1. Introduction

1.1 Overview

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

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

1.2 Agencies responsible for the emissions inventory

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

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

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

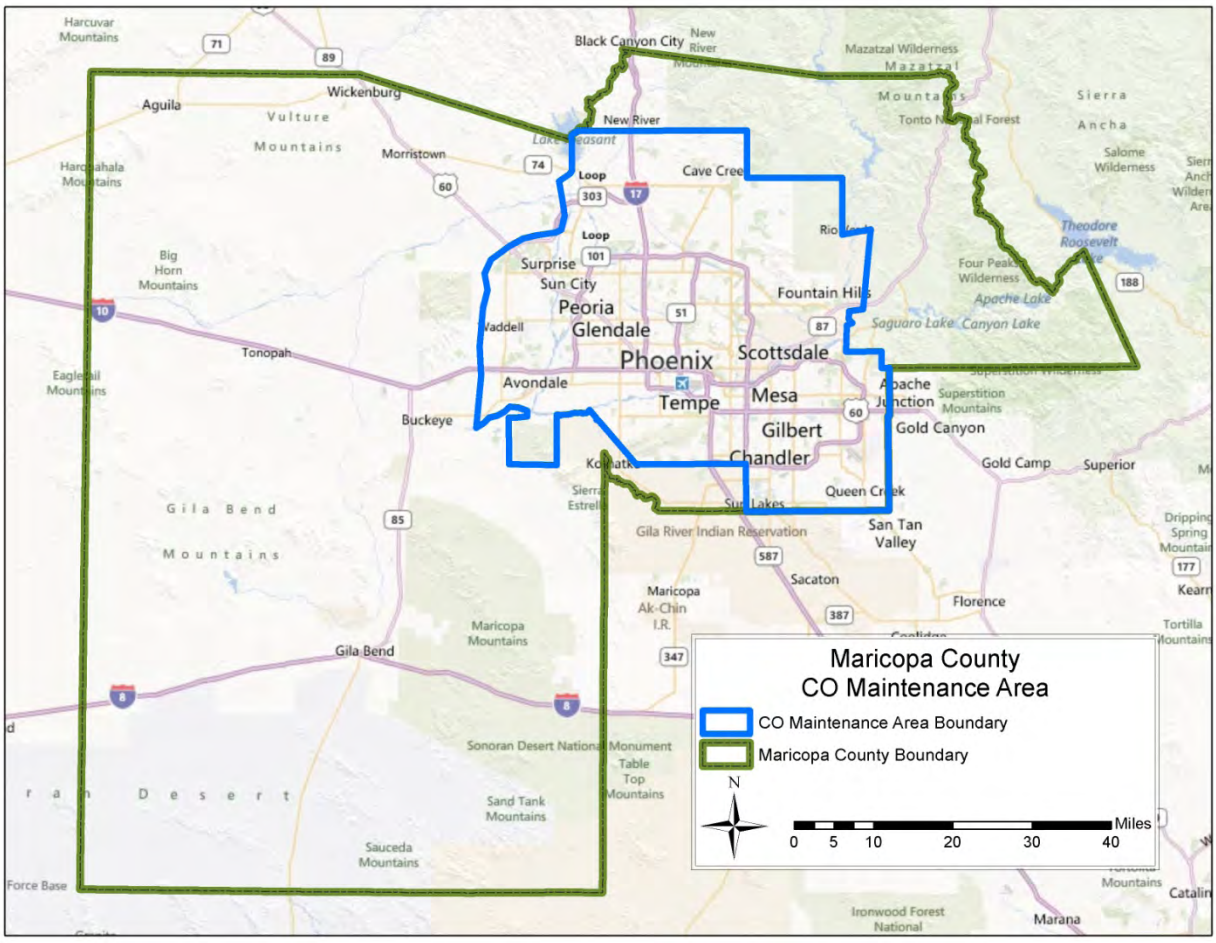
1.3 Temporal scope

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

1.4 Geographic scope

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

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



1.5 Overview of local demographic and land-use data

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

1.5.1 Demographic data

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

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

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

1.5.2 Land-use data

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

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

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

1.6 Emissions overview by source category

1.6.1 Point sources

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

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

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

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

1.6.2 Area sources

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

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

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

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

1.6.3 Nonroad mobile sources

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

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

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

1.6.4 Onroad mobile sources

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

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

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

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

1.6.5 Biogenic sources

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

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

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