

**MAG 2013 CARBON MONOXIDE MAINTENANCE PLAN
FOR THE MARICOPA COUNTY AREA**

MARCH 2013



MAG 2013 CARBON MONOXIDE MAINTENANCE PLAN FOR THE MARICOPA COUNTY AREA

Prepared by:



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Technical Assistance Provided By:

**Arizona Department of Environmental Quality
Arizona Department of Transportation
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U.S. Environmental Protection Agency**

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CHAPTER ONE

INTRODUCTION

The Maricopa County nonattainment area has attained the National Ambient Air Quality Standards for carbon monoxide and has been redesignated as a maintenance area by the Environmental Protection Agency (EPA). In 1978, the Governor of Arizona designated the Maricopa Association of Governments (MAG) as the lead air quality planning agency for Maricopa County in accordance with the Clean Air Act Section 174(a). Together with the State, MAG is responsible for determining which elements of the State Implementation Plan will be planned, implemented and enforced by State and local governments in Arizona. In 1992, the Arizona Legislature recertified MAG as the regional air quality planning agency in accordance with Section 174 of the 1990 Clean Air Act Amendments (A.R.S. Section 49-406A.). MAG coordinates with the Arizona Department of Environmental Quality, Arizona Department of Transportation, and the Maricopa County Air Quality Department in developing the plans necessary to attain and maintain the national standards.

There have been no violations of the one-hour carbon monoxide standard since 1984 and no violations of the eight-hour standard since 1996. The Revised MAG 1999 Serious Area Carbon Monoxide Plan demonstrated attainment by 2000 and was submitted to EPA in 2001. The MAG Carbon Monoxide Redesignation Request and Maintenance Plan demonstrated maintenance of the carbon monoxide standards through 2015 and was submitted to EPA in 2003. On March 9, 2005, EPA published final approval of the Serious Area Plan, Maintenance Plan, and redesignation of the Maricopa County area to attainment status, effective April 8, 2005.

Section 175A(b) of the Clean Air Act requires that eight years after redesignation of an area as an attainment area, an additional plan revision for maintaining the primary air quality standard for ten years after the expiration of the initial ten year period must be submitted to EPA. In accordance with the Clean Air Act, the MAG 2013 Carbon Monoxide Maintenance Plan has been prepared. The plan demonstrates continued maintenance of the carbon monoxide standards through 2025 with a maximum eight-hour concentration of 4.0 parts per million and establishes a 2025 motor vehicle emissions budget of 559.4 metric tons per day for the carbon monoxide maintenance area.

OUTLINE OF THE MAG 2013 CARBON MONOXIDE MAINTENANCE PLAN

The purpose of this document is to present the MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area. The plan was prepared to address the relevant portions of the September 4, 1992 EPA memorandum entitled, "Procedures for Processing Requests to Redesignate Areas to Attainment" that are pertinent to maintenance plans.

The MAG 2013 Carbon Monoxide Maintenance Plan is composed of the following major sections:

1. Introduction (This Chapter) - Includes a general discussion of the prior Serious Area Plan and Maintenance Plan approvals, redesignation to attainment status, and the outline of the MAG 2013 Carbon Monoxide Maintenance Plan.
2. Continued Attainment of the Carbon Monoxide Standards - Includes the historical perspective; carbon monoxide monitoring network; monitoring results and continued attainment demonstration; and quality assurance program.
3. Maintenance Plan - Includes the maintenance plan control measures; emissions inventories; maintenance demonstration; monitoring network and verification of continued attainment; contingency provisions; transportation conformity budget; and subsequent maintenance plan revisions.

CHAPTER TWO

CONTINUED ATTAINMENT OF THE CARBON MONOXIDE STANDARDS

Attainment of the National Ambient Air Quality Standards for carbon monoxide (CO) is demonstrated when two consecutive years of monitoring data for each site show no more than one exceedance per year of the eight-hour (9 ppm) and one-hour (35 ppm) standards. The following information demonstrates that the Maricopa County maintenance area has continued to attain the national standards for carbon monoxide for the past 15 years. This is based on quality assured monitoring data representing all carbon monoxide monitoring locations in the maintenance area.

HISTORICAL PERSPECTIVE

Data from the regional monitoring network indicates that the Maricopa County maintenance area has not experienced a violation of the eight-hour standard for carbon monoxide since 1996. The last violation of the one-hour standard was recorded in 1984. In addition, both the frequency of exceedance days and the magnitude of observed CO concentrations have declined dramatically since air quality monitoring began in the late 1960's.

In contrast to the lack of eight-hour violations since 1996, eighty-six exceedance days were recorded in 1984. There was a noticeable decline in the number of exceedance days from 1984 through 1990. In 1994 through 1996 period, there were a total of eight exceedance days, three each in 1994 and 1995, and two in 1996. There were two violation sites in 1994 (West Indian School and West Phoenix sites), and one each in 1995 and 1996 (both at the Phoenix Grand Avenue microscale monitor). A single exceedance of the eight-hour standard occurred in 1999 at the Phoenix Grand Avenue site, but this one exceedance did not constitute a violation of the standard. There have been no exceedances of the CO standard since 1999.

The Maricopa County maintenance area has been in attainment of the National Ambient Air Quality Standards for carbon monoxide since 1997 and has had a continuous downward trend in concentrations. In the past ten years, the annual eight-hour maximum concentration has decreased by approximately 57 percent, from 7.5 ppm in 2001 to 3.2 ppm in 2011. Since 2008, the maximum eight-hour concentrations reported at the CO monitoring locations have been less than half of the 9 ppm standard (9.4 ppm due to rounding).

CARBON MONOXIDE MONITORING NETWORK

The ambient air monitoring network for carbon monoxide in the Maricopa County maintenance area consists of 12 State and Local Air Monitoring Stations (SLAMS). The Buckeye station is located west of the maintenance area in Maricopa County and also monitors carbon monoxide. Twelve of these sites are operated by the Maricopa County

Air Quality Department and one monitor is operated by the Arizona Department of Environmental Quality. The CO monitoring sites are identified, along with summary data from 2008 through 2011, in Tables 2-1 through 2-4. Figure 2-1 shows the geographical distribution of the regional monitoring network.

MONITORING RESULTS AND CONTINUED ATTAINMENT DEMONSTRATION

The monitoring data presented in Tables 2-1 through 2-4 verify that the Maricopa County maintenance area has remained in attainment of the national standards for carbon monoxide, in accordance with the federal requirements of 40 CFR 50.8. Data recovery rates for the monitors exceed the 75 percent completeness requirements for all years and all state and federal quality assurance procedures have been followed. Figure 2-2 illustrates the downward trend in the second-highest carbon monoxide concentrations at all monitors in the maintenance area.

QUALITY ASSURANCE PROGRAM

Carbon monoxide data for the Maricopa County area has been collected and quality-assured in accordance with 40 CFR, Part 58, Appendix A “Quality Assurance Requirements for SLAMS, SPMs, and PSD Air Monitoring” and EPA’s “Quality Assurance Handbook for Air Pollution Measurement Systems: Volume II: Ambient Air Quality Monitoring Program”. The data are recorded in the EPA Air Quality System and are available for public review through sources such as the EPA AirData website and air quality monitoring reports produced by the Maricopa County Air Quality Department and the Arizona Department of Environmental Quality.

TABLE 2-1

**2008 CARBON MONOXIDE MONITORING DATA SUMMARY
FOR THE MARICOPA COUNTY MAINTENANCE AREA
STANDARDS: 1-HOUR: 35 PPM; 8-HOUR: 9 PPM***

Site Name	1-Hour		8-Hour	
	Max ppm	2 nd Max ppm	Max ppm	2 nd Max ppm
Buckeye, 26449 W. 100 th Dr. ^{s+}	0.7	0.7	0.5	0.5
Central Phoenix, 1645 E. Roosevelt	3.6	3.5	2.6	2.2
Dysart, 16825 N. Dysart Rd. ^s	1.5	1.4	1.0	1.0
Glendale, 6001 W. Olive ^s	2.1	2.0	1.6	1.5
Greenwood, 1128 N. 27 th Ave.	3.0	3.0	2.7	2.4
JLG Supersite, 4530 N. 17 th Ave.	3.1	3.1	2.5	2.4
Mesa, 310 S. Brooks ^s	1.7	1.7	1.4	1.3
North Phoenix, 601 E. Butler Dr. ^s	2.1	2.0	1.3	1.3
South Phoenix, 33 W. Tamarisk Ave. ^s	3.7	3.2	2.2	2.0
South Scottsdale, 2857 N. Miller Rd. ^s	2.0	2.0	1.5	1.4
Tempe, 1525 S. College Ave. ^s	2.4	2.3	1.8	1.4
West Chandler, 275 S. Ellis ^s	1.8	1.7	1.4	1.4
West Indian School, 3315 W. Indian School Rd.	3.9	3.6	2.8	2.8
West Phoenix, 3847 W. Earll	4.7	4.5	3.1	3.0

* Due to mathematical rounding, values ≥ 35.5 and 9.5 ppm are necessary to exceed the standard.

^s Seasonal monitor operating September 1st to April 1st.

⁺ The Buckeye monitor is located outside the carbon monoxide maintenance area.

Sources: Environmental Protection Agency Air Quality System; Maricopa County Air Quality Department 2008-2011 Air Monitoring Network Reviews.

TABLE 2-2

**2009 CARBON MONOXIDE MONITORING DATA SUMMARY
FOR THE MARICOPA COUNTY MAINTENANCE AREA
STANDARDS: 1-HOUR: 35 PPM; 8-HOUR: 9 PPM***

Site Name	1-Hour		8-Hour	
	Max ppm	2 nd Max ppm	Max ppm	2 nd Max ppm
Buckeye, 26449 W. 100 th Dr. ^{s+}	1.2	1.1	0.6	0.5
Central Phoenix, 1645 E. Roosevelt	3.6	3.0	2.2	2.1
Dysart, 16825 N. Dysart Rd. ^s	1.0	0.9	0.9	0.8
Glendale, 6001 W. Olive ^s	2.0	1.9	1.3	1.2
Greenwood, 1128 N. 27 th Ave.	3.5	3.2	2.6	2.4
JLG Supersite, 4530 N. 17 th Ave.	2.9	2.8	2.3	2.3
Mesa, 310 S. Brooks ^s	2.0	1.9	1.5	1.3
North Phoenix, 601 E. Butler Dr. ^s	5.9	2.1	1.3	1.3
South Phoenix, 33 W. Tamarisk Ave. ^s	4.1	3.4	2.6	2.2
South Scottsdale, 2857 N. Miller Rd. ^s	2.9	1.9	1.4	1.4
Tempe, 1525 S. College Ave. ^s	4.0	3.6	2.9	2.1
West Chandler, 275 S. Ellis ^s	2.1	2.1	1.7	1.5
West Indian School, 3315 W. Indian School Rd.	5.6	5.0	4.2	3.3
West Phoenix, 3847 W. Earll	4.9	4.8	4.6	3.3

* Due to mathematical rounding, values ≥ 35.5 and 9.5 ppm are necessary to exceed the standard.

^s Seasonal monitor operating September 1st to April 1st.

⁺ The Buckeye monitor is located outside the carbon monoxide maintenance area.

Sources: Environmental Protection Agency Air Quality System; Maricopa County Air Quality Department 2008-2011 Air Monitoring Network Reviews.

TABLE 2-3

**2010 CARBON MONOXIDE MONITORING DATA SUMMARY
FOR THE MARICOPA COUNTY MAINTENANCE AREA
STANDARDS: 1-HOUR: 35 PPM; 8-HOUR: 9 PPM***

Site Name	1-Hour		8-Hour	
	Max ppm	2 nd Max ppm	Max ppm	2 nd Max ppm
Buckeye, 26449 W. 100 th Dr. ^{s+}	1.9	1.3	0.6	0.6
Central Phoenix, 1645 E. Roosevelt	3.2	3.2	2.4	2.2
Dysart, 16825 N. Dysart Rd. ^s	2.0	1.8	0.9	0.6
Glendale, 6001 W. Olive ^s	9.0	8.9	3.0	1.5
Greenwood, 1128 N. 27 th Ave.	4.3	3.9	3.0	2.3
JLG Supersite, 4530 N. 17 th Ave.	2.9	2.7	2.1	2.1
Mesa, 310 S. Brooks ^s	2.0	2.0	1.4	1.4
North Phoenix, 601 E. Butler Dr. ^s	2.9	2.4	1.7	1.6
South Phoenix, 33 W. Tamarisk Ave. ^s	4.4	4.3	3.1	3.1
South Scottsdale, 2857 N. Miller Rd. ^s	2.1	2.0	1.6	1.6
Tempe, 1525 S. College Ave. ^s	3.4	2.4	1.9	1.6
West Chandler, 275 S. Ellis ^s	2.0	2.0	1.9	1.6
West Indian School, 3315 W. Indian School Rd. (Closed June 30, 2010) [#]	3.7	3.3	2.3	2.3
West Phoenix, 3847 W. Earll	4.3	4.2	3.3	3.2

* Due to mathematical rounding, values ≥ 35.5 and 9.5 ppm are necessary to exceed the standard.

^s Seasonal monitor operating September 1st to April 1st.

[#] Less than 75 percent data available.

⁺ The Buckeye monitor is located outside the carbon monoxide maintenance area.

Sources: Environmental Protection Agency Air Quality System; Maricopa County Air Quality Department 2008-2011 Air Monitoring Network Reviews.

TABLE 2-4

**2011 CARBON MONOXIDE MONITORING DATA SUMMARY
FOR THE MARICOPA COUNTY MAINTENANCE AREA
STANDARDS: 1-HOUR: 35 PPM; 8-HOUR: 9 PPM***

Site Name	1-Hour		8-Hour	
	Max ppm	2 nd Max ppm	Max ppm	2 nd Max ppm
Buckeye, 26449 W. 100 th Dr. ^{s+}	1.8	1.2	0.9	0.8
Central Phoenix, 1645 E. Roosevelt	3.8	3.5	2.1	2.1
Dysart, 16825 N. Dysart Rd. ^s	1.0	0.9	0.5	0.5
Glendale, 6001 W. Olive ^s	1.9	1.8	1.3	1.2
Greenwood, 1128 N. 27 th Ave.	3.0	2.9	2.5	2.5
JLG Supersite, 4530 N. 17 th Ave. [#]	2.5	2.5	2.3	2.1
Mesa, 310 S. Brooks ^s	1.9	1.8	1.5	1.3
North Phoenix, 601 E. Butler Dr. ^s	2.9	2.7	1.6	1.5
South Phoenix, 33 W. Tamarisk Ave. ^s	3.0	2.9	2.6	2.0
South Scottsdale, 2857 N. Miller Rd. ^s	1.8	1.7	1.4	1.3
Tempe, 1525 S. College Ave. ^s	3.6	3.4	3.2	2.9
West Chandler, 275 S. Ellis ^s	1.8	1.7	1.4	1.3
West Phoenix, 3847 W. Earll	4.4	3.9	3.0	2.9

* Due to mathematical rounding, values ≥ 35.5 and 9.5 ppm are necessary to exceed the standard.

^s Seasonal monitor operating September 1st to April 1st.

[#] Less than 75 percent data available.

⁺ The Buckeye monitor is located outside the carbon monoxide maintenance area.

Sources: Environmental Protection Agency Air Quality System; Maricopa County Air Quality Department 2008-2011 Air Monitoring Network Reviews.

FIGURE 2-1

CARBON MONOXIDE MAINTENANCE AREA AND CARBON MONOXIDE MONITORING SITES

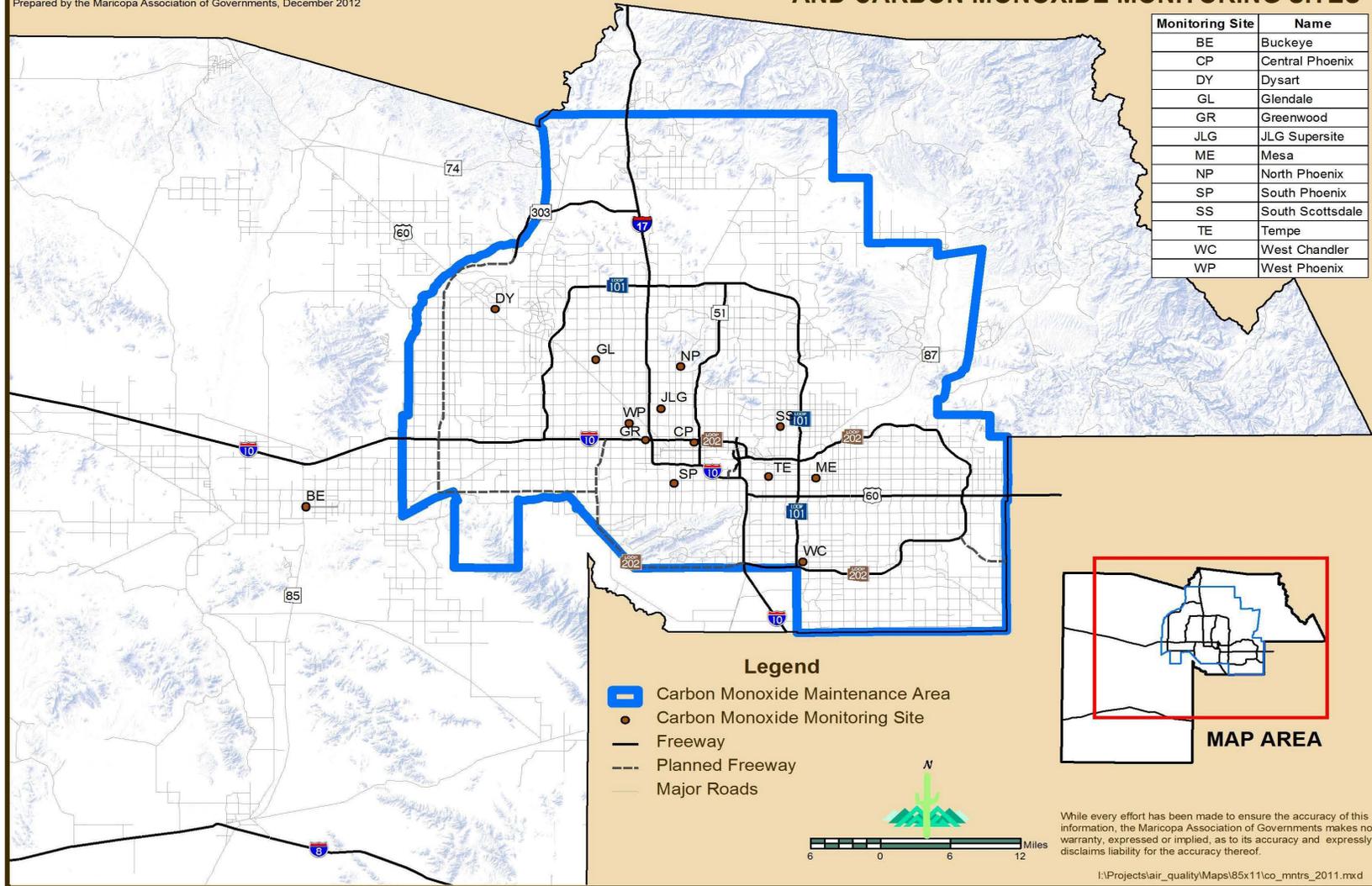
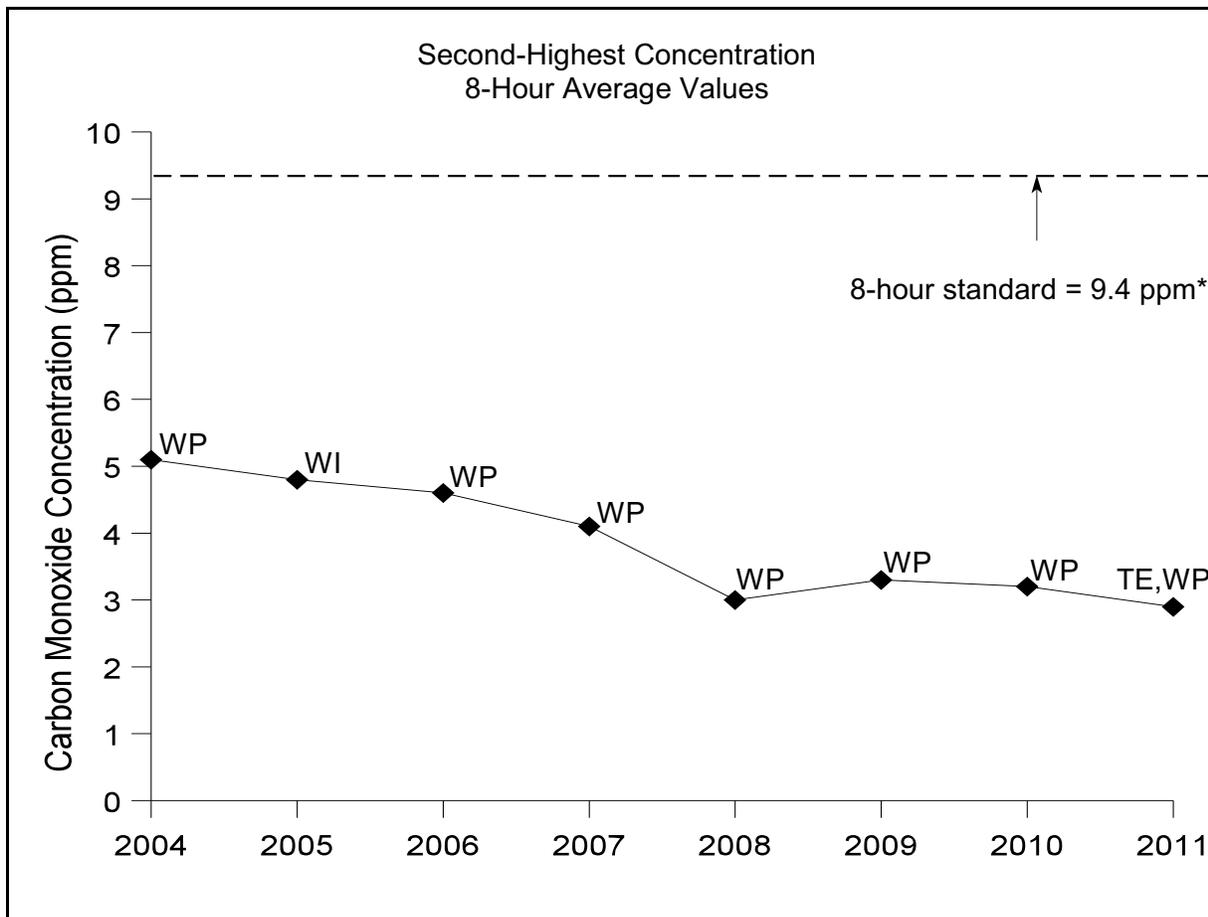


FIGURE 2-2
CARBON MONOXIDE TRENDS
(2004-2011)



* Due to mathematical rounding, values ≥ 9.5 ppm are necessary to exceed the standard.

Monitors Where the Second-Highest Reading Occurred

- (TE) Tempe
- (WI) West Indian School Road
- (WP) West Phoenix

Source: Environmental Protection Agency Air Quality System.

CHAPTER THREE

MAINTENANCE PLAN

No violation of the one-hour National Ambient Air Quality Standard for carbon monoxide has occurred in Maricopa County since 1984 and no violation of the eight-hour carbon monoxide standard has been recorded at any monitor since 1996. The Revised MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area was submitted to the Environmental Protection Agency (EPA) in 2001 (MAG, 2001). The Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area was submitted to EPA in 2003 (MAG, 2003).

The Revised 1999 Serious Area Carbon Monoxide Plan demonstrated attainment of the carbon monoxide standards by 2000. The 2003 Carbon Monoxide Maintenance Plan demonstrated continued maintenance of the carbon monoxide standards through 2015. EPA approved the Revised 1999 Serious Area Carbon Monoxide Plan and the 2003 Carbon Monoxide Maintenance Plan and redesignated the Maricopa County area to attainment, effective April 8, 2005 (EPA, 2005).

Section 175A(b) of the Clean Air Act Amendments states that *“8 years after redesignation of any area as an attainment area under section 107(d), the State shall submit to the Administrator an additional revision of the applicable State implementation plan for maintaining the national primary ambient air quality standard for 10 years after the expiration of the initial 10-year period”*. Thus, a second carbon monoxide maintenance plan for the years 2016 through 2025 for the Maricopa county area is required for submittal to EPA by April 8, 2013.

This second carbon monoxide maintenance plan (hereafter referred to as the 2013 CO Maintenance Plan) demonstrates maintenance of the National Ambient Air Quality Standards for carbon monoxide in the Maricopa County area through 2025 and establishes a 2025 conformity budget for onroad mobile source emissions using the latest version of the EPA Motor Vehicle Emission Simulator (MOVES) model, MOVES2010b. The 2008 Periodic Emissions Inventory for Carbon Monoxide for the Maricopa County, Arizona Maintenance Area is also included in Appendix A, Exhibit 1.

MAINTENANCE PLAN CONTROL MEASURES

The Maricopa County area will continue to implement the maintenance measures in the 2003 Carbon Monoxide Maintenance Plan. The first nine measures in Table 3-1 were used for numeric credit in demonstrating maintenance of the carbon monoxide standards through 2015. These measures are described in Chapter Two of the 2003 CO Maintenance Plan. The tenth measure, Expansion of Area A Boundaries, was one of three contingency measures in the 2003 Carbon Monoxide Maintenance Plan. This measure is described in Section VII-2-2 of the Technical Support Document in Appendix A, Exhibit

**TABLE 3-1
MAINTENANCE MEASURES IN THE 2013 CARBON MONOXIDE MAINTENANCE
PLAN**

- | | |
|-----|--|
| 1. | California Phase 2 Reformulated Gasoline with 3.5% Oxygen Content From November 1 Through March 31 |
| 2. | Off-Road Vehicle and Engine Standards |
| 3. | Phased-In Emission Test Cutpoints |
| 4. | One-time Waiver from Vehicle Emissions Test |
| 5. | Defer Emissions Associated with Government Activities |
| 6. | Coordinate Traffic Signal Systems |
| 7. | Develop Intelligent Transportation Systems |
| 8. | Tougher Enforcement of Vehicle Registration and Emissions Test Compliance |
| 9. | Clean Burning Fireplace Ordinances |
| 10. | Expansion of Area A Boundaries |

2 of the 2003 Carbon Monoxide Maintenance Plan (MAG, 2003). The reason for converting this measure from contingency to maintenance in the 2013 Carbon Monoxide Maintenance Plan is discussed below.

In November 2012, EPA proposed to approve the 110(l) SIP revision submitted by the Arizona Department of Environmental Quality (ADEQ, 2009; ADEQ, 2011) that will eliminate the requirement for motorcycles to participate in the Arizona vehicle emissions inspection and maintenance (VEI) program (EPA, 2012a). EPA has indicated that the benefits of the contingency measure, Expansion of Area A Boundaries, in the 2003 Carbon Monoxide Maintenance Plan may be used to offset the increase in emissions attributable to the exemption of motorcycles from the VEI program. Like other contingency measures in the 2013 CO Maintenance Plan, this measure was implemented early, in accordance with EPA guidance (EPA, 1993).

Therefore, the Expansion of Area A Boundaries is included as a maintenance measure in the 2013 Carbon Monoxide Maintenance Plan. As discussed in the Contingency Provisions section of this chapter, ADEQ has made a commitment to re-institute the VEI program requirement for motorcycles, if there is a future violation of the carbon monoxide standard.

EMISSIONS INVENTORIES

The emissions inventories used in performing the maintenance demonstration are presented in Table 3-2, for 2006, 2008, 2015 and 2025 in the carbon monoxide modeling domain, and Table 3-3, for 2008 and 2025 in the CO maintenance area. The 2008 emissions in both tables are based on the latest periodic emissions inventory (PEI) for carbon monoxide (CO) contained in Appendix A, Exhibit 1 (MCAQD, 2012). The PEI estimates CO emissions for a typical weekday during the winter months, November - January.

Emission reduction credit for two measures in Table 3-1, California Phase 2 Reformulated Gasoline and Off-Road Vehicle and Engine Standards, is reflected in the emissions inventories shown in Tables 3-2 and 3-3. The EPA MOVES2010b model estimates that California Phase 2 Reformulated Gasoline will reduce CO emissions by 128.9 metric tons per day in 2025, a reduction in CO maintenance area emissions of about 17 percent. The EPA NONROAD2008a model estimates that Off-Road Vehicle and Engine Standards will reduce CO emissions by 15.0 metric tons per day in 2025, which represents a two percent reduction in CO maintenance area emissions.

While other maintenance measures in Table 3-1 will continue to be implemented, their collective carbon monoxide reduction impact in 2025 is anticipated to be less than one percent. Therefore, no numeric credit has been taken for these measures in the maintenance demonstration. In addition to Reformulated Gasoline and Off-Road Vehicle and Engine Standards, the maintenance demonstration in this plan is dependent upon the emission reduction benefits of tighter federal emission standards for new onroad and nonroad engines, fuel requirements, and continuing fleet turnover to lower emissions from onroad and nonroad vehicles. These emission reduction benefits are reflected in the onroad and nonroad emissions shown in Tables 3-2 and 3-3.

**TABLE 3-2
AVERAGE WEEKDAY EMISSIONS DURING THE WINTER SEASON
IN THE CARBON MONOXIDE MODELING DOMAIN**

Source Category	CO Emissions (metric tons/day)			
	2006	2008	2015	2025
Point	0.4	0.7	18.0	18.0
Area	26.4	25.8	29.6	33.1
Nonroad	227.1	187.0	133.1	129.4
Onroad	549.1	410.0	297.9	223.4
Total	803.0	623.5	478.6	403.9

**TABLE 3-3
AVERAGE WEEKDAY EMISSIONS DURING THE WINTER SEASON
IN THE CARBON MONOXIDE MAINTENANCE AREA**

Source Category	CO Emissions (metric tons/day)	
	2008	2025
Point	0.7	19.8
Area	37.8	47.3
Nonroad	281.5	213.1
Onroad	581.6	359.4
Total	901.6	639.6

The data used to derive growth factors for estimating point and area source emissions were derived from the MAG Socioeconomic Projections of Population, Housing and Employment by Municipal Planning Area and Regional Analysis Zone in Maricopa County (MAG, 2007). These projections, which cover the period 2010 through 2030, are based on the 2005 Special U.S. Census conducted in Maricopa County and were approved by the MAG Regional Council in May 2007.

Onroad mobile source emissions for the 2013 Carbon Monoxide Maintenance Plan were estimated using the MOVES2010b model and traffic assignment data output by the MAG TransCAD travel demand model. The socioeconomic projections adopted by the MAG Regional Council in 2007 were also used as input to the travel demand model.

Nonroad equipment emissions were developed with the EPA NONROAD2008a model, using default NONROAD2008a activity growth rates for Maricopa County, with one exception. Equipment population and activity levels for commercial lawn and garden equipment were based on a survey performed as part of Cap and Trade Oversight Committee work (ENVIRON, 2003).

The Emissions and Dispersion Modeling System (EDMS) and Federal Aviation Administration Terminal Area Forecast system database were used to estimate future emissions for all airports, except Luke Air Force Base (AFB). Luke AFB emissions were derived from the 2008 Mobile Source Emissions Inventory for Luke AFB (Weston, 2010) and the F-35A Training Basing Environmental Impact Statement (USAF, 2012).

Details regarding the technical inputs and assumptions used in preparing the emissions inventories are provided in Chapter II of the TSD (Appendix A, Exhibit 2). The percentage contributions of CO emissions by source category are illustrated in Figures 3-1 and 3-2 for the CO modeling domain and maintenance area, respectively.

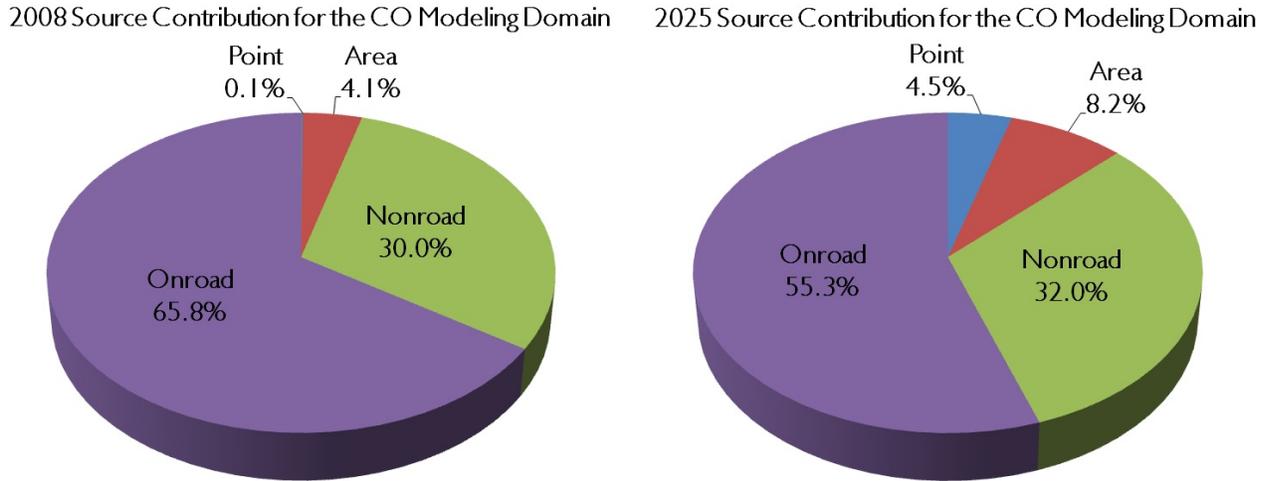
MAINTENANCE DEMONSTRATION

The 2013 Carbon Monoxide Maintenance Plan relies on a series of technical analyses to demonstrate maintenance of the National Ambient Air Quality Standards for carbon monoxide through 2025. The maintenance demonstration assumes that the measures in Table 3-1 will continue to be implemented through 2025.

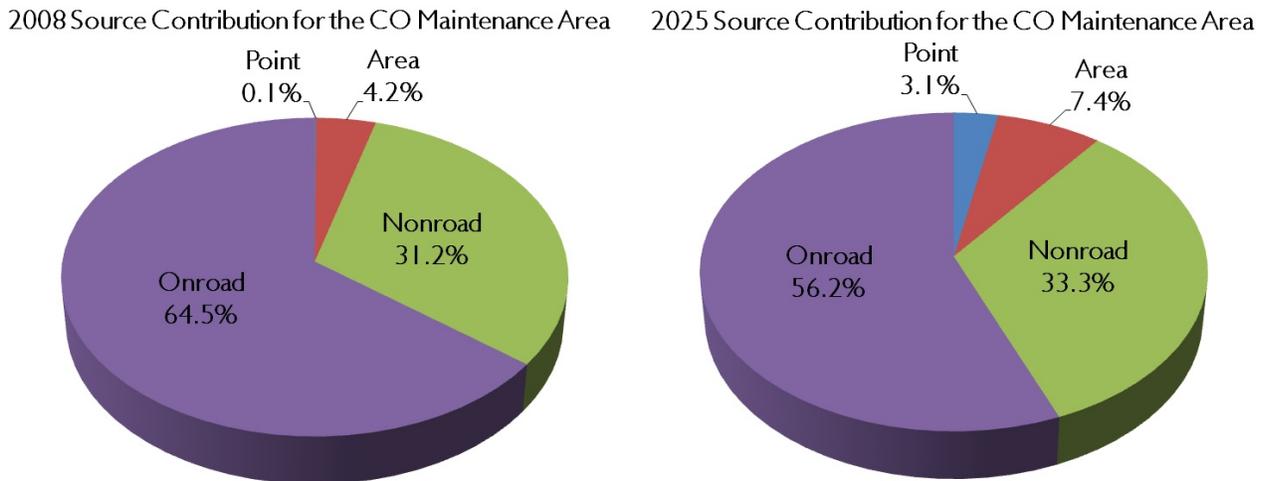
Three different modeling analyses were performed to estimate the effects of growth and emission reduction strategies on future carbon monoxide concentrations in the Maricopa County area. In addition, two weight of evidence evaluations were conducted using actual trends in air quality and meteorological data to reinforce the modeling analyses. The results of these five quantitative assessments provide assurance that there will continue to be compliance with the federal carbon monoxide standards through 2025.

A modeling protocol was developed to detail the technical approaches and assumptions to be used in demonstrating maintenance of the federal standards for carbon monoxide. The modeling protocol is contained in Appendix I of the Technical Support Document for the 2013 CO Maintenance Plan (TSD), contained in Appendix A, Exhibit 2.

**FIGURE 3-1
2008 AND 2025 CARBON MONOXIDE EMISSIONS BY SOURCE CATEGORY FOR
THE CARBON MONOXIDE MODELING DOMAIN**



**FIGURE 3-2
2008 AND 2025 CARBON MONOXIDE EMISSIONS BY SOURCE CATEGORY FOR
THE CARBON MONOXIDE MAINTENANCE AREA**



For the maintenance demonstration, two sets of carbon monoxide emissions inventories were developed representing: (1) the carbon monoxide modeling domain in 2006, 2008, 2015, and 2025 and (2) the carbon monoxide maintenance area in 2008 and 2025. The carbon monoxide modeling domain and maintenance area are illustrated in Figure 3-3. The modeling domain covers 792 square miles, while the maintenance area represents 1,814 square miles. Both of these areas are located within Maricopa County.

The 2008 Periodic Emissions Inventory for Carbon Monoxide in the Maricopa County Maintenance Area is provided in Appendix A, Exhibit 1 (MCAQD, 2012). This inventory was used to establish the 2008 base case emissions, back-cast the 2006 emissions, and project the 2015 and 2025 future emissions with control measures in place.

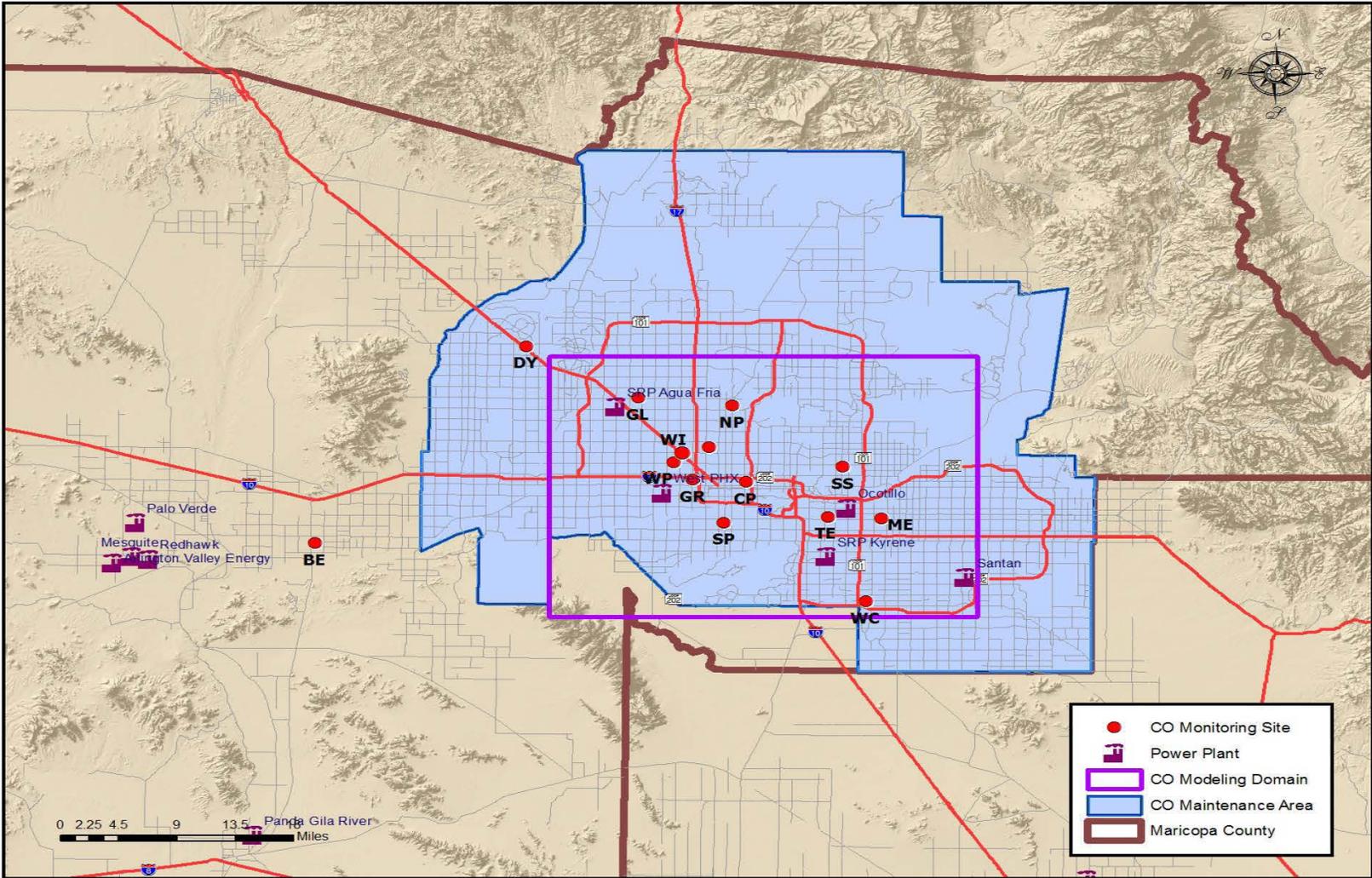
The modeling for the 2013 CO Maintenance Plan was conducted using three approaches: (1) an emissions inventory comparison, (2) a scaling of the Urban Airshed Model/CAL3QHC maximum concentration, and (3) a CAL3QHC intersection hotspot analysis. The first approach demonstrates maintenance of the standard by showing a continuing decrease in emissions levels in 2015 and 2025 compared with emissions levels in 2006 and 2008. The second approach scales the UAM/CAL3QHC maximum eight-hour concentrations for 2006 and 2015 derived from the 2003 CO Maintenance Plan based on the ratio of future year to base year total anthropogenic carbon monoxide emissions. The scaled UAM/CAL3QHC maximum concentration in 2025 was used to demonstrate maintenance of the eight-hour carbon monoxide standard.

In the third approach, CAL3QHC modeling was performed for six intersections which are expected to experience the heaviest traffic volumes and congestion in 2025. The CAL3QHC maximum eight-hour CO concentration projected for each intersection was added to the estimated background concentration for 2025. The combined background and CAL3QHC maximum eight-hour concentration at each intersection was also used to demonstrate maintenance of the eight-hour carbon monoxide standard in 2025.

In addition to the three modeling approaches described above, two weight of evidence analyses were performed to demonstrate maintenance through 2025. These include an evaluation of historical one-hour and eight-hour carbon monoxide concentration trends at monitoring sites and a regional meteorological analysis. For the first weight of evidence analysis, historical CO concentration trends for each monitoring site were developed and the trend was extended to 2015 and 2025 using regression analysis. For the second weight of evidence approach, a meteorological analysis was performed to demonstrate that the historical improvements in CO concentrations in the Maricopa County area are not due to unusually favorable meteorological conditions.

Summaries of the five technical analyses conducted as part of the maintenance demonstration are described in the subsections that follow. Details regarding these analyses and underlying technical assumptions are documented in Section IV of the TSD (Appendix A, Exhibit 2).

**FIGURE 3-3
CARBON MONOXIDE MODELING DOMAIN AND MAINTENANCE AREA**



Emissions Inventory Comparison

The emissions in the carbon monoxide modeling domain shown in Table 3-2 were estimated using the latest emissions models and planning assumptions. Table 3-4 compares the total 2006 and 2015 CO emissions in Table 3-2 with emissions derived with older models and assumptions as part of the 2003 CO Maintenance Plan. In order to estimate the maximum eight-hour CO concentration in 2025, the maximum concentration in 2006 of 5.3 ppm at the West Indian School monitor was multiplied by the ratio of 403.9 metric tons per day in 2025 divided by 803.0 tons per day in 2006. This results in an estimated maximum eight-hour concentration in the CO modeling domain of 2.7 parts per million (ppm) in 2025.

Table 3-3 indicates that total emissions in the CO maintenance area are 639.6 metric tons per day in 2025 and 901.6 metric tons per day in 2008. Applying this ratio to the maximum eight-hour CO concentration of 3.1 ppm at the West Phoenix monitor in 2008, results in an estimated maximum eight-hour CO concentration of 2.2 ppm in 2025. These two emissions inventory comparisons reveal that the maximum concentration will remain well below the eight-hour standard of 9 ppm in both the CO modeling domain and the CO maintenance area through 2025.

Scaled UAM/CAL3QHC Maximum Eight-Hour Concentrations

In the MAG 2003 CO Maintenance Plan, the eight-hour carbon monoxide concentrations in the modeling domain were estimated for the years 2006 and 2015 using the EPA-approved Urban Airshed Model (UAM) and intersection hotspot model (CAL3QHC). Since the UAM/CAL3QHC predictions were derived from the emissions inventories based on older versions of models (e.g., MOBILE6) available at the time the MAG 2003 CO Maintenance Plan was developed, emissions inventories for the years 2006 and 2015, as well as the maintenance year 2025, were newly developed, as shown in Table 3-4, using the latest versions of models and updated input data. The UAM/CAL3QHC projections for the years 2006 and 2015 were adjusted by the ratio of the new to old emissions inventory totals. The adjusted 2006 and 2015 UAM/CAL3QHC estimates from the MAG 2003 CO Maintenance Plan were scaled for the maintenance year 2025.

Although the Phoenix Grand Avenue and West Indian School monitors were deactivated in 1993 and 2010, respectively, modeling conducted for the Revised MAG 1999 Serious Area CO Plan (MAG, 2001) and the MAG 2003 CO Maintenance Plan (MAG, 2003) projected that these monitored intersections would have some of the highest levels of traffic congestion and CO concentrations in future years. In addition, the West Indian School monitor recorded the peak CO concentration of 10.5 ppm during the 1994 episode that was modeled in both plans. The adjusted and scaled maximum concentrations for these two intersections, as well as the highest eight-hour CO concentrations predicted by UAM/CAL3QHC in the modeling domain, are shown in Table 3-5. The scaled maximum UAM/CAL3QHC eight-hour CO concentration for 2025 is 4.0 ppm, which is less than half the eight-hour CO standard of 9 ppm.

**TABLE 3-4
TOTAL CARBON MONOXIDE EMISSIONS IN THE CARBON MONOXIDE MODELING
DOMAIN**

Source	Total CO Emissions (metric tons/day)		
	2006	2015	2025
2003 CO Maintenance Plan	912.3	901.2	N/A
2013 CO Maintenance Plan	803.0	478.6	403.9

**TABLE 3-5
UAM/CAL3QHC MAXIMUM EIGHT-HOUR CARBON MONOXIDE CONCENTRATION
ADJUSTMENTS AND SCALED ESTIMATES FOR 2025**

(units = ppm)

	2006		2015		2025	
	UAM/ CAL3QHC	Adjusted	UAM/ CAL3QHC	Adjusted	Based on 2006	Based on 2015
WI Monitor*	7.28	6.41	6.59	3.50	3.22	2.95
WI Receptor #9	8.25	7.26	8.08	4.29	3.65	3.62
WI Receptor #8	8.08	7.11	7.84	4.16	3.58	3.51
WI Receptor #20	7.85	6.91	7.44	3.95	3.48	3.33
PHGA Monitor**	N/A	N/A	N/A	N/A	N/A	N/A
PHGA Receptor #30	8.24	7.25	7.81	4.15	3.65	3.50
PHGA Receptor #46	8.08	7.11	7.45	3.96	3.58	3.34
PHGA Receptor #29	8.03	7.07	7.39	3.92	3.56	3.31
UAM/CAL3QHC Maximum	8.92	7.85	8.06	4.28	3.95 (rounded to 4.0)	3.61

WI = West Indian School
PHGA = Phoenix Grand Avenue

*The WI Monitor was deactivated on June 30, 2010

**The PHGA monitor values were not available (N/A) for the 1994 episode modeled with UAM/CAL3QHC (MAG, 2001; MAG, 2003), because the monitor was deactivated on March 31, 1993, due to impending reconstruction of the adjacent intersection.

*** The UAM/CAL3QHC maximum was rounded to one decimal place.

Intersection Hotspot Analysis

The three intersections projected to have the highest traffic volumes and the three intersections projected to have the worst traffic congestion were identified using the MAG TransCAD traffic assignment for the year 2025. Detailed data sets were collected for each of the six intersections and they were modeled using CAL3QHC to determine the maximum eight-hour CO concentration in 2025. The modeling input assumptions and results are detailed in Section III of the TSD (Appendix A, Exhibit 2). The background eight-hour CO concentration used for all intersections was determined to be 1.3 ppm. The maximum eight-hour CO concentration in 2025, which is the sum of the intersection maximum impact and the background concentration, was projected to be 1.7 ppm at two intersections: 16th Street and Camelback Road and Priest Drive and Southern Avenue, as shown in Table 3-6. The results from the CAL3QHC intersection hotspot analysis support the conclusion that high traffic volumes and congestion will not contribute to exceedances of the eight-hour carbon monoxide standard in 2025.

Continued Monitored Attainment

In addition to the three modeling analyses described above, MAG conducted two weight of evidence evaluations to support the maintenance demonstration. The first of these assessed the historical trends in one-hour and eight-hour concentrations measured at carbon monoxide monitors in the Maricopa County area. To demonstrate attainment, carbon monoxide concentrations at each monitor should not exceed the one-hour standard of 35 ppm more than once per year for two consecutive years. In addition, the eight-hour standard of 9 ppm can not be exceeded more than once per year for two consecutive years.

The trends in the second-highest eight-hour carbon monoxide concentrations at eighteen monitors for the years 1996 - 2011 are shown in Table 3-7. Similar tables showing the highest and second-highest one-hour CO concentrations and highest eight-hour CO concentrations recorded at these eighteen monitors are shown in Section IV-3-1 of the TSD (Appendix A, Exhibit 2). The one-hour carbon monoxide standard has not been violated at any monitor since 1984. The highest and second highest one-hour CO concentrations at all monitors in 2011 were 4.4 ppm and 3.9 ppm, respectively.

The second-highest eight-hour carbon monoxide concentration of 10.0 ppm was recorded at the Grand Avenue monitor in 1996. Since then, no monitor has violated the eight-hour CO standard. Eight-hour CO concentrations have continued to decline over the past decade. The highest and second highest eight-hour CO concentrations in 2011 were 3.2 ppm and 2.9 ppm, respectively.

To predict future concentrations based on the historical monitored carbon monoxide concentrations, a regression analysis was performed using data recorded at fourteen CO monitors for the period 1980 to 2011. The regression equations were used to project carbon monoxide concentrations to 2015 and 2025. Figure 3-4 shows the historical and projected

**TABLE 3-6
 MAXIMUM CAL3QHC EIGHT-HOUR CARBON MONOXIDE CONCENTRATIONS
 IN 2025**

(units = ppm)

Intersection	CAL3QHC Maximum One-Hour CO Concentration	Maximum Eight-Hour CO Concentration	Background CO Concentration	Total Maximum Eight-Hour CO Concentration
16 th St & Camelback Rd	0.5	0.4	1.3	1.7
107 th Ave & Grand Ave	0.4	0.3		1.6
Priest Dr & Southern Ave	0.5	0.4		1.7
7 th Ave & Van Buren St	0.4	0.3		1.6
Germann Rd & Gilbert Rd	0.4	0.3		1.6
Thomas Rd & 27 th Ave	0.4	0.3		1.6

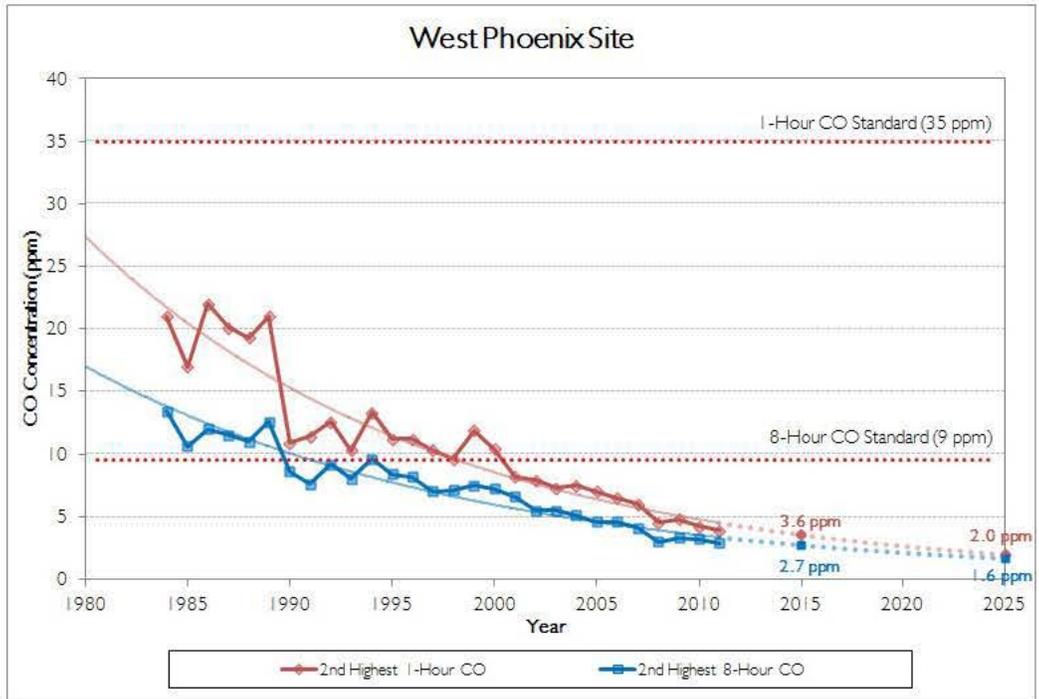
**TABLE 3-7
SECOND HIGHEST EIGHT-HOUR CARBON MONOXIDE CONCENTRATIONS AT MONITORS IN MARICOPA COUNTY
FOR 1996-2011**

(units = ppm)

Site ID	Site Name	Abbr	2 nd highest non-overlapping 8-hour CO concentrations																
			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
04-013-0013	South Phoenix (old)*	SP	5.1	4.4	4.7	4.1													
04-013-0016	W Indian School Rd	WI	8.3	7.2	8.1	7.6	6.8	6.0	5.4	5.3	4.6	4.8	4.5	3.9	2.8	3.3	2.3		
04-013-0019	West Phoenix	WP	8.2	7.0	7.1	7.5	7.2	6.6	5.5	5.5	5.1	4.6	4.6	4.1	3.0	3.3	3.2	2.9	
04-013-0022	Grand Ave	GA	10.0	7.8	6.8	8.1	6.0	6.2	5.5										
04-013-1003	Mesa	ME	3.8	4.5	3.7	4.0	3.2	2.7	3.5	2.2	1.7	2.4	2.0	2.0	1.3	1.3	1.4	1.3	
04-013-1004	North Phoenix	NP	3.7	3.4	5.6	3.5	3.1	2.5	2.7	2.1	2.0	2.2	1.9	1.6	1.3	1.3	1.6	1.5	
04-013-2001	Glendale	GL	3.7	3.0	3.4	3.5	3.2	2.8	2.7	2.3	2.1	2.3	1.8	1.6	1.5	1.2	1.5	1.2	
04-013-3002	Central Phoenix	CP	7.5	7.2	6.3	6.0	5.2	4.1	4.1	3.8	3.3	3.8	3.2	2.9	2.2	2.1	2.2	2.1	
04-013-3003	South Scottsdale	SS	4.9	4.2	3.5	4.1	3.1	3.1	2.8	2.2	2.4	2.4	1.9	1.6	1.4	1.4	1.6	1.3	
04-013-3005	Gilbert	GI		2.2	2.7	2.4	2.0												
04-013-3006	Maryvale	MA		6.3	5.9	6.7	7.0	5.3	5.0	4.1	2.9								
04-013-3009	West Chandler (old)*	WC		2.7	2.7	2.8	2.3												
04-013-3010	Greenwood	GR		6.9	6.8	6.7	5.6	4.6	5.1	5.1	4.3	4.1	3.5	3.0	2.4	2.4	2.3	2.5	
04-013-4003	South Phoenix (new)*	SP				4.4	4.8	3.4	3.7	3.3	3.3	3.2	2.7	2.3	2.0	2.2	3.1	2.0	
04-013-4004	West Chandler (new)*	WC					2.2	2.1	2.2	2.6	2.1	2.0	2.0	1.5	1.4	1.5	1.6	1.3	
04-013-4005	Tempe	TE					3.2	3.1	3.4	2.4	1.7	2.4	2.4	1.9	1.4	2.1	1.6	2.9	
04-013-4007	Surprise	SU						1.1	1.1	0.8									
04-013-4010	Dysart	DY								1.1	1.1	1.2	0.8	1.3	1.0	0.8	0.6	0.5	
04-013-4011	Buckeye	BE									0.4	0.9	0.6	0.8	0.5	0.5	0.6	0.8	
04-013-9997	Super Site	SUPR				6.5	6.5	5.2	4.2	4.2	4.0	3.6	2.9	2.9	2.4	2.3	2.1	2.1	
Maximum			10.0	7.8	8.1	8.1	7.2	6.6	5.5	5.5	5.1	4.8	4.6	4.1	3.0	3.3	3.2	2.9	

* South Phoenix and West Chandler monitors (old) were relocated to the new South Phoenix and West Chandler sites in 1999 and 2000, respectively.

**FIGURE 3-4
HISTORICAL ONE-HOUR AND EIGHT-HOUR CARBON MONOXIDE MONITORING
DATA AND PROJECTIONS FOR THE WEST PHOENIX MONITORING SITE**



trends in the second-highest one-hour and eight-hour CO concentrations at the West Phoenix monitor. The West Phoenix site has the highest projected eight-hour CO concentrations of 2.7 ppm in 2015 and 1.6 ppm in 2025. Similar graphs for the other thirteen monitors are provided in Section IV-3-1 of the TSD (Appendix A, Exhibit 2). The projected carbon monoxide concentrations based on historical data provide additional evidence that the Maricopa County area will continue to maintain the one-hour and eight-hour standards through 2025.

Meteorological Analysis

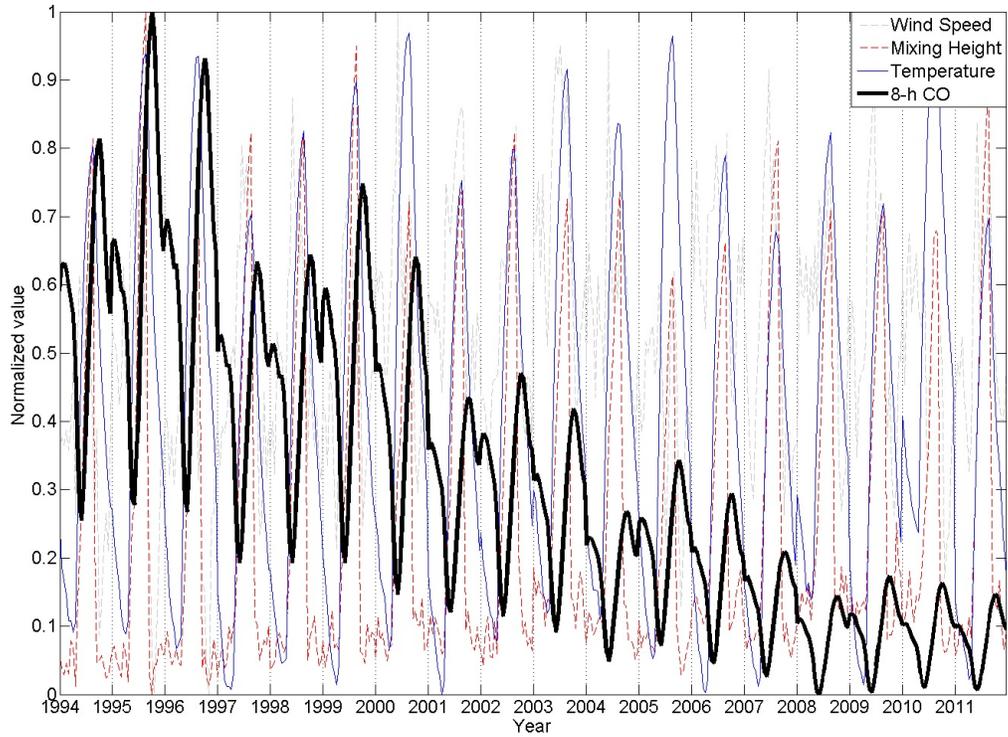
A meteorological analysis was performed to support the premise that the measured decreases in carbon monoxide concentrations are attributable to permanent and enforceable emission reductions, not unusually favorable meteorological conditions. The permanent and enforceable measures that have achieved continuing reductions in carbon monoxide concentrations, despite major increases in population, employment and vehicle travel in the region, are described in the Revised MAG 1999 Serious Area Carbon Monoxide Plan (MAG, 2001). For this purpose, long-term historical conditions for key meteorological parameters, including temperature, wind speed, wind direction, atmospheric stability, and mixing height, have been analyzed. The detailed results of this analysis are documented in Section IV-3-2 of the TSD (Appendix A, Exhibit 2).

Four different meteorological analyses were performed to demonstrate that the continuing trend in declining carbon monoxide concentrations in the Maricopa County area has not been due to favorable meteorological conditions. Figure 3-5 shows the results of one of these four analyses. This analysis was performed using meteorological data and eight-hour carbon monoxide concentrations for the winter seasons of 1994-2011. This graph shows clearly that maximum CO concentrations have declined, while daily wind speeds, temperatures, and mixing heights have not varied significantly over the same period.

The conclusions of the four meteorological analyses are summarized below:

- The maximum eight-hour CO concentrations have continued to decline, even though meteorological conditions during those years have not differed significantly from the 1994 episode meteorological conditions.
- The eight-hour CO concentrations have declined, while the daily variations in wind speeds, temperatures and mixing heights have not varied significantly over time.
- The one-hour CO concentrations have continued to decrease over time regardless of meteorological conditions.
- Daily maximum eight-hour CO concentrations below the CO standard were predominant during the period 1997 through 2011 under the same range of wind speeds and mixing heights.

FIGURE 3-5
NORMALIZED DIURNAL CYCLES OF WIND SPEED, TEMPERATURE, MIXING HEIGHT AND MAXIMUM EIGHT-HOUR CARBON MONOXIDE CONCENTRATIONS



Maintenance Demonstration Summary

Together, the three modeling and two weight of evidence analyses described above support a definitive conclusion that carbon monoxide concentrations will remain well below the one-hour and eight-hour standards through 2025. The following maximum eight-hour carbon monoxide concentrations were projected for 2025:

Emissions Inventory Comparison - 2.7 ppm (modeling domain); 2.2 ppm (maintenance area)

Scaled UAM/CAL3QHC Maximum Eight-Hour Concentrations - 4.0 ppm (modeling domain)

Intersection Hotspot Analysis - 1.7 ppm (near two high traffic/congested intersections)

Continued Monitored Attainment - 1.6 ppm (2nd-high at the West Phoenix monitor)

The maximum 2025 eight-hour carbon monoxide concentration projected by these four analyses was 4.0 ppm, which was based on scaled UAM/CAL3QHC modeling results from the 2003 CO Maintenance Plan. This maximum concentration in 2025 is less than half the eight-hour carbon monoxide standard of 9 ppm.

The Meteorological Analysis provides additional convincing evidence that the major reductions in carbon monoxide concentrations since 1994, despite increases in regional population, employment, and vehicle travel over this period, can be attributed to permanent and enforceable federal and local measures in the EPA-approved carbon monoxide plans for the region (MAG, 2001; MAG, 2003), rather than favorable meteorological conditions.

MONITORING NETWORK AND VERIFICATION OF CONTINUED ATTAINMENT

The ambient air quality monitoring network in Maricopa County is designed to assess the extent of air pollution, ensure compliance with national legislation, evaluate control options, and provide data for air quality modeling. In accordance with 40 CFR Part 58, the Maricopa County Air Quality Department (MCAQD) currently maintains twelve carbon monoxide monitoring sites in Maricopa County, while the Arizona Department of Environmental Quality (ADEQ) operates the Supersite in central Phoenix. Table 3-8 lists the carbon monoxide monitoring sites and their addresses.

MCAQD and ADEQ will continue to operate an appropriate air quality monitoring network to collect and provide air quality data for use in demonstrating ongoing attainment of the carbon monoxide standards. If the ambient levels of carbon monoxide concentrations rise and threaten to exceed the federal standards, the reasons for these occurrences will be investigated and appropriate actions will be taken. In compliance with 40 CFR Part 58 Subpart B, an annual air monitoring network review will be conducted to determine whether the network meets the monitoring objectives defined in Appendix D of 40 CFR Part 58, whether new sites are needed, and whether existing sites are no longer needed and can be terminated.

**TABLE 3-8
CARBON MONOXIDE MONITORING SITES IN MARICOPA COUNTY**

Site ID	Site Name	Abbr	Address	City
04-013-0016	West Indian School Rd*	WI	33 rd Ave & W Indian School Rd	Phoenix
04-013-0019	West Phoenix	WP	39 th Ave & Earll Dr	Phoenix
04-013-1003	Mesa	ME	Broadway Rd & Alma School Rd	Mesa
04-013-1004	North Phoenix	NP	7 th St & Dunlap Ave	Phoenix
04-013-2001	Glendale	GL	59 th Ave & W Olive	Glendale
04-013-3002	Central Phoenix	CP	16 th St & Roosevelt St	Phoenix
04-013-3003	South Scottsdale	SS	Miller Rd & Thomas Rd	Scottsdale
04-013-3010	Greenwood	GR	27 th Ave & Interstate 10	Phoenix
04-013-4003	South Phoenix	SP	Central Ave & Broadway Rd	Phoenix
04-013-4004	West Chandler	WC	Ellis St & Frye Rd	Chandler
04-013-4005	Tempe	TE	College Ave & Apache Blvd	Tempe
04-013-4010	Dysart	DY	Dysart Rd & Bell Rd	Surprise
04-013-4011	Buckeye	BE	Hwy 85 & MC 85	Buckeye
04-013-9997	Supersite	SUPR	4530 N 17 th Ave	Phoenix

* Closed in 2010.

CONTINGENCY PROVISIONS

Section 175A(d) of the Clean Air Act requires that the maintenance plan contain contingency provisions to ensure prompt actions to correct any violation of the carbon monoxide standard which occurs after redesignation to attainment. A contingency plan is not required to contain fully adopted contingency measures. However, the plan should contain clearly identified contingency measures to be adopted, a schedule and procedure for adoption and implementation, and a specific time limit for action by the State. In addition, specific indicators should be identified which will be used to determine when the contingency measures need to be implemented (EPA, 1992). The 2013 Carbon Monoxide Maintenance Plan addresses each of these requirements below.

Two contingency measures in this plan were also contingency measures in the EPA-approved 2003 CO Maintenance Plan: Gross Polluter Option for I/M Program Waivers and Increased Waiver Repair Limit Options (MAG, 2003). A third contingency measure, Reinstatement of the VEI Program for Motorcycles, has been added to the 2013 CO Maintenance Plan.

Consistent with EPA guidance on early implementation of contingency measures, the two contingency measures that were approved in the 2003 CO Maintenance Plan have already been implemented in the CO maintenance area (EPA, 1993). No emission reduction credit for these two contingency measures was taken in this maintenance demonstration.

A description of the contingency measures in the 2003 CO Maintenance Plan is provided in Section VII-2-2 of the Technical Support Document in Appendix A, Exhibit 2 (MAG, 2003). The reasons for converting the Expansion of Area A Boundaries from a contingency measure in the 2003 CO Maintenance Plan to a maintenance measure in the 2013 Carbon Monoxide Maintenance Plan and the addition of a new contingency measure, Reinstatement of the VEI Program for Motorcycles, are discussed below.

In November 2012, EPA proposed to approve the 110(l) SIP revision submitted by the Arizona Department of Environmental Quality (ADEQ, 2009; ADEQ, 2011) that will eliminate the requirement for motorcycles to participate in the Arizona vehicle emissions inspection and maintenance (VEI) program (EPA, 2012a). EPA has indicated that the benefits of the contingency measure, Expansion of Area A Boundaries, in the 2003 CO Maintenance Plan may be used to offset the increase in emissions attributable to the exemption of motorcycles from the VEI program. Like other contingency measures in the 2003 CO Maintenance Plan, this measure was implemented early, in accordance with EPA guidance (EPA, 1993).

The motorcycle exemption is estimated to increase total carbon monoxide emissions in Area A by 0.264 metric tons per day or 0.027 percent, while the 2003 CO Maintenance Plan estimated that the expansion of Area A boundaries mandated by S.B. 1427 in 1998 reduced total CO emissions by 0.1 percent in 2000. Since the Expansion of Area A Boundaries will be used to offset the VEI exemption, it has been converted from a contingency measure in the 2003 Maintenance Plan to a committed maintenance measure in the 2013 Carbon Monoxide Maintenance Plan.

As indicated in the ADEQ SIP revision that will exempt motorcycles from VEI testing, CAA section 175A(d) requires that the State adopt as a contingency measure any control measure that was approved in the SIP prior to redesignation, but which the State subsequently repeals or relaxes (ADEQ, 2009; EPA, 2012a). In this instance, because the EPA-approved VEI program applied to motorcycles at the time the Maricopa County area was redesignated to attainment of the carbon monoxide standards in 2005, Reinstatement of the VEI Program for Motorcycles must also be adopted as a contingency measure in the 2013 Carbon Monoxide Maintenance Plan.

The ADEQ SIP revision proposes a contingency measure to reinstate VEI testing for motorcycles in Area A if a violation of the carbon monoxide standard occurs. If a violation of the eight-hour carbon monoxide standard occurs (i.e., the second-highest reading at the same monitor over two consecutive years is 9.5 ppm or higher), reinstatement of the motorcycle VEI program will be implemented according to the following schedule: ADEQ will request that the Arizona State Legislature reinstate emissions testing of motorcycles by October following the violation. In January 2013, ADEQ will request that the Legislature enact new legislation to reinstate emissions testing of motorcycles previously exempted by the revised SIP in the Phoenix vehicle emissions testing area, beginning January 1 of the following year (ADEQ, 2009).

In general, the success of an air quality program is measured by the concentrations recorded at the monitors. In order to ensure that violations of the carbon monoxide standards do not occur in the future, ambient air quality monitoring data will be examined to determine if additional contingency measures are needed. Two verified eight-hour carbon monoxide readings exceeding 9.0 ppm at one monitor during the same winter season (November - January) will trigger consideration of additional measures, which may include the strengthening of contingency measures that have already been implemented. When the trigger is activated, additional measures would be considered on the following schedule: (A) verification of the monitoring data to be completed three months after activation of the trigger; (B) applicable measures to be considered for adoption six months after the date established in (A); and (C) resultant committed measures to be implemented within twelve months after the adoption date in (B).

TRANSPORTATION CONFORMITY BUDGET

In accordance with the 1990 Clean Air Act Amendments (CAAA), transportation conformity requirements are intended to ensure that transportation activities do not result in air quality degradation. Section 176 of the Amendments requires that transportation plans, programs, and projects conform to applicable air quality plans before the transportation action is approved by a Metropolitan Planning Organization (MPO). The designated MPO for Maricopa County is the Maricopa Association of Governments.

Section 176(c) of the 1990 CAAA provides the framework for ensuring that Federal actions conform to air quality plans under section 110. Conformity to an implementation plan means

that proposed activities must not: (1) cause or contribute to any new violation of any standard in any area, (2) increase the frequency or severity of any existing violation of any standard in any area, or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

EPA transportation conformity regulations establish criteria involving comparison of projected transportation plan emissions with the motor vehicle emissions assumed in applicable air quality plans. These regulations define the term “motor vehicle emissions budget” as meaning “the portion of the total allowable emissions defined in a revision of the applicable implementation plan (or in an implementation plan revision which was endorsed by the Governor or his or her designee) for a certain date for the purpose of meeting reasonable further progress milestones or attainment demonstrations, for any criteria pollutant or its precursors, allocated by the applicable implementation plan to highway and transit vehicles.”

The MAG 2003 CO Maintenance Plan, submitted to EPA in May 2003, established two transportation conformity budgets for the carbon monoxide modeling domain: a 2006 CO emissions budget of 699.7 metric tons per day and a 2015 CO budget of 662.9 metric tons per day. EPA found the 2006 and 2015 carbon monoxide budgets to be adequate for conformity purposes, effective October 14, 2003. In addition, these budgets were approved by EPA as part of the MAG 2003 CO Maintenance Plan, effective April 8, 2005. Currently, the approved 2006 budget applies to conformity horizon years from 2006 through 2014 and the 2015 budget applies to horizon years after 2014.

Table 3-3 indicates that the onroad mobile source emissions for the CO maintenance area will be 359.4 metric tons per day in 2025. EPA has indicated a new version of MOVES may be released in 2013 that “will incorporate multiple sources of new emissions data” and “it is too early in the development process for us to estimate the overall direction and magnitude of the emissions changes” (EPA, 2012b). To ensure that increases in carbon monoxide emission rates in future versions of the MOVES model do not cause exceedances of the 2025 conformity budget, it is proposed that a “safety margin” be applied to the 2025 onroad mobile source emissions produced by MOVES2010b.

Table 3-3 indicates that the 2008 carbon monoxide emissions estimated by MOVES2010b for the maintenance area are 581.6 metric tons per day. The maximum eight-hour carbon monoxide concentration in 2008 was 3.1 ppm (at the West Phoenix monitor), which is only one-third of the standard. Figure IV-1 in the TSD (Appendix A, Exhibit 2) indicates that carbon monoxide concentrations have declined since 2008 at all monitors and are projected to remain far below the 2008 concentrations at every monitoring site. The hotspot analysis also revealed that the traffic at high volume and heavily congested intersections will increase eight-hour carbon monoxide concentrations by a maximum of 0.4 ppm in 2025. Therefore, an increase in the 2025 conformity budget to a level below the 2008 emissions will not result in an exceedance of the carbon monoxide standard.

It is proposed that the safety margin represent 90 percent of the difference between the 2008 and 2025 carbon monoxide emissions, which is 200.0 metric tons per day. When added to the 2025 carbon monoxide emissions of 359.4 metric tons per day, this establishes a new 2025 conformity budget of 559.4 metric tons per day for the CO maintenance area. It is important to note that the 2025 budget for the CO maintenance area is less than the 2006 and 2015 conformity budgets for the CO modeling domain, even though the maintenance area is more than twice the size of the modeling domain.

Once EPA finds the new 2025 budget to be adequate (or approves the 2025 budget as part of the MAG 2013 CO Maintenance Plan), the 2025 budget for the CO maintenance area will be applied in regional conformity analyses conducted by MAG for horizon years 2025 and beyond. The 2006 and 2015 conformity budgets approved by EPA as part of the MAG 2003 CO Maintenance Plan, effective April 8, 2005, will continue to be applied in conformity analyses for horizon years prior to 2025. The approved 2006 carbon monoxide budget of 699.7 metric tons per day for the CO modeling domain will be applied in regional conformity analyses for horizon years 2006 through 2014 and the approved 2015 carbon monoxide budget of 662.9 metric tons per day for the CO modeling domain will be applied for horizon years 2015 through 2024.

SUBSEQUENT MAINTENANCE PLAN REVISIONS

Section 175A(b) of the Clean Air Act requires that a maintenance plan be submitted to EPA eight years after the original redesignation request and maintenance plan has been approved (i.e., by April 8, 2013). The purpose of this second maintenance plan is to demonstrate maintenance of the federal carbon monoxide standards for an additional ten years (2016-2025) following the first ten-year period (2006-2015).

No additional revisions of the carbon monoxide maintenance plan are anticipated at this time. If EPA reduces the carbon monoxide standards, the Maricopa Association of Governments, as the designated Regional Air Quality Planning Agency for the Maricopa County area, will work with ADEQ, MCAQD, ADOT and EPA to revise the State Implementation Plan, if necessary to demonstrate attainment and maintenance of the new carbon monoxide standards.

REFERENCES

ADEQ, 2009. Arizona Department of Environmental Quality. *Arizona State Implementation Plan Revision, Exemption of Motorcycles from Vehicle Emissions Inspections and Maintenance Program Requirements in Area A*. November 6, 2009.

ADEQ, 2011. Arizona Department of Environmental Quality. *Arizona State Implementation Plan Revision, Exemption of Motorcycles from Vehicle Emissions Inspections and Maintenance Program Requirements in Area A*. January 11, 2011.

ENVIRON, 2003. *Maricopa County 2002 Comprehensive Emission Inventory for the Cap and Trade Oversight Committee*. Final Report prepared for Arizona Department of Environmental Quality. October. 8, 2003.

EPA, 1992. U.S. Environmental Protection Agency. *Procedures for Processing Requests to Redesignate Areas to Attainment*. September 4, 1992.

EPA, 1993. U.S. Environmental Protection Agency. *Early Implementation of Contingency Measures for Ozone and Carbon Monoxide (CO) Nonattainment Areas*. August 13, 1993.

EPA, 2005. U.S. Environmental Protection Agency. *Approval and Promulgation of Implementation Plans and Designation of Areas for Air Quality Planning Purposes: Arizona*. Federal Register, March 9, 2005, Vol. 70, No. 45, p. 11553.

EPA, 2012a. U.S. Environmental Protection Agency. *Approval and Promulgation of Implementation Plans and Designation of Areas for Air Quality Planning Purposes: Arizona; Motor Vehicle Inspection and Maintenance Programs*. Federal Register, November 5, 2012, Vol. 77, No. 214, p. 66422.

EPA, 2012b. E-mail from Gary Dolce, EPA, to Taejoo Shin, MAG. October 25, 2012.

MAG, 2001. Maricopa Association of Governments. *Revised MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area*. March 2001.

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

MAG, 2007. Maricopa Association of Governments. *Socioeconomic Projections Documentation*. May 2007.

MCAQD, 2012. Maricopa County Air Quality Department. *2008 Periodic Emissions Inventory for Carbon Monoxide for the Maricopa County, Arizona Maintenance Area*. 2012.

USAF, 2012. United States Air Force. *F-35A Training Basing Environmental Impact Statement, Final Volume 1*. June 2012.

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