Maricopa County
Air Quality Department

2011 Periodic Emissions Inventory for Ozone Precursors

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

February 2014

Foreword

Maricopa County Air Quality Department released a draft version of this document, its 2011 emission inventory of ozone precursors, for a 30-day public review period on January 22, 2014. (The department's news release to announce the availability of the draft report, which outlines the schedule for public review and comment, is contained in Appendix D, along with a copy of the department's calendar item providing details on the workshop). The department held a public workshop on February 14, 2014 to discuss the draft inventory. No formal comments were received during the 30-day public review period.

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1. Introduction

1.1 Overview

This 2011 periodic ozone emissions inventory was developed to meet requirements set forth in Title I of the Clean Air Act Amendments of 1990 (CAAA). The CAAA require development of a baseline emissions inventory and periodic revisions for areas that fail to meet the National Ambient Air Quality Standards (NAAQS). A portion of Maricopa County is classified as nonattainment for the eight-hour ozone standard.

This inventory includes emission estimates for three ozone precursors: volatile organic compounds (VOCs), carbon monoxide (CO) and nitrogen oxides (NO_x). VOC is defined by Maricopa County's Rule 100 as "any organic compound, which participates in atmospheric photochemical reactions, except the non-precursor organic compounds". The inventory provides emission estimates from point, area, nonroad mobile, onroad mobile, and biogenic sources. Note that totals shown in tables may not equal the sum of individual values due to independent rounding.

1.2 Agencies responsible for the emissions inventory

Maricopa County Air Quality Department (MCAQD) has primary responsibility for preparing and submitting the 2011 Periodic Emissions Inventory for Ozone Precursors for Maricopa County. Point, area, and some nonroad mobile source emission estimates were prepared by MCAQD. The Maricopa Association of Governments (MAG) prepared the emission estimates for onroad mobile, biogenic, and the majority of nonroad mobile sources. Table 1.2–1 lists those responsible for inventory preparation and quality assurance/quality control activities, which are described in the respective chapters.

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

Chapter	Author(s)	QA/QC contact persons
2. Point sources	Bob Downing, MCAQD (602) 506-6790	Eric Raisanen, MCAQD (602) 506-6790 Matt Poppen, MAG (602) 254-6300
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6. Biogenic sources	Feng Liu, MAG (602) 254-6300	Matt Poppen, MAG (602) 254-6300 Cathy Arthur, MAG (602) 254-6300

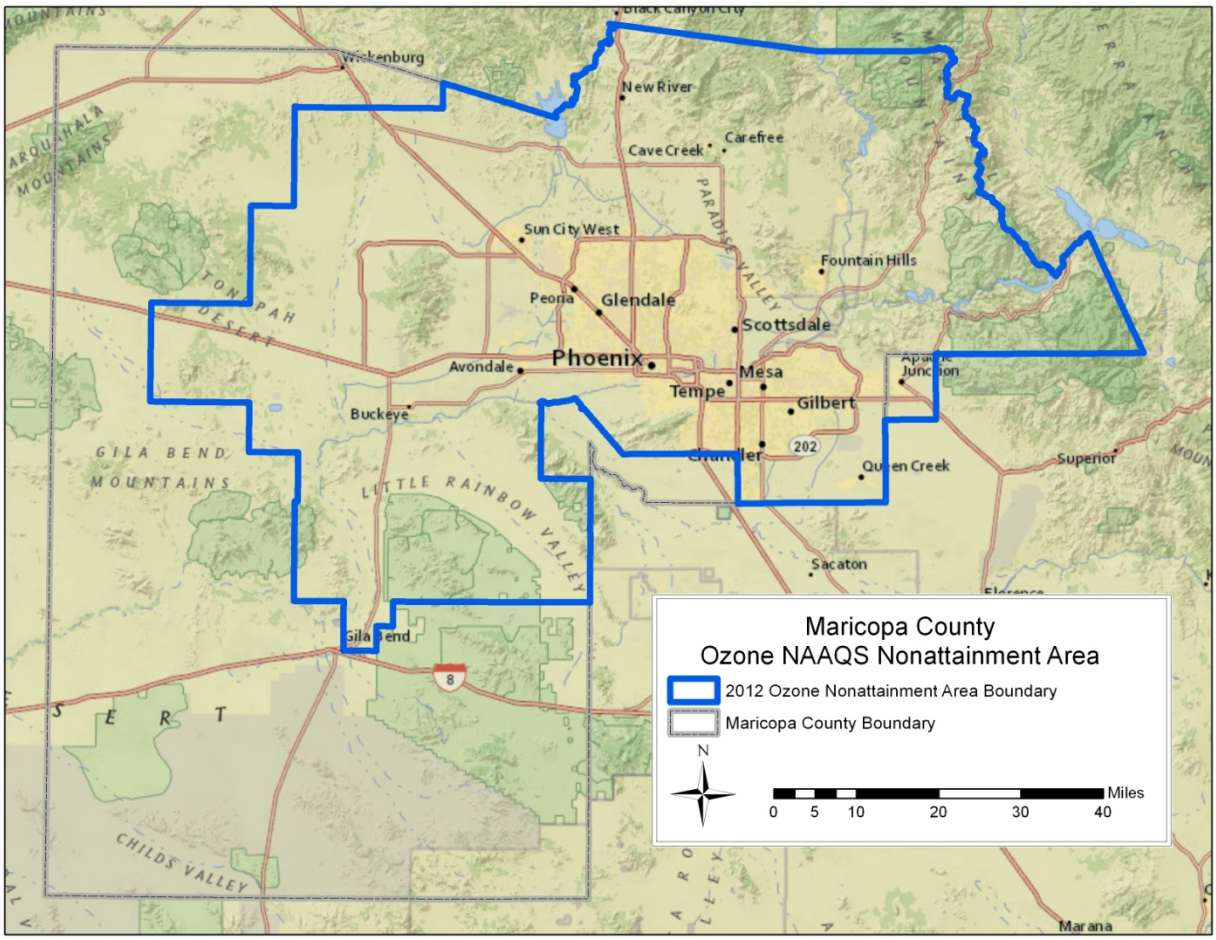
1.3 Temporal scope

Annual and ozone season-day emissions were estimated for the year 2011, for Maricopa County and the Maricopa County eight-hour ozone nonattainment area (NAA). The three-month peak ozone season for the Maricopa County nonattainment area has been defined as July 1 through September 30, based on the 1981–1991 pattern of ozone exceedances.

1.4 Geographic scope

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

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



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

1.5 Overview of local demographic and land use data

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

1.5.1 Demographic profile

The demographic data provided by MAG included population, employment data, and single family/multi-family splits for calendar year 2011, for both Maricopa County and the eight-hour ozone nonattainment area. Table 1.5–1 provides an overview of the key demographic data used in this report. As noted throughout the text, these data are frequently used to derive estimates of activity or emissions within the eight-hour ozone nonattainment area from county-level calculations. It is important to note, however, that the nonattainment area includes a portion of Pinal County, AZ as shown in Figure 1.4–1. Thus in some cases (e.g., those source categories calculated based on total population), the multiplier used to derive nonattainment area estimates from County-level values may be greater than 1, and thus the resulting NAA emission totals are larger than the County-level estimates from which they are derived.

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

Demographic variable	Maricopa County	8-hr ozone NAA	Percentage within 8-hr ozone NAA
Total resident population	3,843,370	3,873,528	100.78%
Total non-resident population	286,276	303,342	105.96%
Total population:	**4,129,646**	**4,176,870**	**101.14%**
Retail employment	414,477	415,672	100.29%
Office employment	320,536	320,189	99.89%
Industrial employment	374,338	372,731	99.57%
Public employment	240,952	241,429	100.20%
Other employment	261,769	258,963	98.93%
Construction	24,026	24,791	103.18%
Work at home	100,016	100,617	100.60%
Total employment:	**1,736,114**	**1,734,392**	**99.90%**
Single-family/multi-family household split:			
Single-family	77%	77%	
Multi-family	23%	23%	

1.5.2 Land use data

MAG provided draft 2010 land use data. The 2010 land use data was assumed to be representative of 2011. Table 1.5–2 presents a summary of the land use categories and acreage used to develop emission estimates for this inventory.

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

Land use category	Acreage within Maricopa County	Acreage within 8-hour ozone NAA	Percentage within 8-hour ozone NAA
General/active open space/golf course (e.g., parks)	210,159	211,297	100.54%
Passive/restricted open space, washes	2,614,870	1,188,251	45.44%
Lakes	12,525	12,525	100.00%
Agriculture	276,016	161,371	58.46%
Vacant (e.g., developable land)	2,045,587	911,304	44.55%

1.6 Emissions overview by source category

1.6.1 Point sources

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

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

Table 1.6–1. Annual and season-day emissions from point sources.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	768.54	1,754.12	1,078.48	4,908.3	15,407.1	9,715.8
8-hour ozone NAA	768.54	1,754.12	1,078.48	4,908.3	15,407.1	9,715.8

1.6.2 Area sources

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

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

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Fuel combustion	653.61	4,675.41	4,866.67	593.3	23,544.5	9,255.2
Industrial processes	2,284.00	263.41	585.79	17,516.5	1,489.5	3,396.2
Solvent use	28,153.45			167,043.9		
Storage/transport	5,176.39			28,577.9		
Waste treatment/disposal	115.61	56.21	193.56	842.6	320.7	1,227.1
Misc. area sources	271.58	166.54	4,765.93	13,982.3	6,680.5	281,693.1
All area sources:	**36,654.65**	**5,161.56**	**10,411.95**	**228,556.4**	**32,035.2**	**295,571.5**

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Fuel combustion	659.63	4,670.68	4,898.99	593.0	23,483.5	9,235.4
Industrial processes	2,276.48	263.41	590.27	17,452.4	1,489.5	3,420.8
Solvent use	28,139.77			166,557.4		
Storage/transport	5,211.35			28,766.2		
Waste treatment/disposal	116.10	56.04	190.06	837.8	315.6	1,119.6
Misc. area sources	261.09	161.70	4,664.71	13,650.0	6,531.8	278,544.9
All area sources:	**36,664.42**	**5,151.83**	**10,344.03**	**227,856.8**	**31,820.5**	**292,320.7**

1.6.3 Nonroad mobile sources

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

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Agricultural equipment	38.53	330.49	303.71	329.3	2,762.6	2,584.4
Airport GSE (+APU)	111.98	406.04	3,275.98	587.3	2,136.6	17,155.0
Commercial equipment	1,924.41	1,361.42	30,224.21	14,537.1	8,334.7	203,404.4
Construction & mining	1,881.88	12,937.30	14,396.92	13,116.9	87,972.9	99,942.8
Industrial equipment	341.25	1,839.35	7,140.99	2,212.6	11,763.4	46,138.5
Lawn & garden	4,913.96	866.64	54,798.41	51,990.4	6,998.4	523,235.5
Pleasure craft	530.39	96.56	1,249.66	11,527.0	1,996.8	26,738.3
Railway maintenance	1.94	8.55	16.48	14.2	59.0	117.8
Recreational equipment	1,518.97	66.10	6,373.46	17,804.4	679.3	74,424.8
Aircraft	1,719.33	2,588.82	11,781.38	8,451.0	12,548.2	65,325.4
Locomotives	77.60	1,406.08	245.74	425.2	7,704.5	1,346.5
All nonroad mobile sources:	**13,060.24**	**21,907.35**	**129,806.94**	**120,995.4**	**142,956.4**	**1,060,413.4**

Table 1.6–5. Annual and season-day emissions from nonroad mobile sources in the eight-hour ozone NAA.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Agricultural equipment	22.52	193.22	177.56	192.5	1,615.1	1,510.9
Airport GSE (+APU)	111.43	404.49	3,259.08	584.5	2,128.9	17,071.7
Commercial equipment	1,916.15	1,355.57	30,094.46	14,474.7	8,299.0	202,531.2
Construction & mining	1,941.80	13,349.23	14,855.32	13,534.5	90,774.0	103,125.0
Industrial equipment	339.78	1,831.45	7,110.33	2,203.1	11,712.9	45,940.4
Lawn & garden	4,970.15	876.55	55,425.05	52,584.9	7,078.4	529,218.9
Pleasure craft	530.39	96.56	1,249.66	11,527.0	1,996.8	26,738.3
Railway maintenance	1.96	8.64	16.67	14.4	59.7	119.1
Recreational equipment	684.30	29.78	2,871.27	8,020.9	306.0	33,528.7
Aircraft	1,705.43	2,585.98	11,719.36	8,385.8	12,535.3	64,993.6
Locomotives	50.15	901.12	153.29	274.8	4,937.7	839.9
All nonroad mobile sources:	**12,274.06**	**21,632.59**	**126,932.05**	**111,797.1**	**141,443.8**	**1,025,617.7**

1.6.4 Onroad mobile sources

Emissions from onroad mobile sources were calculated for Maricopa County and the eight-hour ozone nonattainment area. A detailed description of emissions calculations is contained in Chapter 5.

Table 1.6–6 summarizes annual and season-day emissions from onroad mobile sources in Maricopa County and the eight-hour ozone nonattainment area, respectively.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	24,556.85	60,269.94	235,088.25	150,603.7	319,470.2	1,378,165.5
8-hour ozone NAA	24,110.04	56,861.82	226,581.20	148,186.2	301,823.7	1,321,680.2

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 eight-hour ozone nonattainment area. Emissions were estimated using the Model of Emissions of Gases and Aerosols from Nature (MEGAN). MEGAN is a state-of-the-art biogenic emissions model developed by the National Center for Atmospheric Research (NCAR). Some corrections and improvements were made in the latest version of MEGAN2.1. MEGAN2.1 was used to compute biogenic emissions in Maricopa County and the eight-hour ozone nonattainment area. Annual and season-day emissions from biogenic sources are shown in Table 1.6–7 for Maricopa County and the eight-hour ozone nonattainment area.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	79,714.87	779.52	11,548.84	895,860.0	9,199.0	122,186.2
8-hour ozone NAA	55,311.84	527.18	5,934.55	624,395.0	6,231.7	62,584.2

1.6.6 Summary of all source categories

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

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

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
POINT SOURCES:	**768.54**	**1,754.12**	**1,078.48**	**4,908.3**	**15,407.1**	**9,715.8**
AREA SOURCES:						
Fuel combustion:						
Industrial distillate oil: Boilers	0.61	60.87	15.22	3.9	390.2	97.5
Industrial distillate oil: Engines	0.00	1,838.26	395.65	0.0	11,783.7	2,536.2
Industrial natural gas	36.99	730.94	455.30	217.8	4,303.8	2,680.8
Comm./inst. distillate oil: Boilers	0.00	0.12	0.03	0.0	0.8	0.2
Comm./inst. distillate oil: Engines	0.00	3.72	0.80	0.0	23.8	5.1
Comm./inst. natural gas	54.48	1,080.73	662.84	252.0	4,998.0	3,065.4
Residential distillate oil	0.01	0.35	0.10	0.0	0.0	0.0
Residential natural gas	49.81	851.32	362.26	119.6	2,044.2	869.9
Residential LPG	2.00	51.35	14.56	0.0	0.0	0.0
Residential wood combustion	509.7	57.72	2,959.91	0.0	0.0	0.0
Residential kerosene	0.00	0.03	0.01	0.0	0.0	0.0
All Fuel Combustion	**653.61**	**4,675.41**	**4,866.67**	**593.3**	**23,544.5**	**9,255.2**
Industrial Processes:						
Chemical manufacturing	77.42			599.0		
Commercial cooking	149.33		392.60	820.5		2,157.1
Bakeries	78.18			547.8		
Secondary metal production	41.01	15.02	98.36	306.4	107.9	697.4
Rubber/plastic product mfg.	1,766.75			14,171.0		
Electrical equipment mfg.	122.80	23.47	2.98	746.2	135.8	16.4
Industrial processes, NEC	48.51	224.92	91.84	325.6	1,245.8	525.2
All Industrial Processes	**2,284.00**	**263.41**	**585.79**	**17,516.5**	**1,489.5**	**3,396.2**
Solvent Use:						
Architectural coatings	4,976.22			30,622.9		
Auto refinishing	1,333.26			10,255.9		
Traffic markings	179.60			1,823.6		
Factory finished wood	137.72			1,396.7		
Wood furniture	416.56			3,434.7		
Aircraft surface coating	65.84			473.1		
Miscellaneous surface coating	316.38			2,450.5		
Degreasing	217.55			1,451.4		
Dry cleaning	23.15			178.1		
Graphics arts	290.98			2,225.7		
Miscellaneous industrial solvent use	721.85			5,126.6		
Consumer and commercial products	17,406.46			95,377.9		
Cutback asphalt	835.84			4,567.4		
Emulsified asphalt	866.06			4,732.6		
Roofing asphalt	3.04			23.4		
Agricultural pesticides	362.93			2,903.4		
All Solvent Use	**28,153.45**			**167,043.9**		

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

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Storage/Transport:						
Residential portable gas cans	2,935.09			16,126.8		
Commercial portable gas cans	564.43			3,101.2		
Bulk plants	120.91			659.3		
Gas stations Stage I: Submerged fill	85.08			528.7		
Gas stations Stage I: Bal. submerged fill	229.60			1,426.8		
Gas stations Stage II	0.00			0.0		
Underground tanks: Breathing/emptying	777.00			4,138.6		
Airports: aviation gasoline Stage I	347.57			1,904.5		
Airports: aviation gasoline Stage II	18.04			98.8		
Truck: gasoline (tank trucks in transit)	50.82			315.8		
Pipeline gasoline	17.32			94.5		
Volatile organic liquids storage/transport	30.54			182.7		
All Storage/Transport	**5,176.39**			**28,577.9**		
Waste Treatment/Disposal:						
On-site incineration	0.17	3.31	0.79	1.1	21.4	5.3
Open burning: Land clearing debris	0.67	0.30	6.30	20.5	9.1	193.8
Landfills	36.59	30.40	108.55	200.7	167.4	596.4
Publicly owned treatment works	75.02			577.1		
Leaking underground storage tanks	1.05			32.3		
Other waste	2.12	22.19	77.93	10.9	122.8	431.4
All Waste Treatment/Disposal	**115.61**	**56.21**	**193.56**	**842.6**	**320.7**	**1,227.1**
Miscellaneous Area Sources:						
Agricultural field burning	26.14	11.62	246.85	804.2	357.4	7,595.5
Structure fires	14.78	1.88	80.63	72.4	9.2	395.2
Aircraft engine testing	4.72	46.36	16.16	26.1	259.3	91.2
Vehicle fires	9.27	1.16	36.23	50.8	6.4	198.5
Crematories	1.18	11.19	2.23	51.1	88.5	17.3
Accidental releases	0.45	0.00	0.00	2.1	0.0	0.0
Hospitals	8.57			52.3		
Wildfires	206.08	93.95	4,379.29	12,794.0	5,832.6	271,872.2
Prescribed fires	0.39	0.38	4.54	129.2	127.1	1,523.2
All Misc. Area Sources	**271.58**	**166.54**	**4,765.93**	**13,982.3**	**6,680.5**	**281,693.1**
ALL AREA SOURCES	**36,654.65**	**5,161.56**	**10,411.95**	**228,556.4**	**32,035.2**	**295,571.5**
NONROAD MOBILE SOURCES:						
Agricultural equipment	38.53	330.49	303.71	329.3	2,762.6	2,584.4
Airport GSE (+APU)	111.98	406.04	3,275.98	587.3	2,136.6	17,155.0
Commercial equipment	1,924.41	1,361.42	30,224.21	14,537.1	8,334.7	203,404.4
Construction & mining equipment	1,881.88	12,937.30	14,396.92	13,116.9	87,972.9	99,942.8
Industrial equipment	341.25	1,839.35	7,140.99	2,212.6	11,763.4	46,138.5
Lawn and garden equipment	4,913.96	866.64	54,798.41	51,990.4	6,998.4	523,235.5
Pleasure craft	530.39	96.56	1,249.66	11,527.0	1,996.8	26,738.3
Railway maintenance equipment	1.94	8.55	16.48	14.2	59.0	117.8
Recreational equipment	1,518.97	66.10	6,373.46	17,804.4	679.3	74,424.8
Aircraft	1,719.33	2,588.82	11,781.38	8,451.0	12,548.2	65,325.4
Locomotives	77.60	1,406.08	245.74	425.2	7,704.6	1,346.5
ALL NONROAD MOBILE	**13,060.24**	**21,907.35**	**129,806.94**	**120,995.4**	**142,956.4**	**1,060,413.4**
ONROAD MOBILE SOURCES	24,556.85	60,269.94	235,088.25	150,603.7	319,470.2	1,378,165.5
BIOGENIC SOURCES	79,714.87	779.52	11,548.84	895,860.0	9,199.0	122,186.2
TOTAL, ALL SOURCE CATEGORIES	**154,755.15**	**89,872.48**	**387,934.46**	**1,400,923.9**	**519,067.9**	**2,866,052.4**

Table 1.6–9. Annual and season-day emissions from all sources in the eight-hour ozone nonattainment area.

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
POINT SOURCES:	**768.54**	**1,754.12**	**1,078.48**	**4,908.3**	**15,407.1**	**9,715.8**
AREA SOURCES:						
Fuel combustion:						
Industrial distillate oil: Boilers	0.61	60.61	15.15	3.9	388.5	97.1
Industrial distillate oil: Engines	0.00	1,830.35	393.95	0.0	11,733.0	2,525.3
Industrial natural gas	36.83	727.80	453.34	216.9	4,285.3	2,669.3
Comm./inst. distillate oil: Boilers	0.00	0.12	0.03	0.0	0.8	0.2
Comm./inst. distillate oil: Engines	0.00	3.70	0.80	0.0	23.7	5.1
Comm./inst. natural gas	54.42	1,079.44	662.05	251.7	4,992.0	3,061.7
Residential distillate oil	0.01	0.35	0.10	0.0	0.0	0.0
Residential natural gas	50.20	857.96	365.09	120.5	2,060.1	876.7
Residential LPG	2.02	51.93	14.73	0.0	0.0	0.0
Residential wood combustion	515.53	58.38	2,993.75	0.0	0.0	0.0
Residential kerosene	0.00	0.03	0.01	0.0	0.0	0.0
All Fuel Combustion:	**659.63**	**4,670.68**	**4,898.99**	**593.0**	**23,483.5**	**9,235.4**
Industrial processes:						
Chemical manufacturing	77.09			596.5		
Commercial cooking	151.03		397.07	829.8		2,181.7
Bakeries	77.85			545.4		
Secondary metal production	41.01	15.02	98.36	306.4	107.9	697.4
Rubber/plastic product manufacturing	1,759.15			14,110.1		
Electrical equipment manufacturing	122.80	23.47	2.98	746.2	135.8	16.4
Industrial processes, NEC	47.55	224.92	91.84	318.0	1,245.8	525.2
All Industrial Processes:	**2,276.48**	**263.41**	**590.27**	**17,452.4**	**1,489.5**	**3,420.8**
Solvent use:						
Architectural coatings	5,033.13			30,973.1		
Auto refinishing	1,327.53			10,211.8		
Traffic markings	171.12			1,737.5		
Factory finished wood	137.12			1,390.7		
Wood furniture	414.77			3,419.9		
Aircraft surface coating	65.84			473.1		
Miscellaneous surface coating	315.02			2,440.0		
Degreasing	216.62			1,445.1		
Dry cleaning	23.42			180.1		
Graphics arts	289.73			2,216.1		
Miscellaneous industrial solvent use	718.75			5,104.6		
Consumer and commercial products	17,605.51			96,468.5		
Cutback asphalt	788.72			4,309.9		
Emulsified asphalt	817.24			4,465.8		
Roofing asphalt	3.08			23.7		
Agricultural pesticides	212.18			1,697.5		
All Solvent Use:	**28,139.77**			**166,557.4**		

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

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Section	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Storage/transport:						
Residential portable gas cans	2,968.67			16,311.39		
Commercial portable gas cans	570.89			3,136.73		
Bulk plants	120.91			659.3		
Gas stations Stage I: Submerged fill	85.08			528.7		
Gas stations Stage I: Bal. submerged fill	229.60			1,426.8		
Gas stations Stage II	0.00			0.0		
Underground tanks: Breathing/emptying	777.00			4,138.6		
Airports: Aviation gasoline Stage I	344.41			1,887.2		
Airports: Aviation gasoline Stage II	17.87			97.9		
Truck: Gasoline (tank trucks in transit)	50.82			315.8		
Pipeline gasoline	17.32			94.5		
Volatile organic liquids storage/transport	28.80			169.3		
All Storage/Transport:	**5,211.35**			**28,766.2**		
Waste treatment/disposal:						
On-site incineration	0.17	3.31	0.79	1.1	21.4	5.3
Open Burning: Land clearing debris	0.30	0.13	2.81	9.1	4.1	86.4
Landfills	36.59	30.40	108.55	200.7	167.4	596.4
Publicly owned treatment works	75.88			583.7		
Leaking underground storage tanks	1.05			32.3		
Other waste	2.12	22.19	77.93	10.9	122.8	431.4
All Waste Treatment/Disposal:	**116.10**	**56.04**	**190.06**	**837.8**	**315.6**	**1,119.6**
Misc. area sources:						
Agricultural field burning	15.28	6.79	144.32	470.2	209.0	4,440.7
Structure fires	14.95	1.90	81.55	73.3	9.3	399.7
Aircraft engine testing	4.72	46.36	16.16	26.1	259.3	91.2
Vehicle fires	9.38	1.17	36.64	51.4	6.4	200.8
Crematories	1.18	11.14	2.22	50.9	88.1	17.2
Accidental releases	0.45	0.00	0.00	2.1	0.0	0.0
Hospitals	8.66			52.9		
Wildfires	206.08	93.95	4,379.28	12,794.0	5,832.6	271,872.2
Prescribed fires	0.39	0.38	4.54	129.2	127.1	1,523.2
All Misc. Area Sources	**261.09**	**161.70**	**4,664.71**	**13,650.0**	**6,531.8**	**278,544.9**
ALL AREA SOURCES:	**36,664.42**	**5,151.83**	**10,344.03**	**227,856.8**	**31,820.5**	**292,320.7**
NONROAD MOBILE SOURCES:						
Agricultural equipment	22.52	193.22	177.56	192.5	1,615.1	1,510.9
Airport ground support equipment (+APU)	111.43	404.49	3,259.08	584.5	2,128.9	17,071.7
Commercial equipment	1,916.15	1,355.57	30,094.46	14,474.7	8,299.0	202,531.2
Construction & mining equipment	1,941.80	13,349.23	14,855.32	13,534.5	90,774.0	103,125.0
Industrial equipment	339.78	1,831.45	7,110.33	2,203.1	11,712.9	45,940.4
Lawn and garden equipment	4,970.15	876.55	55,425.05	52,584.9	7,078.4	529,218.9
Pleasure craft	530.39	96.56	1,249.66	11,527.0	1,996.8	26,738.3
Railway maintenance equipment	1.96	8.64	16.67	14.4	59.7	119.1
Recreational equipment	684.30	29.78	2,871.27	8,020.9	306.0	33,528.7
Aircraft	1,705.43	2,585.98	11,719.36	8,385.8	12,535.3	64,993.6
Locomotives	50.15	901.12	153.29	274.8	4,937.7	839.9
ALL NONROAD MOBILE SOURCES:	**12,274.06**	**21,632.59**	**126,932.05**	**111,797.1**	**141,443.8**	**1,025,617.7**
ONROAD MOBILE SOURCES:	**24,110.04**	**56,861.82**	**226,581.20**	**148,186.2**	**301,823.7**	**1,321,680.2**
BIOGENIC SOURCES:	**55,311.84**	**527.18**	**5,934.55**	**624,395.0**	**6,231.7**	**62,584.2**
TOTAL, ALL SOURCE CATEGORIES:	**129,128.91**	**85,927.54**	**370,870.31**	**1,117,143.4**	**496,726.7**	**2,711,918.6**

2. Point Sources

2.1 Introduction and scope

This inventory of ozone precursors (VOC, NO_x, and CO) is one of two 2011emissions inventory reports being prepared to meet US EPA reporting requirements. This inventory has been developed concurrently with a similar inventory for PM_{10} and related pollutants ($PM_{2.5}$, NO_x, SO_x, and NH_3) as part of Maricopa County's requirements under the respective SIPs.

In addition to preparing a periodic emissions inventory for the eight-hour ozone nonattainment area (NAA) as a commitment under the current ozone State Implementation Plan (SIP), the federal Air Emission Reporting Requirements (AERR) 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 2011.

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

> *We are basing the requirement for point source format reporting on whether the source is major under 40 CFR part 70 for the pollutants for which reporting is required, i.e., CO, VOC, NO_x, SO_2, $PM_{2.5}$, PM_{10}, lead and NH_3 but without regard to emissions of HAPs… [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 point source emissions. Table 2.2–1 provides an alphabetical listing of all point sources and their location. Table 2.4–1 shows the annual and ozone season-day emissions of VOC, NO_x, and CO for those point sources which reported emissions of one or more of these pollutants in 2011. Table 2.5–1 lists emission reduction credits for the area, while Table 2.6–1 summarizes point source emission totals for both Maricopa County and the eight-hour ozone nonattainment area. Note that the totals shown in tables may not equal the sum of individual values due to independent rounding.

2.2 Identification of point sources

The Maricopa County Air Quality Department (MCAQD) identified point sources within Maricopa County through its electronic permit system database, EMS, and the 2011 annual emissions reports submitted to the department. A total of 18 stationary sources were identified as point sources using the definition described in Section 2.1. 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
127771	331111	CMC Steel Fabricators Inc	11444 E Germann Rd	Mesa	85212
44439	221112	Gila River Power Station	1250 E Watermelon Rd	Gila Bend	85337
3300	92811	Luke AFB – 56th Fighter Wing	14002 W Marauder St	Glendale	85309
44186	221112	Mesquite Generating Station	37625 W Elliot Rd	Arlington	85322
43530	221112	New Harquahala Generating Co	2530 N 491st Ave	Tonopah	85354
20706	32614	New Wincup Holdings Inc	7980 W Buckeye Rd	Phoenix	85043
1879	562212	Northwest Regional Landfill	19401 W Deer Valley Rd	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 Ave	Glendale	85303
3317	221112	SRP Kyrene Generating Station	7005 S Kyrene Rd	Tempe	85283
1210	337122	Trendwood Inc	2402 S 15th Ave	Phoenix	85007

2.3 Procedures for estimating emissions from point sources

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

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

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

2.3.1 Application of rule effectiveness

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

For processes that claimed emissions reductions through the use of a control device, RE calculations were performed separately for Title V and non-Title V sources. Overall RE values of 91.81% (for Title V processes) and 87.81% (for non-Title V processes) were calculated.

Appendix B contains further details on the methods and data used in computing the above RE rates.

2.4 Detailed overview of point source emissions

Table 2.4–1 provides a summary of annual and season-day emissions from all point sources. All point sources are located within the eight-hour ozone nonattainment area, therefore, county and nonattainment area emissions are equal. Sources for which rule effectiveness has been applied are noted. Values of "0.00" and "0.0" for annual and daily emissions denote a value below the level of significance (0.005 tons/yr and 0.05 lbs/day, respectively).

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

			Annual emissions (tons/yr)			Ozone season day (lbs/day)		
ID #	**Business name**		**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
3313	APS West Phoenix Power Plant	*	28.43	596.56	80.92	163.6	4,162.0	422.6
43063	Arlington Valley LLC		0.52	38.68	24.12	8.7	605.4	377.5
127771	CMC Steel Fabricators Inc	*	23.63	34.05	455.94	226.7	318.6	4,376.6
44439	Gila River Power Station		10.40	194.22	53.43	93.9	1,777.7	501.0
3300	Luke AFB – 56th Fighter Wing	*	8.07	10.04	5.36	53.1	52.2	22.5
44186	Mesquite Generating Station	*	22.53	192.49	22.99	134.0	1,146.1	137.2
43530	New Harquahala Generating Co	*	15.50	23.24	35.24	169.0	251.0	386.3
20706	New Wincup Holdings Inc		125.98	11.82	2.10	684.0	65.1	12.9
1879	Northwest Regional Landfill		2.47	9.74	5.18	13.6	53.5	28.5
1331	Oak Canyon Manufacturing Inc		62.86			483.5		
52382	Ocotillo Power Plant		4.79	82.96	15.54	51.1	1,087.8	203.7
42956	Redhawk Generating Facility		5.61	150.82	168.87	26.6	813.2	890.8
303	Rexam Beverage Can Company		99.49	4.35	3.65	481.1	21.0	17.7
3315	Santan Generating Station	*	8.78	257.77	150.24	87.7	2,817.6	1,648.7
4175	SFPP LP Phoenix Terminal		101.15	4.89	5.53	556.6	36.2	47.4
3316	SRP Agua Fria Generating Station	*	1.88	104.92	25.55	32.2	1,900.1	481.8
3317	SRP Kyrene Generating Station		3.16	27.77	8.51	25.2	245.8	76.9
1210	Trendwood Inc		128.59			989.1		
	TOTAL:		**653.84**	**1,744.32**	**1,063.18**	**4,279.8**	**15,353.4**	**9,632.0**

* = Facility for which rule effectiveness has been applied.

2.5 Emission reduction credits

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 emissions increase from the new source or modification. The obvious purpose of acquiring offsetting emissions decreases is to allow an area to move towards attainment of the national ambient air quality standards while still allowing some industrial growth.

In order for these emission reductions to be available in the future for offsetting, they must be: 1) 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 (Permit Requirements for New Major Sources and Major Modification to Existing Major Sources).

Table 2.5–1 provides a list of emission reduction credits for VOC, NO_x, and CO.

Table 2.5–1. Emission reduction credits as of December 31, 2011.

			Emission reduction credits (tons/yr)		
ID	**Facility/ Owner**	**Reduction Date**	**VOC**	**NO_x**	**CO**
1151	Freescale Semiconductor, Inc.	3/1/2004	17.1	9.8	15.3
	Grey K Envl Fund, NYC	12/11/2006	80.0		
	Woodstuff Mfg	11/30/2007	17.6		
	TOTAL:		**114.7**	**9.8**	**15.3**

2.6 Summary of point source emissions

Table 2.6–1 provides a summary of point source emissions for Maricopa County and the eight-hour ozone nonattainment area, including emission reduction credits.

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

	Annual (tons/yr)			Season-day emissions (lbs/day)		
Geographic Area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	768.54	1,754.12	1,078.48	4,908.3	15,407.1	9,715.8
8-hr ozone NAA	768.54	1,754.12	1,078.48	4,908.3	15,407.1	9,715.8

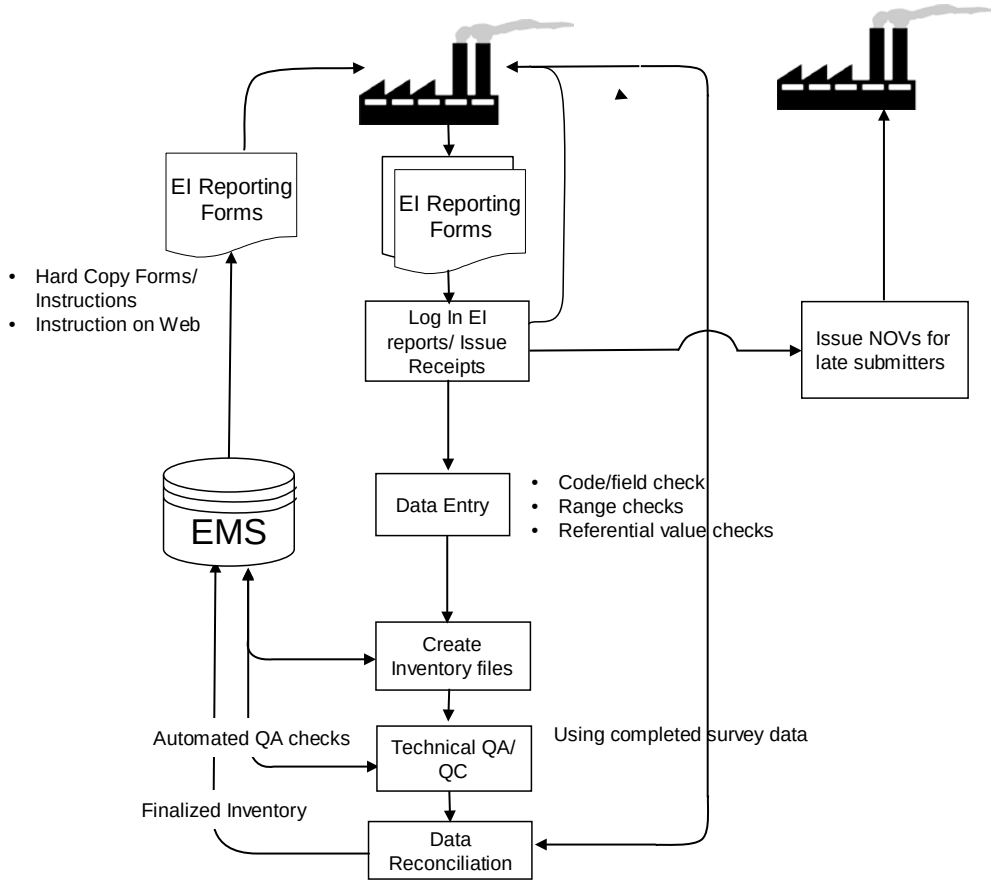
2.7 Quality assurance/quality control procedures

2.7.1 Emission survey preparation and data collection

The MCAQD's Emissions Inventory (EI) Unit annually collects point source criteria pollutant emission data from sources in the county. MCAQD annually reviews EPA guidance, documents from the 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 2.7–1.

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



2.7.2 Submission processing

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

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

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

To prepare the inventory for submittal to the National Emissions Inventory (NEI), the EI Unit 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).

2.7.3 Analysis of annual point source emissions data for this inventory

Two air quality planners checked inventory accuracy and reasonableness, and assured that all point sources had been identified and that the methodology applied to calculate emissions was appropriate and that the calculations were correct. Other reasonableness checks were conducted by recalculating emissions using methods other than those used to make the initial emissions calculations and then comparing results. QA was conducted by checking all emissions reports submitted to MCAQD for the year 2011 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 2011 annual emissions report.

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

2.8 References

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

3. Area Sources

3.1 Scope and methodology

This chapter considers all stationary sources which are too small or too numerous to be treated as point sources. US EPA guidance documents, including "Introduction to Area Source Inventory Development" (US EPA, 2001a) as well as permit and emissions data in the MCAQD's Environmental Management System (EMS) database, and previous SIP inventories, were evaluated to develop the list of area source categories for inclusion. Some source categories were deemed "insignificant" because there are no large production facilities and/or very few small sources, and therefore emissions were not quantified. MCAQD prepared the emission estimates for all area sources and provided quality assurance checks on all data. Table 3.1–1 contains a list of all area source categories, with Source Classification Codes (SCCs), addressed in this chapter.

Table 3.1–1. List of area source categories included in this ozone precursor inventory.

SCC code	Area source description	Section
	Fuel combustion:	**3.2**
2102004001	Industrial distillate oil: Boilers	3.2.1
2102004002	Industrial distillate oil: Engines	3.2.1
2102006000	Industrial natural gas	3.2.2
2103004001	Commercial/institutional distillate oil: Boilers	3.2.3
2103004002	Commercial/institutional distillate oil: Engines	3.2.3
2103006000	Commercial/institutional natural gas	3.2.4
2104004000	Residential distillate oil	3.2.5
2104006000	Residential natural gas	3.2.6
2104007000	Residential liquefied petroleum gas (LPG)	3.2.7
2104011000	Residential kerosene	3.2.8
2104008100	Residential Wood Combustion (RWC): Fireplace	3.2.9
2104008210	RWC: Woodstove: fireplace inserts: Non-EPA certified	3.2.9
2104008220	RWC: Woodstove: fireplace inserts: EPA certified; non-catalytic	3.2.9
2104008230	RWC: Woodstove: fireplace inserts: EPA certified; catalytic	3.2.9
2104008310	RWC: Woodstove: freestanding: Non-EPA certified	3.2.9
2104008320	RWC: Woodstove: freestanding: EPA certified, non-catalytic	3.2.9
2104008330	RWC: Woodstove: freestanding: EPA certified, catalytic	3.2.9
2104008400	RWC: Woodstove: Pellet-fired	3.2.9
2104008610	RWC: Hydronic heater: Outdoor	3.2.9
2104008700	RWC: Outdoor wood burning device, NEC	3.2.9
2104009000	RWC: Residential firelog	3.2.9
	Industrial processes:	**3.3**
2301000000	Chemical manufacturing	3.3.1
2302002100	Commercial cooking: Conveyorized charbroiling	3.3.2.1
2302002200	Commercial cooking: Under-fired charbroiling	3.3.2.1
2302003000	Commercial cooking: Deep fat frying	3.3.2.1
2302003100	Commercial cooking: Flat griddle frying	3.3.2.1
2302003200	Commercial cooking: Clamshell griddle frying	3.3.2.1
2302050000	Bakeries	3.3.2.2
2304000000	Secondary metal production	3.3.3
2308000000	Rubber/plastics product manufacturing	3.3.4
2312000000	Electrical equipment manufacturing	3.3.5
2399000000	Industrial processes not elsewhere classified (NEC)	3.3.6
	Solvent use:	**3.4**
2401001000	Architectural coatings	3.4.1.1
2401005000	Auto refinishing	3.4.1.2
2401008000	Traffic markings	3.4.1.3
2401015000	Factory-finished wood	3.4.1.4

Table 3.1–1. List of area source categories included in this inventory (continued).

AMS code	Area source description	Section
2401020000	Wood furniture	3.4.1.5
2401075000	Aircraft surface coating	3.4.1.6
2401090000	Miscellaneous surface coating	3.4.1.7
2415000000	Degreasing	3.4.2
2420000000	Dry cleaning	3.4.3
2425000000	Graphic arts	3.4.4
2440000000	Miscellaneous industrial solvent use	3.4.5
2460100000	Consumer & commercial products (C&CP): Personal care products	3.4.6
2460200000	C&CP: Household products	3.4.6
2460400000	C&CP: Automotive aftermarket products	3.4.6
2460500000	C&CP: Coatings and related products	3.4.6
2460600000	C&CP: Adhesives and sealants	3.4.6
2460800000	C&CP: FIFRA related products	3.4.6
2460900000	C&CP: Miscellaneous products, NEC	3.4.6
2461021000	Cutback asphalt	3.4.7
2461022000	Emulsified Asphalt	3.4.7
2461023000	Roofing Asphalt	3.4.7
2461850000	Agricultural pesticides	3.4.8
	Storage and transport:	**3.5**
2501011011	Residential portable gas cans (RPG): Permeation	3.5.1
2501011012	RPG: Evaporation	3.5.1
2501011013	RPG: Spillage during transport	3.5.1
2501011014	RPG: Refilling at the pump - vapor displacement	3.5.1
2501011015	RPG: Refilling at the pump - spillage	3.5.1
2501012011	Commercial portable gas cans (CPG): Permeation	3.5.1
2501012012	CPG: Evaporation	3.5.1
2501012013	CPG: Spillage during transport	3.5.1
2501012014	CPG: Refilling at the pump - vapor displacement	3.5.1
2501012015	CPG: Refilling at the pump - spillage	3.5.1
2501055120	Bulk plants	3.5.2
2501060051	Gasoline service stations Stage I: Submerged filling	3.5.3
2501060053	Gasoline service stations Stage I: Balanced submerged filling	3.5.3
2501060201	Gasoline service stations: Underground tank, breathing/emptying	3.5.5
2501080050	Airports: Aviation gasoline Stage I: Total	3.5.6
2501080100	Airports: Aviation gasoline Stage II: Total	3.5.6
2505030120	Gasoline tank trucks in transit	3.5.7
2505040120	Pipeline gasoline	3.5.8
2510000000	Volatile organic liquid (VOL) storage and transport	3.5.9
	Waste treatment and disposal:	**3.6**
2601000000	On-site incineration	3.6.1
2610000500	Open burning: Land clearing debris	3.6.2
2620000000	Landfills	3.6.3
2630020000	Publicly owned treatment works	3.6.4
2660000000	Leaking underground storage tanks	3.6.5
2650000000	Other waste	3.6.6
	Miscellaneous area sources:	**3.7**
2801500000	Agricultural field burning	3.7.1
2810030000	Structure fires	3.7.2
2810040000	Aircraft engine testing	3.7.3
2810050000	Vehicle fires	3.7.4
2810060100	Crematories	3.7.5
2830001000	Accidental releases	3.7.6
2850000000	Hospitals	3.7.7
n/a	Wildfires	3.7.8
n/a	Prescribed fires	3.7.9

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

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

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

3.2 Fuel combustion

Area-source emission estimates are provided in this section for the following categories of fuel consumption: Industrial distillate oil, industrial natural gas, commercial/institutional distillate oil, commercial/institutional natural gas, residential distillate oil, residential natural gas, residential liquefied petroleum gas, residential kerosene, and residential wood.

Data for natural gas combustion emission estimates came from a survey of the three natural gas suppliers in Maricopa County. Table 3.2–1 summarizes the natural gas sales data received from Maricopa County natural gas suppliers.

Table 3.2–1. Maricopa County natural gas sales by end-user category and supplier.

	Sales by end-user category (in MMCF/yr)					
Natural gas supplier	**Electric Utilities**	**Industrial**	**Commercial/ Institutional**	**Residential**	**Transport***	**Other***
Southwest Gas	n/a	592.74	13,303.23	17,083.04	9,288.47	406.92
City of Mesa	n/a	91.17	1,631.61	1,030.07	175.13	n/a
El Paso	112,963.97	150.78	n/a	n/a	n/a	n/a
Total:	**112,963.97**	**834.68**	**14,934.84**	**18,113.11**	**9,463.60**	**406.92**

*For emissions calculations, sales from transport and other were grouped with industrial sales.

3.2.1 Industrial distillate oil

Annual emissions from industrial distillate oil combustion were derived from EPA NEI (US EPA, 2012c) calculations. Emissions come from two different sources, boilers and engines burning distillate oil.

Ozone season-day emissions for the county are calculated by first multiplying annual emissions by 25% to estimate ozone season totals. Ozone season emission totals are then divided by the number of days that activity occurs during the ozone season (6 days/week and 13 weeks), as recommended by EIIP guidance (US EPA, 2001a). Annual and season-day emissions in the eight-hour ozone nonattainment area were calculated by applying the ratio of industrial

employment in the nonattainment area to county-level emission calculations (99.57%). (See Section 1.5.1 for a discussion of the employment data used). Results for boilers and engines are shown in Tables 3.2–2 and 3.2–3, respectively.

Table 3.2–2. Annual and season-day emissions from area-source industrial distillate oil combustion for boilers.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.61	60.87	15.22	3.9	390.2	97.5
8-hr ozone NAA	0.61	60.61	15.15	3.9	388.5	97.1

Table 3.2–3. Annual and season-day emissions from area-source industrial distillate oil combustion for engines.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.00	1,838.26	395.65	0.0	11,783.7	2,536.2
8-hr ozone NAA	0.00	1,830.35	393.95	0.0	11,733.0	2,525.3

3.2.2 Industrial natural gas

All natural gas suppliers in Maricopa County were surveyed to gather information on the volume of natural gas distributed, by user category, within the county in 2011. Area-source industrial natural gas usage for the county is based on the reported total volume of natural gas sold to industrial sources (10,705.20 MMCF), minus natural gas used by industrial point sources (463.95 MMCF).

Natural gas is used for both external combustions (boilers and heaters) and internal combustion (generators), each of which have different emission factors. Thus the area-source natural gas usage derived above must be divided between these two categories. This apportionment was based on the percentages of external and internal natural gas combustion reported by all industrial area sources in 2008. A 2008 apportionment was used because 2011 data were not available for all industrial area sources at the time that these emission estimates were developed.

Annual emissions for the county were calculated by multiplying natural gas usage by the respective emission factors for external (SCC=102006* & 103006*) and internal (SCC=2020020*) combustion obtained from EPA's WebFIRE database (US EPA, 2012a).

Table 3.2–4. Natural gas usage, emission factors, and annual emissions from area-source industrial natural gas consumption, by combustion type.

Combustion	% of	Natural gas usage	Emission factors (lb/MMCF)			Annual emissions (tons/yr)		
type	**total**	**(MMCF)**	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
External	98.44	10,081.49	5.5	100	84	27.72	504.07	423.42
Internal	1.56	159.76	116	2,840	399	9.27	226.86	31.87
Total:	**100.00**	**10,241.25**				**36.99**	**730.94**	**455.30**

Ozone season-day emissions for the county are calculated by first multiplying annual emissions by the percentage of industrial natural gas sold used during the ozone season (22.96%). (Figures reported by natural gas suppliers for the June–August time period are assumed to be representative for the July–September ozone season.) Ozone season emission totals are then divided by the number of days that activity occurs during the ozone season (6 days/wk × 13 wks/season).

Annual and season-day emissions within the eight-hour ozone nonattainment area were calculated by applying the ratio of industrial employment in the nonattainment area to county-level emission calculations (99.57%). (See Section 1.5.1 for a discussion of the employment data used).

Table 3.2–5. Annual and season-day emissions from area-source industrial natural gas combustion.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	36.99	730.94	455.30	217.8	4,303.8	2,680.8
8-hr ozone NAA	36.83	727.80	453.34	216.9	4,285.3	2,669.3

3.2.3 Commercial/institutional distillate oil

Annual emissions from commercial/institutional distillate oil combustion were derived from EPA NEI (US EPA, 2012c) calculations. Emissions come from two different sources, boilers and engines burning distillate oil.

Ozone season-day emissions for the county are calculated by first multiplying annual emissions by 25% to estimate ozone season totals. Ozone season emission totals are then divided by the number of days that activity occurs during the ozone season (6 days/week and 13 weeks), as recommended by EIIP guidance (US EPA, 2001a). Annual and season-day emissions in the eight-hour ozone nonattainment area were calculated by applying the ratio of industrial employment in the nonattainment area to county-level emission calculations (99.57%). (See Section 1.5.1 for a discussion of the employment data used.) Emissions estimates for boilers and engines are shown in Tables 3.3–6 and 3.3–7, respectively.

Table 3.2–6. Annual and season-day emissions from area-source commercial/institutional distillate oil combustion for boilers.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.00	0.12	0.03	0.0	0.8	0.2
8-hr ozone NAA	0.00	0.12	0.03	0.0	0.8	0.2

Table 3.2–7. Annual and season-day emissions from area-source commercial/institutional distillate oil combustion for engines.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.00	3.72	0.80	0.0	23.8	5.1
8-hr ozone NAA	0.00	3.70	0.80	0.0	23.7	5.1

3.2.4 Commercial/institutional natural gas

All natural gas suppliers in Maricopa County were surveyed to gather information on the volume of natural gas distributed, by user category, within the county in 2011. Area-source commercial and institutional (C&I) natural gas usage for the county is based on the reported total volume of natural gas sold to C&I sources (14,934.84 MMCF), minus natural gas used by C&I point sources (77.80 MMCF).

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

based on the percentages of external and internal natural gas combustion reported by all C&I area sources in 2008. A 2008 apportionment was used because 2011 data were not available for all C&I area sources at the time that these emission estimates were developed.

Annual emissions for the county were calculated by multiplying natural gas usage by the respective emission factors for external (SCC=1020060*) and internal (SCC=2020020*) combustion obtained from EPA's WebFIRE database (US EPA, 2012a).

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

Combustion type	% of total	Natural gas usage (MMCF)	Emission factors (lb/MMCF)			Annual emissions (tons/yr)		
			VOC	NO_x	CO	VOC	NO_x	CO
External	98.34	14,610.42	5.5	100	84	40.18	730.52	613.64
Internal	1.66	246.63	116	2,840	399	14.30	350.21	49.20
Total:	**100.00**	**14,857.04**				**54.48**	**1,080.73**	**662.84**

Ozone season-day emissions for the county were calculated by first multiplying annual emissions by the percentage of C&I natural gas used during the ozone season (18.04%). (Figures reported by natural gas suppliers for the June–August time period are assumed to be representative of the July–September ozone season.) Ozone season emission totals are then divided by the number of days that activity occurs during the ozone season (6 days/wk × 13 wks/yr).

Annual and season-day emissions within the eight-hour ozone nonattainment area were calculated by applying the combined ratio of retail, office, public and other employment in the nonattainment area to county-level emission calculations (99.88%). (See Section 1.5.1 for a discussion of the employment data used).

Table 3.2–9. Annual and season-day emissions from area-source commercial/institutional natural gas combustion.

Geographic area	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	54.48	1,080.73	662.84	252.0	4,998.0	3,065.4
8-hr ozone NAA	54.42	1,079.44	662.05	251.7	4,992.0	3,061.7

3.2.5 Residential distillate oil

Annual emissions from residential distillate oil were derived from EPA NEI (US EPA, 2012c) calculations. Ozone season-day emissions would normally be calculated by dividing ozone season emissions by heating degree days (i.e. the number of degrees per day that the daily average temperature is below 65°F). However, data obtained from Arizona Energy Statistics (GOEP, 2013) indicated that there were no heating degree days reported during the 2011 ozone season (July–September). Thus, ozone season-day emissions from residential distillate oil combustion are assumed to be zero.

Annual and season-day emissions within the eight-hour ozone nonattainment area were calculated by multiplying county totals by the ratio of total population in the nonattainment area to the total population in the county (101.14%). See Section 1.5.1 for a further discussion of the population used. Table 3.2–10 summarizes annual and ozone season-day emissions from residential distillate oil combustion for both the county and the eight-hour ozone nonattainment area.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.01	0.35	0.10	0.0	0.0	0.0
8-hr ozone NAA	0.01	0.35	0.10	0.0	0.0	0.0

3.2.6 Residential natural gas

All natural gas suppliers in Maricopa County were surveyed to gather information on the volume of natural gas sold, by user category, within the county. Annual emissions from residential natural gas combustion emissions were calculated by multiplying 2011 residential natural gas sales (18,113.11 MMCF) by emission factors for residential natural gas combustion summarized in the table below (US EPA, 1998).

Table 3.2–11. Residential natural gas combustion emission factors.

Pollutant	Emission Factor (lb/MMCF)
VOC	5.5
NO_x	94.0
CO	40.0

Ozone season-day emissions were calculated by first multiplying reported natural gas usage during the ozone season (1,978.95 MMCF) by the AP-42 emission factors for residential natural gas combustion to produce ozone season emissions. (Natural gas usage reported for the months of June–August is assumed to represent ozone season usage). Ozone season emissions were then divided by days during the ozone season that residential natural gas combustion occurs (7 days/wk × 13 wks/yr) (US EPA, 2001a).

Annual and season-day residential natural gas emissions in the eight-hour ozone nonattainment area were calculated by multiplying county-level emissions by the percentage of total resident population in the eight-hour ozone nonattainment area (100.78%).

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	49.81	851.32	362.26	119.6	2,044.2	869.9
8-hr ozone NAA	50.20	857.96	365.09	120.5	2,060.1	876.7

3.2.7 Residential liquefied petroleum gas (LPG)

Annual emissions from residential liquefied petroleum gas (LPG) were derived from EPA NEI (US EPA, 2012c) calculations.

Ozone season-day emissions would normally be calculated by dividing ozone season emissions by heating degree days (i.e. the number of degrees per day that the daily average temperature is below 65°F). However, data obtained from Arizona Energy Statistics (GOEP, 2013) indicated that there were no heating degree days reported during the 2011 ozone season (July–September). Thus, ozone season-day emissions from residential liquefied petroleum gas (LPG) combustion are assumed to be zero.

Annual and season-day emissions within the eight-hour ozone nonattainment area were calculated by multiplying county totals by the ratio of total population in the nonattainment area to the total population in the county (101.14%). See Section 1.5.1 for a further discussion of the population used.

Table 3.2–13 summarizes annual and ozone season-day emissions from residential liquefied petroleum gas (LPG) combustion for both the county and the eight-hour ozone nonattainment area.

Table 3.2–13. Annual and season-day emissions from residential liquefied petroleum gas (LPG) combustion.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	2.00	51.35	14.56	0.0	0.0	0.0
8-hr ozone NAA	2.02	51.93	14.73	0.0	0.0	0.0

3.2.8 Residential kerosene

Annual emissions from residential kerosene were derived from EPA NEI (US EPA, 2012c) calculations.

Ozone season-day emissions would normally be 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 Arizona Energy Statistics (GOEP, 2013) indicated that there was no heating degree days reported during the 2011 ozone season (July–September). Thus, ozone season-day emissions from residential kerosene combustion are assumed to be zero.

Annual and season-day emissions within the eight-hour ozone nonattainment area were calculated by multiplying county totals by the ratio of total population in the nonattainment area to the total population in the county (101.14%). See Section 1.5.1 for a further discussion of the population used.

Table 3.2–14 summarizes annual and season-day emissions from residential kerosene combustion for both the county and the eight-hour ozone nonattainment area.

Table 3.2–14. Annual and season-day emissions from residential kerosene combustion.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.00	0.03	0.01	0.0	0.0	0.0
8-hr ozone NAA	0.00	0.03	0.01	0.0	0.0	0.0

3.2.9 Residential wood combustion

Annual emissions from residential wood combustion for Maricopa County were obtained from the US Environmental Protection Agency's Residential Wood Combustion Estimation Tool (US EPA, 2012b). County-level annual emissions by appliance type are shown below in Table 3.2–15.

Table 3.2–15. Annual emissions by appliance type for Maricopa County from EPA's residential wood combustion estimation tool.

SCC	Appliance Type	Annual emissions (tons/yr)		
		VOC	NO_x	CO
2104008100	Fireplace	191.08	26.29	1,506.38
2104008210	Woodstove: fireplace inserts; non-EPA certified	147.35	7.78	641.66
2104008220	Woodstove: fireplace inserts; EPA certified; non-catalytic	10.70	2.03	125.54
2104008230	Woodstove: fireplace inserts; EPA certified; catalytic	4.46	0.59	31.02
2104008310	Woodstove: freestanding, non-EPA certified	71.45	3.77	311.15
2104008320	Woodstove: freestanding, EPA certified, non-catalytic	5.18	0.99	60.83
2104008330	Woodstove: freestanding, EPA certified, catalytic	2.16	0.29	15.04
2104008400	Woodstove: pellet-fired, general	0.01	1.19	4.97
2104008610	Hydronic heater: outdoor	0.00	0.00	0.00
2104008700	Outdoor wood burning device, NEC	3.99	0.55	31.49
2104009000	Residential firelog	73.32	14.24	231.82
Total		**509.70**	**57.72**	**2,959.91**

Ozone season-day emissions would normally be calculated by dividing ozone season emissions by heating degree days (i.e. the number of degrees per day that the daily average temperature is below 65°F). However, data obtained from Arizona Energy Statistics (GOEP, 2013) indicated that there was no heating degree days reported during the 2011 ozone season (July–September). Thus, ozone season-day emissions from residential wood combustion are assumed to be zero.

Annual and season-day emissions within the eight-hour ozone nonattainment area were calculated by multiplying county totals by the ratio of total population in the nonattainment area to the total population in the county (101.14%). See Section 1.5.1 for a further discussion of the population used.

Table 3.2–16 summarizes annual and season-day emissions from residential wood combustion for both the county and the eight-hour ozone nonattainment area.

Table 3.2–16. Annual and season-day emissions from residential wood combustion.

Geographic area	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	509.70	57.72	2,959.91	0.0	0.0	0.0
8-hr ozone NAA	515.53	58.38	2,993.75	0.0	0.0	0.0

3.3 Industrial processes

3.3.1 Chemical manufacturing

Emissions from area-source chemical manufacturing were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2012) 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), representing 2010 employment, were used. Table 3.3–1 shows the NAICS codes and employment data used to calculate emissions from chemical manufacturing.

Table 3.3–1. County-level employment estimates for chemical manufacturing, by NAICS code.

NAICS code	NAICS description (and employment range)	Estimated employment
325	Chemical manufacturing	4,605
42469	Other chemical & allied products merchant wholesalers	1,484
424910	Farm supplies merchant wholesalers	904
33312	Construction machinery manufacturing (250–499)	375
Total:		**7,368**

Since there were no point sources in this category, an area-source employment estimate is used to "scale up" emissions reported from those facilities surveyed in 2011.

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

Table 3.3–2 summarizes annual and season-day emissions from chemical manufacturing in both Maricopa County and the eight-hour ozone nonattainment area.

Table 3.3–2. Annual and season-day emissions from area-source chemical manufacturing.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	77.42	599.0
8-hr ozone NAA	77.09	596.5

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 per capita emissions factors developed by EPA for the 2008 National Emissions Inventory (NEI) (Pechan, 2012a). The per capita emission factors for each equipment type are contained in Table 3.3–3. EPA created the emission factors listed in Table 3.3–3 by taking 2002 emissions in the NEI and dividing by the 2002 population to develop per capita emission factors. The equipment types include: chain-driven charbroilers, under-fired charbroilers, deep-fat fryers, flat griddles, and clamshell griddles.

Table 3.3–3. Emission factors for commercial cooking equipment, by device type.

	Emission Factor (lb/person)	
Equipment type	**VOC**	**CO**
Chain-driven charbroilers	0.012056010	0.042446624
Under-fired charbroilers	0.041480307	0.135002176
Deep-fat fryers	0.012608151	0.000000000
Flat griddle fryers	0.005943281	0.012687330
Clamshell griddles	0.000231564	0.000000000

Annual commercial cooking emissions for Maricopa County were estimated by multiplying the MAG-estimated county population (4,129,646) by the per capita emission factors for each type of cooking equipment. See Section 1.5.1 for a discussion of the population data used.

Commercial cooking is assumed to occur uniformly throughout the year, therefore, it was assumed that 25% of annual activity occurs during the ozone season, and that activity occurs 7 days/week. Thus, season-day emissions were estimated by multiplying annual emissions by 25% then dividing the result by 91 (7 days/wk × 13 wks/ozone season). The results are shown in Table 3.3–4 below.

Table 3.3–4. Annual and daily emissions from commercial cooking equipment in Maricopa County.

	Annual Emissions (tons/yr)		Season-day emissions (lbs/day)	
Equipment type	**VOC**	**CO**	**VOC**	**CO**
Chain-driven charbroilers	24.89	87.64	136.8	481.6
Under-fired charbroilers	85.65	278.76	470.6	1,531.6
Deep-fat fryers	26.03	—	143.0	0.0
Flat griddles	12.27	26.20	67.4	143.9
Clamshell griddles	0.48	—	2.6	0.0
Total:	**149.33**	**392.60**	**820.5**	**2,157.1**

Annual and season-day emissions for the eight-hour ozone nonattainment area were calculated by multiplying the county totals by the ratio of total population in the nonattainment area to the total population in the county (101.14%). See Section 1.5.1 for a discussion of the population data used. Table 3.3–5 summarizes the annual and season-day emissions from commercial cooking for the eight-hour ozone nonattainment area.

Table 3.3–5. Annual and daily emissions from commercial cooking equipment in the eight-hour ozone NAA.

	Annual emissions (tons/yr)		Season-day emissions (lbs/day)	
Equipment type	**VOC**	**CO**	**VOC**	**CO**
Chain-driven charbroilers	25.18	88.64	138.3	487.1
Under-fired charbroilers	86.63	281.93	476.0	1,549.1
Deep-fat fryers	26.33	0.00	144.7	0.0
Flat griddles	12.41	26.50	68.2	145.6
Clamshell griddles	0.48	0.00	2.7	0.0
Total:	**151.03**	**397.07**	**829.8**	**2,181.7**

3.3.2.2 Bakeries

Emissions from area-source bakeries were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources and County-level employment data from the US Census Bureau (2012) 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 2010 employment were used. (Where employment estimates were provided as a range of values, the midpoint was used.) CBP estimates for Maricopa County employment in NAICS codes 311812 and 31183 (Commercial bakeries and Tortilla manufacturing) to total 2,491 persons. There were no point sources in this category, thus all emissions from this source category are reported as area sources. Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed daily emissions instead of annual totals.

Annual and season-day emissions for the eight-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county. Results are summarized in Table 3.3–6. See section 1.5.1 for a discussion of the employment data used.

Table 3.3–6. Annual and season-day emissions from area-source bakeries.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	78.18	547.8
8-hr ozone NAA	77.85	545.4

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 eight-hour ozone nonattainment area, total emission values for the county and the nonattainment area from secondary metal production are equal. Annual and season-day emissions are shown in Table 3.3–7.

Table 3.3–7. Annual and season-day emissions from area-source secondary metal production.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	41.01	15.02	98.36	306.4	107.9	697.4
8-hr ozone NAA	41.01	15.02	98.36	306.4	107.9	697.4

3.3.4 Rubber/plastics product manufacturing

Emissions from area-source rubber and plastic manufacturing facilities were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2012) 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 2010 employment were used. Where CBP employment estimates were presented as a range, the midpoint values were chosen for these calculations. Table 3.3–8 shows the NAICS codes and employment data used to calculate emissions from rubber and plastic manufacturing facilities.

Table 3.3–8. County-level employment estimates for rubber and plastic product manufacturing, by NAICS code.

NAICS code	NAICS description (and employment range)	Estimated employment
325211	Plastic material and resin manufacturing (0–19)	10
325991	Custom compounding of purchased resins (100–249)	175
326140	Polystyrene foam product manufacturing	164
326199	All other plastics product manufacturing	3,027
326212	Tire retreading	135
326299	All other rubber product manufacturing	92
332313	Plate work manufacturing	151
336413	Other aircraft parts and aux. equipment manufacturing	2,086
337920	Blind and shade manufacturing (250–499)	375
339115	Ophthalmic goods manufacturing	97
423830	Industrial machinery & equip. merchant wholesalers	2,634
423930	Recyclable material merchant wholesalers	1,268
441310	Automotive parts and accessories stores	3,392
441320	Tire dealers	2,095
Total:		**15,701**

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.

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

Table 3.3–9 summarizes annual and season-day emissions from area source rubber and plastic products manufacturing in Maricopa County and the eight-hour ozone nonattainment area.

Table 3.3–9. Annual and season-day emissions from area-source rubber/plastic product manufacturing.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	1,766.75	14,171.0
8-hr ozone NAA	1,759.15	14,110.1

3.3.5 Electrical equipment manufacturing

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

As all facilities addressed in this source category are located within the eight-hour ozone nonattainment area, emission totals for both areas are equal. Annual and season-day emissions are shown in Table 3.3–10.

Table 3.3–10. Annual and season-day emissions from area-source electric equipment manufacturing.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	122.80	23.47	2.98	746.2	135.8	16.4
8-hr ozone NAA	122.80	23.47	2.98	746.2	135.8	16.4

3.3.6 Industrial processes not elsewhere classified (NEC)

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

In addition, emissions from ADEQ-permitted sources are included in this category due to a lack of specificity regarding the nature of the reported emissions. As a conservative estimate, all of these emissions were assumed to occur within the eight-hour ozone nonattainment area. Estimates of total emissions from this source category are presented in Table 3.3–11.

Table 3.3–11. Annual and season-day emissions from industrial processes not elsewhere classified.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	48.51	224.92	91.84	325.6	1,245.8	525.2
8-hr ozone NAA	47.55	224.92	91.84	318.0	1,245.8	525.2

3.4 Solvent use

3.4.1 Surface coating

3.4.1.1 Architectural coatings

VOC emissions from architectural coatings were calculated using a per-capita emission factor developed and used by EPA for the 2008 NEI (Pechan, 2012). Because Maricopa County Rule 335 contains an emission limit for coatings, the "controlled" VOC emission factor (2.41 lbs/person) was used.

Annual VOC emissions for architectural coating for both Maricopa County and the eight-hour ozone nonattainment area were calculated by multiplying the per-capita emission factor by the county and nonattainment area populations (4,129,646 and 4,176,870, respectively). See Section 1.5.1 for a discussion of the population data used.

Ozone season-day emissions were developed using default assumptions from EIIP (US EPA, 1995a). The seasonal factor for ozone season architectural coating activity was assumed to be 28 percent of annual activity. In addition, it was assumed that coating use may take place 7 days a week during the ozone season (13 wks/season). Thus, season-day emissions were calculated by multiplying annual VOC emissions by the seasonal factor and then dividing the results by 91 days per season. Table 3.4–1 presents the assumptions used as well as annual and season-day

VOC emissions from architectural coatings for Maricopa County and the eight-hour ozone nonattainment area.

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

Geographic area	Population	Annual VOC emissions (tons/yr)	% annual activity in ozone season	Activity level (days/wk)	Season-day VOC emissions (lbs/day)
Maricopa County	4,129,646	4,976.22	28 %	7	30,622.9
8-hr ozone NAA	4,176,870	5,033.13	28 %	7	30,973.1

3.4.1.2 Auto refinishing

VOC emissions from auto refinishing were calculated using the per employee emission factor (89.0 lbs of VOC/employee) developed and reviewed by the Eastern Regional Technical Advisory Committee (ERTAC) advisory panel for the 2008 NEI (Pechan, 2012).

The most recent employment estimates (for the year 2010) from the US Census Bureau's County Business Patterns (CBP) were used (US Census Bureau, 2012). Employment data is listed by the North American Industry Classification System (NAICS) code(s). Table 3.4–2 shows the NAICS codes and employment estimates used to calculate emissions from auto refinishing.

Table 3.4–2. County-level employment estimates for auto refinishing, by NAICS code.

NAICS code	NAICS description	Estimated employment
81112	Auto body, paint, interior, & glass repair	4,236
4411	Auto dealers	22,632
4412	Other motor vehicle dealers	3,093
Total:		**29,961**

The seasonal activity factor for ozone season auto refinishing was assumed to be 25 percent of annual activity. In addition, it was assumed that auto refinishing occurs evenly throughout the year, 5 days/wk (US EPA, 2001a). Thus, ozone season-day emissions were calculated by multiplying annual VOC emissions by the seasonal factor and then dividing the results by 65 days per season (5 days/wk × 13 wks/season).

Annual and season-day emissions for the eight-hour ozone nonattainment area were derived by multiplying Maricopa County annual and season-day emissions by the ratio of industrial employment in the nonattainment area to industrial employment in the county (99.57%). See Section 1.5.1 for a discussion of the employment data used.

Table 3.4–3. Annual and season-day emissions from auto refinishing.

Geographic area	Annual VOC emissions (tons/yr)	% annual activity in ozone season	Activity level (days/wk)	Season-day VOC emissions (lbs/day)
Maricopa County	1,333.26	25 %	5	10,255.9
8-hr ozone NAA	1,327.53	25 %	5	10,211.8

3.4.1.3 Traffic markings

VOC emissions from traffic markings were calculated using the emissions factor developed by EPA for the 2008 NEI (22.1 lbs of VOC/road mile) (Pechan, 2012). Annual VOC emissions for

the county were calculated by multiplying the VOC emission factor by 2010 Maricopa County public road and street mileage obtained from the Arizona Department of Transportation Highway Performance Monitoring System (HPMS). ADOT reported 16,253 miles of public roads and streets in Maricopa County in 2010, which was assumed to be representative of 2011 (M. Catchpole, pers. commun., August 9, 2012).

Annual VOC emissions for the eight-hour ozone nonattainment area were estimated by multiplying the 2010 Maricopa County public road and street mileage by the percentage of miles within the nonattainment area (95.28%) and then multiplying by the VOC emission factor.

MAG estimated the percentage of miles within the eight-hour ozone nonattainment area as compared to Maricopa County based on 2012 GIS highways and streets data (M. Poppen, pers. commun., October 1, 2012). The 2012 mileage data was assumed to be representative of 2011.

Ozone season-day emissions during the ozone season for Maricopa County and the eight-hour ozone nonattainment area were calculated assuming 33 percent of annual activity occurred during the ozone season (13 wks per year) and a typical activity level of 5 days per week (US EPA, 1997).

Table 3.4–4. Annual and season-day emissions from traffic markings.

Geographic area	Annual VOC emissions (tons/yr)	% annual activity in ozone season	Activity level (days/wk)	Season-day VOC emissions (lbs/day)
Maricopa County	179.60	33 %	5	1,823.6
8-hr ozone NAA	171.12	33 %	5	1,737.5

3.4.1.4 Factory-finished wood

Emissions from factory-finished wood coating were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2012) 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 2011 employment were used. Where CBP employment estimates were presented as a range, the midpoint value was chosen for these calculations. Table 3.4–5 shows the NAICS codes and employment data used to calculate emissions from factory-finished wood surface coating.

Table 3.4–5. County-level employment estimates for factory-finished wood coating, by NAICS code.

NAICS code	NAICS description (and employment range)	Estimated employment
321911	Wood window & door manufacturing	299
321918	Other millwork	163
337212	Custom architectural woodwork & millwork manufacturing	368
337215	Showcase, partition, shelving & locker manufacturing	163
337920	Blind & shade manufacturing (250–499)	375
Total:		**1,368**

Since there were no point sources in this category, an area-source employment estimate was used to "scale up" emissions reported from those facilities surveyed in 2011.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed daily emissions instead of annual totals. Annual and season-day emissions for the eight-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county (99.57%). See Section 1.5.1 for a discussion of the employment data used. Table 3.4–6 summarizes annual and season-day VOC emissions from factory-finished wood surface coating in both Maricopa County and the eight-hour ozone nonattainment area.

Table 3.4–6. Annual and season-day emissions from area-source factory-finished wood surface coating.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	137.72	1,396.7
8-hr ozone NAA	137.12	1390.7

3.4.1.5 Wood furniture

Emissions from wood furniture surface coating were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2012) 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 2010 employment were used. Where CBP employment estimates were presented as a range, the midpoint values was chosen for these calculations. Table 3.4–7 shows the NAICS codes and employment data used to calculate emissions from wood furniture surface coating.

Table 3.4–7. County-level employment estimates for wood furniture surface coating, by NAICS code.

NAICS code	NAICS code description	Estimated employment
337110	Wood kitchen cabinet & countertop manufacturing	693
337121	Upholstered household furniture manufacturing	72
337122	Non-upholstered wood household furniture manufacturing	1,303
337129	Wood television, radio & sewing machine cabinet mfg. (0–19)	10
337211	Wood office furniture manufacturing (0–19)	10
811420	Re-upholstery & furniture repair	132
Total:		**2,220**

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

Annual emissions were calculated by "scaling up" area-source emissions reported from those facilities surveyed in 2011.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed daily emissions instead of annual totals. Annual and season-day emissions for the eight-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial

employment in the county (99.57%). See Section 1.5.1 for a discussion of the employment data used.

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

Table 3.4–8. Annual and season-day emissions from area-source wood furniture surface coating.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	416.56	3,434.7
8-hr ozone NAA	414.77	3,419.9

3.4.1.6 Aircraft surface coating

Annual emissions from aircraft surface coating facilities were derived from annual emissions reports from permitted sources. It is assumed that all aircraft surface coating facilities were surveyed in 2011 based on a comparison of county-level employment data (US Census Bureau, 2012) and annual emissions report employment data. Ozone season-day emissions were calculated based on operating schedule information provided in the facilities' annual emissions reports. Since all facilities considered in this section are located within the eight-hour ozone nonattainment area, total emission values for the county and the nonattainment area are equal.

Table 3.4–9. Annual and season-day VOC emissions from area-source aircraft surface coating.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	65.84	473.1
8-hr ozone NAA	65.84	473.1

3.4.1.7 Miscellaneous surface coating

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

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

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

Table 3.4–10 summarizes annual and season-day VOC emissions from area-source miscellaneous surface coating in both Maricopa County and the eight-hour ozone nonattainment area.

Table 3.4–10. Annual and season-day emissions from miscellaneous surface coating.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	316.38	2,450.5
8-hr ozone NAA	315.02	2,440.0

3.4.2 Degreasing

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

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

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

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

Table 3.4–11 summarizes annual and season-day emissions from area-source degreasing in both Maricopa County and the eight-hour ozone nonattainment area.

Table 3.4–11. Annual and season-day VOC emissions from area-source degreasing.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	217.55	1,451.1
8-hr ozone NAA	216.62	1,445.1

3.4.3 Dry cleaning

Dry cleaning facilities are identified as one of two types: those that use perchloroethylene and those that use a petroleum solvent (140 or Stoddard solvent) or other VOC-based solvent. Perchloroethylene is a synthetic solvent that is not considered photochemically reactive and therefore is not included in this inventory. Data from the 2008 periodic emissions inventory were grown to 2011 based on total population.

Based on operating schedule information provided in the facilities' historic annual emissions reports, it is assumed that operations occur evenly throughout the year, 5 days per week, thus season-day emissions were derived by dividing the annual total emissions by 260 (= 5 days/ wk × 52 weeks/yr).

Annual and season-day emissions estimates for the eight-hour ozone nonattainment area were calculated by multiplying county-level emissions by the ratio of Maricopa County population to nonattainment area population. See Section 1.5.1 for a discussion of the population data used.

Table 3.4–12 summarizes the annual and season-day VOC emissions from dry cleaning.

Table 3.4–12. Annual and season-day emissions from dry cleaning.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	23.15	178.1
8-hr ozone NAA	23.42	180.1

3.4.4 Graphic arts

Emissions from graphic arts were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2012) 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 2010 employment were used. Table 3.4–13 shows the NAICS codes and employment data used to calculate emissions from graphic arts.

Table 3.4–13. County-level employment estimates for graphic arts, by NAICS code.

NAICS code	NAICS description	Estimated employment
323	Printing & related support activities	3,892
5111	Newspaper, periodical, book & database publishers	3,800
Total:		**7,692**

There were no point sources in this category. An area-source employment estimate was used to "scale up" emissions reported from those facilities surveyed in 2011.

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

Table 3.4–14 summarizes annual and season-day emissions from graphic arts in both Maricopa County and the eight-hour ozone nonattainment area.

Table 3.4–14. Annual and season-day VOC emissions from area-source graphic arts sources.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	290.98	2,225.7
8-hr ozone NAA	289.73	2,216.1

3.4.5 Miscellaneous industrial solvent use

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

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

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

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

Table 3.4–15 summarizes annual and season-day VOC emissions from area-source miscellaneous industrial solvent use in both Maricopa County and the eight-hour ozone nonattainment area.

Table 3.4–15. Annual and season-day emissions from area-source miscellaneous industrial solvent use.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	721.85	5,126.6
8-hr ozone NAA	718.75	5,104.6

3.4.6 Consumer and commercial products

Consumer and commercial products emissions include emissions from the following seven product categories: personal care products, household products, automotive aftermarket products, adhesives and sealants, FIFRA-regulated products, coatings and related products, and miscellaneous products.

Annual area-source VOC emissions from consumer and commercial products were calculated by multiplying per-capita emission factors recommended by the Eastern Regional Technical Advisory Committee (Pechan, 2012c) by the population estimates for Maricopa County and the eight-hour ozone nonattainment area (see Section 1.5.1 for a discussion of population data). Ozone season-day emissions for the county and the eight-hour ozone nonattainment area were calculated by dividing annual emissions by 365 days as activity is assumed to occur uniformly throughout the year according to EIIP guidance (US EPA, 2001a).

Table 3.4–16. Annual and season-day emissions from consumer and commercial products.

		Maricopa County		8-hr ozone NAA	
Product category	Emission factor (lbs/person)	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Personal care	1.9	3,923.16	21,496.8	3,968.03	21,742.6
Household	1.8	3,716.68	20,365.4	3,759.18	20,598.3
Automotive aftermarket	1.36	2,808.16	15,387.2	2,840.27	15,563.1
Coatings and related	0.95	1,961.58	10,748.4	1,984.01	10,871.3
Adhesives/sealants	0.57	1,176.95	6,449.0	1,190.41	6,522.8
FIFRA-regulated	1.78	3,675.38	20,139.1	3,717.41	20,369.4
Miscellaneous	0.07	144.54	792.0	146.19	801.0
Total:	**8.43**	**17,406.46**	**95,377.9**	**17,605.51**	**96,468.5**

3.4.7 Asphalt application

Asphalt is applied to pave, seal, and repair surfaces such as roads, parking lots, drives, walkways, roofs, and airport runways. In the past, MCAQD estimated emissions from asphalt application by allocating state-level asphalt usage data obtained from the Asphalt Institute to Maricopa County by the use of two surrogates: vehicle miles traveled (VMT) and population. However, the Asphalt Institute no longer compiles asphalt usage data by state. Therefore, 2011 emissions from asphalt application were calculated by growing 2008 asphalt emissions to 2011 based on VMT and population.

Asphalt emissions were grown for three categories of asphalt application: roofing, cutback and emulsified. A population-based growth factor was used to grow 2008 roofing asphalt emissions

to 2011, while a VMT-based growth factor was used to grow 2008 cutback and emulsified asphalt emissions to 2011.

Table 3.4–17 shows 2008 and 2011 VMT and population for Maricopa County and the eight-hour ozone nonattainment area.

Table 3.4–17. 2008 and 2011 population and VMT, by geographic area.

Total population	**Maricopa County**	**8-hr ozone NAA**
2008	4,279,760	4,322,710
2011	4,129,646	4,176,870
Change, 2008–2011	**–3.51%**	**–3.37%**
Vehicle miles traveled (mi/day)		
2008	91,257,000	88,713,000
2011	88,885,000	83,874,000
Change, 2008–2011	–2.60%	–5.45%

Table 3.4–18 details county VOC emissions from asphalt application by asphalt type and the growth factors used to estimate 2011 emissions.

Table 3.4–18. Emissions from asphalt use, by type, in Maricopa County.

	2008			**2011**	
Asphalt type	**Annual VOC emissions (tons/yr)**	**Season-day VOC emissions (lbs/day)**	**2008:2011 growth factor**	**Annual VOC emissions (tons/yr)**	**Season-day VOC emissions (lbs/day)**
Cutback	858.15	4,689.3	–2.60%	835.84	4,567.4
Emulsified	889.17	4,858.9	–2.60%	866.06	4,732.6
Roofing	3.15	24.3	–3.51%	3.04	23.4
Total:	**1,750.47**	**9,572.5**		**1,704.94**	**9,323.5**

Annual and season-day emissions for the eight-hour ozone nonattainment area were also grown from 2008 by multiplying the 2008 nonattainment area emission by a 2008:2011 growth factor for VMT within the nonattainment area (for cutback and emulsified asphalt) and population within the nonattainment area (for roofing asphalt). Table 3.4–19 details nonattainment area asphalt emissions by type and the factors used to grow 2008 nonattainment area emissions to 2011.

Table 3.4–19. Emissions from asphalt use, by type, in the eight-hour ozone NAA.

	2008			**2011**	
Asphalt type	**Annual VOC emissions (tons/yr)**	**Season-day VOC emissions (lbs/day)**	**2008:2011 growth factor**	**Annual VOC emissions (tons/yr)**	**Season-day VOC emissions (lbs/day)**
Cutback	834.22	4,558.6	–5.45%	788.72	4,309.9
Emulsified	864.39	4,723.4	–5.45%	817.24	4,465.8
Roofing	3.19	24.5	–3.37%	3.08	23.7
Total:	**1,701.80**	**9,306.5**		**1,609.04**	**8,799.4**

3.4.8 Agricultural pesticides

Annual emissions from agricultural pesticide usage within Maricopa County were obtained from the US Environmental Protection Agency's 2011 National Emissions Inventory data and documentation (US EPA, 2012c). US EPA estimated 362.93 tons of VOCs were emitted from agricultural pesticide usage in Maricopa County in 2011.

Agricultural pesticide data for 2011 were obtained from the Arizona Department of Agriculture's 1080 Investigative Search website (ADA, 2013). This data was used to determine ozone season emissions from agricultural pesticide applications. The data included quantities of pesticides applied and the date of pesticide application. Quantities reported in gallons were converted to pounds assuming 8.33 lbs per gallon.

The data showed approximately 2,086,356 lbs of agricultural pesticides were applied in Maricopa County in 2011. Based on the date of pesticide application, approximately, 36.4% (759,349 lbs.) of agricultural pesticides were applied during the ozone season. Ozone season-day emissions for Maricopa County were calculated by multiplying annual emissions (362.93 tons) by 36.4% and then dividing the result by 91 days/season (7 days/wk × 13 wks/ozone season).

Annual and season-day emissions for the eight-hour ozone nonattainment area were calculated by multiplying county totals by the ratio of agricultural land located in the nonattainment area to the agricultural land in the county (58.46%). See Section 1.5.1 for a further discussion of the land use data used.

Table 3.4–20. Annual and season-day emissions from agricultural pesticide application.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	362.93	2,903.4
8-hr ozone NAA	212.18	1,697.5

3.5 Storage and transport

3.5.1 Portable fuel containers

Annual Maricopa County emissions from area-source portable fuel containers (PFCs) were obtained from the US Environmental Protection Agency's 2011 National Emissions Inventory (US EPA, 2012c). These calculations identify a total of seven mechanisms by which emissions can be generated from portable fuel containers:

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

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

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

Ozone season-day emissions for the county were calculated by dividing annual emissions by 365 days as activity is assumed to occur uniformly throughout the year.

Annual and ozone season-day emissions for the eight-hour ozone nonattainment area were calculated by multiplying the county totals by the ratio of total population in the nonattainment area to total population in the county (101.14%). See Section 1.5.1 for a discussion of the employment data used.

Table 3.5–1 summarizes annual and season-day VOC emissions from portable fuel containers in both Maricopa County and the eight-hour ozone nonattainment area.

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

	Maricopa County		Eight-hour ozone NAA	
Emissions source	**Annual VOC emissions (tons/yr)**	**Season-day VOC emissions (lbs/day)**	**Annual VOC emissions (tons/yr)**	**Season-day VOC emissions (lbs/day)**
Permeation: Residential	887.25	4,875.0	897.40	4,930.8
Evaporation/diurnal: Residential	1,732.33	9,518.3	1,752.15	9,627.2
Spillage during transport: Residential	226.04	1,242.0	228.63	1,256.2
Vapor displacement in PFCs: Residential	82.87	455.3	83.82	460.5
Spillage at pump: Residential	6.60	36.2	6.67	36.7
Permeation: Commercial	28.34	155.7	28.66	157.5
Evaporation/diurnal: Commercial	55.33	304.0	55.96	307.5
Spillage during transport: Commercial	308.36	1,694.3	311.89	1,713.7
Vapor displacement in PFCs: Commercial	159.71	877.5	161.54	887.6
Spillage at pump: Commercial	12.69	69.7	12.84	70.5
Displacement during refueling of nonroad equipment*				
Spillage during refueling of nonroad equipment*				
Total:	**3,499.52**	**19,228.2**	**3,539.56**	**19,448.1**

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

3.5.2 Bulk plants

Emissions from this source category were calculated from annual emissions inventory reports from all bulk plants located within the county. It is assumed that there are no unpermitted bulk plants in Maricopa County. To avoid double-counting, emissions from bulk terminals are treated as point sources (totaling 105.94 tons/yr) and thus are reported in Chapter 2. Ozone season-day emissions were calculated based on operating schedule information provided in the facilities annual emissions reports. Since all facilities considered in this section are located within the eight-hour ozone nonattainment area, total emission values for the county and the eight-hour ozone nonattainment area are equal.

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

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	120.91	659.3
8-hr ozone NAA	120.91	659.3

3.5.3 Gasoline stations (Stage I)

Stage I gasoline distribution emissions occur when gasoline vapors are displaced from storage tanks during unloading of gasoline from tank trucks at service stations.

Following EPA methodologies (US EPA, 2001b), annual VOC emissions from gasoline service station unloading were calculated by multiplying gasoline sales (1,553,993 Mgals) (B. Steen, pers. commun., September 13, 2012) by emission factors provided in AP-42 (US EPA, 1995b) for each filling technology. Based on annual emissions reports from 2002, 98.5% of gasoline is delivered using balanced submerged filling with the remaining 1.5% delivered by submerged filling. Table 3.5–3 below shows the emission factors used.

Table 3.5–3. Emission factors for gasoline service stations (Stage I).

Emission source	VOC emission factors (lbs of VOC/Mgal throughput)
Submerged filling	7.3
Balanced submerged filling	0.3

Ozone season-day emissions were calculated by multiplying ozone-season (July–September) gasoline sales (376,616 Mgal) by the emission factors listed above, then dividing by 78 days (13 weeks in the ozone season × 6 days/week).

As a conservative assumption, annual and season-day emissions for the eight-hour ozone nonattainment area are assumed to be equal to Maricopa County emissions.

Table 3.5–4. Annual and season-day emissions from gasoline service stations (Stage I).

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County and 8-hr ozone NAA:		
–Submerged filling	85.08	528.7
–Balanced submerged filling	229.60	1,426.8
Total:	**314.68**	**1,955.5**

3.5.4 Gasoline stations (Stage II)

Stage II gasoline service station emissions are the refueling emissions that occur during the transfer of gasoline from storage tanks at service stations to vehicle fuel tanks (i.e. vehicle refueling and spillage emissions). The MOVES2010b model that was used to calculate onroad emissions captures stage II emissions. Therefore, these emissions are addressed in Chapter 5 as part of the onroad mobile sources emissions and are no longer reported as an area source.

3.5.5 Gasoline stations underground tanks, breathing/emptying

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

Following EPA methodologies (US EPA, 2001b), annual VOC emissions from storage tank breathing and emptying were calculated by multiplying annual gasoline throughput (1,553,993 Mgal [B. Steen, ADOT, pers. commun., September 13, 2012]) by the emission factor for underground tank breathing and emptying (1.0 lb/Mgal) found in AP-42 Table 5.2–7 (US EPA, 1995b).

Ozone season-day VOC emissions were calculated using the same formula as above, using only the gasoline distributed during the ozone season (July–September, 376,616 Mgal) and dividing by the 91 days (13 weeks in the ozone season × 7 days per week that gasoline storage occurs).

As a conservative estimate, all activity was assumed to occur within the nonattainment area; thus annual and season-day emissions estimates for the nonattainment area are equal to county totals.

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

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	777.00	4,138.6
8-hr ozone NAA	777.00	4,138.6

3.5.6 Airports: Aviation gasoline

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

Annual emissions from aviation gasoline Stage I and Stage II were obtained from the US Environmental Protection Agency's 2011 National Emissions Inventory (US EPA, 2012c). Table 3.5–6 shows US EPA 2011 estimated VOC emissions from aviation gasoline for Maricopa County.

Table 3.5–6. Annual emissions from aviation gasoline for Maricopa County.

	VOC Emissions (tons/yr)
Aviation Gasoline Stage I	347.57
Aviation Gasoline Stage II	18.04

Due to lack of data, daily emissions were assumed to be equal throughout the year and were calculated by dividing annual emissions by 365 days/year.

Annual and season-day emission in the eight-hour ozone nonattainment area were calculated by multiplying county totals by the percentage of general aviation operations that occurred within the nonattainment area in 2011 (99.1%) (See Table 4.11–1 for general aviation aircraft operational data used).

Table 3.5–7. Annual and season-day emissions from aviation gasoline.

	Maricopa County		8-hr ozone NAA	
	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day
Aviation Gasoline Stage I	347.57	1904.5	344.41	1,887.2
Aviation Gasoline Stage II	18.04	98.8	17.87	97.9

3.5.7 Gasoline tank trucks in transit

Emissions from tank trucks in transit occur when gasoline vapor evaporates from (1) loaded tank trucks during transportation of gasoline from bulk terminals/plants to service stations, and (2) empty tank trucks returning from service stations to bulk terminals/plants. Annual VOC emissions from gasoline trucks in transit were calculated by multiplying county-level tank truck gasoline throughput by a 0.06 lb of VOC per 1,000 gallon emission factor (Pechan, 2012b).

Gasoline consumption for Maricopa County was determined from gasoline tax sales reports obtained from the Arizona Department of Transportation for 2011 (ADOT, 2012). Gasoline throughput for tank trucks was computed by multiplying the Maricopa County gasoline sales (1,553,992,539 gallons) by a transportation adjustment factor of 1.09 to account for gasoline that is transported more than once in a given area (i.e., transported from bulk terminals to bulk plant and then from bulk plant to service station) (Pechan, 2012b).

Ozone season gasoline throughput for tank trucks was estimated by multiplying the gallons of gasoline sold (376,615,906 gallons) during the ozone-season (July-September) in Maricopa County by the 1.09 transportation adjustment factor noted above to account for gasoline that is transported more than once. Ozone season-day VOC emissions were calculated by multiplying the estimated ozone season gasoline throughput for tank trucks by the 0.06 lb of VOC per 1,000 gallon emission factor noted above and then dividing by 78 days (13 weeks × 6 days/wk).

As a conservative estimate, all activity was assumed to occur within the nonattainment area; thus annual and season-day emissions estimates for the nonattainment area are equal to county totals.

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

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	50.82	315.8
8-hr ozone NAA	50.82	315.8

3.5.8 Pipeline gasoline

Pipeline emissions result from the valves and pumps found at pipeline pumping stations and from the valves, pumps, and storage tanks at pipeline breakout stations.

Annual VOC emissions from gasoline pipelines were derived based on the ratio of pipeline emissions to total emissions for bulk terminals, bulk plants, and pipelines as reported in the US Environmental Protection Agency's 2011 National Emissions Inventory (NEI) (US EPA, 2012c). The NEI reported that 2011 pipeline emissions for Maricopa County were 12.53% of total emissions from bulk terminals, bulk plants, and pipelines.

Thus, annual pipeline emissions for the county were derived by multiplying annual emissions reported in bulk plant emissions reports by 12.53%.

Ozone season-day emissions were calculated in the same manner, by multiplying season-day emissions (derived from operating schedule information provided in the facilities annual emissions reports) by 12.53%.

Since all facilities considered in this section are located within the eight-hour ozone nonattainment area, emissions for the county and the eight-hour ozone nonattainment area are equal.

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

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	17.32	94.5
8-hr ozone NAA	17.32	94.5

3.5.9 Volatile organic liquid (VOL) storage and transport

Emissions from this source category were calculated by summing reported VOC emissions from volatile organic liquid storage/transfer emissions inventory reports. It is assumed that there are no significant unpermitted volatile organic liquid storage/transfer facilities in Maricopa County. To avoid double-counting, emissions from those facilities treated as point sources (totaling 28.8 tons/yr) are addressed in Chapter 2. Ozone season-day emissions were calculated based on operating schedule information provided in the facilities annual emissions reports.

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

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	30.54	182.7
8-hr ozone NAA	28.80	169.3

3.6 Waste treatment and disposal

3.6.1 On-site incineration

This section includes emissions from on-site industrial incinerators, primarily burn-off ovens used to reclaim electric wire or other materials. Emissions from human and animal crematories are addressed in Section 3.7.5. There were no incinerators at residential (e.g., apartment complexes) or commercial/institutional facilities (e.g., hospitals, service establishments) in operation during 2011.

Emissions from on-site incineration were determined from annual emissions inventory reports. It is assumed that all incinerator emissions are accounted for, since all permitted incinerators

received surveys in 2011. All surveyed facilities are located within the eight-hour ozone nonattainment area, thus total emissions for the county and nonattainment area are equal.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.17	3.31	0.79	1.1	21.4	5.3
8-hr ozone NAA	0.17	3.31	0.79	1.1	21.4	5.3

3.6.2 Open burning: Land clearing debris

Emissions from controlled open burning are regulated by Maricopa County Air Pollution Control Regulations 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 ditchbank and fence row burning, tumbleweed burning, land clearance, and firefighting training. Maricopa County's burn permit data base was used to identify all burn permits issued in 2011. A total of 57 open burn permits were issued during the year. The quantity and reported activity for the open burn permits (except for firefighting burn permits) are shown in Table 3.6–2.

Table 3.6–2. Maricopa County burn permit activity.

Category	Number of permits	Unit of measure	Total reported activity
Annual ditchbank & fence row	41	Linear Feet	1,967,795
Land clearance	4	Acres	14.14
Fire hazard	1	Acres	2

Emissions from land clearance and fire hazard open burning are addressed in this section whereas ditchbank and fence row burning are addressed in Section 3.7.1.

The activity data for land clearance and fire hazard were converted to tons of material burned using fuel loading factor for "weeds, unspecified" from AP-42 (US EPA, 1992). The emission and loading factors used are shown in Table 3.6–3.

Table 3.6–3. Emission and fuel loading factors for open burning.

	Emission factors (lbs/ton burned)			Fuel loading factors
Category	**VOC**	**NO_x**	**CO**	**(tons/acre)**
Weeds, unspecified	9	4	85	3.2

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" (shown in Table 3.6–3). Based on an analysis of complaints received in 2011 reporting suspected open or illegal outside burning, emissions estimates were multiplied by a factor of 2.87 to account for unpermitted illegal outdoor burning.

It was assumed that land clearance and fire hazard open burning occur 5 days per week (most burn permits are issued for weekdays but permits may be issued on weekends depending on

circumstances) and evenly during the ozone season months (July–September). Thus, season-day emissions for Maricopa County were derived by dividing annual emissions (lbs/year) by 65 (5 days/wk × 13 wks/yr).

Annual and season-day emissions for the nonattainment area were calculated by multiplying the percentage of vacant land use located in the eight-hour ozone nonattainment area (44.55%) by the Maricopa County emissions estimates. See Section 1.5.2 for a discussion of the land use data used.

Table 3.6–4 summarizes 2011 annual and season-day emissions for the Maricopa County and the eight-hour ozone nonattainment area from land clearance and fire hazard open burning activity.

Table 3.6–4. Annual and season-day emissions from land clearance and fire hazard open burning.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.67	0.30	6.30	20.5	9.1	193.8
8-hr ozone NAA	0.30	0.14	2.81	9.1	4.1	86.4

3.6.3 Landfills

Emissions from municipal solid waste (MSW) landfills come from uncontrolled landfill gas emissions as well as from combustion from control measures, such as a flare. Total emissions were calculated from annual emissions inventory reports from all landfills located within the county. Northwest Regional Landfill was considered a point sources; all other MSW landfills are reportered here as area source landfills.

Since there are no landfills located outside the eight-hour ozone nonattainment area, total emission values for the county and the eight-hour ozone nonattainment area are equal. Annual and season-day emissions are shown in Table 3.6–5.

Table 3.6–5. Annual and season-day emissions from landfills.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	36.59	30.40	108.55	200.7	167.4	596.4
8-hr ozone NAA	36.59	30.40	108.55	200.7	167.4	596.4

3.6.4 Publicly owned treatment works

Annual emissions from publicly owned treatment works (POTW) in Maricopa County were obtained from the US Environmental Protection Agency's 2011 National Emissions Inventory (US EPA, 2012c). EPA estimated 75.02 tons of VOC were emitted from POTWs in Maricopa County in 2011. There were no point sources in this category that needed to be subtracted.

Ozone season-day emissions were calculated by multiplying annual emissions by a 35% season adjustment factor and then dividing by 91 days per season (US EPA, 2001a).

Annual and season-day emissions for the eight-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the percentage of total population in the nonattainment area to the total population in the county (101.14%). See Section 1.5.1 for a discussion of the population data used.

Table 3.6–6. VOC emissions from publicly owned treatment works.

Geographic area	Annual emissions (tons/yr)	Season-day emissions (lbs/day)
Maricopa County	75.02	577.1
8-hr ozone NAA	75.88	583.7

3.6.5 Leaking underground storage tanks

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

A default emission rate of 28 lbs/day per remediation event was used to estimate VOC emissions from LUST remediation (US EPA, 2001c). Data obtained from the Arizona Department of Environmental Quality Leaking Underground Storage Tank Section indicated that 15 LUST opened in Maricopa County in 2011 (N. Giuntoli, pers. commun., March 19, 2013). Data were not available on the number or date of remediation that occurred in 2011; therefore, it was conservatively assumed that all 15 LUST were remediated in 2011 during the ozone season. It was also assumed that an initial site action (tank and soil removal) for an average LUST remediation lasts five days.

Ozone season-day emissions were calculated by dividing annual values by 65 (5 days/wk × 13 wks/ozone season). To be conservative, it was assumed that all gasoline retail outlets were located within the ozone nonattainment area and therefore, annual and season-day emissions for the eight-hour ozone nonattainment area were assumed to be equal to the Maricopa County totals.

Table 3.6–7. Annual and season-day emissions from remediation of leaking underground storage tanks.

Geographic area	Annual VOC emissions (tons/yr)	Season-day VOC emissions (lbs/day)
Maricopa County	1.05	32.3
8-hr ozone NAA	1.05	32.3

3.6.6 Other waste

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

All surveyed facilities for this area source category are located inside the eight-hour ozone nonattainment area; therefore emissions for Maricopa County and the eight-hour ozone nonattainment area are equal. Table 3.6–8 summarizes annual and season-day emissions for Maricopa County and the nonattainment area.

Table 3.6–8. Annual and season-day emissions from other waste.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	2.12	22.19	77.93	10.9	122.8	431.4
8-hr ozone NAA	2.12	22.19	77.93	10.9	122.8	431.4

3.7 Miscellaneous area sources

3.7.1 Agricultural field burning

Agricultural ditchbank and fence row burning are regulated by Maricopa County Air Pollution Control Regulations Rule 314 (Open Outdoor Fires and Indoor Fireplaces at Commercial and Institutional Establishments) which requires a burn permit for open burning activity in Maricopa County. A total of 41 permits were issued during the year for ditchbank and fence row burning. The permit data indicated that a total of 1,967,795 linear feet of ditchbank and fence rows were burned in 2011.

To calculate the amount of material burned, MCAQD assumed that ditchbanks and fence rows in Maricopa County average 7 feet in width and are burned twice per year, based on a previous Maricopa County emissions inventory (MCESD, 1999).

MCAQD estimated 632.44 acres burned [(1,967,795 linear ft. × 7 ft. × 2)/43,560 ft/acre]. Acres burned were converted to tons of material burned using a 3.2 tons/acre fuel loading factor for "weeds, unspecified" from AP-42 (US EPA, 1992). This resulted in an estimated 2,023.81 ton of material burned.

Annual emissions were then calculated by multiplying the amount of material burned by AP-42 emission factors for "weeds, unspecified" as shown in Table 3.7–1.

Table 3.7–1. Emission factors for open burning.

	Emission factors (lbs/ton burned)		
Category	**VOC**	**NO_x**	**CO**
Weeds, unspecified	9	4	85

Based on an analysis of 2011 complaints received reporting suspected open or illegal outside burning, emissions estimates were multiplied by a factor of 2.87 to account for unpermitted illegal outdoor burning.

It was assumed that ditchbank and fence row burning occurs 5 days per week. Thus, season-day emissions were calculated by dividing annual emissions (in lbs) by 65 (5 days/wk × 13 wks/ozone season).

Annual and season-day emissions for the nonattainment area were calculated by multiplying the percentage of agricultural land use within the eight-hour ozone nonattainment area (58.46%) by the Maricopa County emissions estimates. See Section 1.5.2 for a discussion of the land use data used.

Table 3.7–2 summarizes annual and season-day emissions from ditchbank and fence row burning for Maricopa County and the eight-hour ozone nonattainment area.

Table 3.7–2. Annual and season-day emissions from ditchbank and fence row burning.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	26.14	11.62	246.85	804.2	357.4	7,595.5
8-hr ozone NAA	15.28	6.79	144.32	470.2	209.0	4,440.7

3.7.2 Structure fires

Structure fire emissions for Maricopa County were grown from 2008 based on county population growth from 2008 to 2011. Population data was provided by MAG and is shown in Table 3.7−3.

Table 3.7–3. Maricopa County population growth, 2008 to 2011.

	2008	2011	% change
Maricopa Co. Total Population	4,279,760	4,129,646	–3.51%

The 2008 annual emissions from structure fires in Maricopa County and the subsequently grown 2011 annual emissions are shown in Table 3.7–4.

Table 3.7–4. 2008 and 2011 annual emissions from structure fires in Maricopa County.

	Annual emissions (tons/yr)		
Year	**VOC**	**NO_x**	**CO**
2008	15.32	1.95	83.56
2011	14.78	1.88	80.63

Annual emissions for the eight-hour ozone nonattainment area were derived by multiplying annual county emissions by the percentage of total residential population within the nonattainment area (101.14%). See Section 1.5.1 for a discussion of the population data used.

It was assumed that structure fires occur 7 days a week; however, structure fires vary seasonally and may increase during cold weather. Because local season-specific data were not readily available, seasonal occurrences of residential and non-residential structure fires reported by the Federal Emergency Management Agency (FEMA) were used to derive a seasonal adjustment factor for the ozone season (US EPA, 2001d). FEMA reported that 20.9% of residential structure fires and 23.7% of non-residential structural fires occurred during July, August, and September 1994. Thus, an average occurrence of 22.3% [(20.9% + 23.7%) ÷ 2] was used as a seasonal adjustment factor to estimate ozone season-day emissions.

Ozone season-day emissions for Maricopa County and the nonattainment area were derived by multiplying the annual emissions (in lbs) by the seasonal adjustment factor (22.3%) and then dividing by 91 (7 days/wk × 13 wks/ozone season).

Table 3.7–5. Annual and season-day emissions from structure fires.

Geographic area	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	14.78	1.88	80.63	72.4	9.2	395.2
8-hr ozone NAA	14.95	1.90	81.55	73.3	9.3	399.7

3.7.3 Aircraft engine testing

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

Since all facilities considered in this section are located within the eight-hour ozone nonattainment area, total emission values for the county and the nonattainment area are equal. Results are shown in Table 3.7–6.

Table 3.7–6. Annual and season-day emissions from aircraft engine testing.

Geographic area	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	4.72	46.36	16.16	26.1	259.3	91.2
8-hr ozone NAA	4.72	46.36	16.16	26.1	259.3	91.2

3.7.4 Vehicle fires

Vehicle fire emissions for Maricopa County were grown from 2008 based on county population growth from 2008 to 2011. The population data used is shown in Table 3.7−3.

The 2008 annual emissions from vehicle fires in Maricopa County and the subsequently grown 2011 annual emissions are shown in Table 3.7**–7**.

Table 3.7–7. 2008 and 2011 annual emissions from vehicle fires in Maricopa County.

Year	Annual emissions (tons/yr)		
	VOC	NO_x	CO
2008	9.61	1.20	37.55
2011	9.27	1.16	36.23

Annual emissions for the eight-hour ozone nonattainment area were derived by multiplying annual county emissions by the percentage of total residential population within the nonattainment area (101.14%). See Section 1.5.1 for a discussion of the population data used.

It was assumed that vehicle fires occur evenly throughout the year. Thus, ozone season-day emissions were derived by dividing the Maricopa County and nonattainment area annual emissions (in lbs.) by 365 days/year. The results are shown in Table 3.7−8 below.

Table 3.7–8. Annual and season-day emissions from vehicle fires.

Geographic area	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	9.27	1.16	36.23	50.8	6.4	198.5
8-hr ozone NAA	9.38	1.17	36.64	51.4	6.4	200.8

3.7.5 Crematories

Emissions from human and animal crematories were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources, and county-level employment data from the US Census Bureau (2012) 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 2010 employment were used. Table 3.7–9 shows the NAICS code and employment data used to calculate emissions from crematories.

Table 3.7–9. County-level employment estimates for crematories, by NAICS code.

NAICS code	NAICS description	Estimated employment
81222	Cemeteries and crematories	251

There were no point sources in this category. Area-source employment estimate were used to "scale up" emissions reported from those facilities surveyed in 2011.

Ozone season-day emissions were calculated in the same method as annual emissions, only using surveyed daily emissions instead of annual totals. Annual and season-day emissions for the eight-hour ozone nonattainment area were calculated by multiplying the Maricopa County emission totals by the ratio of industrial employment in the nonattainment area to industrial employment in the county. See Section 1.5.1 for a discussion of the employment data used. Table 3.7–10 summarizes annual and season-day emissions from crematories in both Maricopa County and the eight-hour ozone nonattainment area.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	1.18	11.19	2.23	51.1	88.5	17.3
8-hr ozone NAA	1.18	11.14	2.22	50.9	88.1	17.2

3.7.6 Accidental releases

As part of its air quality permit compliance program, MCAQD keeps an "upset log" for each calendar year that records excess emissions and accidental releases at permitted facilities. Annual emissions inventory reports also provide for recording of accidental releases. Data from these two sources documented the release of 0.45 tons of VOC for the year 2012.

Ozone season-day emissions were calculated based on the whether the reported release occurred during the ozone season. If emissions occurred during the ozone season, those emissions were summed and divided by the number of days in the ozone season to produce season-day emissions. Emissions within the eight-hour ozone nonattainment area are calculated based on locations of facilities that reported releases. Results are shown in Table 3.7–11.

Table 3.7–11. Annual and season-day emissions from accidental releases.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.45	0.0	0.0	2.1	0.0	0.0
8-hr ozone NAA	0.45	0.0	0.0	2.1	0.0	0.0

3.7.7 Hospitals

Emissions from hospitals were calculated by the "scaling up" method as described in EPA emissions inventory guidance (US EPA, 2001a). This method combines detailed emissions data from a subset of sources and county-level employment data from the US Census Bureau (2012) 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 2010 employment were used. CBP employment data for NAICS code 662110 (general medical and surgical hospitals) indicated 59,646 employees in this industry in Maricopa County.

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

Table 3.7–12 summarizes annual and season-day emissions from hospitals in both Maricopa County and the eight-hour ozone nonattainment area.

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

Geographic area	**Annual VOC emissions (tons/yr)**	**Season-day VOC emissions (lbs/day)**
Maricopa County	8.57	52.3
8-hr ozone NAA	8.66	52.9

3.7.8 Wildfires

2011 Maricopa County wildfire data were obtained from the Arizona State Forestry Division (ASFD) (G. Buettner, pers. commun., December 17, 2012); the National Wildfire Coordinating Group (NWCG, 2012), and the US Fire Administration, National Fire Data Center (USFA, 2012).

The Arizona State Forestry Division (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 by ASFD includes wildfires that occur outside of local fire districts and municipalities on State, private, and U.S. Bureau of Land Management (BLM) land. In 2011, the (ASFD) reported 5 wildfires in Maricopa County, encompassing 15.2 acres.

Wildfire data provided by ASFD were compared to 2011 Incident Status Summary reports (ICS-209) to identify wildfires that may have occurred outside of ASFD jurisdiction. ICS-209 reports only include large wildfires, generally fires greater than 100 acres. ICS-209 reports showed two additional Maricopa County wildfires in 2011, totaling 2,006 acres (NWCG, 2012).

Lastly, 2011 National Fire Incident Reporting System (NFIRS) data were obtained from the US Fire Administration (USFA, 2012). NFIRS is a voluntary national reporting system used by fire departments to report fires and other incidents to which they respond and to maintain records of these incidents in a uniform manner. However, not all fire departments report to NFIRS and they may not report all of their fire incidents. The 2011 NFIRS data was culled for wildland fires greater than 1 acre that contained either latitude and longitude or township and range information. Wildfire data for Arizona included 18 fires which met these criteria; however, only 2 of these fires were located within Maricopa County, encompassing 7 acres. The NFIRS data was compared to the ASFD data to identify duplicates by comparing the incident dates and locations. One NFIRS fire was excluded from the combined dataset because it may have been a duplicate already captured in the ASFD data. Table 3.7–13 summarizes fire data obtained from each data source.

Table 3.7–13. 2011 wildfire activity in Maricopa County.

Data source	Number of fires in 2011	Acres burned
Arizona State Forestry Division	5	15.2
2011 NFIRS data	1	1.5
ICS-209	2	2,006.0
Total:	**8**	**2,022.7**

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

Table 3.7–14. Data used to estimate 2011 wildfire emissions.

NFDRS model category	Number of fires in 2011	Acres burned	Fuel loading factor (tons/acre)
Agriculture*	1	1.5	4.5
Barren*	1	0.1	0.75
Intermediate brush	4	2,019.5	15.0
Sagebrush grass	2	1.6	4.5
Total:	**8**	**2,022.7**	**—**

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

Estimates of the material burned were derived by multiplying the acres burned for each category by the applicable fuel loading factor.

Latitude and longitude data were used to determine the number of acres burned inside of the nonattainment area. Only one wildfire (=0.1 acre) occurred outside of the eight-hour ozone nonattainment area. Table 3.7–15 shows the number of wildfires and acres burned for Maricopa County and the eight-hour ozone nonattainment area and an estimate of material burned.

Table 3.7–15. Summary of 2011 wildfires, acres burned, and estimate of material burned.

Geographic Area	No. of fires	Acres burned	Material burned annually (tons/yr)	Material burned in 8-hr ozone season (tons/season)
Maricopa County	8	2,023	30,307	30,104
8-hr ozone NAA	7	2,023	30,306	30,104

Annual emissions from wildfires for each geographic area were calculated by multiplying the material burned for each area by the emission factor shown in Table 3.7–16 below. Emission factors were obtained from the Western Regional Air Partnership's (WRAP) 2002 Fire Emissions Inventory (WGA/WRAP, 2005).

Table 3.7–16. Emission factors for wildfires and prescribed broadcast burning.

	Emission factors (lb/ton)		
Activity	**VOC**	**NO_x**	**CO**
Wildfires and prescribed broadcast burning	13.6	6.2	289

Annual emissions from wildfires for Maricopa County and the nonattainment area are shown in Table 3.7–17.

Table 3.7–17. Annual emissions from wildfires.

	Annual emissions (tons/yr)		
Geographic Area	**VOC**	**NO_x**	**CO**
Maricopa County	206.08	93.95	4,379.29
8-hr ozone NAA	206.08	93.95	4,379.28

Because all fires that occurred during ozone season were within the nonattainment area, season-day emissions for the county and the nonattainment area were the same. Ozone season-day emissions were estimated by multiplying the material burned during ozone season by the appropriate emission factor and dividing the result by the number of ozone season burn days. In 2011, 32 burn days occurred during the ozone season in Maricopa County. Table 3.7–18 shows season-day emissions from wildfires in Maricopa County and the nonattainment area.

Table 3.7–18. Season-day emissions from wildfires.

	Ozone-season	Season-day emissions (lbs/day)		
Geographic Area	**burn days**	**VOC**	**NO_x**	**CO**
Maricopa County	32	12,794.0	5,832.6	271,872.2
8-hr ozone NAA		12,794.0	5,832.6	271,872.2

3.7.9 Prescribed fires

Prescribed fire data were obtained from the Arizona Department of Environmental Quality (ADEQ) (B. Busby, pers. commun., November 8, 2012). The ADEQ reported that fourteen prescribed fires occurred in Maricopa County in 2011. Sixty-two acres of piled fuels were burned. All fourteen prescribed fires occurred inside the eight-hour ozone nonattainment area. Because all 2011 prescribed fires were piled fuels, material burned was derived by multiplying the number of acres burned by tons of piles per acre for each fire. Table 3.7–19 shows the data provided by the ADEQ, the amount of material burned for each fire, whether the fire occurred within the nonattainment area and during the ozone season.

Table 3.7–19. 2011 prescribed fire activity in Maricopa County.

Date	Burn number	Burn location	Tons/ acre	Acres burned	Material burned (tons)	Within 8-hr NAA?	During ozone season?
01/05/2011	TNF0301	T7N,R8E,S36	1	5	5	Y	N
04/06/2011	TNF0301	T2N,R7E,S18	1	1	1	Y	N
04/13/2011	TNF0106	T6N,R7E,S33	1	1	1	Y	N
04/14/2011	TNF0106	T7N,R5E,S7	1	1	1	Y	N
04/19/2011	TNF0301	T3N,R8E,S27	1	10	10	Y	N
07/23/2011	TNF0611	T3N,R11E,S2	5	15	75	Y	Y
08/10/2011	TNF0301	T3N,R8E,S27	0.25	6	1.5	Y	Y
08/11/2011	TNF0301	T3N,R8E,S27	0.25	6	1.5	Y	Y
08/16/2011	TNF0301	T3N,R8E,S25	1	4	4	Y	Y
10/20/2011	TNF0301	T2N,R9E,S31	1	5	5	Y	N
11/08/2011	TNF0301	T2N,R9E,S31	3	5	15	Y	N
11/15/2011	TNF0106	T6N,R7E,S15	1	1	1	Y	N
11/16/2011	TNF0106	T7N,R6E,S1	1	1	1	Y	N
12/20/2011	TNF0301	T2N,R9E,S11	0.25	1	0.25	Y	N
Total:				**62**	**122.25**		

Prescribed fire emission factors for "piled fuels" were obtained from the Western Regional Air Partnership's (WRAP) 2002 Fire Emissions Inventory (WGA/WRAP, 2005). The emission factors are listed below in Table 3.7–20.

Table 3.7–20. Emission factors for prescribed fire (piled fuels).

	Emission factors (lbs/ton burned)		
Type of fire	**VOC**	**NO_x**	**CO**
Prescribed fire (piled fuels)	6.3	6.2	74.3

Annual emissions from prescribed fires in Maricopa County were derived by multiplying material burned by the emission factor then dividing by 2000 lbs/ton.

Four prescribed fires occurred during the ozone season. The fires resulted in 82 tons of material burned. It was assumed the prescribed fires lasted one day. Ozone-season day emissions were derived by multiplying 82 tons of material burned by the emission factor (lbs/ton) and then dividing the resulting emissions by four burn days.

Since the prescribed fire data provided by ADEQ included burn location, GIS was used to determine the fires that burned inside the nonattainment area. All the 2011 prescribed fires burned within the eight-hour nonattainment area; therefore, annual and season-day emissions estimates for the nonattainment area are equal to county totals . Table 3.7–21 shows the annual and season-day from prescribed fires for Maricopa County and the nonattainment area.

Table 3.7–21. Annual and season-day emissions from prescribed fires.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic Area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	0.39	0.38	4.54	129.2	127.1	1,523.2
8-hr ozone NAA	0.39	0.38	4.54	129.2	127.1	1,523.2

3.8 Summary of all area sources

Tables 3.8–1 and 3.8–2 summarize the total annual and average season-day emissions from all area sources addressed in this chapter, for both Maricopa County and the eight-hour ozone NAA, respectively.

Table 3.8–1. Annual and season-day emissions from all area sources in Maricopa County.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Fuel combustion:						
Industrial distillate oil: Boilers	0.61	60.87	15.22	3.9	390.2	97.5
Industrial distillate oil: Engines	0.00	1,838.26	395.65	0.0	11,783.7	2,536.2
Industrial natural gas	36.99	730.94	455.30	217.8	4,303.8	2,680.8
Comm./inst. distillate oil: Boilers	0.00	0.12	0.03	0.0	0.8	0.2
Comm./inst. distillate oil: Engines	0.00	3.72	0.80	0.0	23.8	5.1
Comm./inst. natural gas	54.48	1,080.73	662.84	252.0	4,998.0	3,065.4
Residential distillate oil	0.01	0.35	0.10	0.0	0.0	0.0
Residential natural gas	49.81	851.32	362.26	119.6	2,044.2	869.9
Residential LPG	2.00	51.35	14.56	0.0	0.0	0.0
Residential wood combustion	509.7	57.72	2,959.91	0.0	0.0	0.0
Residential kerosene	0.00	0.03	0.01	0.0	0.0	0.0
All Fuel Combustion:	**653.61**	**4,675.41**	**4,866.67**	**593.3**	**23,544.5**	**9,255.2**
Industrial processes:						
Chemical manufacturing	77.42			599.0		
Commercial cooking	149.33		392.60	820.5		2,157.1
Bakeries	78.18			547.8		
Secondary metal production	41.01	15.02	98.36	306.4	107.9	697.4
Rubber/plastic product mfg.	1,766.75			14,171.0		
Electrical equipment mfg.	122.80	23.47	2.98	746.2	135.8	16.4
Industrial processes, NEC	48.51	224.92	91.84	325.6	1,245.8	525.2
All Industrial Processes:	**2,284.00**	**263.41**	**585.79**	**17,516.5**	**1,489.5**	**3,396.2**
Solvent use:						
Architectural coatings	4,976.22			30,622.9		
Auto refinishing	1,333.26			10,255.9		
Traffic markings	179.60			1,823.6		
Factory finished wood	137.72			1,396.7		
Wood furniture	416.56			3,434.7		
Aircraft surface coating	65.84			473.1		
Miscellaneous surface coating	316.38			2,450.5		
Degreasing	217.55			1,451.4		
Dry cleaning	23.15			178.1		
Graphics arts	290.98			2,225.7		
Miscellaneous industrial solvent use	721.85			5,126.6		
Consumer and commercial products	17,406.46			95,377.9		
Cutback asphalt	835.84			4,567.4		
Emulsified asphalt	866.06			4,732.6		
Roofing asphalt	3.04			23.4		
Agricultural pesticides	362.93			2,903.4		
All Solvent Use	**28,153.45**			**167,043.9**		

Table 3.8–1. Annual and season-day emissions from all area sources in Maricopa County (continued).

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Storage/transport:						
Residential portable gas cans	2,935.10			16,126.9		
Commercial portable gas cans	564.43			3,101.3		
Bulk plants	120.91			659.3		
Gas stations Stage I: Submerged fill	85.08			528.7		
Gas stations Stage I: Bal. submerged fill	229.60			1,426.8		
Gas stations Stage II	0.00			0.0		
Underground tanks: Breathing/emptying	777.00			4,138.6		
Airports: aviation gasoline Stage I	347.57			1,904.5		
Airports: aviation gasoline Stage II	18.04			98.8		
Truck: gasoline (tank trucks in transit)	50.82			315.8		
Pipeline gasoline	17.32			94.5		
Volatile organic liquids storage/transport	30.54			182.7		
All Storage/Transport	**5,176.39**			**28,577.9**		
Waste treatment/disposal:						
On-site incineration	0.17	3.31	0.79	1.1	21.4	5.3
Open burning: Land clearing debris	0.67	0.30	6.30	20.5	9.1	193.8
Landfills	36.59	30.40	108.55	200.7	167.4	596.4
Publicly owned treatment works	75.02			577.1		
Other waste	2.12	22.19	77.93	10.9	122.8	431.4
Leaking underground storage tanks	1.05			32.3		
All Waste Treatment/Disposal	**116.10**	**56.04**	**190.06**	**837.8**	**315.6**	**1,119.6**
Misc. area sources:						
Agricultural field burning	26.14	11.62	246.85	804.2	357.4	7,595.5
Structure fires	14.78	1.88	80.63	72.4	9.2	395.2
Aircraft engine testing	4.72	46.36	16.16	26.1	259.3	91.2
Vehicle fires	9.27	1.16	36.23	50.8	6.4	198.5
Crematories	1.18	11.19	2.23	51.1	88.5	17.3
Accidental releases	0.45	0.00	0.00	2.1	0.0	0.0
Hospitals	8.57			52.3		
Wildfires	206.08	93.95	4,379.29	12,794.0	5,832.6	271,872.2
Prescribed fires	0.39	0.38	4.54	129.2	127.1	1,523.2
All Misc. Area Sources	**271.58**	**166.54**	**4,765.93**	**13,982.3**	**6,680.5**	**281,693.1**
TOTAL, ALL AREA SOURCES	**36,654.65**	**5,161.56**	**10,411.95**	**228,556.4**	**32,035.2**	**295,571.5**

Table 3.8–2. Annual and season-day emissions from all area sources in the eight-hour ozone NAA.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Fuel combustion:						
Industrial distillate oil: Boilers	0.61	60.61	15.15	3.9	388.5	97.1
Industrial distillate oil: Engines	0.00	1,830.35	393.95	0.0	11,733.0	2,525.3
Industrial natural gas	36.83	727.80	453.34	219.9	4,285.3	2,669.3
Comm./inst. distillate oil: Boilers	0.00	0.12	0.03	0.0	0.8	0.2
Comm./inst. distillate oil: Engines	0.00	3.70	0.80	0.0	23.7	5.1
Comm./inst. natural gas	54.42	1,079.44	662.05	251.7	4,992.0	3,061.7
Residential distillate oil	0.01	0.35	0.10	0.0	0.0	0.0
Residential natural gas	50.20	857.96	365.09	120.5	2,060.1	876.7
Residential LPG	2.02	51.93	14.73	0.0	0.0	0.0
Residential wood combustion	515.53	58.38	2,993.75	0.00	0.00	0.00
Residential kerosene	0.00	0.03	0.01	0.0	0.0	0.0
All Fuel Combustion	**659.63**	**4,670.68**	**4,898.99**	**593.0**	**23,483.5**	**9,235.4**
Industrial processes:						
Chemical manufacturing	77.09			596.5		
Commercial cooking	151.03		397.07	829.8		2,181.7
Bakeries	77.85			545.4		
Secondary metal production	41.01	15.02	98.36	306.4	107.9	697.4
Rubber/plastic product manufacturing	1,759.15			14,110.1		
Electrical equipment manufacturing	122.80	23.47	2.98	746.2	135.8	16.4
Industrial processes, NEC	47.55	224.92	91.84	318.0	1,245.8	525.2
All Industrial Processes	**2,276.48**	**263.41**	**590.27**	**17,452.4**	**1,489.5**	**3,420.8**
Solvent use:						
Architectural coatings	5,033.13			30,973.1		
Auto refinishing	1,327.53			10,211.8		
Traffic markings	171.12			1,737.5		
Factory finished wood	137.12			1,390.7		
Wood furniture	414.77			3,419.9		
Aircraft surface coating	65.84			473.1		
Miscellaneous surface coating.	315.02			2,440.0		
Degreasing	216.62			1,445.1		
Dry cleaning	23.42			180.1		
Graphics arts	289.73			2,216.1		
Miscellaneous industrial solvent use	718.75			5,104.6		
Consumer and commercial products	17,605.51			96,468.5		
Cutback asphalt	788.72			4,309.9		
Emulsified asphalt	817.24			4,465.8		
Roofing asphalt	3.08			23.7		
Agricultural pesticides	212.18			1,697.5		
All Solvent Use	**28,139.77**			**166,557.4**		

Table 3.8–2. Annual and season-day emissions from all area sources in the eight-hour ozone NAA (continued).

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Storage/transport:						
Residential portable gas cans	2,968.67			16,311.4		
Commercial portable gas can:	570.89			3,136.7		
Bulk plants	120.91			659.3		
Gas stations Stage I: Submerged fill	85.08			528.7		
Gas stations Stage I: Bal. submerged fill	229.60			1,426.8		
Gas stations Stage II	0.00			0.0		
Underground tanks: Breathing/emptying	777.00			4,138.6		
Airports : Aviation gasoline Stage I	344.41			1,887.2		
Airports : Aviation gasoline Stage II	17.87			97.9		
Truck: Gasoline (tank trucks in transit)	50.82			315.8		
Pipeline gasoline	17.32			94.5		
Volatile organic liquids storage/transport	28.80			169.3		
All Storage/Transport:	**5,211.35**			**28,766.2**		
Waste treatment/disposal:						
On-site incineration	0.17	3.31	0.79	1.1	21.4	5.3
Open burning: Land clearing debris	0.30	0.13	2.81	9.1	4.1	86.4
Landfills	36.59	30.40	108.55	200.7	167.4	596.4
Publicly owned treatment works	75.88			583.7		
Other waste	2.12	22.19	77.93	10.9	122.8	431.4
Leaking underground storage tanks	1.05			32.3		
All Waste Treatment/Disposal	**116.10**	**56.04**	**190.06**	**837.8**	**315.6**	**1,119.6**
Misc. area sources:						
Agricultural field burning	15.28	6.79	144.32	470.2	209.0	4,440.7
Structure fires	14.95	1.90	81.55	73.3	9.3	399.7
Aircraft engine testing	4.72	46.36	16.16	26.1	259.3	91.2
Vehicle fires	9.38	1.17	36.64	51.4	6.4	200.8
Crematories	1.18	11.14	2.22	50.9	88.1	17.2
Accidental releases	0.45	0.00	0.00	2.1	0.0	0.0
Hospitals	8.66			52.9		
Wildfires	206.08	93.95	4,379.28	12,794.0	5,832.6	271,872.2
Prescribed fires	0.39	0.38	4.54	129.2	127.1	1,523.2
All Misc. Area Sources	**261.09**	**161.70**	**4,664.71**	**13,650.0**	**6,531.8**	**278,544.9**
ALL AREA SOURCES:	**36,664.42**	**5,151.83**	**10,344.03**	**227,856.8**	**31,820.5**	**292,320.7**

3.9 Quality assurance / quality control procedures

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

Area source categories were identified for inclusion in the inventory based on the latest Emissions Inventory Improvement Program (EIIP) guidance available. In addition, recent EPA activities to develop county-level emissions estimates for newly created source categories (such as portable fuel containers) or refined source classification codes were also reviewed, and incorporated where relevant. Prior-year inventories for the region were also examined to identify possible additional categories for inclusion in the present inventory. The list of area source

categories developed based on these guidance documents was modified to fit the characteristics of Maricopa County, with some area source categories determined to be insignificant (e.g., emissions from industrial coal combustion, or oil and natural gas production, and snowmobile use).

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

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

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

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

3.10 References

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

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

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

MCESD, 1999. 1999 Periodic Ozone Emissions Inventory for the Maricopa County, Arizona Nonattainment Area, Maricopa County Environmental Services Department, Rev. Aug. 2002.

NWCG, 2012. National Wildfire Coordinating Group, Historical Incident ISC-209 reports. 2011 Significant Incident Summary Spreadsheet for southwest GACC Incidents. Internet address: *http://fam.nwcg.gov/fam-web/hist_209/report_list_209.*

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

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

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

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

US Census Bureau, 2012. 2010 County Business Patterns (NAICS). Internet address: http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl

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

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

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

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

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

US EPA, 2001a. Introduction to Area Source Emission Inventory Development. Emission Inventory Improvement Program (EIIP) Vol. III, Chapter 1. Revised Final, January 2001. Prepared by Eastern Research Group, Inc. for the Area Source Committee, EIIP. Internet address: *http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii01_apr2001.pdf*

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

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

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

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

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

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

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

WGA/WRAP, 2005. 2002 Fire Emission Inventory for the WRAP Region – Phase II. Project No. 178-6. Western Governors Association/Western Regional Air Partnership. July 22, 2005. Tables 5 and 6. Internet address: http://www.wrapair.org/forums/fejf/documents/WRAP_2002_PhII_EI_Report_20050722.pdf.

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4. Nonroad Mobile Sources

4.1 Introduction

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

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

Emission calculations for most nonroad mobile source categories except aircraft, airport ground support equipment (GSE) and locomotives were derived using EPA's NONROAD2008a model (Core version 2008a, July 2009). Aircraft and airport GSE emission estimates were made using the Federal Aviation Administration's EDMS (Emissions Dispersion Modeling System) model, ver. 5.1.1. Locomotive emission calculations were derived from surveys of the three railroad companies that have operations in the county.

County specific temperature and fuel-related inputs are required for the operation of the NONROAD2008a model. Monthly temperature and fuel data were provided by the Arizona Department of Weights and Measures. The following table lists the local county inputs used:

Table 4.1–1. NONROAD2008 model county temperature and fuel-related inputs.

	Temperatures (°F)			Fuel RVP	Diesel Sulfur	Gasoline Sulfur	Ethanol Blend		
Month	Max.	Min.	Average	(psi)	(ppm)	(ppm)	ETOH (vol %)	Market share (%)	Total Oxygen (wt %)
January	64	45	54.9	9	9	15	9.92	100	3.66
February	69	48	58.5	9	9	16	10.29	100	3.85
March	79	54	66.8	8	9	11	9.52	100	3.58
April	87	61	74.2	8	9	14	7.90	100	2.98
May	91	66	78.7	7	9	13	9.41	100	3.48
June	107	80	93.4	7	10	18	9.38	100	3.45
July	106	84	95.2	7	9	21	9.70	100	3.62
August	104	82	93.2	7	6	18	9.58	100	3.70
September	101	79	90.1	7	6	18	9.73	100	3.60
October	91	65	78.1	8	9	15	9.49	100	3.56
November	81	56	68.7	8	6	14	10.17	100	3.80
December	65	46	56.0	8	16	12	9.02	100	3.41

Note: All other required temperature and fuel-related inputs not listed assumed NONROAD2008 default values.

The US EPA recommends adjusting default NONROAD2008a model values (such as equipment

population, activity levels of equipment, growth factors, etc.) where local data is available, as the default values in the model are derived from national averages. The NONROAD2008a model defaults were adjusted in the following manner:

- Equipment population numbers and activity levels for commercial lawn and garden equipment 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, the equipment populations for Maricopa County are significantly lower than EPA default values, while the average annual hours of operation for most equipment types are slightly higher than EPA's values. Using these new local data results in a considerable decrease in emissions from this category, compared with earlier results using EPA default data.

Spatial allocation factors were developed (based on EPA guidance documents) to apportion nonroad emissions to the eight-hour ozone nonattainment area. The approaches used are described in each section of this chapter.

Temporal allocations (used to calculate ozone season-day emissions) for nonroad equipment categories modeled in the NONROAD2008a model are based on EPA recommendations on weekday and weekend day activity levels for each nonroad equipment category (US EPA, 1999). Table 4.1–2 below lists the weighted activity level allocation fractions for each equipment class for weekdays and weekend days. For this report, the most conservative (highest) allocation fraction in each nonroad equipment class was used to calculate season-day emissions.

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

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

4.2 Agricultural equipment

Annual emissions from agricultural equipment in Maricopa County were calculated using EPA's NONROAD2008a model, as discussed above. Ozone nonattainment area annual emissions were calculated based on EIIP guidance (US EPA, 2002) which recommends using the ratio of agricultural land inside the nonattainment area (161,371 acres) to agricultural land inside the county (276,016 acres). See Section 1.5.2 for a discussion of land use data used.

Ozone nonattainment area emissions from agricultural equipment = Total Maricopa County VOC emissions from agricultural equipment × Agricultural land use allocation factor

= 38.53 tons × 58.46%

= 22.52 tons VOC/yr

County season-day emissions were calculated by multiplying ozone season emissions (generated by the NONROAD2008a model) by the most conservative weekday/weekend day activity allocation factor for agricultural equipment listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the ozone season (US EPA, 1999), as follows:

Maricopa County VOC season-day emissions (lbs/day)	= Ozone season VOC emissions (tons/season)	× 2,000 (lb/ton)	×	daily activity allocation factor for agricultural equipment expressed as (week/day)	÷ 13 (weeks/season)
	= 12.84	× 2,000	×	0.166667	÷ 13
	= 392.3 lbs/day				

Ozone nonattainment area season-day emissions were calculated by multiplying County season-day emissions by the agricultural land use allocation factor:

Ozone nonattainment area season-day emissions	= Maricopa County VOC season-day emissions	×	Agricultural land use allocation factor
	= 392.3 lbs/day	×	58.46%
	= 192.5 lbs/day		

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	38.53	330.49	303.71	329.3	2,762.6	2,584.4
8-hr ozone NAA	22.52	193.22	177.56	192.5	1,615.1	1,510.9

4.3 Airport ground support equipment

Annual emissions from airport ground support equipment (GSE) and auxiliary power units (APUs) were calculated using the Emissions Dispersion Modeling System (EDMS, v. 5.1.3) from the U.S. Federal Aviation Administration (FAA). Activity data on 2011 aircraft operations and GSE use for eight major airports were obtained from FAA's Air Traffic Activity Data System. In addition, activity data for 2011 for six small general aviation airports were assumed to be the same as those in 2008, which was included in MAG's 2009 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 2011 are assumed to be the same as those used in the 2008 PM_{10} Periodic Emissions Inventory Report for the Maricopa County, Arizona, Nonattainment Area (MCAQD, 2011) based on input from Luke AFB.

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

	Maricopa County			8-hr ozone NAA		
	VOC	NO_x	CO	VOC	NO_x	CO
GSE	104.94	317.86	3,171.63	104.40	316.39	3,155.22
APU	7.04	88.18	104.36	7.03	88.10	103.86
Total:	**111.98**	**406.04**	**3,275.99**	**111.43**	**404.49**	**3,259.08**

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

	Maricopa County			8-hr ozone NAA		
	VOC	NO_x	CO	VOC	NO_x	CO
GSE	549.4	1,663.2	16,597.8	546.7	1,656.0	16,516.8
APU	37.8	473.4	557.3	37.8	473.0	554.8
Total:	**587.3**	**2,136.6**	**17,155.0**	**584.5**	**2,128.9**	**17,071.7**

4.4 Commercial equipment

Annual emissions from commercial equipment in Maricopa County were calculated using EPA's NONROAD2008a model, as described in Section 4.1. Annual emissions for the eight-hour ozone nonattainment area for this category were derived by applying the ratio of industrial employment in the nonattainment area to Maricopa County totals, as data on the number of wholesale establishments recommended by EIIP guidance (US EPA, 2002) was not available. See Section 1.5.1 for a discussion of the industrial employment data used.

County season-day emissions were calculated by multiplying Maricopa County ozone season emissions (generated by the NONROAD2008a model) by the most conservative weekday/ weekend day activity allocation factor for commercial equipment (0.1666667) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the ozone season (US EPA, 1999). Ozone nonattainment area season-day emissions were calculated based on industrial employment ratios as described above.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	VOC	NO_x	CO	VOC	NO_x	CO
Maricopa County	1,924.41	1,361.42	30,224.21	14,537.1	8,334.7	203,404.4
8-hr ozone NAA	1,916.15	1,355.57	30,094.46	14,474.7	8,299.0	202,531.2

4.5 Construction and mining equipment

Annual emissions from construction and mining equipment in Maricopa County were calculated using EPA's NONROAD2008a model as described in Section 4.1. Annual emissions for the eight-hour ozone nonattainment area for this category were derived by applying the ratio of construction employment in the nonattainment area to Maricopa County totals as a conservative estimate, since the EIIP-recommended allocation factor of total dollar value of construction was unavailable (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used.

County season-day emissions were calculated by multiplying Maricopa County ozone season emissions (generated by the NONROAD2008a model) by the most conservative weekday/ weekend day activity allocation factor for construction/mining equipment (0.1666667) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the ozone season (US

EPA, 1999). Ozone nonattainment area season-day emissions were calculated based on construction employment ratios as described above.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1,881.88	12,937.30	14,396.92	13,116.9	87,972.9	99,942.8
8-hr ozone NAA	1,941.80	13,349.23	14,855.32	13,534.5	90,774.0	103,125.0

4.6 Industrial equipment

Annual emissions from industrial equipment in Maricopa County were calculated using EPA's NONROAD2008a model, as described in Section 4.1. Annual emissions for the eight-hour ozone nonattainment area for this category were derived by applying the ratio of industrial employment in the nonattainment area to Maricopa County totals as a conservative estimate, since the number of employees in manufacturing, as recommended by EIIP guidance (US EPA, 2002), was not available. See Section 1.5.1 for a discussion of the industrial employment data used.

County season-day emissions were calculated by multiplying Maricopa County ozone season emissions (generated by the NONROAD2008a model) by the most conservative weekday/ weekend day activity allocation factor for industrial equipment (0.1666667) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the ozone season (US EPA, 1999). Ozone nonattainment area season-day emissions were calculated based on industrial employment ratios as described above.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	341.25	1,839.35	7,140.99	2,212.6	11,763.4	46,138.5
8-hr ozone NAA	339.78	1,831.45	7,110.33	2,203.1	11,712.9	45,940.4

4.7 Lawn and garden equipment

Annual emissions from lawn and garden equipment in Maricopa County were calculated using EPA's NONROAD2008a model, as described in Section 4.1. These results reflect new equipment population and usage estimates from survey work done in early 2003 for the Arizona Department of Environmental Quality (discussed further in Section 4.1). Annual emissions for the eight-hour ozone nonattainment area for this category were derived by applying the ratio of population in the nonattainment area to Maricopa County totals, since the number of housing units, as recommended by EIIP guidance, was not available (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used.

County season-day emissions were calculated by multiplying Maricopa County ozone season emissions (generated by the NONROAD2008a model) by the most conservative weekday/ weekend day activity allocation factor for lawn and garden equipment (0.1600000 for the commercial segment, 0.2222222 for residential) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the ozone season (US EPA, 1999). Ozone nonattainment area season-day emissions were calculated based on population as described above.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	4,913.96	866.64	54,798.41	51,990.4	6,998.4	523,235.5
8-hr ozone NAA	4,970.15	876.55	55,425.05	52,584.9	7,078.4	529,218.9

4.8 Pleasure craft

Annual emissions from pleasure craft equipment in Maricopa County were calculated using EPA's NONROAD2008a model, as described in Section 4.1. Annual emissions for the eight-hour ozone nonattainment area for this category were derived by applying the ratio of lake surface area in the nonattainment area to Maricopa County totals, as recommended by EIIP guidance (US EPA, 2002). See Section 1.5.2 for a discussion of the land use data used.

County season-day emissions were calculated by multiplying Maricopa County ozone season emissions (generated by the NONROAD2008a model) by the most conservative weekday/ weekend day activity allocation factor for pleasure craft (0.350000) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the ozone season (US EPA, 1999). Ozone nonattainment area season-day emissions were calculated based on lake surface area as described above.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	530.39	96.56	1,249.66	11,527.0	1,996.8	26,738.3
8-hr ozone NAA	530.39	96.56	1,249.66	11,527.0	1,996.8	26,738.3

4.9 Railway maintenance equipment

Annual emissions from railway maintenance equipment in Maricopa County were calculated using EPA's NONROAD2008a model, as described in Section 4.1. Annual emissions for the eight-hour ozone nonattainment area for this category were derived by applying the ratio of population in the nonattainment area to Maricopa County totals, as recommended by EIIP guidance (US EPA, 2002). See Section 1.5.1 for a discussion of the population data used.

County season-day emissions were calculated by multiplying Maricopa County ozone season emissions (generated by the NONROAD2008a model) by the most conservative weekday/ weekend day activity allocation factor for railway maintenance equipment (0.1800000) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the ozone season (US EPA, 1999). Ozone nonattainment area season-day emissions were calculated based on the population ratio as described above.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1.94	8.55	16.48	14.2	59.0	117.8
8-hr ozone NAA	1.96	8.64	16.67	14.4	59.7	119.1

4.10 Recreational equipment

Annual emissions from recreational equipment in Maricopa County were calculated using EPA's NONROAD2008a model, as described in Section 4.1. Annual emissions for the eight-hour ozone nonattainment area for this category were derived by applying the ratio of passive open space and vacant land use in the nonattainment area to Maricopa County totals, as recommended by EIIP guidance (US EPA, 2002). See Section 1.5.2 for a discussion of the land use data used.

County season-day emissions were calculated by multiplying Maricopa County ozone season emissions (generated by the NONROAD2008a model) by the most conservative weekday/ weekend day activity allocation factor for recreational equipment (0.2222222) listed in Table 4.1–2, and dividing the product by the number of weeks (13) in the ozone season (US EPA, 1999). Ozone nonattainment area season-day emissions were calculated based on land use as described above.

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

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Geographic area	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Maricopa County	1,518.97	66.10	6,373.46	17,804.4	679.3	74,424.8
8-hr ozone NAA	684.30	29.78	2,871.27	8,020.9	306.0	33,528.7

4.11 Aircraft

Emissions from aircraft at the largest airports in Maricopa County were estimated using the Federal Aviation Administration's Emissions and Dispersion Model (EDMS, v. 5.1.3). The FAA EDMS model combines specified aircraft and activity levels 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 can also estimate emissions from ground support equipment (GSE) and auxiliary power units (APUs), using either default profiles or user-specified activity of these components. The EDMS runs were executed by the Maricopa Association of Governments. The contact person for the EDMS emission estimates is Adam Xia (602-254-6300).

Aircraft emissions were estimated for four aircraft categories:

1. 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;
2. Air taxis ("AT"): Smaller commercial turbine- or piston-powered aircraft with less than 60 seats or 18,000 lbs payload capacity;
3. General aviation ("GA"): Aircraft used on an unscheduled basis for recreational flying, personal transportation, and other activities, including business travel; and
4. Military ("ML"): Aircraft used to support military operations.

First, three databases from FAA's website provide the year 2011 aircraft activity, fleet mix for the types of aircraft used, and hourly/weekly/monthly operational profiles for eight major airports (Chandler Municipal, Falcon Field, Glendale Municipal, Phoenix Deer Valley, Phoenix Goodyear, Phoenix-Mesa Gateway, Phoenix Sky Harbor, and Scottsdale airport). The three databases are (1) FAA's Air Traffic Activity Data System (ATADS) (FAA, 2012a); (2)

Enhanced Traffic Management System Counts (ETMSC) database; and (3) FAA Aviation Performance Metrics (APM) database (FAA, 2012b).

To supplement the FAA's database for the eight major airports, MAG conducted a survey of six additional small general aviation airports (Buckeye Municipal, Gila Bend Municipal, Pleasant Valley, Sky Ranch at Carefree, Stellar Airpark, and Wickenburg Municipal airport) in Maricopa County to gather the year 2008 data on aircraft activity (landings and take-offs or LTOs) and estimated average taxi/idle times in 2009. The year 2008 data for these small general aviation airports are assumed to be the same as those in year 2011, since no updated aircraft activity data were available for the year 2011. Table 4.11–1 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.

One required meteorological input for EDMS is an 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 11059) was employed.

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

Airport	Airport Code	Operations Data Source[1]	Fleet Mix Data Source[2]	Aircraft Type[3]	2011 Operations
Buckeye Municipal	BXK	airnav.com	Generic GA profile	GA	53,070
Chandler Municipal	CHD	FAA/ATADS	FAA/ETMSC	AC	6
				AT	2,168
				GA	158,960
				ML	456
Falcon Field	FFZ	FAA/ATADS	FAA/ETMSC	AC	4
				AT	2,718
				GA	214,486
				ML	2,872
Gila Bend Municipal	E63	airnav.com	Generic GA profile	GA	3,536
Glendale Municipal	GEU	FAA/ATADS	FAA/ETMSC	AT	1,070
				GA	85,998
				ML	56
Luke Air Force Base	LUF	[2011 F-16 aircraft emissions were grown based on the total number of F-16 operations in 2008 vs. 2011]			
Phoenix Deer Valley	DVT	FAA/ATADS, Survey response	Survey response, FAA/ETMSC	AC	2
				AT	3,832
				GA	313,362 *
				ML	248
Phoenix Goodyear	GYR	FAA/ATADS, Survey response	Survey response, FAA/ETMSC	AC	146
				AT	312
				GA	132,566 *
				ML	5,582
Phoenix-Mesa Gateway (formerly Williams Gateway)	IWA	FAA/ATADS	FAA/ETMSC	AC	7,782
				AT	9,176
				GA	147,596
				ML	6,646
Phoenix Sky Harbor	PHX	FAA/ATADS	FAA/ETMSC	AC	375,104
				AT	63,796
				GA	20,582
				ML	2,506
Pleasant Valley	P48	airnav.com	Generic GA profile	GA	6,010
Scottsdale	SDL	FAA/ATADS	FAA/ETMSC	AC	6
				AT	12,970
				GA	127,924
				ML	740
Sky Ranch at Carefree	18AZ	Survey response	Generic GA profile	GA	3,030
Stellar Airpark	P19	airnav.com	Generic GA profile	GA	39,056
Wickenburg Municipal	E25	Survey responses	Generic GA profile	GA	12,000

1. FAA/ATADS: Federal Aviation Administration's Air Traffic Activity Data System (database); http://aspm.faa.gov.
2. FAA/ETMSC: Federal Aviation Administration's Enhanced Traffic Management System Counts (database); http://aspm.faa.gov.
3. AC: Air Commercial; AT: Air Taxi; GA: General Aviation; ML: Military

* includes touch-and-go operations reported by airport.

Both the 2011 hourly surface meteorological data and the 2011 one-minute Automated Surface Observing System (ASOS) wind data from the National Weather Service (NWS) station at the Phoenix Sky Harbor were used (NCDC, 2012). Full year upper air data in 2011 at the Tucson station (station number 23160) were obtained from the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL) Radiosonde Database (ESRL, 2012). Ultimately, a single mixing height dataset in 2011 is used for all airports, except Luke Air Force Base.

F-16 aircraft emissions estimates for Luke AFB for the year 2011 were scaled using a ratio of the number of F-16s in 2011 to the number of F-16s in 2008. The emissions from "transient" aircraft and on-wing engine testing in 2011 were assumed to be the same as those in 2008 based on input from Luke AFB. Emissions from the military aircraft, "transient" aircraft, and on-wing engine testing were summed into a single "ML" category for Luke AFB. This summation method is consistent with that used in the 2008 PM_{10} Periodic Emissions Inventory Report for the Maricopa County, Arizona, Nonattainment Area (MCAQD, 2011).

As with all other airports included in this inventory, emissions from ground support equipment (GSE) at Luke AFB are addressed in Section 4.3, Airport ground support equipment and auxiliary power units.

The following section describes how activity and emissions were estimated for a representative airport, Falcon Field (FFZ). The FAA's Air Traffic Activity System (ATADS, available at www.aspm.faa.gov) provided data on 2011 activity by aircraft type; these results are contained in Table 4.11–1. While ATADS reported a total of 214,486 general aviation operations at this airport in 2011, further information on the aircraft types comprising this activity was needed. The FAA's Enhanced Traffic Management System Counts (ETMSC) database was used to "grow" available aircraft-specific operational data as described below.

The ETMSC database on general aviation activity at Falcon Field airport (FFZ) in 2011 comprises 145 different aircraft types, totaling 3,731 operations (See Table 4.11–2). To simplify modeling input requirements, this aircraft-specific activity data were ranked in order of decreasing frequency. Activity data for the most frequently reported aircraft was then grown to represent all general aviation activity. How this approach was applied for general aviation activity at Falcon Field airport is shown in Table 4.11–2.

This approach of ranking reported activity, and then growing this subset of data, typically resulted in a set of 10 to 30 aircraft types being modeled for each airport/aircraft class combination, representing 75 to 100% of all reported activity.

Ozone season-day emissions were calculated by dividing ozone season total emissions by 92 (the number of days in the ozone season). Tables 4.11–3 and 4.11–4 list the total annual emissions and season-day emissions, by airport and aircraft type for airports within and outside the eight-hour ozone nonattainment area, respectively.

Tables 4.11–3 and 4.11–4 list the total annual and seasonal daily emissions by aircraft type, for airports located inside and outside the eight-hour ozone nonattainment area, respectively.

Table 4.11–2. Growing aircraft-specific activity for EDMS modeling input.

Rank	Aircraft Type	ETMSC-Reported Operations	% of Total Reported Operations	Cumulative Percent	"Grown" Operations for EDMS Modeling
1	DA40 - Diamond Star DA40	536	14.37%	14.37%	40,796
2	BE9L - Beech King Air 90	350	9.38%	23.75%	26,640
3	P28R - Cherokee Arrow/Turbo	250	6.70%	30.45%	19,028
4	DA42 - Diamond Twin Star	163	4.37%	34.82%	12,406
5	BE20 - Beech 200 Super King	130	3.48%	38.30%	9,894
6	C25B - Cessna Citation CJ3	118	3.16%	41.46%	8,982
7	PC12 - Pilatus PC-12	110	2.95%	44.41%	8,372
8	C680 - Cessna Citation Sovereign	103	2.76%	47.17%	7,840
9	C441 - Cessna Conquest	99	2.65%	49.83%	7,536
10	B350 - Beech Super King Air 350	86	2.31%	52.13%	6,546
11	BE36 - Beech Bonanza 36	84	2.25%	54.38%	6,394
12	C172 - Cessna Skyhawk 172/Cutlass	83	2.22%	56.61%	6,318
13	CL60 - Bombardier Challenger 600/601/604	70	1.88%	58.48%	5,328
14	P46T - Piper Malibu Meridian	68	1.82%	60.31%	5,176
15	SR22 - Cirrus SR 22	67	1.80%	62.10%	5,100
16	P28A - Piper Cherokee	62	1.66%	63.76%	4,718
17	COL4 - Lancair LC-41 Columbia 400	52	1.39%	65.16%	3,958
18	TBM7 - Socata TBM-7	50	1.34%	66.50%	3,806
19	C182 - Cessna Skylane 182	48	1.29%	67.78%	3,654
20	C560 - Cessna Citation V/Ultra/Encore	47	1.26%	69.04%	3,578
21	M20P - Mooney M-20C Ranger	46	1.23%	70.28%	3,502
22	C210 - Cessna 210 Centurion	44	1.18%	71.46%	3,348
23	PAY2 - Piper Cheyenne 2	40	1.07%	72.53%	3,044
24	C525 - Cessna CitationJet/CJ1	38	1.02%	73.55%	2,892
25	BE35 - Beech Bonanza 35	37	0.99%	74.54%	2,816
26	C414 - Cessna Chancellor 414	37	0.99%	75.53%	2,814
⋮	⋮	⋮	⋮	⋮	
145	T34P - Beech T-34B Mentor	1	< 0.1%	100.00%	(n/a)
	Total:	**3,731**			**214,486**

Table 4.11–3. Annual and season-day emissions, by aircraft type, for airports in the eight-hour ozone NAA.

		Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Facility	**Category**	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Buckeye Municipal	GA	5.46	2.69	211.10	26.7	11.3	1,172.3
Chandler Municipal	AC	0.02	0.00	0.04	0.4	0.0	0.8
	AT	12.82	1.23	13.52	69.0	6.2	73.5
	GA	127.56	14.18	1,329.77	629.0	62.4	7,236.4
	ML	0.05	0.04	4.85	1.0	0.7	91.2
	Total	***140.45***	***15.45***	***1,348.17***	***699.3***	***69.2***	***7,401.9***
Falcon Field	AC	0.01	0.00	0.02	0.2	0.0	0.4
	AT	7.15	2.27	11.43	36.5	10.5	58.9
	GA	103.99	31.13	1,170.22	484.1	126.8	6,009.2
	ML	3.73	2.67	9.86	17.4	10.8	47.2
	Total	***114.88***	***36.07***	***1,191.53***	***538.1***	***148.1***	***6,115.7***
Gila Bend Municipal	GA	0.36	0.18	14.29	1.8	0.9	71.0
Glendale Municipal	AT	3.67	0.88	5.17	15.6	3.6	22.3
	GA	88.19	17.14	519.57	449.8	78.3	2,899.0
	ML	0.05	0.01	0.14	0.1	0.0	0.4
	Total	***91.91***	***18.02***	***524.88***	***465.5***	***81.9***	***2,921.7***
Luke Air Force Base	ML	154.13	347.83	601.72	844.5	1905.9	3,297.1
Phoenix Deer Valley	AC	0.00	0.00	0.00	0.0	0.0	0.0
	AT	13.65	3.00	17.69	60.0	11.9	78.4
	GA	93.34	52.99	2,382.41	525.7	278.4	15,313.0
	ML	0.20	0.11	0.70	1.2	0.5	3.9
	Total	***107.19***	***56.10***	***2,400.81***	***586.9***	***290.8***	***15,395.2***
Phoenix Goodyear	AC	0.12	0.40	0.92	0.5	1.6	4.4
	AT	0.53	1.01	1.49	2.4	4.5	6.9
	GA	43.39	13.80	1,224.97	234.8	62.9	7,380.0
	ML	3.55	1.31	17.22	25.8	8.6	132.6
	Total	***47.60***	***16.52***	***1,244.61***	***263.6***	***77.6***	***7,523.9***
Phoenix Sky Harbor Intl	AC	266.99	1,823.15	1,893.82	1,414.1	8,732.7	9,944.4
	AT	26.03	101.94	182.25	143.0	506.8	1,004.2
	GA	42.59	7.41	140.93	198.2	31.1	702.2
	ML	110.67	14.01	119.21	474.6	52.9	510.3
	Total	***446.28***	***1,946.50***	***2,336.21***	***2,230.0***	***9,323.5***	***12,161.0***
Phoenix-Mesa Gateway Airport	AC	2.25	27.46	33.32	12.3	138.9	179.9
	AT	56.62	3.53	58.50	285.8	16.2	298.1
	GA	146.94	9.81	713.40	666.4	39.8	3,512.1
	ML	47.87	25.62	100.88	202.6	95.6	428.0
	Total	***253.68***	***66.42***	***906.11***	***1,167.2***	***290.5***	***4,418.1***
Pleasant Valley	GA	0.21	1.61	2.69	1.1	7.6	14.6
Scottsdale	AC	0.02	0.00	0.04	0.0	0.0	0.0
	AT	57.90	8.19	69.79	242.1	31.8	295.1
	GA	274.72	67.08	650.51	1,271.3	283.6	3,082.5
	ML	1.33	0.35	3.64	5.3	1.2	14.6
	Total	***333.96***	***75.63***	***723.98***	***1,518.7***	***316.5***	***3,392.1***
Skyranch at Carefree	GA	1.63	0.58	16.13	4.9	1.6	55.5
Stellar Airpark	GA	7.69	2.38	197.13	37.5	9.9	1,053.5
8–hr ozone NAA total:		**1,705.43**	**2,585.98**	**11,719.36**	**8,385.8**	**12,535.3**	**64,993.6**

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

Table 4.11–4. Annual and season-day emissions, by aircraft type, for airports outside the eight-hour ozone NAA.

		Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Facility	**Category**	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Wickenburg Municipal	GA	13.90	2.84	62.02	65.2	12.9	331.8
Maricopa County total:		**1,719.33**	**2,588.82**	**11,781.38**	**8,451. 0**	**12,548.2**	**65,325.4**

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, yard/switching operations, and passenger trains. Annual emissions were calculated by multiplying diesel fuel usage by the emission factors listed in Table 4.12–1 (US EPA, 2009).

Table 4.12–1. Emission factors for locomotives.

	Emission factors (lbs/gal diesel)		
Activity type	**VOC**	**NO_x**	**CO**
Class I haul line	0.018	0.328	0.059
Yard/switch operations	0.032	0.517	0.060
Passenger trains	0.019	0.367	0.059

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

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

		Annual emissions (tons/yr)		
Locomotive type	**Diesel fuel used (gals)**	**VOC**	**NO_x**	**CO**
Class I haul line	7,706,715	68.74	1,263.13	231.75
Yard/switch operations	520,076	8.43	134.44	12.63
Passenger trains	46,301	0.43	8.51	1.36
Total:	**8,273,092**	**77.60**	**1,406.08**	**245.74**

Eight-hour ozone nonattainment area emissions were calculated by multiplying Maricopa County emissions by the percentage of track miles inside the eight-hour ozone nonattainment area, determined by GIS mapping. Results are shown in Table 4.12–3.

Table 4.12–3. Annual emissions from locomotives in the eight-hour ozone NAA.

	Track in nonattain-	Annual emissions (tons/yr)		
Locomotive type	**ment area (%)**	**VOC**	**NO_x**	**CO**
Class I haul line	60.65%	41.69	766.09	140.56
Yard/switch operations	100.00%	8.43	134.44	12.63
Passenger trains	6.98%	0.03	0.59	0.09
Total:		**50.15**	**901.12**	**153.29**

Ozone season-day emissions for both the county and the eight-hour ozone nonattainment area (shown in Table 4.12–4) were calculated by dividing annual totals by 365 days per year, as locomotive activity is assumed to be uniform throughout the year.

Table 4.12–4. Season-day emissions from locomotives in Maricopa County and the eight-hour ozone NAA.

	Maricopa County			8-hr ozone NAA		
	Season-day emissions (lbs/day)					
Locomotive type	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Class I haul line	376.6	6,921.3	1,269.9	228.4	4,197.7	770.2
Yard/switch operations	46.2	736.7	69.2	46.2	736.7	69.2
Passenger trains	2.4	46.6	7.4	0.2	3.3	0.5
Total:	**425.2**	**7,704.5**	**1,346.5**	**274.8**	**4,937.7**	**839.9**

4.13 Summary of all nonroad mobile source emissions

Table 4.13–1 summarizes annual and season day emissions of VOC, NO_x, and CO from nonroad mobile sources in Maricopa County, respectively. Table 4.13–2 shows annual and season-day emissions for these pollutants for the eight-hour ozone nonattainment area.

Table 4.13–1. Annual and season-day emissions from nonroad mobile sources in Maricopa County.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Agricultural	38.53	330.49	303.71	329.3	2,762.6	2,584.4
Airport GSE & APUs	111.98	406.04	3,275.98	587.3	2,136.6	17,155.0
Commercial	1,924.41	1,361.42	30,224.21	14,537.1	8,334.7	203,404.4
Construction & mining	1,881.88	12,937.30	14,396.92	13,116.9	87,972.9	99,942.8
Industrial	341.25	1,839.35	7,140.99	2,212.6	11,763.4	46,138.5
Lawn & garden	4,913.96	866.64	54,798.41	51,990.4	6,998.4	523,235.5
Pleasure craft	530.39	96.56	1,249.66	11,527.0	1,996.8	26,738.3
Railway maintenance	1.94	8.55	16.48	14.2	59.0	117.8
Recreational	1,518.97	66.10	6,373.46	17,804.4	679.3	74,424.8
Aircraft	1,719.33	2,588.82	11,781.38	8,451. 0	12,548.2	65,325.4
Locomotives	77.60	1,406.08	245.74	425.2	7,704.5	1,346.5
Total:	**13,060.24**	**21,907.35**	**129,806.94**	**120,995.4**	**142,956.4**	**1,060,413.4**

Table 4.13–2. Annual and season-day emissions from nonroad mobile sources in the eight-hour ozone NAA.

	Annual emissions (tons/yr)			Season-day emissions (lbs/day)		
Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Agricultural	22.52	193.22	177.56	192.5	1,615.1	1,510.9
Airport GSE & APUs	111.43	404.49	3,259.08	584.5	2,128.9	17,071.7
Commercial	1,916.15	1,355.57	30,094.46	14,474.7	8,299.0	202,531.2
Construction & mining	1,941.80	13,349.23	14,855.32	13,534.5	90,774.0	103,125.0
Industrial	339.78	1,831.45	7,110.33	2,203.1	11,712.9	45,940.4
Lawn & garden	4,970.15	876.55	55,425.05	52,584.9	7,078.4	529,218.9
Pleasure craft	530.39	96.56	1,249.66	11,527.0	1,996.8	26,738.3
Railway maintenance	1.96	8.64	16.67	14.4	59.7	119.1
Recreational	684.30	29.78	2,871.27	8,020.9	306.0	33,528.7
Aircraft	1,705.43	2,585.98	11,719.36	8,385.8	12,535.3	64,993.6
Locomotives	50.15	901.12	153.29	274.8	4,937.7	839.9
Total:	**12,274.06**	**21,632.59**	**126,932.05**	**111,797.1**	**141,443.8**	**1,025,617.7**

4.14 Quality assurance procedures

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

4.15 References

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

ESRL, 2012. NOAA/ESRL Radiosonde Database, (http://www.esrl.noaa.gov/raobs/).

FAA, 2012a. Air Traffic Activity System (ATADS), (http://aspm.faa.gov/opsnet/sys/Airport.asp).

FAA, 2012b. Aviation Performance Metrics (APM), (https://aspm.faa.gov/apm/sys/AnalysisAP.asp).

MCAQD, 2011. 2008 PM_{10}Periodic Emissions Inventory for the Maricopa County, Nonattainment Area.

NCDC, 2012. The 2008 1-miniute Automated Surface Observing System (ASOS) Data, (ftp://ftp.ncdc.noaa.gov/pub/data/asos-onemin/)

US EPA, 2009. Emission Factors for Locomotives. Office of Transportation and Air Quality. Rep. EPA420-F-09-025, April 2009. Internet address: http://www.epa.gov/otaq/regs/nonroad/locomotv/420f09025.pdf.

US EPA, 2002. Geographic Allocation of State Level Nonroad Engine Population Data to the County Level. EPA Office of Transportation and Air Quality, Rep. EPA420-P-02-009, July. Internet address: http://www.epa.gov/otaq/models/nonrdmdl/p02009.pdf

US EPA, 1999. Weekday and Weekend Day Temporal Allocation of Activity in the NONROAD Model. EPA Office of Transportation and Air Quality, Rep. EPA420-P-99-033, March. Internet address: http://www.epa.gov/otaq/models/nonrdmdl/p99033.pdf

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5. Onroad Mobile Sources

5.1 Introduction

Onroad mobile source emissions for ozone precursors, such as volatile organic compounds (VOCs), nitrogen oxides (NO_x), and carbon monoxide (CO), have been calculated for the eight-hour ozone nonattainment area (NAA) and Maricopa County for the 2011 Periodic Emissions Inventory (PEI).

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

The MOVES2010b modeling accounted for the oxygenated fuel and the Arizona Vehicle Inspection/Maintenance (I/M) programs applied in Maricopa County in 2011. The fuel use assumptions, including oxygen content and Reid Vapor Pressure (RVP), were derived from the 2011 fuel inspection results provided by the Arizona Department of Weights and Measures.

In order to develop the 2011 onroad mobile source emissions, the 2011 vehicle miles traveled (VMT) estimates by facility type and road type were derived from the 2011 Highway Performance Monitoring System (HPMS) data provided by the Arizona Department of Transportation (ADOT). The distribution of VMT by vehicle type is based on the July 2011 vehicle registration data for Maricopa County provided by ADOT. The VMT by vehicle type was provided as local input data for MOVES2010b to produce onroad emissions.

The main references for preparing the onroad mobile source portion of the 2011 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);
- User's Guide for the SMOKE-MOVES Integration Tool (US EPA, 2010);
- Motor Vehicle Emission Simulator (MOVES) - User Guide Version, MOVES2010b (US EPA, 2012a);
- Policy Guidance on the Use of MOVES2010 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes (US EPA, 2012b); and
- Using MOVES to Prepare Emissions Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b (US EPA, 2012c).

5.2 Onroad emissions

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

5.2.1 MOVES2010b model

The emissions were calculated using MOVES2010b. MOVES2010b is EPA's state-of-the-art emissions modeling tool, which replaces EPA's previous mobile source emissions model, MOBILE6.2. MOVES2010b is intended for official use to estimate national, state, and county level inventories of criteria air pollutants from highway vehicles. The user of MOVES2010b is allowed to specify vehicle types, time periods, geographical areas, pollutants, vehicle operating characteristics, and road types for a particular scenario to be modeled by creating a Run Specification (RunSpec).

In order to calculate vehicle emissions for the calendar year 2011, MOVES2010b was executed using local input data for each month of the year and each geographical area (the eight-hour ozone nonattainment area and Maricopa County). Each scenario was created using the County Domain/Scale and the Inventory Calculation Type. The specific MOVES2010b model RunSpec and RunSpec summaries are described in Appendix C.

5.2.2 MOVES2010b local input data

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

5.2.2.1 Fuel data

Regarding the fuel local input data, MOVES2010b provides two MOVES tables, which are [fuelsupply] and [fuelformulation]. The fuel data for each month were derived from the 2011 fuel inspection results in Maricopa County provided by the Arizona Department of Weights and Measures. The 2011 fuel inspection results reflected the committed control measure – California Phase 2 Reformulated Gasoline with (1) 3.5% Oxygen Content from November 1 through March 31 (MAG, 2003) and (2) 7 psi from May 1 through September 30 (MAG, 2009). The fuel data for Maricopa County were also applied to the eight-hour ozone nonattainment area. The specific MOVES tables for fuel data are presented in Appendix C.

5.2.2.2 I/M programs

MOVES2010b has an [IMCoverage] table for I/M programs; this table was prepared using MOBILE6.2 input. This table reflects the actual proportions of vehicles subject to the specified levels of inspection. The term "I/M vehicles" denotes vehicles which are required to undergo an emission test and/or inspection under the Vehicle Inspection/Maintenance Program. It is important to note that participation in the I/M program is required for all vehicles registered in Area A, with the exception of certain model years and vehicle classes. However, it is assumed that 91.6 percent of the vehicles operating within the eight-hour ozone nonattainment area and Maricopa County participate in the I/M program and the remaining 8.4 percent do not participate in the program. These percentages reflect the control measures "Tougher Enforcement of Vehicle Registration and Emissions Test Compliance" and "Expansion of Area A Boundaries," described in the MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for the

Maricopa Nonattainment Area (MAG, 2009). This percentage is directly applied to the Compliance Factor in the [IMCoverage] table. The same I/M programs were applied for the eight-hour ozone nonattainment area and Maricopa County. The specific MOVES table for I/M programs is presented in Appendix C.

5.2.2.3 Meteorological data

MOVES2010b requires hourly temperature and relative humidity data by specific month of the year. Meteorological data for the Phoenix Sky Harbor International Airport in 2011 were obtained from the National Climatic Data Center (*http://www.ncdc.noaa.gov/*). The same hourly average temperature and relative humidity data for each month were applied for the eight-hour ozone nonattainment area and Maricopa County. The specific MOVES table [ZoneMonthHour] for meteorological data is presented in Appendix C.

5.2.2.4 Vehicle population

In order to capture start, evaporative, and extended idle emissions, MOVES2010b introduced a new mobile source emission category called off-network emissions. In MOVES2010b, these off-network emissions are directly determined by population of vehicles in an area. The vehicle population in Maricopa County was obtained from the July 2011 vehicle registration data provided by ADOT. The vehicle population data were allocated to the 28 MOBILE6.2 vehicle types based on MOBILE6.2 VMT fractions for 2011. Then, the vehicle population data allocated to the 28 MOBILE6.2 vehicle types were assigned to the 13 MOVES source types using the match-up table (Table A.1) in EPA's technical guidance (EPA, 2012c). The vehicle population in the eight-hour ozone nonattainment area was estimated by applying the population ratio of the two geographical areas to the vehicle population in Maricopa County. The specific MOVES table [SourceTypeYear] for vehicle population is presented in Appendix C.

5.2.2.5 Source type age distribution

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

5.2.2.6 Annual VMT

The 2011 daily VMTs by facility type were used to estimate onroad exhaust and evaporative emissions. The 2011 VMT distributions by facility type for the eight-hour ozone nonattainment area and Maricopa County were obtained from the 2011 Maricopa County Estimates of Daily Vehicle Travel by Highway Functional Classification provided by ADOT. The 2011 VMT distributions were multiplied by the 2011 HPMS VMT for the eight-hour ozone nonattainment area and Maricopa County. The resultant VMT estimates by facility type for the eight-hour ozone nonattainment area and Maricopa County are shown in Table 5.2–1.
Since MOVES2010b requires annual VMTs by HPMS vehicle type as a local input, the daily VMTs by HPMS vehicle type were derived from the 2011 traffic assignment data provided by

the MAG transportation modeling group in May 2011 and the daily VMTs by facility type and the estimated percentages of daily vehicle travel by vehicle type and highway functional classification provided by ADOT. Then, the daily VMTs by HPMS vehicle type were multiplied by 365 days to obtain the annual VMTs by HPMS vehicle type. The specific MOVES table [HPMSvTypeYear] for annual VMT is presented in Appendix C.

Table 5.2–1. 2011 daily VMT by facility type (annual average daily traffic).

	Facility Type	8-hr ozone NAA (thousand miles/day)	Maricopa County (thousand miles/day)
Rural	Interstate	1,833	3,247
	Other Principal Arterial	897	1,589
	Minor Arterial	166	293
	Major Collector	734	1,301
	Minor Collector	95	168
	Local	149	264
Urban	Interstate	10,906	11,182
	Other Freeway/Expressway	19,263	19,750
	Other Principal Arterial	21,474	22,017
	Minor Arterial	13,767	14,115
	Collector	4,680	4,799
	Local	9,910	10,160
Total:		**83,874**	**88,885**

5.2.2.7 Road type distribution

MOVES2010b requires the distribution of VMTs by road type as a local input. The road type VMT distribution by HPMS vehicle type was derived from the 2011 traffic assignment data and the daily VMTs by HPMS vehicle type mentioned in the previous section. As suggested in EPA's technical guidance (US EPA, 2010), the same road type distribution by HPMS vehicle type was used for all MOVES source types within an HPMS vehicle class. The specific MOVES table [RoadTypeDistribution] for road type distribution is presented in Appendix C.

5.2.2.8 VMT fraction

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

5.2.2.9 Average speed distribution

In MOVES2010b, vehicle power, speed, and acceleration have a significant effect on vehicle emissions for all pollutants. MOVES2010b estimates those emission effects by assigning activity to operating mode distributions, which are determined by the distribution of vehicle hours traveled (VHT) by average speed. As recommended in EPA's technical guidance (US EPA, 2010), estimates of local average speeds were developed by post-processing the output from the 2011 traffic assignment data provided by the MAG transportation modeling group in May 2011. 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 eight-hour ozone nonattainment area. The specific MOVES table [AvgSpeedDistribution] for the average speed distribution is presented in Appendix C.

5.2.2.10 Ramp fraction

MOVES2010b requires the ramp fraction, which represents the percent of VHT on ramps, on both rural restricted roads (road type 2) and urban restricted roads (road type 4). The fraction of VHT on ramps was derived by dividing the total VHTs on ramps by the total VHTs for each restricted road type. Those VHTs were obtained from the 2011 traffic assignment data provided by the MAG transportation modeling group in May 2011. The specific MOVES table [RoadType] for ramp fractions is presented in Appendix C.

5.2.2.11 AVFT strategy

MOVES2010b allows users to modify the fuel engine fraction using different fuels and technologies in each model year in order to reflect the local situation. The fleet information for transit buses for model years 1997 through 2011 was provided by Valley Metro and used to prepare the AVFT input file. Since the fleet data are available only for specific model years, MOVES2010b default values were obtained from the [fuelEngFraction] table in the MOVES default database and used for the rest of the model years. The specific MOVES table [AVFT] for AVFT strategy is presented in Appendix C.

5.2.2.12 Stage II refueling control programs

As an option, MOVES2010b allows to apply Stage refueling emission control programs. Since 1994, the Stage II refueling program has been implemented in Area A as one of committed control measures (MAG, 2009). The program efficiency of 46 percent for the refueling displacement vapor losses and the refueling spillage losses are assumed for LDGVs, LDGTs, and HDGVs (Yantorno, 2007). The same program efficiency was applied to the eight-hour ozone nonattainment area and Maricopa County. The specific MOVES table [CountyYear] for Stage II refueling control programs is presented in Appendix C.

5.2.3 MOVES2010b outputs

MOVES2010b was executed with the RunSpec files described in Appendix C to obtain exhaust and evaporative emissions for VOC, NO_x, and CO. These values were obtained for the following categories by month:

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

5.2.4 MOVES2010b emission estimates

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

Tables 5.2–2 and 5.2–3 show the calculated annual and ozone season-day VOC, NO_x, and CO emissions by facility type and vehicle class in the eight-hour ozone nonattainment area and Maricopa County, respectively.

Table 5.2–2. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in the eight-hour ozone NAA.

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NO_x	CO	VOC	NO_x	CO
Rural Interstate	LDGV	2201001110	28.13	110.70	758.49	163.3	604.9	5,232.5
	LDGT1	2201020110	51.89	243.02	1,356.15	303.6	1,314.9	9,185.7
	LDGT2	2201040110	26.73	125.19	698.62	156.4	677.4	4,732.0
	HDGV	2201070110	13.02	72.48	319.37	74.6	369.0	1,921.9
	MC	2201080110	6.40	4.22	69.24	34.8	21.0	368.5
	LDDV	2230001110	0.05	0.84	0.40	0.3	4.6	2.7
	LDDT	2230060110	1.62	13.96	8.85	9.2	77.5	60.3
	2BHDDV	2230071110	0.71	6.18	3.89	4.0	34.4	26.5
	LHDDV	2230072110	3.85	32.92	20.87	21.8	182.4	141.9
	MHDDV	2230073110	10.86	164.12	45.16	57.2	807.2	237.2
	HHDDV	2230074110	23.31	570.60	116.92	123.1	2,806.7	614.3
	BUSES	2230075110	1.20	23.68	6.14	6.3	116.5	32.3
Rural Principal Arterial	LDGV	2201001130	20.73	70.04	387.68	119.5	403.2	2,614.6
	LDGT1	2201020130	18.86	76.50	363.07	109.6	434.4	2,408.3
	LDGT2	2201040130	9.72	39.41	187.04	56.5	223.8	1,240.7
	HDGV	2201070130	3.53	17.03	71.63	20.3	90.3	435.2
	MC	2201080130	11.93	6.20	105.39	64.6	31.0	561.0
	LDDV	2230001130	0.04	0.63	0.26	0.2	3.7	1.7
	LDDT	2230060130	0.66	5.13	3.60	3.7	29.9	24.0
	2BHDDV	2230071130	0.29	2.28	1.58	1.6	13.3	10.6
	LHDDV	2230072130	1.57	12.04	8.49	8.8	70.1	56.7
	MHDDV	2230073130	2.27	27.40	8.99	11.9	135.0	47.2
	HHDDV	2230074130	3.98	80.40	19.42	21.0	396.0	102.0
	BUSES	2230075130	0.40	6.97	1.97	2.1	34.3	10.3
Rural Minor Arterial	LDGV	2201001150	20.14	68.06	376.72	116.1	391.8	2,540.7
	LDGT1	2201020150	18.33	74.33	352.81	106.5	422.1	2,340.3
	LDGT2	2201040150	9.44	38.29	181.75	54.9	217.4	1,205.6
	HDGV	2201070150	3.43	16.55	69.61	19.7	87.8	422.9
	MC	2201080150	11.59	6.03	102.42	62.8	30.1	545.1
	LDDV	2230001150	0.04	0.61	0.26	0.2	3.6	1.7
	LDDT	2230060150	0.64	4.98	3.49	3.6	29.0	23.4
	2BHDDV	2230071150	0.28	2.21	1.54	1.6	12.9	10.3
	LHDDV	2230072150	1.53	11.70	8.25	8.6	68.1	55.1
	MHDDV	2230073150	2.20	26.63	8.73	11.6	131.1	45.9
	HHDDV	2230074150	3.87	78.12	18.87	20.4	384.8	99.1
	BUSES	2230075150	0.39	6.77	1.91	2.1	33.4	10.0
Rural Major Collector	LDGV	2201001170	3.75	12.69	70.22	21.6	73.0	473.5
	LDGT1	2201020170	3.42	13.86	65.76	19.9	78.7	436.2
	LDGT2	2201040170	1.76	7.14	33.88	10.2	40.5	224.7
	HDGV	2201070170	0.64	3.08	12.97	3.7	16.4	78.8
	MC	2201080170	2.16	1.12	19.09	11.7	5.6	101.6
	LDDV	2230001170	0.01	0.11	0.05	0.0	0.7	0.3
	LDDT	2230060170	0.12	0.93	0.65	0.7	5.4	4.4
	2BHDDV	2230071170	0.05	0.41	0.29	0.3	2.4	1.9
	LHDDV	2230072170	0.28	2.18	1.54	1.6	12.7	10.3
	MHDDV	2230073170	0.41	4.96	1.63	2.2	24.4	8.5
	HHDDV	2230074170	0.72	14.56	3.52	3.8	71.7	18.5
	BUSES	2230075170	0.07	1.26	0.36	0.4	6.2	1.9

Table 5.2–2. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in the eight-hour ozone NAA (continued).

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Rural Minor Collector	LDGV	2201001190	0.87	2.94	16.26	5.0	16.9	109.6
	LDGT1	2201020190	0.79	3.21	15.22	4.6	18.2	101.0
	LDGT2	2201040190	0.41	1.65	7.84	2.4	9.4	52.0
	HDGV	2201070190	0.15	0.71	3.00	0.9	3.8	18.2
	MC	2201080190	0.50	0.26	4.42	2.7	1.3	23.5
	LDDV	2230001190	0.00	0.03	0.01	0.0	0.2	0.1
	LDDT	2230060190	0.03	0.21	0.15	0.2	1.3	1.0
	2BHDDV	2230071190	0.01	0.10	0.07	0.1	0.6	0.4
	LHDDV	2230072190	0.07	0.50	0.36	0.4	2.9	2.4
	MHDDV	2230073190	0.10	1.15	0.38	0.5	5.7	2.0
	HHDDV	2230074190	0.17	3.37	0.81	0.9	16.6	4.3
	BUSES	2230075190	0.02	0.29	0.08	0.1	1.4	0.4
Rural Local	LDGV	2201001210	9.08	30.68	169.82	52.3	176.6	1,145.3
	LDGT1	2201020210	8.26	33.51	159.04	48.0	190.3	1,055.0
	LDGT2	2201040210	4.26	17.26	81.93	24.7	98.0	543.5
	HDGV	2201070210	1.55	7.46	31.38	8.9	39.6	190.6
	MC	2201080210	5.22	2.72	46.17	28.3	13.6	245.7
	LDDV	2230001210	0.02	0.27	0.12	0.1	1.6	0.8
	LDDT	2230060210	0.29	2.25	1.58	1.6	13.1	10.5
	2BHDDV	2230071210	0.13	1.00	0.69	0.7	5.8	4.6
	LHDDV	2230072210	0.69	5.27	3.72	3.9	30.7	24.8
	MHDDV	2230073210	0.99	12.00	3.94	5.2	59.1	20.7
	HHDDV	2230074210	1.74	35.22	8.51	9.2	173.5	44.7
	BUSES	2230075210	0.18	3.05	0.86	0.9	15.0	4.5
Urban Interstate	LDGV	2201001230	315.59	1,122.85	8,542.12	1,828.0	6,198.7	58,613.4
	LDGT1	2201020230	389.33	1,602.91	9,784.95	2,271.6	8,744.6	65,893.5
	LDGT2	2201040230	200.56	825.74	5,040.73	1,170.2	4,504.8	33,945.1
	HDGV	2201070230	125.37	594.77	2,799.95	712.5	3,011.8	16,433.1
	MC	2201080230	128.88	73.37	1,238.82	698.9	365.4	6,593.8
	LDDV	2230001230	0.54	8.81	4.59	3.0	49.4	30.9
	LDDT	2230060230	13.00	102.99	71.45	73.3	575.8	483.3
	2BHDDV	2230071230	5.68	45.66	31.36	32.0	255.6	212.6
	LHDDV	2230072230	31.01	242.58	169.13	174.7	1,354.0	1,141.6
	MHDDV	2230073230	93.83	1,316.73	378.86	494.4	6,475.6	1,990.4
	HHDDV	2230074230	173.92	3,747.08	854.68	918.0	18,429.4	4,490.3
	BUSES	2230075230	14.35	272.67	73.30	75.6	1,341.1	385.1
Urban Freeway And Express-way	LDGV	2201001250	331.11	1,178.07	8,962.22	1,917.9	6,503.5	61,496.0
	LDGT1	2201020250	408.48	1,681.74	10,266.18	2,383.3	9,174.7	69,134.0
	LDGT2	2201040250	210.43	866.35	5,288.63	1,227.8	4,726.3	35,614.5
	HDGV	2201070250	131.53	624.02	2,937.66	747.5	3,160.0	17,241.3
	MC	2201080250	135.22	76.98	1,299.75	733.2	383.3	6,918.1
	LDDV	2230001250	0.56	9.25	4.82	3.2	51.9	32.4
	LDDT	2230060250	13.64	108.06	74.96	76.9	604.1	507.1
	2BHDDV	2230071250	5.96	47.91	32.90	33.6	268.2	223.0
	LHDDV	2230072250	32.53	254.51	177.45	183.3	1,420.6	1,197.8
	MHDDV	2230073250	98.44	1,381.48	397.49	518.7	6,794.1	2,088.3
	HHDDV	2230074250	182.48	3,931.36	896.71	963.2	19,335.8	4,711.2
	BUSES	2230075250	15.05	286.08	76.90	79.3	1,407.1	404.0

Table 5.2–2. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in the eight-hour ozone NAA (continued).

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Urban Principal Arterial	LDGV	2201001270	867.65	2,461.71	14,822.61	4,980.2	14,626.5	98,722.0
	LDGT1	2201020270	723.35	2,268.85	11,877.79	4,187.4	13,305.9	77,666.8
	LDGT2	2201040270	372.63	1,168.80	6,118.85	2,157.1	6,854.6	40,010.1
	HDGV	2201070270	159.42	526.27	2,610.59	907.1	2,833.3	15,528.2
	MC	2201080270	364.35	120.97	2,387.52	1,968.4	603.7	12,707.9
	LDDV	2230001270	1.49	24.89	10.67	8.3	150.4	69.4
	LDDT	2230060270	25.26	203.10	142.81	141.2	1,229.5	939.0
	2BHDDV	2230071270	11.03	90.29	62.60	61.7	547.5	412.4
	LHDDV	2230072270	60.30	478.09	338.58	336.9	2,889.2	2,221.8
	MHDDV	2230073270	99.13	1,116.86	362.02	522.0	5,499.7	1,901.7
	HHDDV	2230074270	167.56	2,988.26	778.64	883.9	14,715.7	4,090.3
	BUSES	2230075270	14.31	229.46	66.76	75.4	1,130.0	350.7
Urban Minor Arterial	LDGV	2201001290	441.02	1,251.27	7,534.27	2,531.4	7,434.6	50,180.0
	LDGT1	2201020290	367.67	1,153.25	6,037.43	2,128.4	6,763.4	39,477.6
	LDGT2	2201040290	189.41	594.10	3,110.19	1,096.5	3,484.2	20,337.0
	HDGV	2201070290	81.03	267.50	1,326.95	461.1	1,440.2	7,892.9
	MC	2201080290	185.20	61.49	1,213.57	1,000.5	306.8	6,459.4
	LDDV	2230001290	0.76	12.65	5.42	4.2	76.4	35.3
	LDDT	2230060290	12.84	103.24	72.59	71.8	625.0	477.3
	2BHDDV	2230071290	5.61	45.89	31.82	31.4	278.3	209.6
	LHDDV	2230072290	30.65	243.01	172.10	171.2	1,468.6	1,129.3
	MHDDV	2230073290	50.39	567.70	184.01	265.3	2,795.5	966.6
	HHDDV	2230074290	85.17	1,518.92	395.78	449.3	7,479.9	2,079.1
	BUSES	2230075290	7.27	116.63	33.93	38.3	574.4	178.3
Urban Collector	LDGV	2201001310	86.13	244.37	1,471.39	494.4	1,451.9	9,799.8
	LDGT1	2201020310	71.80	225.22	1,179.07	415.7	1,320.8	7,709.7
	LDGT2	2201040310	36.99	116.02	607.40	214.1	680.4	3,971.7
	HDGV	2201070310	15.82	52.24	259.14	90.0	281.3	1,541.4
	MC	2201080310	36.17	12.01	237.00	195.4	59.9	1,261.5
	LDDV	2230001310	0.15	2.47	1.06	0.8	14.9	6.9
	LDDT	2230060310	2.51	20.16	14.18	14.0	122.1	93.2
	2BHDDV	2230071310	1.10	8.96	6.21	6.1	54.4	40.9
	LHDDV	2230072310	5.99	47.46	33.61	33.4	286.8	220.5
	MHDDV	2230073310	9.84	110.87	35.94	51.8	545.9	188.8
	HHDDV	2230074310	16.63	296.63	77.29	87.7	1,460.8	406.0
	BUSES	2230075310	1.42	22.78	6.63	7.5	112.2	34.8
Urban Local	LDGV	2201001330	415.75	1,179.56	7,102.48	2,386.3	7,008.5	47,304.1
	LDGT1	2201020330	346.60	1,087.15	5,691.42	2,006.4	6,375.7	37,215.2
	LDGT2	2201040330	178.55	560.05	2,931.94	1,033.6	3,284.5	19,171.4
	HDGV	2201070330	76.39	252.17	1,250.90	434.7	1,357.6	7,440.6
	MC	2201080330	174.58	57.96	1,144.02	943.2	289.2	6,089.2
	LDDV	2230001330	0.71	11.93	5.11	4.0	72.0	33.3
	LDDT	2230060330	12.11	97.32	68.43	67.7	589.1	449.9
	2BHDDV	2230071330	5.29	43.26	30.00	29.6	262.4	197.6
	LHDDV	2230072330	28.89	229.09	162.23	161.4	1,384.4	1,064.6
	MHDDV	2230073330	47.50	535.16	173.46	250.1	2,635.3	911.2
	HHDDV	2230074330	80.29	1,431.87	373.10	423.5	7,051.3	1,960.0
	BUSES	2230075330	6.86	109.95	31.99	36.1	541.4	168.1

Table 5.2–2. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in the eight-hour ozone NAA (continued).

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Off-Network	LDGV	220100100	9,402.26	4,424.20	43,163.97	61,052.9	23,759.3	183,525.8
	LDGT1	220102000	2,588.87	1,468.89	19,360.70	16,455.7	7,981.9	96,124.0
	LDGT2	220104000	1,333.66	756.70	9,973.69	8,477.2	4,111.9	49,518.4
	HDGV	220107000	372.55	217.03	4,052.96	2,338.4	1,182.2	20,958.3
	MC	220108000	547.02	2.43	83.60	4,271.9	9.8	208.1
	LDDV	223000100	6.48	27.63	25.05	22.4	120.8	131.4
	LDDT	223006000	3.32	26.59	16.91	7.6	120.8	87.9
	2BHDDV	223007100	1.42	11.66	7.35	3.2	52.9	38.2
	LHDDV	223007200	7.79	62.35	39.03	17.8	283.1	202.6
	MHDDV	223007300	24.50	144.11	189.20	112.6	621.4	1,016.4
	HHDDV	223007400	418.93	2,672.32	1,119.58	2,179.6	12,161.2	5,908.3
	BUSES	223007500	1.63	4.45	96.15	0.1	0.0	522.5

Table 5.2–3. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in Maricopa County.

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Rural Interstate	LDGV	2201001110	41.81	166.74	1,147.40	242.9	911.2	7,919.6
	LDGT1	2201020110	100.56	475.25	2,658.13	588.5	2,571.6	18,011.7
	LDGT2	2201040110	51.80	244.83	1,369.34	303.2	1,324.8	9,278.8
	HDGV	2201070110	21.52	118.92	538.20	123.8	610.0	3,301.0
	MC	2201080110	11.22	7.49	122.76	61.0	37.3	653.4
	LDDV	2230001110	0.07	1.25	0.60	0.4	6.9	4.1
	LDDT	2230060110	3.14	27.11	17.13	17.7	150.4	116.7
	2BHDDV	2230071110	1.37	12.00	7.53	7.8	66.7	51.4
	LHDDV	2230072110	7.47	63.90	40.44	42.2	354.2	275.0
	MHDDV	2230073110	17.23	281.49	73.31	90.8	1,384.5	385.2
	HHDDV	2230074110	45.10	1,129.87	228.30	238.2	5,557.7	1,199.4
	BUSES	2230075110	1.71	34.23	8.79	9.0	168.4	46.2
Rural Principal Arterial	LDGV	2201001130	33.65	113.61	629.45	193.9	654.0	4,244.8
	LDGT1	2201020130	36.88	149.19	708.92	214.4	847.2	4,701.6
	LDGT2	2201040130	19.00	76.86	365.20	110.4	436.4	2,422.1
	HDGV	2201070130	6.69	31.89	135.07	38.5	169.7	824.3
	MC	2201080130	21.15	10.98	186.63	114.5	54.8	993.4
	LDDV	2230001130	0.06	1.02	0.43	0.3	5.9	2.8
	LDDT	2230060130	1.30	10.05	7.05	7.3	58.6	47.1
	2BHDDV	2230071130	0.57	4.46	3.10	3.2	26.1	20.7
	LHDDV	2230072130	3.08	23.59	16.65	17.3	137.3	111.1
	MHDDV	2230073130	4.17	51.42	16.61	22.0	253.2	87.3
	HHDDV	2230074130	7.84	159.49	38.37	41.4	785.5	201.6
	BUSES	2230075130	0.72	12.48	3.53	3.8	61.5	18.5
Rural Minor Arterial	LDGV	2201001150	32.70	110.40	611.65	188.5	635.5	4,124.9
	LDGT1	2201020150	35.84	144.97	688.88	208.3	823.2	4,568.7
	LDGT2	2201040150	18.46	74.68	354.88	107.3	424.1	2,353.6
	HDGV	2201070150	6.50	30.98	131.25	37.4	164.9	801.0
	MC	2201080150	20.55	10.67	181.35	111.3	53.2	965.3
	LDDV	2230001150	0.06	0.99	0.42	0.3	5.8	2.8
	LDDT	2230060150	1.26	9.76	6.85	7.1	56.9	45.8
	2BHDDV	2230071150	0.55	4.34	3.01	3.1	25.3	20.2
	LHDDV	2230072150	2.99	22.92	16.18	16.8	133.4	107.9
	MHDDV	2230073150	4.05	49.96	16.14	21.3	246.1	84.8
	HHDDV	2230074150	7.62	154.98	37.28	40.2	763.3	195.9
	BUSES	2230075150	0.70	12.13	3.43	3.7	59.8	18.0
Rural Major Collector	LDGV	2201001170	6.09	20.58	114.00	35.1	118.4	768.8
	LDGT1	2201020170	6.68	27.02	128.40	38.8	153.4	851.6
	LDGT2	2201040170	3.44	13.92	66.14	20.0	79.0	438.7
	HDGV	2201070170	1.21	5.78	24.46	7.0	30.7	149.3
	MC	2201080170	3.83	1.99	33.80	20.7	9.9	179.9
	LDDV	2230001170	0.01	0.18	0.08	0.1	1.1	0.5
	LDDT	2230060170	0.23	1.82	1.28	1.3	10.6	8.5
	2BHDDV	2230071170	0.10	0.81	0.56	0.6	4.7	3.8
	LHDDV	2230072170	0.56	4.27	3.01	3.1	24.9	20.1
	MHDDV	2230073170	0.76	9.31	3.01	4.0	45.9	15.8
	HHDDV	2230074170	1.42	28.89	6.95	7.5	142.3	36.5
	BUSES	2230075170	0.13	2.26	0.64	0.7	11.1	3.4

Table 5.2–3. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in Maricopa County (continued).

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Rural Minor Collector	LDGV	2201001190	1.41	4.76	26.39	8.1	27.4	178.0
	LDGT1	2201020190	1.55	6.26	29.73	9.0	35.5	197.1
	LDGT2	2201040190	0.80	3.22	15.31	4.6	18.3	101.6
	HDGV	2201070190	0.28	1.34	5.66	1.6	7.1	34.6
	MC	2201080190	0.89	0.46	7.83	4.8	2.3	41.7
	LDDV	2230001190	0.00	0.04	0.02	0.0	0.2	0.1
	LDDT	2230060190	0.05	0.42	0.30	0.3	2.5	2.0
	2BHDDV	2230071190	0.02	0.19	0.13	0.1	1.1	0.9
	LHDDV	2230072190	0.13	0.99	0.70	0.7	5.8	4.7
	MHDDV	2230073190	0.17	2.16	0.70	0.9	10.6	3.7
	HHDDV	2230074190	0.33	6.69	1.61	1.7	32.9	8.5
	BUSES	2230075190	0.03	0.52	0.15	0.2	2.6	0.8
Rural Local	LDGV	2201001210	14.74	49.77	275.73	85.0	286.5	1,859.5
	LDGT1	2201020210	16.15	65.35	310.54	93.9	371.1	2,059.6
	LDGT2	2201040210	8.32	33.67	159.98	48.4	191.2	1,061.0
	HDGV	2201070210	2.93	13.97	59.17	16.8	74.3	361.1
	MC	2201080210	9.27	4.81	81.75	50.2	24.0	435.1
	LDDV	2230001210	0.03	0.45	0.19	0.1	2.6	1.2
	LDDT	2230060210	0.57	4.40	3.09	3.2	25.7	20.6
	2BHDDV	2230071210	0.25	1.96	1.36	1.4	11.4	9.1
	LHDDV	2230072210	1.35	10.33	7.29	7.6	60.1	48.7
	MHDDV	2230073210	1.83	22.52	7.28	9.6	110.9	38.2
	HHDDV	2230074210	3.43	69.87	16.81	18.1	344.1	88.3
	BUSES	2230075210	0.31	5.47	1.55	1.7	26.9	8.1
Urban Interstate	LDGV	2201001230	321.75	1,147.02	8,736.08	1,863.8	6,328.9	59,952.7
	LDGT1	2201020230	398.95	1,645.13	10,050.63	2,327.9	8,971.4	67,690.5
	LDGT2	2201040230	205.52	847.49	5,177.59	1,199.2	4,621.6	34,870.8
	HDGV	2201070230	129.18	613.34	2,887.04	734.1	3,105.0	16,939.0
	MC	2201080230	131.85	75.30	1,270.33	715.0	375.0	6,761.5
	LDDV	2230001230	0.55	8.99	4.69	3.1	50.4	31.5
	LDDT	2230060230	13.33	105.63	73.26	75.1	590.3	495.6
	2BHDDV	2230071230	5.82	46.83	32.15	32.9	262.1	218.0
	LHDDV	2230072230	31.79	248.83	173.43	179.1	1,388.4	1,170.7
	MHDDV	2230073230	96.93	1,361.53	391.49	510.7	6,696.0	2,056.8
	HHDDV	2230074230	179.94	3,879.33	884.45	949.8	19,079.9	4,646.8
	BUSES	2230075230	14.81	281.59	75.68	78.0	1,385.0	397.6
Urban Freeway and Express-way	LDGV	2201001250	337.58	1,203.43	9,165.73	1,955.5	6,640.2	62,901.2
	LDGT1	2201020250	418.57	1,726.04	10,544.93	2,442.3	9,412.6	71,019.7
	LDGT2	2201040250	215.63	889.17	5,432.23	1,258.2	4,848.9	36,585.8
	HDGV	2201070250	135.53	643.51	3,029.03	770.2	3,257.7	17,772.0
	MC	2201080250	138.33	79.00	1,332.81	750.1	393.4	7,094.0
	LDDV	2230001250	0.58	9.43	4.92	3.2	52.9	33.1
	LDDT	2230060250	13.98	110.83	76.86	78.8	619.4	519.9
	2BHDDV	2230071250	6.11	49.13	33.73	34.5	275.0	228.7
	LHDDV	2230072250	33.36	261.06	181.96	187.9	1,456.7	1,228.3
	MHDDV	2230073250	101.70	1,428.49	410.75	535.8	7,025.3	2,158.0
	HHDDV	2230074250	188.78	4,070.12	927.95	996.5	20,018.3	4,875.3
	BUSES	2230075250	15.54	295.43	79.40	81.9	1,453.1	417.2

Table 5.2–3. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in Maricopa County (continued).

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Urban Principal Arterial	LDGV	2201001270	887.40	2,518.28	15,177.93	5,093.7	14,946.0	101,100.4
	LDGT1	2201020270	740.73	2,323.35	12,173.14	4,288.1	13,611.0	79,607.5
	LDGT2	2201040270	381.59	1,196.87	6,271.01	2,209.0	7,011.7	41,009.9
	HDGV	2201070270	163.87	541.20	2,685.49	932.4	2,910.9	15,968.7
	MC	2201080270	372.91	123.95	2,445.17	2,014.6	618.5	13,014.7
	LDDV	2230001270	1.53	25.46	10.92	8.5	153.6	71.0
	LDDT	2230060270	25.87	207.85	146.31	144.6	1,256.8	962.1
	2BHDDV	2230071270	11.30	92.40	64.13	63.2	559.6	422.5
	LHDDV	2230072270	61.76	489.28	346.88	345.0	2,953.3	2,276.6
	MHDDV	2230073270	102.21	1,151.68	373.34	538.2	5,671.2	1,961.2
	HHDDV	2230074270	172.44	3,077.56	801.69	909.6	15,155.6	4,211.4
	BUSES	2230075270	14.77	236.81	68.89	77.8	1,166.2	361.9
Urban Minor Arterial	LDGV	2201001290	451.06	1,280.03	7,714.88	2,589.1	7,597.0	51,389.0
	LDGT1	2201020290	376.51	1,180.95	6,187.56	2,179.6	6,918.4	40,464.2
	LDGT2	2201040290	193.96	608.37	3,187.53	1,122.8	3,564.0	20,845.2
	HDGV	2201070290	83.30	275.09	1,365.02	473.9	1,479.6	8,116.9
	MC	2201080290	189.55	63.00	1,242.87	1,024.0	314.4	6,615.3
	LDDV	2230001290	0.78	12.94	5.55	4.3	78.1	36.1
	LDDT	2230060290	13.15	105.65	74.37	73.5	638.8	489.0
	2BHDDV	2230071290	5.74	46.97	32.60	32.1	284.5	214.8
	LHDDV	2230072290	31.39	248.70	176.32	175.4	1,501.2	1,157.2
	MHDDV	2230073290	51.95	585.39	189.77	273.6	2,882.6	996.9
	HHDDV	2230074290	87.65	1,564.31	407.50	462.3	7,703.5	2,140.7
	BUSES	2230075290	7.51	120.37	35.02	39.5	592.8	184.0
Urban Collector	LDGV	2201001310	88.09	249.98	1,506.66	505.6	1,483.6	10,035.9
	LDGT1	2201020310	73.53	230.63	1,208.39	425.7	1,351.1	7,902.4
	LDGT2	2201040310	37.88	118.81	622.50	219.3	696.0	4,070.9
	HDGV	2201070310	16.27	53.72	266.58	92.6	289.0	1,585.2
	MC	2201080310	37.02	12.30	242.72	200.0	61.4	1,291.9
	LDDV	2230001310	0.15	2.53	1.08	0.8	15.2	7.1
	LDDT	2230060310	2.57	20.63	14.52	14.4	124.8	95.5
	2BHDDV	2230071310	1.12	9.17	6.37	6.3	55.6	41.9
	LHDDV	2230072310	6.13	48.57	34.43	34.3	293.2	226.0
	MHDDV	2230073310	10.15	114.32	37.06	53.4	563.0	194.7
	HHDDV	2230074310	17.12	305.50	79.58	90.3	1,504.4	418.1
	BUSES	2230075310	1.47	23.51	6.84	7.7	115.8	35.9
Urban Local	LDGV	2201001330	425.21	1,206.67	7,272.74	2,440.7	7,161.6	48,443.8
	LDGT1	2201020330	354.93	1,113.27	5,832.94	2,054.7	6,521.9	38,145.1
	LDGT2	2201040330	182.84	573.50	3,004.85	1,058.5	3,359.8	19,650.5
	HDGV	2201070330	78.52	259.32	1,286.79	446.8	1,394.8	7,651.6
	MC	2201080330	178.68	59.39	1,171.64	965.3	296.4	6,236.2
	LDDV	2230001330	0.73	12.20	5.23	4.1	73.6	34.0
	LDDT	2230060330	12.40	99.59	70.11	69.3	602.2	461.0
	2BHDDV	2230071330	5.41	44.27	30.73	30.3	268.2	202.5
	LHDDV	2230072330	29.59	234.45	166.21	165.3	1,415.1	1,090.9
	MHDDV	2230073330	48.97	551.84	178.89	257.9	2,717.4	939.8
	HHDDV	2230074330	82.63	1,474.66	384.14	435.8	7,262.0	2,018.0
	BUSES	2230075330	7.08	113.47	33.01	37.3	558.8	173.4

Table 5.2–3. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in Maricopa County (continued).

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
	LDGV	2201001000	9,343.57	4,398.52	42,913.45	60,666.2	23,621.4	182,460.8
	LDGT1	2201020000	2,565.00	1,457.16	19,206.53	16,298.8	7,918.2	95,359.0
	LDGT2	2201040000	1,321.36	750.66	9,894.27	8,396.3	4,079.0	49,124.2
	HDGV	2201070000	369.74	215.64	4,033.93	2,320.0	1,174.6	20,862.9
	MC	2201080000	539.75	2.40	82.65	4,215.5	9.7	205.7
Off-Network	LDDV	2230001000	6.44	27.47	24.90	22.3	120.1	130.6
	LDDT	2230060000	3.29	26.39	16.79	7.6	119.8	87.2
	2BHDDV	2230071000	1.41	11.57	7.30	3.2	52.5	37.9
	LHDDV	2230072000	7.74	61.88	38.74	17.6	281.0	201.1
	MHDDV	2230073000	26.03	153.86	192.53	120.6	666.0	1,033.9
	HHDDV	2230074000	448.68	2,863.21	1,186.93	2,336.0	13,033.7	6,262.1
	BUSES	2230075000	1.62	4.42	95.35	0.1	0.0	518.1

5.3 Summary of ozone precursor emissions from onroad mobile sources

Tables 5.3–1 and 5.3–2 show the annual and ozone season-day onroad mobile source emissions by facility type in the eight-hour ozone nonattainment area and Maricopa County, respectively.

Table 5.3–1. Annual and ozone season-day onroad mobile source emissions by facility type in the eight-hour ozone NAA.

		Annual emissions (tons/year)			Season-day emissions (lbs/day)		
	Facility Type	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Rural	Interstate	167.77	1,367.91	3,404.10	954.6	7,016.5	22,555.8
	Principal Arterial	73.98	344.03	1,159.12	419.8	1,865.0	7,512.3
	Minor Arterial	71.88	334.28	1,126.36	408.1	1,812.1	7,300.1
	Major Collector	13.39	62.30	209.96	76.1	337.7	1,360.6
	Minor Collector	3.12	14.42	48.60	17.8	78.3	314.9
	Local	32.41	150.69	507.76	183.8	816.9	3,290.7
Urban	Interstate	1,492.06	9,956.16	28,989.94	8,452.2	51,306.2	190,213.1
	Freeway/Expressway	1,565.43	10,445.81	30,415.67	8,867.9	53,829.6	199,567.7
	Principal Arterial	2,866.48	11,677.55	39,579.44	16,229.6	64,386.0	254,620.3
	Minor Arterial	1,457.02	5,935.65	20,118.06	8,249.4	32,727.3	129,422.4
	Collector	284.55	1,159.19	3,928.92	1,610.9	6,391.4	25,275.2
	Local	1,373.52	5,595.47	18,965.08	7,776.6	30,851.4	122,005.2
Off-network		14,708.43	9,818.36	78,128.19	94,939.4	50,405.3	358,241.9
Total		**24,110.04**	**56,861.82**	**226,581.20**	**148,186.2**	**301,823.7**	**1,321,680.2**

Table 5.3–2. Annual and ozone season-day onroad mobile source emissions by facility type in Maricopa County.

		Annual emissions (tons/year)			Season-day emissions (lbs/day)		
	Facility Type	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Rural	Interstate	303.00	2,563.08	6,211.93	1,725.5	13,143.7	41,242.5
	Principal Arterial	135.11	645.04	2,111.01	767.0	3,490.2	13,675.3
	Minor Arterial	131.28	626.78	2,051.32	745.3	3,391.5	13,288.9
	Major Collector	24.46	116.83	382.33	138.9	632.0	2,476.9
	Minor Collector	5.66	27.05	88.53	32.0	146.3	573.7
	Local	59.18	282.57	924.74	336.0	1,528.8	5,990.5
Urban	Interstate	1,530.42	10,261.01	29,756.82	8,668.7	52,854.0	195,231.5
	Freeway/Expressway	1,605.69	10,765.64	31,220.30	9,094.9	55,453.5	204,833.2
	Principal Arterial	2,936.38	11,984.69	40,564.90	16,624.7	66,014.4	260,967.9
	Minor Arterial	1,492.55	6,091.77	20,618.99	8,450.1	33,554.9	132,649.3
	Collector	291.50	1,189.67	4,026.73	1,650.4	6,553.1	25,905.5
	Local	1,406.99	5,742.63	19,437.28	7,966.0	31,631.8	125,046.8
Off-network		14,634.63	9,973.18	77,693.37	94,404.2	51,076.0	356,283.5
Total		**24,556.85**	**60,269.94**	**235,088.25**	**150,603.7**	**319,470.2**	**1,378,165.5**

Tables 5.3–3 and 5.3–4 present the same emissions by vehicle class in the eight-hour ozone nonattainment area and Maricopa County, respectively.

Table 5.3–3. Annual and ozone season-day onroad mobile source emissions by vehicle class in the eight-hour ozone NAA.

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Vehicle Class	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
LDGV	11,942.21	12,157.14	93,378.25	75,668.9	68,649.4	521,757.3
LDGT1	4,997.65	9,932.44	66,509.59	30,440.7	56,125.6	408,747.3
LDGT2	2,574.55	5,116.70	34,262.49	15,681.6	28,913.2	210,566.7
HDGV	984.43	2,651.31	15,746.11	5,819.4	13,873.3	90,103.4
MC	1,609.22	425.76	7,951.01	10,016.4	2,120.7	42,083.4
LDDV	10.85	100.12	57.82	46.7	550.2	346.9
LDDT	86.04	688.92	479.65	471.5	4,022.6	3,161.3
2BHDDV	37.56	305.81	210.30	205.9	1,788.7	1,388.6
LHDDV	205.15	1,621.70	1,135.36	1,123.8	9,453.6	7,469.4
MHDDV	440.46	5,409.17	1,789.81	2,303.5	26,530.0	9,424.9
HHDDV	1,158.77	17,368.71	4,663.83	6,083.6	84,483.4	24,528.1
BUSES	63.15	1,084.04	396.98	324.2	5,313.0	2,102.9
Total	**24,110.04**	**56,861.82**	**226,581.20**	**148,186.2**	**301,823.7**	**1,321,680.2**

Table 5.3–4. Annual and ozone season-day onroad mobile source emissions by vehicle class in Maricopa County.

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Vehicle Class	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
LDGV	11,985.06	12,469.79	95,292.09	75,868.1	70,411.7	535,379.4
LDGT1	5,125.88	10,544.57	69,728.72	31,170.0	59,506.6	430,578.7
LDGT2	2,640.60	5,432.05	35,920.83	16,057.2	30,654.8	221,813.1
HDGV	1,015.54	2,804.70	16,447.69	5,995.1	14,668.3	94,367.6
MC	1,655.00	451.74	8,402.31	10,247.0	2,250.3	44,488.1
LDDV	10.99	102.95	59.03	47.5	566.4	354.9
LDDT	91.14	730.13	507.92	500.2	4,256.8	3,351.0
2BHDDV	39.77	324.10	222.70	218.7	1,892.8	1,472.4
LHDDV	217.34	1,718.77	1,202.24	1,192.3	10,004.6	7,918.3
MHDDV	466.15	5,763.97	1,890.88	2,438.8	28,272.7	9,956.3
HHDDV	1,242.98	18,784.48	5,001.56	6,527.4	91,383.2	26,302.6
BUSES	66.40	1,142.69	412.28	341.4	5,602.0	2,183.1
Total	**24,556.85**	**60,269.94**	**235,088.25**	**150,603.7**	**319,470.2**	**1,378,165.5**

Table 5.3–5 summarizes annual and ozone season-day emissions for VOC, NO_x, and CO from all onroad mobile sources in the eight-hour ozone nonattainment area and Maricopa County in 2011.

Table 5.3–5. Annual and ozone season-day emissions from all onroad mobile sources in the eight-hour ozone NAA and Maricopa County.

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
	VOC	**NOx**	**CO**	**VOC**	**NOx**	**CO**
8-hr ozone NAA	24,110.04	56,861.82	226,581.20	148,186.2	301,823.7	1,321,680.2
Maricopa County	24,556.85	60,269.94	235,088.25	150,603.7	319,470.2	1,378,165.5

5.4 Quality assurance process

5.4.1 VMT estimates

Normal quality assurance procedures, including automated and manual consistency checks, were conducted by MAG in developing the 2011 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 MOVES2010b analyses included accuracy, completeness, and reasonableness checks. For accuracy and completeness, all calculations were checked by an independent reviewer. Any errors found were corrected and the corrections were then rechecked by the reviewer.

5.4.3 Draft emissions inventory for ozone precursors

The draft onroad mobile source portion of the 2011 periodic emissions inventory for ozone precursors was reviewed using published EPA quality review guidelines for base year emissions inventories (EPA, 1992b). The procedure review (Levels I, II, and III) included checks for completeness, consistency, and the correct use of appropriate procedures.

5.5 References

MAG, 2003. Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area, May 2003.

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

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

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

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

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

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

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

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

Yantorno, D., 2007. E-mail correspondence with Mr. Duane Yantorno at the Arizona Department of Weights and Measures, February 16, 2007.

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6. Biogenic Sources

6.1 Introduction

Biogenic emissions have been estimated for the 2011 Periodic Emissions Inventory for ozone precursors in Maricopa County (9,223 square miles) and the eight-hour ozone nonattainment area (NAA) (5,025 square miles). The Model of Emissions of Gases and Aerosols from Nature (MEGAN) has been used to estimate the biogenic emissions. MEGAN is a state-of-the-art biogenic emissions model developed by the National Center for Atmospheric Research (NCAR). Some important corrections and improvements were made in the latest version of MEGAN2.1 (Guenther et al, 2012; Jiang et al, 2011) compared to previous versions (Guenther, 2006a, 2006b, and 2007; Guenther et al, 2006). The most important change is that higher temporal and spatial resolution of land use and land cover data for MEGAN input has become available. MEGAN, with the vegetation data released in 2011, was applied to compute biogenic emissions in Maricopa County and the eight-hour ozone nonattainment area. Estimated emissions for volatile organic compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NO_x) are included in this biogenic emissions inventory. The MEGAN runs were executed by the Maricopa Association of Governments. The contact person for the MEGAN emission estimates is Feng Liu (602-254-6300).

6.2 Modeling domain

As a numerical model, the MEGAN inputs and outputs are given in user-defined two-dimensional grid cells. To develop biogenic emissions for the 2011 Periodic Emissions Inventory for ozone precursors, the 4-km modeling domain that covers the entire area of Maricopa County were employed. The target area is the eight-hour ozone nonattainment area within the County. The definition of the domain in the Lambert Conformal Conic Projection (LCP) coordinate system is presented in Table 6.2–1. Since MEGAN estimates biogenic emissions for the entire modeling domain rather than specific areas, additional input files, masking areas covered by the eight-hour ozone nonattainment area and Maricopa County, were developed by applying Geographic Information Systems (GIS) to calculate emissions for those two target areas. In order to represent the target area, the masking file assigns 1.0 for the grid cells fully covered by the target area, a fractional value for grid cells partially covered by the target area, and 0.0 for grid cells outside the target area. As shown in Figure 6.3–1, biogenic emissions for the eight-hour ozone nonattainment area and Maricopa County were extracted from MEGAN runs for the masked grid cells in the 4-km modeling domain.

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

Grid Horizontal Resolution	Grid Size	LCP Range (km)	Target Area
4-km	65 by 65	(–131.4713, –129.4593) to (127.9845, 131.1945)	Eight-hour ozone NAA and Maricopa County

6.3 Input data

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

1. EFMAP_LAI file: This file provides emission factors (EF) for 20 MEGAN species including NO_x, CO and VOC, and 8-day average leaf index (LAI) for year 2011in each grid cell.
2. PFTF file: This input file gives percentage of four plant function types (PFT) including broadleaf trees (BT), needle leaf trees (NT), grass and crops (HB) and shrubs (SB) for each model domain grid location.
3. METCRO2D file: This file contains meteorological parameters including temperature, short wave radiation, wind speed, humidity and soil moisture for each grid.

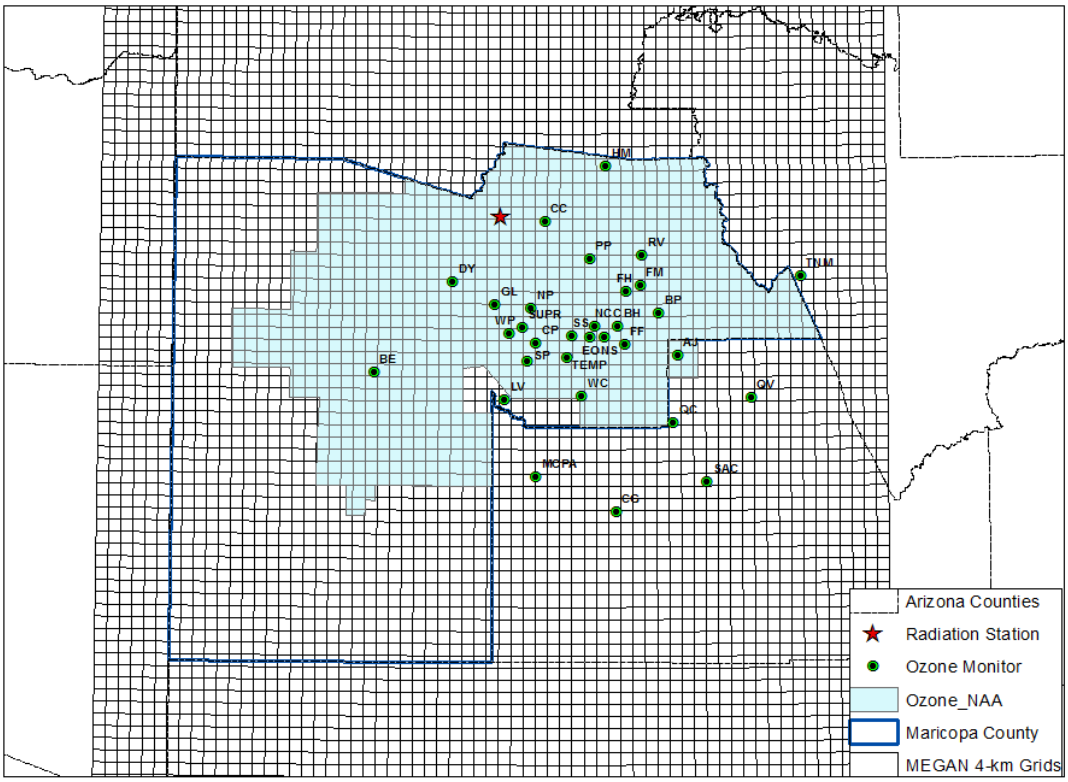

Figure 6.3–1. The masked grid cells in the 4-km modeling domain.

6.3.1 Land cover data

The land cover data, including the 8-day averaged LAI input files for North America for years 2003 to 2011 based on NASA MODIS data, monthly mean PFT, and EF, are provided by the EFMAP_LAI and PFTF files. These input data were derived from the MEGAN land cover database available at the resolution of 30 seconds latitude by 30 seconds longitude (1x1 km^2) in netCDF format (*http://acd.ucar.edu/~guenther/MEGAN/MEGAN.htm*).

6.3.2 Weather data

The weather data used by MEGAN are temperature, downward short wave radiation, wind speed, humidity and soil moisture. The Measurement and Instrumentation Data Center (MIDC) collects irradiance and meteorological data from nation-wide stations. One of those stations is located in northern Phoenix (33.83°N, 112.17°W, see red star in Figure 6.3–1) and is operated by the National Renewable Energy Laboratory (NREL). The archived hourly temperature, wind speed, humidity and radiation data from this site are available to the public. Monthly mean

diurnal cycles of the weather parameters were calculated based on hourly data for the year 2011, and a netCDF file representing 24-hour data for each month was prepared for MEGAN inputs. Biogenic emissions of VOC, NO_x, and CO are first governed by temperature and then highly dependent on downward short wave radiation. Figure 6.3–2 shows monthly mean (left panel) and annual mean diurnal cycle (right panel) of temperature. Figure 6.3–3 illustrates monthly averaged and annual mean diurnal cycle of short wave radiation. The maximum monthly temperature was recorded in August, while the highest radiation was observed in June. The maximum monthly temperature appeared two months later than the highest radiation. The peak hourly temperature was observed around 4:00 – 6:00 pm and lagged three hours behind the peak radiation. The delay is due to the fact that heating of the air occurs not from the sun's rays, but from heating of the earth and infrared radiation leaving the ground in the form of heat. As a result, maximum seasonal emission rates appear in the summer. The highest hourly emission rates take place in the afternoon because the emission rates are positively related to both temperature and short wave radiation (Guenther et al., 2006, 2012). The maximum monthly VOC, NO_x, and CO biogenic emission rates would be expected to occur in the same month as the maximum temperature.

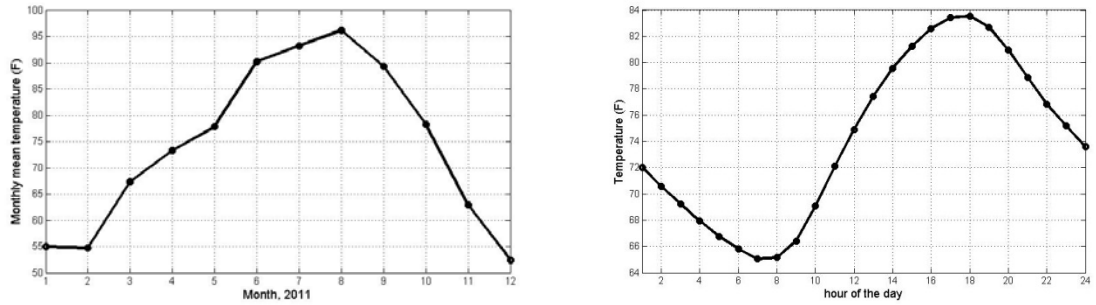

Figure 6.3–2. Monthly averaged temperature (left panel) and annual mean diurnal cycle of temperature (right panel) in 2011.

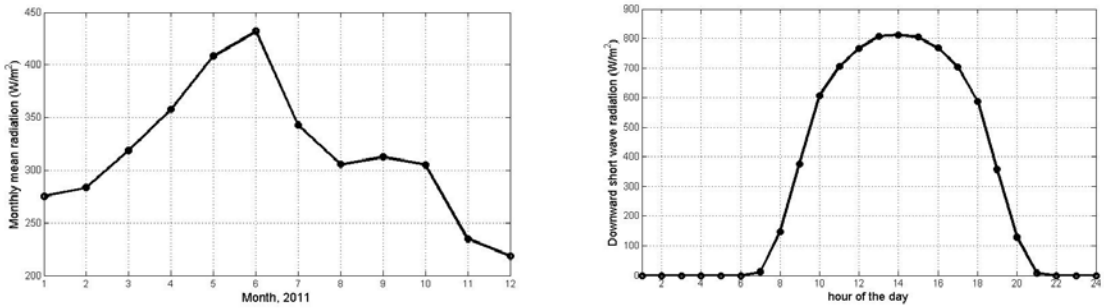

Figure 6.3–3. Monthly averaged radiation (left panel) and annual mean diurnal cycle of radiation (right panel) in 2011.

6.4 Emission estimation

MEGAN runs for the modeling domain provide hourly emission outputs for the year 2011. Figure 6.4–1 illustrates isoprene (ISOP), a major contributor to VOCs, and NO_x emission rates simulated by MEGAN at 17:00 MST in August, 2011. The high ISOP emissions occur in northeastern portion. The high NO_x emissions appear at the central part of Maricopa County and southeastern portion. Daily mean emissions for each month in 2011 are derived by using the hourly outputs for each month. In addition, monthly total emissions were obtained by multiplying the daily mean emissions for each month by the number of days in the month. The

daily mean emissions for the 12 months in 2011 are shown in Tables 6.4–1 and 6.4–2 for the eight-hour ozone nonattainment area and Maricopa County, respectively.

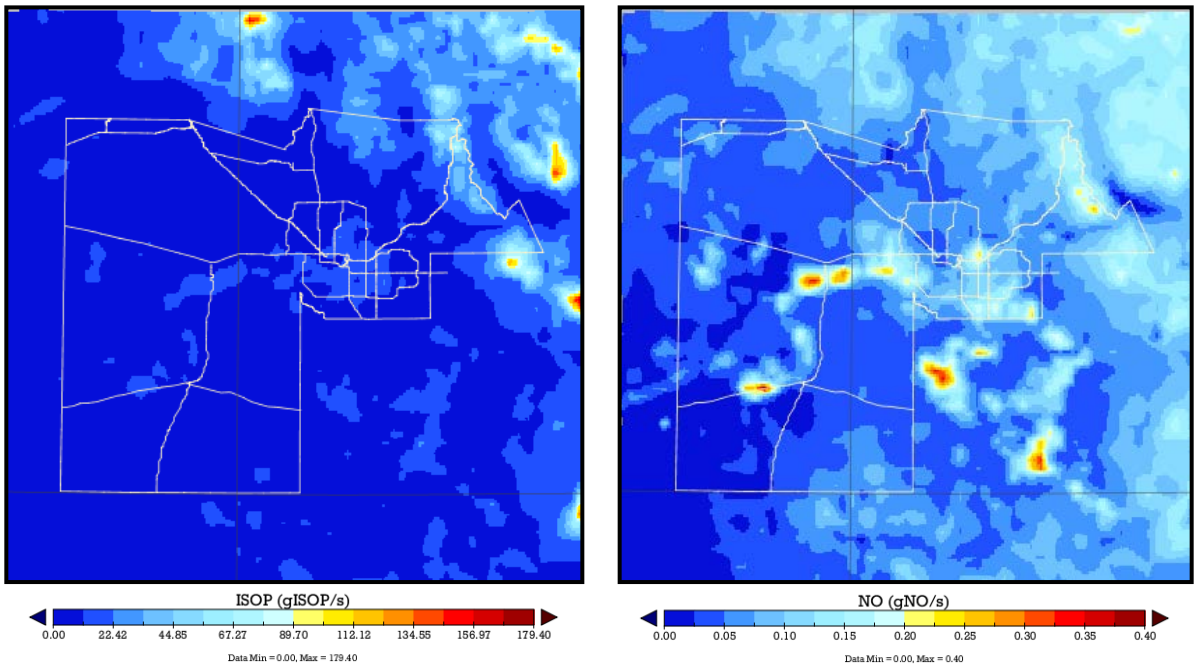

Figure 6.4–1. Estimated emission rates of ISOP (left panel) and NO_x (right panel) at 17:00 MST, August 2011 by MEGAN model.

Table 6.4–1. Daily mean biogenic emissions for each month in the eight-hour ozone NAA.

	VOC		NO_x		CO	
Month	**kg/day**	**lbs/day**	**kg/day**	**lbs/day**	**kg/day**	**lbs/day**
January	15,264.7	33,652.9	210.5	464.1	2,950.2	6,504.1
February	35,341.7	77,915.0	351.6	775.1	5,262.4	11,601.6
March	73,407.4	161,835.4	796.7	1,756.4	10,665.2	23,512.7
April	97,461.1	214,864.7	910.5	2,007.3	11,966.6	26,381.8
May	139,906.1	308,439.8	1,113.0	2,453.7	14,937.6	32,931.7
June	313,026.5	690,104.5	2,308.4	5,089.1	27,998.8	61,726.7
July	314,669.0	693,725.6	2,855.0	6,294.2	29,982.6	66,100.2
August	326,736.8	720,330.5	3,415.3	7,529.4	32,557.0	71,775.8
September	208,257.6	459,128.9	2,209.6	4,871.3	22,623.7	49,876.7
October	86,989.6	191,779.0	994.4	2,192.3	11,389.6	25,109.7
November	20,395.5	44,964.3	309.9	683.2	3,687.5	8,129.5
December	11,230.4	24,758.8	171.8	378.8	2,295.1	5,059.8

Table 6.4–2. Daily mean biogenic emissions for each month in Maricopa County.

	VOC		NO_x		CO	
Month	**kg/day**	**lbs/day**	**kg/day**	**lbs/day**	**kg/day**	**lbs/day**
January	23,123.3	50,978.1	316.3	697.3	5,654.4	12,465.8
February	53,015.2	116,878.4	524.0	1,155.2	9,971.5	21,983.4
March	104,165.5	229,645.3	1,152.6	2,541.0	19,383.1	42,732.4
April	139,181.0	306,841.2	1,330.8	2,933.9	22,591.4	49,805.5
May	200,913.3	442,937.5	1,641.2	3,618.2	28,869.2	63,645.6
June	451,990.3	996,466.9	3,432.5	7,567.4	55,292.2	121,898.3
July	451,204.3	994,734.0	4,207.9	9,276.8	58,566.5	129,116.9
August	467,398.8	1,030,436.7	5,031.7	11,093.0	63,445.8	139,873.9
September	300,464.1	662,409.2	3,278.2	7,227.2	44,256.1	97,567.9
October	129,711.0	285,963.5	1,506.4	3,321.0	23,713.3	52,278.8
November	30,063.3	66,278.2	462.5	1,019.6	7,101.2	15,655.4
December	16,413.2	36,184.9	252.8	557.3	4,255.2	9,381.1

Monthly mean emissions for Maricopa County and the eight-hour ozone nonattainment area are illustrated in Figure 6.4–2. Monthly emission values for the eight-hour ozone nonattainment area and Maricopa County are presented in Tables 6.4–3 and 6.4–4, respectively. It can be seen that the maximum monthly VOC, NO_x, and CO emissions took place in August, because monthly mean temperatures reached the maximum levels in this month.

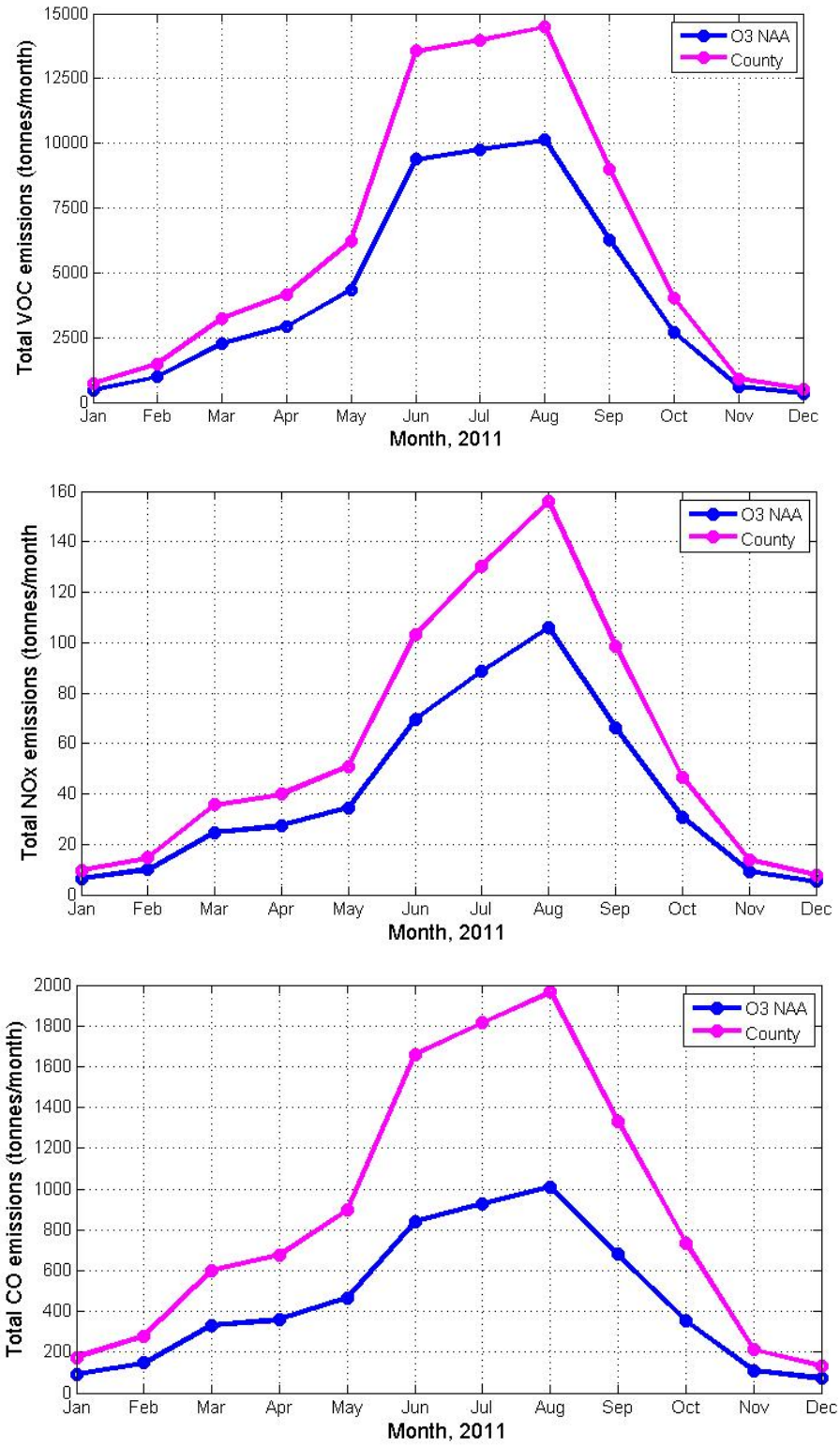

Figure 6.4–2. Monthly emissions of VOC (top), NO_x (middle) and CO (bottom) in Maricopa County (pink solid line, abbreviated as "County") and the eight-hour ozone NAA (blue solid line, abbreviated as "O3 NAA").

Table 6.4–3. Monthly biogenic emissions in the eight-hour ozone NAA.

	VOC		NO_x		CO	
Month	**Metric tons**	**Short tons**	**Metric tons**	**Short tons**	**Metric tons**	**Short tons**
January	473.21	521.62	6.53	7.19	91.46	100.81
February	989.57	1,090.81	9.84	10.85	147.35	162.42
March	2,275.63	2,508.45	24.70	27.22	330.62	364.45
April	2,923.83	3,222.97	27.32	30.11	359.00	395.73
May	4,337.09	4,780.82	34.50	38.03	463.07	510.44
June	9,390.80	10,351.57	69.25	76.34	839.96	925.90
July	9,754.74	10,752.75	88.51	97.56	929.46	1,024.55
August	10,128.84	11,165.12	105.87	116.71	1,009.27	1,112.53
September	6,247.73	6,886.93	66.29	73.07	678.71	748.15
October	2,696.68	2,972.57	30.83	33.98	353.08	389.20
November	611.87	674.46	9.30	10.25	110.63	121.94
December	348.14	383.76	5.33	5.87	71.15	78.43

Table 6.4–4. Monthly biogenic emissions in Maricopa County.

	VOC		NO_x		CO	
Month	**Metric tons**	**Short tons**	**Metric tons**	**Short tons**	**Metric tons**	**Short tons**
January	716.82	790.16	9.81	10.81	175.29	193.22
February	1,484.43	1,636.30	14.67	16.17	279.20	307.77
March	3,229.13	3,559.50	35.73	39.39	600.88	662.35
April	4,175.43	4,602.62	39.92	44.01	677.74	747.08
May	6,228.31	6,865.53	50.88	56.08	894.95	986.51
June	13,559.71	14,947.00	102.98	113.51	1,658.77	1,828.47
July	13,987.33	15,418.38	130.44	143.79	1,815.56	2,001.31
August	14,489.36	15,971.77	155.98	171.94	1,966.82	2,168.05
September	9,013.92	9,936.14	98.35	108.41	1,327.68	1,463.52
October	4,021.04	4,432.43	46.70	51.48	735.11	810.32
November	901.90	994.17	13.88	15.29	213.04	234.83
December	508.81	560.87	7.84	8.64	131.91	145.41

6.5 Summary of biogenic source emissions

Ozone season daily emissions for Maricopa County and the eight-hour ozone nonattainment area in 2011 are shown in Table 6.5–1. Annual emissions for Maricopa County and the eight-hour ozone nonattainment area in 2011 are summarized in Table 6.5–2. Emissions of VOC, NO_x, and CO all decreased in 2011 compared to MEGAN results for PEI 2008. Due to the incorporation of land cover data that are more characteristic of plants located in the desert southwest, as well as improvements to the MEGAN model, the 2011 data shown in Tables 6.5–1 and 6.5–2 represent a substantial improvement over previous biogenic emission estimates for Maricopa County and the eight-hour ozone NAA.

Table 6.5–1. Season-day biogenic emissions.

	VOC		NO_x		CO	
Area	**kg/day**	**lbs/day**	**kg/day**	**lbs/day**	**kg/day**	**lbs/day**
Maricopa County	406,355.7	895,860.0	4,172.6	9,199.0	55,422.8	122,186.2
8-hr ozone NAA	283,221.1	624,395.0	2,826.6	6,231.7	28,387.8	62,584.2

Table 6.5–2. Annual biogenic emissions.

	VOC		NO_x		CO	
Area	**tonnes*/yr**	**tons*/yr**	**tonnes/yr**	**tons/yr**	**tonnes/yr**	**tons/yr**
Maricopa County	72,316.20	79,714.87	707.17	779.52	10,476.94	11,548.84
8-hr ozone NAA	50,178.11	55,311.84	478.25	527.18	5,383.74	5,934.55

* "Tonne" denotes metric ton, and "ton" denotes short (or English) ton

6.6 References

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

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

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

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

Guenther, A., X. Jiang, C. L. Heald, T Sakulyanontvittaya, T. Duhl, L. K. Emmons, and X. Wang, 2012. The model of emissions of gases and aerosols from nature version 2.1 (MEGAN2.1): an extended and updated framework for modeling biogenic emissions, *Geosci. Model Dev. Discuss.*, 5, 1503-1560.

Jiang, X., A. Guenther, and T. Duhl, 2011. MEGAN version 2.10 User's Guide.

Appendix A. Instructions for Reporting 2011 Annual Air Pollution Emissions

Maricopa County
Air Quality Department

INSTRUCTIONS

FOR REPORTING 2011

ANNUAL AIR POLLUTION EMISSIONS

February 2012

Emissions Inventory Unit
1001 North Central Avenue, Suite 125
Phoenix, Arizona 85004
Phone: (602) 506-6790
Fax: (602) 506-6179
Email: ***EmisInv@mail.maricopa.gov***

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

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WHAT'S NEW FOR 2011?

Reporting forms:

- Emission factors for PM-10 for several processes typically found at sand and gravel facilities and/or concrete batch plants, have been revised. The new values are lower than the previous EPA default emission factors, and reflect the more stringent moisture-content requirements required by Maricopa County Rule 316 (Nonmetallic Mineral Processing).

- Some **preprinted information** on your report may be different from last year's version. Please review the enclosed forms carefully, and verify all preprinted information.

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

- **Please VERIFY THOROUGHLY that the information you provide on all reporting forms match the information presented on the preprinted forms from MCAQD.**

Miscellaneous:

- **Non-operational facilities**: Any facility that has been issued an air quality permit, but that did NOT operate at any time during 2011, 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 2011, 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 2011 annual emission fee for Title V sources is $39.83/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 2011 Maricopa County emissions inventory:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

§ **402 CONFIDENTIALITY OF INFORMATION:**

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

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

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

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

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

IV. HELPFUL HINTS AND INFORMATION

Be sure to verify all preprinted information on forms. If any information is incorrect or blank, please provide correct information. Making a change on the Business Form will **NOT** transfer the permit ownership or location. You must contact the Department's Small 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.

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 Small 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	***153***	***Watering with water trucks***	

Data fields:

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

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

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

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

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

General Process Form Instructions

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

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

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

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

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

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

6 Seasonal Throughput Percent: Enter the percent of total annual operating time that occurred per season, rounded to the nearest percent. For example, "Dec-Feb 30% " means 30% of total annual activity occurred in January, February and December 2011. 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 2011.

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 2011 — EXAMPLE: Internal Combustion

Permit number(s) V99999

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

1- Process ID 80

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

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

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

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

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

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

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

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

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

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

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

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

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

*** Calculation Method Codes:**

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

**** Control Efficiency Reference Codes:**

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

General Process Form **2011**

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 2011. The total for all four seasons must equal 100%.

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

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

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

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

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

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

Evaporative Process Form (continued)

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

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

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

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

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

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

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

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

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

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

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

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

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

EXAMPLE: Coating and Painting

Evaporative Process Form 2011

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 2011

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 2011

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 2011? 2,400 *Check one:* ☐ pounds ☒ gallons
Indicate whether this quantity is reported in pounds or gallons. Keep waste disposal company manifests as proof that this amount of waste was taken off-site.

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

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

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

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

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

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

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

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

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

EXAMPLE: Documentation of Emission Factor Calculations

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

Emission Factor Calculation

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

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

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

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

Weighted average sample calculation

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

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

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

Process ID #	Material Type	2011 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 2011

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 2011 Annual Emissions:	(1) Totals from Process Forms	(2) + Accidental Releases	(3) = TOTAL 2011 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
30400737	Industrial Processes	Secondary Metal Production	Steel Foundries	Raw Material Silo
30500120	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Storage Bins: Ferric Chloride
30500121	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Storage Bins: Mineral Stabilizer
30500134	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Blown Saturant Storage
30500135	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Blown Coating Storage
30500141	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Granules Storage
30500143	Industrial Processes	Mineral Products	Asphalt Roofing Manufacture	Mineral Dust Storage
30500203	Industrial Processes	Mineral Products	Asphalt Concrete	Storage Piles
30500212	Industrial Processes	Mineral Products	Asphalt Concrete	Heated Asphalt Storage Tanks
30500213	Industrial Processes	Mineral Products	Asphalt Concrete	Storage Silo
30500290	Industrial Processes	Mineral Products	Asphalt Concrete	Haul Roads: General
30500303	Industrial Processes	Mineral Products	Brick Manufacture	Storage of Raw Materials
30500608	Industrial Processes	Mineral Products	Cement Manufacturing (Dry Process)	Raw Material Piles
30500708	Industrial Processes	Mineral Products	Cement Manufacturing (Wet Process)	Raw Material Piles
30501710	Industrial Processes	Mineral Products	Mineral Wool	Storage of Oils and Binders
30502007	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Open Storage
30502011	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Hauling
30502504	Industrial Processes	Mineral Products	Construction Sand and Gravel	Hauling
30502507	Industrial Processes	Mineral Products	Construction Sand and Gravel	Storage Piles
30502760	Industrial Processes	Mineral Products	Industrial Sand and Gravel	Sand Handling, Transfer, & Storage
30531090	Industrial Processes	Mineral Products	Coal Mining, Cleaning, Material Handling	Haul Roads: General
30532007	Industrial Processes	Mineral Products	Stone Quarrying - Processing	Open Storage
30704002	Industrial Processes	Pulp and Paper & Wood Pdts.	Bulk Handling and Storage - Wood/Bark	Stockpiles
31100199	Industrial Processes	Building Construction	Construction: Building Contractors	Other Not Classified
31100299	Industrial Processes	Building Construction	Demolitions/Special Trade Contracts	Other Construction/Demolition
50100401	Waste Disposal	Solid Waste Disposal	Landfill Dump	Unpaved Road Traffic
50100402	Waste Disposal	Solid Waste Disposal	Landfill Dump	Fugitive Emissions
50100403	Waste Disposal	Solid Waste Disposal	Landfill Dump	Area Method
50100404	Waste Disposal	Solid Waste Disposal	Landfill Dump	Trench Method
50100405	Waste Disposal	Solid Waste Disposal	Landfill Dump	Ramp Method

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

3. Divide your facility's total billable emissions (on line 6) by 2000 to convert pounds into tons. **Round to the nearest ton.** Enter this value on line 7. Multiply this number by **$39.83**, and enter the result on line 8. This is your 2011 emission fee.

EXAMPLE (for Title V sources only)

Data Certification/Fee Calculation Form 2011

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 2011 Annual Emissions:	(1) Totals from Process Forms	(2) + Accidental Releases	(3) = TOTAL 2011 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 **$ 39.83**. This is your **2011 ANNUAL EMISSION FEE**.			$ ***716.94***

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 formulas below illustrate how inclusion of rule effectiveness can significantly affect the resulting emission estimates:

Emissions before the application of rule effectiveness:

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

Emissions including the application of rule effectiveness:

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

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

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

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

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

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

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

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

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

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

Table B–1. Rule effectiveness rate, by source category analyzed.

Source Category	Compliance Rate	Rule Effectiveness (RE) Rate
Title V Facilities	90.45% *	91.81%
Non-Title V Facilities	85.92% *	87.81%

** Compliance rates for both Title V and Non-Title V facilities are based upon 2010-2011 inspection data, and reflect compliance self-monitoring recordkeeping practice, in addition to violation data.*

For the remaining emission processes that include a control device or technique that limits ozone formation, separate multi-rule RE rates have been calculated for permitted Title V and non-Title V facilities. Factor-based matrices have been utilized to develop RE rates for Title V and non-Title V facilities. Compliance rates for these sources are based upon two full years of data (2010 through 2011), as 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' section of the RE calculation matrix. The combined compliance rate for Title V facilities is 90.45% and 85.92% for non-Title V facilities, resulting in RE rates of 91.81% and 87.81% for Title V and non-Title V facilities, respectively, as shown in Tables B–2 and B–3 below.

3 References

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

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

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

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

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Monitoring	94%	100%	97%	Source specific monitoring used for compliance purposes, and monitoring records filed with regulatory agency at least every 4 months.	35%	90%	**31.5%**
	87%	93%	90%	Source specific monitoring used as an indicator of compliance, and monitoring records filed with regulatory agency every 6 to 9 months.			
	81%	86%	84%	Source specific monitoring used as an indicator of compliance, and monitoring records filed with regulatory agency each year.			
	70%	80%	75%	General guidance exists for source specific enhanced monitoring, and monitoring records required but aren't submitted to regulatory agency.			
		< 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%	12 of 21 facilities	**19.4%**
	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.		7 of 21 facilities	**11.3%**
		< 70%	35%	High Priority Violator (HPV): the facility is in significant violation of one or more applicable requirement of the CAA.		2 of 21 facilities	**1.2%**
						Sum:	**31.8%**

Overall Compliance Rate for Title V facilities: **90.45%**

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%	**2.9%**
	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%	90%	**2.7%**
	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.			

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

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

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

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

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

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

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

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

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

Overall rule effectiveness score for Title V facilities: **91.81%**

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

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

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score (= weight × value)
Monitoring	94%	100%	97%	Source specific monitoring used for compliance purposes, and monitoring records filed with regulatory agency at least every 4 months.			
	87%	93%	90%	Source specific monitoring used as an indicator of compliance, and monitoring records filed with regulatory agency every 6 to 9 months.			
	81%	86%	84%	Source specific monitoring used as an indicator of compliance, and monitoring records filed with regulatory agency each year.			
	70%	80%	75%	General guidance exists for source specific enhanced monitoring, and monitoring records re-quired but aren't submitted to regulatory agency.	35%	75%	**26.3%**
		< 70%	35%	No requirements for any type of monitoring.			
Compliance History	94%	100%	97%	The facility has been in compliance for the past eight quarters.	35%	191 of 268 facilities	**24.2%**
	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.		19 of 268 facilities	**2.2%**
	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.		77 of 268 facilities	**7.5%**
		< 70%	35%	High Priority Violator (HPV): the facility is in significant violation of one or more applicable requirement of the CAA.		0 of 268 facilities	**0.0%**
						Sum:	**33.9%**

Overall Compliance Rate for Non-Title V facilities: **85.92%**

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

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

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

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

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

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

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

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

Factor	Range		Midpt. value	Description	Weight	Value assigned to MCAQD	Score(= weight × value)
Operator Training	94%	100%	97%	Control equipment operators complete a formal training program on use of the equipment; the program is kept up to date and has been reviewed by the regulatory agency.			
	87%	93%	90%	Control equipment operators complete formal training program, and such program is kept up to date and available for review by the regulatory agency upon request.			
	81%	86%	84%	Control equipment operators complete some amount of formal training.			
	70%	0.8	75%	Control equipment operators receive only on the job training.	2%	75%	**1.50%**
		< 70%	35%	Control equipment operators receive no specific training.			
Media Publicity	94%	100%	97%	Media publicity of enforcement actions.	2%	97%	**1.94%**
	87%	93%	90%	Media publicity of enforcement actions.			
	81%	86%	84%	Media publicity of enforcement actions.			
	70%	80%	75%	Media publicity of enforcement actions.			
		< 70%	35%	No media publicity of enforcement actions.			
Regulatory Workshops	94%	100%	97%	Regulatory workshops are available annually, and/or the implementing agency mails regulatory information packages each year.	2%	97%	**1.94%**
	87%	93%	90%	Regulatory workshops are available every 1-2 years, and/or the implementing agency mails regulatory information packages every 1-2 years.			
	81%	86%	84%	Regulatory workshops are available every 2-3 years, and/or the implementing agency mails regulatory information packages once every 2-3 years.			
	70%	80%	75%	Regulatory workshop not routinely available, but implementing agency mails regulatory information packages out about once every 2-3 years.			
		< 70%	35%	Regulatory workshops not routinely available. The implementing agency mails regulatory information packages infrequently, if ever.			
Inspector Training	94%	100%	97%	Inspectors must undergo 2 weeks of comprehen-sive basic training, and 1 to 2 weeks of source specific training, and such training is updated each year.			
	87%	93%	90%	Inspectors must undergo 1 to 2 weeks of basic training and 1 week of source specific training and such training is updated every 1-2 years.	2%	90%	**1.80%**
	81%	86%	84%	Inspectors must undergo 1 to 2 weeks of basic training and 3 to 5 days of source specific training, and such training is updated every 1-2 years.			
	70%	80%	75%	Inspectors must undergo 1 to 2 weeks of basic training and 1 to 3 days of source specific training, and such training is updated every 1-2 years.			
		< 70%	35%	Inspectors must undergo less than 5 days of basic training less than 3 days of source specific training, and such training is updated only every 2 years or less frequently.			

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

Overall rule effectiveness score for non-Title V facilities: **87.81%**

Appendix C. MOVES2010b Local Input Data and RunSpecs

In order to calculate the 2011 annual and ozone season-day onroad source emissions, MOVES2010b was executed using local input data for each month of the year and each geographical area (the eight-hour ozone NAA and Maricopa County).

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

MOVES2010b RunSpec Summary (Maricopa County, December 2011)

* Output Database Server Name: [using default]

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

* Time Spans:
  Time Aggregation Level: Hour
  Years: 2011
  Months: December
  Days: Weekend & Weekdays
  Hours: Start Hour 00:00 - 00:59 | End Hour 23:00 - 23:59

* Geographic Bounds:
  Region: County
  Selections: ARIZONA - Maricopa County
  Domain Input Database: pei_mc_2011_may2011_m2010b_in_v1

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

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

* Pollutants and Processes
  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
  Carbon Monoxide (CO) - Running Exhaust
  Carbon Monoxide (CO) - Start Exhaust
  Carbon Monoxide (CO) - Crankcase Running Exhaust
  Carbon Monoxide (CO) - Crankcase Start Exhaust
  Carbon Monoxide (CO) - Crankcase Extended Idle Exhaust
  Carbon Monoxide (CO) - Extended Idle Exhaust
  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
  Methane (CH4) - Running Exhaust
  Methane (CH4) - Start Exhaust
  Methane (CH4) - Crankcase Running Exhaust
  Methane (CH4) - Crankcase Start Exhaust
  Methane (CH4) - Crankcase Extended Idle Exhaust
  Methane (CH4) - Refueling Displacement Vapor Loss
  Methane (CH4) - Refueling Spillage Loss
  Methane (CH4) - Extended Idle Exhaust
  Non-Methane Hydrocarbons - Running Exhaust
  Non-Methane Hydrocarbons - Start Exhaust
  Non-Methane Hydrocarbons - Evap Permeation
  Non-Methane Hydrocarbons - Evap Fuel Vapor Venting
  Non-Methane Hydrocarbons - Evap Fuel Leaks
  Non-Methane Hydrocarbons - Crankcase Running Exhaust
  Non-Methane Hydrocarbons - Crankcase Start Exhaust
  Non-Methane Hydrocarbons - Crankcase Extended Idle Exhaust
  Non-Methane Hydrocarbons - Refueling Displacement Vapor Loss
  Non-Methane Hydrocarbons - Refueling Spillage Loss
  Non-Methane Hydrocarbons - Extended Idle Exhaust
  Non-Methane Organic Gases - Running Exhaust
  Non-Methane Organic Gases - Start Exhaust
  Non-Methane Organic Gases - Evap Permeation
  Non-Methane Organic Gases - Evap Fuel Vapor Venting
  Non-Methane Organic Gases - Evap Fuel Leaks
  Non-Methane Organic Gases - Crankcase Running Exhaust
  Non-Methane Organic Gases - Crankcase Start Exhaust
  Non-Methane Organic Gases - Crankcase Extended Idle Exhaust
  Non-Methane Organic Gases - Refueling Displacement Vapor Loss
  Non-Methane Organic Gases - Refueling Spillage Loss
  Non-Methane Organic Gases - Extended Idle Exhaust
  Total Organic Gases - Running Exhaust
  Total Organic Gases - Start Exhaust
  Total Organic Gases - Evap Permeation
  Total Organic Gases - Evap Fuel Vapor Venting
  Total Organic Gases - Evap Fuel Leaks
  Total Organic Gases - Crankcase Running Exhaust
  Total Organic Gases - Crankcase Start Exhaust
  Total Organic Gases - Crankcase Extended Idle Exhaust
  Total Organic Gases - Refueling Displacement Vapor Loss
  Total Organic Gases - Refueling Spillage Loss
  Total Organic Gases - Extended Idle Exhaust
  Volatile Organic Compounds - Running Exhaust
  Volatile Organic Compounds - Start Exhaust
  Volatile Organic Compounds - Evap Permeation
  Volatile Organic Compounds - Evap Fuel Vapor Venting
  Volatile Organic Compounds - Evap Fuel Leaks
  Volatile Organic Compounds - Crankcase Running Exhaust

Volatile Organic Compounds - Crankcase Start Exhaust
Volatile Organic Compounds - Crankcase Extended Idle Exhaust
Volatile Organic Compounds - Refueling Displacement Vapor Loss
Volatile Organic Compounds - Refueling Spillage Loss
Volatile Organic Compounds - Extended Idle Exhaust

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

* Output
General Output:
Output Database: pei_mc_2011_may2011_m2010b_out_v1
Units: Mass Units (Grams) | Energy Units (Joules) | Distance Units (Miles)
Activity: Distance Traveled | Source Hours | Source Hours Idling | Source Hours Operating | Source Hours Parked | Population | Starts
Output Emissions Detail:
Always: Time (Month) | Location (NATION) | Pollutant
For All Vehicle/Equipment Categories: Fuel Type | Emission Process
On Road: SCC

MOVES2010b RunSpec (Maricopa County, December 2011)

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Truck"/>
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Home"/>
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Short-haul Truck"/>
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Long-haul Truck"/>
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Exhaust"/>

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Exhaust"/>

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Permeation"/>

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Vapor Venting"/>

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Leaks"/>

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Running Exhaust"/>

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Start Exhaust"/>

     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>

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Displacement Vapor Loss"/>

     <pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="19" processname="Refueling
Spillage Loss"/>

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Idle Exhaust"/>

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Exhaust"/>

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Exhaust"/>

     <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="17" processname="Crankcase
Extended Idle Exhaust"/>

     <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="90" processname="Extended Idle
Exhaust"/>

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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"/>

     <pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="90" processname="Extended Idle
Exhaust"/>

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Exhaust"/>

     <pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="16" processname="Crankcase Start
Exhaust"/>

     <pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>

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Vapor Loss"/>

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Loss"/>

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Exhaust"/>

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Exhaust"/>

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Vapor Venting"/>

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Leaks"/>

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     <pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="16" processname="Crankcase
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Spillage Loss"/>

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Idle Exhaust"/>

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Exhaust"/>

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Permeation"/>

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     <pollutantprocessassociation pollutantkey="80" pollutantname="Non-Methane Organic Gases" processkey="13" processname="Evap Fuel
Leaks"/>

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Extended Idle Exhaust"/>

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Leaks"/>

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Exhaust"/>

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Extended Idle Exhaust"/>

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Exhaust"/>

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Permeation"/>

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MOVES2010b Local Input Data (Maricopa County, December 2011)

[FuelFormulation]

Fuel Formulation	Fuel Subtype	RVP	Sulfur Level	ETOH Volume	MTBE Volume	ETBE Volume	TAME Volume	Aromatic Content	Olefin Content	Benzene Content	e200	e300	volToWtPercentOxy	BioDiesel Ester	Cetane Index	PAH Content	T50	T90
11100	12	8.02	20.2	10.	0	0.00194	0.05179	19.6	9.2	1.2	47.9	88.0	2.1717	0	0	0	197.721	309.431
11101	12	8.81	15.4	10.	0	0	0	17.5	6.5	0.9	53.3	90.7	3.7575	0	0	0	185.333	295.25
11102	13	8.79	14.7	10.	0	0	0	20.1	9.1	0.9	54.6	89.4	3.1457	0	0	0	177.636	302.727
11103	12	10.7	15.0	10.	0	0	0	31.9	14.	1.9	54.0	86.0	3.5900	0	0	0	170	317
11104	14	6.94	24.6	10.	0	0.00428	0.11395	19.6	9.9	0.9	42.7	86.7	0.7805	0	0	0	212.908	315.856
11105	12	8.02	26.0	10.	0	0	0	19.9	6.8	0.8	46.0	90.0	3.7400	0	0	0	210	297
11106	11	6.54	22.0	10.	0	0	0	17.6	10.	0.7	45.0	85.5	0.0000	0	0	0	209	320
11107	14	6.80	23.3	10.	0	0	0.36666	21.4	10.	1.2	44.3	86.0	0.1000	0	0	0	212	322
11108	11	6.64	27.2	10.	0	0.02142	0.08571	19.9	11.	0.8	39.0	86.3	0.0171	0	0	0	217	319
11109	14	6.69	24.5	10.	0	0	0.11739	19.2	10.	0.7	39.3	85.8	0.0454	0	0	0	216.543	321.282
11110	13	8.16	19.3	10.	0	0	0	17.0	8.5	0.9	47.8	88.3	2.6418	0	0	0	195.941	310.647
11111	13	8.49	18.7	10.	0	0	0	15.2	6.4	0.8	51.5	90.1	3.2706	0	0	0	191.117	300.294
11112	12	8.53	16.3	10.	0	0	0	16.0	6.4	3.7	51.6	90.3	3.5806	0	0	0	190.363	298.545
21100	12	8.02	20.2	0.0	0	0.00194	0.05179	19.6	9.2	1.2	47.9	88.0	2.1717	0	0	0	197.721	309.431
21101	12	8.81	15.4	0.0	0	0	0	17.5	6.5	0.9	53.3	90.7	3.7575	0	0	0	185.333	295.25
21102	13	8.79	14.7	0.0	0	0	0	20.1	9.1	0.9	54.6	89.4	3.1457	0	0	0	177.636	302.727
21103	12	10.7	15.0	0.0	0	0	0	31.9	14.	1.9	54.0	86.0	3.5900	0	0	0	170	317
21104	14	6.94	24.6	0.0	0	0.00428	0.11395	19.6	9.9	0.9	42.7	86.7	0.7805	0	0	0	212.908	315.856
21105	12	8.02	26.0	0.0	0	0	0	19.9	6.8	0.8	46.0	90.0	3.7400	0	0	0	210	297
21106	11	6.54	22.0	0.0	0	0	0	17.6	10.	0.7	45.0	85.5	0.0000	0	0	0	209	320
21107	14	6.80	23.3	0.0	0	0	0.36666	21.4	10.	1.2	44.3	86.0	0.1000	0	0	0	212	322
21108	11	6.64	27.2	0.0	0	0.02142	0.08571	19.9	11.	0.8	39.0	86.3	0.0171	0	0	0	217	319
21109	14	6.69	24.5	0.0	0	0	0.11739	19.2	10.	0.7	39.3	85.8	0.0454	0	0	0	216.543	321.282
21110	13	8.16	19.3	0.0	0	0	0	17.0	8.5	0.9	47.8	88.3	2.6418	0	0	0	195.941	310.647
21111	13	8.49	18.7	0.0	0	0	0	15.2	6.4	0.8	51.5	90.1	3.2706	0	0	0	191.117	300.294
21112	12	8.53	16.3	0.0	0	0	0	16.0	6.4	3.7	51.6	90.3	3.5806	0	0	0	190.363	298.545
31000	20	0	5.71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31001	20	0	5.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31002	20	0	5.58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31003	20	0	5.88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31004	20	0	5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31005	20	0	5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31006	20	0	5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31007	20	0	5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31008	20	0	5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31009	20	0	5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31010	20	0	5.88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31011	20	0	7.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31012	20	0	5.60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[HPMSvTypeYear]

HPMSVtypeID	yearID	VMTGrowthFactor	HPMSBaseYearVMT	baseYearOffNetVMT
10	2011	0	623037600.1	0
20	2011	0	15806675171	0
30	2011	0	12967244959	0
40	2011	0	118381498.4	0
50	2011	0	1281267928	0
60	2011	0	1646318085	0

[SourceTypeYear]

yearID	sourceTypeID	sourceTypePopulation
2011	11	75309
2011	21	2044983
2011	31	440595.7
2011	32	172099
2011	41	1172.42
2011	42	718.58
2011	43	7592.578
2011	51	585.7895
2011	52	21663.06
2011	53	1344.71
2011	54	3344.705
2011	61	9859.552
2011	62	8092.895

[FuelSupply]

countyID	fuelYearID	monthGroupID	fuelFormulationID	marketShare	marketShareCV
4013	2011	1	21101	0.05	0.5
4013	2011	1	11101	0.95	0.5
4013	2011	1	31001	1	0.5
4013	2011	1	30	1	0.5
4013	2011	2	21102	0.05	0.5
4013	2011	2	11102	0.95	0.5
4013	2011	2	31002	1	0.5
4013	2011	2	30	1	0.5
4013	2011	3	21103	0.05	0.5
4013	2011	3	11103	0.95	0.5
4013	2011	3	31003	1	0.5
4013	2011	3	30	1	0.5
4013	2011	4	21104	0.05	0.5
4013	2011	4	11104	0.95	0.5
4013	2011	4	31004	1	0.5
4013	2011	4	30	1	0.5
4013	2011	5	21105	0.05	0.5
4013	2011	5	11105	0.95	0.5
4013	2011	5	31005	1	0.5
4013	2011	5	30	1	0.5
4013	2011	6	21106	0.05	0.5
4013	2011	6	11106	0.95	0.5
4013	2011	6	31006	1	0.5
4013	2011	6	30	1	0.5
4013	2011	7	21107	0.05	0.5
4013	2011	7	11107	0.95	0.5
4013	2011	7	31007	1	0.5
4013	2011	7	30	1	0.5
4013	2011	8	21108	0.05	0.5
4013	2011	8	11108	0.95	0.5
4013	2011	8	31008	1	0.5
4013	2011	8	30	1	0.5
4013	2011	9	21109	0.05	0.5
4013	2011	9	11109	0.95	0.5
4013	2011	9	31009	1	0.5
4013	2011	9	30	1	0.5
4013	2011	10	21110	0.05	0.5
4013	2011	10	11110	0.95	0.5
4013	2011	10	31010	1	0.5
4013	2011	10	30	1	0.5
4013	2011	11	21111	0.05	0.5
4013	2011	11	11111	0.95	0.5
4013	2011	11	31011	1	0.5
4013	2011	11	30	1	0.5
4013	2011	12	21112	0.05	0.5
4013	2011	12	11112	0.95	0.5
4013	2011	12	31012	1	0.5
4013	2011	12	30	1	0.5

[ZoneMonthHour]

monthID	zoneID	HourID	temperature	relHumidity
12	40130	1	48	62
12	40130	2	47	65
12	40130	3	47	64
12	40130	4	47	64
12	40130	5	46	66
12	40130	6	46	66
12	40130	7	45	68
12	40130	8	46	67
12	40130	9	48	62
12	40130	10	52	54
12	40130	11	55	48
12	40130	12	57	43
12	40130	13	59	40
12	40130	14	60	38
12	40130	15	61	36
12	40130	16	62	35
12	40130	17	61	37
12	40130	18	58	42
12	40130	19	56	47
12	40130	20	54	51
12	40130	21	53	52
12	40130	22	52	56
12	40130	23	50	59
12	40130	24	49	60
12	40130	1	48	62

[SourceTypeAgeDistribution]

SourceTypeID	YearID	AgeID	AgeFraction
11	2011	0	0.029892
11	2011	1	0.036417
11	2011	2	0.083781
11	2011	3	0.101569
11	2011	4	0.116094
11	2011	5	0.105884
11	2011	6	0.08115
11	2011	7	0.058941
11	2011	8	0.067783
11	2011	9	0.054942
11	2011	10	0.046522
11	2011	11	0.038838
11	2011	12	0.031681
11	2011	13	0.023471
11	2011	14	0.018524
11	2011	15	0.017472
11	2011	16	0.014525
11	2011	17	0.011157
11	2011	18	0.010525
11	2011	19	0.007262
11	2011	20	0.005157
11	2011	21	0.005263
11	2011	22	0.005052
11	2011	23	0.004631
11	2011	24	0.004245
11	2011	25	0.003891
11	2011	26	0.003567
11	2011	27	0.00327
11	2011	28	0.002997
11	2011	29	0.002748
11	2011	30	0.002748
21	2011	0	0.043696
21	2011	1	0.053295
21	2011	2	0.042596
21	2011	3	0.068793
21	2011	4	0.083192
21	2011	5	0.080592
21	2011	6	0.077392
21	2011	7	0.070493
21	2011	8	0.065393
21	2011	9	0.061294
21	2011	10	0.056294
21	2011	11	0.051995
21	2011	12	0.043696
21	2011	13	0.034097
21	2011	14	0.029997
21	2011	15	0.022198
21	2011	16	0.021098
21	2011	17	0.015798
21	2011	18	0.012199
21	2011	19	0.009499
21	2011	20	0.008099
21	2011	21	0.006399
21	2011	22	0.005299
21	2011	23	0.004
21	2011	24	0.003019
21	2011	25	0.002278
21	2011	26	0.001719
21	2011	27	0.001298
21	2011	28	0.000979
21	2011	29	0.000739
21	2011	30	0.022565
31	2011	0	0.040367
31	2011	1	0.036952
31	2011	2	0.023272
31	2011	3	0.060977
31	2011	4	0.080902
31	2011	5	0.086168
31	2011	6	0.070426
31	2011	7	0.071799
31	2011	8	0.060662
31	2011	9	0.054761
31	2011	10	0.061661
31	2011	11	0.055069
31	2011	12	0.041776
31	2011	13	0.034756
31	2011	14	0.036143
31	2011	15	0.02573
31	2011	16	0.02484
31	2011	17	0.022254
31	2011	18	0.014775
31	2011	19	0.010328
31	2011	20	0.008996
31	2011	21	0.007982
31	2011	22	0.008785
31	2011	23	0.006661
31	2011	24	0.005076
31	2011	25	0.003888
31	2011	26	0.003002
31	2011	27	0.002329
31	2011	28	0.001818
31	2011	29	0.001418
31	2011	30	0.036429
32	2011	0	0.043709
32	2011	1	0.037275
32	2011	2	0.024506
32	2011	3	0.063116
32	2011	4	0.086828
32	2011	5	0.091952
32	2011	6	0.071425
32	2011	7	0.069687
32	2011	8	0.057689
32	2011	9	0.051358
32	2011	10	0.058053
32	2011	11	0.055657
32	2011	12	0.041337
32	2011	13	0.03425
32	2011	14	0.036441
32	2011	15	0.02487
32	2011	16	0.023712
32	2011	17	0.02089
32	2011	18	0.013959
32	2011	19	0.009727
32	2011	20	0.008543
32	2011	21	0.007639
32	2011	22	0.00826
32	2011	23	0.006259
32	2011	24	0.004777
32	2011	25	0.00368
32	2011	26	0.002847
32	2011	27	0.002226
32	2011	28	0.001755
32	2011	29	0.001411
32	2011	30	0.036162
41	2011	0	0.038296
41	2011	1	0.015698
41	2011	2	0.027397
41	2011	3	0.064494
41	2011	4	0.149585
41	2011	5	0.139386
41	2011	6	0.09579
41	2011	7	0.060294
41	2011	8	0.043396
41	2011	9	0.034397
41	2011	10	0.044396
41	2011	11	0.055294
41	2011	12	0.052495
41	2011	13	0.028097
41	2011	14	0.027297
41	2011	15	0.025797
41	2011	16	0.024298
41	2011	17	0.014999
41	2011	18	0.009599
41	2011	19	0.007199
41	2011	20	0.006299
41	2011	21	0.009299
41	2011	22	0.006299
41	2011	23	0.0048
41	2011	24	0.003657
41	2011	25	0.002786
41	2011	26	0.002123
41	2011	27	0.001617
41	2011	28	0.001232
41	2011	29	0.000939
41	2011	30	0.002744
42	2011	0	0.038296
42	2011	1	0.015698
42	2011	2	0.027397
42	2011	3	0.064494
42	2011	4	0.149585
42	2011	5	0.139386
42	2011	6	0.09579
42	2011	7	0.060294
42	2011	8	0.043396
42	2011	9	0.034397
42	2011	10	0.044396
42	2011	11	0.055294
42	2011	12	0.052495
42	2011	13	0.028097
42	2011	14	0.027297
42	2011	15	0.025797
42	2011	16	0.024298
42	2011	17	0.014999
42	2011	18	0.009599
42	2011	19	0.007199
42	2011	20	0.006299
42	2011	21	0.009299
42	2011	22	0.006299
42	2011	23	0.0048
42	2011	24	0.003657
42	2011	25	0.002786
42	2011	26	0.002123
42	2011	27	0.001617
42	2011	28	0.001232
42	2011	29	0.000939
42	2011	30	0.002744
43	2011	0	0.075389
43	2011	1	0.040094
43	2011	2	0.037195
43	2011	3	0.085088
43	2011	4	0.147379
43	2011	5	0.151778
43	2011	6	0.083488
43	2011	7	0.051493
43	2011	8	0.030696
43	2011	9	0.020197
43	2011	10	0.024996
43	2011	11	0.063691
43	2011	12	0.038794
43	2011	13	0.030796
43	2011	14	0.041094
43	2011	15	0.017397
43	2011	16	0.013008
43	2011	17	0.00801
43	2011	18	0.005722
43	2011	19	0.003933
43	2011	20	0.004121
43	2011	21	0.004475
43	2011	22	0.003412
43	2011	23	0.002644
43	2011	24	0.002026
43	2011	25	0.001526
43	2011	26	0.001172
43	2011	27	0.000893
43	2011	28	0.000686
43	2011	29	0.000527
43	2011	30	0.008281
51	2011	0	0.075401
51	2011	1	0.0401
51	2011	2	0.0372
51	2011	3	0.085101
51	2011	4	0.147402
51	2011	5	0.151802
51	2011	6	0.083501
51	2011	7	0.051501
51	2011	8	0.0307
51	2011	9	0.0202
51	2011	10	0.025
51	2011	11	0.063701
51	2011	12	0.0388
51	2011	13	0.0308
51	2011	14	0.0411
51	2011	15	0.0174
51	2011	16	0.013199
51	2011	17	0.008099
51	2011	18	0.0059
51	2011	19	0.003999
51	2011	20	0.004199
51	2011	21	0.004499
51	2011	22	0.003399
51	2011	23	0.002599
51	2011	24	0.001988
51	2011	25	0.00152
51	2011	26	0.001162
51	2011	27	0.000889
51	2011	28	0.00068
51	2011	29	0.00052
51	2011	30	0.007638
52	2011	0	0.066214
52	2011	1	0.039334
52	2011	2	0.03318
52	2011	3	0.078132
52	2011	4	0.128378
52	2011	5	0.132775
52	2011	6	0.079084

Source TypeID	YearID	AgeID	AgeFraction
52	2011	7	0.056074
52	2011	8	0.038042
52	2011	9	0.02878
52	2011	10	0.034102
52	2011	11	0.060507
52	2011	12	0.038954
52	2011	13	0.031317
52	2011	14	0.039113
52	2011	15	0.019306
52	2011	16	0.016191
52	2011	17	0.011791
52	2011	18	0.008363
52	2011	19	0.005691
52	2011	20	0.005513
52	2011	21	0.005414
52	2011	22	0.004802
52	2011	23	0.003655
52	2011	24	0.00283
52	2011	25	0.002259
52	2011	26	0.00176
52	2011	27	0.001429
52	2011	28	0.001176
52	2011	29	0.001073
52	2011	30	0.02476
53	2011	0	0.074869
53	2011	1	0.040084
53	2011	2	0.036613
53	2011	3	0.08406
53	2011	4	0.144792
53	2011	5	0.148968
53	2011	6	0.082261
53	2011	7	0.050975
53	2011	8	0.030557
53	2011	9	0.02016
53	2011	10	0.024955
53	2011	11	0.062595
53	2011	12	0.038177
53	2011	13	0.030303
53	2011	14	0.040308
53	2011	15	0.017217
53	2011	16	0.013996
53	2011	17	0.008668
53	2011	18	0.006817
53	2011	19	0.004401
53	2011	20	0.004658
53	2011	21	0.004706
53	2011	22	0.003492
53	2011	23	0.002575
53	2011	24	0.002017
53	2011	25	0.001726
53	2011	26	0.001332

Source TypeID	YearID	AgeID	AgeFraction
53	2011	27	0.001106
53	2011	28	0.000916
53	2011	29	0.000861
53	2011	30	0.015836
54	2011	0	0.075419
54	2011	1	0.04011
54	2011	2	0.037209
54	2011	3	0.085122
54	2011	4	0.147438
54	2011	5	0.151839
54	2011	6	0.083521
54	2011	7	0.051513
54	2011	8	0.030708
54	2011	9	0.020205
54	2011	10	0.025006
54	2011	11	0.063716
54	2011	12	0.03881
54	2011	13	0.030808
54	2011	14	0.04111
54	2011	15	0.017404
54	2011	16	0.012531
54	2011	17	0.007698
54	2011	18	0.005268
54	2011	19	0.003727
54	2011	20	0.003917
54	2011	21	0.004384
54	2011	22	0.003365
54	2011	23	0.002681
54	2011	24	0.002082
54	2011	25	0.001515
54	2011	26	0.00117
54	2011	27	0.000884
54	2011	28	0.000678
54	2011	29	0.000526
54	2011	30	0.009633
61	2011	0	0.075521
61	2011	1	0.040164
61	2011	2	0.03726
61	2011	3	0.085237
61	2011	4	0.147637
61	2011	5	0.152044
61	2011	6	0.083634
61	2011	7	0.051583
61	2011	8	0.030749
61	2011	9	0.020232
61	2011	10	0.02504
61	2011	11	0.063802
61	2011	12	0.038862
61	2011	13	0.030849
61	2011	14	0.041166
61	2011	15	0.017428

Source TypeID	YearID	AgeID	AgeFraction
61	2011	16	0.013144
61	2011	17	0.00788
61	2011	18	0.005826
61	2011	19	0.003897
61	2011	20	0.004157
61	2011	21	0.004432
61	2011	22	0.003239
61	2011	23	0.002455
61	2011	24	0.001916
61	2011	25	0.001465
61	2011	26	0.001114
61	2011	27	0.000846
61	2011	28	0.00063
61	2011	29	0.000485
61	2011	30	0.007306
62	2011	0	0.075452
62	2011	1	0.040127
62	2011	2	0.037225
62	2011	3	0.085158
62	2011	4	0.147501
62	2011	5	0.151904
62	2011	6	0.083557
62	2011	7	0.051535
62	2011	8	0.030721
62	2011	9	0.020214
62	2011	10	0.025017
62	2011	11	0.063744
62	2011	12	0.038827
62	2011	13	0.030821
62	2011	14	0.041128
62	2011	15	0.017412
62	2011	16	0.013178
62	2011	17	0.008015
62	2011	18	0.005871
62	2011	19	0.003959
62	2011	20	0.00418
62	2011	21	0.00447
62	2011	22	0.003336
62	2011	23	0.00254
62	2011	24	0.001955
62	2011	25	0.001495
62	2011	26	0.001141
62	2011	27	0.00087
62	2011	28	0.000659
62	2011	29	0.000505
62	2011	30	0.007485

[IMCoverage]

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
101	4	4013	2011	21	1	3	1967	1980	1	13	N	95.8845
101	4	4013	2011	21	1	6	1981	1995	2	33	N	95.8845
101	4	4013	2011	21	1	10	1996	2005	2	51	N	95.8845
101	4	4013	2011	31	1	3	1967	1980	1	13	N	95.8845
101	4	4013	2011	31	1	6	1981	1995	2	33	N	95.8845
101	4	4013	2011	31	1	10	1996	2005	2	51	N	95.8845
101	4	4013	2011	32	1	3	1967	1980	1	13	N	95.8845
101	4	4013	2011	32	1	6	1981	1995	2	33	N	95.8845
101	4	4013	2011	32	1	10	1996	2005	2	51	N	95.8845
101	4	4013	2011	52	1	3	1967	2005	1	13	N	95.8845
102	4	4013	2011	21	1	3	1967	1980	1	13	N	95.8845
102	4	4013	2011	21	1	6	1981	1995	2	33	N	95.8845
102	4	4013	2011	21	1	10	1996	2005	2	51	N	95.8845
102	4	4013	2011	31	1	3	1967	1980	1	13	N	95.8845
102	4	4013	2011	31	1	6	1981	1995	2	33	N	95.8845
102	4	4013	2011	31	1	10	1996	2005	2	51	N	95.8845
102	4	4013	2011	32	1	3	1967	1980	1	13	N	95.8845
102	4	4013	2011	32	1	6	1981	1995	2	33	N	95.8845
102	4	4013	2011	32	1	10	1996	2005	2	51	N	95.8845
102	4	4013	2011	52	1	3	1967	2005	1	13	N	95.8845
112	4	4013	2011	21	1	8	1996	2005	2	43	N	95.8845
112	4	4013	2011	21	1	9	1981	1995	1	44	N	95.8845
112	4	4013	2011	31	1	8	1996	2005	2	43	N	95.8845
112	4	4013	2011	31	1	9	1981	1995	1	44	N	95.8845
112	4	4013	2011	32	1	8	1996	2005	2	43	N	95.8845
112	4	4013	2011	32	1	9	1981	1995	1	44	N	95.8845
112	4	4013	2011	52	1	7	1967	2005	1	41	N	95.8845
113	4	4013	2011	21	1	8	1996	2005	2	43	N	95.8845
113	4	4013	2011	21	1	9	1981	1995	1	44	N	95.8845
113	4	4013	2011	31	1	8	1996	2005	2	43	N	95.8845
113	4	4013	2011	31	1	9	1981	1995	1	44	N	95.8845
113	4	4013	2011	32	1	8	1996	2005	2	43	N	95.8845
113	4	4013	2011	32	1	9	1981	1995	1	44	N	95.8845
113	4	4013	2011	52	1	7	1967	2005	1	41	N	95.8845
201	4	4013	2011	21	1	3	1967	1980	1	13	N	95.8845
201	4	4013	2011	21	1	6	1981	1995	2	33	N	95.8845
201	4	4013	2011	21	1	10	1996	2005	2	51	N	95.8845
201	4	4013	2011	31	1	3	1967	1980	1	13	N	95.8845
201	4	4013	2011	31	1	6	1981	1995	2	33	N	95.8845
201	4	4013	2011	31	1	10	1996	2005	2	51	N	95.8845
201	4	4013	2011	32	1	3	1967	1980	1	13	N	95.8845
201	4	4013	2011	32	1	6	1981	1995	2	33	N	95.8845
201	4	4013	2011	32	1	10	1996	2005	2	51	N	95.8845
201	4	4013	2011	52	1	3	1967	2005	1	13	N	95.8845
202	4	4013	2011	21	1	3	1967	1980	1	13	N	95.8845
202	4	4013	2011	21	1	6	1981	1995	2	33	N	95.8845
202	4	4013	2011	21	1	10	1996	2005	2	51	N	95.8845
202	4	4013	2011	31	1	3	1967	1980	1	13	N	95.8845
202	4	4013	2011	31	1	6	1981	1995	2	33	N	95.8845
202	4	4013	2011	31	1	10	1996	2005	2	51	N	95.8845
202	4	4013	2011	32	1	3	1967	1980	1	13	N	95.8845
202	4	4013	2011	32	1	6	1981	1995	2	33	N	95.8845
202	4	4013	2011	32	1	10	1996	2005	2	51	N	95.8845
202	4	4013	2011	52	1	3	1967	2005	1	13	N	95.8845
301	4	4013	2011	21	1	3	1967	1980	1	13	N	95.8845
301	4	4013	2011	21	1	6	1981	1995	2	33	N	95.8845
301	4	4013	2011	21	1	10	1996	2005	2	51	N	95.8845
301	4	4013	2011	31	1	3	1967	1980	1	13	N	95.8845
301	4	4013	2011	31	1	6	1981	1995	2	33	N	95.8845
301	4	4013	2011	31	1	10	1996	2005	2	51	N	95.8845
301	4	4013	2011	32	1	3	1967	1980	1	13	N	95.8845
301	4	4013	2011	32	1	6	1981	1995	2	33	N	95.8845
301	4	4013	2011	32	1	10	1996	2005	2	51	N	95.8845
301	4	4013	2011	52	1	3	1967	2005	1	13	N	95.8845
302	4	4013	2011	21	1	3	1967	1980	1	13	N	95.8845
302	4	4013	2011	21	1	6	1981	1995	2	33	N	95.8845
302	4	4013	2011	21	1	10	1996	2005	2	51	N	95.8845
302	4	4013	2011	31	1	3	1967	1980	1	13	N	95.8845
302	4	4013	2011	31	1	6	1981	1995	2	33	N	95.8845
302	4	4013	2011	31	1	10	1996	2005	2	51	N	95.8845
302	4	4013	2011	32	1	3	1967	1980	1	13	N	95.8845
302	4	4013	2011	32	1	6	1981	1995	2	33	N	95.8845
302	4	4013	2011	32	1	10	1996	2005	2	51	N	95.8845
302	4	4013	2011	52	1	3	1967	2005	1	13	N	95.8845
101	4	4013	2011	21	1	103	1967	1980	1	13	Y	57.6164
101	4	4013	2011	21	1	106	1981	1995	2	31	Y	64.12
101	4	4013	2011	21	1	110	1996	2007	2	51	Y	90.0428
101	4	4013	2011	31	1	103	1967	1980	1	13	Y	57.6164
101	4	4013	2011	31	1	106	1981	1995	2	31	Y	64.12
101	4	4013	2011	31	1	110	1996	2007	2	51	Y	90.0428
101	4	4013	2011	32	1	103	1967	1980	1	13	Y	57.6164
101	4	4013	2011	32	1	106	1981	1995	2	31	Y	64.12
101	4	4013	2011	32	1	110	1996	2007	2	51	Y	90.0428
101	4	4013	2011	52	1	103	1967	2007	1	13	Y	87.2032
102	4	4013	2011	21	1	103	1967	1980	1	13	Y	57.6164
102	4	4013	2011	21	1	106	1981	1995	2	31	Y	64.12
102	4	4013	2011	21	1	110	1996	2007	2	51	Y	90.0428
102	4	4013	2011	31	1	103	1967	1980	1	13	Y	57.6164
102	4	4013	2011	31	1	106	1981	1995	2	31	Y	64.12
102	4	4013	2011	31	1	110	1996	2007	2	51	Y	90.0428
102	4	4013	2011	32	1	103	1967	1980	1	13	Y	57.6164

polProcess ID	State ID	County ID	yearID	sourceTypeID	fuelTypeID	IMProgramID	Beg ModelYearID	End ModelYearID	inspectFreq	Test StandardsID	useIMyn	Compliance Factor
102	4	4013	2011	32	1	106	1981	1995	2	31	Y	64.12
102	4	4013	2011	32	1	110	1996	2007	2	51	Y	90.0428
102	4	4013	2011	52	1	103	1967	2007	1	13	Y	87.2032
112	4	4013	2011	21	1	108	1996	2007	2	43	Y	83.814
112	4	4013	2011	21	1	109	1981	1995	2	44	Y	64.12
112	4	4013	2011	31	1	108	1996	2007	2	43	Y	83.814
112	4	4013	2011	31	1	109	1981	1995	2	44	Y	64.12
112	4	4013	2011	32	1	108	1996	2007	2	43	Y	83.814
112	4	4013	2011	32	1	109	1981	1995	2	44	Y	64.12
112	4	4013	2011	52	1	107	1981	2007	1	41	Y	86.2872
113	4	4013	2011	21	1	108	1996	2007	2	43	Y	83.814
113	4	4013	2011	21	1	109	1981	1995	2	44	Y	64.12
113	4	4013	2011	31	1	108	1996	2007	2	43	Y	83.814
113	4	4013	2011	31	1	109	1981	1995	2	44	Y	64.12
113	4	4013	2011	32	1	108	1996	2007	2	43	Y	83.814
113	4	4013	2011	32	1	109	1981	1995	2	44	Y	64.12
113	4	4013	2011	52	1	107	1981	2007	1	41	Y	86.2872
201	4	4013	2011	21	1	103	1967	1980	1	13	Y	57.6164
201	4	4013	2011	21	1	106	1981	1995	2	31	Y	64.12
201	4	4013	2011	21	1	110	1996	2007	2	51	Y	90.0428
201	4	4013	2011	31	1	103	1967	1980	1	13	Y	57.6164
201	4	4013	2011	31	1	106	1981	1995	2	31	Y	64.12
201	4	4013	2011	31	1	110	1996	2007	2	51	Y	90.0428
201	4	4013	2011	32	1	103	1967	1980	1	13	Y	57.6164
201	4	4013	2011	32	1	106	1981	1995	2	31	Y	64.12
201	4	4013	2011	32	1	110	1996	2007	2	51	Y	90.0428
201	4	4013	2011	52	1	103	1967	2007	1	13	Y	87.2032
202	4	4013	2011	21	1	103	1967	1980	1	13	Y	57.6164
202	4	4013	2011	21	1	106	1981	1995	2	31	Y	64.12
202	4	4013	2011	21	1	110	1996	2007	2	51	Y	90.0428
202	4	4013	2011	31	1	103	1967	1980	1	13	Y	57.6164
202	4	4013	2011	31	1	106	1981	1995	2	31	Y	64.12
202	4	4013	2011	31	1	110	1996	2007	2	51	Y	90.0428
202	4	4013	2011	32	1	103	1967	1980	1	13	Y	57.6164
202	4	4013	2011	32	1	106	1981	1995	2	31	Y	64.12
202	4	4013	2011	32	1	110	1996	2007	2	51	Y	90.0428
202	4	4013	2011	52	1	103	1967	2007	1	13	Y	87.2032
301	4	4013	2011	21	1	103	1967	1980	1	13	Y	57.6164
301	4	4013	2011	21	1	106	1981	1995	2	31	Y	64.12
301	4	4013	2011	21	1	110	1996	2007	2	51	Y	90.0428
301	4	4013	2011	31	1	103	1967	1980	1	13	Y	57.6164
301	4	4013	2011	31	1	106	1981	1995	2	31	Y	64.12
301	4	4013	2011	31	1	110	1996	2007	2	51	Y	90.0428
301	4	4013	2011	32	1	103	1967	1980	1	13	Y	57.6164
301	4	4013	2011	32	1	106	1981	1995	2	31	Y	64.12
301	4	4013	2011	32	1	110	1996	2007	2	51	Y	90.0428
301	4	4013	2011	52	1	103	1967	2007	1	13	Y	87.2032
302	4	4013	2011	21	1	103	1967	1980	1	13	Y	57.6164
302	4	4013	2011	21	1	106	1981	1995	2	31	Y	64.12
302	4	4013	2011	21	1	110	1996	2007	2	51	Y	90.0428
302	4	4013	2011	31	1	103	1967	1980	1	13	Y	57.6164
302	4	4013	2011	31	1	106	1981	1995	2	31	Y	64.12
302	4	4013	2011	31	1	110	1996	2007	2	51	Y	90.0428
302	4	4013	2011	32	1	103	1967	1980	1	13	Y	57.6164
302	4	4013	2011	32	1	106	1981	1995	2	31	Y	64.12
302	4	4013	2011	32	1	110	1996	2007	2	51	Y	90.0428
302	4	4013	2011	52	1	103	1967	2007	1	13	Y	87.2032

[RoadType]

roadTypeID	rampFraction
2	0.054636
4	0.111569

[RoadTypeDistribution]

sourceTypeID	roadTypeID	roadTypeVMTFraction
11	1	0
11	2	0.013318
11	3	0.05643
11	4	0.290786
11	5	0.639467
21	1	0
21	2	0.021036
21	3	0.039609
21	4	0.296909
21	5	0.642446
31	1	0
31	2	0.050257
31	3	0.044142
31	4	0.371289
31	5	0.534312
32	1	0
32	2	0.050257
32	3	0.044142
32	4	0.371289
32	5	0.534312
41	1	0
41	2	0.030808
41	3	0.032603
41	4	0.500175
41	5	0.436415
42	1	0
42	2	0.030808
42	3	0.032603
42	4	0.500175
42	5	0.436415
43	1	0
43	2	0.030808
43	3	0.032603
43	4	0.500175
43	5	0.436415
51	1	0
51	2	0.043408
51	3	0.027296
51	4	0.52444
51	5	0.404856
52	1	0
52	2	0.043408
52	3	0.027296
52	4	0.52444
52	5	0.404856
53	1	0
53	2	0.043408
53	3	0.027296
53	4	0.52444
53	5	0.404856
54	1	0
54	2	0.043408
54	3	0.027296
54	4	0.52444
54	5	0.404856
61	1	0
61	2	0.081128
61	3	0.02854
61	4	0.528464
61	5	0.361868
62	1	0
62	2	0.081128
62	3	0.02854
62	4	0.528464
62	5	0.361868

[MonthVMTFraction]

sourceTypeID	isLeapYear	monthID	monthVMTFraction
11	N	12	0.083229
21	N	12	0.083229
31	N	12	0.083229
32	N	12	0.083229
41	N	12	0.083229
42	N	12	0.083229
43	N	12	0.083229
51	N	12	0.083229
52	N	12	0.083229
53	N	12	0.083229
54	N	12	0.083229
61	N	12	0.083229
62	N	12	0.083229

[DayVMTFraction]

Source TypeID	Month ID	Road TypeID	dayID	Day VMTFraction
11	12	1	5	0.767488
21	12	1	5	0.767488
31	12	1	5	0.767488
32	12	1	5	0.767488
41	12	1	5	0.767488
42	12	1	5	0.767488
43	12	1	5	0.767488
51	12	1	5	0.767488
52	12	1	5	0.767488
53	12	1	5	0.767488
54	12	1	5	0.767488
61	12	1	5	0.767488
62	12	1	5	0.767488
11	12	2	5	0.768458
21	12	2	5	0.768458
31	12	2	5	0.768458
32	12	2	5	0.768458
41	12	2	5	0.768458
42	12	2	5	0.768458
43	12	2	5	0.768458
51	12	2	5	0.768458
52	12	2	5	0.768458
53	12	2	5	0.768458
54	12	2	5	0.768458
61	12	2	5	0.768458
62	12	2	5	0.768458
11	12	3	5	0.766507
21	12	3	5	0.766507
31	12	3	5	0.766507
32	12	3	5	0.766507
41	12	3	5	0.766507
42	12	3	5	0.766507
43	12	3	5	0.766507
51	12	3	5	0.766507
52	12	3	5	0.766507
53	12	3	5	0.766507
54	12	3	5	0.766507
61	12	3	5	0.766507
62	12	3	5	0.766507
11	12	4	5	0.768458
21	12	4	5	0.768458
31	12	4	5	0.768458
32	12	4	5	0.768458
41	12	4	5	0.768458
42	12	4	5	0.768458
43	12	4	5	0.768458
51	12	4	5	0.768458
52	12	4	5	0.768458
53	12	4	5	0.768458
54	12	4	5	0.768458
61	12	4	5	0.768458
62	12	4	5	0.768458
11	12	5	5	0.766507
21	12	5	5	0.766507
31	12	5	5	0.766507
32	12	5	5	0.766507
41	12	5	5	0.766507
42	12	5	5	0.766507
43	12	5	5	0.766507
51	12	5	5	0.766507
52	12	5	5	0.766507
53	12	5	5	0.766507
54	12	5	5	0.766507
61	12	5	5	0.766507
62	12	5	5	0.766507
11	12	1	2	0.232512
21	12	1	2	0.232512
31	12	1	2	0.232512
32	12	1	2	0.232512
41	12	1	2	0.232512
42	12	1	2	0.232512
43	12	1	2	0.232512
51	12	1	2	0.232512
52	12	1	2	0.232512
53	12	1	2	0.232512
54	12	1	2	0.232512
61	12	1	2	0.232512
62	12	1	2	0.232512
11	12	2	2	0.231542
21	12	2	2	0.231542
31	12	2	2	0.231542
32	12	2	2	0.231542
41	12	2	2	0.231542
42	12	2	2	0.231542
43	12	2	2	0.231542
51	12	2	2	0.231542
52	12	2	2	0.231542
53	12	2	2	0.231542
54	12	2	2	0.231542
61	12	2	2	0.231542
62	12	2	2	0.231542
11	12	3	2	0.233493
21	12	3	2	0.233493
31	12	3	2	0.233493
32	12	3	2	0.233493
41	12	3	2	0.233493
42	12	3	2	0.233493
43	12	3	2	0.233493
51	12	3	2	0.233493
52	12	3	2	0.233493
53	12	3	2	0.233493
54	12	3	2	0.233493
61	12	3	2	0.233493
62	12	3	2	0.233493
11	12	4	2	0.231542
21	12	4	2	0.231542
31	12	4	2	0.231542
32	12	4	2	0.231542
41	12	4	2	0.231542
42	12	4	2	0.231542
43	12	4	2	0.231542
51	12	4	2	0.231542
52	12	4	2	0.231542
53	12	4	2	0.231542
54	12	4	2	0.231542
61	12	4	2	0.231542
62	12	4	2	0.231542
11	12	5	2	0.233493
21	12	5	2	0.233493
31	12	5	2	0.233493
32	12	5	2	0.233493
41	12	5	2	0.233493
42	12	5	2	0.233493
43	12	5	2	0.233493
51	12	5	2	0.233493
52	12	5	2	0.233493
53	12	5	2	0.233493
54	12	5	2	0.233493
61	12	5	2	0.233493
62	12	5	2	0.233493

[HourVMTFraction] (SourceTypeID 21: Passenger Car)

Source TypeID	Road TypeID	dayID	hourID	hourVMT Fraction
21	1	5	1	0.007957
21	1	5	2	0.005448
21	1	5	3	0.004973
21	1	5	4	0.006014
21	1	5	5	0.013468
21	1	5	6	0.034281
21	1	5	7	0.054676
21	1	5	8	0.06466
21	1	5	9	0.060292
21	1	5	10	0.052697
21	1	5	11	0.050973
21	1	5	12	0.054873
21	1	5	13	0.057626
21	1	5	14	0.059009
21	1	5	15	0.064762
21	1	5	16	0.06924
21	1	5	17	0.070039
21	1	5	18	0.07009
21	1	5	19	0.05904
21	1	5	20	0.04192
21	1	5	21	0.033428
21	1	5	22	0.029157
21	1	5	23	0.02144
21	1	5	24	0.013936
21	2	5	1	0.009807
21	2	5	2	0.006923
21	2	5	3	0.00651
21	2	5	4	0.007961
21	2	5	5	0.017302
21	2	5	6	0.042783
21	2	5	7	0.060321
21	2	5	8	0.059377
21	2	5	9	0.057361
21	2	5	10	0.055026
21	2	5	11	0.052104
21	2	5	12	0.05478
21	2	5	13	0.05683
21	2	5	14	0.059985
21	2	5	15	0.065538
21	2	5	16	0.065523
21	2	5	17	0.061668
21	2	5	18	0.059173
21	2	5	19	0.054281
21	2	5	20	0.040837
21	2	5	21	0.033031
21	2	5	22	0.030836
21	2	5	23	0.024921
21	2	5	24	0.017121
21	3	5	1	0.006081
21	3	5	2	0.003952
21	3	5	3	0.003413
21	3	5	4	0.004039
21	3	5	5	0.009578
21	3	5	6	0.025656
21	3	5	7	0.04895
21	3	5	8	0.07002
21	3	5	9	0.063264
21	3	5	10	0.050335
21	3	5	11	0.049826
21	3	5	12	0.054967
21	3	5	13	0.058433
21	3	5	14	0.058019
21	3	5	15	0.063976
21	3	5	16	0.073011
21	3	5	17	0.07853
21	3	5	18	0.081166
21	3	5	19	0.063868
21	3	5	20	0.043018
21	3	5	21	0.033831
21	3	5	22	0.027454
21	3	5	23	0.017909
21	3	5	24	0.010705
21	4	5	1	0.009807
21	4	5	2	0.006923
21	4	5	3	0.00651
21	4	5	4	0.007961
21	4	5	5	0.017302
21	4	5	6	0.042783
21	4	5	7	0.060321
21	4	5	8	0.059377
21	4	5	9	0.057361
21	4	5	10	0.055026
21	4	5	11	0.052104
21	4	5	12	0.05478
21	4	5	13	0.05683
21	4	5	14	0.059985
21	4	5	15	0.065538
21	4	5	16	0.065523
21	4	5	17	0.061668
21	4	5	18	0.059173
21	4	5	19	0.054281
21	4	5	20	0.040837
21	4	5	21	0.033031
21	4	5	22	0.030836
21	4	5	23	0.024921
21	4	5	24	0.017121
21	5	5	1	0.006081
21	5	5	2	0.003952
21	5	5	3	0.003413
21	5	5	4	0.004039
21	5	5	5	0.009578
21	5	5	6	0.025656
21	5	5	7	0.04895
21	5	5	8	0.07002
21	5	5	9	0.063264
21	5	5	10	0.050335
21	5	5	11	0.049826
21	5	5	12	0.054967
21	5	5	13	0.058433
21	5	5	14	0.058019
21	5	5	15	0.063976
21	5	5	16	0.073011
21	5	5	17	0.07853
21	5	5	18	0.081166
21	5	5	19	0.063868
21	5	5	20	0.043018
21	5	5	21	0.033831
21	5	5	22	0.027454
21	5	5	23	0.017909
21	5	5	24	0.010705
21	1	2	1	0.020872
21	1	2	2	0.014804
21	1	2	3	0.013016
21	1	2	4	0.010079
21	1	2	5	0.011715
21	1	2	6	0.018691
21	1	2	7	0.027033
21	1	2	8	0.033174
21	1	2	9	0.040089
21	1	2	10	0.048519
21	1	2	11	0.05524
21	1	2	12	0.060009
21	1	2	13	0.064796
21	1	2	14	0.06555
21	1	2	15	0.064719
21	1	2	16	0.064355
21	1	2	17	0.064852
21	1	2	18	0.064713
21	1	2	19	0.061678
21	1	2	20	0.050477
21	1	2	21	0.043519
21	1	2	22	0.040777
21	1	2	23	0.035718
21	1	2	24	0.025605
21	2	2	1	0.020431
21	2	2	2	0.014508
21	2	2	3	0.012577
21	2	2	4	0.009828
21	2	2	5	0.011013
21	2	2	6	0.01751
21	2	2	7	0.025995
21	2	2	8	0.031456
21	2	2	9	0.038799
21	2	2	10	0.047714
21	2	2	11	0.054712
21	2	2	12	0.060251
21	2	2	13	0.065575
21	2	2	14	0.066506
21	2	2	15	0.065746
21	2	2	16	0.065312
21	2	2	17	0.065948
21	2	2	18	0.066767
21	2	2	19	0.064137
21	2	2	20	0.050196
21	2	2	21	0.042573
21	2	2	22	0.040589
21	2	2	23	0.036012
21	2	2	24	0.025845
21	3	2	1	0.021315
21	3	2	2	0.015101
21	3	2	3	0.013457
21	3	2	4	0.010331
21	3	2	5	0.01242
21	3	2	6	0.019876
21	3	2	7	0.028075
21	3	2	8	0.034899
21	3	2	9	0.041383
21	3	2	10	0.049326
21	3	2	11	0.05577
21	3	2	12	0.059766
21	3	2	13	0.064014
21	3	2	14	0.064591
21	3	2	15	0.063689
21	3	2	16	0.063394
21	3	2	17	0.063753
21	3	2	18	0.062652
21	3	2	19	0.05921
21	3	2	20	0.050759
21	3	2	21	0.044469
21	3	2	22	0.040966
21	3	2	23	0.035423
21	3	2	24	0.025364
21	4	2	1	0.020431
21	4	2	2	0.014508
21	4	2	3	0.012577
21	4	2	4	0.009828
21	4	2	5	0.011013
21	4	2	6	0.01751
21	4	2	7	0.025995
21	4	2	8	0.031456
21	4	2	9	0.038799
21	4	2	10	0.047714
21	4	2	11	0.054712
21	4	2	12	0.060251
21	4	2	13	0.065575
21	4	2	14	0.066506
21	4	2	15	0.065746
21	4	2	16	0.065312
21	4	2	17	0.065948
21	4	2	18	0.066767
21	4	2	19	0.064137
21	4	2	20	0.050196
21	4	2	21	0.042573
21	4	2	22	0.040589
21	4	2	23	0.036012
21	4	2	24	0.025845
21	5	2	1	0.021315
21	5	2	2	0.015101
21	5	2	3	0.013457
21	5	2	4	0.010331
21	5	2	5	0.01242
21	5	2	6	0.019876
21	5	2	7	0.028075
21	5	2	8	0.034899
21	5	2	9	0.041383
21	5	2	10	0.049326
21	5	2	11	0.05577
21	5	2	12	0.059766
21	5	2	13	0.064014
21	5	2	14	0.064591
21	5	2	15	0.063689
21	5	2	16	0.063394
21	5	2	17	0.063753
21	5	2	18	0.062652
21	5	2	19	0.05921
21	5	2	20	0.050759
21	5	2	21	0.044469
21	5	2	22	0.040966
21	5	2	23	0.035423
21	5	2	24	0.025364

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

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	15	1	2.51E-05
21	2	15	2	0
21	2	15	3	0
21	2	15	4	0
21	2	15	5	0
21	2	15	6	0

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	15	7	0.019619
21	2	15	8	0.097646
21	2	15	9	0.131977
21	2	15	10	0.203234
21	2	15	11	0.087838
21	2	15	12	0.07357
21	2	15	13	0.039194
21	2	15	14	0.083438
21	2	15	15	0.102646
21	2	15	16	0.160812
21	2	25	1	2.51E-05
21	2	25	2	0
21	2	25	3	0
21	2	25	4	0
21	2	25	5	0
21	2	25	6	0
21	2	25	7	0.019619
21	2	25	8	0.097646
21	2	25	9	0.131977
21	2	25	10	0.203234
21	2	25	11	0.087838
21	2	25	12	0.07357
21	2	25	13	0.039194
21	2	25	14	0.083438
21	2	25	15	0.102646
21	2	25	16	0.160812
21	2	35	1	2.51E-05
21	2	35	2	0
21	2	35	3	0
21	2	35	4	0
21	2	35	5	0
21	2	35	6	0
21	2	35	7	0.019619
21	2	35	8	0.097646
21	2	35	9	0.131977
21	2	35	10	0.203234
21	2	35	11	0.087838
21	2	35	12	0.07357
21	2	35	13	0.039194
21	2	35	14	0.083438
21	2	35	15	0.102646
21	2	35	16	0.160812
21	2	45	1	2.51E-05
21	2	45	2	0
21	2	45	3	0
21	2	45	4	0
21	2	45	5	0
21	2	45	6	0
21	2	45	7	0.019619
21	2	45	8	0.097646
21	2	45	9	0.131977
21	2	45	10	0.203234
21	2	45	11	0.087838
21	2	45	12	0.07357
21	2	45	13	0.039194
21	2	45	14	0.083438
21	2	45	15	0.102646
21	2	45	16	0.160812
21	2	55	1	2.51E-05
21	2	55	2	0
21	2	55	3	0
21	2	55	4	0
21	2	55	5	0
21	2	55	6	0
21	2	55	7	0.019619
21	2	55	8	0.097646
21	2	55	9	0.131977
21	2	55	10	0.203234
21	2	55	11	0.087838
21	2	55	12	0.07357
21	2	55	13	0.039194
21	2	55	14	0.083438
21	2	55	15	0.102646
21	2	55	16	0.160812
21	2	65	1	2.51E-05
21	2	65	2	0
21	2	65	3	0
21	2	65	4	0
21	2	65	5	0
21	2	65	6	0
21	2	65	7	0.019619
21	2	65	8	0.097646
21	2	65	9	0.131977
21	2	65	10	0.203234
21	2	65	11	0.087838
21	2	65	12	0.07357
21	2	65	13	0.039194
21	2	65	14	0.083438
21	2	65	15	0.102646
21	2	65	16	0.160812
21	2	75	1	1.98E-05
21	2	75	2	0
21	2	75	3	0
21	2	75	4	0
21	2	75	5	0
21	2	75	6	0
21	2	75	7	0
21	2	75	8	0
21	2	75	9	0
21	2	75	10	0.057069
21	2	75	11	0.140623
21	2	75	12	0.248507
21	2	75	13	0.169045
21	2	75	14	0.075169
21	2	75	15	0.111641
21	2	75	16	0.197927
21	2	85	1	1.98E-05
21	2	85	2	0
21	2	85	3	0
21	2	85	4	0
21	2	85	5	0
21	2	85	6	0
21	2	85	7	0
21	2	85	8	0
21	2	85	9	0
21	2	85	10	0.057069
21	2	85	11	0.140623
21	2	85	12	0.248507
21	2	85	13	0.169045
21	2	85	14	0.075169
21	2	85	15	0.111641
21	2	85	16	0.197927
21	2	95	1	1.98E-05
21	2	95	2	0
21	2	95	3	0
21	2	95	4	0
21	2	95	5	0
21	2	95	6	0
21	2	95	7	0
21	2	95	8	0
21	2	95	9	0
21	2	95	10	0.057069
21	2	95	11	0.140623
21	2	95	12	0.248507
21	2	95	13	0.169045
21	2	95	14	0.075169
21	2	95	15	0.111641
21	2	95	16	0.197927
21	2	105	1	1.78E-05
21	2	105	2	0
21	2	105	3	0
21	2	105	4	0
21	2	105	5	0
21	2	105	6	0
21	2	105	7	0
21	2	105	8	0
21	2	105	9	0
21	2	105	10	0.059729
21	2	105	11	0.129919
21	2	105	12	0.24385
21	2	105	13	0.049713
21	2	105	14	0.140357
21	2	105	15	0.191024
21	2	105	16	0.18539
21	2	115	1	1.78E-05
21	2	115	2	0
21	2	115	3	0
21	2	115	4	0
21	2	115	5	0
21	2	115	6	0
21	2	115	7	0
21	2	115	8	0
21	2	115	9	0
21	2	115	10	0.059729
21	2	115	11	0.129919
21	2	115	12	0.24385
21	2	115	13	0.049713
21	2	115	14	0.140357
21	2	115	15	0.191024
21	2	115	16	0.18539
21	2	125	1	1.78E-05
21	2	125	2	0
21	2	125	3	0
21	2	125	4	0
21	2	125	5	0
21	2	125	6	0
21	2	125	7	0
21	2	125	8	0
21	2	125	9	0
21	2	125	10	0.059729
21	2	125	11	0.129919
21	2	125	12	0.24385
21	2	125	13	0.049713
21	2	125	14	0.140357
21	2	125	15	0.191024
21	2	125	16	0.18539
21	2	135	1	1.78E-05
21	2	135	2	0
21	2	135	3	0
21	2	135	4	0
21	2	135	5	0
21	2	135	6	0
21	2	135	7	0
21	2	135	8	0
21	2	135	9	0
21	2	135	10	0.059729
21	2	135	11	0.129919
21	2	135	12	0.24385
21	2	135	13	0.049713
21	2	135	14	0.140357
21	2	135	15	0.191024
21	2	135	16	0.18539
21	2	145	1	1.78E-05
21	2	145	2	0
21	2	145	3	0
21	2	145	4	0
21	2	145	5	0
21	2	145	6	0
21	2	145	7	0
21	2	145	8	0
21	2	145	9	0
21	2	145	10	0.059729
21	2	145	11	0.129919
21	2	145	12	0.24385
21	2	145	13	0.049713
21	2	145	14	0.140357
21	2	145	15	0.191024
21	2	145	16	0.18539
21	2	155	1	1.78E-05
21	2	155	2	0
21	2	155	3	0
21	2	155	4	0
21	2	155	5	0
21	2	155	6	0
21	2	155	7	0
21	2	155	8	0
21	2	155	9	0
21	2	155	10	0.059729
21	2	155	11	0.129919
21	2	155	12	0.24385
21	2	155	13	0.049713
21	2	155	14	0.140357
21	2	155	15	0.191024
21	2	155	16	0.18539
21	2	165	1	1.69E-05
21	2	165	2	0
21	2	165	3	0
21	2	165	4	0
21	2	165	5	0
21	2	165	6	0
21	2	165	7	0
21	2	165	8	0
21	2	165	9	0
21	2	165	10	0
21	2	165	11	0
21	2	165	12	0.000288
21	2	165	13	0.094046
21	2	165	14	0.274366
21	2	165	15	0.241766
21	2	165	16	0.389518
21	2	175	1	1.69E-05
21	2	175	2	0
21	2	175	3	0
21	2	175	4	0
21	2	175	5	0
21	2	175	6	0
21	2	175	7	0
21	2	175	8	0
21	2	175	9	0
21	2	175	10	0
21	2	175	11	0

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	175	12	0.000288
21	2	175	13	0.094046
21	2	175	14	0.274366
21	2	175	15	0.241766
21	2	175	16	0.389518
21	2	185	1	1.69E-05
21	2	185	2	0
21	2	185	3	0
21	2	185	4	0
21	2	185	5	0
21	2	185	6	0
21	2	185	7	0
21	2	185	8	0
21	2	185	9	0
21	2	185	10	0
21	2	185	11	0
21	2	185	12	0.000288
21	2	185	13	0.094046
21	2	185	14	0.274366
21	2	185	15	0.241766
21	2	185	16	0.389518
21	2	195	1	2.51E-05
21	2	195	2	0
21	2	195	3	0
21	2	195	4	0
21	2	195	5	0
21	2	195	6	0
21	2	195	7	0.019619
21	2	195	8	0.097646
21	2	195	9	0.131977
21	2	195	10	0.203234
21	2	195	11	0.087838
21	2	195	12	0.07357
21	2	195	13	0.039194
21	2	195	14	0.083438
21	2	195	15	0.102646
21	2	195	16	0.160812
21	2	205	1	2.51E-05
21	2	205	2	0
21	2	205	3	0
21	2	205	4	0
21	2	205	5	0
21	2	205	6	0
21	2	205	7	0.019619
21	2	205	8	0.097646
21	2	205	9	0.131977
21	2	205	10	0.203234
21	2	205	11	0.087838
21	2	205	12	0.07357
21	2	205	13	0.039194
21	2	205	14	0.083438
21	2	205	15	0.102646
21	2	205	16	0.160812
21	2	215	1	2.51E-05
21	2	215	2	0
21	2	215	3	0
21	2	215	4	0
21	2	215	5	0
21	2	215	6	0
21	2	215	7	0.019619
21	2	215	8	0.097646
21	2	215	9	0.131977
21	2	215	10	0.203234
21	2	215	11	0.087838
21	2	215	12	0.07357
21	2	215	13	0.039194
21	2	215	14	0.083438
21	2	215	15	0.102646
21	2	215	16	0.160812
21	2	225	1	2.51E-05
21	2	225	2	0
21	2	225	3	0
21	2	225	4	0
21	2	225	5	0
21	2	225	6	0
21	2	225	7	0.019619
21	2	225	8	0.097646
21	2	225	9	0.131977
21	2	225	10	0.203234
21	2	225	11	0.087838
21	2	225	12	0.07357
21	2	225	13	0.039194
21	2	225	14	0.083438
21	2	225	15	0.102646
21	2	225	16	0.160812
21	2	235	1	2.51E-05
21	2	235	2	0
21	2	235	3	0
21	2	235	4	0
21	2	235	5	0
21	2	235	6	0
21	2	235	7	0.019619
21	2	235	8	0.097646
21	2	235	9	0.131977
21	2	235	10	0.203234
21	2	235	11	0.087838
21	2	235	12	0.07357
21	2	235	13	0.039194
21	2	235	14	0.083438
21	2	235	15	0.102646
21	2	235	16	0.160812
21	2	245	1	2.51E-05
21	2	245	2	0
21	2	245	3	0
21	2	245	4	0
21	2	245	5	0
21	2	245	6	0
21	2	245	7	0.019619
21	2	245	8	0.097646
21	2	245	9	0.131977
21	2	245	10	0.203234
21	2	245	11	0.087838
21	2	245	12	0.07357
21	2	245	13	0.039194
21	2	245	14	0.083438
21	2	245	15	0.102646
21	2	245	16	0.160812
21	2	12	1	2.51E-05
21	2	12	2	0
21	2	12	3	0
21	2	12	4	0
21	2	12	5	0
21	2	12	6	0
21	2	12	7	0.019619
21	2	12	8	0.097646
21	2	12	9	0.131977
21	2	12	10	0.203234
21	2	12	11	0.087838
21	2	12	12	0.07357
21	2	12	13	0.039194
21	2	12	14	0.083438
21	2	12	15	0.102646
21	2	12	16	0.160812
21	2	22	1	2.51E-05
21	2	22	2	0
21	2	22	3	0
21	2	22	4	0
21	2	22	5	0
21	2	22	6	0
21	2	22	7	0.019619
21	2	22	8	0.097646
21	2	22	9	0.131977
21	2	22	10	0.203234
21	2	22	11	0.087838
21	2	22	12	0.07357
21	2	22	13	0.039194
21	2	22	14	0.083438
21	2	22	15	0.102646
21	2	22	16	0.160812
21	2	32	1	2.51E-05
21	2	32	2	0
21	2	32	3	0
21	2	32	4	0
21	2	32	5	0
21	2	32	6	0
21	2	32	7	0.019619
21	2	32	8	0.097646
21	2	32	9	0.131977
21	2	32	10	0.203234
21	2	32	11	0.087838
21	2	32	12	0.07357
21	2	32	13	0.039194
21	2	32	14	0.083438
21	2	32	15	0.102646
21	2	32	16	0.160812
21	2	42	1	2.51E-05
21	2	42	2	0
21	2	42	3	0
21	2	42	4	0
21	2	42	5	0
21	2	42	6	0
21	2	42	7	0.019619
21	2	42	8	0.097646
21	2	42	9	0.131977
21	2	42	10	0.203234
21	2	42	11	0.087838
21	2	42	12	0.07357
21	2	42	13	0.039194
21	2	42	14	0.083438
21	2	42	15	0.102646
21	2	42	16	0.160812
21	2	52	1	2.51E-05
21	2	52	2	0
21	2	52	3	0
21	2	52	4	0
21	2	52	5	0
21	2	52	6	0
21	2	52	7	0.019619
21	2	52	8	0.097646
21	2	52	9	0.131977
21	2	52	10	0.203234
21	2	52	11	0.087838
21	2	52	12	0.07357
21	2	52	13	0.039194
21	2	52	14	0.083438
21	2	52	15	0.102646
21	2	52	16	0.160812
21	2	62	1	2.51E-05
21	2	62	2	0
21	2	62	3	0
21	2	62	4	0
21	2	62	5	0
21	2	62	6	0
21	2	62	7	0.019619
21	2	62	8	0.097646
21	2	62	9	0.131977
21	2	62	10	0.203234
21	2	62	11	0.087838
21	2	62	12	0.07357
21	2	62	13	0.039194
21	2	62	14	0.083438
21	2	62	15	0.102646
21	2	62	16	0.160812
21	2	72	1	2.51E-05
21	2	72	2	0
21	2	72	3	0
21	2	72	4	0
21	2	72	5	0
21	2	72	6	0
21	2	72	7	0.019619
21	2	72	8	0.097646
21	2	72	9	0.131977
21	2	72	10	0.203234
21	2	72	11	0.087838
21	2	72	12	0.07357
21	2	72	13	0.039194
21	2	72	14	0.083438
21	2	72	15	0.102646
21	2	72	16	0.160812
21	2	82	1	2.51E-05
21	2	82	2	0
21	2	82	3	0
21	2	82	4	0
21	2	82	5	0
21	2	82	6	0
21	2	82	7	0.019619
21	2	82	8	0.097646
21	2	82	9	0.131977
21	2	82	10	0.203234
21	2	82	11	0.087838
21	2	82	12	0.07357
21	2	82	13	0.039194
21	2	82	14	0.083438
21	2	82	15	0.102646
21	2	82	16	0.160812
21	2	92	1	2.51E-05
21	2	92	2	0
21	2	92	3	0
21	2	92	4	0
21	2	92	5	0
21	2	92	6	0
21	2	92	7	0.019619
21	2	92	8	0.097646
21	2	92	9	0.131977
21	2	92	10	0.203234
21	2	92	11	0.087838
21	2	92	12	0.07357
21	2	92	13	0.039194
21	2	92	14	0.083438
21	2	92	15	0.102646
21	2	92	16	0.160812

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	102	1	2.51E-05
21	2	102	2	0
21	2	102	3	0
21	2	102	4	0
21	2	102	5	0
21	2	102	6	0
21	2	102	7	0.019619
21	2	102	8	0.097646
21	2	102	9	0.131977
21	2	102	10	0.203234
21	2	102	11	0.087838
21	2	102	12	0.07357
21	2	102	13	0.039194
21	2	102	14	0.083438
21	2	102	15	0.102646
21	2	102	16	0.160812
21	2	112	1	2.51E-05
21	2	112	2	0
21	2	112	3	0
21	2	112	4	0
21	2	112	5	0
21	2	112	6	0
21	2	112	7	0.019619
21	2	112	8	0.097646
21	2	112	9	0.131977
21	2	112	10	0.203234
21	2	112	11	0.087838
21	2	112	12	0.07357
21	2	112	13	0.039194
21	2	112	14	0.083438
21	2	112	15	0.102646
21	2	112	16	0.160812
21	2	122	1	2.51E-05
21	2	122	2	0
21	2	122	3	0
21	2	122	4	0
21	2	122	5	0
21	2	122	6	0
21	2	122	7	0.019619
21	2	122	8	0.097646
21	2	122	9	0.131977
21	2	122	10	0.203234
21	2	122	11	0.087838
21	2	122	12	0.07357
21	2	122	13	0.039194
21	2	122	14	0.083438
21	2	122	15	0.102646
21	2	122	16	0.160812
21	2	132	1	2.51E-05
21	2	132	2	0
21	2	132	3	0
21	2	132	4	0
21	2	132	5	0
21	2	132	6	0
21	2	132	7	0.019619
21	2	132	8	0.097646
21	2	132	9	0.131977
21	2	132	10	0.203234
21	2	132	11	0.087838
21	2	132	12	0.07357
21	2	132	13	0.039194
21	2	132	14	0.083438
21	2	132	15	0.102646
21	2	132	16	0.160812
21	2	142	1	2.51E-05
21	2	142	2	0
21	2	142	3	0
21	2	142	4	0
21	2	142	5	0
21	2	142	6	0
21	2	142	7	0.019619
21	2	142	8	0.097646
21	2	142	9	0.131977
21	2	142	10	0.203234
21	2	142	11	0.087838
21	2	142	12	0.07357
21	2	142	13	0.039194
21	2	142	14	0.083438
21	2	142	15	0.102646
21	2	142	16	0.160812
21	2	152	1	2.51E-05
21	2	152	2	0
21	2	152	3	0
21	2	152	4	0
21	2	152	5	0

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	152	6	0
21	2	152	7	0.019619
21	2	152	8	0.097646
21	2	152	9	0.131977
21	2	152	10	0.203234
21	2	152	11	0.087838
21	2	152	12	0.07357
21	2	152	13	0.039194
21	2	152	14	0.083438
21	2	152	15	0.102646
21	2	152	16	0.160812
21	2	162	1	2.51E-05
21	2	162	2	0
21	2	162	3	0
21	2	162	4	0
21	2	162	5	0
21	2	162	6	0
21	2	162	7	0.019619
21	2	162	8	0.097646
21	2	162	9	0.131977
21	2	162	10	0.203234
21	2	162	11	0.087838
21	2	162	12	0.07357
21	2	162	13	0.039194
21	2	162	14	0.083438
21	2	162	15	0.102646
21	2	162	16	0.160812
21	2	172	1	2.51E-05
21	2	172	2	0
21	2	172	3	0
21	2	172	4	0
21	2	172	5	0
21	2	172	6	0
21	2	172	7	0.019619
21	2	172	8	0.097646
21	2	172	9	0.131977
21	2	172	10	0.203234
21	2	172	11	0.087838
21	2	172	12	0.07357
21	2	172	13	0.039194
21	2	172	14	0.083438
21	2	172	15	0.102646
21	2	172	16	0.160812
21	2	182	1	2.51E-05
21	2	182	2	0
21	2	182	3	0
21	2	182	4	0
21	2	182	5	0
21	2	182	6	0
21	2	182	7	0.019619
21	2	182	8	0.097646
21	2	182	9	0.131977
21	2	182	10	0.203234
21	2	182	11	0.087838
21	2	182	12	0.07357
21	2	182	13	0.039194
21	2	182	14	0.083438
21	2	182	15	0.102646
21	2	182	16	0.160812
21	2	192	1	2.51E-05
21	2	192	2	0
21	2	192	3	0
21	2	192	4	0
21	2	192	5	0
21	2	192	6	0
21	2	192	7	0.019619
21	2	192	8	0.097646
21	2	192	9	0.131977
21	2	192	10	0.203234
21	2	192	11	0.087838
21	2	192	12	0.07357
21	2	192	13	0.039194
21	2	192	14	0.083438
21	2	192	15	0.102646
21	2	192	16	0.160812
21	2	202	1	2.51E-05
21	2	202	2	0
21	2	202	3	0
21	2	202	4	0
21	2	202	5	0
21	2	202	6	0
21	2	202	7	0.019619
21	2	202	8	0.097646
21	2	202	9	0.131977
21	2	202	10	0.203234

Source TypeID	Road TypeID	Hour DayID	avgSpeed BinID	avgSpeed Fraction
21	2	202	11	0.087838
21	2	202	12	0.07357
21	2	202	13	0.039194
21	2	202	14	0.083438
21	2	202	15	0.102646
21	2	202	16	0.160812
21	2	212	1	2.51E-05
21	2	212	2	0
21	2	212	3	0
21	2	212	4	0
21	2	212	5	0
21	2	212	6	0
21	2	212	7	0.019619
21	2	212	8	0.097646
21	2	212	9	0.131977
21	2	212	10	0.203234
21	2	212	11	0.087838
21	2	212	12	0.07357
21	2	212	13	0.039194
21	2	212	14	0.083438
21	2	212	15	0.102646
21	2	212	16	0.160812
21	2	222	1	2.51E-05
21	2	222	2	0
21	2	222	3	0
21	2	222	4	0
21	2	222	5	0
21	2	222	6	0
21	2	222	7	0.019619
21	2	222	8	0.097646
21	2	222	9	0.131977
21	2	222	10	0.203234
21	2	222	11	0.087838
21	2	222	12	0.07357
21	2	222	13	0.039194
21	2	222	14	0.083438
21	2	222	15	0.102646
21	2	222	16	0.160812
21	2	232	1	2.51E-05
21	2	232	2	0
21	2	232	3	0
21	2	232	4	0
21	2	232	5	0
21	2	232	6	0
21	2	232	7	0.019619
21	2	232	8	0.097646
21	2	232	9	0.131977
21	2	232	10	0.203234
21	2	232	11	0.087838
21	2	232	12	0.07357
21	2	232	13	0.039194
21	2	232	14	0.083438
21	2	232	15	0.102646
21	2	232	16	0.160812
21	2	242	1	2.51E-05
21	2	242	2	0
21	2	242	3	0
21	2	242	4	0
21	2	242	5	0
21	2	242	6	0
21	2	242	7	0.019619
21	2	242	8	0.097646
21	2	242	9	0.131977
21	2	242	10	0.203234
21	2	242	11	0.087838
21	2	242	12	0.07357
21	2	242	13	0.039194
21	2	242	14	0.083438
21	2	242	15	0.102646
21	2	242	16	0.160812

[AVFT] (SourceTypeID 42: Transit Bus)

Source TypeID	Model YearID	Fuel TypeID	Eng TechID	fuelEng Fraction
42	1960	2	1	1
42	1961	2	1	1
42	1962	2	1	1
42	1963	2	1	1
42	1964	2	1	1
42	1965	2	1	1
42	1966	2	1	1
42	1967	2	1	1
42	1968	2	1	1
42	1969	2	1	1
42	1970	2	1	1
42	1971	2	1	1
42	1972	2	1	1
42	1973	2	1	1
42	1974	2	1	1
42	1975	2	1	1
42	1976	2	1	1
42	1977	2	1	1
42	1978	2	1	1
42	1979	2	1	1
42	1980	2	1	1
42	1981	2	1	1
42	1982	2	1	1
42	1983	2	1	1
42	1984	2	1	1
42	1985	2	1	1
42	1986	2	1	1
42	1987	2	1	1
42	1988	2	1	1
42	1989	2	1	1
42	1990	2	1	0.993
42	1990	3	1	0.007
42	1991	2	1	0.982
42	1991	3	1	0.018
42	1992	1	1	0.01
42	1992	2	1	0.944
42	1992	3	1	0.046
42	1993	1	1	0.01
42	1993	2	1	0.914
42	1993	3	1	0.076
42	1994	1	1	0.01
42	1994	2	1	0.905
42	1994	3	1	0.085
42	1995	1	1	0.01
42	1995	2	1	0.837
42	1995	3	1	0.153
42	1996	1	1	0.01
42	1996	2	1	0.892
42	1996	3	1	0.098
42	1997	1	1	0
42	1997	2	1	1
42	1997	3	1	0
42	1998	1	1	0
42	1998	2	1	0
42	1998	3	1	1
42	1999	1	1	0
42	1999	2	1	0
42	1999	3	1	1
42	2000	1	1	0
42	2000	2	1	0
42	2000	3	1	1
42	2001	1	1	0
42	2001	2	1	0
42	2001	3	1	1
42	2002	1	1	0
42	2002	2	1	0
42	2002	3	1	1
42	2003	1	1	0
42	2003	2	1	0.08
42	2003	3	1	0.92
42	2004	1	1	0
42	2004	2	1	0.397059
42	2004	3	1	0.602941
42	2005	1	1	0
42	2005	2	1	1
42	2005	3	1	0
42	2006	1	1	0.089744
42	2006	2	1	0.128205
42	2006	3	1	0.782051
42	2007	1	1	0.149533
42	2007	2	1	0.850467
42	2007	3	1	0
42	2008	1	1	0
42	2008	2	1	0.479592
42	2008	3	1	0.520408
42	2009	1	1	0.121212
42	2009	2	1	0.030303
42	2009	3	1	0.848485
42	2010	1	1	0
42	2010	2	1	1
42	2010	3	1	0
42	2011	1	1	0
42	2011	2	1	1
42	2011	3	1	0
42	2012	1	1	0
42	2012	2	1	1
42	2012	3	1	0
42	2013	1	1	0
42	2013	2	1	1
42	2013	3	1	0
42	2014	1	1	0
42	2014	2	1	1
42	2014	3	1	0
42	2015	1	1	0
42	2015	2	1	1
42	2015	3	1	0
42	2016	1	1	0
42	2016	2	1	1
42	2016	3	1	0
42	2017	1	1	0
42	2017	2	1	1
42	2017	3	1	0
42	2018	1	1	0
42	2018	2	1	1
42	2018	3	1	0
42	2019	1	1	0
42	2019	2	1	1
42	2019	3	1	0
42	2020	1	1	0
42	2020	2	1	1
42	2020	3	1	0
42	2021	1	1	0
42	2021	2	1	1
42	2021	3	1	0
42	2022	1	1	0
42	2022	2	1	1
42	2022	3	1	0
42	2023	1	1	0
42	2023	2	1	1
42	2023	3	1	0
42	2024	1	1	0
42	2024	2	1	1
42	2024	3	1	0
42	2025	1	1	0
42	2025	2	1	1
42	2025	3	1	0
42	2026	1	1	0
42	2026	2	1	1
42	2026	3	1	0
42	2027	1	1	0
42	2027	2	1	1
42	2027	3	1	0
42	2028	1	1	0
42	2028	2	1	1
42	2028	3	1	0
42	2029	1	1	0
42	2029	2	1	1
42	2029	3	1	0
42	2030	1	1	0
42	2030	2	1	1
42	2030	3	1	0
42	2031	1	1	0
42	2031	2	1	1
42	2031	3	1	0
42	2032	1	1	0
42	2032	2	1	1
42	2032	3	1	0
42	2033	1	1	0
42	2033	2	1	1
42	2033	3	1	0
42	2034	1	1	0
42	2034	2	1	1
42	2034	3	1	0
42	2035	1	1	0
42	2035	2	1	1
42	2035	3	1	0
42	2036	1	1	0
42	2036	2	1	1
42	2036	3	1	0
42	2037	1	1	0
42	2037	2	1	1
42	2037	3	1	0
42	2038	1	1	0
42	2038	2	1	1
42	2038	3	1	0
42	2039	1	1	0
42	2039	2	1	1
42	2039	3	1	0
42	2040	1	1	0
42	2040	2	1	1
42	2040	3	1	0
42	2041	1	1	0
42	2041	2	1	1
42	2041	3	1	0
42	2042	1	1	0
42	2042	2	1	1
42	2042	3	1	0
42	2043	1	1	0
42	2043	2	1	1
42	2043	3	1	0
42	2044	1	1	0
42	2044	2	1	1
42	2044	3	1	0
42	2045	1	1	0
42	2045	2	1	1
42	2045	3	1	0
42	2046	1	1	0
42	2046	2	1	1
42	2046	3	1	0
42	2047	1	1	0
42	2047	2	1	1
42	2047	3	1	0
42	2048	1	1	0
42	2048	2	1	1
42	2048	3	1	0
42	2049	1	1	0
42	2049	2	1	1
42	2049	3	1	0
42	2050	1	1	0
42	2050	2	1	1
42	2050	3	1	0

[CountyYear]

countyID	yearID	refuelingVaporProgramAdjust	refuelingSpillProgramAdjust
4013	1999	0.46	0.46
4013	2000	0.46	0.46
4013	2001	0.46	0.46
4013	2002	0.46	0.46
4013	2003	0.46	0.46
4013	2004	0.46	0.46
4013	2005	0.46	0.46
4013	2006	0.46	0.46
4013	2007	0.46	0.46
4013	2008	0.46	0.46
4013	2009	0.46	0.46
4013	2010	0.46	0.46
4013	2011	0.46	0.46
4013	2012	0.46	0.46
4013	2013	0.46	0.46
4013	2014	0.46	0.46
4013	2015	0.46	0.46
4013	2016	0.46	0.46
4013	2017	0.46	0.46
4013	2018	0.46	0.46
4013	2019	0.46	0.46
4013	2020	0.46	0.46
4013	2021	0.46	0.46
4013	2022	0.46	0.46
4013	2023	0.46	0.46
4013	2024	0.46	0.46
4013	2025	0.46	0.46
4013	2026	0.46	0.46
4013	2027	0.46	0.46
4013	2028	0.46	0.46
4013	2029	0.46	0.46
4013	2030	0.46	0.46
4013	2031	0.46	0.46
4013	2032	0.46	0.46
4013	2033	0.46	0.46
4013	2034	0.46	0.46
4013	2035	0.46	0.46
4013	2036	0.46	0.46
4013	2037	0.46	0.46
4013	2038	0.46	0.46
4013	2039	0.46	0.46
4013	2040	0.46	0.46
4013	2041	0.46	0.46
4013	2042	0.46	0.46
4013	2043	0.46	0.46
4013	2044	0.46	0.46
4013	2045	0.46	0.46
4013	2046	0.46	0.46
4013	2047	0.46	0.46
4013	2048	0.46	0.46
4013	2049	0.46	0.46
4013	2050	0.46	0.46

NEWS

for immediate release

MARICOPA COUNTY
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Phoenix, AZ 85004
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Emissions Inventory Public Review Draft Released

PHOENIX, January 22, 2014 – The Maricopa County Air Quality Department (MCAQD) today released its draft **2011 Periodic Emissions Inventory for Ozone Precursors**. The inventory includes emission estimates for volatile organic compounds (VOC), nitrogen oxides (NO_x) and carbon monoxide (CO). Emissions are calculated for both Maricopa County and the eight-hour ozone nonattainment area. Annual totals as well as season-day emissions are provided for all source categories.

The emissions inventory report will now undergo a 30-day public review period. The document is available in electronic format (PDF files) on the department's website at:
http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx

The main body of the report consists of six chapters:

Chapter 1: Introduction	(overview and summary of all source categories)
Chapter 2: Point sources	(large manufacturing facilities, power plants, etc.)
Chapter 3: Area sources	(widespread similar sources, such as fuel combustion, fires, etc.)
Chapter 4: Nonroad mobile sources	(aircraft, locomotives, lawn mowers, tractors, etc.)
Chapter 5: Onroad mobile sources	(cars, trucks, other vehicles, etc.)
Chapter 6: Biogenic sources	(crops, indigenous vegetation, landscaping, etc.)

MCAQD will hold a public workshop to discuss the draft emissions inventory report on Friday, February 14, 2014. The workshop will begin at 2:00 PM in the fifth-floor classroom (Suite 560) at the department's offices at 1001 N. Central Ave. in Phoenix.

**All visitors to the MCAQD office located at 1001 N. Central Ave. will need to check-in at the reception area in suite 125 and then proceed to the 5th floor classroom.*

The department is also accepting written comments on the draft report through the close of business on Friday, February 21, 2014. Written comments may be submitted (via US mail or email) to:

Maricopa County Air Quality Department
Emissions Inventory Unit
1001 N. Central Ave. Suite 595
Phoenix, AZ 85004
E-mail: EmisInv@mail.maricopa.gov

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About Maricopa County Air Quality Department

The Maricopa County Air Quality Department is a regulatory agency whose goal is to ensure federal clean air standards are achieved and maintained for the residents and visitors of Maricopa County. The department is governed by the Maricopa County Board of Supervisors and follows air quality standards set forth by the federal Clean Air Act.

Calendar

<	February 2014					>
S	M	T	W	T	F	S
26	27	28	29	30	31	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	1
2	3	4	5	6	7	8

Public Workshop

Air Quality Department, Bob Huhn, PIO

The Maricopa County Air Quality Department is holding a public workshop to discuss the draft 2011 Periodic Emissions Inventory for Ozone Precursors, published in January 2014.

The inventory includes emissions estimates for volatile organic compounds (VOC), nitrogen oxides (NOx) and carbon monoxide (CO). Emissions are calculated for both Maricopa County and the eight-hour ozone nonattainment area. Annual totals as well as season-day emissions are provided for all source categories.

The emissions inventory report will undergo a 30-day public review period. The document is available in electronic format (PDF files) on the department's website (see link below).

The department is accepting written comments on the draft emissions inventory report through the close of business on Friday, February 21, 2014.

The public workshop is an informal meeting for all interested parties, is free of charge, and requires no advance registration or RSVP.

*All visitors to the MCAQD offices at 1001 N. Central Ave, Phoenix, AZ are kindly requested to check in at the reception area in Suite 125.

Date: 2/14/2014
Time: 2:00 PM
Registration Required: No
Fee: None

More Info: http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/reports/Default.aspx
Contact: Bob Downing
Emissions Inventory Unit Manager
602-506-6790
bdowning@mail.maricopa.gov
Location: Maricopa County Air Quality Department

Address:
1001 N. Central Ave. Suite 125
Phoenix, AZ 85004

Maricopa County
Air Quality Department

2011 Periodic Emissions Inventory for Ozone Precursors

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

ADDENDUM

August 2015

2011 Periodic Emissions Inventory for Ozone Precursors

ADDENDUM

August 2015

Table of Contents

2011 Periodic Emissions Inventory for Ozone Precursors

ADDENDUM

August 2015

1. Background and Introduction

This addendum serves as a supplement to the 2011 Periodic Emissions Inventory for Ozone Precursors for the Maricopa County, Arizona, Eight-Hour Ozone Nonattainment Area, published in February 2014, and included as part of the *MAG 2014 Eight-Hour Ozone Plan – Submittal of Marginal Area Requirements for the Maricopa Nonattainment Area* submitted to EPA in June 2014. This document has been developed by the Maricopa County Air Quality Department (MCAQD) for three purposes:

- It adds a facility to the list of available Emission Reduction Credits (ERCs) in the Arizona Emissions Bank.
- In response to inquiries from EPA staff, it provides a "recasting" of the emissions calculations to develop an ozone season-day inventory reflecting the June–August 2011 period (vs. July–September addressed in the original Periodic Emissions Inventory [PEI] report).
- It provides further details on facility-specific emissions levels from County-permitted sources that are reflected in the original PEI report as area-source (nonpoint) emissions in Chapter 3.

Each of the above points is discussed in further detail below. Where applicable, the changes that affect (annual and/or season-day) emissions estimates for a particular source category are provided in summary tables. This Addendum concludes with a detailed table summarizing emissions for the eight-hour ozone nonattainment area (NAA), revised to reflect the two analyses described above.

Note that shaded cells in the tables below indicate emissions values that have been revised from the original PEI report. Where applicable, table and page numbers from the originally published 2011 Periodic Emissions Inventory document published in February 2014 are noted parenthetically in the table captions.

2. Availability of Additional Emission Reduction Credits (ERCs)

Since the original publication of the 2011 Periodic Emissions Inventory for Ozone Precursors in February 2014, additional emissions reduction credits (ERCs) have been added to the Arizona Emissions Bank. Penn Racquet Sports, a sports-ball manufacturing facility located within the eight-hour ozone nonattainment area, closed permanently in 2009, and its ERCs have been added to the Arizona Emissions Bank. Table A1 below lists the currently available emission reduction credits, while Table A2 provides updated annual and ozone season-day emissions estimates for the eight-hour ozone nonattainment area.

These newly available ERCs have also been incorporated into the base-year and future-year emissions inventories used by the Maricopa Association of Governments (MAG) for the modeling exercises conducted in developing the moderate-area ozone State Implementation Plan (SIP).

Table A1. Emission reduction credits as of December 31, 2011. (cf. original Table 2.5–1, p. 14)

Facility/ Current Owner	Reduction Date	Emission reduction credits (tons/yr) VOC	NO_x	CO
Freescale Semiconductor, Inc.	3/1/2004	17.1	9.8	15.3
Grey K Envl Fund LP	12/11/2006	80.0		
Woodstuff Manufacturing	11/30/2007	17.6		
Penn Racquet Sports Inc.	3/06/2009	98.33	4.34	
TOTAL:		**213.03**	**14.14**	**15.3**

As in the original 2011 PEI report, season-day emissions from ERCs have been estimated by dividing annual totals by 365, as these are presumed equally distributed throughout the year. Table A2 provides a summary of point source emissions for the eight-hour ozone nonattainment area, including emission reduction credits.

Table A2. Revised annual and season-day point source emissions for the eight-hour ozone nonattainment area, including emission reduction credits.

	Annual (tons/yr)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
Point Sources	653.84	1,744.32	1,063.18	4,279.8	15,353.4	9,632.0
Emission Reduction Credits	213.03	14.14	15.30	1,167.3	77.5	83.8
Totals:	**866.87**	**1,758.46**	**1,078.48**	**5,447.1**	**15,430.9**	**9,715.8**

3. "Recasting" the 2011 Ozone Season-day Inventory for the Eight-Hour Ozone Nonattainment Area

3.1 Identifying an Alternative Time Period for the 2011 Ozone Season

For this exercise, MCAQD and MAG revisited the 2011 Periodic Emissions Inventory (PEI) originally prepared in 2014, to investigate if there were any significant differences in ozone season-day emissions when considering an ozone season different from the July–September period defined in the original 2011 PEI. To identify an alternative period deemed more representative of the actual ozone season, calendar year 2011 data on average and maximum Air Quality Index (AQI) values, as well as information on the incidence of ozone exceedances, were analyzed. The base data is shown below in Table A3.

Table A3. Average and maximum AQI values, and frequency of ozone exceedances in 2011, by month.

Month	Average Daily AQI Value	Maximum AQI Value	Number of Exceedances
February	42	49	0
March	48	61	0
April	63	100	0
May	70	122	2
June	85	142	9
July	69	122	2
August	70	122	4
September	60	119	1
October	44	64	0

From the above information, three-month rolling averages were calculated for each parameter, in order to identify the most representative three-month period for the ozone season. Results are shown in Table A4; maximum values in each column are shown in **bold.**

Table A4. Three-month rolling averages of monthly AQI and exceedance data for 2011.

Three-month period	Average Daily AQI Value	Maximum AQI Value	Average Number of Exceedances	Percentage of All 2011 Exceedances
February–April	51.09	70.00	0.0	0%
March–May	60.36	94.33	0.67	11%
April–June	72.52	121.33	3.67	61%
May–July	74.39	**128.67**	4.33	72%
June–August	**74.44**	**128.67**	**5.0**	**83%**
July–September	66.10	121.00	2.33	39%
August–October	57.94	101.67	1.67	28%

The above table indicates that the rolling three-month average for each of the parameters analyzed reaches its maximum value for the June through August time period. Thus, this time period is considered representative of the 2011 ozone season for the Phoenix area, and used in this "recasting" exercise to assess the impact of redefining the ozone season on overall emissions in the 2011 PEI.

3.2 Recalculating the 2011 Ozone Season-day Inventory

Each source category contained in the original 2011 ozone precursor emissions inventory was reviewed, and season-day emissions re-calculated where needed, depending on the methodology used to derive the original emissions estimates for that source category. The derivation of the "recast" emissions values for each source category type are described in more detail below. At the end of this section, Table A16 presents a comparison of season-day emissions for each source category, including the values contained in the original 2011 PEI report (for the July–September period), as well as the "recast" emissions reflecting the three-month period covering June through August.

3.2.1 Point and Area Sources

When analyzing season-day emissions calculations for the recasting exercise, each point and nonpoint (area) source type could be classified into one of the following categories:

- Sources whose emissions were derived from **actual activity data** for the June–August time period; thus whose emissions remain unchanged. All reported point source activity falls into this classification, as did those area source categories (e.g., bakeries, graphic arts) which had been estimated directly based on data from individual facility surveys, which were then "grown" by overall employment for that sector.

- Sources whose activity (and thus emissions) were assumed to be **evenly distributed throughout the year**, thus whose emissions remain unchanged. Examples include commercial cooking and consumer solvent use.

- Some emission categories (e.g., residential combustion of wood, LPG, and kerosene) were **assumed to have no summertime activity** (at any time between May and September), thus ozone season-day emissions for these source categories remained zero.

- Several source categories were estimated using published EPA guidance and recommended "seasonal activity factors" to derive season-day emissions from annual estimates; thus overall emissions estimates remained the same.

- One category, prescribed fires, had no reported activity in either June or September, thus the reported emissions for the ozone season (reflecting burns conducted in July and August) remained the same.

For the remaining categories, adjustments were made to recalculate the ozone-season emissions for the June–August period. For the following area source categories, monthly data was used to estimate season-day emissions in both the original PEI report, as well as this Addendum:

- Agricultural pesticides
- Gas stations Stage I: Submerged fill
- Gas stations Stage I: Bal. submerged fill
- Underground tanks: Breathing/emptying
- Truck: gasoline (tank trucks in transit)
- Accidental releases
- Wildfires

3.2.2 Nonroad Mobile Sources

3.2.2.1 Source Categories Calculated Using the NONROAD Model

Annual and monthly emissions for nonroad mobile source categories except locomotives, aircraft, airport ground support equipment (GSE) and auxiliary power units (APU), were developed using NONROAD2008a for the 2011 PEI report. For this Addendum, monthly nonroad mobile source emissions for June, July, and August 2011 were extracted from the NONROAD2008a outputs which had been generated for the original 2011 PEI. Table A5 below provides monthly emissions within the eight-hour ozone nonattainment area for each major nonroad source category calculated by the model. Season-day emissions were then calculated using activity allocation factors (as described in Section 4.1 of the original 2011 Ozone Precursor PEI report). Lawn and garden equipment total emissions were calculated by summing the residential and commercial lawn and garden equipment categories. Season-day emissions for the period of June through August 2011 are provided in Table A6.

Table A5. Monthly nonroad mobile source emissions in the eight-hour ozone nonattainment area for the period June–August, 2011 (in tons/month).

	VOC			NOx			CO		
Nonroad Source Category	**June**	**July**	**August**	**June**	**July**	**August**	**June**	**July**	**August**
Agricultural Equipment	2.58	2.63	2.61	21.84	21.83	21.83	20.46	20.45	20.50
Commercial Equipment	186.38	198.89	192.66	108.13	107.74	107.24	2,643.99	2,640.97	2,652.57
Construction /mining Equipment	180.11	182.14	180.91	1,211.17	1,211.08	1,210.96	1,380.06	1,377.79	1,379.73
Industrial Equipment	28.68	28.81	28.69	152.37	152.34	152.30	598.34	598.26	598.63
Lawn & Garden (Residential)	382.25	419.43	411.33	31.24	30.82	30.27	3,277.43	3,272.49	3,286.46
Lawn & Garden (Commercial)	180.11	181.47	180.97	56.86	56.55	56.13	2,932.22	2,924.99	2,934.99
Logging Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pleasure Craft	78.61	82.85	83.82	14.97	15.01	14.97	203.49	201.52	200.94
Railroad Equipment	0.17	0.18	0.17	0.72	0.72	0.72	1.44	1.44	1.44
Recreational Equipment	85.10	87.32	86.58	3.35	3.32	3.28	366.35	365.14	366.14

Table A6. Ozone season-day emissions from nonroad mobile sources in the eight-hour ozone nonattainment area for the period June–August, 2011.

	Season-day Emissions (lbs/day)		
Nonroad Source Category	**VOC**	**NOx**	**CO**
Agricultural Equipment	200.6	1,679.5	1,574.6
Commercial Equipment	14,818.6	8,284.7	203,526.4
Construction and Mining Equipment	13,927.2	93,159.3	106,091.9
Industrial Equipment	2,209.9	11,718.2	46,031.6
Lawn and Garden Equipment (Total)	54,825.3	7,329.9	552,709.8
Logging Equipment	0.0	0.0	0.0
Pleasure Craft	13,207.4	2,420.5	32,628.3
Railway Maintenance Equipment	14.5	59.7	119.5
Recreational Equipment	8,855.0	339.9	37,525.9

3.2.2.2 Aircraft, Ground Support Equipment, and Auxiliary Power Units

Emissions from aircraft, ground support equipment (GSE), and auxiliary power units (APUs) for the period of June through August 2011 were calculated by applying adjustment factors to the emission estimates prepared for the original 2011 PEI report, covering the period of July through September 2011. These adjustment factors for airports have been developed by dividing the number of operations for the June–August timeframe, by the number of operations within the July–September period covered by the initial model calculations, for each of four aircraft categories (air carrier, air taxi, general aviation, and military). Monthly airport operational data were obtained from the Federal Aviation Administration (FAA) Air Traffic Activity Data System (ATADS) database for the year 2011, and from MAG 2009 airport survey data. The total operations for airports for the two periods are presented in Table A7. The season-day emissions for aircrafts, GSE, and APUs for the eight-hour ozone nonattainment area for the period of June through August 2011 developed using the adjustment factors are provided in Table A8.

Table A7. Total operations for two three-month time periods in 2011 (June–August, and July–September) for airports within the eight-hour ozone nonattainment area.

	Count of Total Operations Over a Three-Month Period, by Aircraft Category							
	Air Carrier		Air Taxi		General Aviation		Military	
Airport	**Jun-Aug**	**Jul-Sep**	**Jun-Aug**	**Jul-Sep**	**Jun-Aug**	**Jul-Sep**	**Jun-Aug**	**Jul-Sep**
Buckeye Municipal	0	0	0	0	12,421	12,008	0	0
Chandler Municipal	0	6	532	553	36,210	37,001	389	388
Falcon Field	0	3	696	656	48,426	47,073	547	629
Gila Bend Municipal	0	0	0	0	833	806	0	0
Glendale Municipal	0	0	240	220	19,613	20,904	14	8
Luke Air Force Base	0	0	0	0	0	0	21,082	20,794
Phoenix Deer Valley	0	0	828	796	77,787	84,991	24	61
Phoenix Goodyear	29	29	83	65	33,302	33,437	1,611	1,944
Phoenix Sky Harbor	95,534	92,717	16,326	16,484	4,398	4,536	585	505
Phoenix-Mesa Gateway	2,082	1,974	2,317	2,196	31,047	31,686	1,198	1,326
Pleasant Valley	0	0	0	0	1,503	1,503	0	0
Scottsdale	0	0	2,459	2,584	27,027	28,111	107	139
Sky Ranch at Carefree	0	0	0	0	448	432	0	0
Stellar Airpark	0	0	0	0	9,153	8,849	0	0

Table A8. Ozone season-day emissions from aircraft, ground support equipment, and auxiliary power units in the eight-hour ozone nonattainment area for the period June–August, 2011.

	Ozone Season-day Emissions (lbs/day)		
Nonroad Source Category	**VOC**	**NOx**	**CO**
Aircraft	8,355.4	12,789.2	63,737.5
GSE & APU	590.0	2,155.7	17,236.5

3.2.3 Onroad Mobile Sources

MOVES2010b was used to generate monthly onroad mobile source emissions for vehicle classes, facility types, weekdays and weekend for the 2011 Periodic Emissions Inventory (PEI) for ozone precursors. Monthly onroad mobile source emissions in the eight-hour ozone nonattainment area for June through August were obtained from the MOVES2010b output database developed for the original 2011 PEI; results are shown in Table A9 below. To calculate the average daily emissions for the period, the three-month total onroad emissions were divided by 92 (the total number of days in the three-month period) as shown in Table A10.

Table A9. Monthly emissions from onroad mobile sources in the eight-hour ozone nonattainment area for the period June–August, 2011.

	Onroad Mobile Source Emissions (lbs/month)		
	VOC	**NOx**	**CO**
June	4,283,659.6	10,160,425.4	38,461,716.3
July	4,528,226.8	9,006,439.8	39,909,804.7
August	4,739,641.7	9,267,486.0	42,238,005.8
Total	**13,551,528.1**	**28,434,351.2**	**120,609,526.8**

Table A10. Average season-day emissions from onroad mobile sources in the eight-hour ozone nonattainment area for the period June–August, 2011.

	Average Season-day Emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**
Onroad Mobile Sources	147,299.2	309,069.0	1,310,973.1

3.2.4 Biogenic Sources

Daily mean biogenic emissions for June, July, and August 2011 were obtained from Table 6.4–1 in the 2011 ozone precursor PEI report (and reproduced below in Table A11). The three-month daily means were then averaged to derive season-day biogenic emissions values, as shown in Table A12.

Table A11. Daily mean emissions from biogenic sources in the eight-hour ozone nonattainment area for the period June–August, 2011.

	Daily Mean Biogenic Emissions (lbs/day)		
	VOC	**NOx**	**CO**
June	690,104.5	5,089.1	61,726.7
July	693,725.6	6,294.2	66,100.2
August	720,330.5	7,529.4	71,775.8

Table A12. Average season-day emissions from biogenic sources in the eight-hour ozone nonattainment area for the period June–August, 2011.

	Average Season-day Emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**
Biogenic Sources	701,386.9	6,304.2	66,534.2

3.3 Summary of the "Recasting" Exercise Using a June–August Ozone Season

The tables below compare the original ozone season-day emissions inventory for the eight-hour ozone nonattainment area, with the revised season-day totals that incorporate the revised season-day emissions calculations described in Section 3.2 above. Table A13 compares overall season-day emissions for the eight-hour nonattainment area, broken out by major source category.

Table A13. Comparison of ozone season-day emissions in the eight-hour ozone nonattainment area from the original 2011 PEI report vs. the "recast" inventory, by major source category.

	Ozone Season-day Emissions (lbs/day)					
	As In Original PEI Report (July–September ozone season)			"Recast" Inventory (June–August ozone season)		
Source Category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Point Sources	4,908	15,407	9,716	4,908	15,407	9,715
Nonpoint (Area) Sources	227,857	31,820	292,321	228,322	32,043	302,710
Nonroad Mobile Sources	111,797	141,444	1,025,618	117,279	144,874	1,061,973
Onroad Mobile Sources	148,186	301,824	1,321,680	147,299	309,069	1,310,973
Biogenic Sources	624,395	6,232	62,584	701,387	6,304	66,534
Total, all source categories	**1,117,143**	**496,727**	**2,711,919**	**1,199,195**	**507,698**	**2,751,955**

The two tables below summarize the changes in emissions that result from redefining the ozone season as the June–August time period. Table A14 presents the absolute emission changes (both increases and decreases), while Table A15 presents these changes in percentage terms. Both tables indicate that the net change in anthropogenic emissions that results from a revised definition of an "ozone season" to June–August is insignificant (i.e., slightly less than 1% of the overall inventory). Finally, Table A16 presents a detailed, line-item comparison of the season-day inventory presented in the original PEI report, vs the recast version incorporating the revised emissions calculated described above.

Table A14. Absolute change in ozone season-day emissions in the eight-hour ozone nonattainment area between the original 2011 PEI report (reflecting a July–September ozone season) and the "recast" inventory (reflecting June–August), by major source category.

	Change in Season-day Emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**
Point Sources	0	0	0
Nonpoint (Area) Sources	+465	+223	+10,389
Nonroad Mobile Sources	+5,482	+3,431	+36,404
Onroad Mobile Sources	–887	+7,245	–10,707
Biogenic Sources	+76,992	+73	+3,950
Net change, all source categories	+82,052	+10,971	+40,037
Net change, anthropogenic sources only (excluding wildfires and biogenic sources)	**+4,571**	**+10,676**	**+25,697**

Table A15. Percentage change in ozone season-day emissions in the eight-hour ozone nonattainment area between the original 2011 PEI report (reflecting a July–September ozone season) and the "recast" inventory (reflecting June–August), by major source category.

	Change in Season-day Emissions (%)		
Source Category	**VOC**	**NOx**	**CO**
Point Sources	0.00%	0.00%	0.00%
Nonpoint (Area) Sources	+0.20%	+0.70%	+3.55%
Nonroad Mobile Sources	+4.90%	+2.43%	+3.55%
Onroad Mobile Sources	–0.60%	+2.40%	–0.81%
Biogenic Sources	+12.33%	+1.16%	+6.31%
Net change, all source categories	+7.34%	+2.21%	+1.48%
Net change, anthropogenic sources only (excluding wildfires and biogenic sources)	**+0.41%**	**+2.15%**	**+0.95%**

Table A16. Ozone season-day emissions from all source categories in the eight-hour ozone nonattainment area, comparing the original 2011 PEI report (reflecting a July–September ozone season) and the "recast" inventory (reflecting June–August), by major source category. Shaded cells indicate revised emission values.

	Original PEI (July–Sept., in lbs/day)			"Recast" ozone season (June–August, in lbs/day)		
Source Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
POINT SOURCES[1]	4,279.8	15,353.4	9,632.0	4,279.8	15,353.4	9,632.0
Emission Reduction Credits[2] (unchanged)	628.5	53.7	83.8	628.5	53.7	83.8
Total, All Point Sources:	**4,908.3**	**15,407.1**	**9,715.8**	**4,908.3**	**15,407.1**	**9,715.8**
AREA SOURCES:						
Fuel combustion:						
Industrial distillate oil: Boilers[2]	3.9	388.5	97.1	3.9	388.5	97.1
Industrial distillate oil: Engines[2]	0.0	11,733.0	2,525.3	0.0	11,733.0	2,525.3
Industrial natural gas[1]	216.9	4,285.3	2,669.3	216.9	4,285.3	2,669.3
Comm./inst. distillate oil: Boilers[2]	0.0	0.8	0.2	0.0	0.8	0.2
Comm./inst. distillate oil: Engines[2]	0.0	23.7	5.1	0.0	23.7	5.1
Comm./inst. natural gas[1]	251.7	4,992.0	3,061.7	251.7	4,992.0	3,061.7
Residential distillate oil[3]	0	0	0	0	0	0
Residential natural gas[1]	120.5	2,060.1	876.7	120.5	2,060.1	876.7
Residential LPG[3]	0	0	0	0	0	0
Residential wood combustion[3]	0	0	0	0	0	0
Residential kerosene[3]	0	0	0	0	0	0
All Fuel Combustion:	**593.0**	**23,483.5**	**9,235.4**	**593.0**	**23,483.5**	**9,235.4**
Industrial processes:						
Chemical manufacturing[1]	596.5			596.5		
Commercial cooking[2]	829.8		2,181.7	829.8		2,181.7
Bakeries[1]	545.4			545.4		
Secondary metal production[1]	306.4	107.9	697.4	306.4	107.9	697.4
Rubber/plastic product manufacturing[1]	14,110.1			14,110.1		
Electrical equipment manufacturing[1]	746.2	135.8	16.4	746.2	135.8	16.4
Industrial processes, NEC[1]	318.0	1,245.8	525.2	318.0	1,245.8	525.2
All Industrial Processes:	**17,452.4**	**1,489.5**	**3,420.8**	**17,452.4**	**1,489.5**	**3,420.8**
Solvent use:						
Architectural coatings[4]	30,973.1			30,973.1		
Auto refinishing[2]	10,211.8			10,211.8		
Traffic markings[4]	1,737.5			1,737.5		
Factory finished wood[1]	1,390.7			1,390.7		
Wood furniture[1]	3,419.9			3,419.9		
Aircraft surface coating[1]	473.1			473.1		
Miscellaneous surface coating[1]	2,440.0			2,440.0		
Degreasing[1]	1,445.1			1,445.1		
Dry cleaning[2]	180.1			180.1		
Graphics arts[1]	2,216.1			2,216.1		
Miscellaneous industrial solvent use[1]	5,104.6			5,104.6		
Consumer and commercial products[2]	96,468.5			96,468.5		
Cutback asphalt[2]	4,309.9			4,309.9		
Emulsified asphalt[2]	4,465.8			4,465.8		
Roofing asphalt[2]	23.7			23.7		
Agricultural pesticides	1,697.5			1,697.3		
All Solvent Use:	**166,557.4**			**166,557.2**		

[1] = No change; season-day emissions are based on June–August activity data reported by sources.
[2] = No change; activity is assumed evenly distributed throughout the year.
[3] = No change; no activity assumed to occur between May and September.
[4] = No change; season-day emissions were estimated using EPA guidance and seasonal activity factor.
[5] = No change; no activity reported in June or September.
[6] = No change; activity is accounted for as part of mobile source emission calculations.

Table A16 (continued). Ozone season-day emissions from all source categories in the eight-hour ozone non-attainment area, comparing the original 2011 PEI report (reflecting a July–September ozone season) and the "recast" inventory (reflecting June–August), by major source category. Shaded cells indicate revised emission values.

	Original PEI (July–Sept., in lbs/day)			"Recast" ozone season (June–August, in lbs/day)		
Source Category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Storage/transport:						
Residential portable gas cans[2]	16,311.4			16,311.4		
Commercial portable gas cans[2]	3,136.7			3,136.7		
Bulk plants[1]	659.3			659.3		
Gas stations Stage I: Submerged fill	528.7			526.9		
Gas stations Stage I: Bal. submerged fill	1,426.8			1,421.9		
Gas stations Stage II[6]	0			0		
Underground tanks: Breathing/emptying	4,138.6			4,124.4		
Airports: aviation gasoline Stage I[2]	1,887.2			1,887.2		
Airports: aviation gasoline Stage II[2]	97.9			97.9		
Truck: gasoline (tank trucks in transit)	315.8			314.7		
Pipeline gasoline[2]	94.5			94.5		
Volatile organic liquids storage/transport[1]	169.3			169.3		
All Storage/Transport:	**28,766.2**			**28,744.2**		
Waste treatment/disposal:						
On-site incineration[1]	1.1	21.4	5.3	1.1	21.4	5.3
Open burning: Land clearing debris[2]	9.1	4.1	86.4	9.1	4.1	86.4
Landfills[1]	200.7	167.4	596.4	200.7	167.4	596.4
Publicly owned treatment works[4]	583.7			583.7		
Leaking underground storage tanks[2]	32.3			32.3		
Other waste[1]	10.9	122.8	431.4	10.9	122.8	431.4
All Waste Treatment/Disposal:	**837.8**	**315.6**	**1,119.6**	**837.8**	**315.6**	**1,119.6**
Misc. area sources:						
Agricultural field burning[2]	470.2	209.0	4,440.7	470.2	209.0	4,440.7
Structure fires[4]	73.3	9.3	399.7	73.3	9.3	399.7
Aircraft engine testing[1]	26.1	259.3	91.2	26.1	259.3	91.2
Vehicle fires[2]	51.4	6.4	200.8	51.4	6.4	200.8
Crematories[1]	50.9	88.1	17.2	50.9	88.1	17.2
Accidental releases	2.1	0.0	0.0	0.6	0.0	0.0
Hospitals[1]	52.9			52.9		
Wildfires	12,794.0	5,832.6	271,872.2	13,282.9	6,055.4	282,261.6
Prescribed fires[5]	129.2	127.1	1,523.2	129.2	127.1	1,523.2
All Misc. Area Sources:	**13,650**	**6,532**	**278,545**	**14,137.4**	**6,754.7**	**288,934.4**
ALL AREA SOURCES:	**227,856.8**	**31,820.5**	**292,320.7**	**228,322.0**	**32,043.4**	**302,710.1**
NONROAD MOBILE SOURCES:						
Agricultural equipment	192.5	1,615.1	1,510.9	200.6	1,679.5	1,574.6
Airport GSE & APUs	584.5	2,128.9	17,071.7	590.0	2,155.5	17,236.7
Commercial equipment	14,474.7	8,299.0	202,531.2	14,818.6	8,284.7	203,526.4
Construction & mining equipment	13,534.5	90,774.0	103,125.0	13,927.2	93,159.3	106,091.9
Industrial equipment	2,203.1	11,712.9	45,940.4	2,209.9	11,718.2	46,031.6
Lawn and garden equipment	52,584.9	7,078.4	529,218.9	54,825.3	7,329.9	552,709.8
Pleasure craft	11,527.0	1,996.8	26,738.3	13,207.4	2,420.5	32,628.3
Railway maintenance equipment	14.4	59.7	119.1	14.5	59.7	119.5
Recreational equipment	8,020.9	306.0	33,528.7	8,855.0	339.9	37,525.9
Aircraft	8,385.8	12,535.3	64,993.6	8,355.4	12,789.2	63,737.5
Locomotives[2]	274.8	4,937.7	839.9	274.8	4,937.7	839.9
ALL NONROAD MOBILE SOURCES:	**111,797.1**	**141,443.8**	**1,025,617.7**	**117,278.7**	**144,874.4**	**1,062,022.0**
ONROAD MOBILE SOURCES:	**148,186.2**	**301,823.7**	**1,321,680.2**	**147,299.2**	**309,069.0**	**1,310,973.1**
BIOGENIC SOURCES:	**624,395.0**	**6,231.7**	**62,584.2**	**701,386.9**	**6,304.2**	**66,534.2**
TOTAL, ALL SOURCE CATEGORIES:	**1,117,143.4**	**496,726.7**	**2,711,918.6**	**1,199,195.0**	**507,698.0**	**2,751,955.2**

4. Emissions from Facilities Treated as Area Sources in the 2011 Periodic Emissions Inventory

Table A17 below lists those sources whose 2011 emissions were included in the area source categories of the 2011 Periodic Emissions Inventory (PEI) report for Ozone Precursors, originally published in February 2014.

Table A17. 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
1074	23RD AVE WASTEWATER TREATMENT PLANT	2470 S 22ND AVE	PHOENIX	0.24	2.62	25.73
1303	ABLE ENGINEERING & COMPONENT SERVICES	2920 E CHAMBERS ST	PHOENIX	1.29	0.07	0.06
1387	ABLE STEEL FABRICATORS	4150 E QUARTZ CIR	MESA	2.06		
103646	ABSS MANUFACTURING CO INC	3935 W ADAMS ST	PHOENIX	1.21		
73117	ACE ASPHALT OF ARIZONA INC	3030 S 7TH ST	PHOENIX	0.75		
4005	AEROTEC INTERNATIONAL INC	3007 E CHAMBERS ST	PHOENIX	0.27	0.20	0.01
969	AF LORTS MANUFACTURING COMPANY INC	15836 W EDDIE ALBERT WAY	GOODYEAR	16.48		
74939	AFFORDABLE POWDER COATING	2111 W FILLMORE ST	PHOENIX	0.01	0.09	0.08
34139	ALL WOOD TREASURES CO	2063 E CEDAR ST	TEMPE	7.80		
35541	ALLIED TUBE AND CONDUIT	2525 N 27TH AVE	PHOENIX	14.52	0.08	0.07
4369	AM FORM U-HAUL	4650 W PASADENA AVE	GLENDALE	0.01		
4397	AMBER STEEL FABRICATION, INC	11331 E GERMANN RD	CHANDLER	13.17		
128418	AMERICAN AEROSPACE TECHNICAL CASTINGS	2950 W CATALINA DR	PHOENIX	0.08	0.21	0.18
1412	AMERICAN AIRLINES INC	3400 E SKY HARBOR BLVD	PHOENIX	0.05	0.65	0.14
1243	AMERICAN FIBERGLASS	2533 W CYPRESS ST	PHOENIX	2.35		
131366	AMERICAN METALS COMPANY, INC	740 W BROADWAY RD	MESA	0.13	1.64	0.35
1195	AMERICAN MONUMENT CO	2337 W VAN BUREN ST	PHOENIX	0.09		
54414	AMERICAN SAND & ROCK	PORTABLE		0.15	1.83	0.39
42432	AMERIPRIDE LINEN & APPAREL SERVICE	6025 W VAN BUREN ST	PHOENIX	0.06	1.11	0.94
199	AMERON INTL-WATER TRANSMISSION GROUP	2325 S 7TH ST	PHOENIX	1.73	0.19	0.10
129545	AMES DIVERSIFIED SERVICES	3015 W CLARENDON AVE	PHOENIX	0.03	1.39	0.08
78183	AMKOR TECHNOLOGY INC	1900 S PRICE RD	CHANDLER	0.02	0.27	0.08
130799	ANASAZI DOOR	5650 S 67TH AVE	LAVEEN	0.16		
31637	ANDERSON CLAYTON CORP	25500 W SOUTHERN AVE	BUCKEYE	0.01	0.39	0.07
79726	ANGELICA TEXTILE SERVICES	4410 W MOHAVE ST	PHOENIX	0.16	2.80	1.41
41	ANIMAL CREMATION SERVICES	5646 W BETHANY HOME RD	GLENDALE	0.02	1.14	0.06
92785	APEX BLOCK	1901 W FILLMORE ST	PHOENIX	0.01		
83379	APS BIOGROUP	601 S 54TH AVE	PHOENIX	0.02	0.37	0.31
78943	AQC PAINTING	6947 W SOUTHERN AVE	LAVEEN	0.32		
84	ARIZONA BRAKE & CLUTCH SUPPLY INC	2211 N BLACK CANYON HWY	PHOENIX	1.05	0.01	0.01
35372	ARIZONA CUSTOM CABINETS INC	8729 N 78TH AVE	PEORIA	2.88		
3938	ARIZONA GALVANIZING INC	15775 W ELWOOD ST	GOODYEAR	0.14	2.56	2.15
130470	ARIZONA LANDFILL LLC	2750 S 11TH AVE	PHOENIX	0.65	13.51	2.07
131021	ARIZONA NUTRITIONAL SUPPLEMENTS LLC	210 S BECK AVE	CHANDLER	12.07		
69409	ARIZONA POLYMER FLOORING INC	7731 N 68TH AVE	GLENDALE	5.96		
4364	ARIZONA STATE UNIVERSITY	1551 S RURAL RD	TEMPE	2.29	8.99	4.09
128851	ARMOR DESIGN LLC	2500 N 24TH ST	PHOENIX	0.02	0.00	0.00
36340	ARMORWORKS LLC	305 N 54TH ST	CHANDLER	2.17		
30112	ASM AMERICA INC	3440 E UNIVERSITY DR	PHOENIX	0.13	0.15	0.03

Table A17 (continued). 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
36898	ASPC-LEWIS	26700 S HWY 85	BUCKEYE	2.37	14.29	10.31
4109	ASSOCIATED CONSTRUCTION ENTERPRISES INC	3645 N 40TH AVE	PHOENIX	0.30		
4328	ASU MACROTECHNOLOGY WORKS	7700 S RIVER PKWY	TEMPE	1.06	2.79	1.12
1502	ATLAS ROOFING CORPORATION	40 S 45TH AVE	PHOENIX	6.07	0.49	2.02
2656	AVIATION DEPT - PHOENIX SKY HARBOR	3400 E SKY HARBOR BLVD	PHOENIX	0.50	3.48	1.01
50422	BAE SYSTEMS AEROSPACE AND DEFENSE GROUP	7822 S 46TH ST	PHOENIX	9.24	0.83	0.69
1449	BAKER COMMODITIES	3602 W ELWOOD ST	PHOENIX	13.87	2.47	0.00
31585	BANK OF AMERICA	2500 W FRYE RD	CHANDLER	0.11	6.02	0.91
781	BANNER GOOD SAMARITAN MEDICAL CENTER	1111 E MCDOWELL RD	PHOENIX	0.56	8.23	5.29
29946	BANNER THUNDERBIRD MEDICAL CENTER	5555 W THUNDERBIRD RD	GLENDALE	1.36	6.57	1.75
126319	BELLA BEAMS & ARCHITECTURAL PRODUCTS INC	825 N 73RD AVE	PHOENIX	0.39		
65354	BERGMANN GROUP	3730 E SOUTHERN AVE	PHOENIX	0.00	0.06	0.05
961	BIG SURF WATERPARK	1500 N MCCLINTOCK DR	TEMPE	0.32	7.83	1.10
74058	BILTMORE SHUTTERS INC	1138 W WATKINS ST	PHOENIX	5.22		
1192	BINGHAM OF ARIZONA	2327 E JONES AVE	PHOENIX	0.14		
128814	BIOTECH RESEARCH LABS INC	3809 E WATKINS ST	PHOENIX	1.08	1.53	1.28
115733	BOLT'S METALLIZING, INC	222 S 37TH ST	PHOENIX	0.86		
34872	BONDED LOGIC	24053 S ARIZONA AVE	CHANDLER	0.00	2.12	0.35
226	BORAL ROOFING LLC	1832 S 51ST AVE	PHOENIX	2.24	0.27	0.23
688	BREWER COTE OF ARIZONA	5226 W MISSOURI AVE	GLENDALE	0.00	0.02	0.00
59	BROWN & BROWN CHEVROLET	145 E MAIN ST	MESA	3.84	0.29	0.24
3528	BROWN EVANS DIST - B/P #1	306 S COUNTRY CLUB DR	MESA	6.71		
458	BRYANT INDUSTRIES INC	788 W ILLINI ST	PHOENIX	3.77		
130047	BUESING CORPORATION	11520 E GERMANN RD	CHANDLER	0.24	2.99	0.64
217	BUILDING PRODUCTS CO	4850 W BUCKEYE RD	PHOENIX	1.02	1.40	4.81
2854	BUNGER STEEL INC	8112 W BUCKEYE RD	PHOENIX	0.60		
56105	BURDETTE CABINET CO INC	3941 N HIGLEY RD	MESA	8.91		
1218	BUTTERFIELD STATION FACILITY	40404 S 99TH AVE	MOBILE	5.82	17.73	23.58
46123	CABINETS BY SUZI INC	2801 N 37TH AVE	PHOENIX	1.16		
131634	CAFE VALLEY, INC	7000 W BUCKEYE RD	PHOENIX	5.81	2.03	1.71
3307	CALJET	5119 W MONROE ST	PHOENIX	32.44		
3442	CALJET	125 N 53RD AVE	PHOENIX	30.15	0.01	0.08
108199	CALJET OF AMERICA LLC	57 N 57TH AVE	PHOENIX	8.82		
120006	CALPORTLAND	PORTABLE #1		0.00	0.04	0.03
129582	CALPORTLAND	23742 N CENTRAL AVE	PHOENIX	0.00	0.06	0.06
131966	CALPORTLAND	4830 S 43RD AVE	PHOENIX	0.01	0.25	0.21
109360	CALPORTLAND COMPANY	7505 S 143RD AVE	GOODYEAR	0.00	0.04	0.03
3296	CALVERT OIL CO	214 E ARIZONA EASTERN AVE	BUCKEYE	10.33		
291	CAPITAL LUMBER COMPANY	11 N 45TH AVE	PHOENIX	0.38		
177	CAPITOL ENGINEERING CO	724 E SOUTHERN PACIFIC DR	PHOENIX	0.31		
284	CARL T HAYDEN VA MEDICAL CENTER	650 E INDIAN SCHOOL RD	PHOENIX	0.83	4.58	2.09
776	CASE SANDBLASTING INC	1018 S 27TH AVE	PHOENIX	1.00		
1317	CAVCO INDUSTRIES INC	2602 S 35TH AVE	PHOENIX	0.00		
1318	CAVCO INDUSTRIES INC	1366 S LITCHFIELD RD	GOODYEAR	9.91		
1316	CAVCO INDUSTRIES LLC/DURANGO PLANT	2502 W DURANGO ST	PHOENIX	3.19		
260	CEMEX - 19TH AVE PLANT	3640 S 19TH AVE	PHOENIX	2.50	9.56	29.27
98591	CEMEX - 7TH STREET PLANT	PORTABLE #4	PHOENIX	0.00	0.07	0.02
98492	CEMEX - BUCKEYE PLANT	22625 W BELOAT RD	BUCKEYE	0.00	0.01	0.00
63	CEMEX - EL MIRAGE PLANT	8635 N EL MIRAGE RD	EL MIRAGE	0.00	0.04	0.01
129625	CEMEX - TABLE MESA SITE	TABLE MESA RD	PHOENIX	0.00	0.03	0.01

Table A17 (continued). 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
1266	CEMEX - WEST PLANT	11701 W INDIAN SCHOOL RD	PHOENIX	0.00	0.00	
4009	CEMEX ENTERPRISES, LLC	327 S 27TH AVE	PHOENIX	0.01	0.09	0.08
16	CEM-TEC CORPORATION	3745 S 7TH AVE	PHOENIX	1.17	0.10	0.08
27947	CENTRAL ARIZONA WATER CONSERVATION DIST	23636 N 7TH ST	PHOENIX	0.99	0.64	0.14
1310	CENTURY GRAPHICS LLC	2960 GRAND AVE	PHOENIX	8.44	0.33	0.28
823	CHEMRESEARCH CO INC	1130 W HILTON AVE	PHOENIX	4.57	0.36	0.31
3976	CHOLLA CUSTOM CABINETS INC	1727 E DEER VALLEY DR	PHOENIX	2.04	0.01	0.00
261	CHROMALLOY ARIZONA	5161 W POLK ST	PHOENIX	0.04	0.68	0.57
127623	CINTAS CORPORATION	2425 W NEVADA ST	CHANDLER	1.85	0.71	0.59
61573	CIRCLE H SAND & ROCK	6400 S EL MIRAGE RD	TOLLESON	0.19	2.37	0.51
3441	CIRCLE K TERMINAL LLC	5333 W VAN BUREN ST	PHOENIX	36.16		
35819	CITY OF CHANDLER LANDFILL	3850 S MCQUEEN RD	CHANDLER	0.15	1.53	0.07
3403	CITY OF PHOENIX 19TH AVE LANDFILL	1701 W LOWER BUCKEYE RD	PHOENIX	0.04	0.70	0.30
29919	CITY OF PHOENIX 27TH AVE LANDFILL	2800 S 27TH AVE	PHOENIX	0.12	1.50	2.61
43818	CLASSIC PARTY RENTALS	3103 E BROADWAY RD	PHOENIX	0.89		
1075	CITY OF PHOENIX 91ST AVE WWTP	5615 S 91ST AVE	TOLLESON	2.97	19.08	9.16
49636	COFFMAN SPECIALTIES INC	PORTABLE 1		0.33	4.10	0.88
926	COMPOSITES ONE LLC	2701 W VIRGINIA AVE	PHOENIX	0.08		
113723	CONTRACTORS LANDFILL & RECYCLING	2425 N CENTER ST	MESA	0.14	1.72	0.37
130397	COOLING TOWER PRODUCTS	415 E GRANT ST	PHOENIX	0.56		
34473	COPLIN MFG INC	7505 W WASHINGTON ST	TOLLESON	2.91		
1054	COPPERSTATE CABINET CO INC	1932 W NORTH LN	PHOENIX	6.08		
31570	COPPERSTATE RUBBER OF ARIZONA	750 S 59TH AVE	PHOENIX	8.17	0.35	0.30
399	CORESLAB STRUCTURES (ARIZ) INC	5026 S 43RD AVE	PHOENIX	2.30		
225	CORNING GILBERT INC	5310 W CAMELBACK RD	GLENDALE	0.72		
227	CORROSION ENGINEERING INC	145 S NINA CIR	MESA	14.98	0.43	0.36
1198	COURIER GRAPHICS CORP	2621 S 37TH ST	PHOENIX	8.80	0.30	0.25
289	COURTHOUSE AG HOLDINGS LLC	51040 W VALLEY RD	AGUILA	1.74	0.01	0.01
65	CRAFCO INC	6975 W CRAFCO WAY	CHANDLER	1.74	0.32	0.23
4368	CRAFTSMEN IN WOOD MFG	5441 W HADLEY ST	PHOENIX	4.81	0.04	0.03
1407	CRANE CO. SIGNAL TECHNOLOGY	340 N ROOSEVELT AVE	CHANDLER	0.37	0.24	0.20
100059	CRM OF AMERICA (NEW AIR)	11400 E PECOS RD	MESA	0.19	0.18	0.15
131179	CSE OPERATING I, LLC	29115 W BROADWAY RD	BUCKEYE	0.00	0.44	0.05
130790	CUSTOM FAB INC	3065 S 43RD AVE	PHOENIX	3.74	0.25	0.21
131444	CUSTOM LANDSCAPE MATERIALS "BELMONT"		WICKENBURG	0.08	1.00	0.21
131392	CUSTOM LANDSCAPE MATERIALS "BIG HORN"	AGUILA RD MILE POST 12	AGUILA	0.18	2.20	0.47
87	DECA CREMATION SERVICES INC	2237 S 15TH ST	PHOENIX	0.01	0.76	0.04
45027	DEER VALLEY TRANSFER STATION	2120 W ADOBE DR	PHOENIX	0.01	0.06	0.01
1342	DEL RIO LANDFILL	1150 E ELWOOD ST	PHOENIX	0.23	0.10	0.02
696	DESERT FIRE INDUSTRIES INC	720 W ILLINI ST	PHOENIX	1.02	1.29	1.08
47179	DESERT MILLWORK INC	1702 W ROOSEVELT ST	PHOENIX	0.94		
50725	DESERT POWDER COATING	4409 S 35TH AVE	PHOENIX	5.42	0.27	0.23
51073	DIGITAL REALTY TRUST CHANDLER, LLC	2121 S PRICE RD	CHANDLER	0.54	6.75	4.92
440	DI-MATRIX PRECISION MANUFACTURING	5225 S 31ST PL	PHOENIX	23.67		
130195	DIRT 101 OPERATIONS LLC	11748 W GLENDALE AVE	GLENDALE	0.12	1.45	0.31
130	DOLPHIN INC	740 S 59TH AVE	PHOENIX	0.87	0.81	0.68
127094	DOUBLETREE PAPER MILL LLC	31201 W THAYER RD	GILA BEND	5.76	4.66	12.62
299	DPC ENTERPRISES INC GP	4909 W PASADENA AVE	GLENDALE	1.60		
971	DUCOMMUN LABARGE TECHNOLOGIES INC	1601 E BROADWAY RD	PHOENIX	1.51	0.12	0.10
51062	DURANGO CORRECTIONAL FACILITY	3225 W DURANGO ST	PHOENIX	0.14	2.12	1.19

Table A17 (continued). 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
36595	D-VELCO AVIATION SERVICES	300 S 23RD ST	PHOENIX	0.37	0.06	0.05
48771	EAGLE ROOFING PRODUCTS	4602 W ELWOOD ST	PHOENIX	1.01	0.22	0.19
35018	EARL'S FIBERGLASS INC	128 W MARICOPA FWY	PHOENIX	6.56		
3305	EARTHGRAINS BAKING COMPANIES INC	738 W VAN BUREN ST	PHOENIX	14.74	2.11	1.77
1286	EASTERN PRODUCTS FOUNDRY	2810 E ILLINI ST	PHOENIX	0.04	0.05	0.04
26	EMPIRE MACHINERY CO	1725 S COUNTRY CLUB DR	MESA	8.90	32.42	19.53
62367	EMPIRE POWER SYSTEMS	840 N 43RD AVE	PHOENIX	0.11		
130260	ENTRUSTED PET LLC	2237 S 15TH ST	PHOENIX	0.00	0.17	0.01
87202	ENVIRONMENTAL MANAGEMENT SYSTEMS INC	2132 S 5TH AVE	PHOENIX	0.00	0.02	0.00
55952	ERGON ASPHALT PRODUCTS INC	6940 W CHANDLER BLVD	CHANDLER	0.11	0.27	0.22
114747	ERICKSON FRAMING AZ LLC	250 N BECK AVE	CHANDLER	0.07		
1505	EXECUTIVE DOOR COMPANY	3939 W CLARENDON AVE	PHOENIX	0.36		
1488	FARMER'S GIN INC	8400 S TURNER RD	BUCKEYE	0.03	0.89	0.15
59426	FEDERAL EXPRESS-PHXR	3002 E OLD TOWER RD	PHOENIX	0.48	1.01	0.22
224	FERTIZONA	17102 W OLIVE AVE	WADDELL	0.28		
925	FERTIZONA BUCKEYE LLC	26705 W BASELINE RD	BUCKEYE	0.69		
132090	FINE WOODS MFG INC	4817 S 35TH ST	PHOENIX	0.39		
131222	FINECRAFT CUSTOM WOODWORKS LLC	5230 W LUKE AVE	GLENDALE	2.34		
107758	FIREBIRD FIBERGLASS PRODUCTS INC	6010 N 53RD DR	GLENDALE	6.47		
128991	FISHER SAND & GRAVEL	PORTABLE #3		0.86	8.65	7.98
63471	FISHER SAND & GRAVEL CO	PORTABLE #1		0.03	0.36	0.08
85509	FISHER SAND & GRAVEL COMPANY	PORTABLE #2		0.08	0.97	0.21
1087	FLEX FOAM DIVISION	617 N 21ST AVE	PHOENIX	2.92	0.23	0.20
27728	FLIPCHIP INTERNATIONAL LLC	3701 E UNIVERSITY DR	PHOENIX	21.28	0.50	0.42
1375	FOREST DESIGNS	3230 E ROESER RD	PHOENIX	4.42		
881	FREESCALE SEMICONDUCTOR INC	1300 N ALMA SCHOOL RD	CHANDLER	20.51	13.51	13.06
4206	FUJI FILM ELECTRONIC MATERIALS USA	6550 S MOUNTAIN RD	MESA	1.88	1.51	1.27
64450	FUTUREWELD CO INC	3518 E WOOD ST	PHOENIX	0.02		
36258	G & K SERVICES	4804 W ROOSEVELT ST	PHOENIX	3.76	0.91	0.76
1118	GANNON & SCOTT	2113 E SKY HARBOR CIR S	PHOENIX	0.06	2.90	0.67
41751	GCR TIRE CENTERS	2815 N 32ND AVE	PHOENIX	0.33		
994	GEMINI COMPANY INC	1711 E JACKSON ST	PHOENIX	1.25		
902	GENERAL DYNAMICS C4 SYSTEMS	8201 E MCDOWELL RD	SCOTTSDALE	3.27	4.79	1.60
4173	GLENDALE MUN SANITARY LANDFILL/FLD OPER	11480 W GLENDALE AVE	GLENDALE	0.24	14.83	82.80
73110	GLENN WEINBERGER TOPSOIL INC	39500 S 99TH AVE	MARICOPA Co	0.01	0.13	0.03
561	GLENWOOD CUSTOM CABINETS, LLC	44 E PIONEER ST	PHOENIX	2.21		
46711	GLOBAL ORGANICS INC	26305 S 295TH AVE	BUCKEYE	0.00	0.03	0.03
123080	GODADDY.COM, LLC	1402 E BUCKEYE RD	PHOENIX	0.14	3.96	0.74
1418	GOODRICH CORPORATION	3414 S 5TH ST	PHOENIX	26.71	0.36	0.16
131758	GOODRICH LIGHTING SYSTEMS	3445 S 5TH ST	PHOENIX	0.02	0.00	0.00
1374	GOODRICH TURBOMACHINERY PRODUCTS	323 S BRACKEN LN	CHANDLER	2.61	0.15	0.12
62288	GREEN WASTE RECYCLING	6840 S 35TH AVE	PHOENIX	0.09	3.02	0.69
1182	GREENWOOD MEMORY LAWN MORTUARY	2300 W VAN BUREN ST	PHOENIX	0.02	0.83	0.05
141	GRO-WELL BRANDS INC	2807 S 27TH AVE	PHOENIX	0.26		
56900	GRO-WELL BRANDS INC	3060 S 27TH AVE	PHOENIX	0.54	6.56	1.41
4498	HANSON AGGREGATES LLC	33500 W INDIAN SCHOOL RD	TONOPAH	0.03	0.39	0.08
699	HANSON AGGREGATES OF ARIZONA INC	4002 S 51ST AVE	PHOENIX	2.47	3.19	3.54
67317	HANSON PIPE & PRECAST INC	12600 W NORTHERN AVE	EL MIRAGE	0.01	0.13	0.11
112836	HASSAYAMPA PLANT #32	31908 W CAMELBACK RD	BUCKEYE	0.00	0.02	0.00
131334	HELIAE DEVELOPMENT LLC	614 E GERMANN RD	GILBERT	0.69		

Table A17 (continued). 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
31565	HENRY PRODUCTS INC	302 S 23RD AVE	PHOENIX	10.77	0.44	0.37
1320	HERAEUS MATERIALS TECHNOLOGY NORTH AMERI	301 N ROOSEVELT AVE	CHANDLER	2.93	0.10	0.02
590	HOLLY ASPHALT COMPANY	7110 W NORTHERN AVE	GLENDALE	5.12	6.56	5.51
3536	HOLSUM BAKERY INC	2322 W LINCOLN ST	PHOENIX	25.02	4.04	3.39
39213	HOLSUM OF TOLLESON LLC	9600 W BUCKEYE RD	TOLLESON	21.89	2.51	2.11
76313	HONEYWELL ELECTRONIC CHEMICAL LLC	6760 W CHICAGO ST	CHANDLER	0.00		
1059	HONEYWELL ENGINES SYS & SERVICE PHX R&O	1944 E SKY HARBOR CIR	PHOENIX	13.58	1.67	3.01
355	HONEYWELL-ENGINES SYSTEMS & SERVICES	111 S 34TH ST	PHOENIX	26.84	45.90	15.35
403	HYDRO ALUMINUM NORTH AMERICA INC	249 S 51ST AVE	PHOENIX	33.53	10.99	8.42
168	HYDRO CONDUIT CORP	1011 S 43RD AVE	PHOENIX	0.01	0.02	0.01
131198	IMPERIAL WOODWORKING LLC	4012 W TURNEY AVE	PHOENIX	0.77		
354	IMSAMET OF ARIZONA	3829 S ESTRELLA PKWY	GOODYEAR	8.00	5.60	52.80
352	INCIDE TECHNOLOGIES INC	50 N 41ST AVE	PHOENIX	0.00	0.05	0.04
4033	INDUSTRIAL POWDER COATING INC	3736 S 7TH AVE	PHOENIX	0.00	0.03	0.02
777	INSULFOAM	3401 W COCOPAH ST	PHOENIX	35.39	0.72	0.60
31617	INTEL CORP CHANDLER CAMPUS (FAB 6)	5000 W CHANDLER BLVD	CHANDLER	5.35	7.92	5.89
89885	INTERCO PRINT	4501 W POLK ST	PHOENIX	0.94	0.16	0.13
4444	INTERNATIONAL RECTIFIER (EPI SERVICES)	550 W JUANITA AVE	MESA	0.56	0.16	0.03
131226	INTERSAN MANUFACTURING	1746 W FILLMORE ST	PHOENIX	0.15		
130265	IO PHOENIX ONE, LLC	615 N 48TH ST	PHOENIX	0.37	6.74	0.55
40471	IRONWOOD CUSTOM FINISHING	1822 E MADISON ST	PHOENIX	3.90		
983	ISOLA GROUP S A R L	165 S PRICE RD	CHANDLER	19.09	15.04	2.97
77985	ITC MFG	110 S 41ST AVE	PHOENIX	0.04	0.68	0.57
29975	J & A OAK INC	2452 W SHERMAN ST	PHOENIX	1.60		
732	JABIL	615 S RIVER DR	TEMPE	4.84		
121	JACKS TIRE & OIL	5925 W MONROE ST	PHOENIX	0.89	0.05	0.04
101	JBS TOLLESON INC	651 S 91ST AVE	TOLLESON	13.15	15.00	12.60
1027	JPCI SERVICES	PORTABLE		3.16	1.42	0.31
101303	KARCHER NORTH AMERICA	325 S PRICE RD	CHANDLER	0.10		
130981	KELLER ELECTRICAL INDUSTRIES INC	1881 E UNIVERSITY DR	PHOENIX	0.55	0.10	0.08
725	KILAUEA CRUSHERS INC	HWY 74	WICKENBURG	2.04	25.57	5.51
114904	KILAUEA CRUSHERS INC	16402 S TUTHILL RD	BUCKEYE	0.04	0.47	0.10
128509	KILAUEA CRUSHERS INC	HWY 85	BUCKEYE	0.09	1.12	0.24
811	KROPF WOODWORKING INC	11035 N 22ND AVE	PHOENIX	1.17		
341	L & M LAMINATES & MARBLE	813 E UNIVERSITY DR	PHOENIX	3.70		
857	L-3 COMMUNICATIONS CORPORATION	1215 S 52ND ST	TEMPE	10.65	0.16	0.03
48255	LADY WOODRUFF CABINETRY INC	4812 S 43RD AVE	PHOENIX	0.03		
817	LANE AWARD MFG INC	1118 S CENTRAL AVE	PHOENIX	0.45		
30357	LARON INC	3550 S 16TH ST	PHOENIX	0.59	0.04	0.04
96886	LEGENDS FURNITURE	10300 W BUCKEYE RD	TOLLESON	34.27		
130111	LIFEPLAN CREMATORY INC	1216 N 17TH AVE	PHOENIX	0.70	0.35	1.17
744	M E GLOBAL INC	5857 S KYRENE RD	TEMPE	25.91	12.49	49.13
1248	MAAX SPAS INDUSTRIES CORP	25605 S ARIZONA AVE	CHANDLER	37.94		
31261	MADISON GRANITE SUPPLIES	29925 N NORTH VALLEY PKWY	PHOENIX	2.09	24.38	7.17
113181	MAGELLAN AEROSPACE TURBINE SERVICES LLC	5170 W BETHANY HOME RD	GLENDALE	0.99		
131855	MARICOPA COUNTY SOLID WASTE DEPARTMENT	40135 N HWY 60	MORRISTOWN	0.30		
353	MARLAM INDUSTRIES INC	834 E HAMMOND LN	PHOENIX	10.30	0.01	0.01
61268	MASTER BLOCK	12620 W BUTLER DR	EL MIRAGE	0.00	0.03	0.02
1200	MEDTRONIC - TEMPE	2343 W MEDTRONIC WAY	TEMPE	5.62	0.56	0.47
128760	MERIDIAN OPTICAL	3711 E ATLANTA AVE	PHOENIX	1.13		

Table A17 (continued). 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
82244	MESA COMMUNITY COLLEGE MORTUARY SCI PROG	7440 E TAHOE AVE	MESA	0.00	0.00	
3326	MESA FULLY FORMED LLC	1111 S SIRRINE ST	MESA	6.45		
4105	MESA INDUSTRIES INC	230 N 48TH AVE	PHOENIX	0.17		
1414	MESA MATERIALS INC	3410 N HIGLEY RD	MESA	0.18	0.50	1.21
1415	MESA MATERIALS INC	7845 W BROADWAY RD	PHOENIX	1.27	3.84	11.64
29474	METAL MANAGEMENT ARIZONA LLC	3640 S 35TH AVE	PHOENIX	0.27		
192	MEYER & LUNDAHL MANUFACTURING CO	2345 W LINCOLN ST	PHOENIX	6.56		
1203	MICROCHIP TECHNOLOGY INC	2355 W CHANDLER BLVD	CHANDLER	1.18	0.61	0.41
1875	MICROCHIP TECHNOLOGY INC	1200 S 52ND ST	TEMPE	11.95	11.22	7.05
53593	MICROSEMI CORP	3601 E UNIVERSITY DR	PHOENIX	1.65		
1277	MISSION UNIFORM & LINEN SERVICE	2652 S 16TH ST	PHOENIX	0.13	2.31	1.94
131880	MMI TANK & INDUSTRIAL SERVICE	3240 S 37TH AVE	PHOENIX	0.38		
882	MORTON SALT, INC	13000 W GLENDALE AVE	GLENDALE	0.67	9.10	2.58
128379	MURPHY WALL PRODUCTS INTERNATIONAL INC	228 E ARIZONA EASTERN AVE	BUCKEYE	0.00		
146	MWM CORPORATION	5650 W BUCKEYE RD	PHOENIX	1.12		
648	NAMMO TALLEY INC	4111 N HIGLEY RD	MESA	4.22		0.01
852	NATIONAL COUNTERTOPS & CABINETS	1202 W WATKINS ST	PHOENIX	1.84		
34197	NATIONAL GYPSUM COMPANY	1414 E HADLEY ST	PHOENIX	7.84	11.34	15.71
114015	NATIONAL SPECIALTY AGGREGATES LLC	4310 S 80TH ST	MESA	0.00	0.02	0.00
910	NELTEC INC	1420 W 12TH PL	TEMPE	5.78	7.58	1.53
812	NEOTERIC LTD	11035 N 23RD DR	PHOENIX	0.76		
3758	NK ASPHALT PARTNERS	131 S 57TH AVE	PHOENIX	1.66	1.12	0.94
128912	NORTH GATEWAY TRANSFER STATION	30205 N BLACK CANYON HWY	PHOENIX	0.01	0.08	0.02
620	NORTHWEST WATER RECLAMATION PLANT	960 N RIVERVIEW	MESA	0.09	4.49	44.55
131646	NRC, LLC	2003 W MCDOWELL RD	PHOENIX	0.04		
56506	OAK CREEK FURNITURE INC	5355 N 51ST AVE	GLENDALE	1.52		
3953	OAKCRAFT INC	7733 W OLIVE AVE	PEORIA	34.54	0.07	0.06
27925	OASIS BEDROOM COMPANY	2022 N 22ND AVE	PHOENIX	5.55		
53	OLDCASTLE PRECAST INC	411 E FRYE RD	CHANDLER	2.23	1.77	0.38
302	OLSON PRECAST OF ARIZONA INC	3045 S 35TH AVE	PHOENIX	0.00	0.00	0.00
4147	OPT CO	PORTABLE		0.74	9.08	1.95
98	PALO VERDE NUCLEAR GENERATING STATION	5801 S WINTERSBURG RD	TONOPAH	11.72	64.44	16.53
428	PALOMA GIN PROPERTIES LLC	57525 S POTATOE RD	GILA BEND	0.00	0.05	0.04
130656	PALOMA READY MIX & MATERIALS LLC	PORTABLE #1		0.00	0.05	0.01
733	PAN GLO SERVICES LLC	2401 W SHERMAN ST	PHOENIX	16.90	0.49	0.41
57852	PARADISE WASTE SRVS TRANSFER FACILITY	4845 W LOWER BUCKEYE RD	PHOENIX	1.21	0.01	0.51
1055	PARAMOUNT PETROLEUM CORP OF AZ INC	1935 W MCDOWELL RD	PHOENIX	4.12	7.95	6.68
419	PARKER HANNIFIN CORP	7777 N GLEN HARBOR BLVD	GLENDALE	17.30		
1398	PATRICIAN MARBLE CO	3333 W OSBORN RD	PHOENIX	2.11		
93102	PATRICK INDUSTRIES	601 S 54TH AVE	PHOENIX	0.15		
4241	PEPSI CO	409 S 104TH AVE	TOLLESON	5.71	8.50	14.10
61	PERMA-FINISH INC	74 N 45TH AVE	PHOENIX	0.06	0.24	0.21
29244	PET & ANIMAL LOVERS SERVICE (PALS)	3629 N 40TH AVE	PHOENIX	0.03	1.78	0.10
1014	PHOENIX BRICK YARD	1814 S 7TH AVE	PHOENIX	0.53	2.46	8.30
69	PHOENIX HEAT TREATING INC	2405 W MOHAVE RD	PHOENIX	1.38	1.49	1.26
1472	PHOENIX MANUFACTURING INC	3655 E ROESER RD	PHOENIX	2.31	0.89	0.75
1491	PHOENIX METALCRAFT INC	3845 N 29TH AVE	PHOENIX	3.74		
562	PHOENIX NEWSPAPERS INC	22600 N 19TH AVE	PHOENIX	1.54	0.43	0.10
130009	PHOENIX SAN-MAN INC	10423 S APACHE RD	BUCKEYE	0.17	5.88	1.35
1154	PING INC	2201 W DESERT COVE AVE	PHOENIX	8.46	0.18	0.15

Table A17 (continued). 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
23	PIONEER ROOFING CO	9221 N 15TH AVE	PHOENIX	0.91		
73263	PMA PHOTOMETALS OF ARIZONA INC	3040 N 27TH AVE	PHOENIX	2.14	0.11	0.09
128007	PRECISION ELECTRIC CO INC	1822 E JACKSON ST	PHOENIX	0.40	0.00	0.00
4007	PRECISION TRUCK PAINTING & REPAIR INC	2212 N 27TH AVE	PHOENIX	6.18		
116742	PREFERRED PACKAGING & CONTAINER	3330 W COCOPAH ST	PHOENIX	4.29	0.09	0.07
148	PRESTO CASTING CO	5440 W MISSOURI AVE	GLENDALE	10.25	1.07	0.80
108860	PRISMA GRAPHIC CORPORATION	2937 E BROADWAY RD	PHOENIX	9.28	0.21	0.18
75998	PRO PETROLEUM PHOENIX TERMINAL	408 S 43RD AVE	PHOENIX	0.99	2.37	2.07
60889	PURCELLS WESTERN STATES TIRE	420 S 35TH AVE	PHOENIX	6.20	0.12	0.10
131158	PURE EARTH ENERGY RESOURCES LLC	1980 W COMMERCE AVE	GILBERT	0.20		
1335	QUALITY BLOCK INC	3035 S 35TH AVE	PHOENIX	0.02	0.32	0.27
90599	QUEEN CREEK LANDFILL	20224 E RIGGS RD	QUEEN CRK	3.81		
437	QUIKRETE COMPANIES-ARIZONA	26807 W BASELINE RD	BUCKEYE	0.04	1.17	0.16
131898	QUIKTRIP DISTRIBUTION - PHOENIX	8501 W LATHAM ST	TOLLESON	1.38	7.21	5.53
44182	QUINCY JOIST COMPANY	22253 W SOUTHERN AVE	BUCKEYE	3.17		
1493	R J RUFF CO	3883 W LOWER BUCKEYE RD	PHOENIX	0.03		
87807	R&D SALES INC	6200 W DOBBINS RD	LAVEEN	0.09	1.07	0.23
131682	RAILJET LAND, LLC	5601 W VAN BUREN ST	PHOENIX	2.69		
840	RECONSERVE OF ARIZONA, INC	1704 W BROADWAY RD	PHOENIX	0.05	0.93	0.78
2206	RED EAGLE ENTERPRISES INC	12946 W SANTA FE DR	SURPRISE	0.01	0.11	0.09
537	RED MOUNTAIN MINING INC	4520 N POWER RD	MESA	0.41	5.06	1.09
54	REDBURN TIRE CO	3801 W CLARENDON AVE	PHOENIX	1.19		
126322	RELIANCE CUSTOM CABINETS	825 N 73RD AVE	PHOENIX	0.84		
300	REUTER EQUIPMENT CO	3816 W LOWER BUCKEYE RD	PHOENIX	1.33		
122515	RIO SALADO LANDFILL	2802 S 7TH AVE	PHOENIX	0.10	0.38	0.09
44356	RITCHIE BROS AUCTIONEERS (AMERICA) INC	5410 W LOWER BUCKEYE RD	PHOENIX	0.37	0.04	0.03
4318	RIVER RANCH PLANT #40	5159 N EL MIRAGE RD	LITCHFLD PK	0.07	0.03	0.00
36084	ROCK SOLID INC	11550 W NORTHERN AVE	PEORIA	0.39	4.72	1.02
758	ROGERS CORP - CMD	100 N DOBSON RD	CHANDLER	0.86	0.40	0.34
759	ROGERS CORP/ADVANCED CIRCUIT MATERIALS	100 S ROOSEVELT AVE	CHANDLER	14.37	1.50	4.37
4174	ROGERS CORPORATION	2225 W CHANDLER BLVD	CHANDLER	1.72	0.01	0.01
130171	ROYDEN CONSTRUCTION CO.	3423 S 51ST AVE	PHOENIX	0.00	0.02	0.00
132153	SAINT GOBAIN SOLAR GLASS FACILITY	17300 W BROADWAY RD	GOODYEAR	1.37	0.02	0.00
132005	SALT RIVER MATERIALS GROUP	6204 W SOUTHERN AVE	LAVEEN	0.00	0.06	0.01
86686	SAN TAN TRANSFER STATION	4040 S 80TH ST	MESA	0.02	0.23	0.05
42617	SASCO/SOUTHERN ARIZONA STUD COMPANY	5415 W MOHAVE ST	PHOENIX	0.30		
772	SCHAUMAPLAST PRECISION FOAM MOLDING LP	101 S 30TH ST	PHOENIX	5.74	0.45	0.38
4072	SCHREIBER FOODS INC	2122 S HARDY DR	TEMPE	1.73	5.07	15.92
255	SCHUFF STEEL CO	619 N COOPER RD	GILBERT	1.97		
266	SCHUFF STEEL CO	420 S 19TH AVE	PHOENIX	7.31	5.23	1.13
246	SCHULT HOMES	231 N APACHE RD	BUCKEYE	10.77		
120518	SEALMASTER AZ	2020 W MCDOWELL RD	PHOENIX	0.72	0.53	0.38
1332	SEMIRAY INSPECTION SERVICES	3027 E WASHINGTON ST	PHOENIX	0.45		
1351	SERENITY MORTUARY SERV INC	2514 S 6TH AVE	PHOENIX	0.02	1.31	0.07
1036	SERVICE BRASS FOUNDRY	2501 W JACKSON ST	PHOENIX	0.03	0.04	0.03
1169	SHAMROCK FOODS CO	2228 N BLACK CANYON HWY	PHOENIX	0.49	8.92	7.49
130996	SHUTTERZ INC	6655 W FRYE RD	CHANDLER	1.14		
4050	SIGNATURE BREADS INC	1120 W FAIRMONT DR	TEMPE	5.19	0.38	0.32
57976	SIGNETIX INC	2611 S 7TH ST	PHOENIX	2.33	0.59	0.49
27933	SKUNK CREEK LANDFILL	3165 W HAPPY VALLEY RD	PHOENIX	0.77	4.47	1.99

Table A17 (continued). 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
4176	SKY HARBOR TRANSFER STATION	2425 S 40TH ST	PHOENIX	1.26		
131809	SKY PILOT VERTICAL WIND TUNNEL LLC	PORTABLE		0.00	0.02	0.01
39980	S-L SNACKS AZ, LLC	1200 N BULLARD AVE	GOODYEAR	17.82	5.99	5.03
1213	SMITH PRECAST	2410 W BROADWAY RD	PHOENIX	0.01		
129	SODEXO COMMERCIAL LINEN EXCHANGE	4445 S 36TH ST	PHOENIX	0.28	5.17	4.34
131686	SOLAR & RENEWABLES MANAGEMENT, LLC	29505 W SOUTHERN AVE	BUCKEYE	0.00	0.15	0.02
89313	SOLVENT RECY-CLEAN	1850 W BROADWAY RD	PHOENIX	0.51	0.02	0.00
129028	SONORAN DOORS INC	21002 N 19TH AVE	PHOENIX	1.25		
4086	SOUTH BAY CIRCUITS INC	6409 W COMMONWEALTH PL	CHANDLER	2.90		
2108	SOUTHWEST AIRLINES CO	4153 E SKY HARBOR BLVD	PHOENIX	6.75	0.25	0.05
131861	SOUTHWEST ARCHITECTURAL CASTINGS	5343 W MOHAVE ST	PHOENIX	0.17		
838	SOUTHWEST POWDER COATING INC	116 N 59TH AVE	PHOENIX	0.02	0.17	0.14
612	SOUTHWEST PRODUCTS CORP	5143 W ROOSEVELT ST	PHOENIX	1.46		
854	SOUTHWEST REFINING CORP	1205 W HILTON AVE	PHOENIX	0.00	0.01	0.01
31643	SOUTHWEST REGIONAL LANDFILL	24427 S HWY 85	BUCKEYE	0.56	7.17	1.46
130102	SOUTHWEST ROCK PRODUCTS	6500 N 115TH AVE	GLENDALE	0.12	1.51	0.33
130199	SPECIALTY TEXTILE SERVICES	720 W BUCHANAN ST	PHOENIX	0.19	3.49	2.93
136	SPECIALTY VERMICULITE CORP.	4220 W GLENROSA AVE	PHOENIX	0.92	0.10	0.09
122	SPELLMAN HARDWOODS INC	4645 N 43RD AVE	PHOENIX	0.08		
80437	SR 85 LANDFILL PUBLIC WORKS DEPT	28633 W PATTERSON RD	BUCKEYE	0.07	2.80	0.18
582	STONE CREEK INC	4221 E RAYMOND ST	PHOENIX	29.32		
388	STOROPACK INC	77 N 45TH AVE	PHOENIX	3.08	0.08	0.07
131720	STP PERFORMANCE COATING LLC	406 E PIONEER ST	PHOENIX	7.32		
1214	SULZER EMS INC	2412 W DURANGO ST	PHOENIX	2.00	0.01	0.01
4400	SUMCO SOUTHWEST CORPORATION	19801 N TATUM BLVD	PHOENIX	7.52	11.31	2.32
71801	SUMIKA ELECTRONIC MATERIALS INC	3832 E WATKINS ST	PHOENIX	0.15	0.28	0.06
378	SUN LAND MATERIALS	6950 W SOUTHERN AVE	LAVEEN	0.37	4.53	0.98
130187	SUN VALLEY OAK	801 S 25TH AVE	PHOENIX	1.58		
31	SUNLAND MEMORIAL PARK/MORT/CREM CTR	15826 N DEL WEBB BLVD	SUN CITY	0.00	0.24	0.01
42102	SUNTRON CORPORATION	2401 W GRANDVIEW RD	PHOENIX	4.90		
41431	SUPER RADIATOR COILS LTD	2610 S 21ST ST	PHOENIX	0.02	0.33	0.27
165	SUPERLITE BLOCK	301 E BASELINE RD	GILBERT	0.00	0.06	0.05
392	SUPERLITE BLOCK	1639 E DEER VALLEY RD	PHOENIX	0.00	0.05	0.01
3691	SUPREME OIL CO	2110 GRAND AVE	PHOENIX	3.05		
121397	SVP MFG INC	702 N 21ST AVE	PHOENIX	0.90		
131377	SWIM PLATFORMS INC	3220 S 38TH ST	PHOENIX	5.52		
1109	TEMPE CAMPUS SPV, LLC	2100 E ELLIOT RD	TEMPE	0.33	1.19	0.84
1102	TEVA PHARMACEUTICALS USA, INC	2050 S 35TH AVE	PHOENIX	0.45	1.07	0.90
249	THE BOEING COMPANY	5000 E MCDOWELL RD	MESA	18.26	1.69	1.76
1216	THE COOKSON COMPANY INC	2417 S 50TH AVE	PHOENIX	2.05	0.27	0.22
122552	THE SHERWIN-WILLIAMS COMPANY 4380	1515 E HADLEY ST	PHOENIX	1.00		
4386	THERMO FLUIDS INC	4301 W JEFFERSON ST	PHOENIX	0.14	0.41	0.10
552	THORNWOOD FURNITURE MFG	5125 E MADISON ST	PHOENIX	62.84	0.11	0.57
3806	TODDS A DIV OF HJ HEINZ	610 S 56TH AVE	PHOENIX	0.02	0.38	0.32
56	TPAC A DIVISION OF KIEWIT WESTERN CO	3052 S 19TH AVE	PHOENIX	0.00	0.00	0.00
37546	TRENWYTH INDUSTRIES	4626 N 42ND AVE	PHOENIX	4.04	0.74	0.62
129453	TRICOM COATINGS, INC	2639 N 31ST AVE	PHOENIX	1.94		
1510	TRIUMPH AIR REPAIR	4010 S 43RD PL	PHOENIX	1.46	1.79	0.18
1122	TRIUMPH MANUFACTURING LLC	2130 S INDUSTRIAL PARK AVE	TEMPE	2.59		
1261	TROY CORPORATION	113 S 47TH AVE	PHOENIX	0.13	0.05	0.01

Table A17 (continued). 2011 emissions (in tons/yr) from permitted facilities whose emissions are reflected in area source categories.

ID	Business Name	Address	City	VOC	NOx	CO
30173	TRUCK WORKS	3216 W SHERMAN ST	PHOENIX	5.17		
819	TRW VEHICLE SAFETY SYSTEMS INC	11202 E GERMANN RD	MESA	2.11	0.25	0.31
39309	UNION DISTRIBUTING COMPANY	622 S 56TH AVE	PHOENIX	4.45		
234	UNITED DAIRYMEN OF ARIZONA	2008 S HARDY DR	TEMPE	2.52	28.07	31.70
63962	UPPER CRUST BAKERY	3655 W WASHINGTON ST	PHOENIX	7.97	1.09	0.92
1504	US AIRWAYS	4000 E SKY HARBOR BLVD	PHOENIX	1.25		
131506	USAA (UNITED SERVICES AUTOMOBILE ASSOC)	ONE N NORTERRA DR	PHOENIX	0.02	0.55	0.13
28393	UTC AEROSPACE SYSTEMS	1007 E UNIVERSITY DR	PHOENIX	3.04		
827	VALLEY INDUSTRIAL PAINTING	1131 W WATKINS ST	PHOENIX	11.85	0.44	0.37
30171	VEOLIA TRANSPORTATION PHOENIX	2225 W LOWER BUCKEYE RD	PHOENIX	0.92	0.19	0.16
194	VEOLIA TRANSPORTATION SERVICES, INC	2010 W DESERT COVE AVE	PHOENIX	1.21	0.11	0.09
187	VERCO DECKING INC	4340 N 42ND AVE	PHOENIX	0.53	0.15	0.12
130178	VULCAN MATERIALS CO DBA CAL-MAT COMPANY	3205 S 24TH ST	PHOENIX	0.10	1.21	0.26
2	VULCAN MATERIALS CO-WESTERN DIVISION	14521 N 115TH AVE	EL MIRAGE	0.20	8.02	16.30
90	VULCAN MATERIALS CO-WESTERN DIVISION	4830 S 43RD AVE	PHOENIX	3.45	5.85	1.38
4022	WALKER POWER SYSTEMS INC	1301 E JACKSON ST	PHOENIX	1.46	0.11	0.02
130002	WASTE MGMT 7TH AVE TRANSFER & LANDFILL	3000 S 7TH AVE	PHOENIX	0.58	7.29	1.60
113519	WASTE MGMT PHX HAUL CONTAINER SHOP	2441 S 40TH ST	PHOENIX	10.38		
1149	WEAVER QUALITY SHUTTERS INC	218 S 15TH ST	PHOENIX	1.55		
125450	WESTERN AGGREGATES PLANT #41	31805 W SOUTHERN AVE	BUCKEYE	0.15	10.67	2.36
1475	WESTERN BLOCK CO INC	4021 S 19TH AVE	PHOENIX	0.02	0.30	0.25
4131	WESTERN DIGITAL PROPERTIES	1000 E BELL RD	PHOENIX	1.85	1.65	1.66
36676	WESTERN MILLING	310 S 24TH AVE	PHOENIX	0.00	0.05	0.01
1240	WESTERN MILLWORK INC	2525 W CORONADO RD	PHOENIX	4.03		
130574	WESTERN MILLWORK INC	2940 W WILLETTA ST	PHOENIX	0.85		
1339	WESTERN REFINING COMPANY LP	3050 S 19TH AVE	PHOENIX	0.18	2.32	1.95
2703	WESTERN STATES PETROLEUM	450 S 15TH AVE	PHOENIX	13.30		
91589	WHITE TANKS TRANSFER STATION	18605 W MCDOWELL RD	GOODYEAR	0.03	0.29	0.06
398	WICKENBURG FACILITY	44605 GRAND AVE	WICKENBURG	0.06	0.58	0.12
515	WINGFOOT COMMERCIAL TIRE SYSTEMS LLC	3007 N 31ST AVE	PHOENIX	0.36		
128707	WOOD UNLIMITED INC (AIR)	9801 N LITCHFIELD RD	EL MIRAGE	1.22	15.31	3.30
1382	WOODCASE FINE CABINETRY INC	3255 W OSBORN RD	PHOENIX	13.60		
35359	WOODESIGN A CORPORATION	3234 E CORONA AVE	PHOENIX	0.62		

5. Summary of All Revisions to the 2011 Periodic Emissions Inventory for Ozone Precursors

Table A18 below reflects all revisions made (to both annual and season-day emission calculations) resulting from the two sets of changes described in this Addendum, namely: (1) the inclusion of additional Emission Reduction Credits and (2) the "recasting" of ozone season-day emissions to reflect the three-month period from June–August 2011 (vs. July–September in the original publication).

Table A18. Revised annual and season-day emissions from all sources in the eight-hour ozone nonattainment area. (cf. Table 1.6–9, pp. 9–10). Shaded cells indicate revised values vs. the original 2011 PEI report.

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NO_x**	**CO**	**VOC**	**NO_x**	**CO**
POINT SOURCES:	653.84	1,744.32	1,063.18	4,279.8	15,353.4	9,632.0
Emission Reduction Credits	213.03	14.14	15.30	1,167.3	77.5	83.8
Total, All Point Sources:	**866.87**	**1,758.46**	**1,078.48**	**5,447.1**	**15,430.9**	**9,715.8**
AREA SOURCES:						
Fuel combustion:						
Industrial distillate oil: Boilers	0.61	60.61	15.15	3.9	388.5	97.1
Industrial distillate oil: Engines	0.00	1,830.35	393.95	0.0	11,733.0	2,525.3
Industrial natural gas	36.83	727.80	453.34	216.9	4,285.3	2,669.3
Comm./inst. distillate oil: Boilers	0.00	0.12	0.03	0.0	0.8	0.2
Comm./inst. distillate oil: Engines	0.00	3.70	0.80	0.0	23.7	5.1
Comm./inst. natural gas	54.42	1,079.44	662.05	251.7	4,992.0	3,061.7
Residential distillate oil	0.01	0.35	0.10	0.0	0.0	0.0
Residential natural gas	50.20	857.96	365.09	120.5	2,060.1	876.7
Residential LPG	2.02	51.93	14.73	0.0	0.0	0.0
Residential wood combustion	515.53	58.38	2,993.75	0.0	0.0	0.0
Residential kerosene	0.00	0.03	0.01	0.0	0.0	0.0
All Fuel Combustion:	**659.63**	**4,670.68**	**4,898.99**	**593.0**	**23,483.5**	**9,235.4**
Industrial processes:						
Chemical manufacturing	77.09			596.5		
Commercial cooking	151.03		397.07	829.8		2,181.7
Bakeries	77.85			545.4		
Secondary metal production	41.01	15.02	98.36	306.4	107.9	697.4
Rubber/plastic product manufacturing	1,759.15			14,110.1		
Electrical equipment manufacturing	122.80	23.47	2.98	746.2	135.8	16.4
Industrial processes, NEC	47.55	224.92	91.84	318.0	1,245.8	525.2
All Industrial Processes:	**2,276.48**	**263.41**	**590.27**	**17,452.4**	**1,489.5**	**3,420.8**
Solvent use:						
Architectural coatings	5,033.13			30,973.1		
Auto refinishing	1,327.53			10,211.8		
Traffic markings	171.12			1,737.5		
Factory finished wood	137.12			1,390.7		
Wood furniture	414.77			3,419.9		
Aircraft surface coating	65.84			473.1		
Miscellaneous surface coating	315.02			2,440.0		
Degreasing	216.62			1,445.1		
Dry cleaning	23.42			180.1		
Graphics arts	289.73			2,216.1		
Miscellaneous industrial solvent use	718.75			5,104.6		
Consumer and commercial products	17,605.51			96,468.5		
Cutback asphalt	788.72			4,309.9		
Emulsified asphalt	817.24			4,465.8		
Roofing asphalt	3.08			23.7		
Agricultural pesticides	212.18			1,697.3		
All Solvent Use:	**28,139.77**			**166,557.2**		

Table A18 (continued). Revised annual and season-day emissions from all sources in the eight-hour ozone nonattainment area.

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
Source Category	**VOC**	**NOx**	**CO**	**VOC**	**NOx**	**CO**
Storage/transport:						
Residential portable gas cans	2,968.67			16,311.4		
Commercial portable gas cans	570.89			3,136.7		
Bulk plants	120.91			659.3		
Gas stations Stage I: Submerged fill	85.08			526.9		
Gas stations Stage I: Bal. submerged fill	229.60			1,421.9		
Gas stations Stage II	0.00			0.0		
Underground tanks: Breathing/emptying	777.00			4,124.4		
Airports: aviation gasoline Stage I	344.41			1,887.2		
Airports: aviation gasoline Stage II	17.87			97.9		
Truck: gasoline (tank trucks in transit)	50.82			314.7		
Pipeline gasoline	17.32			94.5		
Volatile organic liquids storage/transport	28.80			169.3		
All Storage/Transport:	**5,211.35**			**28,744.2**		
Waste treatment/disposal:						
On-site incineration	0.17	3.31	0.79	1.1	21.4	5.3
Open burning: Land clearing debris	0.30	0.13	2.81	9.1	4.1	86.4
Landfills	36.59	30.40	108.55	200.7	167.4	596.4
Publicly owned treatment works	75.88			583.7		
Leaking underground storage tanks	1.05			32.3		
Other waste	2.12	22.19	77.93	10.9	122.8	431.4
All Waste Treatment/Disposal:	116.10	56.04	190.06	837.8	315.6	1,119.6
Miscellaneous area sources:						
Agricultural field burning	15.28	6.79	144.32	470.2	209.0	4,440.7
Structure fires	14.95	1.90	81.55	73.3	9.3	399.7
Aircraft engine testing	4.72	46.36	16.16	26.1	259.3	91.2
Vehicle fires	9.38	1.17	36.64	51.4	6.4	200.8
Crematories	1.18	11.14	2.22	50.9	88.1	17.2
Accidental releases	0.45	0.00	0.00	0.6	0.0	0.0
Hospitals	8.66			52.9		
Wildfires	206.08	93.95	4,379.28	13,282.9	6,055.4	282,261.6
Prescribed fires	0.39	0.38	4.54	129.2	127.1	1,523.2
All Miscellaneous Area Sources:	261.09	161.70	4,664.71	14,137.4	6,754.7	288,934.4
ALL AREA SOURCES:	36,664.42	5,151.83	10,344.03	228,322.0	32,043.4	302,710.1
NONROAD MOBILE SOURCES:						
Agricultural equipment	22.52	193.22	177.56	200.6	1,679.5	1,574.6
Airport GSE (+APU)	111.43	404.49	3,259.08	590.0	2,155.7	17,236.5
Commercial equipment	1,916.15	1,355.57	30,094.46	14,818.6	8,284.7	203,526.4
Construction & mining equipment	1,941.80	13,349.23	14,855.32	13,927.2	93,159.3	106,091.9
Industrial equipment	339.78	1,831.45	7,110.33	2,209.9	11,718.2	46,031.6
Lawn and garden equipment	4,970.15	876.55	55,425.05	54,825.3	7,329.9	552,709.8
Pleasure craft	530.39	96.56	1,249.66	13,207.4	2,420.5	32,628.3
Railway maintenance equipment	1.96	8.64	16.67	14.5	59.7	119.5
Recreational equipment	684.30	29.78	2,871.27	8,855.0	339.9	37,525.9
Aircraft	1,705.43	2,585.98	11,719.36	8,355.4	12,789.2	63,737.5
Locomotives	50.15	901.12	153.29	274.8	4,937.7	839.9
ALL NONROAD MOBILE SOURCES:	12,274.06	21,632.59	126,932.05	117,278.7	144,874.4	1,062,022.0
ONROAD MOBILE SOURCES:	24,110.04	56,861.82	226,581.20	147,299.2	309,069.0	1,310,973.1
BIOGENIC SOURCES:	55,311.84	527.18	5,934.55	701,386.9	6,304.2	66,534.2
TOTAL, ALL SOURCE CATEGORIES:	**129,277.24**	**85,931.88**	**370,870.31**	**1,199,733.8**	**507,721.8**	**2,751,955.2**