0.6	0.4	3.0	0.9		4	2	19	6	
Open burning	30.4	30.4	8.1			234	234	62		
Landfills	67.5	65.5	9.9	6.6		377	365	54	36	
Publicly owned treatmt works					11.7					64
Other waste	23.0	11.1	20.6	51.4		161	75	113	282	
All Waste Treatmt/Disp.:	**121.5**	**107.4**	**41.5**	**58.9**	**11.7**	**776**	**677**	**249**	**324**	**64**
Miscellaneous area sources:										
Windblown dust	2,888.8	433.3				15,829	2,374			
Cotton ginning	26.9	4.0				159	24			
Tilling	4,236.4	847.3				62,024	12,405			
Harvesting	157.2	23.6				3,811	572			
Travel on unpaved ag. roads	1,929.0	192.9				12,365	1,237			
Fertilizer application					573.6					3,143
Livestock					8,711.9					47,737
Humans					1,190.3					6,522
Backyard barbeques	197.3	157.8	60.5			1,081	865	332		
Structure fires	15.2	15.2	2.0			83	83	11		
Aircraft engine testing	2.5	2.4	45.5	8.7		14	14	260	48	
Vehicle fires	33.0	33.0	1.3			181	181	7		
Crematories, human	5.5	3.3	10.7	1.4		40	24	77	10	
Crematories, animal	2.7	1.6	5.6	0.7		24	14	49	6	
Accidental releases			0.2					0		
Wildfires	9.2	7.9	2.0	0.6	0.4	59	51	13	4	3
Prescribed fires	0.2	0.2	0.2	0.0	0.0	65	65	51	14	4
Travel on unpaved pkg lots	4,071.1	407.1				22,308	2,231			
Leaf blowers fugitive dust	991.2	374.1				5,431	2,050			
Offrd rec vehicle fugitive dust	16,542.1	1,654.8				90,642	9,067			
All Misc. Area Sources	**31,108.2**	**4,158.5**	**128.1**	**11.4**	**10,476.3**	**214,115**	**31,255**	**800**	**82**	**57,409**
All Area Sources:	**41,817.9**	**8,459.9**	**5,633.2**	**204.5**	**12,585.1**	**285,464**	**62,311**	**35,641**	**1,407**	**71,094**

Table 1.6–9. Annual and typical daily emissions from all source categories in Maricopa County (cont'd).

	Annual emissions (tons/year)					Typical daily emissions (lbs/day)				
Section	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
NONROAD MOBILE SOURCES:										
Agricultural equipment	22.9	22.2	286.9	0.0	0.3	146	142	1,832	0	2
Airport GSE (+APU)	17.3	16.9	293.7	18.2	0.0	95	93	1,610	100	0
Commercial equipment	102.6	97.9	1,175.6	1.3	2.4	656	626	7,520	9	15
Construction/mining equipmt	925.8	895.6	10,495.7	0.3	15.1	5,920	5,727	67,111	2	97
Industrial equipment	70.9	69.2	1,263.3	0.7	1.3	432	422	7,727	5	8
Lawn and garden equipment	163.9	151.5	589.9	2.0	2.7	904	834	3,370	13	16
Pleasure craft	5.2	4.9	98.3	0.1	0.2	70	64	1,304	1	2
Rail maintenance equipment	0.9	0.9	7.7	0.0	0.0	6	6	53	0	0
Recreational equipment	38.7	35.6	62.4	0.3	0.4	328	302	530	3	4
Aircraft	110.4	110.4	2,391.1	288.5	0.0	689	689	13,644	1,631	0
Locomotives	70.8	68.7	2,478.3	264.0	1.8	388	376	13,580	1,446	10
All Nonroad Mobile Sources	**1,529.4**	**1,473.8**	**19,143.1**	**575.4**	**24.2**	**9,634**	**9,282**	**118,279**	**3,209**	**154**
ONROAD MOBILE SOURCES:										
Exhaust/tire wear/brake wear	844.6	765.7	34,219.1	187.7	1,047.6	4,629	4,196	187,536	1,029	5,742
Paved road fugitive dust	6,578.3	1,627.4	—	—	—	36,046	8,918	—	—	—
Unpaved road fugitive dust	6,591.2	657.9	—	—	—	36,116	3,605	—	—	—
All Onroad Mobile Sources	**14,014.2**	**3,051.1**	**34,219.1**	**187.7**	**1,047.6**	**76,791**	**16,719**	**187,536**	**1,029**	**5,742**
BIOGENIC SOURCES:	—	—	**987.9**	—	—	—	—	**5,392**	—	—
TOTAL, ALL SOURCE CATEGORIES:	**57,873.9**	**13,455.1**	**61,630.9**	**1,045.3**	**13,853.7**	**374,853**	**91,024**	**356,095**	**6,178**	**78,071**

Table 1.6–10. Annual and typical daily emissions from all source categories in the PM_{10} nonattainment area.

	Annual emissions (tons/year)					Typical daily emissions (lbs/day)				
Section	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
POINT SOURCES:	193.0	174.5	913.0	40.9	42.1	1,183	1,061	5,187	328	231
Emission reduction credits	4.8		14.1	0.2		26		77	1	
pERCs			28.8					158		
Totals:	**197.8**	**174.5**	**955.9**	**41.0**	**42.1**	**1,210**	**1,061**	**5,422**	**329**	**231**
AREA SOURCES:										
Fuel combustion:										
Industrial distillate oil: boilers	11.0	7.4	95.7	34.0	3.8	71	48	614	218	25
Industrial distillate oil: engines	138.8	130.2	1,927.4	22.4	2.6	890	835	12,355	144	16
Industrial natural gas	4.0	3.2	737.5	4.4	23.6	26	20	4,727	28	151
Industrial LPG	0.2	0.1	51.9	0.2	1.1	1	1	333	1	7
Comm./inst. dist. oil: boilers	0.3	0.3	2.8	0.1	0.1	2	1.9	17.8	0.7	0.7
Comm./inst. dist. oil: engines	0.3	0.3	4.4	0.0	0.0	2	2.0	28.3	0.0	0.0
Comm./inst. natural gas	5.8	4.8	1,123.3	6.7	5.5	37	31.0	7,200.8	43.2	35.3
Residential distillate oil	0.0	0.0	0.3	0.8	0.0	0	0	3	8	0
Residential natural gas	63.0	63.0	778.8	5.0		345	345	4,267	27	
Residential LPG	0.2	0.1	41.5	0.2	0.1	1	1	392	2	1
Residential wood combustion	1,253.9	1,251.6	156.7	21.2	64.6	11,829	11,808	1,478	200	610
All Fuel Combustion:	**1,477.5**	**1,461.1**	**4,920.5**	**95.0**	**101.5**	**13,205**	**13,092**	**31,417**	**671**	**846**
Industrial processes:										
Chemical manufacturing	108.1	65.3				1,168	652			
Commercial cooking	1,743.1	1,616.4				9,551	8,857			
Grain handling/processing	177.6	18.9				135	134			
Ammonia cold storage					1,966.2					12,604
Secondary metal production	53.6	39.8	55.1	30.6	0.5	411	306	488	282	3
Nonmetallic mineral processes	43.4	18.2				325	134			
Mining/quarrying	53.7	11.5				371	78			
Wood product manufacturing	24.2	23.0				179	171			
Rubber/plastic product mfg.	95.5	79.9				699	612			
Fabricated metals	13.9	12.9				99	92			
Residential construction	1,233.6	123.4				7,908	791			
Commercial construction	2,858.3	285.8				18,322	1,832			
Road construction	926.4	92.6				5,939	594			
Construction, other	123.8	12.4				793	79			
Electrical equipment mfg.	26.0	18.5	24.3	0.6	14.3	144	102	135	3	79
Ind. paved/unpaved road travel	131.8	29.4				1,000	215			
Industrial processes, NEC	159.9	55.7	449.7	7.7	4.8	915	322	2,464	42	28
All Industrial Processes	**7,772.9**	**2,503.8**	**529.1**	**38.9**	**1,985.8**	**47,961**	**14,972**	**3,088**	**328**	**12,714**
Waste treatment/disposal:										
On-site incineration	0.6	0.4	2.9	0.9		4	2	19	6	0
Open burning	9.9	9.9	2.6			76	76	20		
Landfills	46.8	45.5	5.2	3.2		260	253	29	17	
Publicly owned treatmt works					11.7					64
Other waste	12.4	9.5	20.5	50.5		81	62	113	277	
All Waste Treatmt/Disposal	**69.7**	**68.3**	**31.3**	**54.6**	**11.7**	**421**	**394**	**181**	**301**	**64**
Miscellaneous area sources:										
Windblown dust	1,750.2	262.5				9,590	1,439			
Cotton ginning	5.3	0.8				29	4			
Tilling	1,814.2	362.8				26,561	5,312			
Harvesting	59.3	8.9				1,442	216			
Travel on unpaved ag. roads	781.6	78.2				5,010	501			

Table 1.6–10. Annual and typical daily emissions from all source categories in the PM_{10} nonattainment area (continued).

	Annual emissions (tons/year)					Typical daily emissions (lbs/day)				
Section	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Misc. area sources (contd):										
Fertilizer application					245.6					1,346
Livestock					3,730.4					20,441
Humans					1,194.0					6,542
Backyard barbeques	197.7	158.2	60.6			1,083	867	332		
Structure fires	15.3	15.3	2.0			84	84	11		
Aircraft engine testing	2.5	2.4	45.5	8.7		14	14	260	48	
Vehicle fires	33.1	33.1	1.3			181	181	7		
Crematories, human	5.5	3.3	10.7	1.4		39	24	76	10	
Crematories, animal	2.7	1.6	5.6	0.7		24	14	48	6	
Accidental releases			0.2					0		
Wildfires	8.0	6.9	1.8	0.5	0.4	51	44	11	3	2
Prescribed fires	0.0	0.0	0.0	0.0	0.0	11	11	8	2	1
Travel on unpaved pkg lots	2,163.4	216.3				11,854	1,185			
Leaf blowers fugitive dust	994.2	375.2				5,448	2,056			
Offrd rec vehicle fugitive dust	2,949.5	295.0				16,161	1,617			
All Misc. Area Sources:	**10,782.5**	**1,820.6**	**127.9**	**11.3**	**5,170.4**	**77,583**	**13,568**	**754**	**69**	**28,332**
All Area Sources:	**20,102.7**	**5,853.8**	**5,608.8**	**199.7**	**7,269.4**	**139,170**	**42,027**	**35,440**	**1,369**	**41,957**
NONROAD MOBILE SOURCES:										
Agricultural equipment	9.8	9.5	122.9	0.0	0.1	63	61	785	0	1
Airport GSE (+APU)	17.1	16.7	288.6	18.0		94	92	1,581	98	
Commercial equipment	102.3	97.6	1,171.5	1.3	2.4	654	624	7,493	9	15
Construction/mining equipmt	870.5	842.1	9,869.2	0.3	14.2	5,566	5,385	63,105	2	91
Industrial equipment	70.6	68.9	1,258.8	0.7	1.3	430	420	7,699	5	8
Lawn and garden equipment	164.4	151.9	591.7	2.0	2.7	906	837	3,380	13	17
Pleasure craft	3.0	2.8	56.3	0.1	0.1	40	37	746	1	1
Rail maintenance equipment	0.9	0.9	7.8	0.0	0.0	6	6	54	0	0
Recreational equipment	6.9	6.4	11.1	0.1	0.1	59	54	94	1	1
Aircraft	108.4	108.4	2,382.5	286.1		678	678	13,597	1,618	
Locomotives	35.2	34.2	1,271.3	129.0	0.9	193	187	6,966	707	5
All Nonroad Mobile Sources:	**1,389.1**	**1,339.4**	**17,031.5**	**437.5**	**21.7**	**8,689**	**8,380**	**105,499**	**2,452**	**138**
ONROAD MOBILE SOURCES:										
Exhaust / tire wear / brake wear	763.0	690.7	30,718.6	180.4	1,017.8	4,181	3,785	168,352	989	5,578
Paved road fugitive dust	6,290.5	1,555.8	—	—	—	34,469	8,525	—	—	—
Unpaved road fugitive dust	6,337.6	632.6	—	—	—	34,726	3,466	—	—	—
All Onroad Mobile Sources:	**13,391.0**	**2,879.1**	**30,718.6**	**180.4**	**1,017.8**	**73,376**	**15,777**	**168,352**	**989**	**5,578**
BIOGENIC SOURCES:			**378.7**					**2,067**		
TOTAL, ALL SOURCE CATEGORIES:	**35,080.6**	**10,246.9**	**54,693.4**	**858.7**	**8,351.0**	**222,445**	**67,245**	**316,780**	**5,140**	**47,905**

2. Point Sources

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2.1 Introduction and scope

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

In addition to preparing a periodic emissions inventory for the PM_{10} nonattainment area (NAA) as a commitment under the current PM_{10} SIP, the federal Air Emission Reporting Requirements (AERR; US EPA, 2015) rule requires that state and local agencies prepare emissions estimates on a county basis, and submit data electronically to the US EPA for inclusion in the National Emissions Inventory (NEI) for calendar year 2014.

2.2 Identifying point sources

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

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

This chapter contains several tables that provide information on emissions from large stationary point sources. Table 2.2–1 provides an alphabetical listing of all point sources and their location. Table 2.4–1 shows the annual and typical daily emissions of PM_{10}, $PM_{2.5}$, NO_x, SO_x and NH_3 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 PM_{10} nonattainment area. Note that totals shown in the tables may not equal the sum of individual values due to independent rounding.

The Maricopa County Air Quality Department (MCAQD) identified point sources within the county through its electronic permit system database, EMS, and the 2014 annual emissions reports submitted to the department. A total of 19 stationary sources were identified as point sources using the definition described in Section 2.1 above. While the Arizona Department of Environmental Quality (ADEQ) retains permitting authority for a limited number of industrial source categories in Maricopa County, no ADEQ-permitted facilities are considered point sources, and are addressed instead as area sources.

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

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

ID #	NAICS	Business name	Address	City	ZIP	
3313	221112	APS West Phoenix Power Plant	4606 W Hadley St	Phoenix	85043	
43063	221112	Arlington Valley LLC	39027 W Elliot Rd	Arlington	85322	*
1218	562212	Butterfield Station Facility	40404 S 99th Ave	Mobile	85239	*
127771	331111	CMC Steel Fabricators Inc.	11444 E Germann Rd	Mesa	85212	
44439	221112	Gila River Power Station	1250 E Watermelon	Gila Bend	85337	*
4173	562212	Glendale Mun Sanitary Landfill	11480 W Glendale Av	Glendale	85301	
44186	221112	Mesquite Generating Station	37625 W Elliot Rd	Arlington	85322	*
43530	221112	New Harquahala Generating Co	2530 N 491st Ave	Tonopah	85354	*
20706	32614	New Wincup Holdings Inc.	7980 W Buckeye Rd	Phoenix	85043	
1879	562212	Northwest Regional Landfill	19401 W Deer Valley	Surprise	85387	
1331	337122	Oak Canyon Manufacturing Inc.	3021 N 29th Dr	Phoenix	85017	
52382	221112	Ocotillo Power Plant	1500 E University Dr	Tempe	85281	
42956	221112	Redhawk Generating Facility	11600 S 363rd Ave	Arlington	85322	*
303	332431	Rexam Beverage Can Company	211 N 51st Ave	Phoenix	85043	
3315	221112	Santan Generating Station	1005 S Val Vista Rd	Gilbert	85296	
4175	424710	SFPP LP Phoenix Terminal	49 N 53rd Ave	Phoenix	85043	
3316	221112	SRP Agua Fria Generating Station	7302 W Northern Av	Glendale	85303	
3317	221112	SRP Kyrene Generating Station	7005 S Kyrene Rd	Tempe	85283	
1210	337122	Trendwood Inc.	2402 S 15th Ave	Phoenix	85007	

* = Facility is located outside the PM_{10} nonattainment area.

2.3 Procedures for estimating emissions from point sources

Annual and typical daily emission estimates were calculated from annual source emissions reports, MCAQD investigation reports, permit files and logs, or telephone contacts with sources. For most of the sources, material balance methods were used for determining emissions. Emissions were estimated using the emission factors from source tests, AP–42, engineering calculations, or manufacturers' specifications.

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

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

2.3.1 Calculation of $PM_{2.5}$ emissions

For all county-permitted sources that submitted an annual emission inventory report, all process-level emissions for PM_{10}, NO_x, SO_x, and NH_3 were calculated for each facility. Actual emissions for these pollutants were calculated using reported emission factors (from AP–42 or source test results) and reflecting any control devices installed. $PM_{2.5}$ was calculated using a variety of methods, depending on the Source Classification Code (SCC) of the process reported:

1. For those SCCs and control device combinations included in EPA's *WebFIRE*, this database was used to calculate $PM_{2.5}$, using EPA-recommended emission factors and typical control efficiencies.
2. For processes with no PM_{10} controls, emission factors for $PM_{2.5}$ published by the California Air Resources Board (CARB, 2004) were used where available.
3. For all other processes (where neither of the above resources provided guidance), $PM_{2.5}$ was assumed equal to PM_{10} as a conservative estimate.

2.3.2 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 those manually controlled processes that are regulated under specific Maricopa County Rules:

- Rule 310 (Fugitive Dust from Dust-Generating Operations) 90.94% rule effectiveness
- Rule 310.01 (Fugitive Dust from Non-Traditional Sources) 97.48% rule effectiveness
- Rule 316 (Nonmetallic Mineral Processing) 81.08% rule effectiveness

For processes that claimed emissions reductions through the use of a control device, rule effectiveness calculations was quantified separately for Title V and non-Title V sources. Overall RE values of 90.44% (for Title V processes) and 89.00% (for non-Title V processes) were calculated, , and applied to 2014 process-level emissions 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 typical daily emissions from all 19 facilities that have been categorized as point sources (all but one of which are also located within the PM_{10} nonattainment area). Sources for which rule effectiveness has been applied (for PM_{10} emissions) are noted. Emissions values of "0.0" and "0" for annual and daily emissions denote quantities below the level of significance (0.05 tons/yr and 0.5 lbs/day, respectively).

Table 2.4–1. Annual and typical daily emissions from point sources, by facility.

			Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
ID #	**Business name**		**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
3313	APS W. Phoenix Power Plant		30.3	27.4	441.5	4.2	26.1	166	151	2,426	23	143
43063	Arlington Valley LLC	†*	42.5	42.4	75.8	2.5	0.6	234	234	425	15	3
1218	Butterfield Station Facility	*	29.5	29.1	16.7	1.5		188	186	103	9	
127771	CMC Steel Fabricators Inc.	*	24.4	17.5	42.7	25.4		208	149	405	243	
44439	Gila River Power Station	†	42.8	37.8	216.3	10.0	62.8	235	208	1,191	55	345
4173	Glendale Mun San Landfill	*	8.7	8.2	13.0	0.2		54	51	71	1	
44186	Mesquite Power Operations	†	133.2	126.2	190.5	11.4	33.5	732	694	1,047	62	184
43530	New Harquahala Gen Co.	†	34.4	34.3	38.8	2.8	41.1	189	189	213	15	226
20706	New Wincup Holdings Inc.		1.1	1.1	11.4	0.1		6	6	63	1	
1879	Northwest Regl. Landfill		54.8	52.8	21.1	2.3		342	331	116	13	
1331	Oak Canyon Inc.		0.0	0.0				0	0			
52382	Ocotillo Power Plant		9.5	7.2	76.4	0.3		52	39	420	2	
42956	Redhawk Gen. Facility	†	32.4	25.8	153.5	8.5	16.7	178	142	844	47	92
303	Rexam Beverage Can Co.	*	0.4	0.4	4.8	0.0		2	2	27	0	
3315	Santan Generating Station		44.9	43.6	211.8	6.5	12.9	247	239	1,164	36	71
4175	SFPP LP Phoenix Terminal		0.9	0.5	3.6	0.1		5	3	20	1	
3316	SRP Agua Fria Gen Station		7.9	5.8	44.6	0.1		43	32	245	1	
3317	SRP Kyrene Generating Stn.		10.1	10.0	42.0	1.6	3.2	56	55	231	9	17
1210	Trendwood Inc.		0.2	0.2				2	2			
	Totals:		**507.7**	**470.3**	**1,604.6**	**77.5**	**196.8**	**2,939**	**2,712**	**9,011**	**532**	**1,081**

† = Facility is outside the PM_{10} nonattainment area.
* = Facility for which rule effectiveness (RE) has been applied to one or more reported processes.

2.5 Emission reduction credits (ERCs)

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

In order for these emission reductions to be available in the future for offsetting, they must: (1) be explicitly included and quantified as growth in projection-year inventories required in rate of progress plans or attainment demonstrations that were based on 1990 actual inventories, and (2) meet the requirements outlined in MCAQD Rule 240 (renamed "Federal Major New Source Review [NSR]" in early 2016). Table 2.5–1 provides a list of emission reduction credits for PM_{10}, NO_x, and SO_x.

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

		Emission reduction credits (tons/yr)		
Facility	**Reduction date**	**PM_{10}**	**NO_x**	**SO_x**
Freescale Semiconductor, Inc.	3/1/2004	1.8	9.8	0.16
Madison 51, LLC (Thornwood)	10/8/2012	1.8		
Penn Racquet Sports Inc.	3/6/2009	1.19	4.34	
Totals:		**4.79**	**14.14**	**0.16**

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

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

Permit no.	Facility name	City, ZIP	Potential NO_x ERCs (tons/yr)
090003	Phoenix San-Man Inc.	Buckeye, 85326	9.9
010143	Gro-Well Brands Inc.	Phoenix, 85009	8.3
970349	Cemex - Central Ave Plant	Phoenix, 85041	7.5
090298	Phoenix Brick Yard	Phoenix, 85007	3.1
Total:			**28.8**

2.6 Quality assurance/quality control procedures

2.6.1 Emission survey preparation and data collection

The MCAQD's Emissions Inventory (EI) Unit annually collects point source criteria pollutant emission data from sources in the county. MCAQD annually reviews EPA guidance, documents from the Emissions Inventory Improvement Program (EIIP), and other source materials to ensure that the most current emission factors and emission calculation methods are used for each year's survey. Each January, the EI Unit prepares a pre-populated hard copy of the preceding year's submissions and mails reporting forms to permitted sources, along with detailed instructions for completing the forms. (A copy of these instructions is included as Appendix A). The EI Unit asks sources to verify and update the data. The EI Unit also holds numerous workshops each spring to assist businesses in completing EI forms. The general data flow for data collection and inventory preparation is shown in Figure 2.6–1.

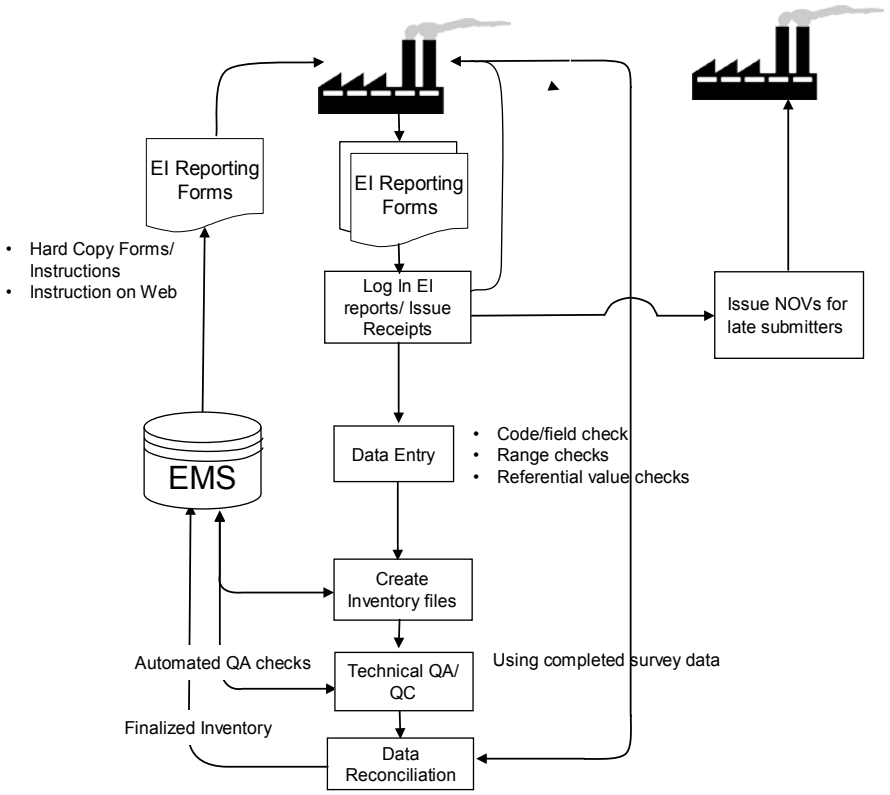

Figure 2.6–1. Data flow for annual point source emissions inventory reporting.

2.6.2 Submission processing

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

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

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

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

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

flagged, the businesses are contacted and correct information is obtained and input to EMS. Outstanding reporting issues are documented. Confidential business information (CBI) is identified by a checkbox on the form, and these data elements are flagged during data entry and are not transmitted to EPA.

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

2.6.3 Analysis of annual point source emissions data for this inventory

Air quality planning staff checked inventory accuracy and reasonableness, and assured that all point sources had been identified and that the methodology applied to calculate emissions was appropriate and that the calculations were correct. Other reasonableness checks were conducted by recalculating emissions using methods other than those used to make the initial emissions calculations and then comparing results. Quality assurance checks were conducted by checking all emissions reports submitted to MCAQD for the year 2014 for missing and questionable data and by checking the accuracy and reasonableness of all emissions calculations made for such reports. Notes concerning follow-up calls and corrections to calculations were documented on each 2014 annual emissions report.

2.7 Summary of all point source emissions

Table 2.7–1 below summarizes annual and typical daily emissions from all point sources, including the existing and potential emission reduction credits listed above in Tables 2.5–1 and 2.5–2 respectively, for both Maricopa County and the PM_{10} nonattainment area.

Table 2.7–1. Annual and typical daily point source emissions (including all emission reduction credits).

Geographic area	Annual emissions (tons/yr)					Typical daily (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	512.5	470.3	1,647.6	77.7	196.8	2,965	2,712	9,246	533	1,081
PM_{10} NAA	197.8	174.5	955.9	41.0	42.1	1,210	1,061	5,422	329	231

2.8 References

CARB, 2004. Speciation Profiles and Size Fractions. California Air Resources Board, Sacramento CA. *http://www.arb.ca.gov/ei/ speciate/speciate.htm*.

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

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

3. Area (Nonpoint) Sources

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3.1 Scope and methodology

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

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

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

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

3.2 Fuel combustion

3.2.1 Industrial fuel combustion

3.2.1.1 Industrial distillate oil

Annual emissions from industrial distillate oil combustion were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016). US EPA developed separate estimates for emissions from external combustion sources (boilers) and internal combustion engines, for each county nationwide. Annual emissions for the PM_{10} nonattainment area were estimated by apportioning Maricopa County's

emissions to the nonattainment area, using the ratio of industrial employment (99.64%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual emissions for Maricopa County and the PM_{10} nonattainment area are presented in Table 3.2–1.

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

Equipment	Maricopa County					PM_{10} nonattainment area				
type	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Boilers	11.0	7.4	96.1	34.1	3.8	11.0	7.4	95.7	34.0	3.8
Engines	139.3	130.7	1,934.4	22.5	2.6	138.8	130.2	1,927.4	22.4	2.6
Totals:	**150.3**	**138.1**	**2,030.5**	**56.6**	**6.4**	**149.8**	**137.6**	**2,023.1**	**56.4**	**6.4**

To calculate typical daily emissions, it was assumed that industrial combustion of distillate oil occurs six days per week, and is relatively uniform throughout the year. Thus annual emissions were divided by 312 (= 6 days/week × 52 weeks/year) to derive emissions for a typical day. Typical daily emissions for Maricopa County and the PM_{10} nonattainment area are presented in Table 3.2–2.

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

Equipment	Maricopa County					PM_{10} nonattainment area				
type	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Boilers	71	48	616	219	25	71	48	614	218	25
Engines	893	838	12,400	144	16	890	835	12,355	144	16
Totals:	964	886	13,016	363	41	961	883	12,969	362	41

3.2.1.2 Industrial natural gas

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

Emissions for the PM_{10} nonattainment area were estimated by apportioning County-level emissions to the nonattainment area, using the ratio of industrial employment (99.64%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual and typical daily emissions for Maricopa County and the PM_{10} nonattainment area are presented in Table 3.2–3.

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

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Cty	4.0	3.2	740.1	4.4	23.7	26	20	4,744	28	152
PM_{10} NAA	4.0	3.2	737.5	4.4	23.6	26	20	4,727	28	151

3.2.1.3 Industrial liquefied petroleum gas (LPG)

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

Emissions for the PM_{10} nonattainment area were estimated by apportioning County-level emissions to the nonattainment area, using the ratio of industrial employment (99.64%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual and typical daily emissions for Maricopa County and the PM_{10} nonattainment area are shown in Table 3.2–4.

Table 3.2–4. Annual and typical daily emissions from area-source industrial LPG combustion.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Cty	0.2	0.1	52.1	0.2	1.1	1	1	334	1	7
PM_{10} NAA	0.2	0.1	51.9	0.2	1.1	1	1	333	1	7

3.2.2 Commercial/institutional fuel combustion

3.2.2.1 Commercial/institutional distillate oil

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

Annual emissions for the PM_{10} nonattainment area were estimated by apportioning Maricopa County's emissions to the nonattainment area, using the ratio of commercial/institutional employment (99.69%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual emissions for Maricopa County and the PM_{10} nonattainment area are presented in Table 3.2–5.

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

Equipment	Maricopa County					PM_{10} nonattainment area				
type	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Boilers	0.3	0.3	2.8	0.1	0.1	0.3	0.3	2.8	0.1	0.1
Engines	0.3	0.3	4.4	0.0	0.0	0.3	0.3	4.4	0.0	0.0
Totals:	**0.6**	**0.6**	**7.2**	**0.1**	**0.1**	**0.6**	**0.6**	**7.2**	**0.1**	**0.1**

To calculate typical daily emissions, it was assumed that industrial combustion of distillate oil occurs six days per week, and is relatively uniform throughout the year. Thus annual emissions were divided by 312 (= 6 days/week × 52 weeks/year) to derive emissions for a typical day. Typical daily emissions for Maricopa County and the PM_{10} nonattainment area are presented in Table 3.2–6.

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

Equipment	Maricopa County					PM_{10} nonattainment area				
type	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Boilers	2	2	18	1	1	2	2	18	1	1
Engines	2	2	28	0	0	2	2	28	0	0
Totals:	**4**	**4**	**46**	**1**	**1**	**4**	**4**	**46**	**1**	**1**

3.2.2.2 Commercial/institutional natural gas

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

Emissions for the PM_{10} nonattainment area were estimated by apportioning County-level emissions to the nonattainment area, using the ratio of commercial/institutional employment (99.69%) as a surrogate. See Section 1.5.1 for a discussion of the employment data used. Annual and typical daily emissions for Maricopa County and the PM_{10} nonattainment area are presented in Table 3.2–7.

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

Geographic	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
area	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Cty	5.9	4.8	1,126.8	6.8	5.5	38	31	7,223	43	35
PM_{10} NAA	5.8	4.8	1,123.3	6.7	5.5	37	31	7,201	43	35

3.2.3 Residential fuel combustion

3.2.3.1 Residential distillate oil

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

Typical daily emissions were calculated by dividing annual emissions by heating degree days (i.e. the number of degrees per day that the daily average temperature is below 65 °F). However, data obtained from National Oceanic and Atmospheric Administration (NOAA, 2016) indicated that there were no heating degree days reported during the May–September period (i.e., 5 months totaling 153 days). Assuming that no distillate oil combustion activity took place during those months, it is assumed that all residential distillate oil combustion occurred during the remaining 212 days of the year. Thus, typical daily emissions were calculated by dividing annual emission by the number of days distillate oil combustion occurred.

Annual and typical daily emissions within the PM_{10} nonattainment area were calculated by multiplying county totals by the ratio of total resident population in the nonattainment area to the total resident population in the county (100.23%). See Section 1.5.1 for a discussion of the population data used. The resulting annual and daily emissions estimates are presented in Table 3.2–8.

Table 3.2–8. Annual and typical daily emissions from residential distillate oil combustion.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Cty	0.0	0.0	0.3	0.8	0.0	0	0	3	8	0
PM_{10} NAA	0.0	0.0	0.3	0.8	0.0	0	0	3	8	0

3.2.3.2 Residential natural gas

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

Typical daily emissions were calculated by dividing annual emissions by the number of days (365) that activity occurs for residential natural gas combustion. Annual and typical daily natural gas emissions for the PM_{10} nonattainment area were calculated by multiplying county-level emissions by the ratio of total resident population in the nonattainment area to the total resident

population in the county (100.23%). See Section 1.5.1 for a discussion of the population data used. Table 3.2–9 below summarizes annual and typical daily emissions from residential natural gas combustion for both Maricopa County and the PM_{10} nonattainment area.

Table 3.2–9. Annual and typical daily emissions from residential natural gas combustion.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Cty	62.8	62.8	777.0	5.0	–	344	344	4,258	27	–
PM_{10} NAA	63.0	63.0	788.8	5.0	–	345	345	4,267	27	–

3.2.3.3 Residential liquefied petroleum gas (LPG)

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

Typical daily emissions were calculated by dividing annual emissions by heating degree days (i.e. the number of degrees per day that the daily average temperature is below 65 °F). However, data obtained from National Oceanic and Atmospheric Administration (NOAA, 2016) indicated that there were no heating degree days reported during the May-September period (i.e., 5 months totaling 153 days). Assuming that no residential LPG combustion activity took place during those months, it is assumed that all residential LPG combustion occurred during the remaining 212 days of the year. Thus, typical daily emissions were calculated by dividing annual emission by the number of days residential LPG combustion occurred.

Annual and typical daily emissions for the PM_{10} nonattainment area were calculated by multiplying the county-level emissions totals by the ratio of resident population in the nonattainment area to the total resident population in the county (100.23%). See Section 1.5.1 for a discussion of the population data used. Annual and typical daily emissions for Maricopa County and the PM_{10} nonattainment area are presented in Table 3.2–10.

Table 3.2–10. Annual and typical daily emissions from residential LPG combustion.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Cty	0.2	0.1	41.5	0.2	0.1	1	1	391	2	1
PM_{10} NAA	0.2	0.1	41.5	0.2	0.1	1	1	392	2	1

3.2.3.4 Residential kerosene

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

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

3.2.3.5 Residential wood combustion

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

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

	Annual emissions (tons/yr)				
Appliance type	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Woodstoves:					
–Fireplace insert, non EPA-certified	179.1	179.1	19.7	3.0	13.7
–Fireplace insert, EPA-certified, non-catalytic	114.6	114.6	10.5	1.5	6.4
–Fireplace insert, EPA-certified, catalytic	48.1	48.1	5.6	1.0	2.2
–Freestanding, non EPA-certified	14.8	14.8	1.5	0.3	0.7
–Freestanding, EPA-certified, non-catalytic	341.8	341.8	31.3	4.5	19.0
–Freestanding, EPA-certified, catalytic	271.5	271.5	31.6	5.5	12.5
–Pellet-fired, general	188.4	188.4	18.5	3.7	8.3
Hydronic heater: outdoor	14.5	14.5	18.0	1.5	1.4
Outdoor wood burning device, NEC	5.0	5.0	0.6	0.1	0.4
Residential firelog	73.3	71.0	19.2	–	–
Totals:	**1,251.0**	**1,248.7**	**156.3**	**21.1**	**64.5**

Typical daily emissions were calculated by dividing annual emissions by heating degree days (i.e. the number of degrees per day that the daily average temperature is below 65 °F). However, data obtained from National Oceanic and Atmospheric Administration (NOAA, 2016) indicated that there were no heating degree days reported during the May–September period (i.e., a 5-month period totaling 153 days). Since it was assumed that no (or negligible) residential wood combustion took place during this 5-month period, then all residential wood combustion must have occurred during the remaining 212 days of the year. Thus, typical daily emissions were calculated by dividing annual emissions by 212.

Annual and typical daily emissions within the PM_{10} nonattainment area were calculated by multiplying county totals by the ratio of total population in the nonattainment area to total population in the county (100.23%). See Section 1.5.1 for a discussion of the population data used. Table 3.2–12 summarizes annual and daily emissions from residential wood combustion for both the county and the PM_{10} nonattainment area.

Table 3.2–12. Annual and typical daily emissions from residential wood combustion.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Cty	1,251.0	1,248.7	156.3	21.1	64.5	11,802	11,780	1,475	199	608
PM_{10} NAA	1,253.9	1,251.6	156.7	21.2	64.6	11,829	11,807	1,478	200	609

3.3 Industrial processes

3.3.1 Chemical manufacturing

Historically, emissions from chemical manufacturing were calculated for the periodic emissions inventory by the "scaling up" method as described elsewhere in this report. However, the sample size for the 2014 periodic emissions inventory was not large enough to calculate an accurate and reliable result. Therefore, data from the 2011 Periodic Emissions Inventory for PM_{10} (MCAQD, 2014) were grown to 2014 based on industrial employment.

Annual and daily emissions for the PM_{10} nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used. Table 3.3–1 summarizes annual and daily emissions from chemical manufacturing in both Maricopa County and the PM_{10} nonattainment area.

Table 3.3–1. Annual and typical daily emissions from area-source chemical manufacturing.

Geographic area	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Maricopa County	108.5	65.5	1,172	654
PM_{10} nonattainment area	108.1	65.3	1,168	652

3.3.2 Food and kindred products

3.3.2.1 Commercial cooking

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

Maricopa County population data for 2013 and 2014 were obtained from the Arizona Department of Administration (ADOA, 2016). The population data indicated population growth of 1.6% from 2013 to 2014. This growth factor was then applied to the county-level estimates from the 2014 NEI to develop emission estimates for Maricopa County for 2014. The 2014 NEI estimates for the commercial cooking source category did not include NOx, SOx, and NH3 estimates.

Commercial cooking activity is assumed to occur uniformly throughout the year. Therefore, typical daily emissions were developed by dividing the annual emissions by 365. The results are shown in Table 3.3–2 below.

Table 3.3–2. Annual and typical daily emissions from commercial cooking equipment in Maricopa County.

	Annual emissions (tons/yr)		Typical daily emissions (lb/day)	
Equipment type	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Chain-driven charbroilers	177.2	171.8	971	941
Under-fired charbroilers	1,219.4	1,178.7	6,681	6,459
Flat griddles	321.4	244.2	1,761	1,338
Clamshell griddles	21.2	18.0	116	99
Deep-fat fryers	–	–	–	–
Totals:	**1,739.2**	**1,612.8**	**9,530**	**8,837**

Annual and typical daily emissions for the PM_{10} nonattainment area were calculated by multiplying the county-level emissions totals by the ratio of resident population in the nonattainment area to the total resident population in the county (100.23%). See Section 1.5.1 for a discussion of the population data used. Table 3.3–3 below summarizes the annual and typical daily emissions from commercial cooking in the PM_{10} nonattainment area.

Table 3.3–3. Annual and typical daily emissions from commercial cooking equipment in the PM_{10} nonattainment area.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Equipment type	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Chain-driven charbroilers	177.6	172.2	973	943
Under-fired charbroilers	1,222.1	1,181.4	6,697	6,474
Flat griddles	322.1	244.8	1,765	1,341
Clamshell griddles	21.3	18.0	117	99
Deep-fat fryers	–	–	–	–
Totals:	**1,743.1**	**1,616.4**	**9,551**	**8,857**

3.3.2.2 Grain handling/processing

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

The most recent employment estimates (for the year 2013) from the US Census Bureau's County Business Patterns (CBP) were used. Table 3.3–4 shows the NAICS codes and employment estimates used to calculate emissions from grain handling and processing operations.

Table 3.3–4. County-level employment estimates for grain handling and processing operations, by NAICS code.

NAICS code	NAICS description	Estimated employment
115111	Cotton ginning	50
42399	Other miscellaneous durable goods merchant wholesalers	1,682
Total:		**1,732**

Table 3.3–5 summarizes annual and typical daily emissions from grain handling and processing operations in both Maricopa County and the PM_{10} nonattainment area.

Table 3.3–5. Annual and typical daily emissions from area-source grain handling and processing.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	178.2	19.0	1,037	1,033
PM_{10} nonattainment area	177.6	18.9	135	134

3.3.2.3 Ammonia cold storage

Area-source emissions from ammonia cold storage are estimates of ammonia emissions from food and kindred products industrial sources that use ammonia for refrigeration of food products. Emission calculations are based on the number of employees in the food and kindred products industry classification (NAICS codes 311, 312) as reported by the 2013 County Business Patterns (US Census Bureau, 2013). Annual emissions were calculated by multiplying employment numbers by the emission factor for ammonia cold storage as listed in Table 6-5 of "Development and Selection of Ammonia Emission Factors" (Battye et al., 1994).

Typical daily emissions were calculated by dividing annual emissions by the number of days per year that activity occurred. Annual and typical daily emissions for the PM_{10} nonattainment area were calculated by multiplying Maricopa County emissions by the ratio of industrial employment in the County to the PM_{10} nonattainment area. See Section 1.5.1 for a discussion of employment data used. Results are shown in Table 3.3–6.

Table 3.3–6. Annual and typical daily ammonia emissions from cold storage.

Geographic area	Annual emissions (tons/yr)	Typical daily emissions (lbs/day)
Maricopa County	1,973.3	12,649
PM_{10} nonattainment area	1,966.2	12,604

3.3.3 Secondary metal production

Annual emissions from secondary metal production facilities were derived from annual emissions reports from permitted sources. As this category consists primarily of foundries, it was assumed that there were no significant unpermitted sources within Maricopa County. Since all facilities considered in this section are located within the PM_{10} nonattainment area, total emission values for the county and the nonattainment area are equal. Annual and typical daily emissions are shown in Table 3.3–7.

Table 3.3–7. Annual and typical daily emissions from secondary metal production.

Geographic	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
area	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Cty	53.6	39.8	55.1	30.6	0.5	411	306	488	282	3
PM_{10} NAA	53.6	39.8	55.1	30.6	0.5	411	306	488	282	3

3.3.4 Nonmetallic mineral product manufacturing

The primary contributors to this source category include concrete batch plants, ceramic clay and tile manufacturing, brick manufacturing, and gypsum mining. Emissions from this source category were derived from annual emissions reports from permitted facilities. Since all permitted facilities in this category were surveyed in 2011, it was assumed that there were no significant unpermitted sources within Maricopa County. Some portable concrete batch operations which operate within Maricopa County for only part of the year are issued air quality permits by the Arizona Department of Environmental Quality (ADEQ). Emissions from these state-permitted portable sources are addressed in Section 3.3.12, "Industrial processes not elsewhere classified".

Typical daily emissions were calculated based on the operating schedule data reported by surveyed facilities. County-permitted portable sources with no location data were assumed to operate within the PM_{10} nonattainment area as a conservative estimate. Since all facilities considered in this section were located within the PM_{10} nonattainment area, total emission values for the county and the nonattainment area are equal. Table 3.3–8 summarizes annual and typical daily emissions from nonmetallic mineral product manufacturing activities.

Table 3.3–8. Annual and typical daily emissions from area-source nonmetallic mineral product manufacturing.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Maricopa County	43.4	18.2	325	134
PM_{10} nonattainment area	43.4	18.2	325	134

3.3.5 Mining and quarrying

Annual emissions from area-source mining and quarrying operations were derived from annual emission reports submitted by permitted sources. It was assumed that there were no significant unpermitted sources within Maricopa County. Those portable mining and quarrying operations which operate within Maricopa County for only part of the year are issued air quality permits by the Arizona Department of Environmental Quality (ADEQ). Emissions from these state-permitted portable sources are addressed in Section 3.3.12, Industrial Processes not elsewhere classified).

Typical daily emissions were calculated based on reported activity data (days per week) for each individual process, and then summed. Nearly all processes reported operating on either a 5- or 6-day week. Emissions within the PM_{10} nonattainment area were identified using information on the location of each permitted facility. County-permitted portable sources with no location data were assumed to operate within the PM_{10} nonattainment area as a conservative estimate. Annual and daily emissions are shown in Table 3.3–9.

Table 3.3–9. Annual and typical daily emissions from area-source mining and quarrying operations.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	66.8	14.9	464	102
PM_{10} nonattainment area	53.7	11.5	371	78

3.3.6 Wood product manufacturing

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

The most recent data from the US Census Bureau's County Business Patterns (CBP) for 2013 employment were used. Table 3.3–10 shows the NAICS codes and employment data used to calculate emissions from wood product manufacturing.

Table 3.3–10. County-level employment estimates for wood product manufacturing, by NAICS code.

NAICS code	NAICS description	Estimated employment
321	Wood products manufacturing	3,267
337	Furniture and related products manufacturing	4,105
Total:		**7,372**

Some facilities in this category are considered point sources and have been addressed in Chapter 2. To avoid double-counting, employment at point sources is subtracted from total employment.

Typical daily emissions were calculated in the same method as annual emissions, only using surveyed daily emissions instead of annual totals. Annual and typical daily emissions for the PM_{10} nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage of industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used. Table 3.3–11 summarizes annual and typical daily emissions from wood products manufacturing in both Maricopa County and the PM_{10} nonattainment area.

Table 3.3–11. Annual and typical daily emissions from area-source wood products manufacturing.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	24.3	23.1	180	172
PM_{10} nonattainment area	24.2	23.0	179	171

3.3.7 Rubber/plastics product manufacturing

Emissions from area-source rubber and plastic manufacturing facilities were calculated by the "scaling up" method as described in EPA emission inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2013) to develop a per-employee emission factor that is then used to estimate emissions from all sources in an industry category. The most recent data from the US Census Bureau's County Business Patterns (CBP) for 2013 employment were used. Where CBP employment estimates were presented as a range, the midpoint values were chosen for these calculations. Table 3.3–12 shows the NAICS codes and employment data used to calculate emissions from rubber and plastic manufacturing facilities.

Table 3.3–12. County-level employment estimates for rubber and plastic product manufacturing, by NAICS code.

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

Some facilities in this category are considered point sources and have been addressed in Chapter 2. To avoid double-counting, employment at point sources is subtracted from total employment.

Daily emissions are calculated in the same method as annual emissions, only using surveyed daily emissions instead of annual totals. Annual and typical daily emissions for the PM_{10} nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage of industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used. Table 3.3–13 summarizes annual and typical daily emissions from rubber/plastic products manufacturing in both Maricopa County and the PM_{10} nonattainment area.

Table 3.3–13. Annual and typical daily emissions from area-source rubber/plastic product manufacturing.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	95.8	80.2	702	614
PM_{10} nonattainment area	95.5	79.9	699	612

3.3.8 Fabricated metal products manufacturing

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

The most recent data from the US Census Bureau's County Business Patterns (CBP) for 2013 employment were used. CBP employment data for NAICS code 332 (fabricated metal products manufacturing) indicated that there were 14,662 employees in this industry in Maricopa County. Since there were no point sources in this category, an area-source employment estimate of 14,662 was used to "scale up" emissions reported from those facilities surveyed in 2014.

Typical daily emissions are calculated in the same method as annual emissions, only using surveyed daily emissions instead of annual totals. Annual and typical daily emissions for the PM_{10} nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage of industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used. Table 3.3–14 summarizes annual and typical daily emissions from fabricated metal products manufacturing in both Maricopa County and the PM_{10} nonattainment area.

Table 3.3–14. Annual and typical daily emissions from area-source fabricated metal products manufacturing.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	14.0	12.9	100	92
PM_{10} nonattainment area	13.9	12.9	99	92

3.3.9 Construction

Maricopa County's air quality permits database was used to identify all dust control permits issued during 2014. A total of 3,046 permits were issued, comprising a total of 28,872 acres (Table 3.3–15). Data requested on each dust control permit application includes the project type and acreage. It was assumed there is no unpermitted earthmoving activity.

Table 3.3–15. Maricopa County dust control permits issued in 2014, by permit type.

Project type	Reported acreage
Residential (single- and multi-family)	15,316
Commercial/ Industrial	9,539
Road construction	2,160
Trenching	11
Demolition	1,204
Site preparation/land development	622
Temporary storage yard	20
Total:	**28,872**

The Western Regional Air Partnership (WRAP) Fugitive Dust Handbook (WRAP, 2006a) provides different emission factors for residential (single-family houses and apartment buildings), nonresidential, road, and general construction. MCAQD used the WRAP-recommended emission factors except for the following activities:

- The WRAP Fugitive Dust Handbook recommended using 0.42 ton PM_{10}/acre-month for road construction to account for the large amount of dirt moved during the construction of roadways. However, both the (California) South Coast Air Quality Management District (SCAQMD) and the Clark County (Nevada) Department of Air Quality and Environmental Management have estimated that a certain percentage of their road construction projects do not involve large-scale earthmoving activities, and thus have developed average emission factors for road construction projects (0.1895 ton PM_{10}/acre-month and 0.265 ton PM_{10}/acre-month, respectively).
- Since Maricopa County and Clark County have similar population growth rates, climatic conditions, and PM_{10} sources, MCAQD used the Clark County road construction emission factor of 0.265 tons/acre-month to estimate emissions from road construction projects (Clark County, 2001).

Specific emission factors were not available in the WRAP Fugitive Dust Handbook for trenching, demolition, or temporary storage yard activities; thus, the general construction emission factor of 0.11 tons PM_{10}/acre-month was used to estimate emissions from these activities.

Information was not readily available regarding the breakout of residential construction activity between single-family and multi-family residential construction; thus, acreage for residential construction was allocated based on single-family and multi-family household percentages (See Section 1.5.1 for single-family and multi-family household percentages used).

Estimates for the duration of house and apartment construction were obtained from EIIP guidance (US EPA, 2002), while estimates for the duration of nonresidential construction and road construction were obtained from the WRAP Fugitive Dust Handbook (WRAP, 2006a). No estimates for a 'typical' duration for trenching, demolition, site prep/land development, or temporary storage yard activities were available. Thus MCAQD made the following assumptions:

- 1-month duration for trenching and demolition.
- 8-month duration for site prep/land development activities (weighted average of residential and commercial duration) as the actual duration depends on the project type and size.
- 12-month duration for temporary storage yard activities, since these activities are frequently associated with road construction.

The average duration of construction activity and emission factors for each project type are shown below in Table 3.3–16.

Table 3.3–16. Average duration of construction projects and emission factor, by project type.

Activity type	Average duration (months)	Emission factor (tons PM_{10}/acre-month)
Residential: single-family	6	0.032
Residential: multi-family	12	0.11
Commercial	11	0.19
Road construction	12	0.265
Trenching	1	0.11
Demolition	1	0.11
Weed control	1	0.11
Site preparation/land development	8	0.11
Temporary storage yard	12	0.11

County-wide annual **uncontrolled** PM_{10} emissions for each construction category were then calculated as follows:

Annual uncontrolled PM_{10} emissions = total acres/yr × no. months × emission factor

As in prior periodic emissions inventories, a control efficiency of 90% for watering was applied to the uncontrolled emissions calculations. This control efficiency is consistent with similar values that have been applied in a number of earlier SIP documents for both Maricopa County as well as Clark County (Nevada), including:

- Revised MAG 1999 Serious Area Particulate Plan for PM_{10} (Appendices volume two, page V-9, and vol. four), Feb. 2000.

- Revised MAG 1999 Serious Area Particulate Plan for PM_{10}, (Appendix C, Exhibit 3: Evaluation for Compliance with 24-Hour PM_{10} Standard for West Chandler and Gilbert Microscale Sites, Arizona Department of Environmental Quality, June 1999, pp. 3-5 and 3-9), Feb. 2000.
- "Evaluation of Fugitive Dust Control in the Maricopa Co. PM_{10} Nonattainment Area", report by ENSR in: Final Plan for Attainment of the 24-hour PM_{10} Standard, ADEQ, May 1997, Appendix B.
- Clark Co. PM_{10} State Implementation Plan, June 2001, pg. L-5. (This document assumes an 87% emission reduction percentage for watering at construction activities.)

A 2014 rule effectiveness study by Maricopa County (described more fully in Appendix B) estimated a 90.94% compliance rate with Maricopa County Rule 310 on dust control at construction sites. Thus, an overall control effectiveness of 81.8% (= 90% × 90.9%) was applied for all Maricopa County construction activity. Controlled PM_{10} emissions were calculated as follows:

Annual **controlled** PM_{10} emissions = Annual **uncontrolled** PM_{10} emissions × [1 – (control efficiency × rule effectiveness)]

$PM_{2.5}$ emissions were estimated to comprise 10% of PM_{10} emissions (WRAP, 2006a). Table 3.3–17 summarizes the calculations for each dust control permit category.

Table 3.3–17. Annual emissions (tons/yr) from construction activity in Maricopa County.

Activity type	Total acre-months	Emission factor (tons/acre-month)	Annual PM_{10} emissions	Annual $PM_{2.5}$ emissions
Residential: single-family	68,923	0.032	400.4	40.0
Residential: multi-unit	45,949	0.11	917.6	91.8
Commercial	104,932	0.19	3,619.4	361.9
Road construction	25,920	0.265	1,247.0	124.7
Trenching	11	0.11	0.2	0.0
Demolition	1,204	0.11	24.0	2.4
Site preparation/land development	4,972	0.11	99.3	9.9
Temporary storage yard	236	0.11	4.7	0.5
Totals:			**6,312.6**	**631.3**

Dust control permit site location data were used to determine construction activity that occurred in the Maricopa County PM_{10} nonattainment area. The same average duration of construction activity and emission factors used to estimate Maricopa County emissions (see Table 3.3–18) were applied to construction activity in the Maricopa County PM_{10} nonattainment area. Table 3.3–18 summarizes Maricopa County PM_{10} nonattainment area construction activity and calculations for each project type.

Table 3.3–18. Annual emissions from construction within the Maricopa County portion of the PM_{10} nonattainment area, by project type.

Activity type	Total acre-months	Emission factor (tons/acre-month)	Controlled PM_{10}	Controlled $PM_{2.5}$
Residential: single-family	64,438	0.032	374.3	37.4
Residential: multi-unit	42,956	0.11	857.8	85.8
Commercial	81,851	0.19	2,823.2	282.3
Road construction	19,258	0.265	926.4	92.6
Trenching	11	0.11	0.2	0.0
Demolition	1,202	0.11	24.0	2.4
Site prep/land development	4,953	0.11	98.9	9.9
Temporary storage yard	31	0.11	0.6	0.1
Totals:			**5,105.5**	**510.6**

In addition, the Pinal County Air Quality Department (PCAQD) provided construction emission estimates for the Pinal County portion of the PM_{10} nonattainment area. The PCAQD estimates (presented in Table 3.3–19 below) incorporated the same assumptions concerning relevant input variables such as the average duration of construction activity, emission factors and control efficiency. PCAQD assumed an 83% rule effectiveness.

Table 3.3–19. Annual and typical daily emissions from construction activity in the Pinal County portion of the PM_{10} nonattainment area.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Project type	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Residential: single-family	1.5	0.2	10	1
Residential: multi-family	0.0	0.0	0	0
Commercial	35.1	3.5	225	22
Road construction	0.0	0.0	0	0
Trenching	0.0	0.0	0	0
Temporary storage yard	0.0	0.0	0	0
Totals:	**36.6**	**3.7**	**234**	**23**

To calculate typical daily emissions from construction activity, it was assumed that construction activity typically occurs 6 days per week and remains relatively even throughout the year. Thus, typical daily emissions were calculated by dividing annual emissions for each category were divided by 312 (= 6 days/week × 52 weeks/yr) to derive the daily emissions estimates shown in Table 3.3–20.

Table 3.3–20. Annual and typical daily emissions from construction activity in Maricopa County and the PM_{10} nonattainment area.

	Maricopa County				PM_{10} NAA			
	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)		Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Activity type	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Residential	1,318.0	131.8	8,448	845	1,233.6	123.4	7,908	791
Commercial	3,619.4	361.9	23,201	2,320	2,858.3	285.8	18,322	1,832
Road	1,247.0	124.7	7,993	799	926.4	92.6	5,939	594
All other*	128.3	12.8	822	82	123.8	12.4	793	79
Totals:	**6,312.6**	**631.3**	**40,465**	**4,047**	**5,142.1**	**514.2**	**32,962**	**3,296**

*Includes: trenching, demolition, site prep/land development, and temporary storage yards.

3.3.10 Electrical equipment manufacturing

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

As all facilities addressed in this source category are located within the PM_{10} nonattainment area, emission totals for both areas are equal. Annual and typical daily emissions are shown in Table 3.3–21.

Table 3.3–21. Annual and typical daily emissions from area-source electric equipment manufacturing.

Geographic	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Maricopa Cty	26.0	18.5	24.3	0.6	14.3	144	102	135	3	79
PM_{10} NAA	26.0	18.5	24.3	0.6	14.3	144	102	135	3	79

3.3.11 Paved/unpaved road travel on industrial sites

This section addresses emissions from travel on paved and unpaved roads within the boundaries of a permitted facility. Emissions from motor vehicle travel on public and private roads is addressed in Chapter 5, Mobile Sources, and road travel emissions from facilities considered point sources are addressed in Chapter 2, Point Sources. PM_{10} emissions from this source category were derived from annual emissions reports from permitted sources, using AP-42 equations based on vehicle size and average speed (US EPA, 1997; 1998). It is assumed that there are no unpermitted sources with significant emissions from on-site road travel.

$PM_{2.5}$ emissions were calculated from PM_{10} using a ratio derived from California Air Resources Board's (CARB) $PM_{2.5}$ Fraction Table (CARB, 2006).

Typical daily emissions were calculated using operating schedule information for each reported process (normally a 5- or 6-day week), which were then summed to provide total daily emissions

for the county. Emissions totals for the PM_{10} nonattainment area were determined from the site locations of each facility. Results are shown in Table 3.3–22.

Table 3.3–22. Annual and typical daily emissions from paved and unpaved road travel at industrial facilities.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	205.0	87.3	1,476	587
PM_{10} nonattainment area	131.8	29.4	1,000	215

3.3.12 Industrial processes not elsewhere classified

Annual area-source emissions from other industrial processes not elsewhere classified (NEC) were derived primarily from annual emissions reports from permitted facilities. Other industrial processes include a wide array of industrial activities that are often specific to the permitted facility that reported the process. For this reason, it is assumed there are no significant emissions from other industrial processes, other than those reported by permitted facilities on their annual emissions reports. Typical daily emissions were calculated based on operating schedule information provided by individual facilities through MCAQD's annual emissions reporting program. Emissions estimates for the PM_{10} nonattainment area were derived using data on the location of the facilities that report other industrial processes.

In addition, emissions from ADEQ-permitted sources are included in this category due to a lack of specificity regarding the nature of the reported emissions. As a conservative estimate, all of these emissions are assumed to occur within the PM_{10} nonattainment area. Estimates of total emissions from this source category are presented in Table 3.3–23.

Table 3.3–23. Annual and typical daily emissions from industrial processes not elsewhere classified.

Geographic	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Maricopa Cty	245.7	112.0	452.2	7.9	7.6	1,387	631	2,478	43	44
PM_{10} NAA	159.9	55.7	449.7	7.7	4.8	915	322	2,464	42	28

3.4 Waste treatment and disposal

3.4.1 On-site incineration

This section includes emissions from on-site industrial incinerators, primarily burn-off ovens used to reclaim electric wire or other materials. Emissions from human and animal crematories are addressed in Section 3.5.7.

Historically, emissions from on-site incinerator were determined from annual emissions inventory reports. It was assumed that all incinerators were surveyed and emissions accounted for, since all permitted incinerators received surveys in 2011. Not all incinerators were sampled

for the 2014 annual emissions inventory. As such, data from the 2011 Periodic Emissions Inventory for PM_{10} (MCAQD, 2014) were grown to 2014 based on industrial employment.

Annual and typical daily emissions estimates for the PM_{10} nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage industrial employment within the nonattainment area. See Section 1.5.1 for a discussion of the employment data used. Results are shown in Table 3.4–1.

Table 3.4–1. Annual and typical daily emissions from on-site incineration.

Geographic area	Annual emissions (tons/yr)				Typical daily emissions (lbs/day)			
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	PM_{10}	$PM_{2.5}$	NO_x	SO_x
Maricopa Cty	0.6	0.4	3.0	0.9	4	2	19	6
PM_{10} NAA	0.6	0.4	2.9	0.9	4	2	19	6

3.4.2 Open burning

Emissions from controlled open burning are regulated by Maricopa County Rule 314 (Open Outdoor Fires and Indoor Fireplaces at Commercial and Institutional Establishments), which requires a burn permit for open burning in Maricopa County. Burn permits are issued primarily for purposes of agricultural ditch bank and fence row burning, tumbleweed burning, land clearance, and firefighting training. MCAQD's burn permit data base was used to identify all burn permits issued in 2014. A total of 43 open burn permits were issued during the year. The quantity and reported activity for the open burn permits (except for firefighting burn permits) are shown in Table 3.4–2.

Table 3.4–2. Maricopa County burn permit activity during 2014.

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

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

To estimate typical daily emissions, it was assumed that activity in all categories listed above normally occurs, on average, 5 days per week. Thus, typical daily emissions were calculated by dividing total annual emissions by 260 (=5 days/week × 52 weeks/year).

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

Annual and daily emissions for the PM_{10} nonattainment area were calculated by applying ratios of various land-use types located in the nonattainment area to County-level emissions estimates. See Section 1.5.2 for a discussion of the land-use data used. Table 3.4–3 summarizes annual and typical daily emissions from open burning, for both Maricopa County and the PM_{10} nonattainment area.

Table 3.4–3. Annual and typical daily emissions from open burning.

	Annual emissions (tons/yr)			Typical daily emissions (lbs/day)		
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**
Maricopa County	30.4	30.4	8.1	234	234	62
PM_{10} nonattainment area	9.9	9.9	2.6	76	76	20

3.4.3 Landfills

Emissions from municipal solid waste (MSW) landfills come from uncontrolled landfill gas emissions as well as from cover operations and combustion from control measures, such as a flare. Total emissions were calculated from annual emissions inventory reports from all landfills located within the county; results are shown in Table 3.4–4 below. Butterfield Station Facility, Glendale Municipal Sanitary Landfill and Northwest Regional Landfill were considered as point sources; all other MSW landfills are reported here as an area-source category.

Geographic data on the location of each landfill was used to identify whether each landfill was located inside or outside of the nonattainment area. Annual and typical daily emissions for Maricopa County and the nonattainment area are summarized in Table 3.4–4.

Table 3.4–4. Annual and typical daily emissions from landfills.

	Annual emissions (tons/yr)				Typical daily emissions (lbs/day)			
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**
Maricopa County	67.5	65.5	9.9	6.6	377	365	54	36
PM_{10} nonattainment area	46.8	45.5	5.2	3.2	260	253	29	17

3.4.4 Publicly owned treatment works

Annual emissions from publicly owned treatment works (POTWs) within Maricopa County were obtained from the US Environmental Protection Agency's 2014 National Emission Inventory (US EPA, 2012c). US EPA estimated that 11.7 tons of ammonia was emitted from POTWs in Maricopa County in 2014. There were no point sources in this category that needed to be subtracted.

Typical daily emissions were calculated by dividing annual emissions by 365 days, as activity is assumed to occur uniformly throughout the year. Annual and typical daily emissions for the PM_{10} nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage of total population in the nonattainment area to the total population in the county (100.31%). See Section 1.5.1 for a discussion of the population data used. The resulting emissions estimates are presented in Table 3.4–5 below.

Table 3.4–5. Annual and typical daily NH_3 emissions from publicly-owned treatment works.

Geographic area	Annual NH_3 emissions (tons/yr)	Typical daily NH_3 emissions (lbs/day)
Maricopa County	11.7	64
PM_{10} nonattainment area	11.7	64

3.4.5 Other waste

Annual area-source emissions from other industrial waste disposal were derived from annual emissions reports from permitted facilities. Other industrial waste disposal processes include a wide array of industrial activities that are often specific to the permitted facility that reported the process. For this reason, it is assumed there are no significant emissions from this category, other than those reported by permitted facilities on their annual emissions reports. Typical daily emissions were calculated based on operating schedule information provided by the facilities in their annual emissions report. Annual and typical daily emissions for the PM_{10} nonattainment area were derived based on the location data of the individual facilities. Emission estimates are shown in Table 3.4–6 below.

Table 3.4–6. Annual and typical daily emissions from other industrial waste disposal.

	Annual emissions (tons/yr)				Typical daily emissions (lbs/day)			
Geographic area	PM_{10}	$PM_{2.5}$	NO_x	SO_x	PM_{10}	$PM_{2.5}$	NO_x	SO_x
Maricopa County	23.0	11.1	20.6	51.4	161	75	113	282
PM_{10} nonattainment area	12.4	9.5	20.5	50.5	81	62	113	277

3.5 Miscellaneous area sources

3.5.1 Windblown dust

Estimates of PM_{10} and $PM_{2.5}$ emissions from windblown dust are developed using the supply-limited windblown dust emission scheme described in detail in Appendix 4 of the *2008 PM_{10} Periodic Emissions Inventories for the Maricopa County, Arizona, Nonattainment Area* (MCAQD, 2011). Updates to the methodology developed for the 2008 inventory include the use of 2014 land-use data, 2014 rule effectiveness rates, 2014 meteorological data, and 2014 PM_{10} concentration data.

The land-use categories that are capable of producing windblown dust in Maricopa County and the PM_{10} nonattainment area were defined in the *2011 PM_{10} Periodic Emissions Inventories for the Maricopa County, Arizona, Nonattainment Area* (MCAQD, 2014). Table 3.5–1 contains the amount of acreage in each land-use category capable of producing windblown dust within Maricopa County and the nonattainment area and Figure 3.5–1 displays the location of these land-use categories.

Table 3.5–1. Total acreage capable of producing windblown dust, within Maricopa County and the PM_{10} nonattainment area, by land-use category.

Land-use category	Maricopa County acreage	PM_{10} nonattainment area acreage
Agriculture	268,491	115,244
Commercial	18,972	17,947
Developing	18,508	16,405
Industrial	32,622	32,419
Public/Military	37,784	26,705
Sand & Gravel/Mining	12,402	10,534
Vacant and Open Areas	3,899,581	794,087

Based upon a matched-pairs comparison of wind speed and PM_{10} concentration data, a five-minute average wind speed of 12 mph has been established as the threshold when windblown dust emissions are created from both the stable and disturbed portions of each land-use category. Vertical flux PM_{10} emission factors for the stable and disturbed portions of each land-use category have been developed for five-minute average wind speed bins. The vertical flux emission factors are primarily based upon wind tunnel testing performed in southern Arizona with additional input from, and consideration of, wind tunnel tests in the areas around Barstow, California and Las Vegas, Nevada.

The amount of stable and disturbed land in each land-use category is determined through the use of rule effectiveness (RE) rates (e.g., a RE rate of 90% would assume 90% of the land is stabilized and 10% is disturbed). RE rates calculated from 2014 activity are used for most land-use categories whenever available. As RE rates for agricultural land have not been updated, the rates developed for the MAG 2012 Five Percent Plan (MAG, 2012) are assumed to represent 2014 conditions on agricultural land. Table 3.5–2 contains the PM_{10} vertical flux emission factors for the stable and disturbed portions of each land-use category, by wind speed bin.

Figure 3.5–1. Location of land-use categories within Maricopa County capable of producing windblown dust.

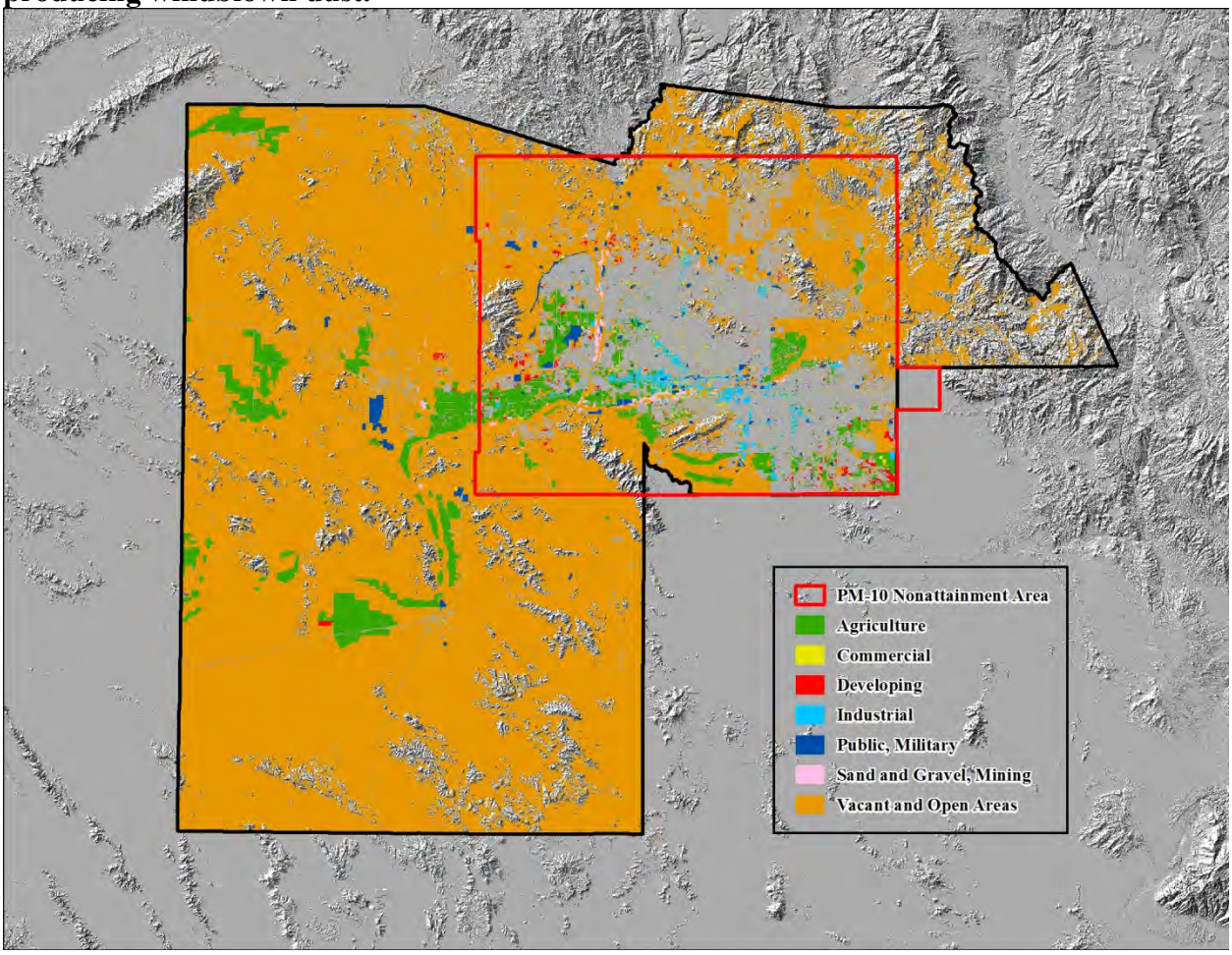

Table 3.5–2. Vertical flux PM_{10} emission factors for the stable and disturbed portions of each land-use category, by wind speed bin.

Land-use category	Percent of total land-use category	PM_{10} emission factor (tons/acre-5-minute) by wind speed bin (mph)				
		12–15	15–20	20–25	25–30	30–35
Active agriculture (crop activity present)	NA	NA – Calculated under different methodology				
Inactive agriculture – Stable	85%	1.10×10^{-5}	2.93×10^{-5}	7.68×10^{-5}	1.64×10^{-4}	3.10×10^{-4}
Inactive agriculture – Disturbed	15%	5.44×10^{-5}	1.69×10^{-4}	5.14×10^{-4}	1.24×10^{-3}	2.57×10^{-3}
Commercial – Stable	97%	1.10×10^{-5}	2.93×10^{-5}	7.68×10^{-5}	1.64×10^{-4}	3.10×10^{-4}
Commercial – Disturbed	3%	5.44×10^{-5}	1.69×10^{-4}	5.14×10^{-4}	1.24×10^{-3}	2.57×10^{-3}
Developing – Stable	91%	1.10×10^{-5}	2.93×10^{-5}	7.68×10^{-5}	1.64×10^{-4}	3.10×10^{-4}
Developing – Disturbed	9%	5.44×10^{-5}	1.69×10^{-4}	5.14×10^{-4}	1.24×10^{-3}	2.57×10^{-3}
Industrial – Stable	97%	1.10×10^{-5}	2.93×10^{-5}	7.68×10^{-5}	1.64×10^{-4}	3.10×10^{-4}
Industrial – Disturbed	3%	5.44×10^{-5}	1.69×10^{-4}	5.14×10^{-4}	1.24×10^{-3}	2.57×10^{-3}
Public/military – Stable	97%	1.10×10^{-5}	2.93×10^{-5}	7.68×10^{-5}	1.64×10^{-4}	3.10×10^{-4}
Public/military – Disturbed	3%	5.44×10^{-5}	1.69×10^{-4}	5.14×10^{-4}	1.24×10^{-3}	2.57×10^{-3}
Sand & gravel/Mining – Stable	81%	1.10×10^{-5}	2.93×10^{-5}	7.68×10^{-5}	1.64×10^{-4}	3.10×10^{-4}
Sand & gravel/Mining – Disturbed	19%	5.44×10^{-5}	1.69×10^{-4}	5.14×10^{-4}	1.24×10^{-3}	2.57×10^{-3}
Vacant and open areas – Stable	97%	1.10×10^{-5}	2.93×10^{-5}	7.68×10^{-5}	1.64×10^{-4}	3.10×10^{-4}
Vacant and open areas – Disturbed	3%	5.44×10^{-5}	1.69×10^{-4}	5.14×10^{-4}	1.24×10^{-3}	2.57×10^{-3}

Annual 2014 wind speed data from 37 meteorological stations are used to produce wind speed counts for grouping into five-minute average wind speed bins. Where necessary, wind speeds are adjusted to account for differences in heights between anemometers, grown to replace missing values, and interpolated to produce five-minute averages. Table 3.5–3 lists the resulting counts of five-minute average wind speeds for all meteorological stations in 2014.

Table 3.5–3. Annual 2014 counts of hourly average wind speeds and actual/interpolated five-minute average wind speeds, by meteorological station and wind speed bin.

Meteorological Station	Count of hourly average wind speeds >12 mph	Count of hourly average wind speeds >15 mph	Count of hourly average wind speeds >18 mph	Count of five-minute average wind speeds, by wind speed bin*				
				12–15 mph	15–20 mph	20–25 mph	25–30 mph	30–35 mph
ADEQ Ajo	359	70	10	3,334	981	82	12	2
ADEQ Queen Valley	912	392	155	7,821	4,960	1,030	188	32
ADEQ Super Site	5	0	0	462	116	17	2	0
AZMET Aguila	602	255	102	5,306	3,267	684	130	22
AZMET Buckeye	336	111	27	3,147	1,487	193	34	6
AZMET Desert Ridge	200	44	7	2,044	659	63	12	2
AZMET Harquahala	481	225	91	4,324	2,896	612	113	20
AZMET Maricopa	346	111	42	3,228	1,487	291	41	7
AZMET Mesa	39	2	0	738	140	17	2	0
AZMET Paloma	468	187	64	4,218	2,426	435	72	13
AZMET Phoenix Encanto	46	10	1	794	239	23	2	0
AZMET Phoenix Greenway	43	7	2	770	202	30	7	1
AZMET Queen Creek	341	125	48	3,188	1660	331	46	8
MCAQD Blue Point	92	23	6	1,373	461	71	12	1
MCAQD Buckeye	169	50	13	1,676	766	136	16	2
MCAQD Cave Creek	142	36	16	1,749	655	92	5	0
MCAQD Central Phoenix	83	14	5	1,371	339	40	5	3
MCAQD Deer Valley	215	74	19	2,069	1,143	142	25	3
MCAQD Durango Complex	93	22	2	1,280	446	41	2	6
MCAQD Dysart	146	43	5	1,757	695	39	0	0
MCAQD Falcon Field	185	50	17	1,856	727	156	50	0
MCAQD Glendale	157	28	6	2,192	544	72	8	1
MCAQD Greenwood	26	3	1	527	72	11	3	0
MCAQD Higley	67	18	2	916	298	57	8	4
MCAQD Mesa	27	3	1	533	127	21	1	0
MCAQD North Phoenix	13	2	0	348	59	12	0	0
MCAQD Pinnacle Peak	187	34	2	2,481	550	18	2	0
MCAQD South Phoenix	17	5	1	341	104	12	1	0
MCAQD South Scottsdale	22	6	2	490	112	18	5	0
MCAQD Tempe	2	0	0	62	20	1	0	0
MCAQD West 43rd Avenue	214	46	14	2,482	880	114	10	4
MCAQD West Chandler	65	12	1	954	282	42	11	4
MCAQD West Phoenix	58	10	1	940	185	15	2	1
MCAQD Zuni Hills	418	163	36	3,675	2,193	256	6	0
PCAQCD Apache Junction	201	70	18	1,940	873	126	21	0
PCAQCD Cowtown	373	136	43	3,012	1,547	287	49	15
PCAQCD Stanfield	163	39	7	1,538	646	56	4	1

**Shaded cells denote interpolated values.*

Geographic information system (GIS) analysis was used to assign the five-minute average wind speed counts in Table 3.5–3 to individual parcels within the land-use categories listed in Table

3.5–1. "Pre-standardized" emissions[1] are then calculated for those windblown dust-producing parcels using the emission factors in Table 3.5–2, with the exception of parcels in the "Active agricultural" land-use category (i.e., fields growing crops, neither fallow or abandoned). Windblown dust from active agricultural lands is calculated using a U.S. Department of Agriculture (USDA) soil erodibility formula (in US EPA, 1974). Annual 2014 harvested acres by crop type (cf. Section 3.5.2) serve as a surrogate for determining the amount of acres in the active agricultural land-use category within Maricopa County. The USDA formula is applied to the acreage in each crop type to generate annual 2014 windblown dust emissions. A control factor is applied to the USDA-generated emissions to account for the benefits of Arizona's Agricultural Best Management Practices (AgBMP) program.

To account for the dust-mitigating effects of precipitation, pre-standardized emissions have been reduced by 6.03% (as there were 22 days of precipitation in 2014 in Maricopa County). Annual 2014 pre-standardized PM_{10} windblown dust emissions from all applicable land-use categories are listed in Table 3.5–4 for Maricopa County and the PM_{10} nonattainment area.

Table 3.5–4. Pre-standardized PM_{10} emissions from windblown dust in Maricopa County and the PM_{10} nonattainment area.

	Annual PM_{10} emissions (tons/yr)	
Land-use category	**Maricopa County**	**PM_{10} nonattainment area**
Active agriculture	3,149.4	1,348.6
Inactive agriculture	15,189.0	2,673.7
Commercial	245.8	206.2
Developing	1,866.0	1,512.8
Industrial	290.3	281.5
Public/military	908.7	474.2
Sand & gravel/Mining	1,470.4	1,100.1
Vacant and open areas	523,770.0	51,136.3
Totals:	**546,889.5**	**58,733.3**

Pre-standardized windblown dust emission estimates are the product of maximum windblown dust emission rates. These pre-standardized emissions are based upon wind tunnel-produced vertical flux emission factors that do not incorporate many of the supply limitations to windblown dust production that exist in Maricopa County, and thus over-estimate windblown dust emissions. Correction for this bias in the pre-standardized emissions is accomplished through a sensitivity analysis that utilizes the percentage of 2014 monitored PM_{10} concentrations under high wind conditions to scale pre-standardized emissions. Table 3.5–5 shows the percentages of 2014 PM_{10} concentrations associated with five-minute average wind speeds greater than or equal to 12 mph at the 15 monitors in Maricopa County that simultaneously record five-minute average wind speed and PM_{10} concentration.

[1] Pre-standardized emissions are windblown dust emissions that have not been adjusted to scale with observed ratios of PM_{10} monitoring concentrations under high wind conditions. See Appendix 4 of the 2008 PM_{10} Periodic Emissions Inventory (MCAQD, 2011) for an expanded explanation of pre-standardized emissions.

Table 3.5–5. Percentages of 2014 PM_{10} concentrations associated with five-minute average wind speeds greater than or equal to 12 mph at 15 Maricopa County monitors.

Monitoring Station	Sum of 5-min PM_{10} concentrations when 5-min winds ≥ 12mph ($\mu g/m^3$)	Sum of all 5-min PM_{10} concentrations ($\mu g/m^3$)	Percent PM_{10} concentrations associated with 5-min winds ≥ 12 mph
Buckeye	321,551	4,675,879	6.88%
Central Phoenix	188,488	3,392,297	5.56%
Durango Complex	260,470	4,486,692	5.81%
Dysart	138,957	2,885,002	4.82%
Glendale	178,596	2,927,244	6.10%
Greenwood	146,975	4,691,387	3.13%
Higley	251,271	3,247,617	7.74%
Mesa	114,263	3,235,455	3.53%
South Phoenix	146,575	4,330,091	3.39%
South Scottsdale	121,395	3,330,811	3.64%
Tempe	59,346	3,082,562	1.93%
West 43rd Avenue	349,992	4,887,079	7.16%
West Chandler	239,913	3,170,092	7.57%
West Phoenix	167,712	4,132,270	4.06%
Zuni Hills	226,911	2,243,232	10.12%
All Monitors:	**2,912,415**	**54,717,710**	**5.32%**

Table 3.5–5 shows that as a weighted average of the monitoring stations, about 5% of PM_{10} concentrations are associated with five-minute average wind speeds greater than or equal to 12 mph. As such, pre-standardized emission estimates are scaled to represent 5% of the total annual 2014 emissions inventory for PM_{10} for Maricopa County and the nonattainment area. Annual 2014 PM_{10} emissions from sources other than windblown dust total 54,886.42 tons for Maricopa County and 33,253.81 tons for the PM_{10} nonattainment area. After applying this scaling technique, PM_{10} emissions from windblown dust for Maricopa County and the nonattainment area are standardized to 2,888.76 and 1,750.20 tons, respectively.[2]

Standardized estimates of annual and daily PM_{10} and $PM_{2.5}$ emissions from windblown dust for Maricopa County and the PM_{10} nonattainment area are shown in Tables 3.5–6 and 3.5–7. Daily emissions are obtained by dividing annual emissions by 365, the number of days in calendar year 2014. As per WRAP guidance, $PM_{2.5}$ emissions are assumed to be 15% of PM_{10} emissions (WGA, 2006).

[2] (54,886.42 tons ÷ (1 – 5%)) – 54,886.42 = 2,888.76 tons; (33,253.81 ÷ (1 – 5%)) – 33,253.81 = 1,750.20 tons.

Table 3.5–6. Annual and daily PM_{10} and $PM_{2.5}$ emissions from windblown dust in Maricopa County (standardized), by land-use category.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Land-use category	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Active agriculture	44.4	6.7	243	37
Inactive agriculture	108.9	16.3	597	90
Commercial	6.2	0.9	34	5
Developing	45.9	6.9	252	38
Industrial	8.4	1.3	46	7
Public/military	15.1	2.3	83	12
Sand and gravel/mining	33.7	5.1	184	28
Vacant and open areas	2,626.2	393.9	14,390	2,159
Totals:	**2,888.8**	**433.3**	**15,829**	**2,374**

Table 3.5–7. Annual and daily PM_{10} and $PM_{2.5}$ emissions from windblown dust in the PM_{10} nonattainment area (standardized), by land-use category.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Land-use category	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Active agriculture	40.2	6.0	220	33
Inactive agriculture	79.7	12.0	437	66
Commercial	6.1	0.9	34	5
Developing	45.1	6.8	247	37
Industrial	8.4	1.3	46	7
Public/military	14.1	2.1	77	12
Sand and gravel/mining	32.8	4.9	180	27
Vacant and open areas	1,523.8	228.6	8,350	1,252
Totals:	**1,750.2**	**262.5**	**9,590**	**1,438**

3.5.2 Agricultural activities

3.5.2.1 Cotton ginning

Annual emissions from cotton ginning were derived from annual emissions reports from all permitted cotton gins in the county. Typical daily emissions were calculated based on the operating schedule data reported by surveyed facilities. Annual and typical daily emissions for the PM_{10} nonattainment area were derived based on the location data of the individual facilities.

Table 3.5–8 summarizes annual and typical daily emissions from cotton gins in both Maricopa County and the PM_{10} nonattainment area.

Table 3.5–8. Annual and typical daily emissions from area-source cotton ginning.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	26.9	4.0	159	24
PM_{10} nonattainment area	5.3	0.8	29	4

3.5.2.2 Tilling

Tilling emissions for Maricopa County were directly taken from the county-level emission estimates prepared for use in the 2014 National Emissions Inventory (NEI) data and documentation (U.S. EPA, 2016). U.S. EPA estimated that 4,236.4 tons of PM_{10} and 847.3 tons of $PM_{2.5}$ were emitted from agricultural tillage operations in Maricopa County in 2014. The 2014 NEI used the number of acres tilled in each county by crop type and tillage type to estimate emissions. These data were obtained from the 2012 Census of Agriculture developed by the US Department of Agriculture (USDA, 2014). The 2014 NEI estimated Maricopa County emissions from tilling operations for the following crop types:

- Barley
- Beans
- Corn
- Cotton
- Cover
- Fallow
- Fall-Seeded/Winter Wheat
- Forage (Hay and Alfalfa)
- Hay
- Oats
- Permanent Pasture
- Potatoes
- Sorghum
- Spring Wheat

Annual emissions for the PM_{10} nonattainment area were calculated by multiplying Maricopa County PM_{10} annual emissions by the ratio of agricultural land acreage in the PM_{10} nonattainment area to the agricultural land acreage in Maricopa County (42.82%). See Section 1.5.2 for a discussion of the land-use data used for allocating emissions to the PM_{10} nonattainment area.

Typical daily emissions for Maricopa County and the PM_{10} nonattainment area were calculated by dividing the annual emissions by estimated days per year of tillage operation by crop. Data on the number of days of tillage operations per year were obtained from the 2011 PM_{10} Periodic Emissions Inventory (Table 3.5–12) and assuming that tillage activities occur 7 days per week during the months of tillage operations. Table 3.5–9 presents the annual and typical daily PM_{10} estimates for Maricopa County and the PM_{10} nonattainment area.

Table 3.5–9. Annual and typical daily emissions from agricultural tilling operations.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	4,236.4	847.3	62,024	12,405
PM_{10} nonattainment area	1,814.2	362.8	26,561	5,312

Annual and typical daily PM_{10} and $PM_{2.5}$ emissions, by crop type, for Maricopa County and the PM_{10} nonattainment area are shown in Tables 3.5–10 and 3.5–11, respectively. The first table also lists the number of tillage operations per year that were assigned for each crop type. Refer to Table 3.5–12 of the 2011 Periodic Emissions Inventory for PM_{10} (MCAQD, 2014) for a discussion of the tillage operations data used for Maricopa County.

Table 3.5–10. Annual and typical daily emissions from tilling operations in Maricopa County, by crop type.

Crop type	Allocated tilling operations (days/yr)	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Barley	243	325.8	65.2	2,682	536
Beans	243	14.9	3.0	122	24
Corn	152	30.4	6.1	400	80
Cotton	365	1,034.6	206.9	5,669	1,134
Cover	91	104.4	20.9	2,293	459
Fallow	91	9.6	1.9	211	42
Winter wheat	243	13.6	2.7	112	22
Forage hay/alfalfa	91	965.3	193.1	21,215	4,243
Hay	91	1,081.1	216.2	23,760	4,752
Oats	243	36.2	7.2	297	59
Permanent pasture	91	1.9	0.4	42	8
Potatoes	182	46.3	9.3	509	102
Sorghum	243	14.5	2.9	119	24
Spring wheat	243	558.1	111.6	4,593	919
Totals:		**4,236.4**	**847.3**	**62,024**	**12,405**

Table 3.5–11. Annual and typical daily emissions from tilling operations in the PM_{10} nonattainment area, by crop type.

Crop type	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Barley	139.5	27.9	1,148	230
Beans	6.4	1.3	52	10
Corn	13.0	2.6	171	34
Cotton	443.1	88.6	2,428	486
Cover	44.7	8.9	982	196
Fallow	4.1	0.8	90	18
Winter wheat	5.8	1.2	48	10
Forage hay/alfalfa	413.4	82.7	9,085	1,817
Hay	463.0	92.6	10,175	2,035
Oats	15.5	3.1	127	25
Permanent pasture	0.8	0.2	18	4
Potatoes	19.8	4.0	218	44
Sorghum	6.2	1.2	51	10
Spring wheat	239.0	47.8	1,967	393
Totals:	**1,814.2**	**362.8**	**26,561**	**5,312**

3.5.2.3 Harvesting

Harvesting emissions for Maricopa County for 2014 were estimated based on growing 2011 data sing the ratio of agricultural land area within the County and NAA, for each year. Agricultural land area data was provided by MAG and is shown in Table 3.5−12.

Table 3.5–12. Maricopa County land area growth, 2011 to 2014.

	Acreage within Maricopa County	Acreage within PM_{10} NAA
Agricultural acreage, 2011	276,016	118,568
Agricultural acreage, 2014	267,894	114,722
% change; 2011–2014	**–2.94%**	**–3.24%**

Typical daily emissions for both Maricopa County and the nonattainment area were derived by dividing annual emissions by 365, as activity was assumed to take place 7 days a week. Results are shown in Table 3.5–13.

Table 3.5–13. Annual and typical daily emissions from harvesting.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	157.2	23.6	3,811	572
PM_{10} nonattainment area	59.2	8.9	1,442	216

3.5.2.4 Travel on unpaved agricultural roads

Travel on unpaved agricultural roads emissions for Maricopa County were grown from 2011 data using the ratio of agricultural land area within the County and NAA, for each year, as shown above in Table 3.5–12. Typical daily emissions for both Maricopa County and the PM_{10} nonattainment area were derived by dividing the annual emissions by 365, as activity was assumed to take place 7 days a week. Results are shown in Table 3.5–14.

Table 3.5–14. Annual and typical daily emissions from travel on unpaved agricultural roads.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	1,929.0	192.9	12,365	1,237
PM_{10} nonattainment area	781.6	78.2	5,010	501

3.5.2.5 Fertilizer application

Annual NH_3 emissions from synthetic nitrogen fertilizers for Maricopa County were obtained from the US Environmental Protection Agency's 2014 National Emissions Inventory (US EPA, 2012c).

Typical daily NH_3 emissions were derived by dividing annual emissions by 365 days/year. Annual and typical daily emissions for the PM_{10} nonattainment area were derived by multiplying the county annual and typical daily emissions by the percentage of agricultural land located in the PM_{10} nonattainment (42.82%). See Section 1.5.2 for a discussion of the land-use data used. Annual and typical daily NH_3 emissions from fertilizer application are shown in Table 3.5–15.

Table 3.5–15. Annual and typical daily ammonia emissions from fertilizer application.

Geographic area	Annual NH_3 emissions (tons/yr)	Typical daily NH_3 emissions (lbs/day)
Maricopa County	573.6	3,143
PM_{10} nonattainment area	245.6	1,346

3.5.2.7 Livestock

Annual NH_3 emissions from livestock for Maricopa County were derived from the county-level estimates prepared by US EPA for use in the National Emissions Inventory (NEI) for 2014 (US EPA, 2016).

Typical daily NH_3 emissions were derived by dividing annual emissions by 365 days/year. Annual and typical daily emissions for the PM_{10} nonattainment area were derived by multiplying the county annual and typical daily emissions by the percentage of agricultural land located in the PM_{10} nonattainment area (42.82%). See Section 1.5.2 for a discussion of the land-use data used. Results are shown in Table 3.5–16.

Table 3.5–16. Annual and typical daily emissions from livestock.

Geographic area	Annual NH_3 emissions (tons/yr)	Typical daily NH_3 emissions (lbs/day)
Maricopa County	8,711.9	47,737
PM_{10} nonattainment area	3,730.4	20,441

3.5.3 Humans

A literature review by Battye et al. (1994) recommended using a per-capita emission factor developed for the National Acid Precipitation Assessment Program (NAPAP) inventory in 1985. This factor was applied to MAG population estimates for the county and PM_{10} nonattainment areas. See Section 1.5 for a discussion of the population data used. Typical daily emissions were calculated by dividing annual values by 365. The resulting estimates are shown in Table 3.5–17.

Table 3.5–17. Annual and typical daily ammonia emissions from human activity.

Geographic area	Population	Emission factor (lbs/person-yr)	Annual emissions (tons/yr)	Typical daily emissions (lbs/day)
Maricopa County	4,328,435	0.55	1,190.3	6,522
PM_{10} NAA	4,341,678	0.55	1,194.0	6,542

3.5.4 Backyard barbeques

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

ERG downloaded and reviewed the Temporal Allocation Factor File (TAFF) that is available with U.S. EPA's 2011 Air Emissions Modeling Platform (version 6.2). The temporal allocation data (U.S. EPA, 2015) indicates equal allocation across the year for residential charcoal grilling source category (SCC 2810025000). Based on this information, ERG calculated typical daily emissions by dividing the 2014 annual emissions by 365.

Maricopa County emissions were then allocated to the PM_{10} nonattainment area by multiplying the county totals with the ratio of total resident population in the PM_{10} nonattainment area to the total resident population in Maricopa County (100.23%). Refer to 1.5.1 for a discussion of the population data used. Table 3.5–18 presents the summary of annual and typical daily emissions for Maricopa County and the PM_{10} nonattainment area.

Table 3.5–18. Annual and typical daily emissions from backyard barbeques.

	Annual emissions (tons/yr)			Typical daily emissions (lbs/day)		
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**
Maricopa County	197.3	157.8	60.5	1,081	865	332
PM_{10} nonattainment area	197.7	158.2	60.6	1,083	867	332

3.5.5 Structure fires

Emissions from structure fires in Maricopa County were estimated based on 2011 data, which were projected to 2014, based on county population growth over the 2011–2014 period (4.81%). Annual emissions for the PM_{10} nonattainment area were derived by multiplying annual county emissions by the percentage of total population within the nonattainment area (100.31%). See Section 1.5.1 for a discussion of the population data used.

In the absence of sufficient data on the temporal distribution of structure fires in 2014, activity for this source category was assumed to occur evenly throughout the year. Thus, typical daily emissions were derived by dividing annual emissions by 365 days/year. The results are shown in Table 3.5–19 below.

Table 3.5–19. Annual and typical daily emissions from structure fires.

	Annual emissions (tons/yr)			Typical daily emissions (lbs/day)		
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**
Maricopa County	15.2	15.2	2.0	83	83	11
PM_{10} nonattainment area	15.3	15.3	2.0	84	84	11

3.5.6 Aircraft engine testing

Annual emissions from area-source engine testing facilities were derived from annual emissions reports from permitted sources that were not considered point sources in this inventory. It was assumed that there were no significant unpermitted sources within Maricopa County. Typical daily emissions were calculated based on operating schedule information provided in the facilities' annual emissions reports.

Since all facilities considered in this section are located within the PM_{10} nonattainment area, total emission values for the county and the PM_{10} NAA are equal. Results are shown in Table 3.5–20.

Table 3.5–20. Annual and typical daily emissions from engine testing.

	Annual emissions (tons/yr)				Typical daily emissions (lbs/day)			
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**
Maricopa County	2.5	2.4	45.5	8.7	14	14	260	48
PM_{10} nonattainment area	2.5	2.4	45.5	8.7	14	14	260	48

3.5.7 Vehicle fires

Emissions from vehicle fires in Maricopa County were estimated based on 2011 data, which were grown to 2014 based on county population growth over the 2011–2014 period (4.81%). Annual emissions for the PM_{10} nonattainment area were derived by multiplying annual county emissions by the percentage of total population within the nonattainment area (100.85%). See Section 1.5.1 for a discussion of the population data used.

It was assumed that vehicle fires occur evenly throughout the year. Thus, typical daily emissions were derived by dividing the Maricopa County and nonattainment area annual emissions by 365 days/year. The results are shown in Table 3.5–21 below.

Table 3.5–21. Annual and typical daily emissions from vehicle fires.

	Annual emissions (tons/yr)			Typical daily emissions (lbs/day)		
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**
Maricopa County	33.0	33.0	1.3	181	181	7
PM_{10} nonattainment area	33.1	33.1	1.3	181	181	7

3.5.8 Crematories

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

Typical daily emissions were calculated using reported activity data from each facility (days per week and weeks per year in operation) for each individual process, and then summed. Emissions within the PM_{10} nonattainment area were identified using information on the location of each permitted facility. (Only one small facility was located outside of the PM_{10} nonattainment area.) Table 3.5–22 summarizes annual emissions from crematories in both Maricopa County and the nonattainment area, while typical daily emissions for both areas are presented in Table 3.5–23.

Table 3.5–22. Annual emissions (tons/yr) from human and animal crematories.

Crematory	**Maricopa County**				**PM_{10} nonattainment area**			
type	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**
Human	5.5	3.3	10.7	1.4	5.5	3.3	10.7	1.4
Animal	2.7	1.6	5.6	0.7	2.7	1.6	5.6	0.7
Totals:	**8.3**	**5.0**	**16.4**	**2.1**	**8.3**	**5.0**	**16.4**	**2.1**

Table 3.5–23. Typical daily emissions (lbs/day) from human and animal crematories.

Crematory type	Maricopa County				PM_{10} nonattainment area			
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	PM_{10}	$PM_{2.5}$	NO_x	SO_x
Human	40	24	77	10	39	24	76	10
Animal	24	14	49	6	24	14	48	6
Totals:	**63**	**38**	**126**	**16**	**63**	**38**	**125**	**16**

3.5.8 Accidental releases

As part of its air quality permit compliance program, MCAQD keeps an "upset log" for each calendar year that records excess emissions and accidental releases at permitted facilities. Annual emissions inventory reports also provide for recording of accidental releases. Data from these two sources were reviewed to estimate emissions from all accidental releases reported in 2014. Results are shown in Table 3.5–24.

Table 3.5–24. Annual and typical daily emissions from accidental releases.

Geographic area	Annual NO_x emissions (tons/yr)	Typical daily NO_x emissions (lbs/day)
Maricopa County	0.2	0
PM_{10} nonattainment area	0.2	0

3.5.9 Wildfires

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

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

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

Latitude and longitude data were used to determine the number of acres burned inside of the nonattainment area. Table 3.5–25 shows the number of wildfires and acreage burned for Maricopa County and the PM_{10} nonattainment area, as well as the estimated total material burned.

Table 3.5–25. Wildfire incidence, acreage burned, and material burned in 2014.

Geographic area	No. of fires	Acreage burned	Fuel loading factor (tons/acre)	Material burned (tons/yr)
Maricopa County	1,299	145.8	4.5	656.1
PM_{10} nonattainment area	1,239	126.7	4.5	570.1

Annual emissions from wildfires for each geographic area were calculated by multiplying the material burned for each area by the emission factors obtained from the Western Regional Air Partnership's (WRAP) 2002 Fire Emissions Inventory (WGA/WRAP, 2005). Typical daily emissions were estimated by multiplying the total material burned during the year by the appropriate emission factor, and dividing the result by the number of separate days on which wildfire activity was reported (313 days in 2014). Table 3.5–26 shows annual and typical daily emissions from wildfires in Maricopa County and the PM_{10} nonattainment area.

Table 3.5–26. Annual and typical daily emissions from wildfires.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	9.2	7.9	2.0	0.6	0.4	59	51	13	4	3
PM_{10} NAA	8.0	6.9	1.8	0.5	0.4	51	44	11	3	2

3.5.10 Prescribed fires

Emissions from prescribed fires were estimated using data obtained from the Arizona Department of Environmental Quality (ADEQ, 2015), which reported that a total of six (6) prescribed fires occurred in Maricopa County during 2014. Because all 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 3.5–27 shows the data provided by the ADEQ, the amount of material burned for each fire, and whether the fire occurred within the PM_{10} nonattainment area.

Table 3.5–27. Prescribed fire activity in Maricopa County in 2014.

Date	Burn location	Tons/acre	Acres burned	Material burned (tons)	Within PM_{10} NAA?
02/27/2014	T3N,R8E,S33	1	5	5	No
03/03/2014	T3N,R11E,S2	2	3	6	No
03/14/2014	T3N,R8E,S33	1	10	10	No
07/21/2014	T2N,R9E,S4	1	10	10	No
09/02/2014	T6N,R10E,S10	2	4	8	Yes
10/01/2014	T3N,R11E,S2	2	5	10	No
Totals:			**37**	**49**	

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. It was assumed that each prescribed fire lasted one day, thus annual emissions were divided by the number of prescribed fires (6), to derive an estimate of typical daily emissions. Table 3.5–28 shows the annual and typical daily emissions from prescribed fires.

Table 3.5–28. Annual and typical daily emissions from prescribed fires.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Maricopa Co.	0.2	0.2	0.2	0.0	0.0	65	65	51	14	4
PM_{10} NAA	0.0	0.0	0.0	0.0	0.0	11	11	8	2	1

3.5.11 Unpaved parking lots fugitive dust

Fugitive dust emissions from vehicles traveling on unpaved parking lots were developed by MAG based on land area devoted to unpaved parking lots, vehicle activity on unpaved parking lots, and emission rates from AP-42 (EPA, 2006). The methodology, assumptions and calculations involved in estimating fugitive dust from vehicles traveling on unpaved parking lots are described in this section.

The vehicle miles traveled on unpaved parking lots in the PM_{10} nonattainment area were derived using assumptions from the Phase I windblown dust modeling for the Western Regional Air Partnership (ENVIRON, 2004). This study estimated that eight percent of the vacant land in core urban areas is disturbed and thirty percent of the land under development is disturbed. For the 2014 periodic emissions inventory, the core urban area is defined as the carbon monoxide maintenance area. GIS was applied to 2014 MAG land-use data to estimate that there are 167,836 acres of vacant land in the core urbanized area and 16,530 acres of land under residential and non-residential development in the PM_{10} NAA. Multiplying the vacant disturbed percentages by these land areas produces:

167,836 acres x 0.08 = 13,427 acres of vacant disturbed land in the urbanized core

16,530 acres x 0.30 = 4,959 acres of vacant disturbed land under development in the PM_{10} NAA

Summing the vacant disturbed acres in the urbanized core and areas under development produces a total of 18,386 acres of vacant disturbed land in the PM_{10} NAA. In estimating fugitive dust emissions from unpaved parking lots, the MAG Serious Area PM_{10} Plan assumed that 24 percent of the disturbed vacant non-agricultural land is devoted to unpaved parking areas (MAG, 2000). Applying this percentage to the acres of vacant disturbed land results in 4,413 acres of unpaved parking lots in the PM_{10} NAA.

The MAG Serious Area PM_{10} Plan also assumed that the average size of an unpaved parking lot is 625 square meters (i.e., 0.154 acres), an average of ten vehicles travel on each lot per day, and each vehicle travels an average distance of 0.031 miles on a lot. Multiplying 10 vehicles per day times 0.031 miles per vehicle and dividing by 0.154 acres produces 2.0 vehicle miles of travel (VMT) per acre per day. Multiplying 2.0 VMT per acre per day by 4,413 acres yields 8,826 VMT per day on unpaved parking lots in the PM_{10} NAA.

The emission factors for unpaved parking lots were derived from the AP-42 equation for unpaved industrial roads (EPA, 2006); assuming a silt content of 11.9 percent, an average vehicle weight of 2.74 tons in the PM_{10} NAA (derived from 2014 vehicle registration data), and accounting for days of the year in 2014 with precipitation of at least 0.01 inches (22). The resultant AP-42 emission factors are 1.3431 pounds per mile for PM_{10} and 0.1343 pounds per mile for $PM_{2.5}$.

These AP-42 emission factors were applied to the unpaved parking lot VMT of 8,826 to obtain PM_{10} emissions of 11,854.2 pounds per day and $PM_{2.5}$ emissions of 1,185.3 pounds per day. The pounds per day were converted to annual emissions, assuming 365 days in 2014, to obtain values of 2,163.39 tons per year of PM_{10} and 216.32 tons per year of $PM_{2.5}$.

To estimate emissions for Maricopa County, GIS was applied to 2014 MAG land-use data to obtain 2,053,015 acres of vacant land in Maricopa County. Removing the vacant land in the Maricopa County portion of the PM_{10} NAA (i.e., 403,288 acres) results in 1,649,727 vacant acres located inside Maricopa County, but outside the PM_{10} NAA.

Assuming one percent of the vacant land outside the PM_{10} NAA is disturbed (Clark County, 2006) and 24 percent of the disturbed vacant land is unpaved parking areas (MAG, 2000), results in 3,959 acres of unpaved parking areas inside Maricopa County, but outside the PM_{10} NAA. Multiplying by 2.0 VMT per acre per day results in 7,918 VMT per day. Applying the AP-42 emission rates produces the unpaved parking lot emissions inside Maricopa County, but outside the PM_{10} NAA of 10,634.7 pounds per day of PM_{10} and 1,063.4 pounds per day of $PM_{2.5}$.

The final step in estimating Maricopa County emissions requires removing the Pinal County portion of the PM_{10} NAA. The unpaved parking lot emissions in the Pinal County portion of the PM_{10} NAA are assumed to be proportional to the acres of vacant land. These were derived using GIS and 2014 MAG land-use data, with the results shown below:

Vacant land in the Pinal County portion of the PM_{10} NAA = 6,278 acres

Vacant land in the PM_{10} NAA = 409,566 acres

Ratio = 6,278/409,566 = 1.53%; Pinal County portion = 1.53% x PM_{10} NAA emissions

Pinal County portion of PM_{10} emissions = 1.53% x 11,854.2 = 181.4 pounds per day

Pinal County portion of $PM_{2.5}$ emissions = 1.53% x 1,185.3 = 18.1 pounds per day

Adding the emissions inside and outside the PM_{10} NAA and subtracting the Pinal County portion produces total Maricopa County emissions attributable to vehicles traveling on unpaved parking lots in pounds per day. Pounds per day are converted to tons per year, assuming 365 days in 2014. The resultant 2014 emissions for Maricopa County and the PM_{10} NAA are shown in Table 3.5–29.

Table 3.5–29. Annual and typical daily emissions from vehicles traveling on unpaved parking lots.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	4,071.1	407.1	22,308	2,231
PM_{10} nonattainment area	2,163.4	216.3	11,854	1,185

3.5.12 Leaf blower fugitive dust

Fugitive dust emissions from leaf blowers are the result of blowing loose material from the area being cleared by the leaf blowers. Exhaust emissions from gasoline-powered leaf blowers are covered under the Nonroad Mobile Sources section of this report (Chapter 4). Fugitive dust emission estimates are developed with the use of three sources: EPA's NONROAD model, California Air Resources Board report to the state legislature on leaf blowers (CARB, 2000), and a recent research effort done by the University of Riverside (Fitz et al., 2005).

EPA's 2011NONROAD model was used to estimate the number of gasoline-powered leaf blowers in Maricopa County (n = 122,089), along with the average activity figures for those leaf blowers. Total leaf blower population estimates were derived from CARB (2000), which estimated that 60% of all leaf blowers sold are electric. Thus assuming the remaining 40% are gasoline-powered.

Fitz et al. (2005) developed emission factors for PM_{10} and $PM_{2.5}$ fugitive dust emissions from leaf blowers. For this report, the most conservative (highest) emission factors were chosen to estimate emissions. Given these two data sources, Table 3.5–30 lists the equipment population numbers, activity estimates and emission factors for leaf blowers in Maricopa County.

Table 3.5–30. Leaf blower equipment populations, activity levels and emission factors for Maricopa County.

Leaf blower description	**Population**	**Annual activity (hrs/yr)**	**PM_{10} emission factor (mg/m^2)**	**$PM_{2.5}$ emission factor (mg/m^2)**
Commercial 2-stroke gasoline	3,719	626	70	30
Commercial 4-stroke gasoline	1,823	626	70	30
Residential 2-stroke gasoline	110,788	10	70	30
Residential 4-stroke gasoline	5,759	10	70	30
Electric	183,134	10	130	40
Total:	305,223	n/a	n/a	n/a

CARB (2000) estimates that approximately 1600m^2 of surface can be cleared in one hour of leaf blower operation. Therefore, annual emission estimates were calculated by using the following formula, as in the following example for electric leaf blowers:

Annual PM_{10} emissions from electric leaf blowers	=	population	× activity (hrs/yr)	× emission factor (mg/m^2)	× area covered (m^2/hr)
	=	183,134	× 10 hrs/yr	× 130 mg/m^2	× 1600 m^2/hr
	=	380,918,720,000 mg/yr			
	=	419.52 tons PM_{10}/yr			

The activity hours associated with leaf blowers can occur at any time during the year in Maricopa County due to the temperate climate, with no substantial seasonal variation. Therefore, typical daily emissions were estimated by dividing annual totals by 365 days per year. Emissions for the PM_{10} nonattainment area are allocated based on the ratio of population in the County to the nonattainment area. See Section 1.5 for a discussion on the population data used. Table 3.5–31 lists annual and typical daily fugitive emissions from leaf blowers for Maricopa County and the PM_{10} nonattainment area.

Table 3.5–31. Annual and typical daily emissions from leaf blower fugitive dust.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	991.2	374.1	5,431	2,050
PM_{10} nonattainment area	994.2	375.2	5,448	2,056

3.5.13 Offroad recreation vehicles fugitive dust

The MOVES2014a model estimates exhaust emissions for offroad recreational vehicles. These emissions are included in the nonroad emissions category of the 2014 particulate emissions inventory. Particulate emissions are also generated by recreational vehicles traveling on unpaved surfaces. For the 2014 periodic inventory, these emissions were estimated by MAG using mileage and activity data for offroad recreational vehicles in Maricopa County from the MOVES2014a model. The methodology and assumptions for calculating fugitive dust emissions from offroad recreational vehicles traveling are described in this section.

The MOVES2014a model provides annual mileage and number of vehicles by county for all terrain vehicles (ATVs) and offroad motorcycles (ORMs). The MOVES2014a model also provides annual operating hours and number of vehicles by county for specialty vehicles/carts (SVCs). To convert operating hours to mileage, it was assumed that SVCs travel at an average speed of 10 miles per hour. This is consistent with the speed that vehicles travel on unpaved alleys in Maricopa County (See Section 5.3.2). The annual mileage and number of vehicles by type for Maricopa County in 2014 are shown in Table 3.5–32.

To be consistent with the 2011 Periodic Emissions Inventory for PM_{10} (MCAQD, 2014), it was assumed that 75 percent of the annual travel by offroad recreational vehicles occurs on unpaved surfaces inside Maricopa County, with the remaining 25 percent occurring on paved surfaces within Maricopa County and paved and unpaved surfaces outside of Maricopa County. The product of the mileage, number of vehicles, and 75 percent produces the annual vehicle miles of travel (VMT) on unpaved surfaces, shown in Table 3.5–32. Dividing the annual VMT by 365 results in the 2014 daily offroad recreational vehicle travel on unpaved surfaces in Maricopa County.

Table 3.5–32. Offroad recreational vehicle travel on unpaved surfaces in Maricopa County.

Vehicle Type	Annual Mileage	Number of Vehicles	2014 VMT	
			Annual	Daily
ATV	1,608	38,261	46,142,766	126,419
ORM	1,600	8,971	10,765,200	29,494
SVC (Non-Diesel)	650	1,794	874,575	2,396
SVC (Diesel)	4,350	172	561,150	1,537

The VMTs above were multiplied by emission factors for unpaved industrial roads from AP-42 (EPA, 2006), assuming a silt content of 11.9 percent, an average vehicle weight of one-half of a ton, and accounting for days of the year in 2014 with precipitation of at least 0.01 inches (22). The resultant PM_{10} emission factor for ATVs and SVCs is 0.6247 pounds per vehicle mile traveled. This emission factor was reduced by 50 percent for ORMs (i.e., 0.3123 pounds per mile) to account for two wheels generating dust instead of four. Applying the AP-42 equation results in a $PM_{2.5}$ emission factor for ATVs and SVCs of 0.0625 pounds per mile, while the comparable $PM_{2.5}$ emission factor for ORMs is 0.0312 pounds per mile.

The AP-42 emission rates were multiplied by the annual and daily VMTs in Table 3.5–35 to obtain Maricopa County fugitive dust emissions in pounds per day and tons per year. The results are shown in Table 3.5–36.

The emissions for the PM_{10} nonattainment area were derived by applying geographic information systems (GIS) to MAG 2014 land-use data to obtain the acreage of vacant and passive open space in the PM_{10} nonattainment area and Maricopa County. Passive open space includes open desert, mountains, and washes. The detailed calculations for deriving the PM_{10} nonattainment area emissions are shown below.

Vacant and passive open space in the PM_{10} nonattainment area (NAA) = 829,895 acres

Vacant and passive open space in Maricopa County = 4,655,379 acres

Ratio of vacant and passive open space in PM_{10} NAA to Maricopa County = 17.83%

PM_{10} NAA Emissions = 0.1783 × Maricopa County emissions

Application of the ratio above to Maricopa County emissions produces the annual and typical daily emissions for the PM_{10} nonattainment area shown in Table 3.5–33. The PM_{10} and $PM_{2.5}$ emissions for all offroad recreational vehicle types (i.e., ATVs, ORMs and SVCs) are summed in this table.

Table 3.5–33. Annual and typical daily emissions from offroad recreational vehicles.

Geographic area	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Maricopa County	16,542.1	1,654.8	90,642	9,067
PM_{10} nonattainment area	2,949.5	295.0	16,161	1,617

3.7 Quality assurance/quality control procedures

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

Area source categories were identified for inclusion in the inventory based on the latest Emission Inventory Improvement Program (EIIP) guidance available. In addition, recent EPA activities to develop county-level emissions estimates for newly created source categories (such as portable fuel containers) or redefined 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 or non-existent(such as industrial coal combustion, oil and gas production, and snowmobile use).

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

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

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

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

3.6 Summary of all area sources

Tables 3.6–1 and 3.6–2 summarize annual and typical daily emissions from all area sources addressed in this chapter, for both Maricopa County and the PM_{10} nonattainment area, respectively.

Table 3.6–1. Annual and typical daily emissions from all area sources in Maricopa County.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Source Category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Fuel combustion:										
Industrial distillate oil:										
–boilers	11.0	7.4	96.1	34.1	3.8	71	48	616	219	25
–engines	139.3	130.7	1,934.4	22.5	2.6	893	838	12,400	144	16
Industrial natural gas	4.0	3.2	740.1	4.4	23.7	26	20	4,744	28	152
Industrial LPG	0.2	0.1	52.1	0.2	1.1	1	1	334	1	7
Comm./inst. distillate oil:										
–boilers	0.3	0.3	2.8	0.1	0.1	2	2	18	1	1
–engines	0.3	0.3	4.4	0.0	0.0	2	2	28	0	0
Comm./inst. natural gas	5.9	4.8	1,126.8	6.8	5.5	38	31	7,223	43	35
Residential distillate oil	0.0	0.0	0.3	0.8	0.0	0	0	3	8	0
Residential natural gas	62.8	62.8	777.0	5.0		344	344	7223	27	
Residential LPG	0.2	0.1	41.5	0.2	0.1	1	1	391	2	1
Residential wood combustion	1,251.0	1,248.7	156.3	21.1	64.5	11,802	11,780	1,475	199	608
All Fuel Combustion:	**1,475.1**	**1,458.6**	**4,931.9**	**95.2**	**101.4**	**13,181**	**13,068**	**31,491**	**672**	**846**
Industrial processes:										
Chemical manufacturing	108.5	65.5				1,172	654			
Commercial cooking	1,739.2	1,612.8				9,530	8,837			
Grain handling/processing	178.2	19.0				1,037	1,033			
Ammonia cold storage					1,973.3					12,649
Secondary metal production	53.6	39.8	55.1	30.6	0.5	411	306	488	282	3
Nonmetallic mineral products	43.4	18.2				325	134			
Mining/quarrying	66.8	14.9				464	102			
Wood product manufacturing	24.3	23.1				180	172			
Rubber/plastic product mfg.	95.8	80.2				702	614			
Fabricated metals	14.0	12.9				100	92			
Residential construction	1,318.0	131.8				8,448	845			
Commercial construction	3,619.4	361.9				23,201	2,320			
Road construction	1,247.0	124.7				7,993	799			
Construction, other	128.3	12.8				822	82			
Electrical equipment mfg.	26.0	18.5	24.3	0.6	14.3	144	102	135	3	79
Industrial paved/unpaved road travel	205.0	87.3				1,476	587			
Industrial processes, NEC	245.7	112.0	452.2	7.9	7.6	1,387	631	2,478	43	44
All Industrial Processes:	**9,113.1**	**2,7354**	**531.6**	**39.0**	**1,995.7**	**57,392**	**17,311**	**3,102**	**329**	**12,775**
All Waste Treatment/ Disposal:										
On-site incineration	0.6	0.4	3.0	0.9		4	2	19	6	
Open burning	30.4	30.4	8.1			234	234	62		
Landfills	67.5	65.5	9.9	6.6		377	365	54	36	
Publicly owned treatment works					11.7					64
Other waste	23.0	11.1	20.6	51.4		161	75	113	282	
All Waste Treatment/ Disposal	**121.5**	**107.4**	**41.5**	**58.9**	**11.7**	**776**	**677**	**249**	**324**	**64**

Table 3.6–1 (continued). Annual and typical daily emissions from all area sources in Maricopa County.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Source category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Misc. area sources:										
Windblown dust	2,888.8	433.3				15,829	2,374			
Cotton ginning	26.9	4.0				159	24			
Tilling	4,236.4	847.3				62,024	12,405			
Harvesting	157.2	23.6				3,811	572			
Travel on unpaved ag. roads	1,929.0	192.9				12,365	1,237			
Fertilizer application					573.6					3,143
Livestock					8,711.9					47,737
Humans					1,190.3					6,522
Backyard barbeques	197.3	157.8	60.5			1,081	865	332		
Structure fires	15.2	15.2	2.0			83	83	11		
Aircraft engine testing	2.5	2.4	45.5	8.7		14	14	260	48	
Vehicle fires	33.0	33.0	1.3			181	181	7		
Crematories, human	5.5	3.3	10.7	1.4		40	24	77	10	
Crematories, animal	2.7	1.6	5.6	0.7		24	14	49	6	
Accidental releases			0.2					0		
Wildfires	9.2	7.9	2.0	0.6	0.4	59	51	13	4	3
Prescribed fires	0.2	0.2	0.2	0.0	0.0	65	65	51	14	4
Travel on unpaved parking lots	4,071.1	407.1				22,308	2,231			
Leaf blowers fugitive dust	991.2	374.1				5,431	2,050			
Offroad rec vehicle fugitive dust	16,542.1	1,654.8				90,642	9,067			
All Misc. Area Sources	**31,108.2**	**4,158.5**	**128.1**	**11.4**	**10,476.2**	**214,115**	**31,255**	**800**	**82**	**57,409**
TOTAL, ALL AREA SOURCES	**41,817.9**	**8,459.9**	**5,633.2**	**204.5**	**12,585.1**	**285,464**	**62,311**	**35,641**	**1,407**	**71,094**

Table 3.6–2. Annual and typical daily emissions from all area sources in the PM_{10} nonattainment area.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Source category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Fuel combustion:										
Industrial distillate oil: boilers	11.0	7.4	95.7	34.0	3.8	71	48	614	218	25
Industrial distillate oil: engines	138.8	130.2	1,927.4	22.4	2.6	890	835	12,355	144	16
Industrial natural gas	4.0	3.2	737.5	4.4	23.6	26	20	4,727	28	151
Industrial LPG	0.2	0.1	51.9	0.2	1.1	1	1	333	1	7
Comm./inst. diesel oil: boilers	0.3	0.3	2.8	0.1	0.1	2	2	18	1	1
Comm./inst. diesel oil: engines	0.3	0.3	4.4	0.0	0.0	2	2	28	0	0
Comm./inst. natural gas	5.8	4.8	1,123.3	6.7	5.5	37	31	7,201	43	35
Residential distillate oil	0.0	0.0	0.3	0.8	0.0	0	0	3	8	0
Residential natural gas	63.0	63.0	778.8	5.0		345	345	4,267	27	
Residential LPG	0.2	0.1	41.5	0.2	0.1	1	1	392	2	1
Residential wood combustion	1,253.9	1,251.6	156.7	21.2	64.6	11,829	11,807	1,478	200	609
All Fuel Combustion	**1,477.5**	**1,461.1**	**4,920.5**	**95.0**	**101.5**	**13,205**	**13,092**	**31,417**	**671**	**846**
Industrial processes:										
Chemical manufacturing	108.1	65.3				1,168	652			
Commercial cooking	1,743.1	1,616.4				9,551	8,857			
Grain handling/processing	177.6	18.9				135	134			
Ammonia cold storage					1,966.2					12,604
Secondary metal production	53.6	39.8	55.1	30.6	0.5	411	306	488	282	3
Mineral processes	43.4	18.2				325	134			
Mining/quarrying	53.7	11.5				371	78			
Wood product manufacturing	24.2	23.0				179	171			
Rubber/plastic product mfg.	95.5	79.9				699	612			
Fabricated metals	13.9	12.9				99	92			
Residential construction	1,233.6	123.4				7,908	791			
Commercial construction	2,858.3	285.8				18,322	1,832			
Road construction	926.4	92.6				5,939	594			
Construction, other	123.8	12.4				793	79			
Electrical equipment mfg.	26.0	18.5	24.3	0.6	14.3	144	102	135	3	79
Indust. paved/unpaved rd travel	131.8	29.4				1,000	215			
Industrial processes, NEC	159.9	55.7	449.7	7.7	4.8	915	322	2,464	42	28
All Industrial Processes:	**7,772.9**	**2,503.8**	**529.1**	**38.9**	**1,985.8**	**47,961**	**14,972**	**3,088**	**328**	**12,714**
Waste treatment/disposal:										
On-site incineration	0.6	0.4	2.9	0.9		4	2	19	6	
Open burning	9.9	9.9	2.6			76	76	20		
Landfills	46.8	45.5	5.2	3.2		260	253	29	17	
Publicly owned treatment works					11.7					64
Other waste	12.4	9.5	20.5	50.5		81	62	113	277	
All Waste Treatment/ Disposal	**69.7**	**68.3**	**31.3**	**54.6**	**11.7**	**421**	**394**	**181**	**301**	**64**

Table 3.6–2. Annual and typical daily emissions from all area sources in the PM_{10} NAA (contd).

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Source Category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Misc. area sources:										
Windblown dust	1,750.2	262.5				9,590	1,439			
Cotton ginning	5.3	0.8				29	4			
Tilling	1,814.2	362.8				26,561	5,312			
Harvesting	59.2	8.9				1,442	216			
Travel on unpaved ag. roads	780.7	78.1				5,010	501			
Fertilizer application					245.6					1,346
Livestock					3,730.4					20,441
Humans					1,194.0					6,542
Backyard barbeques	197.7	158.2	60.6			1,083	867	332		
Structure fires	15.3	15.3	2.0			84	84	11		
Aircraft engine testing	2.5	2.4	45.5	8.7		14	14	260	48	
Vehicle fires	33.1	33.1	1.3			181	181	7		
Crematories, human	5.5	3.3	10.7	1.4		39	24	76	10	
Crematories, animal	2.7	1.6	5.6	0.7		24	14	48	6	
Accidental releases			0.2					0		
Wildfires	8.0	6.9	1.8	0.5	0.4	51	44	11	3	2
Prescribed fires	0.0	0.0	0.0	0.0	0.0	11	11	8	2	1
Travel on unpaved parking lots	2,163.4	216.3				11,854	1,185			
Leaf blowers fugitive dust	994.2	375.2				5,448	2,056			
Offroad rec vehicle fugitive dust	2,949.5	295.0				16,161	1,617			
All Misc. Area Sources:	10,782.5	1,820.6	127.9	11.3	5,170.4	77,583	13,568	754	69	28,332
TOTAL, ALL AREA SOURCES	**20,102.7**	**5,853.8**	**5,608.8**	**199.7**	**7,269.4**	**139,170**	**42,027**	**35,440**	**1,369**	**41,957**

3.7 Quality assurance/quality control procedures

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

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4. Nonroad Mobile Sources

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4.1 Introduction

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

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

EPA released MOVES2014a in November 2015 as a replacement for its prior NONROAD2008 model. EPA announced that it would no longer support NONROAD2008, and instead recommended using MOVES2014a to model nonroad mobile source emissions. The MOVES2014a model allows for the use of consistent fuel and meteorology inputs for both onroad and nonroad mobile sources. While the same NONROAD2008 core code is still utilized, the inputs and outputs are controlled with MySQL databases that are more efficient to maintain. Procedures for updating local activity and population data have also improved and now require less run time.

Emission calculations for most nonroad mobile source categories except aircraft, airport ground support equipment (GSE) and locomotives were derived using the MOVES2014a model. Aircraft and airport GSE emission estimates were made using the Federal Aviation Administration's EDMS (Emissions Dispersion Modeling System) model, ver. 5.1.4. Locomotive emission calculations were derived from surveys of the three railroad companies that have operations in the county (Burlington Northern Santa Fe, Union Pacific and Amtrak).

County-specific temperature and fuel-related inputs are required to run the MOVES2014a model. The prior NONROAD2008 model required manual user input of monthly temperatures (minimum, maximum and average); Reid Vapor Pressure (RVP); gasoline and diesel sulfur content; and information on local gasoline ethanol blends (volume percentage, market share percentage and total oxygen weight percentage).

For the MOVES2014a model, hourly observed temperature data for a typical day in each month were obtained from Phoenix Sky Harbor Airport. Fuel data were provided by the Arizona Department of Weights and Measures, and are identical to the fuel data used in modeling onroad mobile emissions

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

Typical daily emissions were estimated based on a 12-month average of the typical weekday, or typical weekend, emissions in each month as generated by the MOVES2014a model. To be conservative, the day with the highest emissions (weekday or weekend) was selected to represent typical daily emissions for each nonroad emissions category. For example, typical daily emissions from agricultural equipment are highest on weekdays as compared to weekends. As such, weekday emissions are selected to be representative of daily emissions for agricultural equipment. (Other categories, such as recreational equipment, have higher emissions on weekends as compared to weekdays).

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

Spatial allocation factors were developed to apportion Maricopa County-level annual and typical daily nonroad emissions to the PM_{10} nonattainment area. The approaches used are described in each section of this chapter.

4.2 Agricultural equipment

Annual and typical daily emissions from agricultural equipment in Maricopa County were calculated using EPA's MOVES2014a model as discussed above. Annual and typical daily emissions for the PM_{10} nonattainment area were calculated based on the Emission Inventory Guidance for Implementation of Ozone [and Particulate Matter] National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations (US EPA, 2014) and Geographical Allocation (GA) guidance (US EPA, 2002) which recommends using the ratio of agricultural land inside the nonattainment area (114,722 acres) to agricultural land inside the county (267,894 acres). See Section 1.5.2 for a discussion of the land-use data used. The resulting annual and typical daily emissions are presented in Table 4.2–1.

Table 4.2–1. Annual and typical daily emissions from agricultural equipment.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	22.9	22.2	286.9	0.0	0.3	146	142	1,832	0	2
PM_{10} NAA	9.8	9.5	122.9	0.0	0.1	63	61	785	0	1

4.3 Airport ground support equipment

Annual and typical daily emissions from airport ground support equipment (GSE) and auxiliary power units (APUs) were calculated using the Emissions Dispersion Modeling System (EDMS, v. 5.1.4) from the U.S. Federal Aviation Administration (FAA). Activity data on 2014 aircraft operations and GSE use for eight major airports were obtained from FAA's Operations and Performance Data System and MAG's 2014 survey data. In addition, 2014 activity data for six small general-aviation airports were obtained from FAA's 2015 Terminal Area Forecast (TAF) dataset and MAG's 2009 and 2014 survey data. (Further details concerning the modeling input data and results are described in Section 4.11, Aircraft). Emissions from GSE and APUs at Luke Air Force Base (AFB) for the year 2014 are grouped together with aircraft emissions at Luke AFB in Section 4.11. The resulting annual and typical daily emissions are shown in Tables 4.3–1 and 4.3–2 below. (Note that the EDMS model does not include calculation of ammonia emissions.)

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

	Maricopa County				PM_{10} nonattainment area			
Equipment type	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**
GSE	6.8	6.4	211.1	6.6	6.6	6.3	206.2	6.4
APUs	10.5	10.5	82.7	11.6	10.5	10.5	82.4	11.5
Totals:	**17.3**	**16.9**	**293.7**	**18.2**	**17.1**	**16.7**	**288.6**	**18.0**

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

	Maricopa County				PM_{10} nonattainment area			
Equipment type	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**
GSE	37	35	1,156	36	36	35	1,130	35
APUs	58	58	453	63	57	57	452	63
Totals:	**95**	**93**	**1,610**	**100**	**94**	**92**	**1,581**	**98**

4.4 Commercial equipment

Annual and typical daily emissions from commercial equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and typical daily emissions for the PM_{10} nonattainment area for this category were derived by applying the ratio of industrial employment in the nonattainment area to Maricopa County-level employment, as data on the number of wholesale establishments recommended by EPA guidance (US EPA, 2002) was not available. See Section 1.5.1 for a discussion of the industrial employment data used. The resulting annual and typical daily emissions estimates are shown in Table 4.4–1 below.

Table 4.4–1. Annual and typical daily emissions from commercial equipment.

Geographic	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
area	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Maricopa Co.	102.6	97.9	1,175.6	1.3	2.4	656	626	7,520	9	15
PM_{10} NAA	102.3	97.6	1,171.5	1.4	2.4	654	624	7,493	9	15

4.5 Construction and mining equipment

Annual and typical daily emissions from construction and mining equipment in Maricopa County were calculated using EPA's MOVES2014a model as described in Section 4.1. Annual and typical daily emissions for the PM_{10} nonattainment area for this category were derived by applying the ratio of construction employment in the nonattainment area to Maricopa County-level employment as a conservative estimate, as the EPA-recommended allocation factor (the total dollar value of all construction) was unavailable (US EPA, 2002). See Section 1.5.1 for a discussion of the employment data used. The resulting annual and typical daily emissions estimates are shown in Table 4.5–1 below.

Table 4.5–1. Annual and typical daily emissions from construction and mining equipment.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	925.8	895.6	10,495.7	0.3	15.1	5,920	5,727	67,111	2	97
PM_{10} NAA	870.5	842.1	9,869.2	0.3	14.2	5,566	5,385	63,105	2	91

4.6 Industrial equipment

Annual and typical daily emissions from industrial equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and typical daily emissions for the PM_{10} nonattainment area for this category were derived by applying the ratio of industrial employment in the nonattainment area to Maricopa County-level employment as a conservative estimate, as the number of employees in manufacturing recommended by EPA guidance (US EPA, 2002) was unavailable. See Section 1.5.1 for a discussion of the industrial employment data used. The resulting annual and typical daily emissions estimates are shown in Table 4.6–1 below.

Table 4.6–1. Annual and typical daily emissions from industrial equipment.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	70.9	69.2	1,263.3	0.7	1.3	432	422	7,727	5	8
PM_{10} NAA	70.6	68.9	1,258.8	0.7	1.3	430	420	7,699	5	8

4.7 Lawn and garden equipment

Annual and typical daily emissions from lawn and garden equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. These results reflect equipment population and usage estimates from survey work done in early 2003 for the Arizona Department of Environmental Quality (discussed further in Section 4.1). Annual and typical daily emissions for the PM_{10} nonattainment area for this category were derived by applying the ratio of population in the nonattainment area to Maricopa County-level population, since housing units was not available, as recommended by EPA guidance (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used. The resulting annual and typical daily emissions estimates are shown in Table 4.7–1 below.

Table 4.7–1. Annual and typical daily emissions from lawn and garden equipment.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	163.9	151.5	589.9	2.0	2.7	904	834	3,370	13	16
PM_{10} NAA	164.4	151.9	591.7	2.0	2.7	906	837	3,380	13	17

4.8 Pleasure craft

Annual and typical daily emissions from pleasure craft equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and typical daily emissions for the PM_{10} nonattainment area for this category were derived by applying the ratio of water surface area in the nonattainment area to Maricopa County-level water surface area, as recommended by EPA guidance (US EPA, 2002). See Section 1.5.2 for a discussion of the land-use data used. The resulting annual and typical daily emissions estimates are shown in Table 4.8–1 below.

Table 4.8–1. Annual and typical daily emissions from pleasure craft equipment.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	5.2	4.9	98.3	0.1	0.2	70	64	1,304	1	2
PM_{10} NAA	3.0	2.8	56.3	0.1	0.1	40	37	746	1	1

4.9 Railway maintenance equipment

Annual and typical daily emissions from railway maintenance equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and typical daily emissions for the PM_{10} nonattainment area for this category were derived by applying the ratio of population in the nonattainment area to Maricopa County-level population, as recommended by EPA guidance (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used. The resulting annual and typical daily emissions estimates are shown in Table 4.9–1 below.

Table 4.9–1. Annual and typical daily emissions from railway maintenance equipment.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	0.9	0.9	7.7	0.0	0.0	6	6	54	0	0
PM_{10} NAA	0.9	0.9	7.8	0.0	0.0	6	6	54	0	0

4.10 Recreational equipment

Annual and typical daily emissions from recreational equipment in Maricopa County were calculated using EPA's MOVES2014a model, as described in Section 4.1. Annual and typical daily emissions for the PM_{10} nonattainment area for this category were derived by applying the ratio of passive open space and vacant land use within the nonattainment area to Maricopa County-level land use, as recommended by EPA guidance (US EPA, 2002). See Section 1.5.2 for a discussion

of the land-use data used. The resulting annual and typical daily emissions estimates are shown in Table 4.10–1 below.

Table 4.10–1. Annual and typical daily emissions from recreational equipment.

Geographic area	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Maricopa Co.	38.7	35.6	62.4	0.3	0.4	328	302	530	3	4
PM_{10} NAA	6.9	6.4	11.1	0.1	0.1	59	54	94	1	1

4.11 Aircraft

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

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

Aircraft emissions have been estimated for four aircraft categories:

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

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

Three databases from the Federal Aviation Administration (FAA) provide annual aircraft activity, aircraft type fleet mix, and hourly/weekly/monthly operational profiles for the eight major airports in the PM_{10} nonattainment area: Chandler Municipal, Falcon Field, Glendale Municipal, Phoenix Deer Valley, Phoenix Goodyear, Phoenix-Mesa Gateway, Phoenix Sky Harbor, and Scottsdale airports. The three FAA databases are:

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

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

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

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

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

The following section describes how activity and emissions were estimated for a representative airport, Chandler Municipal (CHD). The FAA's Operational Network (OPSNET) database provided 2014 activity by aircraft type category as listed in Table 4.11–1. While OPSNET reported a total of 215,589 general aviation operations at this airport in 2014, further information on the aircraft types for this activity was needed so that the FAA's Enhanced Traffic Management System Counts (ETMSC) database was used to "grow" available aircraft-specific operational data as described below.

The ETMSC database on general aviation activity at Chandler Municipal Airport (CHD) in 2014 comprises 86 different aircraft types, totaling 3,063 operations. The aircraft-specific activity data were ranked in the decreasing order. Activity data for the predominant aircraft was then grown to represent all general aviation activity. This process for the general aviation activity at Chandler Municipal Airport is depicted in Table 4.11–2.

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

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

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

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

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

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

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

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

Tables 4.11–3 and 4.11–4 present the total annual and typical daily emissions by airport and aircraft type, for airports inside and outside the PM_{10} nonattainment area, respectively.

Table 4.11–3. Annual and typical daily emissions for airports in the PM_{10} nonattainment area, by airport and aircraft type.

Facility	Cate-gory	Annual emissions (tons/yr)				Typical daily emissions (lbs/day)			
		PM_{10}	$PM_{2.5}$	NO_x	SO_x	PM_{10}	$PM_{2.5}$	NO_x	SO_x
Chandler Municipal	AT	0.1	0.1	1.2	0.2	1	1	7	1
	GA	5.5	5.5	24.1	6.9	30	30	132	38
	ML	0.0	0.0	0.0	0.0	0	0	0	0
	Total	**5.7**	**5.7**	**25.3**	**7.1**	**31**	**31**	**139**	**38**
Falcon Field	AC	0.0	0.0	0.0	0.0	0	0	0	0
	AT	2.8	2.8	27.9	4.7	15	15	153	26
	GA	5.0	5.0	24.7	7.4	28	28	135	41
	ML	0.1	0.1	0.8	0.2	0	0	5	1
	Total	**7.9**	**7.9**	**53.4**	**12.3**	**43**	**43**	**292**	**68**
Glendale Municipal	AT	0.1	0.1	0.9	0.1	0	0	5	1
	GA	2.6	2.6	11.5	3.1	14	14	63	17
	ML	0.0	0.0	0.0	0.0	0	0	0	0
	Total	**2.7**	**2.7**	**12.4**	**3.3**	**15**	**15**	**68**	**18**
Luke Air Force Base	ML	**38.1**	**38.1**	**244.8**	**22.7**	**293**	**293**	**1,883**	**174**
Phoenix Deer Valley	AC	0.0	0.0	0.0	0.0	0	0	0	0
	AT	0.3	0.3	5.6	0.8	2	2	31	5
	GA	8.3	8.3	49.0	13.1	45	45	269	72
	ML	0.0	0.0	0.0	0.0	0	0	0	0
	Total	**8.6**	**8.6**	**54.6**	**13.9**	**47**	**47**	**299**	**76**
Phoenix Goodyear	AC	0.0	0.0	0.7	0.1	0	0	4	0
	AT	0.3	0.3	3.8	0.6	2	2	21	4
	GA	2.5	2.5	39.1	5.7	14	14	214	31
	ML	0.3	0.3	23.5	1.8	2	2	129	10
	Total	**3.2**	**3.2**	**67.1**	**8.3**	**17**	**17**	**367**	**45**
Phoenix Sky Harbor Intl	AC	22.7	22.7	1,567.1	156.3	125	125	8,587	856
	AT	1.7	1.7	109.2	14.8	9	9	598	81
	GA	0.8	0.8	9.3	1.9	5	5	51	10
	ML	0.4	0.4	29.1	2.8	2	2	159	15
	Total	**25.6**	**25.6**	**1,714.6**	**175.7**	**141**	**141**	**9,395**	**963**
Phoenix-Mesa Gateway Airport	AC	0.6	0.6	39.0	4.9	3	3	214	27
	AT	2.1	2.1	13.1	2.7	12	12	72	15
	GA	6.0	6.0	47.8	13.5	33	33	262	74
	ML	0.7	0.7	17.3	2.6	4	4	95	14
	Total	**9.4**	**9.4**	**117.3**	**23.6**	**52**	**52**	**643**	**130**
Pleasant Valley	GA	**0.0**	**0.01**	**0.4**	**0.1**	**0**	**0**	**2**	**1**
Scottsdale	AC	0.0	0.0	0.1	0.0	0	0	0	0
	AT	1.0	1.03	13.1	2.2	6	6	72	12
	GA	5.5	5.49	76.6	15.8	30	30	420	87
	ML	0.0	0.04	0.5	0.1	0	0	3	1
	Total	**6.6**	**6.56**	**90.3**	**18.1**	**36**	**36**	**495**	**99**
Skyranch at Carefree	GA	**0.1**	**0.07**	**0.3**	**0.1**	**0**	**0**	**1**	**1**
Stellar Airpark	GA	**0.7**	**0.65**	**2.3**	**0.9**	**4**	**4**	**12**	**5**
PM_{10} NAA totals:		**108.4**	**108.4**	**2,382.5**	**286.1**	**678**	**678**	**13,597**	**1,618**

AC: Air Commercial; AT: Air Taxi; GA: General Aviation; ML: Military

Table 4.11–4. Annual and typical daily emissions for airports outside the PM_{10} nonattainment area, by airport and aircraft type.

Facility	Category	Annual emissions (tons/yr)				Typical daily emissions (lbs/day)			
		PM_{10}	$PM_{2.5}$	NO_x	SO_x	PM_{10}	$PM_{2.5}$	NO_x	SO_x
Buckeye Municipal	GA	0.5	0.5	1.7	0.6	3	3	9	4
Gila Bend Municipal	GA	0.1	0.1	0.2	0.1	0	0	1	0
Wickenburg Municipal	GA	1.4	1.4	6.8	1.7	8	8	37	9
Non-PM_{10} NAA totals:		**2.0**	**2.0**	**8.7**	**2.4**	**11**	11	**47**	13
Maricopa County totals:		**110.4**	**110.4**	**2,391.1**	**288.5**	**689**	**689**	**13,644**	**1,631**

4.12 Locomotives

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

Activity was assumed to occur evenly throughout the year, thus annual emission values were divided by 365 to derive daily estimates. The resulting annual and typical day emissions from each of the categories in Maricopa County are presented in Table 4.12–1.

Table 4.12–1. Annual and typical daily emissions from locomotives in Maricopa County.

Locomotive type	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Class I	62.8	60.9	2,126.8	238.4	1.7	344	334	11,654	1,306	9
Yard/switch	7.4	7.2	329.7	23.4	0.2	41	40	1,807	128	1
Passenger	0.6	0.6	21.8	2.2	0.0	3	3	119	12	0
Totals:	**70.8**	**68.7**	**2,478.3**	**264.0**	**1.8**	**388**	**376**	**13,580**	**1,446**	**10**

To calculate emissions within the PM_{10} nonattainment area, County-level emissions were multiplied by the percentage of track miles within the nonattainment area, determined by GIS mapping. The resulting annual and typical daily emissions are shown in Table 4.12–2.

Table 4.12–2. Annual and typical daily emissions from locomotives in the PM_{10} nonattainment area.

Activity type	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Class I	27.8	27.0	941.6	105.5	0.7	152	148	5,159	578	4
Yard/switch	7.4	7.2	329.7	23.4	0.2	41	40	1,807	128	1
Passenger	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0
Totals:	**35.2**	**34.2**	**1,271.3**	**129.0**	**0.9**	**193**	**187**	**6,966**	**707**	**5**

4.13 Quality assurance procedures

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

4.14 Summary of all nonroad mobile source emissions

Table 4.14–1 summarizes annual and typical daily emissions of PM_{10}, $PM_{2.5}$, NO_x, SO_x and NH_3 from nonroad mobile sources in Maricopa County. Table 4.14–2 shows annual and typical daily emissions for these pollutants for the PM_{10} nonattainment area.

Table 4.14–1. Annual and typical daily emissions from nonroad mobile sources in Maricopa County.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Agricultural	22.9	22.2	286.9	0.0	0.3	146	142	1,832	0	2
Airport GSE+APUs	17.3	16.9	293.7	18.2	0.0	95	93	1,610	100	0
Commercial	102.6	97.9	1,175.6	1.3	2.4	656	626	7,520	9	15
Construction/mining	925.8	895.6	10,495.7	0.3	15.1	5,920	5,727	67,111	2	97
Industrial	70.9	69.2	1,263.3	0.7	1.3	432	422	7,727	5	8
Lawn & garden	163.9	151.5	589.9	2.0	2.7	904	834	3,370	13	16
Pleasure craft	5.2	4.9	98.3	0.1	0.2	70	64	1,304	1	2
Railway maintenance	0.9	0.9	7.7	0.0	0.0	6	6	53	0	0
Recreational	38.7	35.6	62.4	0.3	0.4	328	302	530	3	4
Aircraft	110.4	110.4	2,391.1	288.5	0.0	689	689	13,644	1,631	0
Locomotives	70.8	68.7	2,478.3	264.0	1.9	388	377	13,580	1,446	10
Totals:	**1,529.4**	**1,473.8**	**19,143.1**	**575.4**	**24.2**	**9,634**	**9,282**	**118,279**	**3,209**	**154**

Table 4.14–2. Annual and typical daily emissions from nonroad mobile sources in the PM_{10} nonattainment area.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Agricultural	9.8	9.5	122.9	0.0	0.1	146	142	1,832	0	2
Airport GSE+APUs	17.1	16.7	288.6	18.0	0.0	95	93	1,610	100	0
Commercial	102.3	97.6	1,171.5	1.3	2.4	656	626	7,520	9	15
Construction/mining	870.5	842.1	9,869.2	0.3	14.2	5,920	5,727	67,111	2	97
Industrial	70.6	68.9	1,258.8	0.7	1.3	432	422	7,727	5	8
Lawn & garden	164.4	151.9	591.7	2.0	2.7	904	834	3,370	13	16
Pleasure craft	3.0	2.8	56.3	0.1	0.1	70	64	1,304	1	2
Railway maintenance	0.9	0.9	7.8	0.0	0.0	6	6	53	0	0
Recreational	6.9	6.4	11.1	0.1	0.1	328	302	530	3	4
Aircraft	108.4	108.4	2,382.5	286.1	0.0	689	689	13,644	1,631	0
Locomotives	35.2	34.2	1,271.3	129.0	0.9	388	377	13,580	1,446	10
Totals:	**1,389.1**	**1,339.4**	**17,031.5**	**437.5**	**21.7**	**8,689**	**8,380**	**105,499**	**2,452**	**138**

4.15 References

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5. Onroad Mobile Sources

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5.1 Introduction

Onroad mobile source emissions have been calculated for particulate matter for the 2014 Periodic Emissions Inventory (PEI) for the Maricopa County area. For the purposes of this particulate matter inventory, the following pollutants were included: PM_{10}, $PM_{2.5}$, nitrogen oxides (NO_x), sulfur dioxide (SO_2), and ammonia (NH_3). PM_{10} refers to all particles less than or equal to 10 micrometers in diameter and $PM_{2.5}$ refers to particles less than or equal to 2.5 micrometers in diameter.

Onroad mobile source emissions were estimated for the PM_{10} nonattainment area (NAA), as well as for Maricopa County. Emission factors were calculated using Motor Vehicle Emission Simulator (MOVES2014a), which is the latest model developed by the U.S. Environmental Protection Agency (EPA) for the purpose of estimating motor vehicle emission factors, and AP-42, which is the EPA Compilation of Air Pollutant Emission Factors.

Onroad exhaust, tire wear, and brake wear emissions were estimated by MOVES2014a. The MOVES2014a inputs were developed using local data from multiple sources such as the Arizona Department of Transportation (ADOT), the Arizona Department of Weights and Measures (ADWM), the Maricopa Association of Governments (MAG) Transportation Division, and the National Climatic Data Center (NCDC).

Paved road fugitive dust emission estimates were derived from the AP-42 equation published by EPA in January 2011. The 2014 vehicle miles traveled (VMT) for freeways, high-traffic arterials, and low-traffic arterials were derived from the 2014 traffic assignment produced by the MAG travel demand model. Low-traffic arterials carry less than 10,000 vehicles on an average weekday, while high-traffic arterials carry 10,000 or more vehicles on an average weekday. These traffic assignment VMTs were multiplied by the appropriate particulate emission factors derived from the AP-42 equation for paved roads.

Public unpaved road VMTs were derived from the MAG 2009 Unpaved Road Inventory (MAG, 2010). VMTs for private unpaved roads and alleys were derived from a study conducted by MAG in August-September 2011 (MAG, 2011). The public and private unpaved road and alley VMTs were multiplied by the appropriate AP-42 emission factors.

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

- Emission Inventory Requirements for Ozone State Implementation Plans (US EPA, 1991);
- Procedures for Emission Inventory Preparation Volume IV: Mobile Sources (US EPA, 1992a);
- Quality Review Guidelines for 1990 Base Year Emission Inventories (US EPA, 1992b);
- Compilation of Air Pollutant Emissions Factors, AP-42 (US EPA, 2006);
- Emissions Inventory Guidance for Implementation of Ozone [and Particulate Matter] National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations (US EPA, 2014a);

- Policy Guidance on the Use of MOVES2014 for State Implementation Plan Development, Transportation Conformity, and Other Purposes (US EPA, 2014b);
- MOVES2014a User Guide (US EPA, 2015a);
- MOVES2014a User Interface Reference Manual (US EPA, 2015b);
- MOVES2014a Software Design Reference Manual (US EPA, 2015c); and
- MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity (US EPA, 2015d)

5.2 Exhaust, tire wear, and brake wear

Vehicle exhaust emission factors for PM_{10}, $PM_{2.5}$, NO_x, SO_2, and NH_3, as well as tire wear and brake wear emission factors for PM_{10} and $PM_{2.5}$, were calculated using MOVES2014a. The exhaust PM_{10} and $PM_{2.5}$ estimates include the components of sulfate and carbon (organic and elemental).

5.2.1 MOVES2014a model

The emissions were calculated using the EPA state-of-the-art emissions modeling tool, MOVES2014a. MOVES2014a is intended for official use to estimate national, state, and county level inventories of criteria air pollutants from highway vehicles. The user of MOVES2014a is allowed to specify vehicle types, time periods, geographical areas, pollutants, vehicle operating characteristics, and road types for the particular scenario to be modeled by creating a Run Specification (RunSpec).

In order to calculate vehicle emissions for the calendar year 2014, MOVES2014a was executed using local input data for each geographical area (Maricopa County and the PM_{10} nonattainment area). Each scenario was created using the county scale setting and the inventory calculation type. The specific MOVES2014a model RunSpec and RunSpec summaries are described in Appendix C.

5.2.2 Local input data used with the MOVES2014a model

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

5.2.2.1 Fuel data

Regarding the fuel local input data, MOVES2014a provides three MOVES tables, which are [fuelsupply], [fuelformulation], and [fuelusagefraction]. The fuel data for each month were derived from the 2014 fuel inspection results in Maricopa County provided by ADWM. The fuel data for Maricopa County were also applied to the PM_{10} nonattainment area. The specific MOVES tables for fuel data are presented in Appendix C.

5.2.2.2 I/M programs

MOVES2014a has an [IMCoverage] table for I/M programs, which reflects the actual proportions of vehicles subject to the specified levels of inspection. The term "I/M vehicles" denotes vehicles which are required to undergo an emission test and/or inspection under the Vehicle Inspection/Maintenance Program. It is important to note that participation in the I/M program is required for all vehicles registered in the Area A, with the exception of certain model years and vehicle classes. However, it is assumed that 91.6 percent of the vehicles operating within Maricopa County and the PM_{10} nonattainment area 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 same I/M programs were applied for Maricopa County and the PM_{10} nonattainment area. The specific MOVES table for I/M programs is presented in Appendix C.

5.2.2.3 Meteorological data

MOVES2014a requires hourly temperature and relative humidity data by specific month of the year. Meteorological data for the Phoenix Sky Harbor International Airport in 2014 were obtained from the National Climatic Data Center (http://www.ncdc.noaa.gov/IPS/lcd/lcd.html). The same hourly average temperature and relative humidity data for each month were applied for Maricopa County and the PM_{10} nonattainment area. The specific MOVES table [ZoneMonthHour] for meteorological data is presented in Appendix C.

5.2.2.4 Vehicle population

In MOVES2014a, off-network emissions including start, evaporative, and extended idle emissions are directly determined by population of vehicles in an area. The vehicle population in Maricopa County was obtained from the July 2014 vehicle registration data provided by ADOT. The vehicle population data were allocated to the 13 MOVES source types based on MOVES default vehicle population fractions for Maricopa County in 2014. The vehicle population in the PM_{10} nonattainment area was estimated by applying the population ratio of the two geographical areas to the vehicle population in Maricopa County. The population ratio for 2014 was derived from the MAG socioeconomic data, which are 3,998,000 people for the PM_{10} nonattainment area and 3,989,980 people for Maricopa County. The specific MOVES table [SourceTypeYear] for vehicle population is presented in Appendix C.

5.2.2.5 Source type age distribution

MOVES2014a categorizes vehicles according to vehicle classes and model years. The source type age distribution input table was prepared using EPA MOVES data converter and the vehicle registration data from ADOT. The same source type age distribution was applied for Maricopa County and the PM_{10} nonattainment area. The specific MOVES table [SourceTypeAgeDistribution] for source type age distribution is presented in Appendix C.

5.2.2.6 Annual VMT

The 2014 annual VMTs were used to estimate onroad exhaust and evaporative emissions. The 2014 annual average daily VMTs by HPMS vehicle type for Maricopa County and the PM_{10} nonattainment area were derived from the 2014 traffic assignment data provided by the MAG Transportation Modeling Group in July 2015. The annual average daily VMTs were multiplied by 365 days to obtain the annual VMTs. The specific MOVES table [HPMSvTypeYear] for annual VMT is presented in Appendix C.

5.2.2.7 Road type distribution

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

5.2.2.8 VMT fraction

Since VMT varies by month, day of week, and hour, MOVES2014a requires month/day/hour VMT fractions as a local input in order to derive hourly VMT for each weekday/weekend and month from the annual VMT. The month/day/hour VMT fractions were developed from data recorded by continuous traffic counters on freeways (ADOT Freeway Management System) and arterials (Phoenix Automatic Traffic Recorders) in 2007. The specific MOVES tables [MonthVMTFraction], [DayVMTFraction], and [HourVMTFraction] for VMT fractions are presented in Appendix C.

5.2.2.9 Average speed distribution

In MOVES2014a, vehicle power, speed, and acceleration have a significant effect on vehicle emissions for all pollutants. MOVES2014a estimates those emission effects by assigning activity to operating mode distributions, which are determined by the distribution of vehicle hours traveled (VHT) in sixteen speed bins. Local estimates of average speed were developed by post-processing the output from the 2014 traffic assignment data. To develop the average speed distribution, VHTs in sixteen speed bins were accumulated separately for each hour of the day, source type, and road type in Maricopa County. Then, the average speed distribution was calculated by normalizing VHTs in sixteen speed bins for each hour of the day, source type, and road type. The same methodology was applied to develop the speed estimates for the PM_{10} nonattainment area. The specific MOVES table [AvgSpeedDistribution] for the average speed distribution is presented in Appendix C.

5.2.2.10 Ramp fraction

MOVES2014a requires the ramp fraction, which represents the percent of vehicle hours traveled (VHT) on ramps, on both rural restricted roads (road type 2) and urban restricted roads (road type 4). The fraction of VHT on ramps was derived by dividing the total VHTs on ramps by the

total VHTs for each restricted road type. Those VHTs were obtained from the 2014 traffic assignment. The specific MOVES table [RoadType] for ramp fractions is shown in Appendix C.

5.2.2.11 Alternative vehicle and fuel technologies (AVFT) strategy

MOVES2014a allows users to modify the fuel engine fraction using different fuels and technologies in each model year in order to reflect the local situation. The fleet information for transit buses was provided by Valley Metro and used to prepare the AVFT input. Since the fleet data are available only for specific model years, MOVES2014a default values were obtained from the [fuelEngFraction] table in the MOVES default database and used for the rest of the model years. The specific MOVES table [AVFT] for AVFT strategy is shown in Appendix C.

5.2.2.12 Stage II refueling control programs

To account for the impact of Stage II refueling control programs on refueling losses, MOVES2014a requires the control efficiency for the local area. The control efficiency for the refueling displacement vapor losses in 2014 were provided by Arizona Department of Weights and Measures. The same program efficiency of 66.1% was applied to Maricopa County and the PM_{10} nonattainment area. The specific MOVES table [CountyYear] for Stage II refueling control programs is presented in Appendix C.

5.2.3 MOVES2014a outputs

MOVES2014a was executed with the RunSpec files described in Appendix C to obtain exhaust, tire wear, and brake wear emissions for PM_{10}, $PM_{2.5}$, NO_x, SO_2, and NH_3. These values were obtained for the following categories:

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

5.2.4 MOVES2014a emission estimates

MOVES2014a was used to generate onroad emissions by vehicle class, facility type, weekday/weekend day, and month. By specifying the output time aggregate level as month, MOVES2014a produces monthly emissions including weekday and weekend emissions for a given month. The annual emissions were calculated by aggregating monthly onroad emissions derived by MOVES2014a. The average daily emissions were calculated by dividing the annual emissions by 365 days.

Tables 5.2–1 and 5.2–2 show the calculated annual and typical daily PM_{10}, $PM_{2.5}$, NO_x, SO_2, and NH_3 emissions by road type and source type in Maricopa County and the PM_{10} nonattainment area, respectively. Emission estimates for PM_{10} and $PM_{2.5}$ in these tables represent exhaust, tire wear, and brake wear emissions.

Table 5.2–1. Annual and average daily onroad mobile source emissions in Maricopa County, by road and source type.

		Annual emissions (tons/year)					Average daily emissions (lbs/day)				
Road type	**Source type**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_2**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_2**	**NH_3**
Off-Network	Motorcycle	0.1	0.1	2.9	0.0	0.0	0	0	16	0	0
	Passenger car	47.2	41.8	3,947.7	3.6	0.0	259	229	21,635	20	0
	Passenger truck	19.1	16.9	1,785.2	1.1	0.0	105	93	9,784	6	0
	Light commercial truck	5.1	4.5	494.5	0.3	0.0	28	25	2,710	2	0
	Intercity bus	0.0	0.0	0.1	0.0	0.0	0	0	0	0	0
	Transit bus	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0
	School bus	0.2	0.1	2.3	0.0	0.0	1	1	13	0	0
	Refuse truck	0.0	0.0	0.1	0.0	0.0	0	0	1	0	0
	Single unit short-haul truck	0.9	0.8	88.0	0.1	0.0	5	5	482	0	0
	Single unit long-haul truck	0.0	0.0	2.3	0.0	0.0	0	0	13	0	0
	Motor home	0.0	0.0	4.9	0.0	0.0	0	0	27	0	0
	Combo short-haul truck	0.1	0.1	0.0	0.0	0.0	1	1	0	0	0
	Combo long-haul truck	27.3	25.1	2,030.6	0.7	5.6	150	138	11,129	4	31
Rural Restricted Access	Motorcycle	0.2	0.1	4.8	0.0	0.3	1	1	26	0	2
	Passenger car	4.4	3.9	225.5	2.5	20.5	24	21	1,236	14	112
	Passenger truck	1.9	1.7	154.9	0.9	6.3	10	9	849	5	34
	Light commercial truck	0.6	0.6	40.1	0.2	1.5	3	3	220	1	8
	Intercity bus	0.5	0.5	15.3	0.0	0.0	3	3	84	0	0
	Transit bus	0.4	0.4	24.2	0.0	0.1	2	2	133	0	1
	School bus	1.5	1.4	37.8	0.1	0.2	8	8	207	1	1
	Refuse truck	0.5	0.5	15.4	0.0	0.1	3	3	84	0	0
	Single unit short-haul truck	6.3	5.8	153.0	0.5	1.5	35	32	839	3	8
	Single unit long-haul truck	0.3	0.3	8.2	0.0	0.1	2	2	45	0	1
	Motor home	0.2	0.2	5.7	0.0	0.1	1	1	31	0	0
	Combo short-haul truck	13.8	12.7	431.8	1.3	2.0	76	70	2,367	7	11
	Combo long-haul truck	39.8	36.6	1,172.9	3.0	4.5	218	201	6,428	17	25
Rural Unrestricted Access	Motorcycle	0.4	0.3	12.8	0.1	0.7	2	2	70	0	4
	Passenger car	8.1	7.2	502.1	6.7	45.8	44	39	2,752	37	251
	Passenger truck	3.6	3.2	324.1	2.3	13.7	20	17	1,776	13	75
	Light commercial truck	1.4	1.3	90.1	0.6	3.3	8	7	494	3	18
	Intercity bus	0.3	0.3	6.8	0.0	0.0	2	2	37	0	0
	Transit bus	0.2	0.1	9.1	0.0	0.0	1	1	50	0	0
	School bus	0.8	0.8	13.9	0.0	0.1	5	4	76	0	0
	Refuse truck	0.9	0.8	19.1	0.1	0.1	5	5	105	0	0
	Single unit short-haul truck	9.9	9.1	204.3	0.7	2.0	54	50	1,120	4	11
	Single unit long-haul truck	0.5	0.5	11.1	0.0	0.1	3	3	61	0	1
	Motor home	0.2	0.2	6.5	0.0	0.1	1	1	36	0	0
	Combo short-haul truck	4.6	4.3	109.2	0.3	0.5	25	23	598	2	3
	Combo long-haul truck	13.2	12.2	300.8	0.7	1.2	72	67	1,649	4	7

Table 5.2–1. Annual and average daily onroad mobile source emissions in Maricopa County, by road and source type (continued).

		Annual emissions (tons/year)					Average daily emissions (lbs/day)				
Road type	**Source type**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_2**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_2**	**NH_3**
Urban Restricted Access	Motorcycle	2.4	2.1	54.0	0.3	3.1	13	12	296	2	17
	Passenger car	79.8	70.6	3,150.3	36.0	277.3	437	387	17,265	197	1,520
	Passenger truck	34.7	30.9	2,102.2	12.6	84.3	190	169	11,521	69	462
	Light commercial truck	10.3	9.3	543.9	3.1	20.0	57	51	2,981	17	109
	Intercity bus	1.9	1.7	43.8	0.1	0.1	10	9	240	0	1
	Transit bus	1.3	1.2	71.7	0.1	0.3	7	7	393	1	2
	School bus	5.3	4.9	112.9	0.3	0.5	29	27	619	1	3
	Refuse truck	6.5	6.0	156.1	0.4	0.7	36	33	856	2	4
	Single unit short-haul truck	79.3	72.7	1,776.2	6.4	16.1	435	398	9,735	35	88
	Single unit long-haul truck	4.4	4.0	97.7	0.4	1.0	24	22	535	2	6
	Motor home	2.4	2.2	62.0	0.2	0.6	13	12	340	1	3
	Combo short-haul truck	31.0	28.6	811.4	2.4	3.7	170	157	4,447	13	20
	Combo long-haul truck	89.1	81.9	2,205.7	5.6	8.4	488	449	12,088	31	46
Urban Unrestricted Access	Motorcycle	2.4	2.1	72.7	0.5	3.9	13	11	399	3	21
	Passenger car	67.9	60.1	4,131.7	58.9	367.6	372	329	22,644	323	2,014
	Passenger truck	30.6	27.3	2,578.9	20.0	106.3	168	150	14,133	110	582
	Light commercial truck	12.4	11.2	732.6	5.0	25.9	68	62	4,015	27	142
	Intercity bus	2.2	2.0	37.6	0.1	0.1	12	11	206	0	0
	Transit bus	0.7	0.7	39.6	0.1	0.2	4	4	217	0	1
	School bus	4.6	4.2	68.3	0.2	0.3	25	23	374	1	2
	Refuse truck	6.7	6.2	123.1	0.3	0.4	37	34	674	2	2
	Single unit short-haul truck	66.5	61.2	1,347.8	4.7	10.7	365	335	7,387	26	59
	Single unit long-haul truck	3.5	3.2	73.1	0.3	0.7	19	18	401	2	4
	Motor home	1.5	1.4	40.1	0.2	0.4	8	8	220	1	2
	Combo short-haul truck	21.3	19.6	412.3	1.2	1.6	117	108	2,260	6	9
	Combo long-haul truck	61.4	56.5	1,115.5	2.8	3.6	337	310	6,113	15	20

Summary, all road types:

	Motorcycle	2.4	2.1	72.7	0.5	3.9	13	11	399	3	21
	Passenger car	67.9	60.1	4,131.7	58.9	367.6	372	329	22,644	323	2,014
	Passenger truck	30.6	27.3	2,578.9	20.0	106.3	168	150	14,133	110	582
	Light commercial truck	12.4	11.2	732.6	5.0	25.9	68	62	4,015	27	142
	Intercity bus	2.2	2.0	37.6	0.1	0.1	12	11	206	0	0
	Transit bus	0.7	0.7	39.6	0.1	0.2	4	4	217	0	1
	School bus	4.6	4.2	68.3	0.2	0.3	25	23	374	1	2
	Refuse truck	6.7	6.2	123.1	0.3	0.4	37	34	674	2	2
	Single unit short-haul truck	66.5	61.2	1,347.8	4.7	10.7	365	335	7,387	26	59
	Single unit long-haul truck	3.5	3.2	73.1	0.3	0.7	19	18	401	2	4
	Motor home	1.5	1.4	40.1	0.2	0.4	8	8	220	1	2
	Combo short-haul truck	21.3	19.6	412.3	1.2	1.6	117	108	2,260	6	9
	Combo long-haul truck	61.4	56.5	1,115.5	2.8	3.6	337	310	6,113	15	20

Table 5.2–2. Annual and average daily onroad mobile source emissions in the PM_{10} nonattainment area, by road and source type.

		Annual emissions (tons/year)					Average daily emissions (lbs/day)				
Road type	**Source type**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_2**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_2**	**NH_3**
Off-Network	Motorcycle	0.1	0.1	3.0	0.0	0.0	0	0	16	0	0
	Passenger car	47.2	41.8	3,948.5	3.6	0.0	259	229	21,640	20	0
	Passenger truck	19.1	16.9	1,787.0	1.1	0.0	105	93	9,793	6	0
	Light commercial truck	5.1	4.5	495.0	0.3	0.0	28	25	2,713	2	0
	Intercity bus	0.0	0.0	0.1	0.0	0.0	0	0	0	0	0
	Transit bus	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0
	School bus	0.2	0.1	2.3	0.0	0.0	1	1	13	0	0
	Refuse truck	0.0	0.0	0.1	0.0	0.0	0	0	1	0	0
	Single unit short-haul truck	0.9	0.8	88.4	0.1	0.0	5	5	484	0	0
	Single unit long-haul truck	0.0	0.0	2.3	0.0	0.0	0	0	13	0	0
	Motor home	0.0	0.0	4.9	0.0	0.0	0	0	27	0	0
	Combo short-haul truck	0.1	0.1	0.0	0.0	0.0	1	1	0	0	0
	Combo long-haul truck	5.9	5.4	430.8	0.2	1.2	32	30	2,361	1	7
Rural Restricted Access	Motorcycle	0.1	0.1	2.7	0.0	0.2	1	1	15	0	1
	Passenger car	3.0	2.7	141.8	1.6	12.7	17	15	777	9	69
	Passenger truck	1.3	1.2	96.7	0.6	3.9	7	6	530	3	21
	Light commercial truck	0.4	0.4	24.9	0.1	0.9	2	2	136	1	5
	Intercity bus	0.1	0.1	3.2	0.0	0.0	1	1	18	0	0
	Transit bus	0.1	0.1	5.2	0.0	0.0	1	0	28	0	0
	School bus	0.3	0.3	8.2	0.0	0.0	2	2	45	0	0
	Refuse truck	0.3	0.2	7.5	0.0	0.0	2	1	41	0	0
	Single unit short-haul truck	3.2	2.9	77.5	0.3	0.7	18	16	425	2	4
	Single unit long-haul truck	0.2	0.2	4.2	0.0	0.1	1	1	23	0	0
	Motor home	0.1	0.1	2.8	0.0	0.0	1	1	16	0	0
	Combo short-haul truck	3.0	2.8	91.1	0.3	0.4	17	15	499	2	2
	Combo long-haul truck	8.8	8.1	247.3	0.6	0.9	48	44	1,355	4	5
Rural Unrestricted Access	Motorcycle	0.3	0.2	9.9	0.1	0.5	2	1	54	0	3
	Passenger car	6.6	5.8	404.0	5.5	36.7	36	32	2,214	30	201
	Passenger truck	2.9	2.6	259.6	1.9	10.9	16	14	1,423	10	60
	Light commercial truck	1.2	1.0	72.4	0.5	2.6	6	6	397	3	15
	Intercity bus	0.2	0.2	3.7	0.0	0.0	1	1	20	0	0
	Transit bus	0.1	0.1	4.6	0.0	0.0	1	0	25	0	0
	School bus	0.4	0.4	7.2	0.0	0.0	2	2	40	0	0
	Refuse truck	0.7	0.6	13.4	0.0	0.1	4	3	73	0	0
	Single unit short-haul truck	6.9	6.4	143.3	0.5	1.4	38	35	785	3	7
	Single unit long-haul truck	0.4	0.3	7.8	0.0	0.1	2	2	43	0	1
	Motor home	0.2	0.2	4.5	0.0	0.1	1	1	25	0	0
	Combo short-haul truck	2.6	2.4	59.2	0.2	0.3	15	13	325	1	2
	Combo long-haul truck	7.6	7.0	162.7	0.4	0.6	41	38	892	2	3

Table 5.2–2. Annual and average daily onroad mobile source emissions in the PM_{10} nonattainment area, by road and source type (continued).

Road type	Source type	Annual emissions (tons/year)					Average daily emissions (lbs/day)				
		PM_{10}	$PM_{2.5}$	NO_x	SO_2	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_2	NH_3
Urban Restricted Access	Motorcycle	2.4	2.1	54.3	0.3	3.1	13	12	298	2	17
	Passenger car	80.4	71.2	3,171.3	36.3	279.0	441	390	17,380	199	1,529
	Passenger truck	35.0	31.1	2,117.6	12.7	84.8	192	171	11,605	70	465
	Light commercial truck	10.4	9.3	547.8	3.1	20.1	57	51	3,002	17	110
	Intercity bus	1.9	1.7	44.0	0.1	0.1	10	9	241	0	1
	Transit bus	1.3	1.2	72.0	0.1	0.3	7	7	395	1	2
	School bus	5.3	4.9	113.5	0.3	0.5	29	27	622	1	3
	Refuse truck	6.5	6.0	157.4	0.4	0.7	36	33	863	2	4
	Single unit short-haul truck	79.7	73.0	1,786.1	6.4	16.2	437	400	9,788	35	89
	Single unit long-haul truck	4.4	4.0	98.2	0.4	1.0	24	22	538	2	6
	Motor home	2.4	2.2	62.3	0.2	0.6	13	12	341	1	3
	Combo short-haul truck	31.2	28.7	814.7	2.4	3.7	171	157	4,465	13	20
	Combo long-haul truck	89.5	82.3	2,215.8	5.6	8.5	490	451	12,143	31	46
Urban Unrestricted Access	Motorcycle	2.4	2.1	73.3	0.5	3.9	13	12	402	3	21
	Passenger car	68.3	60.5	4,158.5	59.3	370.0	374	331	22,791	325	2,028
	Passenger truck	30.8	27.5	2,598.0	20.1	107.1	169	151	14,238	110	587
	Light commercial truck	12.5	11.3	738.0	5.0	26.1	69	62	4,045	28	143
	Intercity bus	2.2	2.1	37.7	0.1	0.1	12	11	207	0	0
	Transit bus	0.7	0.7	39.7	0.1	0.2	4	4	218	0	1
	School bus	4.6	4.2	68.5	0.2	0.3	25	23	376	1	2
	Refuse truck	6.8	6.2	123.9	0.3	0.4	37	34	679	2	2
	Single unit short-haul truck	66.8	61.4	1,352.9	4.7	10.8	366	337	7,414	26	59
	Single unit long-haul truck	3.5	3.3	73.4	0.3	0.7	19	18	402	2	4
	Motor home	1.5	1.4	40.2	0.2	0.4	8	8	220	1	2
	Combo short-haul truck	21.4	19.7	413.4	1.2	1.6	117	108	2,266	6	9
	Combo long-haul truck	61.6	56.7	1,118.9	2.8	3.6	338	311	6,132	15	20

5.3 Fugitive dust emissions

While exhaust, tire wear, and brake wear emissions were calculated using the EPA MOVES2014a model, fugitive dust emissions from paved and unpaved roads were calculated using the equations found in sections 13.2.1 and 13.2.2 of the EPA Compilation of Air Pollutant Emission Factors, AP-42 (US EPA, 2006). The new AP-42 equation published by EPA in January 2011 has been applied to estimate the PM_{10} and $PM_{2.5}$ emissions from paved roads.

5.3.1 Paved road fugitive dust emissions

In the AP-42 equation, paved road emissions are a function of silt loading values and the average weight of vehicles traveling on paved road surfaces. Paved roads have been classified as freeways, high-traffic arterials, and low-traffic arterials to reflect different silt loading assumptions. An arterial carrying a traffic volume of less than 10,000 vehicles per average weekday is classified as low-traffic; all other roads that are not freeways are classified as high-traffic arterials. The silt loading levels, in grams per square meter, are 0.02 for freeways, 0.067 for high-traffic arterials, and 0.23 for low-traffic arterials. The silt loadings were derived from paved road samples collected in Maricopa County by an EPA contractor (US EPA, 1993). The average vehicle weights were derived from 2014 vehicle registrations for Maricopa County provided by the ADOT. The fugitive dust emission factors for paved roads were derived by applying the following AP-42 equation:

$$E = k \times sL^{0.91} \times W^{1.02} \times (1 - P/4N)$$

where: E = annual average particulate emission factor (g/mile),
k = particle size multiplier for particle size range (1.0 g/mile for PM_{10} and 0.25 g/mile for $PM_{2.5}$),
sL = road surface silt loading (0.02 g/m^2 for freeways, 0.067 g/m^2 for high-traffic arterials, and 0.23 g/m^2 for low-traffic arterials),
W = average weight of the vehicles traveling on the roads (3.25 tons on freeways and 2.38 tons on arterials),
P = annual number of "wet" days with at least 0.254 mm (0.01 in) of precipitation (22 days in 2014), and
N = annual number of days (365 days in 2014).

To determine the value of *P*, precipitation data for 2014 were obtained from National Oceanic and Atmospheric Administration (NOAA) in the form of local climatological data at Phoenix Sky Harbor Airport. The annual average PM_{10} and $PM_{2.5}$ emission factors for paved roads derived from the AP-42 equation are presented in Table 5.3–1.

The 2014 VMTs by silt loading category were used to estimate paved road fugitive dust emissions. Daily VMTs by silt loading category for Maricopa County and the PM_{10} nonattainment area are shown in Table 5.3–2. The VMTs were derived by applying geographic information systems (GIS) to a 2014 traffic assignment output by the MAG travel demand model, TransCAD. The 2014 weekday traffic volumes output by TransCAD were normalized to 2014 VMTs for Maricopa County and the PM_{10} nonattainment area to produce the annual average daily VMTs by silt loading category shown in Table 5.3–2.

Table 5.3–1. Fugitive dust emission factors for paved roads.

	Emission factors (g/mile)	
Silt loading category	**PM_{10}**	**$PM_{2.5}$**
Freeways	0.09	0.02
High-traffic arterials	0.20	0.05
Low-traffic arterials	0.63	0.16

Table 5.3–2. Annual vehicle miles traveled (VMT) for paved roads, by silt loading category.

	Daily VMT	
Silt loading category	**Maricopa County**	**PM_{10} NAA**
Freeways	37,194,608	35,914,038
High-traffic arterials	36,810,445	36,810,974
Low-traffic arterials	15,284,107	14,331,400
Totals:	**89,289,160**	**87,056,412**

Applying the emission factors in Table 5.3–1 to the VMTs in Table 5.3–2 and converting to pounds per day produces the 2014 uncontrolled particulate emissions from paved roads for Maricopa County and the PM_{10} nonattainment area, shown in Table 5.3–3. These uncontrolled

emissions do not include the 2014 emission reductions attributed to PM_{10}-certified street sweepers in the MAG 2012 Five Percent Plan for PM_{10} (MAG, 2012).

Table 5.3–3. Daily uncontrolled fugitive dust emissions from paved roads in 2014.

	Maricopa County (lbs/day)		PM_{10} NAA (lbs/day)	
Silt loading category	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Freeways	7,380	1,640	7,126	1,584
High-traffic arterials	16,231	4,058	16,231	4,058
Low-traffic arterials	21,228	5,391	19,905	5,055
Totals:	**44,839**	**11,089**	**43,261**	**10,696**

The MAG 2012 Five Percent Plan includes emission reduction credit for 78 PM_{10}-certified street sweepers purchased by December 31, 2006 with MAG Congestion Mitigation and Air Quality Improvement (CMAQ) funds, that were still in service on December 31, 2009. Reductions for the sweepers purchased by December 31, 2006 were also applied to base case uncontrolled paved road emissions in the MAG 2012 Five Percent Plan. The PM_{10} emission reduction benefit of these 78 sweepers is 5,097.2 pounds per day (lbs/day) in 2010. In 2014, this benefit is increased to 5,291.7 lbs/day, based on the 3.815 percent growth in arterial VMT in the PM_{10} nonattainment area between 2010 and 2014.

In addition, the MAG 2012 Five Percent Plan contains contingency measures implemented in 2007-2011 that reduce paved road emissions. These measures include Arizona Department of Transportation (ADOT) contracted PM_{10}-certified street sweeping of freeways and frontage roads (1,868.4 lbs/day), projects completed by local governments in 2008-2011 that paved and stabilized unpaved shoulders (822.0 lbs/day), ADOT overlays of state highways with rubberized asphalt (14.3 lbs/day), and 22 additional PM_{10}-certified street sweepers purchased with CMAQ funds in 2007–2009. The benefit of the 22 PM_{10}-certified street sweepers is increased from 767.1 lbs/day to 796.4 lbs/day, using the 3.815 percent growth in arterial VMT in the PM-10 nonattainment area between 2010 and 2014.

The total reduction of 8,792.8 pounds per day was subtracted from the uncontrolled PM_{10} emissions shown in Table 5.3–3 for both Maricopa County and the PM_{10} nonattainment area. This emission reduction represents 20.3 percent of the uncontrolled PM_{10} emissions of 43,261.4 pounds per day in the PM_{10} nonattainment area. This percent reduction was applied to the uncontrolled $PM_{2.5}$ emissions in the PM_{10} nonattainment area and the absolute reduction in $PM_{2.5}$ emissions was then applied to the uncontrolled $PM_{2.5}$ emissions in Maricopa County. The resultant controlled emissions in tons per year and pounds per day are shown in Table 5.3–4.

Table 5.3–4. Annual and average daily controlled fugitive dust emissions from paved roads.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	6,578.3	1,627.4	36,046	8,918
PM_{10} nonattainment area	6,290.5	1,555.8	34,469	8,525

5.3.2 Unpaved road fugitive dust emissions

AP-42 emission factors were applied to unpaved road and alley VMTs to estimate fugitive dust emissions (US EPA, 2006). The unpaved road and alley particulate emission factors were derived from the following AP-42 equation for publicly accessible unpaved roads, assuming a silt content of 11.9%, a soil moisture content of 0.5%, and an average speed of 25 miles per hour on public unpaved roads, 20 miles per hour on private unpaved roads and 10 miles per hour on unpaved alleys:

$$E = \left[\frac{k \left(\frac{s}{12}\right)^{1} \left(\frac{S}{30}\right)^{0.5}}{\left(\frac{M}{0.5}\right)^{0.2}} - C \right] \left(1 - \frac{P}{N}\right)$$

where: E = annual average particulate emission factor extrapolated for natural mitigation (lb/mile),
k = particle size multiplier for particle size range (1.8 lb/mile for PM_{10} and 0.18 lb/mile for $PM_{2.5}$),
s = surface material silt content (11.9%),
S = mean vehicle speed (25 mph for public unpaved roads, 20 mph for private unpaved roads and 10 mph for unpaved alleys),
M = surface material moisture content (0.5%),
C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lb/mile for PM_{10} and 0.00036 lb/mile for $PM_{2.5}$),
P = annual number of "wet" days with at least 0.254 mm (0.01 in) of precipitation (22 days in 2014), and
N = annual number of days (365 days in 2014).

The public unpaved road emission factors resulting from the above equation are 1.5308 pounds per mile for PM_{10} and 0.1528 pounds per mile for $PM_{2.5}$. The private unpaved road emission factors are 1.3692 pounds per mile for PM_{10} and 0.1366 pounds per mile for $PM_{2.5}$. The unpaved alley emission factors are 0.9680 pounds per mile for PM_{10} and 0.0965 pounds per mile for $PM_{2.5}$. These unpaved road and alley emission factors are consistent with the assumptions used in the MAG 2012 Five Percent Plan (MAG, 2012). These factors were applied to the annual average daily 2014 VMT estimates shown in Table 5.3–5.

The 2014 VMT for public unpaved roads in the PM_{10} nonattainment area was derived from the MAG 2009 Unpaved Road Inventory (MAG, 2010). The 2014 VMT for private unpaved roads in the PM_{10} nonattainment area was derived from a study of private unpaved roads and alleys conducted by MAG in August-September 2011 (MAG, 2011). The 2014 VMT for unpaved alleys was derived by multiplying a MAG GIS-derived estimate of 650 miles of dirt alleys by an annual average daily traffic (AADT) estimate of 4 vehicles per day. The AADT for alleys was also derived from the 2011 MAG study referenced above.

The 2014 Maricopa County VMT on unpaved roads and alleys was obtained by applying a ratio of 1.02564713 to the PM_{10} nonattainment area VMT in Table 5.3–5. This ratio represents 2014 VMT on all roads in Maricopa County to 2014 VMT on all roads in the PM_{10} nonattainment area, as shown in Table 5.3–6.

Table 5.3–5. Annual vehicle miles traveled (VMT) on unpaved roads in Maricopa County and the PM_{10} nonattainment area, by road ownership type.

	2014 annual average daily VMT		
Geographic area	Unpaved public roads	Unpaved private roads	Unpaved alleys
Maricopa County	12,448	24,795	2,667
PM_{10} nonattainment area	12,137	24,175	2,600

Table 5.3–6. Annual vehicle miles traveled (VMT) on all roads in Maricopa County and the PM_{10} nonattainment area.

Geographic area	2014 annual average daily VMT	Ratio to 2014 annual average daily VMT in the PM_{10} NAA
Maricopa County	89,289,160	1.02564713
PM_{10} nonattainment area	87,056,413	1.00000000

Multiplying the unpaved road emission factors by the VMTs in Table 5.3–5 results in the emissions shown in Table 5.3–7. These uncontrolled emissions do not include the emission reductions attributable to contingency measures in the MAG 2012 Five Percent Plan for PM_{10} that were implemented by 2011. In addition, the uncontrolled emissions do not include credit for paving projects in the MAG Transportation Improvement Program (TIP) that were implemented in 2012 and 2013.

Table 5.3–7. Daily uncontrolled unpaved road and alley fugitive dust emissions.

	PM_{10} (lbs/day)		$PM_{2.5}$ (lbs/day)	
Geographic area	Unpaved Roads	Unpaved Alleys	Unpaved Roads	Unpaved Alleys
Maricopa County	53,005	2,582	5,289	257
PM_{10} NAA	51,680	2,517	5,157	251

The MAG 2012 Five Percent Plan (MAG, 2012) identifies a large number of projects that were implemented in 2008–2011 to pave and reduce speed limits on unpaved roads and alleys in the PM_{10} nonattainment area (MAG, 2012). In 2014, the total PM_{10} emission reduction credit for these projects is 15,270.3 pounds per day. In addition to the benefits in the MAG 2012 Five Percent Plan, the total PM_{10} emission reduction for unpaved roads needs to include credit for CMAQ-funded road and alley paving projects and other paving projects in the MAG FY11–18 TIP that were implemented by the end of 2013. This additional emission reduction for CMAQ and TIP paving projects is 4,199.9 pounds per day for 2014. The total unpaved road emission reduction of 19,470.2 pounds per day was subtracted from the total uncontrolled unpaved road and alley PM_{10} emissions shown in Table 5.3–7 for both Maricopa County and the PM_{10} nonattainment area. This reduction represents 35.9 percent of the total uncontrolled unpaved road and alley emissions of 54,196.5 pounds per day in the PM_{10} nonattainment area. This 35.9 percent reduction was applied to the uncontrolled $PM_{2.5}$ emissions in the PM_{10} nonattainment area and the absolute reduction in $PM_{2.5}$ emissions was then applied to the uncontrolled $PM_{2.5}$ emissions in Maricopa County. The resultant controlled unpaved road and alley emissions in tons per year and pounds per day are shown in Table 5.3–8.

Table 5.3–8. Annual and average daily controlled fugitive dust emissions from unpaved roads and alleys for Maricopa County and the PM_{10} nonattainment area.

	Annual emissions (tons/yr)		Typical daily emissions (lbs/day)	
Geographic area	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Maricopa County	6,591.2	657.9	36,116	3,605
PM_{10} nonattainment area	6,337.6	632.6	34,726	3,466

5.4 Quality assurance process

5.4.1 VMT estimates

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

5.4.2 Emission estimates

The quality assurance process performed on the MOVES2014a analyses included accuracy, completeness, and reasonableness checks. For accuracy and completeness, all calculations were checked by an independent reviewer. Any errors found were corrected and the changes were then rechecked by the reviewer.

5.4.3 Draft particulate matter emissions inventory

The draft onroad mobile source portion of the 2014 periodic emissions inventory for PM_{10} was reviewed using published EPA quality review guidelines for base year emission inventories (US EPA, 1992b). The procedure review (Levels I, II, and III) included checks for completeness, consistency, and the correct use of appropriate procedures.

5.5 Summary of all onroad mobile source emissions

Table 5.5–1 summarizes the annual emissions and the average daily emissions for PM_{10}, $PM_{2.5}$, NO_x, SO_2, and NH_3 from all onroad mobile sources in Maricopa County in 2014. Similar data for the PM_{10} nonattainment area are presented in Table 5.5–2.

Table 5.5–1. Annual and typical daily emissions from all onroad mobile sources in Maricopa County.

	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
Emission category	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**NH_3**
Exhaust, tire wear and brake wear	844.6	765.7	34,219.1	187.7	1,047.6	4,629	4,196	187,536	1,029	5,742
Paved road fugitive dust	6,578.3	1,627.4	—	—	—	36,046	8,918	—	—	—
Unpaved road and alley fugitive dust	6,591.2	657.9	—	—	—	36,116	3,605	—	—	—
Totals:	**14,014.2**	**3,051.1**	**34,219.1**	**187.7**	**1,047.6**	**76,791**	**16,719**	**187,536**	**1,029**	**5,742**

Table 5.5–2. Annual and typical daily emissions from all onroad mobile sources in the PM_{10} nonattainment area.

Emission category	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3	PM_{10}	$PM_{2.5}$	NO_x	SO_x	NH_3
Exhaust, tire wear and brake wear	763.0	690.7	30,718.6	180.4	1,017.8	4,181	3,785	168,352	989	5,578
Paved road fugitive dust	6,290.5	1,555.8	—	—	—	34,469	8,525	—	—	—
Unpaved road and alley fugitive dust	6,337.6	632.6	—	—	—	34,726	3,466	—	—	—
Totals:	**13,391.0**	**2,879.1**	**30,718.6**	**180.4**	**1,017.8**	**73,376**	**15,777**	**168,352**	**989**	**5,578**

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US EPA, 2015c. MOVES2014a Software Design Reference Manual, U.S. Environmental Protection Agency, EPA-420-B-15-096, November 2015.
US EPA, 2015d. MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity, U.S. Environmental Protection Agency, EPA-420-B-15-093, November 2015.

6. Biogenic Sources

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6.1 Introduction

Biogenic emissions has been estimated for the 2014 Periodic Emissions Inventory (PEI) for PM_{10} precursor in Maricopa County and the PM_{10} nonattainment area (NAA) using the Model of Emissions of Gases and Aerosols from Nature (MEGAN), a state-of-the-art biogenic emissions model developed by the National Center for Atmospheric Research (NCAR). Some important corrections and improvements were made in the latest version of MEGAN2.1 (Jiang et al., 2011; Guenther et al., 2012) compared to its previous versions (Guenther, 2006a, 2006b, and 2007; Guenther et al., 2006). Nitrogen oxides (NO_x) emissions are reported in the PM_{10} emission inventory.

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

In contrast, meteorology data measured at the Southwest Solar Research Park were applied to all grid cells of the modeling domain in the 2011 PEI. The biogenic emissions were estimated for one representative day of each month using the monthly average diurnal cycle of the meteorological data at the site. The daily emissions were then multiplied by the number of days for each month to calculate the monthly total emissions. The monthly total emissions were summed together for annual emissions. Since daily biogenic emissions have a large range of temporal and spatial variability depending on the day-to-day weather conditions, the use of more dynamic values provided by the WRF meteorology resulted in an increase in the monthly and annual biogenic NO_x emissions in the 2014 PEI as compared to the 2011 PEI.

6.2 Modeling domain

MEGAN inputs and outputs are based on the user-defined two-dimensional grid cells. A 4-km grid modeling domain covering Maricopa County and portions of neighboring counties are employed to develop biogenic emissions with MEGAN. The target areas for the development of biogenic emissions are the PM_{10} nonattainment area and Maricopa County within the 4-km domain. The modeling domain is defined with a Lambert Conformal Conic Projection (LCP) coordinate system presented in Table 6.2–1. Additional input files to mask areas covered by the PM_{10} nonattainment area and Maricopa County are developed by using Geographic Information Systems (GIS) software to calculate emissions for those two target areas. The masking file assigns 1.0 for the grid cells fully covered by the target area, a fractional value for grid cells partially covered by the target area (e.g., boundaries of Maricopa County or the PM_{10} nonattainment area), and 0.0 for grid cells outside the target area. As shown in Figure 6.2–1, biogenic emissions for the PM_{10} nonattainment area and Maricopa County are extracted from MEGAN simulations using the masked grid cells in the 4-km modeling domain.

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

Grid horizontal resolution	Grid size	LCP range (km)	Target areas
4 km	56 × 44	(32.4989, –113.3869) to (34.07317, –111.0435)	PM_{10} NAA and Maricopa County

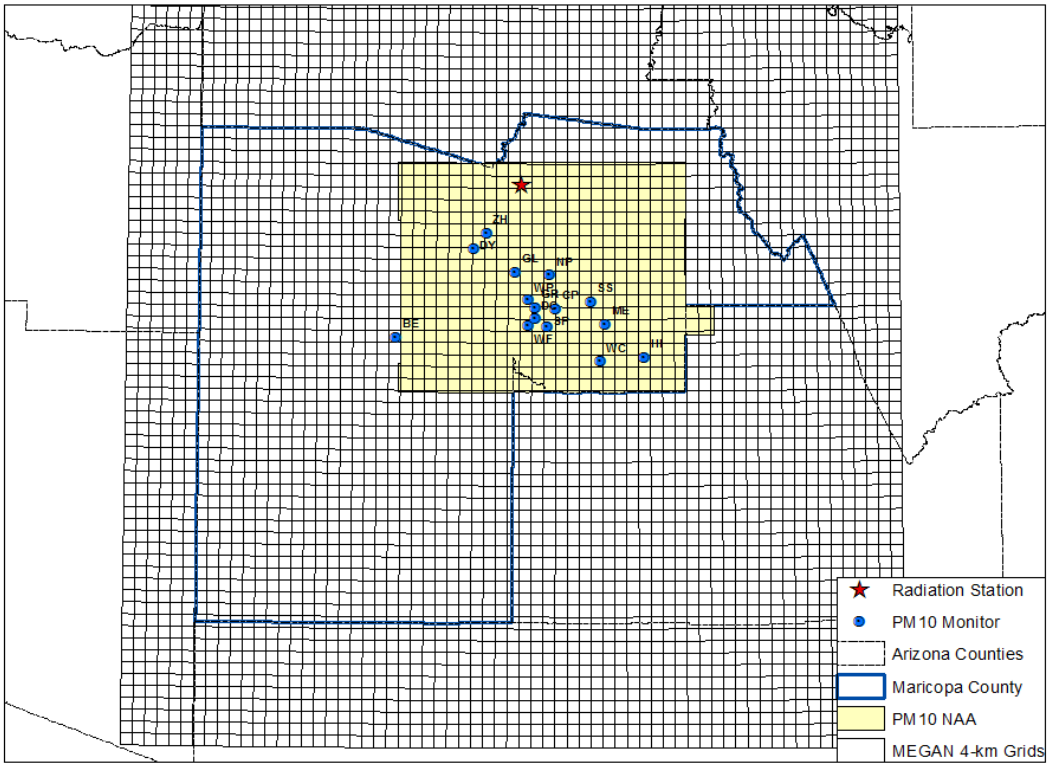


Figure 6.2–1. The masked grid cells in the 4-km modeling domain.

6.3 Input data

To calculate biogenic emissions using MEGAN, the land cover data and meteorological data need to be prepared as inputs.

6.3.1 Land cover data

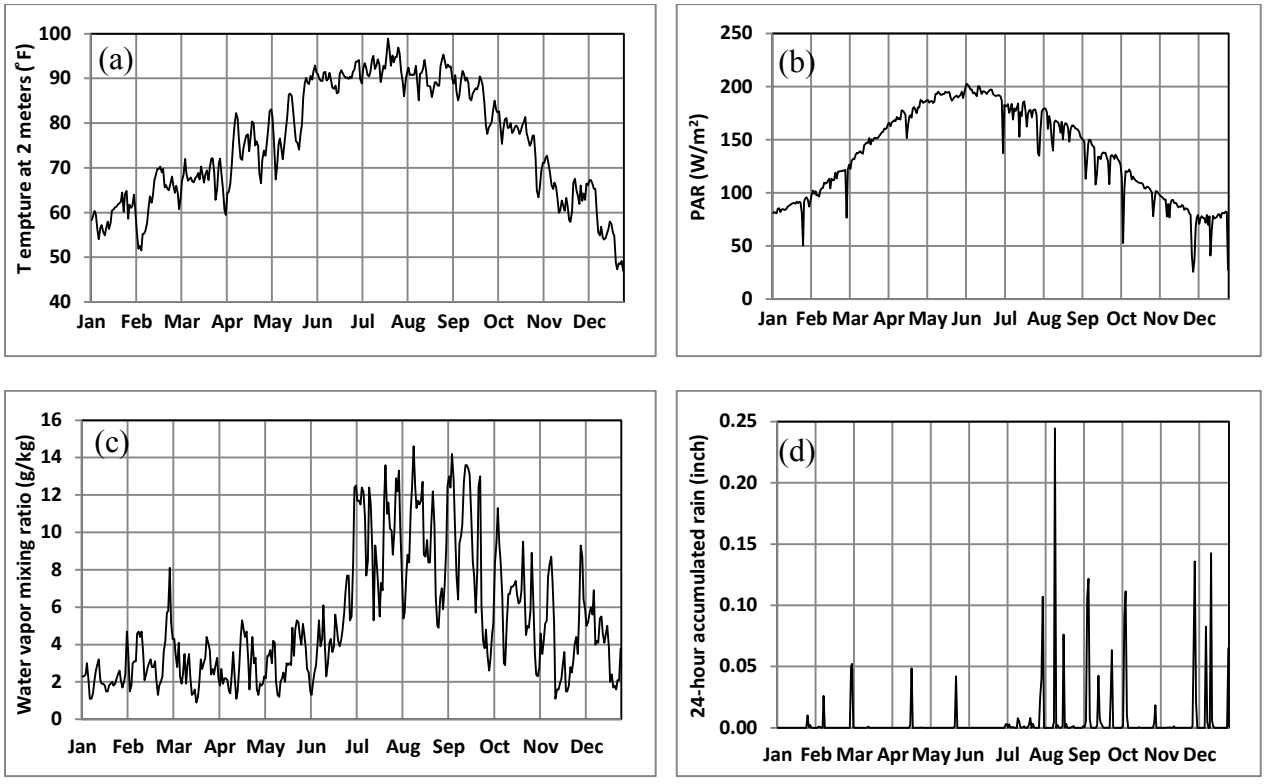
Land cover datasets released with MEGAN v2.1 include eight-day average leaf area index (LAI), percentages of 16 plant functional types (PFT), and emission factors (EF). The LAI data are based on a resolution of 30 arc-seconds (approximately 1 km) dataset from the North America Leaf Index (version 2011);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

6.3.2 Meteorological data

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

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

In order to examine the reliability of WRF model results, temperature, the water vapor mixing ratio, wind speed, and solar radiation are validated using hourly observational datasets from standard National Weather Service (NWS; DS472.0) and the Arizona Meteorological Network (AZMET) stations. There are 12 NWS and 13 AZMET stations within the 4-km grid modeling domain. The model validation results are illustrated in Figure 6.3–2. Temperature and water vapor mixing ratio are well replicated with coefficients of determination (R^2) above 0.9. The positive bias of solar radiation indicates the overestimation of PAR and solar radiation by WRF; likely due to inaccurately modeled cloud cover data.



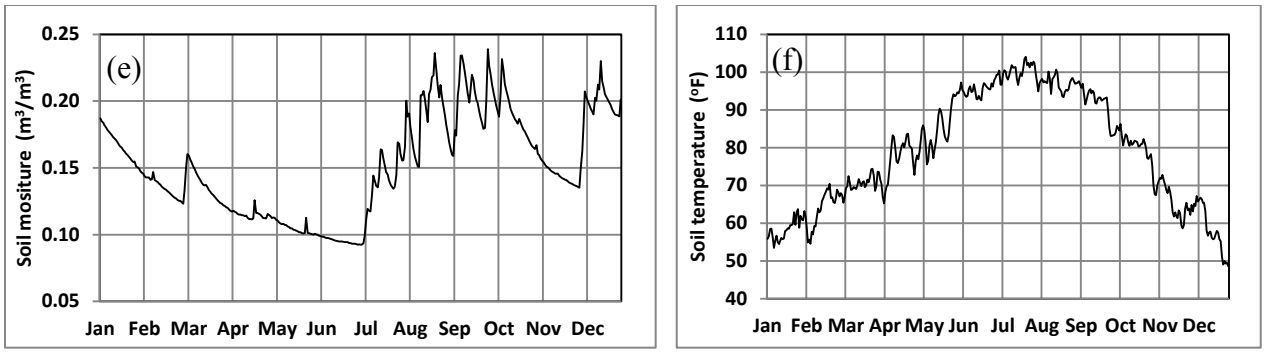


Figure 6.3–1. Daily averages of meteorological variables derived from WRF simulations for 2014. (a) air temperature at 2-m height, (b) PAR, (c) water vapor mixing ratio, (d) 24-hour accumulated precipitation, (e) soil moisture, and (f) soil temperature.

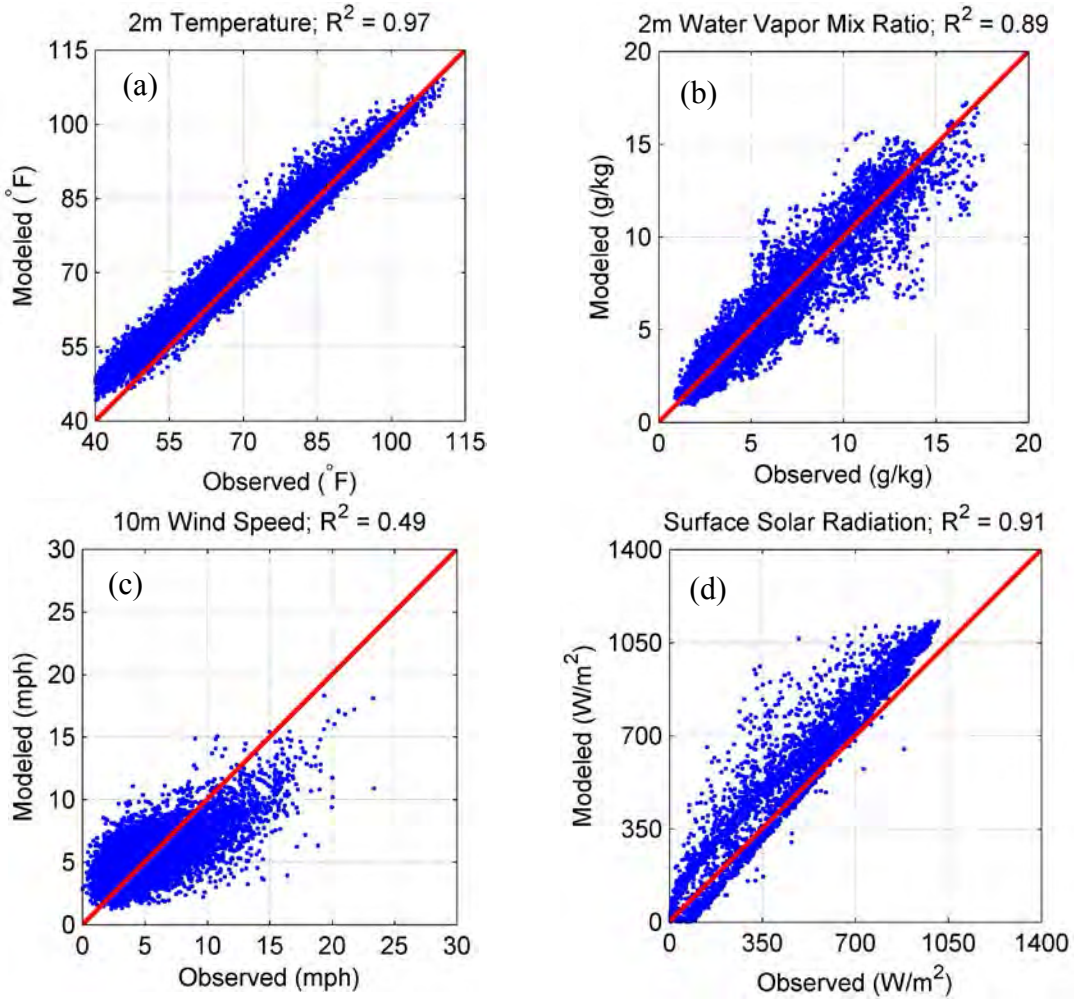


Figure 6.3–2. Validation results of WRF model simulations using hourly observational data from NWS and AZMET: (a) air temperature at 2-m height, (b) water vapor mixing ratio, (c) wind speed, and (d) surface solar radiation. Results are based on paired hourly modeled and observed data for all of 2014.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

6.4 Emission estimation

Daily average and monthly NO_x biogenic emissions for each month in 2014 are provided in Table 6.4–1 for the PM_{10} nonattainment area and Maricopa County, respectively. Daily average emissions in 2014 (a) and annual mean diurnal cycle (b) of NOx for Maricopa County and the PM_{10} nonattainment area are illustrated in Figure 6.4–1. The maximum emissions occurred during the ozone season (June–August), as temperature and solar radiation reached their highest levels during these summer months.

Table 6.4–1. Average daily biogenic NO_x emissions in 2014 for Maricopa County and the PM_{10} nonattainment area, by month.

	Maricopa County		PM_{10} nonattainment area	
Month	Monthly (tons/month)	Daily average (lbs/day)	Monthly (tons/month)	Daily average (lbs/day)
January	16.6	1,068	6.0	386
February	30.1	2,147	11.4	817
March	46.8	3,021	18.6	1,200
April	58.6	3,905	22.9	1,527
May	99.6	6,425	39.3	2,532
June	155.4	10,360	60.9	4,060
July	194.2	12,531	76.3	4,925
August	167.6	10,813	63.7	4,110
September	124.5	8,297	46.7	3,112
October	62.3	4,021	21.3	1,376
November	17.5	1,166	6.1	406
December	14.8	954	5.4	351

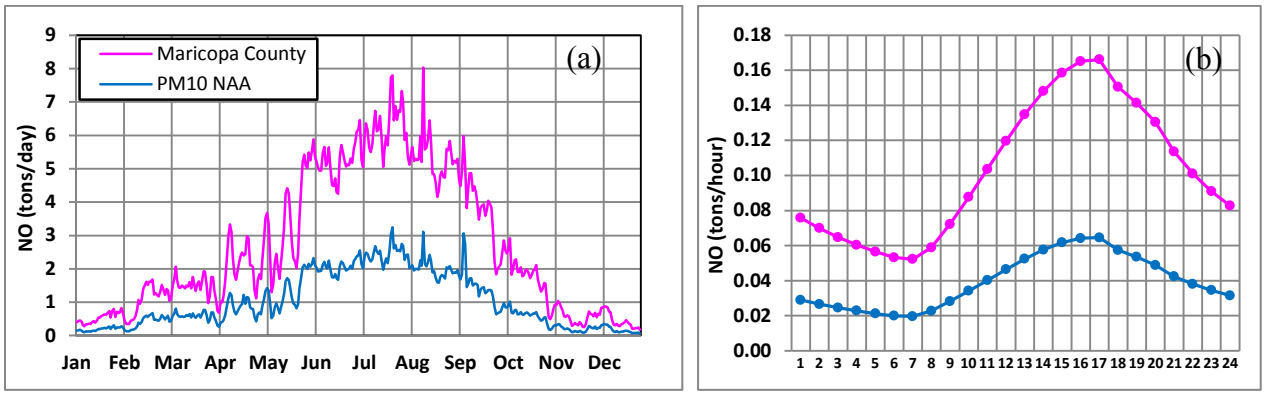


Figure 6.4–1. Average daily biogenic NO_x emissions, by month (left) and diurnal emission cycle (right), for both Maricopa County (pink line) and the PM_{10} nonattainment area (blue line).

6.5 Summary of all biogenic source emissions

Daily average and annual NO_x emissions from biogenic sources in Maricopa County and the PM_{10} nonattainment area are provided in Table 6.5–1.

Table 6.5–1. Annual and typical daily biogenic NO_x emissions for Maricopa County and the PM_{10} nonattainment area.

Geographic area	Annual emissions (tons/yr)	Typical daily emissions (lbs/day)
Maricopa County	987.9	5,392
PM_{10} nonattainment area	378.7	2,067

6.6 References

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Appendix A. Instructions for Reporting 2014 Annual Air Pollution Emissions

Maricopa County
Air Quality Department

INSTRUCTIONS

FOR REPORTING 2014

ANNUAL AIR POLLUTION EMISSIONS

revised
January 2015

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

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

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

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WHAT'S NEW FOR 2014?

Emission factors, codes, etc.:

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

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

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

Reporting forms:

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

- Many of our reporting forms have changed in past years. If you develop your own forms, or a computerized reproduction of our forms, the forms used ***must*** conform to the current information requirements and **FORMAT** as supplied on our preprinted forms. "Homemade" reporting forms that vary significantly from the preprinted forms sent to you will ***not*** be accepted.

Miscellaneous:

- **Non-operational facilities**: Any facility that has been issued an air quality permit, but that did NOT operate at any time during 2014, must still respond in writing to this request for annual emissions information, as a condition of its air quality permit. Please provide ALL information requested on both the "Business Form" and the "Data Certification Form", and submit these forms, along with a letter certifying that there were no operations at the facility during calendar year 2014, by the due date shown on the Business Form.
- **Emissions fees for Title V facilities:** In accordance with Maricopa County Air Pollution Control Rule 280 (Fees), the 2014 annual emission fee for Title V sources is $42.21/ton. **NOTE:** Only emissions from Title V sources (those whose air quality permit numbers have a **"V"** prefix) are subject to this annual emissions fee.

I. INTRODUCTION

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

Follow these steps to complete your 2014 Maricopa County emissions inventory:

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

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

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

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

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

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

II. REPORTING REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

EMISSION CALCULATION METHOD HIERARCHY:

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

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

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

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

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

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

III. CONFIDENTIALITY OF DATA SUBMITTED

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

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

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

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

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

a. A person has taken reasonable measures to protect from disclosure and the person intends to continue to take such measures.
b. The information is not, and has not been, reasonably obtainable without the person's consent by other persons, other than governmental bodies, by use of legitimate means, other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding.
c. No statute, including ARS §49-487, specifically requires disclosure of the information to the public.
d. The person has satisfactorily shown that disclosure of the information is likely to cause substantial harm to the business's competitive position.

§ **402 CONFIDENTIALITY OF INFORMATION:**

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

a. Precisely identifies the information in the permit(s), records, or reports which is considered confidential.
b. Provides sufficient supporting information to allow the Control Officer to evaluate whether such information satisfies the requirements related to trade secrets as defined in Section 200.107 of this rule.

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

- Specific data which you request be held confidential must be identified by marking an "X" in the corresponding gray confidentiality box(es) on the relevant report forms.
- Provide a written explanation which gives factual information satisfactorily describing why releasing this information could cause substantial harm to the business's competitive position.
- Use the gray-shaded boxes on the reporting forms to indicate which data are to be held confidential. Do NOT stamp "Confidential", highlight data, or otherwise mark the page.

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

IV. HELPFUL HINTS AND INFORMATION

Be sure to verify all preprinted information on forms. If any information is incorrect or blank, please provide correct information. Making a change on the Business Form will **NOT** transfer the permit ownership or location. You must contact the Department's Business Assistance Program at (602) 506-5102 or the Engineering & Permitting Division at (602) 506-6094 to accomplish this.

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

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

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

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

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

GROUPING MATERIALS AND/OR EQUIPMENT UNDER ONE PROCESS ID:

You can group together under one process ID:

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

ASSIGNING IDENTIFICATION NUMBERS (IDs):

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

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

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

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

COMMONLY USED CONVERSION FACTORS:

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

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

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

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

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

V. INSTRUCTIONS AND EXAMPLES FOR COMPLETING EMISSIONS REPORTING FORMS

Business Form Instructions

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

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

Data fields:

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

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

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

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

Stack Form Instructions

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

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

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

EXAMPLE Stack Form Information:

1	2	3	4	5a OR 5b		6a OR 6b & 6c			7
Stack ID	Stack Type Code*	Stack Height**	Exit Gas Temperature	Velocity feet/sec	Flow Rate acfm	Diameter inside inch	Length / Width inside inch		Stack Name/Description. Include lat/long coordinates of stack (in decimal degrees)
1	*W*	*30* ft	*90* ^{o}F		*20,000*	*36*			*paint booth* **Lat: N33.5277 Long: W112.2626**
2	*V*	*14* ft	*200* ^{o}F		*19,186*	*40*			*thermal oxidizer, Bldg. 2* **Lat:N33.5259 Long:W112.2613**

* Stack Type Codes: **V** = Vertical unobstructed; **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: http://www.maricopa.gov/aq/divisions/planning_analysis/emissions inventory/Default.aspx or call (602) 506-6790 for assistance.

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

General Process Form Instructions

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

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

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

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

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

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

6 Seasonal Throughput Percent: Enter the percent of total annual operating time that occurred per season, rounded to the nearest percent. For example, "Dec-Feb 30% " means 30% of total annual activity occurred in January, February and December 2014. The total for all four seasons must equal 100%.

7 Normal Operating Schedule and
8 Typical Hours of Operation:
These reflect the normal daily, weekly, and annual operating parameters of ***this process*** during 2014.

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

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

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

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

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

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

General Process Form Instructions (continued)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

General Process Form 2014

EXAMPLE: Internal Combustion

Permit number(s) v99999

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

1- Process ID 80

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

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

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

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

6- Seasonal Throughput Percent: Dec-Feb 20 % Mar-May 25 % Jun-Aug 30 % Sep-Nov 25 %

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

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

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

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

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

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

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

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

*** Calculation Method Codes:**

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

**** Control Efficiency Reference Codes:**

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

General Process Form **2014**

EXAMPLE: Unpaved Road Travel

Permit number(s) V99999

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

1- Process ID 28

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

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

4- Process TIER Code: 140799 MISCELLANEOUS: FUGITIVE DUST

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

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

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

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

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

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

11- Annual Amount: *(a number)* 7,500 12- Fuel Sulfur Content (in percent) _____ %

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

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

	Emission Factor (EF) Information					Control Device Information					
15	**16**		**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Pollutant	Emission Factor (EF) (number)		Emission Factor Unit (lb per)	Controlled EF? Yes or No	Calculation Method Code*	Capture % Efficiency	Primary Control Device ID	Secondary Control Device ID	Control Device(s) % Efficiency	Efficiency Reference Code**	Estimated Actual Emissions
PM-10	3.2		VMT	N	6	100	4		90	6	2400 lbs
											lbs
											lbs
											lbs
											lbs
											lbs

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

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

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

Evaporative Process Form Instructions

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

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

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

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

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

3 Seasonal Throughput Percent: Enter the percent of total annual operating time that occurred per season (rounded to the nearest percent). For example, "Dec-Feb 30% " means 30% of the total annual activity occurred during January, February and December 2014. The total for all four seasons must equal 100%.

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

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

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

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

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

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

Evaporative Process Form (continued)

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

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

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

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

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

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

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

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

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

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

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

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

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

EXAMPLE: Coating and Painting

Evaporative Process Form 2014

Permit number(s) V99999

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

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

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

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

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

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

6	7	8	9		10	11		12	13	14			15
Process ID	Stack ID(s)	Material Type	Annual Usage Input	lb or gal	VOC, HAP&NON or NHx	Emission Factor	EF Units (lbs per)	Pounds of pollutant* sent off site	Capture Efficiency %	Control ID	Control Efficiency %	Control Efficiency Code**	Estimated Emissions (lbs/yr)
800	*1*	*Lacquer 6455-06*	*95*	*gl*	*VOC*	*4.7*	*gal*		%		%		*447*
801	*1*	*lacq thinner*	*120*	*gl*	*VOC*	*7.1*	*gal*		%		%		*852*
802	*1*	*Paint red 4039-03*	*940*	*gl*	*VOC*	*4.2*	*gal*		%		%		*3,948*
803	*1*	*Toro-Red Paint*	*707*	*gl*	*VOC*	*7.0*	*gal*		%		%		*4,949*
803	*1*	*Toro-Red Paint*	*707*	*gl*	*HAP&NON*	*0.5*	*gal*		%		%		*354*
804	*1*	*powder paint 8730-11*	*20,200*	*lb*	*VOC*	*0.001*	*lb*		%		%		*20*

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

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

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

**** Control Efficiency Reference Codes**

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

EXAMPLE: Cleaning solvent (with recycling)

Evaporative Process Form 2014

Permit number(s) V99999

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

1- Process Type/Description: CLEANING METAL PARTS

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

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

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

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

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

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

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

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

EXAMPLE

Off-Site Recycling/Disposal Form 2014

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

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

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

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

2) What was the quantity of this waste stream in 2014? 2,400 *Check one:* ☐ pounds ☒ gallons
Indicate whether this quantity is reported in pounds or gallons. Keep waste disposal company manifests as proof that this amount of waste was taken off-site.

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

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

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

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

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

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

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

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

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

EXAMPLE: Documentation of Emission Factor Calculations

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

Emission Factor Calculation

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

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

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

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

Weighted average sample calculation

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

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

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

Process ID #	Material Type	2014 Usage	Units	VOC (lbs/unit)	VOC Emissions (= Usage × VOC content)	Percent contributed to waste stream
6	gun cleaner	180	gal	7.2	1,296 lbs.	5.6 %
7	xyz stripper	1,300	gal	3.3	4,290 lbs.	18.5 %
8	cleaning solvent	358	gal	6.4	2,291 lbs.	9.9 %
9	MEGASOLVE	2,258	gal	6.8	15,354 lbs.	66.1 %
	Totals:	4,096	**gal**		**23,231 lbs.**	100.0 %

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

EXAMPLE (for all sources except Title V sources)

Data Certification Form 2014

Permit number ***999999***

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

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

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

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

TO COMPLETE YOUR EMISSIONS INVENTORY REPORT:

- Complete the Confidentiality Statement below.
- Sign and date this form below where indicated.
- Send the **original** copy of your completed forms to: Maricopa County Air Quality Dept., Emissions Inventory Unit,1001 North Central Avenue, Suite 125, Phoenix, AZ 85004.
- Keep a copy of all forms for your records.

CONFIDENTIALITY STATEMENT:

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

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

CERTIFICATION STATEMENT:

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

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

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

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

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

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

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

SCC	Major Category	Subcategory	Facility / Process Type	Process Description
30200814	Industrial Processes	Food and Agriculture	Feed Manufacture	Storage
30300834	Industrial Processes	Primary Metal Production	Iron Production	Paved Road Travel
30400737	Industrial Processes	Secondary Metal Production	Steel Foundries	Raw Material Silo
30500120	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Storage Bins: Ferric Chloride
30500121	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Storage Bins: Mineral Stabilizer
30500134	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Blown Saturant Storage
30500135	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Blown Coating Storage
30500141	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Granules Storage
30500143	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Mineral Dust Storage
30500203	Industrial Processes	Mineral Products	Asphalt Concrete	Storage Piles
30500212	Industrial Processes	Mineral Products	Asphalt Concrete	Heated Asphalt Storage Tanks
30500213	Industrial Processes	Mineral Products	Asphalt Concrete	Storage Silo
30500290	Industrial Processes	Mineral Products	Asphalt Concrete	Haul Roads: General
30500303	Industrial Processes	Mineral Products	Brick Manufacture	Storage of Raw Materials
30500608	Industrial Processes	Mineral Products	Cement Manufacturing (Dry Process)	Raw Material Piles
30500708	Industrial Processes	Mineral Products	Cement Manufacturing (Wet Process)	Raw Material Piles
30501710	Industrial Processes	Mineral Products	Mineral Wool	Storage of Oils and Binders
30502007	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Open Storage
30502012	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Hauling
30502504	Industrial Processes	Mineral Products	Construction Sand and Gravel	Hauling
30502507	Industrial Processes	Mineral Products	Construction Sand and Gravel	Storage Piles
30502760	Industrial Processes	Mineral Products	Industrial Sand and Gravel	Sand Handling, Transfer, & Storage
30531090	Industrial Processes	Mineral Products	Coal Mining, Cleaning, Material Handling	Haul Roads: General
30532007	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Open Storage
30704002	Industrial Processes	Pulp and Paper & Wood Pdts.	Bulk Handling and Storage - Wood/Bark	Stockpiles
31100199	Industrial Processes	Building Construction	Construction: Building Contractors	Other Not Classified
31100299	Industrial Processes	Building Construction	Demolitions/Special Trade Contracts	Other Construction/Demolition
50100401	Waste Disposal	Solid Waste Disposal	Landfill Dump	Unpaved Road Traffic
50100402	Waste Disposal	Solid Waste Disposal	Landfill Dump	Fugitive Emissions
50100403	Waste Disposal	Solid Waste Disposal	Landfill Dump	Area Method
50100404	Waste Disposal	Solid Waste Disposal	Landfill Dump	Trench Method
50100405	Waste Disposal	Solid Waste Disposal	Landfill Dump	Ramp Method

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

3. Divide your facility's total billable emissions (on line 6) by 2000 to convert pounds into tons. **Round to the nearest ton.** Enter this value on line 7. Multiply this number by **$42.21**, and enter the result on line 8. This is your 2014 emission fee.

EXAMPLE (for Title V sources only)

Data Certification/Fee Calculation Form 2014

Permit number **v99999**

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

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

	Summary of 2014 Annual Emissions:	(1) Totals from Process Forms	(2) + Accidental Releases	(3) = TOTAL 2014 Emissions
	CO	2,113	0	2,113
	NH_x	0	0	0
	Lead	0	0	0
	PM_{10} (non-billable; see page 22)	2,400	0	2,400
	Emissions fees are based on your emissions of the following pollutants ONLY:			
1	HAP&NON	354	0	354
2	VOC	24,220	0	24,220
3	NO_x	9,815	0	9,815
4	SO_x	645	0	645
5	PM_{10} (billable; see page 22)	691	0	691
6	**Add "TOTAL" column from lines 1 through 5 ONLY:**			35,725 lbs.
7	Divide the total on line 6 by 2000 (pounds per ton) to get tons, and round the number to the nearest ton. (Drop any decimal of .499 or less. Increase to the next whole number any decimal of .500 or more.) Enter the resulting WHOLE NUMBER here.			18 TONS
8	Multiply line 7 (a WHOLE number) by **$ 42.21**. This is your **2014 ANNUAL EMISSION FEE**.			$ 759.78

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

TO COMPLETE YOUR EMISSIONS INVENTORY REPORT:

- Include a check (made payable to Maricopa County Air Quality Department) for the amount calculated on line 8 above.
- Complete the Confidentiality Statement below.
- Sign and date this form below where indicated.
- Send the **Original** copy of your completed forms along with any emission fee due to: Maricopa County Air Quality Department, Emissions Inventory Unit,1001 North Central Avenue, Suite 125, Phoenix, AZ 85004.
- Keep a copy of all forms for your records.

CONFIDENTIALITY STATEMENT:

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

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

CERTIFICATION STATEMENT:

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

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

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

Appendix B. Rule Effectiveness (RE) Studies

1. Introduction

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

Once an RE rate has been calculated, its value is applied to relevant sources at an individual process level, thus adjusting (i.e., increasing) emission estimates to reflect a lower degree of control efficiency. The following example illustrates how the application of rule effectiveness can significantly affect the resulting emission estimates. The calculations below reflect a process whose reported emissions are controlled via a control device with a nominal 90% control efficiency (CE). In the second equation, an RE rate of 83% is applied to the controlled process.

Emissions before the application of rule effectiveness:

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

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

Emissions including the application of an 83% rule effectiveness (RE):

Uncontrolled emissions × [1 – (*CE* × ***RE***)] = *Emissions after control* ***and*** *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 Rules 310, 310.01, and 316

Rule effectiveness studies adjust the emissions from subject facilities and source categories to account for times of non-compliance and control device equipment failure. Of particular importance to the Maricopa County Air Quality Department (MCAQD) are those rules that control particulate matter release, since parts of the county have been designated as nonattainment areas in regard to US EPA PM_{10} standards. Consequently, the rule effectiveness studies presented in this section deal with the control of criteria pollutant PM_{10}.

Source-specific rule effectiveness studies were undertaken as part of this project to adjust the emissions from subject facilities and source categories to account for times of non-compliance and control device equipment failure by incorporating applicable compliance history data to ascribe a percentage rate (RE rate) at which the subject rule(s) attains the intended emissions reductions. These source-specific studies use data from inspections conducted for calendar year 2010 to determine the rate of compliance of subject facilities and source categories with Rule 310 (Fugitive Dust from Dust-Generating Operations), Rule 310.01 (Fugitive Dust from Non-Traditional Sources of Fugitive Dust), and Rule 316 (Nonmetallic Mineral Processing).

Rule effectiveness rates were calculated separately for Title V and non-Title V permitted facilities. These are described in Section 2.3. Final RE rates are listed in Table B–1 below.

Table B–1. Rule effectiveness rates for 2014, listed by rule or source category analyzed.

Rule/ Source category	Rule Effectiveness (RE) rate
Rule 310	90.94%
Rule 310.01	97.48%
Rule 316	81.08%
Title V facilities	90.44%
Non-Title V facilities	89.00%

The resulting rule effectiveness rates shown above have been applied to relevant point and area source inventory categories and are reflected in the emission estimates presented in applicable sections of Chapters 2 and 3.

The US EPA has provided a number of guidance documents that detail the use and formulation of rule effectiveness studies (US EPA, 2005; 1994; 1992). The most recent of these documents states, “First and foremost, an agency responsible for emissions inventory preparation should attempt to obtain facility specific data from as many sources as possible, and use the collected information to make a refined source or source category RE determination” (US EPA, 2005). Given this directive, MCAQD developed a rule effectiveness study methodology that utilizes all available compliance data to produce a RE rate that best reflects the field effectiveness of the rule. By using the entire population of data for the prescribed time period, (calendar year 2014) the statistical validity of the RE rate greatly improves.

The source-specific RE rates presented here are developed from statistical examination of recorded inspection data. This is the rate at which inspection staff is observing facility and source category compliance in the field. While this provides the most direct measure of rule effectiveness, it can still be an incomplete picture of overall rule effectiveness. In the case of the source-specific studies for those sources directly affected by a county air quality rule (Rules 310, 310.01, and 316) the compliance rate is used as the RE rate. These sources tend to have a focused, homogeneous set of processes. This, combined with the fact that these studies not only

contain the entire population of affected sources but are also very large sample sizes, gives confidence that inconsistencies of individual inspections are already addressed in practice. To further focus the study of these sources each unique permit was classified as "in violation" if any inspection during the allotted time period resulted in an emission based violation or as "in compliance" if no violations were issued or an administrative based violation was issued.

A total of five distinct rule effectiveness rates were calculated for use in this emissions inventory: three source-specific rule effectiveness determinations (Rule 310, Rule 310.01, and Rule 316) along with two multi-rule determinations (Title V and non-Title V permitted facilities). The following three sections describe in further detail the data and methods used in developing the Rule 310, Rule 310.01, and Rule 316 RE factors.

2.1 Calculating Rule Effectiveness for Sources Subject to Rule 310

Sources subject to the department Rule 310 (Fugitive Dust from Dust-Generating Operations) are most often those construction sites where the disturbance of earth is occurring. The RE rate for Rule 310 sources is developed from the observed compliance rate of permitted sites.

The compliance rate for Rule 310 sources uses inspection data of issued dust permits between January 2010 and December 2010. Only inspections that result in a finding of compliance or non-compliance (i.e., "in violation") are considered in the compliance rate. Inspections conducted solely to confirm the closing of a permit, or inspections where a compliance determination could not be made, were not included in the development of the compliance rate. Using these criteria, a total of 9,798 inspections were conducted on 2,632 issued permits, out of a possible pool of 5,391 issued permits. Dust Control Permits are only valid for 12 months, and expire on the anniversary of their issue date; for instance a permit issued on January 22, 2009 would have a January 22, 2010 expiration date. This permit would therefore only have "operated" 22 days in the inspection period on which this compliance data is based. Some issued permits also experience limited operations, perhaps only a month or two, but in most cases these permits are left open by the permit holder for the entire 12 months. Given these realities, it is not unexpected that 2,759 out of the pool of 5,391 permits received no compliance determination inspection during the 12-month period of January 2010–December 2010. Conversely, over 48% of all issued permits that received a compliance determination inspection were inspected two or more times.

Of the inspected sources listed above, individual compliance rates are determined on a permit by permit basis. Any permit that received at least one emissions-related violation during any inspection conducted between January 2010 and December 2010 received a compliance rate of 0%. Permitted sites that had no recorded emissions-related violations during the study period received a compliance rate of 100%. Of the permits with violations noted, 171 (84%) were emissions-related (track-out, visible emissions, recordkeeping, silt content, etc.), with the remaining 32 (16%) violating permits being procedural (inadequate dust control plan, late fees, etc.). The permit-specific compliance rates were summed and averaged to produce an overall grouped compliance rate of 93.50%.

2.2 Calculating Rule Effectiveness for Sources Subject to Rule 310.01

The majority of sources subject to Rule 310.01 (Fugitive Dust from Non-Traditional Sources of Fugitive Dust) are vacant lots. It is estimated that there are presently more than 100,000 vacant

lots in Maricopa County. Rule 310.01 sources generally do not require a permit, unlike Rule 310 and Rule 316 sources. The RE rate for Rule 310.01 sources is calculated based upon vacant lot inspection compliance rates.

During the study period (January 2010 – December 2010), the department inspectors performed a total of 4,990 inspections on 4,693 unique vacant lots in Maricopa County. The primary purpose of a Rule 310.01 inspection is to verify whether or not the vacant lot in question has a stabilized surface. If the surface is determined to be stable (through a variety of tests), the lot is deemed to be in compliance. Conversely, if the lot's surface is deemed to be unstable, then a violation of Rule 310.01 has occurred. As with Rule 310, a compliance rate is determined individually for each vacant lot, and then summed and averaged to produce a group compliance rate. The overall compliance rate for Rule 310.01 sites is 96.06%. All 185 violations noted by inspectors were emissions-related violations, as all the violations are for unstable soil conditions.

2.3 Calculating Rule Effectiveness for Sources Subject to Rule 316

Facilities subject to Rule 316 (Nonmetallic Mineral Processing) include those involved in the mining of sand and gravel and the production of concrete products. All such "Rule 316 sites" are required to have either a Title V or non-Title V permit issued by the department. At present, all facilities that are subject to Rule 316 have only non-Title V permits. (One class of sources that has long been an exception to this is portable sources that may operate in more than one county during the life of the permit; thus these sources are issued permits by the Arizona Department of Environmental Quality.) The RE rate for Rule 316 sites was determined in a similar fashion as for Rules 310 and 310.01; i.e., calculated on the basis of the actual observed compliance rates of permitted sites.

Inspection data for the period January 2010 through December 2010 reveal that 184 Rule 316 facilities were inspected. Overall, 2,400 inspections that resulted in a compliance determination were performed during the study period. Of the violating facilities noted, 49 (74%) were emissions-related, with the remaining 17 (26%) primarily procedural in nature. As with Rules 310 and 310.01, a compliance rate is computed for each facility, and then summed and averaged for the group, resulting in an overall compliance rate of 73.37%.

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

For the remaining emission processes (not regulated by Rules 310, 310.01 and/or 316) that include a control device or technique that limits particulate matter or ozone formation, a separate multi-rule RE rate has been developed for permitted Title V and non-title V facilities. Factor-based matrices were utilized to develop RE rates for Title V and non-Title V facilities.

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–3 and B–4.

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 are contained in Tables B–3 and B–4.

The data and methods used to develop RE rates for Title V and non-Title V permitted facilities are described below. The resulting rule effectiveness values for 2014 are summarized in Table B–2 below.

Table B–2. Rates of compliance and rule effectiveness for 2014, by permit category.

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

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

Compliance rates for both Title V and non-Title V facilities are based on two full years of data (2013 and 2014), since compliance information for these sources tends to be more detailed (as reflected in the matrix). The compliance rate for these facilities also includes data on self-monitoring recordkeeping practices in addition to inspection data. The combined scores of the monitoring data and inspection data divided by the 70% of the overall RE rate comprise the "compliance rate" portion of the RE calculation matrix, as shown in Tables B–3 and B–4 below.

4. 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–3. 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.			
						Sum:	**30.10%**

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–3. 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. **<u>Other factors (9 criteria, each assigned weighting of 2% of total)</u>:**

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–3. 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–3. 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 1–3 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–4. 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.			
						Sum:	**33.91%**

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%	**2.9%**
	87%	93%	90%	Inspections involve detailed review of process parameters & inspection of control equipment.			
	81%	86%	84%	Inspections involve review of process and inspection of control equipment.			
	70%	80%	75%	Inspections generally consist of only a records review.			
		< 70%	35%	Inspections most likely consist of visual inspection (e.g., opacity), or drive by.			
Operation & Maintenance	94%	100%	97%	Control equipment operators follow and sign daily O&M instructions.	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–4. 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–4. Rule Effectiveness Matrix for Non-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; 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–4. Rule Effectiveness Matrix for Non-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 1–3 days of source-specific training, and such training is updated every 1–2 years.			
		< 70%	35%	Inspectors must undergo less than 5 days of basic training less than 3 days of source-specific training, and such training is updated only every 2 years or less frequently.			
Testing Guidelines	94%	100%	97%	Specific guidelines and schedule for testing and test methods exist.	2%	97%	**1.94%**
	87%	93%	90%	Specific guidelines on testing and test methods exist, but no schedule for testing.			
	81%	86%	84%	Specific guidelines on testing and test methods exist, but no schedule for testing.			
	70%	80%	75%	Specific guidelines on testing and test methods, but no schedule for testing.			
		< 70%	35%	Only general guidance on testing, or no mention of testing requirements.			
Follow-up Inspections	94%	100%	97%	Follow-up inspections always or almost always conducted (90 % of the time or more).	2%	97%	**1.94%**
	87%	93%	90%	Follow-up inspections usually conducted (approximately 75% of the time).			
	81%	86%	84%	Follow-up inspections sometimes conducted (approximately 50% of the time).			
	70%	80%	75%	Follow-up inspections infrequently conducted (approximately 25% of the time).			
		< 70%	35%	Follow-up inspections rarely or never conducted (10% of the time or less)			

Overall rule effectiveness score for non-Title V facilities: 89.00%

Appendix C. MOVES2014a Local Input Data and RunSpecs

To calculate 2014 annual and typical daily emissions from onroad sources, MOVES2014a was executed using local input data for each month of the year and each geographic area analyzed (Maricopa County and the PM_{10} nonattainment area).

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

MOVES2014a RunSpec Summary (Maricopa County)

* Output Database Server Name: [using default]

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

* Time Spans:
  - Time Aggregation Level: Hour
  - Years: 2014
  - Months: January - December
  - Days: Weekend & Weekdays
  - Hours: Start Hour 00:00 - 00:59 | End Hour 23:00 - 23:59

* Geographic Bounds:
  - Region: County
  - Selections: ARIZONA - Maricopa County
  - Domain Input Database: c04013y2014_20151118

* Vehicles/Equipment
  - On Road Vehicle Equipment:
    - Compressed natural Gas (CNG) - Transit Bus
    - Diesel Fuel - Combination Long-haul Truck
    - Diesel Fuel - Combination Short-haul Truck
    - Diesel Fuel - Intercity Bus
    - Diesel Fuel - Light Commercial Truck
    - Diesel Fuel - Motor Home
    - Diesel Fuel - Passenger Car
    - Diesel Fuel - Passenger Truck
    - Diesel Fuel - Refuse Truck
    - Diesel Fuel - School Bus
    - Diesel Fuel - Single Unit Long-haul Truck
    - Diesel Fuel - Single Unit Short-haul Truck
    - Diesel Fuel - Transit Bus
    - Electricity - Light Commercial Truck
    - Electricity - Passenger Car
    - Electricity - Passenger Truck
    - Ethanol (E-85) - Light Commercial Truck
    - Ethanol (E-85) - Passenger Car
    - Ethanol (E-85) - Passenger Truck
    - Gasoline - Combination Short-haul Truck
    - Gasoline - Light Commercial Truck
    - Gasoline - Motor Home
    - Gasoline - Motorcycle
    - Gasoline - Passenger Car
    - Gasoline - Passenger Truck
    - Gasoline - Refuse Truck
    - Gasoline - School Bus
    - Gasoline - Single Unit Long-haul Truck
    - Gasoline - Single Unit Short-haul Truck
    - Gasoline - Transit Bus

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

* Pollutants and Processes
  - Aluminum - Running Exhaust
  - Aluminum - Start Exhaust
  - Aluminum - Crankcase Running Exhaust
  - Aluminum - Crankcase Start Exhaust
  - Aluminum - Crankcase Extended Idle Exhaust
  - Aluminum - Extended Idle Exhaust
  - Aluminum - Auxiliary Power Exhaust
  - Ammonia (NH3) - Running Exhaust
  - Ammonia (NH3) - Start Exhaust
  - Ammonia (NH3) - Crankcase Running Exhaust
  - Ammonia (NH3) - Crankcase Start Exhaust
  - Ammonia (NH3) - Crankcase Extended Idle Exhaust
  - Ammonia (NH3) - Extended Idle Exhaust
  - Ammonia (NH3) - Auxiliary Power Exhaust
  - Ammonium (NH4) - Running Exhaust
  - Ammonium (NH4) - Start Exhaust
  - Ammonium (NH4) - Crankcase Running Exhaust
  - Ammonium (NH4) - Crankcase Start Exhaust
  - Ammonium (NH4) - Crankcase Extended Idle Exhaust
  - Ammonium (NH4) - Extended Idle Exhaust
  - Ammonium (NH4) - Auxiliary Power Exhaust
  - CMAQ5.0 Unspeciated (PMOTHR) - Running Exhaust
  - CMAQ5.0 Unspeciated (PMOTHR) - Start Exhaust
  - CMAQ5.0 Unspeciated (PMOTHR) - Crankcase Running Exhaust
  - CMAQ5.0 Unspeciated (PMOTHR) - Crankcase Start Exhaust
  - CMAQ5.0 Unspeciated (PMOTHR) - Crankcase Extended Idle Exhaust
  - CMAQ5.0 Unspeciated (PMOTHR) - Extended Idle Exhaust
  - CMAQ5.0 Unspeciated (PMOTHR) - Auxiliary Power Exhaust
  - Calcium - Running Exhaust
  - Calcium - Start Exhaust
  - Calcium - Crankcase Running Exhaust
  - Calcium - Crankcase Start Exhaust
  - Calcium - Crankcase Extended Idle Exhaust
  - Calcium - Extended Idle Exhaust
  - Calcium - Auxiliary Power Exhaust
  - Chloride - Running Exhaust
  - Chloride - Start Exhaust
  - Chloride - Crankcase Running Exhaust
  - Chloride - Crankcase Start Exhaust
  - Chloride - Crankcase Extended Idle Exhaust
  - Chloride - Extended Idle Exhaust
  - Chloride - Auxiliary Power Exhaust
  - Composite - NonECPM - Running Exhaust
  - Composite - NonECPM - Start Exhaust
  - Composite - NonECPM - Crankcase Running Exhaust
  - Composite - NonECPM - Crankcase Start Exhaust
  - Composite - NonECPM - Crankcase Extended Idle Exhaust
  - Composite - NonECPM - Extended Idle Exhaust
  - Composite - NonECPM - Auxiliary Power Exhaust
  - Elemental Carbon - Running Exhaust
  - Elemental Carbon - Start Exhaust
  - Elemental Carbon - Crankcase Running Exhaust

Elemental Carbon - Crankcase Start Exhaust
Elemental Carbon - Crankcase Extended Idle Exhaust
Elemental Carbon - Extended Idle Exhaust
Elemental Carbon - Auxiliary Power Exhaust
H2O (aerosol) - Running Exhaust
H2O (aerosol) - Start Exhaust
H2O (aerosol) - Crankcase Running Exhaust
H2O (aerosol) - Crankcase Start Exhaust
H2O (aerosol) - Crankcase Extended Idle Exhaust
H2O (aerosol) - Extended Idle Exhaust
H2O (aerosol) - Auxiliary Power Exhaust
Iron - Running Exhaust
Iron - Start Exhaust
Iron - Crankcase Running Exhaust
Iron - Crankcase Start Exhaust
Iron - Crankcase Extended Idle Exhaust
Iron - Extended Idle Exhaust
Iron - Auxiliary Power Exhaust
Magnesium - Running Exhaust
Magnesium - Start Exhaust
Magnesium - Crankcase Running Exhaust
Magnesium - Crankcase Start Exhaust
Magnesium - Crankcase Extended Idle Exhaust
Magnesium - Extended Idle Exhaust
Magnesium - Auxiliary Power Exhaust
Nitrate (NO3) - Running Exhaust
Nitrate (NO3) - Start Exhaust
Nitrate (NO3) - Crankcase Running Exhaust
Nitrate (NO3) - Crankcase Start Exhaust
Nitrate (NO3) - Crankcase Extended Idle Exhaust
Nitrate (NO3) - Extended Idle Exhaust
Nitrate (NO3) - Auxiliary Power Exhaust
Non-carbon Organic Matter (NCOM) - Running Exhaust
Non-carbon Organic Matter (NCOM) - Start Exhaust
Non-carbon Organic Matter (NCOM) - Crankcase Running Exhaust
Non-carbon Organic Matter (NCOM) - Crankcase Start Exhaust
Non-carbon Organic Matter (NCOM) - Crankcase Extended Idle Exhaust
Non-carbon Organic Matter (NCOM) - Extended Idle Exhaust
Non-carbon Organic Matter (NCOM) - Auxiliary Power Exhaust
Organic Carbon - Running Exhaust
Organic Carbon - Start Exhaust
Organic Carbon - Crankcase Running Exhaust
Organic Carbon - Crankcase Start Exhaust
Organic Carbon - Crankcase Extended Idle Exhaust
Organic Carbon - Extended Idle Exhaust
Organic Carbon - 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
Potassium - Running Exhaust
Potassium - Start Exhaust
Potassium - Crankcase Running Exhaust
Potassium - Crankcase Start Exhaust
Potassium - Crankcase Extended Idle Exhaust
Potassium - Extended Idle Exhaust
Potassium - Auxiliary Power Exhaust
Primary Exhaust PM10 - Total - Running Exhaust
Primary Exhaust PM10 - Total - Start Exhaust
Primary Exhaust PM10 - Total - Crankcase Running Exhaust
Primary Exhaust PM10 - Total - Crankcase Start Exhaust
Primary Exhaust PM10 - Total - Crankcase Extended Idle Exhaust
Primary Exhaust PM10 - Total - Extended Idle Exhaust
Primary Exhaust PM10 - Total - Auxiliary Power Exhaust
Primary Exhaust PM2.5 - Total - Running Exhaust
Primary Exhaust PM2.5 - Total - Start Exhaust
Primary Exhaust PM2.5 - Total - Crankcase Running Exhaust
Primary Exhaust PM2.5 - Total - Crankcase Start Exhaust
Primary Exhaust PM2.5 - Total - Crankcase Extended Idle Exhaust
Primary Exhaust PM2.5 - Total - Extended Idle Exhaust
Primary Exhaust PM2.5 - Total - Auxiliary Power Exhaust
Primary PM10 - Brakewear Particulate - Brakewear
Primary PM10 - Tirewear Particulate - Tirewear
Primary PM2.5 - Brakewear Particulate - Brakewear
Primary PM2.5 - Tirewear Particulate - Tirewear
Silicon - Running Exhaust
Silicon - Start Exhaust
Silicon - Crankcase Running Exhaust
Silicon - Crankcase Start Exhaust
Silicon - Crankcase Extended Idle Exhaust
Silicon - Extended Idle Exhaust
Silicon - Auxiliary Power Exhaust
Sodium - Running Exhaust
Sodium - Start Exhaust
Sodium - Crankcase Running Exhaust
Sodium - Crankcase Start Exhaust
Sodium - Crankcase Extended Idle Exhaust
Sodium - Extended Idle Exhaust
Sodium - Auxiliary Power Exhaust
Sulfate Particulate - Running Exhaust
Sulfate Particulate - Start Exhaust
Sulfate Particulate - Crankcase Running Exhaust
Sulfate Particulate - Crankcase Start Exhaust
Sulfate Particulate - Crankcase Extended Idle Exhaust
Sulfate Particulate - Extended Idle Exhaust
Sulfate Particulate - Auxiliary Power Exhaust
Sulfur Dioxide (SO2) - Running Exhaust
Sulfur Dioxide (SO2) - Start Exhaust
Sulfur Dioxide (SO2) - Crankcase Running Exhaust
Sulfur Dioxide (SO2) - Crankcase Start Exhaust
Sulfur Dioxide (SO2) - Crankcase Extended Idle Exhaust
Sulfur Dioxide (SO2) - Extended Idle Exhaust
Sulfur Dioxide (SO2) - Auxiliary Power Exhaust
Titanium - Running Exhaust
Titanium - Start Exhaust
Titanium - Crankcase Running Exhaust
Titanium - Crankcase Start Exhaust
Titanium - Crankcase Extended Idle Exhaust
Titanium - Extended Idle Exhaust
Titanium - Auxiliary Power Exhaust
Total Energy Consumption - Running Exhaust
Total Energy Consumption - Start Exhaust
Total Energy Consumption - Extended Idle Exhaust
Total Energy Consumption - Auxiliary Power Exhaust
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

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

* Output
    General Output:
        Output Database: c04013y2014_20151118_out
        Units: Mass Units (Grams) | Energy Units (Joules) | Distance Units (Miles)
        Activity: Distance Traveled | Source Hours | Source Hours Idling | Source Hours Operating | Source Hours Parked | Population | Starts
    Output Emissions Detail:
        Always: Time (Month) | Location (COUNTY) | Pollutant
        For All Vehicle/Equipment Categories: Fuel Type | Emission Process
        On Road: SCC

MOVES2014a RunSpec (Maricopa County)

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Exhaust"/>
     <pollutantprocessassociation pollutantkey="59" pollutantname="Iron" processkey="90" processname="Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="59" pollutantname="Iron" processkey="91" processname="Auxiliary Power Exhaust"/>
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     <pollutantprocessassociation pollutantkey="54" pollutantname="Magnesium" processkey="2" processname="Start Exhaust"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="54" pollutantname="Magnesium" processkey="16" processname="Crankcase Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="54" pollutantname="Magnesium" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
     <pollutantprocessassociation pollutantkey="54" pollutantname="Magnesium" processkey="90" processname="Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="54" pollutantname="Magnesium" processkey="91" processname="Auxiliary Power Exhaust"/>
     <pollutantprocessassociation pollutantkey="66" pollutantname="Manganese Compounds" processkey="1" processname="Running
```

```
Exhaust"/>
     <pollutantprocessassociation pollutantkey="35" pollutantname="Nitrate (NO3)" processkey="1" processname="Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="35" pollutantname="Nitrate (NO3)" processkey="2" processname="Start Exhaust"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="35" pollutantname="Nitrate (NO3)" processkey="16" processname="Crankcase Start
Exhaust"/>
     <pollutantprocessassociation pollutantkey="35" pollutantname="Nitrate (NO3)" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
     <pollutantprocessassociation pollutantkey="35" pollutantname="Nitrate (NO3)" processkey="90" processname="Extended Idle
Exhaust"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="122" pollutantname="Non-carbon Organic Matter (NCOM)" processkey="1"
processname="Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="122" pollutantname="Non-carbon Organic Matter (NCOM)" processkey="2"
processname="Start Exhaust"/>
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processname="Crankcase Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="122" pollutantname="Non-carbon Organic Matter (NCOM)" processkey="16"
processname="Crankcase Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="122" pollutantname="Non-carbon Organic Matter (NCOM)" processkey="17"
processname="Crankcase Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="122" pollutantname="Non-carbon Organic Matter (NCOM)" processkey="90"
processname="Extended Idle Exhaust"/>
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processname="Auxiliary Power Exhaust"/>
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     <pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="15" processname="Crankcase Running
Exhaust"/>
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Exhaust"/>
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Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="111" pollutantname="Organic Carbon" processkey="90" processname="Extended Idle
Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="16" processname="Crankcase
Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="91" processname="Auxiliary
Power Exhaust"/>
     <pollutantprocessassociation pollutantkey="53" pollutantname="Potassium" processkey="1" processname="Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="53" pollutantname="Potassium" processkey="2" processname="Start Exhaust"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="53" pollutantname="Potassium" processkey="16" processname="Crankcase Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="53" pollutantname="Potassium" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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processname="Crankcase Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10  - Total" processkey="16"
processname="Crankcase Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10  - Total" processkey="17"
processname="Crankcase Extended Idle Exhaust"/>
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processname="Extended Idle Exhaust"/>
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processname="Auxiliary Power Exhaust"/>
     <pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="1" processname="Running
Exhaust"/>
     <pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="2" processname="Start
Exhaust"/>
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processname="Crankcase Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="16"
processname="Crankcase Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="17"
processname="Crankcase Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="90"
processname="Extended Idle Exhaust"/>
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processname="Auxiliary Power Exhaust"/>
     <pollutantprocessassociation pollutantkey="106" pollutantname="Primary PM10 - Brakewear Particulate" processkey="9"
processname="Brakewear"/>
     <pollutantprocessassociation pollutantkey="107" pollutantname="Primary PM10 - Tirewear Particulate" processkey="10"
processname="Tirewear"/>
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processname="Brakewear"/>
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processname="Tirewear"/>
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     <pollutantprocessassociation pollutantkey="57" pollutantname="Silicon" processkey="16" processname="Crankcase Start Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Running Exhaust"/>
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Exhaust"/>
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Extended Idle Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="16" processname="Crankcase Start
Exhaust"/>
     <pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="90" processname="Extended Idle
Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="91" processname="Auxiliary
Power Exhaust"/>
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Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="2" processname="Start
Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="11" processname="Evap
Permeation"/>
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Vapor Venting"/>
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Leaks"/>
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Running Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="16" processname="Crankcase
Start Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="18" processname="Refueling
Displacement Vapor Loss"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="19" processname="Refueling
Spillage Loss"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="90" processname="Extended
Idle Exhaust"/>
     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="91" processname="Auxiliary
Power Exhaust"/>
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   <internalcontrolstrategies>
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classname="gov.epa.otaq.moves.master.implementation.ghg.internalcontrolstrategies.rateofprogress.RateOfProgressStrategy"><![CDATA
[
useParameters                No

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   </internalcontrolstrategies>
   <inputdatabase servername="" databasename="" description=""/>
   <uncertaintyparameters uncertaintymodeenabled="false" numberofrunspersimulation="0" numberofsimulations="0"/>
   <geographicoutputdetail description="COUNTY"/>
   <outputemissionsbreakdownselection>
     <modelyear selected="false"/>
     <fueltype selected="true"/>
     <emissionprocess selected="true"/>
     <onroadoffroad selected="true"/>
     <roadtype selected="true"/>
     <sourceusetype selected="true"/>
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      <movesvehicletype selected="true"/>
      <onroadscc selected="true"/>
      <estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>
      <sector selected="false"/>
      <engtechid selected="false"/>
      <hpclass selected="false"/>
      <regclassid selected="false"/>
   </outputemissionsbreakdownselection>
   <outputdatabase servername="" databasename="c04013y2014_20151118_out" description=""/>
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   <outputvmtdata value="true"/>
   <outputsho value="true"/>
   <outputsh value="true"/>
   <outputshp value="true"/>
   <outputshidling value="true"/>
   <outputstarts value="true"/>
   <outputpopulation value="true"/>
   <scaleinputdatabase servername="localhost" databasename="c04013y2014_20151118" description=""/>
   <pmsize value="0"/>
   <outputfactors>
      <timefactors selected="true" units="Months"/>
      <distancefactors selected="true" units="Miles"/>
      <massfactors selected="true" units="Grams" energyunits="Joules"/>
   </outputfactors>
   <savedata>

   </savedata>

   <donotexecute>

   </donotexecute>

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

[HPMSvTypeYear]

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

[SourceTypeYear]

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

[FuelFormulation]

Fuel Formulation	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
3190	12	6.83	18.53	10.05	0	0	0	21.9648	4.81614	0.53	44.2567	88.7117	0	0	0	211.537	303.44
3191	12	8.6170	14.83	10.34	0	0	0	21.8943	4.68487	0.53	46.808	89.6701	0	0	0	206.331	299.09
3192	12	7.885	19	10.1	0	0	0	21.9175	4.90971	0.53	45.7798	89.3134	0	0	0	208.429	300.71
25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0	0
27001	51	10.5	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
28001	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[FuelUsageFraction]

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

[FuelSupply]

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

[ZoneMonthHour]

monthID	zoneID	HourID	temperature	relHumidity
1	40130	1	53	41
1	40130	2	52	43
1	40130	3	51	44
1	40130	4	51	44
1	40130	5	50	46
1	40130	6	49	47
1	40130	7	49	46
1	40130	8	49	46
1	40130	9	52	39
1	40130	10	57	31
1	40130	11	62	25
1	40130	12	66	21
1	40130	13	68	18
1	40130	14	70	16
1	40130	15	71	15
1	40130	16	72	15
1	40130	17	71	16
1	40130	18	69	18
1	40130	19	65	22
1	40130	20	63	26
1	40130	21	61	28
1	40130	22	58	33
1	40130	23	56	36
1	40130	24	55	39
2	40130	1	59	35
2	40130	2	58	38
2	40130	3	57	39
2	40130	4	56	40
2	40130	5	55	41
2	40130	6	54	42
2	40130	7	54	43
2	40130	8	54	43
2	40130	9	58	37
2	40130	10	62	31
2	40130	11	67	26
2	40130	12	70	23
2	40130	13	72	21
2	40130	14	74	19
2	40130	15	75	18
2	40130	16	75	18
2	40130	17	75	18
2	40130	18	74	18
2	40130	19	72	20
2	40130	20	69	23
2	40130	21	67	26
2	40130	22	65	29
2	40130	23	63	32
2	40130	24	61	34
3	40130	1	65	34
3	40130	2	64	35
3	40130	3	62	37
3	40130	4	61	40
3	40130	5	59	43
3	40130	6	59	44

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

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

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

[SourceTypeAgeDistribution]

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

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

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

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

[IMCoverage]

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

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
201	4	4013	2014	31	1	106	1981	1995	2	31	N	64.12
201	4	4013	2014	31	1	110	1996	2010	2	51	N	90.0428
201	4	4013	2014	32	1	103	1967	1980	1	13	N	57.6164
201	4	4013	2014	32	1	106	1981	1995	2	31	N	64.12
201	4	4013	2014	32	1	110	1996	2010	2	51	N	90.0428
201	4	4013	2014	52	1	103	1967	2010	1	13	N	87.2032
202	4	4013	2014	21	1	103	1967	1980	1	13	N	57.6164
202	4	4013	2014	21	1	106	1981	1995	2	31	N	64.12
202	4	4013	2014	21	1	110	1996	2010	2	51	N	90.0428
202	4	4013	2014	31	1	103	1967	1980	1	13	N	57.6164
202	4	4013	2014	31	1	106	1981	1995	2	31	N	64.12
202	4	4013	2014	31	1	110	1996	2010	2	51	N	90.0428
202	4	4013	2014	32	1	103	1967	1980	1	13	N	57.6164
202	4	4013	2014	32	1	106	1981	1995	2	31	N	64.12
202	4	4013	2014	32	1	110	1996	2010	2	51	N	90.0428
202	4	4013	2014	52	1	103	1967	2010	1	13	N	87.2032
301	4	4013	2014	21	1	103	1967	1980	1	13	N	57.6164
301	4	4013	2014	21	1	106	1981	1995	2	31	N	64.12
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301	4	4013	2014	31	1	110	1996	2010	2	51	N	90.0428
301	4	4013	2014	32	1	103	1967	1980	1	13	N	57.6164
301	4	4013	2014	32	1	106	1981	1995	2	31	N	64.12
301	4	4013	2014	32	1	110	1996	2010	2	51	N	90.0428
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302	4	4013	2014	21	1	106	1981	1995	2	31	N	64.12
302	4	4013	2014	21	1	110	1996	2010	2	51	N	90.0428
302	4	4013	2014	31	1	103	1967	1980	1	13	N	57.6164
302	4	4013	2014	31	1	106	1981	1995	2	31	N	64.12
302	4	4013	2014	31	1	110	1996	2010	2	51	N	90.0428
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302	4	4013	2014	32	1	106	1981	1995	2	31	N	64.12
302	4	4013	2014	32	1	110	1996	2010	2	51	N	90.0428
302	4	4013	2014	52	1	103	1967	2010	1	13	N	87.2032
101	4	4013	2014	21	5	303	1967	1980	1	13	N	57.6164
101	4	4013	2014	21	5	306	1981	1995	2	31	N	64.12
101	4	4013	2014	21	5	310	1996	2010	2	51	N	90.0428
101	4	4013	2014	31	5	303	1967	1980	1	13	N	57.6164
101	4	4013	2014	31	5	306	1981	1995	2	31	N	64.12
101	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
101	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
101	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
101	4	4013	2014	32	5	310	1996	2010	2	51	N	90.0428
101	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032
102	4	4013	2014	21	5	303	1967	1980	1	13	N	57.6164
102	4	4013	2014	21	5	306	1981	1995	2	31	N	64.12
102	4	4013	2014	21	5	310	1996	2010	2	51	N	90.0428
102	4	4013	2014	31	5	303	1967	1980	1	13	N	57.6164
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102	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
102	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
102	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
102	4	4013	2014	32	5	310	1996	2010	2	51	N	90.0428
102	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032
112	4	4013	2014	21	5	308	1996	2010	2	43	N	83.814
112	4	4013	2014	21	5	309	1981	1995	2	44	N	64.12
112	4	4013	2014	31	5	308	1996	2010	2	43	N	83.814
112	4	4013	2014	31	5	309	1981	1995	2	44	N	64.12
112	4	4013	2014	32	5	308	1996	2010	2	43	N	83.814
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112	4	4013	2014	52	5	307	1981	2010	1	41	N	86.2872
201	4	4013	2014	21	5	303	1967	1980	1	13	N	57.6164
201	4	4013	2014	21	5	306	1981	1995	2	31	N	64.12
201	4	4013	2014	21	5	310	1996	2010	2	51	N	90.0428
201	4	4013	2014	31	5	303	1967	1980	1	13	N	57.6164
201	4	4013	2014	31	5	306	1981	1995	2	31	N	64.12
201	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
201	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
201	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
201	4	4013	2014	32	5	310	1996	2010	2	51	N	90.0428
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202	4	4013	2014	31	5	303	1967	1980	1	13	N	57.6164
202	4	4013	2014	31	5	306	1981	1995	2	31	N	64.12
202	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
202	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
202	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
202	4	4013	2014	32	5	310	1996	2010	2	51	N	90.0428
202	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032
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301	4	4013	2014	31	5	306	1981	1995	2	31	N	64.12
301	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
301	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
301	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
301	4	4013	2014	32	5	310	1996	2010	2	51	N	90.0428
301	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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302	4	4013	2014	21	5	306	1981	1995	2	31	N	64.12
302	4	4013	2014	21	5	310	1996	2010	2	51	N	90.0428
302	4	4013	2014	31	5	303	1967	1980	1	13	N	57.6164
302	4	4013	2014	31	5	306	1981	1995	2	31	N	64.12
302	4	4013	2014	31	5	310	1996	2010	2	51	N	90.0428
302	4	4013	2014	32	5	303	1967	1980	1	13	N	57.6164
302	4	4013	2014	32	5	306	1981	1995	2	31	N	64.12
302	4	4013	2014	32	5	310	1996	2010	2	51	N	90.0428
302	4	4013	2014	52	5	303	1967	2010	1	13	N	87.2032
101	4	4013	2014	21	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	21	1	6	1981	1995	2	31	Y	63.6192
101	4	4013	2014	21	1	10	1996	2010	2	51	Y	83.1594
101	4	4013	2014	31	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	31	1	6	1981	1995	2	31	Y	63.6192
101	4	4013	2014	31	1	10	1996	2010	2	51	Y	78.1699
101	4	4013	2014	32	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	32	1	6	1981	1995	2	31	Y	63.6192
101	4	4013	2014	32	1	10	1996	2010	2	51	Y	73.1802
101	4	4013	2014	41	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	42	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	43	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	51	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	52	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	53	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	54	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	61	1	3	1967	1980	1	13	Y	57.2079
101	4	4013	2014	62	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	21	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	21	1	6	1981	1995	2	31	Y	63.6192
102	4	4013	2014	21	1	10	1996	2010	2	51	Y	83.1594
102	4	4013	2014	31	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	31	1	6	1981	1995	2	31	Y	63.6192
102	4	4013	2014	31	1	10	1996	2010	2	51	Y	78.1699
102	4	4013	2014	32	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	32	1	6	1981	1995	2	31	Y	63.6192
102	4	4013	2014	32	1	10	1996	2010	2	51	Y	73.1802
102	4	4013	2014	41	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	42	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	43	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	51	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	52	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	53	1	3	1967	1980	1	13	Y	57.2079
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102	4	4013	2014	61	1	3	1967	1980	1	13	Y	57.2079
102	4	4013	2014	62	1	3	1967	1980	1	13	Y	57.2079
112	4	4013	2014	21	1	8	1996	2010	2	45	Y	89.3396
112	4	4013	2014	21	1	9	1981	1995	2	44	Y	63.6192
112	4	4013	2014	21	1	11	1967	1980	1	41	Y	86.7668
112	4	4013	2014	31	1	8	1996	2010	2	45	Y	83.9792
112	4	4013	2014	31	1	9	1981	1995	2	44	Y	59.8021
112	4	4013	2014	31	1	11	1967	1980	1	41	Y	86.7668
112	4	4013	2014	32	1	8	1996	2010	2	45	Y	78.6188
112	4	4013	2014	32	1	9	1981	1995	2	44	Y	55.9849
112	4	4013	2014	32	1	11	1967	1980	1	41	Y	86.7668
112	4	4013	2014	41	1	7	1981	2010	1	41	Y	85.6133
112	4	4013	2014	41	1	11	1967	1980	1	41	Y	86.7668
112	4	4013	2014	42	1	7	1981	2010	1	41	Y	85.6133
112	4	4013	2014	42	1	11	1967	1980	1	41	Y	86.7668
112	4	4013	2014	43	1	7	1981	2010	1	41	Y	85.6133
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112	4	4013	2014	53	1	11	1967	1980	1	41	Y	86.7668
112	4	4013	2014	54	1	7	1981	2010	1	41	Y	85.6133
112	4	4013	2014	54	1	11	1967	1980	1	41	Y	86.7668
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113	4	4013	2014	21	1	11	1967	1980	1	41	Y	86.7668
113	4	4013	2014	31	1	8	1996	2010	2	45	Y	83.9792
113	4	4013	2014	31	1	9	1981	1995	2	44	Y	59.8021
113	4	4013	2014	31	1	11	1967	1980	1	41	Y	86.7668
113	4	4013	2014	32	1	8	1996	2010	2	45	Y	78.6188
113	4	4013	2014	32	1	9	1981	1995	2	44	Y	55.9849
113	4	4013	2014	32	1	11	1967	1980	1	41	Y	86.7668
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113	4	4013	2014	43	1	11	1967	1980	1	41	Y	86.7668
113	4	4013	2014	51	1	7	1981	2010	1	41	Y	85.6133
113	4	4013	2014	51	1	11	1967	1980	1	41	Y	86.7668
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113	4	4013	2014	52	1	11	1967	1980	1	41	Y	86.7668
113	4	4013	2014	53	1	7	1981	2010	1	41	Y	85.6133

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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113	4	4013	2014	62	1	11	1967	1980	1	41	Y	86.7668
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201	4	4013	2014	21	1	6	1981	1995	2	31	Y	63.6192
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201	4	4013	2014	31	1	6	1981	1995	2	31	Y	63.6192
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201	4	4013	2014	32	1	3	1967	1980	1	13	Y	57.2079
201	4	4013	2014	32	1	6	1981	1995	2	31	Y	63.6192
201	4	4013	2014	32	1	10	1996	2010	2	51	Y	73.1802
201	4	4013	2014	41	1	3	1967	1980	1	13	Y	57.2079
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202	4	4013	2014	31	1	3	1967	1980	1	13	Y	57.2079
202	4	4013	2014	31	1	6	1981	1995	2	31	Y	63.6192
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202	4	4013	2014	32	1	6	1981	1995	2	31	Y	63.6192
202	4	4013	2014	32	1	10	1996	2010	2	51	Y	73.1802
202	4	4013	2014	41	1	3	1967	1980	1	13	Y	57.2079
202	4	4013	2014	42	1	3	1967	1980	1	13	Y	57.2079
202	4	4013	2014	43	1	3	1967	1980	1	13	Y	57.2079
202	4	4013	2014	51	1	3	1967	1980	1	13	Y	57.2079
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202	4	4013	2014	53	1	3	1967	1980	1	13	Y	57.2079
202	4	4013	2014	54	1	3	1967	1980	1	13	Y	57.2079
202	4	4013	2014	61	1	3	1967	1980	1	13	Y	57.2079
202	4	4013	2014	62	1	3	1967	1980	1	13	Y	57.2079
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301	4	4013	2014	31	1	6	1981	1995	2	31	Y	63.6192
301	4	4013	2014	31	1	10	1996	2010	2	51	Y	78.1699
301	4	4013	2014	32	1	3	1967	1980	1	13	Y	57.2079
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301	4	4013	2014	32	1	10	1996	2010	2	51	Y	73.1802
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302	4	4013	2014	31	1	3	1967	1980	1	13	Y	57.2079
302	4	4013	2014	31	1	6	1981	1995	2	31	Y	63.6192
302	4	4013	2014	31	1	10	1996	2010	2	51	Y	78.1699
302	4	4013	2014	32	1	3	1967	1980	1	13	Y	57.2079
302	4	4013	2014	32	1	6	1981	1995	2	31	Y	63.6192
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302	4	4013	2014	62	1	3	1967	1980	1	13	Y	57.2079
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101	4	4013	2014	61	1	4	1981	2010	2	13	Y	86.5221
101	4	4013	2014	62	1	4	1981	2010	2	13	Y	86.5221
102	4	4013	2014	41	1	4	1981	2010	2	13	Y	86.5221
102	4	4013	2014	42	1	4	1981	2010	2	13	Y	86.5221
102	4	4013	2014	43	1	4	1981	2010	2	13	Y	86.5221
102	4	4013	2014	51	1	4	1981	2010	2	13	Y	86.5221
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201	4	4013	2014	41	1	4	1981	2010	2	13	Y	86.5221
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101	4	4013	2014	21	5	506	1981	1995	2	31	Y	63.6192
101	4	4013	2014	21	5	510	1996	2010	2	51	Y	83.1594
101	4	4013	2014	31	5	503	1967	1980	1	13	Y	57.2079
101	4	4013	2014	31	5	506	1981	1995	2	31	Y	63.6192
101	4	4013	2014	31	5	510	1996	2010	2	51	Y	78.1699
101	4	4013	2014	32	5	503	1967	1980	1	13	Y	57.2079
101	4	4013	2014	32	5	506	1981	1995	2	31	Y	63.6192
101	4	4013	2014	32	5	510	1996	2010	2	51	Y	73.1802
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101	4	4013	2014	62	5	503	1967	1980	1	13	Y	57.2079
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102	4	4013	2014	31	5	506	1981	1995	2	31	Y	63.6192
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102	4	4013	2014	32	5	506	1981	1995	2	31	Y	63.6192
102	4	4013	2014	32	5	510	1996	2010	2	51	Y	73.1802
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102	4	4013	2014	62	5	503	1967	1980	1	13	Y	57.2079
112	4	4013	2014	21	5	508	1996	2010	2	45	Y	89.3396
112	4	4013	2014	21	5	509	1981	1995	2	44	Y	63.6192
112	4	4013	2014	21	5	511	1967	1980	1	41	Y	86.7668
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112	4	4013	2014	31	5	511	1967	1980	1	41	Y	86.7668
112	4	4013	2014	32	5	508	1996	2010	2	45	Y	78.6188
112	4	4013	2014	32	5	509	1981	1995	2	44	Y	55.9849
112	4	4013	2014	32	5	511	1967	1980	1	41	Y	86.7668
112	4	4013	2014	41	5	507	1981	2010	1	41	Y	85.6133
112	4	4013	2014	41	5	511	1967	1980	1	41	Y	86.7668
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112	4	4013	2014	42	5	511	1967	1980	1	41	Y	86.7668
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112	4	4013	2014	43	5	511	1967	1980	1	41	Y	86.7668
112	4	4013	2014	51	5	507	1981	2010	1	41	Y	85.6133
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polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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112	4	4013	2014	52	5	511	1967	1980	1	41	Y	86.7668
112	4	4013	2014	53	5	507	1981	2010	1	41	Y	85.6133
112	4	4013	2014	53	5	511	1967	1980	1	41	Y	86.7668
112	4	4013	2014	54	5	507	1981	2010	1	41	Y	85.6133
112	4	4013	2014	54	5	511	1967	1980	1	41	Y	86.7668
112	4	4013	2014	61	5	507	1981	2010	1	41	Y	85.6133
112	4	4013	2014	61	5	511	1967	1980	1	41	Y	86.7668
112	4	4013	2014	62	5	507	1981	2010	1	41	Y	85.6133
112	4	4013	2014	62	5	511	1967	1980	1	41	Y	86.7668
113	4	4013	2014	21	5	508	1996	2010	2	45	Y	89.3396
113	4	4013	2014	21	5	509	1981	1995	2	44	Y	63.6192
113	4	4013	2014	21	5	511	1967	1980	1	41	Y	86.7668
113	4	4013	2014	31	5	508	1996	2010	2	45	Y	83.9792
113	4	4013	2014	31	5	509	1981	1995	2	44	Y	59.8021
113	4	4013	2014	31	5	511	1967	1980	1	41	Y	86.7668
113	4	4013	2014	32	5	508	1996	2010	2	45	Y	78.6188
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113	4	4013	2014	32	5	511	1967	1980	1	41	Y	86.7668
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113	4	4013	2014	42	5	507	1981	2010	1	41	Y	85.6133
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polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
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302	4	4013	2014	52	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	53	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	54	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	61	5	503	1967	1980	1	13	Y	57.2079
302	4	4013	2014	62	5	503	1967	1980	1	13	Y	57.2079
101	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
101	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
102	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
201	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
202	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
301	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	41	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	42	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	43	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	51	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	52	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	53	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	54	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	61	5	504	1981	2010	2	13	Y	86.5221
302	4	4013	2014	62	5	504	1981	2010	2	13	Y	86.5221

[RoadType]

roadTypeID	rampFraction
2	0.071069
4	0.132624

[RoadTypeDistribution]

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

[MonthVMTFraction]

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

[DayVMTFraction] (July 2014)

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

[HourVMTFraction] (SourceTypeID 21: Passenger Car)

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

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

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

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	165	16	0.00419
21	2	175	1	0.00000
21	2	175	2	0.00000
21	2	175	3	0.00000
21	2	175	4	0.00000
21	2	175	5	0.00000
21	2	175	6	0.00000
21	2	175	7	0.00000
21	2	175	8	0.00000
21	2	175	9	0.01914
21	2	175	10	0.00000
21	2	175	11	0.00000
21	2	175	12	0.05332
21	2	175	13	0.08409
21	2	175	14	0.22279
21	2	175	15	0.61647
21	2	175	16	0.00419
21	2	185	1	0.00000
21	2	185	2	0.00000
21	2	185	3	0.00000
21	2	185	4	0.00000
21	2	185	5	0.00000
21	2	185	6	0.00000
21	2	185	7	0.00000
21	2	185	8	0.00000
21	2	185	9	0.01914
21	2	185	10	0.00000
21	2	185	11	0.00000
21	2	185	12	0.05332
21	2	185	13	0.08409
21	2	185	14	0.22279
21	2	185	15	0.61647
21	2	185	16	0.00419
21	2	195	1	0.00000
21	2	195	2	0.00000
21	2	195	3	0.00000
21	2	195	4	0.00000
21	2	195	5	0.00000
21	2	195	6	0.00000
21	2	195	7	0.00000
21	2	195	8	0.00000
21	2	195	9	0.00000
21	2	195	10	0.00000
21	2	195	11	0.00000
21	2	195	12	0.00000
21	2	195	13	0.00000
21	2	195	14	0.04740
21	2	195	15	0.95259
21	2	195	16	0.00000
21	2	205	1	0.00000
21	2	205	2	0.00000
21	2	205	3	0.00000
21	2	205	4	0.00000
21	2	205	5	0.00000
21	2	205	6	0.00000
21	2	205	7	0.00000
21	2	205	8	0.00000
21	2	205	9	0.00000
21	2	205	10	0.00000
21	2	205	11	0.00000
21	2	205	12	0.00000
21	2	205	13	0.00000
21	2	205	14	0.04740
21	2	205	15	0.95259
21	2	205	16	0.00000
21	2	215	1	0.00000
21	2	215	2	0.00000
21	2	215	3	0.00000
21	2	215	4	0.00000
21	2	215	5	0.00000
21	2	215	6	0.00000
21	2	215	7	0.00000
21	2	215	8	0.00000
21	2	215	9	0.00000
21	2	215	10	0.00000
21	2	215	11	0.00000
21	2	215	12	0.00000
21	2	215	13	0.00000
21	2	215	14	0.04740
21	2	215	15	0.95259
21	2	215	16	0.00000
21	2	225	1	0.00000
21	2	225	2	0.00000
21	2	225	3	0.00000
21	2	225	4	0.00000
21	2	225	5	0.00000
21	2	225	6	0.00000
21	2	225	7	0.00000
21	2	225	8	0.00000
21	2	225	9	0.00000
21	2	225	10	0.00000
21	2	225	11	0.00000
21	2	225	12	0.00000
21	2	225	13	0.00000
21	2	225	14	0.04740
21	2	225	15	0.95259
21	2	225	16	0.00000
21	2	235	1	0.00000
21	2	235	2	0.00000
21	2	235	3	0.00000
21	2	235	4	0.00000
21	2	235	5	0.00000
21	2	235	6	0.00000
21	2	235	7	0.00000
21	2	235	8	0.00000
21	2	235	9	0.00000
21	2	235	10	0.00000
21	2	235	11	0.00000
21	2	235	12	0.00000
21	2	235	13	0.00000
21	2	235	14	0.04740
21	2	235	15	0.95259
21	2	235	16	0.00000
21	2	245	1	0.00000
21	2	245	2	0.00000
21	2	245	3	0.00000
21	2	245	4	0.00000
21	2	245	5	0.00000
21	2	245	6	0.00000
21	2	245	7	0.00000
21	2	245	8	0.00000
21	2	245	9	0.00000
21	2	245	10	0.00000
21	2	245	11	0.00000
21	2	245	12	0.00000
21	2	245	13	0.00000
21	2	245	14	0.04740
21	2	245	15	0.95259
21	2	245	16	0.00000
21	2	12	1	0.00000
21	2	12	2	0.00000
21	2	12	3	0.00000
21	2	12	4	0.00000
21	2	12	5	0.00000
21	2	12	6	0.00000
21	2	12	7	0.00000
21	2	12	8	0.00000
21	2	12	9	0.00000
21	2	12	10	0.00000
21	2	12	11	0.00000
21	2	12	12	0.00000
21	2	12	13	0.00000
21	2	12	14	0.04740
21	2	12	15	0.95259
21	2	12	16	0.00000
21	2	22	1	0.00000
21	2	22	2	0.00000
21	2	22	3	0.00000
21	2	22	4	0.00000
21	2	22	5	0.00000
21	2	22	6	0.00000
21	2	22	7	0.00000
21	2	22	8	0.00000
21	2	22	9	0.00000
21	2	22	10	0.00000
21	2	22	11	0.00000
21	2	22	12	0.00000
21	2	22	13	0.00000
21	2	22	14	0.04740
21	2	22	15	0.95259
21	2	22	16	0.00000
21	2	32	1	0.00000
21	2	32	2	0.00000
21	2	32	3	0.00000
21	2	32	4	0.00000
21	2	32	5	0.00000
21	2	32	6	0.00000
21	2	32	7	0.00000
21	2	32	8	0.00000
21	2	32	9	0.00000
21	2	32	10	0.00000
21	2	32	11	0.00000
21	2	32	12	0.00000
21	2	32	13	0.00000
21	2	32	14	0.04740
21	2	32	15	0.95259
21	2	32	16	0.00000
21	2	42	1	0.00000
21	2	42	2	0.00000
21	2	42	3	0.00000
21	2	42	4	0.00000
21	2	42	5	0.00000
21	2	42	6	0.00000
21	2	42	7	0.00000
21	2	42	8	0.00000
21	2	42	9	0.00000
21	2	42	10	0.00000
21	2	42	11	0.00000
21	2	42	12	0.00000
21	2	42	13	0.00000
21	2	42	14	0.04740
21	2	42	15	0.95259
21	2	42	16	0.00000
21	2	52	1	0.00000
21	2	52	2	0.00000
21	2	52	3	0.00000
21	2	52	4	0.00000
21	2	52	5	0.00000
21	2	52	6	0.00000
21	2	52	7	0.00000
21	2	52	8	0.00000
21	2	52	9	0.00000
21	2	52	10	0.00000
21	2	52	11	0.00000
21	2	52	12	0.00000
21	2	52	13	0.00000
21	2	52	14	0.04740
21	2	52	15	0.95259
21	2	52	16	0.00000
21	2	62	1	0.00000
21	2	62	2	0.00000
21	2	62	3	0.00000
21	2	62	4	0.00000
21	2	62	5	0.00000
21	2	62	6	0.00000
21	2	62	7	0.00000
21	2	62	8	0.00000
21	2	62	9	0.00000
21	2	62	10	0.00000
21	2	62	11	0.00000
21	2	62	12	0.00000
21	2	62	13	0.00000
21	2	62	14	0.04740
21	2	62	15	0.95259
21	2	62	16	0.00000
21	2	72	1	0.00000
21	2	72	2	0.00000
21	2	72	3	0.00000
21	2	72	4	0.00000
21	2	72	5	0.00000
21	2	72	6	0.00000
21	2	72	7	0.00000
21	2	72	8	0.02627
21	2	72	9	0.00000
21	2	72	10	0.00000
21	2	72	11	0.05723
21	2	72	12	0.02975
21	2	72	13	0.10615
21	2	72	14	0.20489
21	2	72	15	0.56656
21	2	72	16	0.00915
21	2	82	1	0.00000
21	2	82	2	0.00000
21	2	82	3	0.00000
21	2	82	4	0.00000
21	2	82	5	0.00000
21	2	82	6	0.00000
21	2	82	7	0.00000
21	2	82	8	0.02627
21	2	82	9	0.00000
21	2	82	10	0.00000
21	2	82	11	0.05723
21	2	82	12	0.02975
21	2	82	13	0.10615
21	2	82	14	0.20489
21	2	82	15	0.56656
21	2	82	16	0.00915
21	2	92	1	0.00000
21	2	92	2	0.00000
21	2	92	3	0.00000
21	2	92	4	0.00000

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	92	5	0.00000
21	2	92	6	0.00000
21	2	92	7	0.00000
21	2	92	8	0.02627
21	2	92	9	0.00000
21	2	92	10	0.00000
21	2	92	11	0.05723
21	2	92	12	0.02975
21	2	92	13	0.10615
21	2	92	14	0.20489
21	2	92	15	0.56656
21	2	92	16	0.00915
21	2	102	1	0.00000
21	2	102	2	0.00000
21	2	102	3	0.00000
21	2	102	4	0.00000
21	2	102	5	0.00000
21	2	102	6	0.00000
21	2	102	7	0.00000
21	2	102	8	0.00000
21	2	102	9	0.00000
21	2	102	10	0.00000
21	2	102	11	0.00000
21	2	102	12	0.00000
21	2	102	13	0.00849
21	2	102	14	0.04656
21	2	102	15	0.94495
21	2	102	16	0.00000
21	2	112	1	0.00000
21	2	112	2	0.00000
21	2	112	3	0.00000
21	2	112	4	0.00000
21	2	112	5	0.00000
21	2	112	6	0.00000
21	2	112	7	0.00000
21	2	112	8	0.00000
21	2	112	9	0.00000
21	2	112	10	0.00000
21	2	112	11	0.00000
21	2	112	12	0.00000
21	2	112	13	0.00849
21	2	112	14	0.04656
21	2	112	15	0.94495
21	2	112	16	0.00000
21	2	122	1	0.00000
21	2	122	2	0.00000
21	2	122	3	0.00000
21	2	122	4	0.00000
21	2	122	5	0.00000
21	2	122	6	0.00000
21	2	122	7	0.00000
21	2	122	8	0.00000
21	2	122	9	0.00000
21	2	122	10	0.00000
21	2	122	11	0.00000
21	2	122	12	0.00000
21	2	122	13	0.00849
21	2	122	14	0.04656
21	2	122	15	0.94495
21	2	122	16	0.00000
21	2	132	1	0.00000
21	2	132	2	0.00000
21	2	132	3	0.00000
21	2	132	4	0.00000
21	2	132	5	0.00000
21	2	132	6	0.00000
21	2	132	7	0.00000
21	2	132	8	0.00000
21	2	132	9	0.00000
21	2	132	10	0.00000
21	2	132	11	0.00000
21	2	132	12	0.00000
21	2	132	13	0.00849
21	2	132	14	0.04656
21	2	132	15	0.94495
21	2	132	16	0.00000
21	2	142	1	0.00000
21	2	142	2	0.00000
21	2	142	3	0.00000
21	2	142	4	0.00000
21	2	142	5	0.00000
21	2	142	6	0.00000
21	2	142	7	0.00000
21	2	142	8	0.00000
21	2	142	9	0.00000
21	2	142	10	0.00000
21	2	142	11	0.00000
21	2	142	12	0.00000
21	2	142	13	0.00849
21	2	142	14	0.04656
21	2	142	15	0.94495
21	2	142	16	0.00000
21	2	152	1	0.00000
21	2	152	2	0.00000
21	2	152	3	0.00000
21	2	152	4	0.00000
21	2	152	5	0.00000
21	2	152	6	0.00000
21	2	152	7	0.00000
21	2	152	8	0.00000
21	2	152	9	0.01914
21	2	152	10	0.00000
21	2	152	11	0.00000
21	2	152	12	0.05332
21	2	152	13	0.08409
21	2	152	14	0.22279
21	2	152	15	0.61647
21	2	152	16	0.00419
21	2	162	1	0.00000
21	2	162	2	0.00000
21	2	162	3	0.00000
21	2	162	4	0.00000
21	2	162	5	0.00000
21	2	162	6	0.00000
21	2	162	7	0.00000
21	2	162	8	0.00000
21	2	162	9	0.01914
21	2	162	10	0.00000
21	2	162	11	0.00000
21	2	162	12	0.05332
21	2	162	13	0.08409
21	2	162	14	0.22279
21	2	162	15	0.61647
21	2	162	16	0.00419
21	2	172	1	0.00000
21	2	172	2	0.00000
21	2	172	3	0.00000
21	2	172	4	0.00000
21	2	172	5	0.00000
21	2	172	6	0.00000
21	2	172	7	0.00000
21	2	172	8	0.00000
21	2	172	9	0.01914
21	2	172	10	0.00000
21	2	172	11	0.00000
21	2	172	12	0.05332
21	2	172	13	0.08409
21	2	172	14	0.22279
21	2	172	15	0.61647
21	2	172	16	0.00419
21	2	182	1	0.00000
21	2	182	2	0.00000
21	2	182	3	0.00000
21	2	182	4	0.00000
21	2	182	5	0.00000
21	2	182	6	0.00000
21	2	182	7	0.00000
21	2	182	8	0.00000
21	2	182	9	0.01914
21	2	182	10	0.00000
21	2	182	11	0.00000
21	2	182	12	0.05332
21	2	182	13	0.08409
21	2	182	14	0.22279
21	2	182	15	0.61647
21	2	182	16	0.00419
21	2	192	1	0.00000
21	2	192	2	0.00000
21	2	192	3	0.00000
21	2	192	4	0.00000
21	2	192	5	0.00000
21	2	192	6	0.00000
21	2	192	7	0.00000
21	2	192	8	0.00000
21	2	192	9	0.00000
21	2	192	10	0.00000
21	2	192	11	0.00000
21	2	192	12	0.00000
21	2	192	13	0.00000
21	2	192	14	0.04740
21	2	192	15	0.95259
21	2	192	16	0.00000
21	2	202	1	0.00000
21	2	202	2	0.00000
21	2	202	3	0.00000
21	2	202	4	0.00000
21	2	202	5	0.00000
21	2	202	6	0.00000
21	2	202	7	0.00000
21	2	202	8	0.00000
21	2	202	9	0.00000
21	2	202	10	0.00000
21	2	202	11	0.00000
21	2	202	12	0.00000
21	2	202	13	0.00000
21	2	202	14	0.04740
21	2	202	15	0.95259
21	2	202	16	0.00000
21	2	212	1	0.00000
21	2	212	2	0.00000
21	2	212	3	0.00000
21	2	212	4	0.00000
21	2	212	5	0.00000
21	2	212	6	0.00000
21	2	212	7	0.00000
21	2	212	8	0.00000
21	2	212	9	0.00000
21	2	212	10	0.00000
21	2	212	11	0.00000
21	2	212	12	0.00000
21	2	212	13	0.00000
21	2	212	14	0.04740
21	2	212	15	0.95259
21	2	212	16	0.00000
21	2	222	1	0.00000
21	2	222	2	0.00000
21	2	222	3	0.00000
21	2	222	4	0.00000
21	2	222	5	0.00000
21	2	222	6	0.00000
21	2	222	7	0.00000
21	2	222	8	0.00000
21	2	222	9	0.00000
21	2	222	10	0.00000
21	2	222	11	0.00000
21	2	222	12	0.00000
21	2	222	13	0.00000
21	2	222	14	0.04740
21	2	222	15	0.95259
21	2	222	16	0.00000
21	2	232	1	0.00000
21	2	232	2	0.00000
21	2	232	3	0.00000
21	2	232	4	0.00000
21	2	232	5	0.00000
21	2	232	6	0.00000
21	2	232	7	0.00000
21	2	232	8	0.00000
21	2	232	9	0.00000
21	2	232	10	0.00000
21	2	232	11	0.00000
21	2	232	12	0.00000
21	2	232	13	0.00000
21	2	232	14	0.04740
21	2	232	15	0.95259
21	2	232	16	0.00000
21	2	242	1	0.00000
21	2	242	2	0.00000
21	2	242	3	0.00000
21	2	242	4	0.00000
21	2	242	5	0.00000
21	2	242	6	0.00000
21	2	242	7	0.00000
21	2	242	8	0.00000
21	2	242	9	0.00000
21	2	242	10	0.00000
21	2	242	11	0.00000
21	2	242	12	0.00000
21	2	242	13	0.00000
21	2	242	14	0.04740
21	2	242	15	0.95259
21	2	242	16	0.00000

[AVFT] (SourceTypeID 42: Transit Bus)

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

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

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

[CountyYear]

countyID	yearID	refuelingVaporProgramAdjust	refuelingSpillProgramAdjust
4013	2014	0.661	0.000

Appendix D. Emissions from Facilities Treated as Area Sources in the 2014 Periodic Emissions Inventory for PM_{10}

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

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

ID	Business Name	Street address and city	PM_{10}	$PM_{2.5}$	NOx	SOx	NHx
1074	23RD AVE WASTEWATER TREATMENT PLANT	2470 S 22ND AVE, PHOENIX	0.7	0.5	2.8	2.1	
133843	A LEGACY FUNERAL HOME LLC	1722 N BANNING #101, MESA	0.1	0.1	0.2	0.0	
132976	ABEL FUNERAL SERVICES INC	1544 W GRANT ST, PHOENIX	0.6	0.3	1.1	0.1	
1387	ABLE STEEL FABRICATORS	4150 E QUARTZ CIR, MESA	0.0	0.0			
969	AF LORTS MANUFACTURING COMPANY INC	15836 W EDDIE ALBERT, GOODYEAR	0.0	0.0			
125823	AFFORDABLE CREMATION & BURIAL CHAPEL	1130 S HORNE, MESA	0.0	0.0	0.0	0.0	
107220	ALL PETS GREAT AND SMALL	1110 S HORNE ST #103, MESA	0.0	0.0	0.6	0.1	
90012	ALL STATE CREMATORY	1110 S HORNE #108, MESA	0.8	0.5	1.5	0.2	
34139	ALL WOOD TREASURES CO	2063 E CEDAR ST, TEMPE	0.0	0.0			
131474	ALLIED PACKAGING CORPORATION	5640 S 16TH ST, PHOENIX	0.0	0.0	0.2	0.0	
35541	ALLIED TUBE AND CONDUIT	2525 N 27TH AVE, PHOENIX	0.0	0.0	0.1	0.0	
27925	AMERICAN CASE & PED MANUFACTURING CO INC	2022 N 22ND AVE, PHOENIX	0.0	0.0			
132483	AMERICAN FENCE & SECURITY CO INC	2737 W VIRGINIA AVE, PHOENIX	1.8	1.6			
54414	AMERICAN SAND & ROCK	PORTABLE	0.4	0.2	1.7	0.1	
42432	AMERIPRIDE LINEN & APPAREL SERVICE	6025 W VAN BUREN ST, PHOENIX	1.1	0.8	1.3	0.0	
199	AMERON WATER TRANSMISSION GROUP, LLC	2325 S 7TH ST, PHOENIX	0.4	0.1	0.1	0.0	
129545	AMES DIVERSIFIED SERVICES	3015 W CLARENDON AVE, PHOENIX	1.0	0.6	1.8	0.2	
133188	ANIMAL CREMATION SERVICES	5348 W BETHANY HOME, GLENDALE	0.3	0.2	0.6	0.1	
84	ARIZONA BRAKE & CLUTCH SUPPLY INC	2211 N BLACK CANYON, PHOENIX	0.0	0.0	0.0	0.0	
3938	ARIZONA GALVANIZING INC	15775 W ELWOOD ST, GOODYEAR	7.2	4.3	4.4	0.0	0.0
130470	ARIZONA LANDFILL LLC	2750 S 11TH AVE, PHOENIX	1.7	0.7	10.8	0.4	
36772	ARIZONA MATERIALS	3636 S 43RD AVE, PHOENIX	13.7	3.2			
53008	ARIZONA MATERIALS	12820 W ROOKS RD, BUCKEYE	0.8	0.2			
85545	ARIZONA MATERIALS	PORTABLE #4	2.0	0.6			
41257	ARIZONA MATERIALS LLC	21838 N 20TH ST, PHOENIX	0.8	0.3			
131021	ARIZONA NUTRITIONAL SUPPLEMENTS LLC	210 S BECK AVE, CHANDLER	4.1	4.1			
69409	ARIZONA POLYMER FLOORING INC	7731 N 68TH AVE, GLENDALE	0.9	0.9			
4364	ARIZONA STATE UNIVERSITY	1551 S RURAL RD, TEMPE	6.7	5.3	13.5	0.4	
36898	ASPC-LEWIS	26700 S HWY 85, BUCKEYE	0.3	0.3	9.6	0.1	
4328	ASU MACROTECHNOLOGY WORKS	7700 S RIVER PKWY, TEMPE	0.1	0.1	3.0	0.0	0.3
1502	ATLAS ROOFING CORPORATION	40 S 45TH AVE, PHOENIX	0.0	0.0	0.5	0.0	
2656	AVIATION DEPT - PHOENIX SKY HARBOR	3400 E SKY HARBOR BLVD, PHOENIX	0.2	0.2	3.2	0.0	
50422	BAE SYSTEMS AEROSPACE & DEFENSE GROUP	7822 S 46TH ST, PHOENIX	0.0	0.0	0.0	0.0	
1449	BAKER COMMODITIES	3602 W ELWOOD ST, PHOENIX	0.2	0.2	2.1	0.0	
31585	BANK OF AMERICA	2500 W FRYE RD, CHANDLER	0.0	0.0	3.4	0.1	
781	BANNER GOOD SAMARITAN MEDICAL CENTER	1111 E MCDOWELL RD, PHOENIX	0.6	0.6	7.6	0.2	
29946	BANNER THUNDERBIRD MEDICAL CENTER	5555 W THUNDERBIRD, GLENDALE	0.2	0.2	3.3	0.2	
129595	BARREL O' FUN SNACK FOOD SOUTHWEST	7330 W SHERMAN ST, PHOENIX	23.5	5.2	6.1	0.0	
110901	BAY FOAM PRODUCTS INC	2240 W PEORIA AVE, PHOENIX	0.0	0.0	0.3	0.0	
607	BEST FUNERAL SERVICES INC	9380 W PEORIA AVE, PEORIA	0.3	0.2	0.6	0.1	
961	BIG SURF WATERPARK	1500 N MCCLINTOCK DR, TEMPE	0.0	0.0	2.6	0.0	
74058	BILTMORE SHUTTERS INC	1138 W WATKINS ST, PHOENIX	0.0	0.0			
3305	BIMBO BAKERIES USA, INC	738 W VAN BUREN ST, PHOENIX	0.4	0.1	1.8	0.0	
226	BORAL ROOFING LLC	1832 S 51ST AVE, PHOENIX	0.1	0.1	0.3	0.0	0.0
130047	BUESING CORPORATION	11520 E GERMANN RD, CHANDLER	5.9	0.9			
56105	BURDETTE CABINET CO INC	3941 N HIGLEY RD, MESA	0.1	0.0			
131634	CAFE VALLEY INC	7000 W BUCKEYE RD, PHOENIX	0.2	0.2	3.2	0.0	

ID	Business Name	Street address and city	PM_{10}	$PM_{2.5}$	NOx	SOx	NHx
131208	CALGON CARBON CORPORATION	521 S BUTTERFIELD TR, GILA BEND	1.8	1.8	2.5	0.2	
3442	CALJET	125 N 53RD AVE, PHOENIX	0.0	0.0	0.1	0.0	
131966	CALPORTLAND	4830 S 43RD AVE, PHOENIX	1.9	0.8	0.4	0.0	
133365	CALPORTLAND	3410 E VIRGINIA ST, MESA	8.0	3.6	0.0	0.0	
898	CAMINO DEL SOL FUNERAL CHAPEL&CREMATION	13738 CAMINO DEL SOL, SUN CITY W	0.1	0.1	0.2	0.0	
44182	CANAM STEEL CORPORATION	22253 W SOUTHERN AVE, BUCKEYE	0.4	0.3			
130156	CASE FURNITURE & DESIGN, LLC	1502 E HADLEY ST #100, PHOENIX	0.5	0.5			
1318	CAVCO INDUSTRIES INC	1366 S LITCHFIELD RD, GOODYEAR	0.1	0.1			
1316	CAVCO INDUSTRIES LLC/DURANGO PLANT	2502 W DURANGO ST, PHOENIX	0.2	0.2			
260	CEMEX - 19TH AVE PLANT	3640 S 19TH AVE, PHOENIX	15.8	3.4	3.4	0.8	
98591	CEMEX - 7TH STREET PLANT	PORTABLE #4, PHOENIX	1.9	0.9	0.1	0.0	
98492	CEMEX - BUCKEYE PLANT	22625 W BELOAT RD, BUCKEYE	0.2	0.2	0.0	0.0	
63	CEMEX - EL MIRAGE PLANT	8635 N EL MIRAGE RD, EL MIRAGE	1.7	0.5	0.1	0.0	
213	CEMEX - GLENDALE PLANT	11920 W GLENDALE AVE, GLENDALE	2.4	0.8	1.8	4.2	
106410	CEMEX - SUN CITY EAST PLANTS 4106 & 4118	24004 N 107TH AVE, SUN CITY	1.2	0.2			
1266	CEMEX - WEST PLANT	11701 W INDIAN SCHOOL, PHOENIX	4.4	1.4	8.7	0.6	
579	CEMEX - WEST VALLEY PLANT	11550 W NORTHERN AVE, GLENDALE	16.6	2.9	6.4	4.2	
129574	CEMEX CONSTRUCTION MATERIALS SOUTH LLC	4815 S 67TH AVE, PHOENIX	0.1	0.0			
1310	CENTURY GRAPHICS LLC	2960 GRAND AVE, PHOENIX	0.0	0.0	0.3	0.0	
823	CHEMRESEARCH CO INC	1130 W HILTON AVE, PHOENIX	0.0	0.0	0.4	0.0	
127623	CINTAS CORPORATION	2425 W NEVADA ST, CHANDLER	0.1	0.1	0.8	0.0	
61573	CIRCLE H SAND & ROCK	6400 S EL MIRAGE RD, TOLLESON	3.1	0.7	4.1	0.3	
3441	CIRCLE K TERMINAL LLC	5333 W VAN BUREN ST, PHOENIX	0.9	0.6			
3403	CITY OF PHOENIX 19TH AVE LANDFILL	1701 W LOWER BUCKEYE, PHOENIX	8.3	8.2	0.4	0.2	
29919	CITY OF PHOENIX 27TH AVE LANDFILL	2800 S 27TH AVE, PHOENIX	5.8	5.5	1.2	0.4	
132552	CNH AMERICA, LLC	19501 W NORTHERN AVE, WADDELL	1.4	0.2			
1075	CO PHX 91ST AVE WWTP	5615 S 91ST AVE #1, TOLLESON	6.2	4.3	19.8	48.4	
113723	CONTRACTORS LANDFILL & RECYCLING	2425 N CENTER ST, MESA	1.2	0.7	8.8	0.1	
31570	COPPER STATE RUBBER OF ARIZONA	750 S 59TH AVE, PHOENIX	0.0	0.0	0.5	0.0	
399	CORESLAB STRUCTURES (ARIZ) INC	5026 S 43RD AVE, PHOENIX	8.1	1.3			
227	CORROSION ENGINEERING INC	145 S NINA CIR, MESA	0.0	0.0	0.4	0.0	
1198	COURIER GRAPHICS CORP	2621 S 37TH ST, PHOENIX	0.0	0.0	0.4	0.0	
289	COURTHOUSE AG HOLDINGS LLC	51040 W VALLEY RD, AGUILA	3.6	0.3	0.0	0.0	
132333	COYOTE TIRE RETREADING, INC.	1802 N 23RD AVE, PHOENIX	0.0	0.0	0.1	0.0	
4368	CRAFTSMEN IN WOOD MFG	5441 W HADLEY ST, PHOENIX	1.8	1.8	0.0	0.0	
1407	CRANE ELECTRONICS, INC	340 N ROOSEVELT AVE, CHANDLER	0.0	0.0	0.1	0.0	
100059	CRM OF AMERICA (NEW AIR)	11400 E PECOS RD, MESA	3.7	0.3	0.3	0.0	
129	CROTHALL LAUNDRY SERVICES	4445 S 36TH ST, PHOENIX	0.3	0.3	4.2	0.0	
134012	CROWN CUSTOM MILLWORK, LLC	2740 W DEER VALLEY RD, PHOENIX	0.2	0.2			
131179	CSE OPERATING I, LLC	29115 W BROADWAY RD, BUCKEYE	0.1	0.1	0.1	0.9	
130790	CUSTOM FAB INC	3065 S 43RD AVE, PHOENIX	1.3	1.1	0.6	0.0	
87	DECA CREMATION SERVICES INC	2237 S 15TH ST, PHOENIX	0.1	0.0	0.7	0.1	
45027	DEER VALLEY TRANSFER STATION	2120 W ADOBE DR, PHOENIX	7.4	7.3	0.1	0.0	
1342	DEL RIO LANDFILL	1150 E ELWOOD ST, PHOENIX	3.9	3.9	0.0	0.0	
50725	DESERT POWDER COATING	4409 S 35TH AVE, PHOENIX	0.0	0.0	0.3	0.0	
40629	DESERT READY MIX	1800 N ALMA SCHOOL RD, MESA	1.1	0.7			
51073	DIGITAL REALTY TRUST CHANDLER, LLC	2121 S PRICE RD, CHANDLER	0.3	0.3	12.5	0.0	
127094	DOUBLETREE PAPER MILL LLC	31201 W THAYER RD, GILA BEND	6.4	5.2	4.0	0.3	
40470	DRAKE MATERIALS PLANT 151	10800 W ROSE GARDEN, SUN CITY	0.8	0.5			
51062	DURANGO CORRECTIONAL FACILITY	3225 W DURANGO ST, PHOENIX	0.1	0.1	0.9	0.0	
48771	EAGLE ROOFING PRODUCTS	4602 W ELWOOD ST, PHOENIX	5.1	4.0	2.3	0.0	
1383	EAST VALLEY CREMATORY	9642 E APACHE TR, MESA	0.1	0.1	0.2	0.0	
109938	EBAY INC	4010 N 3RD ST, PHOENIX	0.3	0.3	49.2	1.3	
26	EMPIRE MACHINERY CO	1725 S COUNTRY CLUB DR, MESA	0.9	0.9	8.9	0.1	
130260	ENTRUSTED PETS, INC.	2237 S 15TH ST, PHOENIX	0.1	0.0	0.1	0.0	
1505	EXECUTIVE DOOR COMPANY	3939 W CLARENDON AVE, PHOENIX	1.2	1.2			
1488	FARMER'S GIN INC	8400 S TURNER RD, BUCKEYE	10.1	1.5	0.3	0.0	
59426	FEDERAL EXPRESS-PHXR	3002 E OLD TOWER RD, PHOENIX	0.1	0.1	0.8	0.0	
132911	FINECRAFT CUSTOM WOODWORKS LLC	5775 N 51ST AVE, GLENDALE	0.0	0.0			

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128991	FISHER SAND & GRAVEL	PORTABLE #3	5.2	1.5	12.1	0.0	
85509	FISHER SAND & GRAVEL COMPANY	PORTABLE #2	8.1	2.3	15.4	1.0	
1087	FLEX FOAM DIVISION	617 N 21ST AVE, PHOENIX	0.0	0.0	0.2	0.0	
27728	FLIPCHIP INTERNATIONAL LLC	3701 E UNIVERSITY DR, PHOENIX	0.0	0.0	0.4	0.0	0.1
4206	FUJI FILM ELECTRONIC MATERIALS USA	6550 S MOUNTAIN RD, MESA	0.1	0.1	1.5	0.0	0.1
36258	G & K SERVICES	4804 W ROOSEVELT ST, PHOENIX	0.1	0.1	1.0	0.0	
41751	GCR TIRE CENTERS	2815 N 32ND AVE, PHOENIX	0.1	0.1			
902	GENERAL DYNAMICS C4 SYSTEMS	8201 E MCDOWELL RD, SCOTTSDALE	0.1	0.1	1.4	0.1	
73110	GLENN WEINBERGER TOPSOIL INC	39500 S 99TH AVE, MOBILE	13.9	2.1	0.2	0.0	
1418	GOODRICH CORPORATION	3414 S 5TH ST, PHOENIX	0.0	0.0	0.0	0.0	
515	GOODYEAR COMMERCIAL TIRE SERVICE CTRS	3007 N 31ST AVE, PHOENIX	0.0	0.0			
131841	GRANITE EXPRESS	MORRISTOWN	1.4	0.7	6.3	0.4	
10	GREEN ACRES MORTUARIES & CEMETERIES INC	401 N HAYDEN RD, SCOTTSDALE	0.0	0.0	0.0	0.0	
1182	GREENWOOD MEMORY LAWN MORTUARY	2300 W VAN BUREN ST, PHOENIX	0.5	0.3	0.9	0.1	
141	GRO-WELL BRANDS INC	2807 S 27TH AVE, PHOENIX	2.7	2.2			
4498	HANSON AGGREGATES LLC	33500 W INDIAN SCHOO, TONOPAH	0.6	0.2			
699	HANSON AGGREGATES OF ARIZONA INC	4002 S 51ST AVE, PHOENIX	1.4	0.6	3.6	0.4	
113855	HANSON AGGREGATES, LLC	6204 W SOUTHERN AVE, LAVEEN	0.6	0.3			
131334	HELIAE DEVELOPMENT LLC	614 E GERMANN RD, GILBERT	0.0	0.0	0.2	0.0	
31565	HENRY PRODUCTS INC	302 S 23RD AVE, PHOENIX	0.0	0.0	0.4	0.0	
129711	HERITAGE CREMATORY	12525 NW GRAND AVE, EL MIRAGE	0.2	0.1	0.4	0.0	
3536	HOLSUM BAKERY INC	2322 W LINCOLN ST, PHOENIX	0.3	0.3	3.6	0.0	
39213	HOLSUM OF TOLLESON LLC	9600 W BUCKEYE RD, TOLLESON	0.2	0.2	2.9	0.0	
1059	HONEYWELL ENGINES SYS & SERVICE PHX R&O	1944 E SKY HARBOR CIR, PHOENIX	0.1	0.1	1.4	0.1	
355	HONEYWELL INTERNATIONAL INC	111 S 34TH ST, PHOENIX	2.3	2.2	42.0	8.5	0.3
247	HONEYWELL INTERNATIONAL INC (TEMPE, AZ)	1300 W WARNER RD, TEMPE	1.5	1.0	3.3	0.0	
348	HONEYWELL PHOENIX AVIONICS DEER VALLEY	21111 N 19TH AVE, PHOENIX	0.1	0.1	1.4	0.0	
354	IMSAMET OF ARIZONA	3829 S ESTRELLA PKWY, GOODYEAR	3.2	2.4	6.4	0.0	
4444	INFINEON TECHNOLOGIES EPI SERVICES INC	550 W JUANITA AVE, MESA	4.0	4.0	0.1	0.0	0.9
777	INSULFOAM	3401 W COCOPAH ST, PHOENIX	0.0	0.0	0.6	0.0	
31617	INTEL CORP CHANDLER CAMPUS (FAB 6)	5000 W CHANDLER BLVD, CHANDLER	2.1	2.1	14.5	0.2	0.3
3966	INTEL CORP-OCOTILLO CAMPUS	4500 S DOBSON RD, CHANDLER	12.7	8.8	27.0	0.7	2.7
89885	INTERCO PRINT	4501 W POLK ST, PHOENIX	0.0	0.0	0.2	0.0	0.0
130597	INTERNATIONAL FLORA TECHNOLOGIES	28633 W PATTERSON RD, BUCKEYE	0.3	0.2	0.1	0.0	
43832	INTERNATIONAL PAPER	660 S 83RD AVE, TOLLESON	5.8	4.9	0.9	0.0	0.9
131226	INTERSAN MANUFACTURING	1746 W FILLMORE ST, PHOENIX	0.0	0.0			
130265	IO PHOENIX ONE, LLC	615 N 48TH ST, PHOENIX	0.1	0.1	7.6	0.2	
983	ISOLA GROUP S A R L	165 S PRICE RD, CHANDLER	0.3	0.3	10.6	0.0	
121	JACKS TIRE & OIL	5925 W MONROE ST, PHOENIX	1.4	1.4	0.0	0.0	0.0
121873	JAMES EDWARD FURNITURE	1555 E JACKSON ST, PHOENIX	0.2	0.2			
101	JBS TOLLESON INC	651 S 91ST AVE, TOLLESON	6.5	3.6	12.4	0.1	2.7
25823	JOY GLOBAL - SURFACE MINING	112 W IRON AVE, MESA	0.0	0.0	0.0	0.0	
1027	JPCI SERVICES	PORTABLE,	0.2	0.2	3.3	0.2	
130981	KELLER ELECTRICAL INDUSTRIES INC	1881 E UNIVERSITY DR, PHOENIX	0.3	0.3	0.1	0.0	
725	KILAUEA CRUSHERS INC	HWY 74, WICKENBURG	11.9	2.5			
114904	KILAUEA CRUSHERS INC	16402 S TUTHILL RD, BUCKEYE	3.2	0.6	1.0	0.1	
128509	KILAUEA CRUSHERS INC	SR 85 & BUCKEYE HILLS, BUCKEYE	0.9	0.3	0.8	0.1	
857	L-3 COMMUNICATIONS CORPORATION	1215 S 52ND ST, TEMPE	0.0	0.0	0.3	0.0	
281	LAFARGE NORTH AMERICA	11500 W BEARDSLEY RD, SUN CITY	8.1	1.3			
443	LAFARGE NORTH AMERICA	21209 W BELOAT RD, BUCKEYE	1.2	0.3			
30357	LARON INC	3550 S 16TH ST, PHOENIX	0.0	0.0	0.1	0.0	
96886	LEGENDS FURNITURE	10300 W BUCKEYE RD, TOLLESON	0.6	0.6			
130111	LIFEPLAN CREMATORY INC.	1216 N 17TH AVE, PHOENIX	0.4	0.2	0.7	0.1	
3300	LUKE AFB - 56TH FIGHTER WING	14002 W MARAUDER ST, GLENDALE	0.6	0.6	7.7	0.2	
744	M E GLOBAL INC	5857 S KYRENE RD, TEMPE	18.8	15.2	11.5	4.5	
106053	M R TANNER MINING	6515 N EL MIRAGE RD, GLENDALE	4.4	0.7			
1248	MAAX SPAS INDUSTRIES CORP	25605 S ARIZONA AVE, CHANDLER	0.5	0.5			
31261	MADISON GRANITE SUPPLIES	29925 N NORTH VALLEY, PHOENIX	17.1	3.0	25.9	1.5	
148	MAGELLAN AEROSPACE, GLENDALE INC	5440 W MISSOURI AVE, GLENDALE	0.3	0.2	1.0	0.1	

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353	MARLAM INDUSTRIES INC	834 E HAMMOND LN, PHOENIX	0.0	0.0	0.0	0.0	
15445	MAYO CLINIC ARIZONA	13400 E SHEA BLVD, SCOTTSDALE	0.2	0.2	2.6	0.0	
1200	MEDTRONIC - TEMPE	2343 W MEDTRONIC WAY, TEMPE	0.1	0.1	0.5	0.0	0.1
244	MELCHER MISSION CHAPEL AND CREMATORY	6625 E MAIN ST, MESA	0.4	0.3	0.8	0.1	
596	MELDRUM MORTUARY & CREMATORY	52 N MACDONALD, MESA	0.0	0.0	0.1	0.0	
82244	MESA COMMUNITY COLLEGE MORTUARY SCI	7440 E TAHOE AVE, MESA	0.0	0.0	0.0	0.0	
3326	MESA FULLY FORMED LLC	1111 S SIRRINE ST, MESA	0.4	0.4			
4105	MESA INDUSTRIES INC	230 N 48TH AVE, PHOENIX	3.2	3.2			
3758	MESA OIL, INC	131 S 57TH AVE, PHOENIX	0.0	0.0			
1203	MICROCHIP TECHNOLOGY INC	2355 W CHANDLER BLVD, CHANDLER	0.1	0.1	0.9	0.0	0.1
1875	MICROCHIP TECHNOLOGY INC	1200 S 52ND ST, TEMPE	5.1	3.2	11.6	0.2	6.4
53593	MICROSEMI CORP	3601 E UNIVERSITY DR, PHOENIX	0.1	0.1			
3724	MISSION FOODS-TEMPE	5860 S ASH AVE, TEMPE	0.2	0.2	2.8	0.0	
882	MORTON SALT, INC.	13000 W GLENDALE AVE, GLENDALE	3.3	1.9	8.0	0.4	
264	MOUNTAIN VIEW FUNERAL HOME AND CEMETERY	7900 E MAIN ST, MESA	0.1	0.1	0.1	0.0	
132523	MOUNTAINVIEW CUSTOM CABINETS	23306 N 15TH AVE, PHOENIX	0.1	0.1			
128379	MURPHY WALL PRODUCTS INTERNATIONAL INC	228 E ARIZONA EASTERN, BUCKEYE	0.0	0.0			
121682	MUSKET CORPORATION	816 N 19TH AVE, PHOENIX	0.0	0.0	0.0	0.0	
34197	NATIONAL GYPSUM COMPANY	1414 E HADLEY ST, PHOENIX	4.0	3.0	9.8	6.2	
114015	NATIONAL SPECIALTY AGGREGATES LLC	4310 S 80TH ST, MESA	1.0	0.2	0.0	0.0	
910	NELTEC INC	1420 W 12TH PL, TEMPE	0.1	0.1	3.6	0.0	
590	NK ASPHALT PARTNERS	7110 W NORTHERN AVE, GLENDALE	0.5	0.5	5.9	0.0	
129677	NO WASTE GRINDINGS	PORTABLE #1, PHOENIX	0.4	0.4	6.2	0.4	
620	NORTHWEST WATER RECLAMATION PLANT	960 N RIVERVIEW, MESA	0.1	0.1	3.5	0.0	
104156	NRG ENERGY CENTER PHOENIX	514 E BUCHANAN ST, PHOENIX	3.0	1.8			
881	NXP SEMICONDUCTORS	1300 N ALMA SCHOOL, CHANDLER	7.4	5.6	12.9	0.1	3.4
3953	OAKCRAFT INC	7733 W OLIVE AVE, PEORIA	0.1	0.0	0.1	0.0	
31637	OLAM COTTON	25500 W SOUTHERN AVE, BUCKEYE	5.3	0.8	0.1	0.0	
53	OLDCASTLE PRECAST INC	411 E FRYE RD, CHANDLER	0.5	0.2	1.9	0.1	
4147	OPT CO	PORTABLE	1.1	0.9	6.1	0.4	
101348	ORBITAL SCIENCES CORPORATION	1721 W ELLIOT RD, GILBERT	0.0	0.0	0.5	0.0	
528	PACKAGING CORPORATION OF AMERICA INC	441 S 53RD AVE, PHOENIX	0.1	0.1	1.5	0.0	
98	PALO VERDE NUCLEAR GENERATING STATION	5801 S WINTERSBURG RD, TONOPAH	28.3	17.4	48.7	0.0	2.8
428	PALOMA GIN PROPERTIES LLC	57525 S POTATOE RD, GILA BEND	11.0	1.7	0.1	0.0	
130656	PALOMA READY MIX & MATERIALS LLC	PORTABLE #1,	0.3	0.1	0.4	0.0	
733	PAN GLO SERVICES LLC	2401 W SHERMAN ST, PHOENIX	0.0	0.0	0.5	0.0	
4004	PAN JIT	2502 W HUNTINGTON DR, TEMPE	0.0	0.0	0.0	0.0	
49047	PARADISE MEMORIAL CREMATORY	9300 E SHEA BLVD # C, SCOTTSDALE	0.7	0.4	1.2	0.2	
420	PARAGON-AGGREGATE PRODUCTS CORP	5420 W BETHANY HOME, GLENDALE	0.1	0.0			
1055	PARAMOUNT PETROLEUM CORP OF AZ INC	1935 W MCDOWELL RD, PHOENIX	0.7	0.7	9.3	0.1	
4241	PEPSICO	409 S 104TH AVE, TOLLESON	1.5	1.5	10.0	0.1	
29244	PET & ANIMAL LOVERS SERVICE (PALS)	3629 N 40TH AVE, PHOENIX	1.4	0.8	2.5	0.3	
69	PHOENIX HEAT TREATING INC	2405 W MOHAVE RD, PHOENIX	0.4	0.4	1.9	0.0	1.0
126445	PHOENIX PAVER MANUFACTURING LLC	515 W ELWOOD ST, PHOENIX	0.8	0.5			
27946	PHOENIX-MESA GATEWAY AIRPORT AUTHORITY	5835 S SOSSAMAN RD, MESA	0.1	0.0	0.2	0.0	
1154	PING INC	2201 W DESERT COVE AVE, PHOENIX	0.0	0.0	0.1	0.0	
57639	PIONEER LANDSCAPING MATERIALS INC	31906 W CAMELBACK RD, BUCKEYE	5.1	0.9			
116742	PREFERRED PACKAGING & CONTAINER	3330 W COCOPAH ST #1, PHOENIX	0.0	0.0	0.1	0.0	
108860	PRISMA GRAPHIC CORPORATION	2937 E BROADWAY RD, PHOENIX	0.0	0.0	0.2	0.0	0.1
75998	PRO PETROLEUM PHOENIX TERMINAL	408 S 43RD AVE, PHOENIX	0.0	0.0	0.0	0.0	
60889	PURCELLS WESTERN STATES TIRE	420 S 35TH AVE, PHOENIX	10.9	10.9	0.1	0.0	
1335	QUALITY BLOCK INC	3035 S 35TH AVE, PHOENIX	0.3	0.2	0.4	0.0	
131898	QUIKTRIP DISTRIBUTION - PHOENIX	8501 W LATHAM ST, TOLLESON	0.1	0.1	1.1	0.0	
537	RED MOUNTAIN MINING INC	4520 N POWER RD, MESA	5.0	1.2	6.2	0.4	
54	REDBURN TIRE CO	3801 W CLARENDON AVE, PHOENIX	0.1	0.1			
128324	REGENCY MORTUARY SERVICES INC	9850 W THUNDERBIRD RD, SUN CITY	0.1	0.0	0.1	0.0	
44356	RITCHIE BROS AUCTIONEERS (AMERICA) INC	5410 W LOWER BUCKEYE, PHOENIX	0.6	0.6	0.0	0.0	0.0
4318	RIVER RANCH PLANT #40	5159 EL MIRAGE RD, LITCHFIELD PK	15.6	3.7	0.1	0.0	
131080	ROBERTSON FUEL SYSTEMS LLC	800 W CARVER RD #101, TEMPE	0.0	0.0	0.1	0.0	

ID	Business Name	Street address and city	PM_{10}	$PM_{2.5}$	NOx	SOx	NHx
133058	ROCK SOLID INC	11500 W BEARDSLEY RD, SUN CITY	0.9	0.4	0.0	0.0	
133589	ROCK SOLID INC	6204 W SOUTHERN AVE, PHOENIX	0.5	0.2	0.0	0.0	
759	ROGERS CORP/ADVANCED CIRCUIT MATERIALS	100 S ROOSEVELT AVE, CHANDLER	0.3	0.3	6.5	0.0	
4174	ROGERS CORPORATION	2225 W CHANDLER BLVD, CHANDLER	0.0	0.0	0.3	0.0	
29474	SA RECYCLING LLC	3640 S 35TH AVE, PHOENIX	3.7	0.8			
132005	SALT RIVER MATERIALS GROUP	6204 W SOUTHERN AVE, LAVEEN	2.4	0.4			
132784	SAM'S CLUB #6605	1225 N GILBERT RD, GILBERT	0.0	0.0	0.1	0.0	
403	SAPA EXTRUSIONS NORTH AMERICA, LLC	249 S 51ST AVE, PHOENIX	2.2	2.0	10.9	0.6	
132227	SCHAUMAPLAST PRECISION FOAM MOLDING LP	21 N 39TH AVE, PHOENIX	0.0	0.0	0.5	0.0	
4072	SCHREIBER FOODS INC	2122 S HARDY DR, TEMPE	1.2	1.2	4.2	0.2	
266	SCHUFF STEEL CO	420 S 19TH AVE, PHOENIX	1.8	1.3	9.3	0.6	
246	SCHULT HOMES	231 N APACHE RD, BUCKEYE	0.5	0.4			
1351	SERENITY MORTUARY SERV INC	2514 S 6TH AVE, PHOENIX	0.7	0.4	1.3	0.2	
1169	SHAMROCK FOODS CO	2228 N BLACK CANYON, PHOENIX	0.8	0.8	10.8	0.1	
4050	SIGNATURE BREADS INC	1120 W FAIRMONT DR STE, TEMPE	0.1	0.1	0.3	0.0	
27933	SKUNK CREEK LANDFILL	3165 W HAPPY VALLEY RD, PHOENIX	30.1	29.3	3.6	2.6	
39980	S-L SNACKS AZ, LLC	1200 N BULLARD AVE, GOODYEAR	0.5	0.5	6.3	0.0	
131682	SOLJET, LLC	5601 W VAN BUREN ST, PHOENIX	0.0	0.0	0.1	0.0	
4086	SOUTH BAY CIRCUITS INC	6409 COMMONWEALTH, CHANDLER					0.2
2108	SOUTHWEST AIRLINES CO	4153 E SKY HARBOR BLVD, PHOENIX	0.0	0.0	0.3	0.0	
131861	SOUTHWEST ARCHITECTURAL CASTINGS	5343 W MOHAVE ST, PHOENIX	0.0	0.0			
52776	SOUTHWEST BAKING COMPANY	9604 W BUCKEYE RD, TOLLESON	0.0	0.0	0.0	0.0	
46277	SOUTHWEST FOREST PRODUCTS INC	2828 S 35TH AVE #1, PHOENIX	0.4	0.3			
31643	SOUTHWEST REGIONAL LANDFILL	24427 S HWY 85, BUCKEYE	25.5	25.5	8.2	0.6	
2110	SPECIAL DEVICES INC	3431 N RESEDA CIR, MESA	0.0	0.0			
80437	SR 85 LANDFILL	28633 W PATTERSON RD, BUCKEYE	48.5	46.8	4.0	3.3	
582	STONE CREEK INC	4221 E RAYMOND ST #102, PHOENIX	0.0	0.0			
388	STOROPACK INC	77 N 45TH AVE #2, PHOENIX	0.0	0.0	0.1	0.0	
131720	STP PERFORMANCE COATING LLC	406 E PIONEER ST, PHOENIX	0.0	0.0	0.1	0.0	
827	STP PERFORMANCE COATING, LLC	1131 W WATKINS ST, PHOENIX	0.0	0.0	0.5	0.0	
1214	SULZER EMS INC	2412 W DURANGO ST, PHOENIX	0.0	0.0	0.0	0.0	
4400	SUMCO SOUTHWEST CORPORATION	19801 N TATUM BLVD, PHOENIX	1.4	1.4	13.9	0.0	0.0
71801	SUMIKA ELECTRONIC MATERIALS INC	3832 E WATKINS ST, PHOENIX	0.0	0.0	0.3	0.0	0.0
31	SUNLAND MEMORIAL PARK/MORT/CREM CTR	15826 N DEL WEBB BLVD, SUN CITY	0.0	0.0	0.0	0.0	
134210	SUNSHINE CONCRETE & MATERIALS, INC	6033 S SOSSAMAN RD, MESA	2.9	2.0			
41431	SUPER RADIATOR COILS LTD	2610 S 21ST ST, PHOENIX	0.0	0.0	0.3	0.0	
37546	SUPERLITE BLOCK	4626 N 42ND AVE, PHOENIX	2.2	1.4	1.1	0.0	
131453	SYSCO ARIZONA INC	611 S 80TH AVE, TOLLESON	0.0	0.0	1.0	0.7	
249	THE BOEING COMPANY	5000 E MCDOWELL RD, MESA	2.2	1.0	2.1	0.0	
133082	TRANSWESTERN PIPELINE COMPANY, LLC	W TABLE MESA RD, NEW RIVER	0.1	0.1	1.7	0.0	
819	TRW VEHICLE SAFETY SYSTEMS INC	11202 E GERMANN RD, MESA	3.6	1.7	0.3	0.0	
234	UNITED DAIRYMEN OF ARIZONA	2008 S HARDY DR, TEMPE	26.4	9.9	27.0	0.3	
132907	UNITED METAL PRODUCTS, INC	1920 E ENCANTO DR, TEMPE	1.1	1.1	0.6	0.0	
63962	UPPER CRUST BAKERY	3655 W WASHINGTON ST, PHOENIX	0.1	0.1	1.7	0.0	
131506	USAA (UNITED SERVICES AUTOMOBILE ASSOC)	1 N NORTERRA DR, PHOENIX	0.0	0.0	1.4	0.1	
187	VERCO DECKING INC	4340 N 42ND AVE, PHOENIX	0.0	0.0	0.1	0.0	
344	VULCAN MATERIALS CO	11923 W INDIAN SCHOOL, AVONDALE	2.4	0.4			
1415	VULCAN MATERIALS CO	7845 W BROADWAY RD, PHOENIX	19.7	4.0	12.2	12.6	
132528	VULCAN MATERIALS COMPANY	3410 E VIRGINIA ST, MESA	5.0	0.8	3.0	4.1	
130787	VULCAN MATERIALS COMPANY AVONDALE PLANT	5301 S DYSART RD, AVONDALE	0.9	0.2			
2	VULCAN MATERIALS CO-WESTERN DIVISION	14521 N 115TH AVE, EL MIRAGE	2.9	0.6	3.0	0.4	
90	VULCAN MATERIALS CO-WESTERN DIVISION	4830 S 43RD AVE, PHOENIX	11.9	1.9	4.6	0.1	
134056	VULTURE PEAK GOLD INC	36610 N 355TH AVE, WICKENBURG	2.7	0.5			
131642	W L GORE ASSOCIATES, INC	32340 N NORTH VALLEY, PHOENIX	0.0	0.0	0.8	0.0	
130002	WASTE MGMT 7TH AVE TRANSFER & LANDFILL	3000 S 7TH AVE, PHOENIX	2.1	2.1	3.9	0.3	
113519	WASTE MGMT PHX HAUL CONTAINER SHOP	2441 S 40TH ST, PHOENIX	0.2	0.2			
1149	WEAVER QUALITY SHUTTERS INC	218 S 15TH ST, PHOENIX	0.0	0.0			
131585	WEST COAST SAND AND GRAVEL	13333 W SOUTHERN AVE, AVONDALE	2.3	1.0	10.5	0.7	
125450	WESTERN AGGREGATES PLANT #41	31805 W SOUTHERN AVE, BUCKEYE	5.7	3.9			

ID	Business Name	Street address and city	PM_{10}	$PM_{2.5}$	NOx	SOx	NHx
1240	WESTERN MILLWORK INC	2525 W CORONADO RD, PHOENIX	0.0	0.0			
1339	WESTERN REFINING TERMINALS, LLC	3050 S 19TH AVE, PHOENIX	0.1	0.1	1.2	0.0	
820	WESTSIDE CREMATORY	11211 W MICHIGAN, YOUNGTOWN	0.2	0.1	0.4	0.1	
398	WICKENBURG FACILITY	44605 GRAND AVE, WICKENBURG	0.6	0.2			
121588	WICKENBURG FUNERAL HOMES INC	187 N ADAMS ST, WICKENBURG	0.0	0.0	0.1	0.0	
128707	WOOD UNLIMITED INC (AIR)	9801 N LITCHFIELD RD, EL MIRAGE	0.6	0.5	9.1	0.2	
1382	WOODCASE FINE CABINETRY INC	3255 W OSBORN RD, PHOENIX	0.3	0.2			

Appendix E. 2014 PM10 Periodic Emissions Inventory Affidavit of Publication

Return to Table of Appendices

THE RECORD REPORTER

~ SINCE 1914 ~

2025 N THIRD ST #160, PHOENIX, AZ 85004-1425
Telephone (602) 417-9900 / Fax (602) 417-9910

Publishing for Maricopa
and Pima Counties

Michelle Mada
MARICOPA AIR QUALITY DIV.
1001 N. CENTRAL AVE., STE, 125
PHOENIX, AZ - 85004-1942

RR# 2952145

insert logo here

Maricopa County Air Quality Department 30-Day Comment Period: 2014 PM10 PEI December 7, 2016 – January 9, 2017 The 2014 Periodic PM 10 Emission Inventory (PM 10 PEI) provides emissions data from point, nonpoint, nonroad mobile, onroad mobile, and biogenic sources for coarse particulate matter <10 µm in diameter (PM 10), fine particulate matter <2.5 µm (PM 2.5), nitrogen oxides (NOx), sulfur oxides (SOx), and ammonia (NH 3). Emissions are calculated for both Maricopa County and the PM 10 nonattainment area. The 2014 PM10 PEI was developed to meet requirements set forth in Title I of the Clean Air Act Amendments of 1990 (CAAA) and is a component of the PM10 state implementation plan (SIP). The department invites you to review this emission inventory at http://cleanairmakemore.com/wp-content/uploads/2016/11/PEI_PM10_2014-1.pdf and to submit your comments to Maricopa County Air Quality Department, Emissions Inventory Unit, 1001 N Central Ave, Suite 125, Phoenix, AZ 85004, or emisinv@mail.maricopa.gov . Comments must be received no later than January 9, 2017. Questions or a request for a public hearing may be submitted to emisinv@mail.maricopa.gov prior to January 9, 2017. 12/7, 12/14/16

RR-2952145#

AFFIDAVIT OF PUBLICATION

Reference #:

Notice Type: MCGPN - GOVERNMENT PUBLIC NOTICE

Ad Description: 2014 PM10 Periodic Emissions Inventory 30-Day Comment Period Notice

I, Heather Clayton, 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:

12/07/2016, 12/14/2016

State Of Arizona)
)ss.
County Of Maricopa)

Subscribed and sworn to before me on the 14th day of December, 2016

CATHY L FISHER
Notary Public - Arizona
Maricopa County
Expires 07/31/2020

PUBLIC NOTICES

OM

VERONICA MARCELLA
ADO, JONATHAN BLAYLOCK,
RT VERA, LAZARO
NTES, GEORGE CAMPOS,
)HN DOE (a fictitious name),
of the above-named children.
Department of Child Safety,
or the Department), by and
n undersigned counsel, has
Dependency Petition pursuant
8, of the Arizona Revised
s, Rules 4.1 and 4.2 of the
Rules of Civil Procedure; and
8(D) of the Arizona Rules of
ure for the Juvenile Court.
Court has set a hearing on
11, 2017 at 1:30 p.m., at the
a County Superior Court, 125
shington, Phoenix, Arizona
before the Honorable Jeanne
for the purpose of determining
r any parent or guardian
herein is contesting the
ons in the Petition.
and your child are entitled
e an attorney present at the
. You may hire your own
y or, if you cannot afford an
y and want to be represented
ittorney, one may be appointed
Court.
have a right to appear as a
n this proceeding. You are
that your failure to personally
in court at the initial hearing,
conference, status conference,
endency adjudication, without
ause shown, may result in a
that you have waived your
ights and have admitted the
ons in the Petition. In addition,
fail to appear, without good
the hearing may go forward
r absence and may result
adjudication of dependency,
ation of your parental rights
establishment of a permanent
nship based upon the record
e evidence presented to the
s well as an order of paternity,
y, or change of custody in a
dated family law matter and an
r child support if paternity has
stablished.
u are receiving this Notice by
ition, you may obtain a copy
Dependency Petition, Notice
ring, and Temporary Orders
mitting a written request to:
ER Y. SCHAUPP, Office of the
y General, P.O. Box 6123-700A
x, Arizona 85004. The assigned
anager is Edith De Los Rios
y be reached by telephone at
4-9731.
equests for reasonable
modation for persons with
ities must be made to the
y parties at least three working
advance of a scheduled court
ding and can be made by
502-506-3204.
have the right to make a
or motion prior to any hearing
e hearing be closed to the

this 10th day of November,

BRNOVICH
y General
ER Y. SCHAUPP
nt Attorney General
/30, 12/7, 12/14/16

RR-2948027#

**S NOTICE OF HEARING ON
ON FOR TERMINATION OF
NT-CHILD RELATIONSHIP
NO. JD528623**
onorable Arthur Anderson)
E SUPERIOR COURT OF THE
STATE OF ARIZONA
ND FOR THE COUNTY OF
MARICOPA
natter of:
A MARIE-JANE
ING
2/25/2015
(s) under 18 years of age.
INA MARIE ELDER, ERIC
ING, JOHN DOE, a fictitious
parents of the above-named

Department of Child Safety,
or the Department), by and
n undersigned counsel, has
Motion for Termination of
Child Relationship under Title
ne Arizona Revised Statutes
ile 64 of the Arizona Rules of
ure for the Juvenile Court.
Court has set a Publication
on the 16th day of February,
at 1:30 p.m., at the Maricopa
Superior Court, 1810 South
Street, Mesa, Arizona 85210,
the Honorable Arthur Anderson
purpose of determining whether
absence and may result in termination of your parental rights based upon the record and the evidence presented to the Court.
5. If you are receiving this Notice by publication, you may obtain a copy of the Motion for Termination of Parent-Child Relationship and Notice of Hearing by submitting a written request to: JEREMY BENTLER ASHWORTH, Office of the Attorney General, 120 West 1st Avenue, 2nd Floor, Mesa, Arizona 85210. The assigned child safety worker is Susana Bautista, and may be reached by telephone at (602) 255-4459.
6. Requests for reasonable accommodation for persons with disabilities must be made to the court by parties at least three working days in advance of a scheduled court proceeding and can be made by calling (602) 506-2544.
7. You have the right to make a request or motion prior to any hearing that the hearing be closed to the public.
DATED this 15th day of November, 2016.
MARK BRNOVICH
Attorney General
JEREMY BENTLER ASHWORTH
Assistant Attorney General
11/23, 11/30, 12/7, 12/14/16

RR-2948020#

DCS'S NOTICE OF HEARING ON DEPENDENCY PETITION NO. JD33417
(Honorable Nicolas B. Hoskins)
IN THE SUPERIOR COURT OF THE STATE OF ARIZONA
IN AND FOR THE COUNTY OF MARICOPA
In the Matter of:
ANGEL CARRASCO
d.o.b. 01/12/2006
Person under 18 years of age.
TO: JANNETTE RIOS, CARLOS CARRASCO, and JOHN DOE, a fictitious name, parents of the above-named child.
1. The Department of Child Safety, (DCS or the Department), by and through undersigned counsel, has filed a Dependency Petition pursuant to Title 8, of the Arizona Revised Statutes, Rules 4.1 and 4.2 of the Arizona Rules of Civil Procedure; and Rule 48(D) of the Arizona Rules of Procedure for the Juvenile Court.
2. The Court has set a hearing on February 17, 2017 at 10:00 a.m., at the Maricopa County Superior Court, 3131 West Durango, Phoenix, Arizona 85009, before Honorable Nicolas B. Hoskins for the purpose of determining whether any parent or guardian named herein is contesting the allegations in the Petition.
3. You and your child are entitled to have an attorney present at the hearing. You may hire your own attorney or, if you cannot afford an attorney and want to be represented by an attorney, one may be appointed by the Court.
4. You have a right to appear as a party in this proceeding. You are advised that your failure to personally appear in court at the initial hearing, pretrial conference, status conference, or dependency adjudication, without good cause shown, may result in a finding that you have waived your legal rights and have admitted the allegations in the Petition. In addition, if you fail to appear, without good cause, the hearing may go forward in your absence and may result in an adjudication of dependency, termination of your parental rights or the establishment of a permanent guardianship based upon the record and the evidence presented to the court, as well as an order of paternity, custody, or change of custody in a consolidated family law matter and an order for child support if paternity has been established.
5. If you are receiving this Notice by publication, you may obtain a copy of the Dependency Petition, Notice of Hearing, and Temporary Orders by submitting a written request to: MICHAEL J. GOODMAN, Office of the Attorney General, P.O. Box 6123-700A, Phoenix, Arizona 85004. The assigned case manager is Tammy Villani and may be reached by telephone at 602-774-9724.
6. Requests for reasonable accommodation for persons with disabilities must be made to the court by parties at least three working days in advance of a scheduled court proceeding and can be made by calling 602-506-4533.
of a child born on March 25, 2016, in San Jose, California.
You are informed of the following:
1. Connie K. Hong, the natural mother, plans to place the child for adoption.
2. Under sections 8-106 and 8-107, Arizona Revised Statutes, you have the right to consent or withhold consent to the adoption.
3. Your written consent to the adoption is irrevocable once you give it.
4. If you withhold consent to the adoption, you must initiate paternity proceedings under Arizona Revised Statutes, Title 25, Chapter 6, Article 1, (A.R.S. §25-801 et seq.), and serve the mother within thirty days after completion of service of this notice.
5. You have the obligation to proceed to judgment in the paternity action.
6. You have the right to seek custody.
7. If you are established as the child's father, you must begin to provide financial support for the child.
8. If you do not file a paternity action Arizona Revised Statutes, Title 25, Chapter 6, Article 1, (A.R.S. §25-801 et seq.), and do not serve the mother within thirty days after completion of the service of this notice and pursue the action to judgment, you cannot bring or maintain any action to assert any interest in the child.
9. The Indian Child Welfare Act may supersede the Arizona Revised Statutes regarding adoption and paternity.
10. You may wish to consult with an attorney to assist you in responding to this notice.
Dated this 8 day of November 2016
Daniel I. Ziskin
Post Office Box 7447
Phoenix, AZ 85011-7447
11/23, 11/30, 12/7, 12/14/16

RR-2947965#

DCS'S NOTICE OF HEARING ON DEPENDENCY PETITION NO. JD-33433
(Honorable Lisa D. Flores)
IN THE SUPERIOR COURT OF THE STATE OF ARIZONA
IN AND FOR THE COUNTY OF MARICOPA
In the Matter of:
THOMAS ANTHONY RODRIGUEZ IV
d.o.b. 05/19/2000
DESTINY NICOLE RODRIGUEZ
d.o.b. 09/02/2001
BRIANNA DANIELLE RODRIGUEZ
d.o.b. 11/24/2004
Person(s) under 18 years of age.
TO: ANGELA JOVAN MARTINEZ and THOMAS ANTHONY RODRIGUEZ III aka THOMAS ANTHONY RODRIGUEZ, parents of the above-named children.
1. The Department of Child Safety has filed a Dependency Petition pursuant to Title 8, of the Arizona Revised Statutes, Rules 4.1 and 4.2 of the Arizona Rules of Civil Procedure and Rule 48(D) of the Rules of Procedure for the Juvenile Court.
2. The Court has set a hearing on the 13th day of February, 2017 at 8:45 a.m. at the Maricopa County Superior Court, 125 W. Washington, Phoenix, Arizona 85003, before the Honorable Lisa D. Flores for the purpose of determining whether any parent or guardian named herein is contesting the allegations in the Petition.
3. You and your children are entitled to have an attorney present at the hearing. You may hire your own attorney or, if you cannot afford an attorney and want to be represented by an attorney, one may be appointed by the Court.
4. You have a right to appear as a party in this proceeding. You are advised that your failure to personally appear in court at the initial hearing, pretrial conference, status conference or dependency adjudication, without good cause shown, may result in a finding that you have waived your legal rights and have admitted the allegations in the Petition. In addition, if you fail to appear, without good cause, the hearing may go forward in your absence and may result in an adjudication of dependency, termination of your parental rights or the establishment of a permanent guardianship based upon the record and the evidence presented to the court, as well as an order of paternity, custody, or change of custody in a consolidated family law matter and an order for child support if paternity has been established.
5. If you are receiving this Notice by publication, you may obtain a copy of the Dependency Petition, Notice of Hearing, and Temporary Orders
2016.
MARK BRNOVICH
Attorney General
JENNIFER BUNKERS
Assistant Attorney General
11/23, 11/30, 12/7, 12/14/16

RR-2947942#

DCS'S NOTICE OF HEARING ON MOTION FOR APPOINTMENT OF A PERMANENT GUARDIAN OF A MINOR CHILD NO. JD32912
(Honorable Sally S. Duncan)
IN THE SUPERIOR COURT OF THE STATE OF ARIZONA
IN AND FOR THE COUNTY OF MARICOPA
In the Matter of:
DAE SHAUN JEFFERY FELGER
d.o.b. 09/13/2003
Person(s) under 18 years of age.
TO: JESSICA LYNN FELGER and JOHN DOE, a fictitious name, parents of the above-named child.
1. The Department of Child Safety, (DCS or the Department), by and through undersigned counsel, has filed a Motion for Appointment of a Permanent Guardian pursuant to Title 8, of the Arizona Revised Statutes, Rules 4.1, 4.2, and 5 of the Arizona Rules of Civil Procedure and Rule 61 of the Rules of Procedure for the Juvenile Court.
2. The Court has set a hearing on the 24th day of January, 2017, at 9:15 a.m., at the Maricopa County Superior Court, 3131 West Durango Street, Phoenix, Arizona 85009, before the Honorable Sally S. Duncan for the purpose of determining whether any parent or guardian named herein is contesting the allegations in the motion.
3. You and your child are entitled to have an attorney present at the hearing. You may hire your own attorney or, if you cannot afford an attorney and want to be represented by an attorney, one may be appointed by the Court.
4. You have a right to appear as a party in this proceeding. You are advised that your failure to personally appear in court at the initial hearing, pretrial conference, status conference or dependency adjudication, without good cause shown, may result in a finding that you have waived your legal rights and have admitted the allegations in the Motion. In addition, if you fail to appear, without good cause, the hearing may go forward in your absence and may result in an adjudication of dependency, termination of your parental rights or the establishment of a permanent guardianship based upon the record and the evidence presented to the court.
5. If you are receiving this Notice by publication, you may obtain a copy of the Motion for Appointment of a Permanent Guardian and Notice of Hearing by submitting a written request to: KIMBERLY D. NYE, Office of the Attorney General, P.O. Box 6123-040A, Phoenix, Arizona, 85005. The assigned case manager is Shahineh Gusters and may be reached by telephone at (602) 774-5979.
6. Requests for reasonable accommodation for persons with disabilities must be made to the court by parties at least three working days in advance of a scheduled court proceeding and can be made by calling (602) 506-3204.
7. You have the right to make a request or motion prior to any hearing that the hearing be closed to the public.
DATED this 16th day of November, 2016.
MARK BRNOVICH
Attorney General
KIMBERLY D. NYE
Assistant Attorney General
11/23, 11/30, 12/7, 12/14/16

RR-2947941#

MARICOPA COUNTY

Appendix H (Procedures for Determining Ambient Air Concentrations for Hazardous Air Pollutants). Rule 372 and associated Appendix H implement/establish procedures for a Maricopa County program for the regulation of de minimis amounts of federally listed hazardous air pollutants (HAPs). In 2007, Maricopa County had been given the mandate to create a County HAPs program by A.R.S. § 49-480.04. On March 20, 2008, as a result of a final judgment of the Maricopa County Superior Court, the superior court held that the State of Arizona does not have authority to regulate de minimis amounts of federal HAPs. Consequently, the department is proposing to rescind Rule 372 and associated Appendix H. The public hearing will be held at the Maricopa County Board of Supervisors' Auditorium, 205 West Jefferson St., Phoenix, Arizona. For more information regarding this rulemaking, please refer to the Staff Report to the Board of Supervisors, available at: http://www.maricopa.gov/regulations/. Copies of the Staff Report to the Board of Supervisors and the final draft rules will also be available at least 30 days prior to the hearing for public inspection at the offices of the Maricopa County Air Quality Department, 1001 N. Central Ave. Suite #125, Phoenix, Arizona 85004.
12/14, 12/21/16

RR-2954551#

Maricopa County Air Quality Department 30-Day Comment Period: 2014 PM10 PEI December 7, 2016 – January 9, 2017 The 2014 Periodic PM 10 Emission Inventory (PM 10 PEI) provides emissions data from point, nonpoint, nonroad mobile, onroad mobile, and biogenic sources for coarse particulate matter <10 µm in diameter (PM 10), fine particulate matter <2.5 µm (PM 2.5), nitrogen oxides (NOx), sulfur oxides (SOx), and ammonia (NH 3). Emissions are calculated for both Maricopa County and the PM 10 nonattainment area. The 2014 PM10 PEI was developed to meet requirements set forth in Title I of the Clean Air Act Amendments of 1990 (CAAA) and is a component of the PM10 state implementation plan (SIP). The department invites you to review this emission inventory at http://cleanairmakemore.com/wp-content/uploads/2016/11/PEI_PM10_2014-1.pdf and to submit your comments to Maricopa County Air Quality Department, Emissions Inventory Unit, 1001 N Central Ave, Suite 125, Phoenix, AZ 85004, or emisinv@mail.maricopa.gov . Comments must be received no later than January 9, 2017. Questions or a request for a public hearing may be submitted to emisinv@mail.maricopa.gov prior to January 9, 2017.
12/7, 12/14/16

RR-2952145#

PROBATE

NOTICE OF HEARING REGARDING PETITION FOR: (1) APPROVAL OF SETTLEMENT AGREEMENT AMONG BENEFICIARIES: (2) DECLARATORY RELIEF CONCERNING CHARITABLE PROVISIONS OF THE TRUST; AND TO THE EXTENT NECESSARY, (3) REFORMATION OF TRUST TO CONFORM TO INTENT AND PURPOSE OF DECEDENT NO. PB2016-004242
Hearing Date and Time: Tuesday, January 10, 2017 at 9:30 a.m.
Assigned to the Hon. Aryeh Schwartz
SUPERIOR COURT OF THE STATE OF ARIZONA
COUNTY OF MARICOPA
In the Matter of:
THE LARNEY FAMILY TRUST DATED MAY 19, 2001, AS AMENDED,
Deceased.
NOTICE IS HEREBY GIVEN that the Court has set an appearance hearing on the Petition for: (1) Approval of Settlement Agreement Among Beneficiaries; (2) Declaratory Relief Concerning Charitable Provisions of the Trust; and to the extent necessary, (3) Reformation of Trust to Conform to Intent and Purpose of Decedent (the "Petition" - copy served along with this Notice) filed by Petitioner Chris Griffin

AFFIDAVIT OF PUBLICATION
AIR QUALITY/EMISSION INVENTORY

Reference/PO # PN10FEB16
01

Arizona Business Gazette
The business resource

PO BOX 194
Phoenix, Arizona 85001-0194
(602) 444-7315 FAX (602) 444-5901

CLASS 1
MARICOPA COUNTY

Maricopa County Air Quality Department 30-DayComment Period: 2014 PM10 PEI December 7,2016 - January 9,2017
The 2014 Periodic PM" Emission Inventory (PM" PEI) provides emissions data from point, nonpoint, nonroad mobile, onroad mobile, and biogenic sources for coarse particulate matter <1 0 -m in diameter (PM..), fine particulate matter <2.5 -m (PM..), nitrogen oxides (NOx), sulfur oxides (Sax), and ammonia (NH3). Emissions are calculated for both Maricopa County and the PM" nonattainment area. The 2014 PM10 PEI was developed to meet requirements set forth in Title I of the Clean Air Act Amendments of 1990 (CAAA) and is a component of the PM10 state implementation plan (SIP).
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Published: December 8, 15, 2016

STATE OF ARIZONA
COUNTY OF MARICOPA } SS.

Justin Silver, being first duly sworn, upon oath deposes and says: That he is the Manager of the Arizona Business Gazette, a newspaper of general circulation in the counties of Maricopa, Coconino, Pima and Pinal, in the State of Arizona, published weekly at Phoenix, Arizona, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates indicated.

12/8/2016
12/15/2016

Sworn to before me this
15TH day of
DECEMBER 2016

BRIAN BILLINGS
Notary Public - Arizona
Maricopa County
My Commission Expires
July 25, 2018

Notary Public

AFFIDAVIT OF PUBLICATION
AIR QUALITY/EMISSION INVENTORY

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CLASS 1
MARICOPA COUNTY

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The 2014 Periodic PM" Emission Inventory (PM" PEI) provides emissions data from point, nonpoint, nonroad mobile, onroad mobile, and biogenic sources for coarse particulate matter <1 0 -m in diameter (PM_{10}), fine particulate matter <2.5 -m ($PM_{2.5}$), nitrogen oxides (NOx), sulfur oxides (Sax), and ammonia (NH3). Emissions are calculated for both Maricopa County and the PM" nonattainment area. The 2014 PM10 PEI was developed to meet requirements set forth in Title I of the Clean Air Act Amendments of 1990 (CAAA) and is a component of the PM10 state implementation plan (SIP).
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12/8/2016
12/15/2016

Sworn to before me this
15TH day of
DECEMBER 2016

BRIAN BILLINGS
Notary Public - Arizona
Maricopa County
My Commission Expires
July 25, 2018

Notary Public

RESPONSIVENESS SUMMARY

2014 PM_{10} PERIODIC EMISSIONS INVENTORY

The 2014 PM_{10} Periodic Emissions Inventory was made available for public review on December 7, 2016. No requests for a public hearing or comments were received during the public comment period.