CARBON MONOXIDE REDESIGNATION REQUEST AND MAINTENANCE PLAN

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SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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1.0 PURPOSE

The South Coast Air Basin (Basin) is currently designated as a serious nonattainment area for carbon monoxide (CO). Under the Federal Clean Air Act (CAA), an area can be redesignated as attainment if, among other requirements, the U.S. Environmental Protection Agency (EPA) determines that the national ambient air quality standards (NAAQS) have been attained. The NAAQS provides for one exceedance of the 8-hour CO standard in two consecutive calendar years of quality assured air quality monitoring data. The Basin has not violated the federal 1-hour CO standard (35.0 ppm) for more than 25 years. The 8-hour CO standard (9.0 ppm)[1] was not violated in 2001 or 2003 and was only violated on one day at one monitoring site in 2002. Preliminary analysis of the monitoring data indicates that the Basin did not violate the 8-hour CO standard in 2004. Per the criteria specified in the NAAQS, the Basin has been in compliance with the 8-hour CO standard since 2002 and has maintained compliance for the past two years. Accordingly, the purpose of this document is to revise the previous CO State Implementation Plans (SIP) to request redesignation of the Basin to attainment for CO and to submit the attendant maintenance plan and other required actions to qualify for such redesignation by EPA.

A draft document was available for public review on January 21, 2005. The South Coast Air Quality Management District (District) is coordinating with other agencies for input regarding the CO redesignation request and the proposed maintenance plan. As part of the public process, regional Public Hearings were held in each of the four counties in the District jurisdiction on February 15 & 16, 2005 and a consultation meeting with other agencies was held on January 28, 2005. A final public hearing will take place at the March 4, 2005 meeting of the District's Governing Board.

[1] The federal 8-hour average CO standard is defined at 9.00 ppm. A violation of the standard occurs if thea 8-hour average concentration equals or exceeds 9.50 ppm.

2.0 REDESIGNATION REQUEST

The District is requesting redesignation of the Basin from serious nonattainment to attainment of the CO NAAQS. There are two options available to pursue the redesignation request: CAA Section 107 (d)(3)(E), and application of the "Clean Data Policy."

Section 107 (d)(3)(E) of the CAA requires the U.S. EPA administrator to make five findings prior to granting a request for redesignation:

1. The U.S. EPA has determined that the NAAQS have been attained.
2. The applicable implementation plan has been fully approved by U.S. EPA under section 110(k).
3. The U.S. EPA has determined that the improvement in air quality is due to permanent and enforceable reductions in emissions.
4. The State has met all applicable requirements for the area under Section 110 and Part D.
5. The U.S. EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175A.

EPA policy provides for an option to satisfy two of the Section 107 findings (2 and 4 addressing selected CAA Section 110 requirements) if the non-attainment area has achieved attainment through ambient air monitoring. The "Clean Data Policy" is outlined in EPA Memorandum dated June 15, 1995, from John S. Seitz, Director, Office of Air Quality Planning and Standards, USEPA, entitled "Reasonable Further Progress, Attainment Demonstration, and Related Requirements for Ozone Nonattainment Areas Meeting the Ozone National Ambient Air Quality Standard."

For this policy to apply, a CO nonattainment area: (a) must be attaining the CO NAAQS with the two most recent years of quality assured air quality data; (b) must continue to operate an appropriate CO air quality monitoring network, in accordance with 40 CFR part 58, in order to verify the attainment status of the area; and (c) must have submitted and EPA must have approved the control measures which were responsible for bringing the area into attainment. As outlined in sections 2.2.1, 2.2.2, and 2.3, the Basin meets the criteria set forth above.

The District staff believes that EPA can apply the "Clean Data Policy" to satisfy both requirement (2) that an applicable CO implementation plan has been fully approved by U.S. EPA under section 110(k) and is in effect and requirement (4) that the State has met all applicable requirements for the area under Section 110 and Part D.

The following paragraphs provide the additional information necessary for the U.S. EPA to make the above findings.

2.1 Attainment of the Standard

According to U.S. EPA guidance, the demonstration of attainment with the CO standard must rely on two complete, consecutive calendar years of quality-assured air quality monitoring data collected in accordance with 40 CFR 50, Appendix C. The NAAQS provides for one exceedance of the 8-hour CO standard in the two consecutive calendar year period to account for the impact of extreme weather conditions.

2.2.1 Monitoring Network and Data Certification

The District operates a network of air quality monitoring stations distributed through the four-county jurisdiction within the Basin. CO is monitored in accordance with 40 CFR 50, Appendix C at 22 of the stations to meet the program requirements of National Air Monitoring Stations (NAMS) and State and Local Air Monitoring Stations (SLAMS) and to provide special monitoring in support of air quality research and health studies. Each station is designated on the basis of the major program requirements as well as the monitoring objective and the representative spatial scale of sampling. Table 2-1 lists the 22 air monitoring stations that sample CO and provides the EPA Aerometric Informational Retrieval System (AIRS), and California Air Resources Board (ARB) identification numbers, the District identification code, as well as the equipment designation, monitoring objectives and monitoring scales. The CO monitoring data are subjected to validation and are submitted to ARB and EPA for inclusion in the AIRS data base.

As required by Federal Regulations (40CFR Part 58), the District conducts an annual review of the air quality monitoring network that is forwarded to ARB and EPA for evaluation. In addition, the District provides annual certification to EPA to certify that the data has been monitored and validated in accordance with Federal Regulations and that they are complete and accurate. Certification letters to EPA for the 2001-2003 monitoring years are provided as Attachment-1 to this document.

2.1.2 Certified Ambient CO Air Quality: 2001 - 2003

Table 2-2 provides a summary of the certified ambient CO data measured in the Basin by the District for the period including 2001 through 2003. Listed for each station are the annual maximum 8-hour average concentrations, the annual number of days exceeding the federal standard and the consecutive two-year total number of days exceeding the standard for the 2001-2002 and 2002-2003 time periods. The station measuring the highest CO concentrations in the Basin is located in South Central Los Angeles, in the City of Lynwood. The Lynwood monitoring station is heavily impacted from CO emissions from on-road traffic. The monitoring site is located near a busy intersection (Long Beach Blvd. and Imperial Highway) and is within one half mile distance north of the 105 Freeway.

During the three year period, the CO 8-hour standard was exceeded on only one day in 2002 and at one site (South Central Los Angeles - Lynwood). This occurred on January 8, 2002 under very stagnant conditions punctuated by a strong radiation inversion that was enhanced by subsidence warming aloft and a summer strength high pressure system dominating southern California. (Note: January 8, 2002 ranked in the 95^{th} percentile of severity of Basin CO meteorological episodes). No violations of the 8-hour standard were measured in the Basin in either 2001 or 2003.

The average seasonal potential for CO is reflected in the late fall and winter rainfall totals for the months of January, October, November and December. Higher rainfall totals are indicative of an active weather pattern and a greater frequency of unstable atmospheric conditions. The long-term (90-year) average rainfall for the four month CO season for the Los Angeles Civic Center is 7.18 inches of rain (with a standard deviation of 4.39 inches). Only 2001 (8.45 inches) exceeded the long term average with 2002 having nearly average weather (6.59 inches) and 2003 being measured significantly lower than the long term mean (2.67 inches). Averaged over the three year period, meteorology was more conducive to higher ambient CO than the long term mean.

Daily vehicle miles traveled (VMT) for all vehicles in the Basin based on Southern California Association of Governments (SCAG) estimates provided in the 2001 Regional Transportation Plan indicated annual growth from 2001 through 2003. Estimated VMT increased from 322.8 million miles in 2001 to 330.4 million miles in 2003. Future year estimated of VMT continue the growth pattern for the Basin.

Based on the criteria specified in the CAA (which allows for one violation at one location in two consecutive years) the Basin attained the standard in 2002 and has maintained attainment in 2003.

Table 2-1

Air Quality Monitoring Network Review Summary

Monitoring Location	**AIRS Station No.**	**ARB Station No.**	**SCAQMD Site Code**	**Equipment Designation**	**Objective***	**Spatial Scale****
Los Angeles County						
Central LA	060371103	70087	CELA	SLAMS	RC	NS
Northwest Coastal LA County	060370113	70091	WSLA	SLAMS	RC	NS
Southwest Coastal LA County	060375001	70094	HAWT	SLAMS	RC	MS
South Coastal LA County	060374002	70072	LGBH	SLAMS	HC	MI
West San Fernando Valley	060371201	70074	RESE	SLAMS	RC	NS
East San Fernando Valley	060371002	70069	BURK	SLAMS	HC	NS
West San Gabriel Valley	060372005	70088	PASA	SLAMS	RC	MS
East San Gabriel Valley 1	060370002	70060	AZUS	SLAMS	RC	NS
East San Gabriel Valley 2	060370016	70591	GLEN	SPECIAL	RC	NS
Pomona/Walnut Valley 1	060371701	70075	POMA	SLAMS	RC	MI
South San Gabriel Valley	060371601	70085	PICO	SLAMS	RC	NS
South Central LA County	060371301	70084	LYNN	NAMS	HC	MS
Santa Clarita Valley	060376012	70090	SCLR	SLAMS	RC	NS
Orange County						
North Orange County	060595001	30177	LAHB	SLAMS	RC	NS
Central Orange County	060590001	30176	ANAH	NAMS	RC	NS
North Coastal Orange County	060591003	30195	COST	SLAMS	RC	NS
Saddleback Valley 1	060592022	30812	MSVJ	SLAMS	RC	NS
Riverside County						
Metropolitan Riverside County 1	060658001	33144	RIVR	NAMS	RC	MS
Metropolitan Riverside County 2	060651003	33146	RIVM	SLAMS	HC	MI
Lake Elsinore	060659001	33158	ELSN	SPECIAL	--	--
San Bernardino County						
Northwest San Bernardino Valley	060711004	36176	UPLA	SPECIAL	--	--
Central San Bernardino Valley 2	060719004	36203	SNBO	NAMS	RC	MS

* RC - Representative Concentrations, HC - High Concentrations
** MI - Microscale, MI - Middle Scale, NS - Neighborhood Scale

Table 2-2

South Coast Air Basin Certified Carbon Monoxide: 2001-2003

Monitoring Location	Maximum 8-Hour Average Concentration (ppm)			Number of Days Exceeding Federal 8-Hour Average Standard (≥9.0 ppm)			Two-Year Total Number of Days Exceeding the Standard	
	2001	**2002**	**2003**	**2001**	**2002**	**2003**	**2001-2002**	**2002-2003**
Los Angeles County								
Central LA	4.6	4.0	4.6	0	0	0	0	0
Northwest Coastal LA County	3.0	2.7	2.7	0	0	0	0	0
Southwest Coastal LA County	5.1	6.1	5.0	0	0	0	0	0
South Coastal LA County	4.7	4.6	4.7	0	0	0	0	0
West San Fernando Valley	6.0	4.8	4.1	0	0	0	0	0
East San Fernando Valley	4.9	4.6	4.7	0	0	0	0	0
West San Gabriel Valley	5.0	4.0	3.8	0	0	0	0	0
East San Gabriel Valley 1	2.9	2.4	2.6	0	0	0	0	0
East San Gabriel Valley 2	2.5	2.3	2.1	0	0	0	0	0
Pomona/Walnut Valley 1	3.4	3.3	4.4	0	0	0	0	0
South San Gabriel Valley	4.0	4.0	4.0	0	0	0	0	0
South Central LA County	7.7	**10.1**	7.3	0	**1**	0	**1**	**1**
Santa Clarita Valley	3.1	1.9	1.7	0	0	0	0	0
Orange County								
North Orange County	4.7	4.4	4.1	0	0	0	0	0
Central Orange County	4.7	5.4	3.9	0	0	0	0	0
North Coastal Orange County	4.6	4.3	5.8	0	0	0	0	0
Saddleback Valley	2.4	3.6	1.8	0	0	0	0	0
Riverside County								
Metropolitan Riverside County 1	3.4	3.0	3.7	0	0	0	0	0
Metropolitan Riverside County 2	4.5	3.9	3.4	0	0	0	0	0
Lake Elsinore	2.0	2.0	1.3	0	0	0	0	0
San Bernardino County								
Northwest San Bernardino Valley	1.8	1.6	2.9	0	0	0	0	0
Central San Bernardino Valley 2	3.3	3.3	4.6	0	0	0	0	0

2.1.2 Preliminary Ambient 2004 CO Air Quality

Table 2-3 provides a summary of the preliminary ambient CO data measured in the Basin for 2004. Listed for each station are the preliminary annual maximum 8-hour CO average concentrations. As previously stated, the Basin did not violate the federal 8-hour CO standard in 2004. The peak 8-hour average concentration was 6.5 ppm, measured at South Central Los Angeles, in the City of Lynwood.

Table 2-3

South Coast Air Basin Preliminary Carbon Monoxide: 2004

Monitoring Location	AIRS Station Number	Maximum 8-Hour Average Concentration (ppm)
Los Angeles County		
Central LA	060371103	3.2
Northwest Coastal LA County	060370113	2.3
Southwest Coastal LA County	060375001	4.4
South Coastal LA County	060374002	3.4
West San Fernando Valley	060371201	3.5
East San Fernando Valley	060371002	3.8
West San Gabriel Valley	060372005	3.5
East San Gabriel Valley 1	060370002	1.9
East San Gabriel Valley 2	060370016	2.0
Pomona/Walnut Valley 1	060371701	3.1
South San Gabriel Valley	060371601	3.5
South Central LA County	060371301	6.5
Santa Clarita Valley	060376012	3.7
Orange County		
North Orange County	060595001	4.1
Central Orange County	060590001	4.1
North Coastal Orange County	060591003	4.1
Saddleback Valley	060592022	1.6
Riverside County		
Metropolitan Riverside County 1	060658001	3.0
Metropolitan Riverside County 2	060651003	2.1
Lake Elsinore	060659001	0.9
San Bernardino County.		
Northwest San Bernardino Valley	060711004	2.2
Central San Bernardino Valley 2	060719004	3.2

2.2 Status of Implementation Plan

As part of the 2003 Air Quality Management Plan, the District prepared a revision to the State Implementation Plan (SIP) to update the Basin CO Attainment Demonstration Plan. Following the 1990 amendments to the CAA, the Federal Attainment Plan for CO, which provided demonstration of attainment in 2000 of the NAAQS, was approved by the District in 1992 and subsequently forwarded to US EPA. The plan was revised in 1994 and approved by U.S. EPA. The CO Plan was later revised in 1997 and granted a full and interim approval by U.S. EPA on April 21, 1998.

The interim approval of the CO Plan lapsed on August 7, 1998, when an approval deadline requirement of the Federal Highway Designation Act of 1995 (Highway Act) expired. The Highway Act required the state submit supporting documentation for the interim approval of a decentralized inspection and maintenance program (I/M) and U.S. EPA grant approval of the I/M plan within an 18 month window. While EPA's interim approval of the CO Plan lapsed, the state and local enforceable emissions reduction components of the CO Plan have remained in effect and as a result regional air quality has continued to improve.

The 2003 revision to the CO Plan provided a dual purpose: it replaced the 1997 CO attainment demonstration and provided the basis for a CO maintenance plan for the future. The 2003 CO Plan was submitted to the ARB, which subsequently forwarded the plan to the U.S. EPA as a SIP revision. The U.S. EPA has not yet taken action on this Plan revision.

Since the Basin has attained the 8-hour CO standard, and meets the criteria for applying the "Clean Data Policy" referenced in Section 2.0 of this document, the requirement for an approved implementation plan under CAA Section 110(k) is therefore satisfied.

2.3 Permanent and Enforceable Emission Reductions

CO emission reductions leading to attainment of the federal standard are primarily the result of ongoing fleet turn over of older on-road light duty vehicles and cleaner fuels. The attainment of the CO standard did not result from either unusual meteorology (as discussed in Section 2.1.2) or depressed regional activity levels.

Based on the ARB EMFAC2002 on-road emissions factor program and SCAG's VMT estimates, on-road mobile sources in 1997 contributed more than 78 percent of the 6,460 tons per day (TPD) of Basin total CO emissions. Other mobile sources and stationary CO sources contributed 18 and 4 percent, respectively, to the total CO emissions. Based on EMFAC2002 and SCAG VMT estimates, the on-road mobile source contribution to daily

CO emissions in the 2002 winter planning inventory were reduced by 25 percent from 1997 to a total of 4,835 TPD.

EMFAC2002, which was adopted by the ARB in 2002, replaced the ARB's EMFAC7G emissions factor program which was the basis of the 1997 CO Plan revision. EMFAC2002 incorporates the full spectrum of on-road emissions reductions resulting from the adoption and implementation of ARB rules and mandated cleaner automotive emissions standards. Future CO emissions are projected to continue to decline significantly due to fleet turn over. Total daily emissions (winter planning inventory) will be reduced to 3,053 and 2,526 TPD in 2010 and 2015, respectively. These emissions reductions are permanent and enforceable through ARB's adopted motor vehicle emissions standards as included in the California SIP.

2.4 Section 110 and Part D Requirements

As outlined in Section in 2.2, the Basin has attained the 8-hour CO standard, and has met the criteria for applying the "Clean Data Policy" referenced in Section 2.0.

For a CO nonattainment area that meets the prerequisite criteria referenced in Section 2.0 of this document, the requirements under CAA section 172(c) for developing an attainment demonstration, Reasonable Further Progress (RFP) demonstration, and contingency measures are suspended due to the fact that an area which is eligible under this approach has already attained the CO NAAQS and has met RFP.

Because the Basin has met the criteria for application of the "Clean Data" area approach, the District's SIP obligations to have an approved CO attainment demonstration, RFP demonstration, and contingency measures are suspended. In EPA's rulemaking on the 1997 CO plan for the Basin, EPA fully approved the remaining applicable requirements for the area. (See 63 FR 19661, [April 21, 1998]). Thus, the State has met all SIP requirements applicable to the area under section 110 and part D, as required by CAA section 107(d)(3)(E).

2.5 Maintenance Plan

The District is submitting its CO Maintenance Plan (Section 3) concurrently with this redesignation request. The District requests U.S. EPA to expeditiously review the Plan, and if determined to meet the provisions of the CAA, approve the Maintenance Plan as part of the redesignation process.

3.0 CO MAINTENANCE PLAN

Section 107(d)(3)(E) of the CAA specifies that for an area to be redesignated as attainment, the U.S. EPA must approve a maintenance plan that meets the requirements of Section 175A. The purpose of the maintenance plan is to provide for the maintenance of the CO NAAQS for at least ten years after the redesignation (not ten years after the redesignation submittal). CAA Section 107(d)(3)(D) allows the U.S. EPA Administrator up to 18 months from receipt of a complete submittal to process a redesignation request. To accommodate the U.S. EPA's review time and to be consistent with other District planning timelines, the maintenance plan will cover the period 2005 through 2015. The maintenance plan requires a maintenance demonstration, commitment to a future monitoring network, verification of continued attainment, a contingency plan, and provisions for contingency plan implementation. Under the "Clean Data Policy" the requirements for inclusion of contingency measures are eliminated from the CO maintenance plan.

3.1 Maintenance Demonstration

According to U.S. EPA guidance, a maintenance plan may demonstrate future maintenance of the NAAQS by either showing that future emissions will not exceed the level of the attainment inventory or by modeling to show that the future mix of sources and emissions rates will not cause a violation of the NAAQS. The District will use both the first approach to demonstrate the attainment inventory and modeling to assure future maintenance of the CO standards.

3.1.1 Attainment Inventory and Modeling Demonstration

The CO 8-hour standard allows for one violation to occur in a consecutive two year period. Based on this criterion, the CO standard was attained in the Basin at the conclusion of the 2002 monitoring year. The baseline CO winter planning attainment inventory for 2002 was 4,835 TPD with on-road motor vehicles accounting for 3,402 TPD or 70 percent of the total emissions.

Through the development of the 2003 revision to the CO Plan, a model derived CO attainment "carrying capacity" was also identified. The 2003 revision to the CO Plan provided updated model simulations of a severe CO episode and "hot-spot" roadway impacts. Regional CO modeling using the Comprehensive Air Quality Model (CAMx) and linear rollback established a basin-wide CO "carrying capacity." The October 31 – November 1, 1997 meteorological episode was used in the attainment demonstration. The episode ranked in the 98^{th} percentile in stagnation severity and included a Friday night, when traffic volume is highest in the Basin. Additional "hot-spot" roadway intersection modeling using the CAL3QHC model was included to confirm that the regional

CO inventory used by CAMx would show attainment for high volume traffic intersections under severe meteorological conditions.

The models were simulated for the severe CO episode using the 1997 and 2002 inventories. The CAMx simulated maximum regional CO concentration of 9.9 ppm for the 2002 inventory nominally exceeded the federal 8-hour standard. Using linear rollback and the 2003 predicted winter planning CO emissions inventory of 4,527 tons per day, attainment of the federal 8-hour average standard was demonstrated. (The model predicted CO concentration using the 2003 winter planning inventory was 9.1 ppm)[2]. In addition, the model-predicted maximum 1-hour average concentration was simulated to be less than one-third of the federal 1-hour average CO standard of 35.0 ppm.

The CO "carrying capacity" presented in the 2003 AQMP reflects the 2003 predicted winter day CO emissions inventory of 4,527 tons per day. It is important to note that the "carrying capacity" was determined for a severe episode. Attainment of the standard actually occurred in 2002 for a winter day emissions inventory that was higher than the model derived "carrying capacity." The structure of the 8-hour CO standard is designed to accommodate an infrequent, severe, meteorological episode that leads to a violation in one of the two consecutive years of monitoring. The attainment modeling demonstrations provide confidence that given a repeat of a severe meteorological episode, the CO standard would be maintained. A summary of the near-term CO emissions inventory and model predicted-CO concentrations is presented in Table 3-1. Details of the CAMx and CAL3QHC modeling analyses and results have been extracted from Appendix V, Section 4 of the 2003 AQMP, and are provided as Attachment 2 to this document.

Table 3-1

Carbon Monoxide Emissions and Model-Predicted Concentrations

Year/Scenario	CO-Planning Inventory (TPD)	8-hr Maximum Concentration (ppm)	1-hr Maximum Concentration (ppm)
1997 Baseline	6460	14.9	16.7
2002 Attainment	4835	9.9	10.8
2003 Predicted	4527	9.1	9.9
2004 Predicted	4278	8.4	9.2
2005 Predicted	4029	7.8	8.5

[2] Note: while the federal 8-hour average CO standard is 9.0 ppm, EPA's rounding convention allows for a concentration of less than 9.5 ppm to attain the standard.

3.1.2 Projected CO Emission Inventories

The CO emissions inventory for the attainment year 2002, and future year projected CO emissions inventories for 2005, 2010, and 2015 are presented in Table 3-2. The 2003 AQMP grown (based on demographic projections) and controlled (based on adopted emissions controls) winter planning emissions estimates are presented for the Basin. Projected reductions are based on control measures adopted in the SIP. On and off-road motor vehicle emissions include an adjustment in the projections for 2010 and 2015 to reflect the potential use of non-oxygenated fuels in the future. The impact of potential future modifications to the oxygenated fuels is discussed in the following subsection. (A detailed listing of the emissions by subcategory is presented in Appendix III of the 2003 AQMP).

Future CO emissions are projected to continue to decline significantly from the 2002 attainment inventory due to fleet turn-over whereby total daily emissions (winter planning inventory) will be reduced to 3,346 and 2,739 TPD in 2010 and 2015, respectively.

TABLE 3-2

South Coast Air Basin
Projected Winter Carbon Monoxide Emission Inventory (TPD)

SUBCATEGORY	2002	2005	2010	2015[3]
Stationary	53	55	59	64
Area-Wide	315	318	325	332
On-Road Motor Vehicles	3402	2668	2018	1428
Oxygenated Fuel Adjustment	--	--	23	16
Total On-Road Mobile	3402	2668	2041	1444
Off-Road Motor Vehicles	1065	987	912	890
Oxygenated Fuel Adjustment	--	--	9	9
Total Off-Road Mobile	1065	987	921	899
Total Anthropogenic	4835	4028	3346	2739

[3] On-road projected mobile source emissions for winter season 2015 were generated by CARB using EMFAC2002 v2.2 interpolating vehicle populations from calendar year 2010 and 2020 populations found in **Assessment 410, South Coast SIP Inventory** (April 2003).

Potential Wintertime Oxygenates Changes.

Gasoline sold in the South Coast Air Basin contains extra oxygen to comply with two separate requirements in the federal Clean Air Act: one tied to the region's nonattainment status for CO, and the other to its nonattainment status for ozone. To comply with the requirements for CO nonattainment areas, the CARB's fuel regulations require the use of oxygenated fuel in the SCAB from November through February, the months in which the CO standard might be exceeded. The oxygenated fuel requirement for ozone nonattainment areas applies year-round.

Although the CAA requires CO nonattainment areas to have oxygenated gasoline during the high CO season, it also allows areas that are later redesignated as attainment to discontinue oxygenate use if they show that the additive is not necessary for maintenance of the CO standard thereafter. CARB has previously made this demonstration for ten other CO maintenance areas around the State. In 1998, CARB rescinded the wintertime oxygenates provision statewide, except for the Los Angeles urbanized area and Calexico which continued to violate the CO standard at that time. Staff analyses showed that the increase in CO emissions without wintertime oxygenates would be more than offset by the benefits of additional vehicle controls. CARB submitted corresponding SIP revisions for the ten maintenance areas to implement this change.

CARB may choose to pursue a similar action to rescind the CO-based requirement for wintertime oxygenates in the South Coast Air Basin in the future[4]. Such rulemaking would include a full public notice and comment process. By including a demonstration in this SIP revision that the South Coast Air Basin can show maintenance of the CO standard in 2010 and beyond without the benefits of wintertime oxygenates, it leaves the door open to implement such a change without need for a further revision to the CO SIP. This section describes CARB staff's evaluation to support its conclusion that removing the CO-based requirement for wintertime oxygenates in the future would not jeopardize continued attainment of the CO standard in the South Coast Air Basin.

Potential CO Emission Increases

Oxygenated gasoline reduces wintertime CO emissions primarily from older, carbureted engines. The CO benefits from oxygenated gasoline decline over time as older vehicles are replaced with newer vehicles that have inherently cleaner engines. The wintertime use of non-oxygenated gasoline in the SCAB could result in CO emission increases of up to 32 TPD in 2010, and 25 TPD by 2015, as shown in Table 3-3. The methodology and assumptions used to calculate this impact are described in Appendix A.

[4] The federal requirement to use oxygenates year-round for ozone control would remain until that provision is waived or otherwise repealed.

Table 3-3

Maximum Potential CO Emissions Increase Associated with
Eliminating Wintertime Oxygenates from Gasoline
(SCAB, Winter Planning Inventory, TPD)

Category	2010	2015
On-Road Vehicles	23	16
Off-Road Engines	9	9
Stationary and Area Sources	0	0
Total	32	25

Impact on Continued Attainment

As described in Appendix A, the methodology employed to estimate the emissions shown above uses the most conservative of a range of future impacts determined by a blue ribbon panel convened by U.S. EPA. CARB staff believes the actual impact would be less than estimated here.

The attainment of the CO standard in 2002 can be largely attributed to improvements in motor vehicle emission controls, and the effect of replacing older, more polluting cars and trucks with newer, cleaner vehicles. Table 3-4 demonstrates that the emission reductions from these technologies and continued fleet turnover greatly exceed any CO reductions that can be attributed to wintertime oxygenated fuels. The maximum potential increase in CO emissions represents less than one percent of total CO emissions in the future years. As a result, CO emissions will remain well below the attainment year emissions level of 4835 TPD through year 2015 even without CARB's wintertime oxygenate requirements.

Table 3-4

Maximum Potential Impact of Removing Wintertime Oxygenate
on the Carbon Monoxide Maintenance Demonstration
(SCAB, Winter Seasonal Emissions, TPD)

	2002	**2005**	**2010**	**2015**
Attainment Year Inventory	4835	4835	4835	4835
Projected CO Inventory				
Baseline CO Inventory	4835	4029	3315	2714
Oxygenated Fuel Adjustment	0	0	32	25
Adjusted Inventory	4835	4029	3347	2739
Difference: Adjusted - Attainment	N/A	806	1488	2096

3.1.3 Transportation Conformity Requirements

The federal transportation conformity regulation requires SIPs to specify the level of on-road motor vehicle emissions that are consistent with attainment and maintenance of air quality standards. To receive federal approval and funding, transportation agencies must demonstrate that emissions from new transportation plans, programs and projects conform to these "emission budgets."

Budget Approach

Motor vehicle emission budgets have typically been derived from the projected future year inventory, but maintenance plans provide additional flexibility in setting an appropriate budget as long as the SIP demonstrates that the area will continue to attain the standard. There are two important factors to consider in setting CO maintenance budgets: (1) there are not any more health-protective federal or State CO standards to be achieved; and (2) fleet turnover to cleaner vehicles will continue to dramatically reduce emissions well below the levels that resulted in attainment of the federal 8-hour CO standard.

There is a spectrum of acceptable approaches that could be taken to establish motor vehicle budgets for the South Coast Air Basin for the 2015 out year of this plan. At one end, the budget could be based on the 2002 level of emissions that resulted in attainment. The other extreme is to base the 2015 budget on the projected 2015 level of emissions; however, this level of emissions is less than half of the 2002 attainment level (See Table

3-2). Some of the additional vehicle reductions are needed to compensate for small emission increases in other source categories by 2015.

Based on several AQMP modeling attainment demonstrations, CO emissions contribute to the formation of regional ozone production. If the Basin was required to address CO as the sole pollutant of concern, the 2002 level of emissions would provide for attainment of the CO standard and public health. However, the Basin is also extreme nonattainment for ozone. To assure future attainment of the ozone standard, on-road motor CO emissions need to be reduced from the 2002 attainment year levels.

The proposed budgets seek a balance between the two ends of the spectrum by applying part of the additional vehicle emission reductions expected in future years towards continued maintenance of the CO standard and future attainment of the ozone standard, while holding back a portion of those reductions to give SCAG some flexibility in anticipation that future updates to transportation activity and emissions assumptions could raise the CO inventory or emissions. Providing this flexibility now would allow higher projections of future vehicle emissions to be accommodated without jeopardizing conformity or requiring a formal SIP revision to amend the budgets. U.S. EPA's transportation conformity regulation specifically allows such flexibility (referred to as a conformity "safety margin"), when accompanied by the health-protective demonstrations included in this plan.

The level of emissions proposed for the CO maintenance budgets was derived through consultation with CARB and the Southern California Association of Governments (SCAG).

<u>Proposed Motor Vehicle CO Emission Budgets</u>

Table 3-5 shows the proposed budgets, which are derived from ARB's EMFAC2002 model with minor adjustments. The travel activity data used with EMFAC2002 emission rates were provided by the SCAG during development of the 2003 AQMP. Because this maintenance plan builds on the CO attainment demonstration and modeling included in the 2003 AQMP, the District determined that the two plans should be based on the same travel activity inputs and emission inventories.

Table 3-5

Proposed On-Road Motor Vehicle CO Emission Budgets
(Winter Seasonal Emissions, TPD)

Year	**2005-2009**	**2010-2014**	**2015 & Later**
CO Emission Budget	2888	2137	2137

This maintenance plan proposes to tier the CO emissions budget to reflect the continued need for regional CO emissions reductions to attain and maintain all air quality standards. This plan would establish a near-term motor vehicle emissions budget for analysis years 2005 through 2009, and a longer-range budget for year 2010 and beyond. Specifically, 2004 projected emissions serve as the basis for the calendar year 2005 through 2009 emissions budgets, while 2009 projected emissions provide the foundation for the calendar year 2010 through 2015 budgets.

The rationale for setting the near-term budget using the 2004 emissions level is as follows: In the attainment year, 2002, one violation of the 8-hour CO standard was observed in the Basin. While the 2003 AQMP CO modeling analysis demonstrated attainment for 2003, the analysis provided little margin of error to guarantee that a violation of the standard could not occur given a repeat of the severe meteorological episode. The 2004 emissions level was selected for near-term 2005-2009 budget for two reasons: First, monitoring indicated no violations of the standard for both 2003 and 2004, assuring three consecutive years of attainment. Second, the modeling analysis indicated that given the 2004 emissions level, predicted peak CO concentrations for a severe meteorological episode would be more than 10 percent below the violation concentration.

In addition, regional transportation models and motor vehicle emissions models continue to undergo required revisions and improvements. The uncertainties associated with the introduction of new models and demographic estimates highlights the need for flexibility in the determination of an emissions budget. The 2004 emissions level provides both adequate public heath protection and sufficient flexibility for implementing and developing necessary transportation projects.

The element of providing sufficient flexibility in the CO budget for implementing and developing necessary transportation projects extends to the long term period 2010 through 2015. The 2009 on-road mobile emissions level provides for this level of flexibility. However, increasing the emissions in the 2009 projected CO mobile category of the inventory must not cause the 2010 ozone attainment demonstration to be compromised. CO emissions contribute to the formation of ozone and are an integral component in the regional ozone modeling attainment demonstration. The 2003 AQMP modeling analyses relied on the 2010 emissions inventory to demonstrate attainment of the federal 1-hour ozone standard.

A sensitivity analysis was conducted to assess the impact to projected maximum ozone concentrations by solely increasing the level of the Basin CO emissions above the 2010 attainment inventory. The analysis indicated that peak 1-hour average ozone concentrations would nominally increase (approximately 0.5 ppb) when CO emissions in all categories (stationary, areawide, on-road and off-road mobile) where increased by 10 percent. A similar increase (0.5 ppb) was determined for the maximum 8-hour average ozone concentrations. The projected concentration increase would not cause a future violation (2010) of the 1-hour ozone standard to occur.

The projected 2009 on-road CO emissions level is approximately 5 percent greater than that for 2010. The projected total 2009 basin wide CO emissions from all categories are estimated to be approximately 3 percent greater than 2010. These projections fall within the bounds of the sensitivity analysis. The 2010 simulated maximum 1-hour ozone concentrations will continue to meet the federal standard using the 2009 projected on-road mobile CO emissions. In summary, using the 2009 on-road CO emissions as the basis for the 2010 through 2015 budgets will provide both transportation planning flexibility and public health protection.

This approach locks in motor vehicle emission reductions achieved since the attainment year, ensures continued maintenance of the standard, and provides flexibility for use of updated planning assumptions in future conformity determinations. The budgets also include the maximum potential increase in CO emissions from on-road vehicles in 2010 and 2015, to reflect the potential impacts of non-oxygenated fuel use, as discussed in Section 3.1.2.

The maintenance plan proposes to set the CO conformity budget at the 2004 projected on-road CO emissions level[5] (2888 TPD), for the years 2005 through 2009. The conformity budget would be reestablished at the 2009 projected motor vehicle emissions level (2114 TPD) with the addition of the oxygenated fuel adjustment (23 TPD) for a total of 2137 TPD in 2010. The conformity budget would be maintained at that level through 2015. It is important to note that the proposed levels for the conformity budget do not reflect the implementation of the local RTP emissions control measures. The establishment of a tiered on-road motor vehicle emissions budget provides for both maintenance of the CO standard, and transportation conformity through the development of a motor vehicle emissions "safety margin." The safety margin represents the difference between the conformity budget and the projected on-road emissions.

These emission budgets will apply to all subsequent analysis years as required by the federal conformity regulation, including any year prior to a budget year, the 2015 horizon year, and any year beyond 2015. These budgets will become effective upon a finding of budget adequacy by U.S. EPA, typically 90 days after submittal of a SIP.

U.S. EPA requests that states explicitly quantify how proposed motor vehicle emission budgets differ from projected vehicle emissions. These numbers can be derived from Tables 3-2 and Table 3-5. Table 3-6 compares the proposed budget for the horizon year of 2015 against the two ends of the spectrum discussed earlier as the possible basis for

[5] The 2004 and 2009 on-road CO emissions projections are provided as Attachment-3: CARB Assessment 549: South Coast Air Basin CO Maintenance Plan Winter Emissions for Calendar Years 2004, 2009, and 2015.

that budget – the 2002 vehicle inventory that resulted in attainment and the projected 2015 vehicle inventory. Column C shows the extent to which the proposed budget is lower than attainment emissions; column F shows the extent to which the proposed budget is higher than projected emissions in the last year of the maintenance period. The proposed 2015 budget is 37 percent lower than the 2002 attainment level of emissions, and 48 percent higher than the projected 2015 on-road vehicle inventory.

Table 3-6

Comparison of Proposed CO Motor Vehicle Budgets in Horizon Year
to Projected CO Vehicle Inventories
(Winter Seasonal Emissions in TPD)

	(A) Projected 2002 On-Road Inventory	(B) Proposed 2015 Emission Budget	(C) Difference (A) – (B)	(D) Proposed 2015 Emission Budget	(E) Projected 2015 On-Road Inventory	(F) Difference (D) – (E)
South Coast Air Basin	3402	2137	1265	2137	1444	693

Further Illustration that Budgets are Adequate for Maintenance

The proposed budget provides a comfortable increment of extra reductions to ensure maintenance and offset the small emission increases expected from growth in areawide and stationary sources. To further illustrate this point, we can look at the combined effect of the budget and emissions from other sources by comparing the resulting maximum emissions allowed under this plan to the 2002 emission levels that resulted in attainment. Table 3-7 shows the 2002 attainment emissions, the maximum potential 2015 emissions (based on the emission budgets for on-road vehicles, plus projected 2015 levels for off-road mobile, stationary, and areawide sources), and the resulting percent emission reduction below attainment levels.

Table 3-7

Percent Reduction in Total CO Emissions Using Maximum Emission Levels in 2015
(Winter Seasonal Emissions in TPD)

	2002 Attainment Inventory	Maximum Potential 2015 Emissions[5]	Percent Reduction Below Attainment Levels
South Coast Air Basin	4835	3432	29%

[5] Motor vehicle emissions budgets +projected emission inventories for stationary, areawide and off-road sources (with maximum potential impact of discontinuing wintertime oxygenates in gasoline).

3.2 Future Monitoring Network

U.S. EPA guidance states that once an area has been redesignated, the State should continue to operate an appropriate air quality monitoring network in accordance with 40 CFR Part 58, to verify the attainment status of the area. As discussed in Section 2.2.1, the District presently operates CO analyzers at twenty two air quality monitoring stations in the Basin in accordance with 40 CFR, part 58. To assure the quality of the measured data, operational procedures for data collection include routine calibrations, pre-run and post-run test procedures, and routine service checks. An annual review of the District's entire air quality monitoring network is required by federal regulations as a means to determine if the network is effectively meeting the objectives of the monitoring program. If relocation or a closure is recommended in the annual network review, reports are submitted to the U.S. EPA and the ARB to document compliance with siting criteria. The data collection procedures already in place, in conjunction with the annual review program, will ensure that future CO ambient concentrations are monitored in the Basin.

3.3 Verification of Continued Attainment

U.S. EPA guidance requires the District to periodically review the assumptions and data for the attainment inventory and demonstration. This guidance further suggests that the reevaluation take place every three years and include a complete review of the modeling assumptions and input data. The purpose of the reevaluation is to determine the effectiveness of the control strategy. The District will conduct a reevaluation of the CO Maintenance Plan as part of the AQMP process, in June of 2007 and 2010. In accordance with U.S. EPA guidance, a revision to the CO Maintenance Plan for the subsequent ten year maintenance planning period will be submitted to U.S. EPA in 2013.

In addition to the verification actions listed above, the District will analyze the CO air quality data collected on a daily basis. Specifically, daily CO 8-hour average concentrations will be compared directly with the 8-hour CO NAAQS.

In order to ensure continued maintenance of the CO standards CARB has committed additional reductions beyond the attainment inventory as discussed in the Contingency Plan.

3.4 Contingency Plan

CAA Section 175A(d) requires maintenance plans to identify contingency provisions to offset any unexpected increases in emissions and ensure maintenance of the standard.

3.4.1 Emissions Reductions

Contingency provisions are traditionally held in reserve and implemented only if an area violates the standard. However, California's ongoing motor vehicle program creates a unique situation in which far more emission reductions are being achieved from currently adopted and implemented measures than are needed to maintain the standard.

Existing regulations will continue to cut CO emissions despite growth in passenger vehicles and miles traveled. These measures include tighter emission standards for cars, trucks, buses, and off-road equipment (such as forklifts, lawn and garden equipment, and marine pleasure craft). The margin by which these adopted regulations will bring CO emissions even further below 2002 attainment levels serves to satisfy the contingency requirement and provide additional public health benefits by lowering CO exposure.

Table 3-8 shows that in 2010 and 2015, the combination of the maximum potential on-road vehicle emissions (as represented by the motor vehicle emission budgets) and projected emissions from off-road mobile, stationary, and areawide sources, will be 29 percent below the level of emissions that resulted in attainment of the standard. These are the contingency emission reductions for this CO maintenance plan.

Table 3-8

Emission Reductions

	2010	**2015**
Attainment Year Inventory	4835	4835
Maximum Potential Emissions[6]	3442	3432
Reductions	1393	1403
Percent Emissions Below Attainment	29%	29%

6 Motor vehicle emissions budgets +projected emission inventories for stationary, areawide and off-road sources (with maximum potential impact of discontinuing wintertime oxygenates in gasoline).

3.4.2 Implementing Agency

The CARB has the authority to set vehicle emissions standards and fuel formulation for California.

The District has the authority and is the agency responsible for developing and enforcing air pollution control rules and regulations in the South Coast Air Basin for stationary and areawide sources.

3.5 Contingency Plan Implementation

As described previously, the District has committed to a formal review of the CO Maintenance Plan in 2007 and 2010, and will also review ambient CO daily monitoring data. If either of these mechanisms indicates that the contingency emissions reductions are needed and the adopted rules are not achieving the committed reductions, the District will ensure that substitute measures are developed and adopted to achieve the equivalent reductions as expeditiously as possible.

The District also commits to submit a second maintenance plan 8 years after redesignation to show maintenance for at least the next 10 year period.

3.6 Authority

The CARB has the authority to set vehicle emissions standards and fuel formulation for California.

The District has the authority and is the agency responsible for developing and enforcing air pollution control rules and regulations in the South Coast Air Basin for stationary and areawide sources.

4.0 SUMMARY CHECKLIST

Table 4-1 summarizes the status of the elements that need to be satisfied in order to meet CAA requirements as well as conform to the guidance documents prepared by the U.S. EPA (e.g., request for redesignation and maintenance plan).

Table 4-1

Summary Checklist of Document References

Plan Components	CAA/U.S. EPA Requirements	Status	Document Reference
Redesignation Request	Attainment with NAAQS	Conditions met	Section 2.1.2
	U.S. EPA approval of State Implementation Plan	Conditions met through application of the Clean Data Policy	Section 2.2
	Air quality improvements due to permanent and enforceable emissions reductions	Conditions met	Section 2.3
	Section 110 and Part D requirements have been meet	Conditions met through application of the Clean Data Policy	Section 2.4
	U.S. EPA approval of a maintenance plan and contingency plan	Pending (as part of this submittal)	Section 3
Maintenance Plan	Attainment inventory	Conditions met	Section 3.1.1
	Maintenance demonstration	Conditions met	Sections 3.1, 3.1.2, and 3.1.3
	Monitoring network	Commitment established	Sections 2.3 and 3.2
	Verification of continued attainment	Commitment established	Section 3.3
	Contingency Plan	Commitment established	Sections 3.4, 3.5 and 3.6

APPENDIX - A

Methodology for Quantifying the Maximum Potential Change in Wintertime CO Emissions Due to Use of Non-Oxygenated Gasoline

METHODOLOGY FOR QUANTIFYING THE MAXIMUM POTENTIAL CHANGE IN WINTERTIME CO EMISSIONS DUE TO USE OF NON-OXYGENATED GASOLINE

In order to determine whether use of non-oxygenated fuel would be consistent with continued maintenance of the CO standard, this draft Plan includes an adjustment to the CO emissions inventory and motor vehicle emissions budgets for 2010 and 2015. This appendix describes the methodology used to estimate the maximum potential change in CO emissions that might result from allowing the wintertime use of non-oxygenated gasoline in the South Coast Air Basin.

On-Road Inventory Adjustment: The emission benefits of oxygenated gasoline use in on-road motor vehicles is declining over time due to the use of new emission control technologies and fleet turnover. By 2010 and 2015, the benefits of oxygenated fuels in cars and trucks are likely to be negligible, accruing only when the very oldest vehicles (mid-1980's and earlier model years) are started in cold temperatures not typical of the South Coast Air Basin. However, staff has used the most conservative estimate of the potential CO emissions increase in this plan in assessing whether the use of non-oxygenated fuel would be consistent with continued attainment of the standard.

U.S. EPA's Blue Ribbon Panel on Oxygenates in Gasoline[1] estimates that by 2010, fuel with 3.5 percent oxygenate content will provide between zero and two percent CO emission reductions from gasoline-powered on-road vehicles. Staff has used the high end of this range in its calculations. Since the Blue Ribbon Panel study was based on areas with ten percent ethanol content gasoline, the projected benefits were adjusted by a factor of 0.57 to reflect the 5.7 percent oxygenate content gasoline in the SCAB as shown in Table A-1 below. This analysis indicates that the emissions inventory for on-road gasoline-powered vehicles should be adjusted by a factor of 0.0114 to reflect the maximum potential increase that could be associated with discontinuing the use of oxygenates. Since the Blue Ribbon Panel study did not provide emission factors for 2015, the 2010 emission factor was applied to 2015 CO emissions. This represents a conservative assumption since the 2015 fleet will have fewer of the older vehicles with CO emissions that are affected by use of oxygenated fuel.

[1] U.S. Environmental Protection Agency, Achieving Clean Air and Clean Water: Report of the Blue Ribbon Panel on Oxygenates in Gasoline, EPA-420-R-99-021, September 15, 1999.

Table A-1

Methodology for Estimating On-Road Motor Vehicle Oxygenate Adjustment for Wintertime CO Emissions

U.S. EPA Blue Ribbon Panel Range of Estimated Benefits	Adjustment Factor for CA Gasoline (CA fuel ethanol content/ Blue Ribbon Panel assumed ethanol content)	Adjustment Factor Applied to On-Road Gasoline Powered Emissions
0% - 2%	5.7%/10.0% = 0.57	2% * 0.57 = 0.0114

Gasoline-powered vehicles contribute about 98 percent and 97 percent of the total on-road mobile source CO inventory in 2010 and 2015, respectively. The gasoline-powered portion of the emission inventory is multiplied by the 0.0114 adjustment factor to determine the maximum potential CO emissions increase due to use of non-oxygenated gasoline, as shown in Table A-2 below. Actual emissions are likely to be lower, as fuel specification changes needed to continue to meet hydrocarbon emission standards would also tend to limit any increase in CO.

Table A-2

Maximum Potential CO Emissions Adjustment for Discontinuing the Use of Oxygenated Gasoline in On-Road Vehicles (SCAB, Winter Seasonal Emissions, TPD)

	Year 2010	Year 2015
Baseline Inventory	2018	1428
Percent gasoline-powered	98%	97%
Gasoline-powered inventory	1978	1385
Oxygenate adjustment factor	0.0114	0.0114
Potential emissions increase	23	16

Off-Road Inventory Adjustment: Gasoline is used to power a wide variety of off-road mobile sources, such as lawn mowers, dirt bikes, and recreational boats. Since the emissions impact of non-oxygenated fuel use by off-road sources has not been studied extensively, emissions profiles for older on-road vehicles with a similar engine and control equipment configuration were used to adjust emissions. CARB's documentation for its On-Road Motor Vehicle Emission Factor Model (EMFAC2002)[2] indicates that California oxygenated fuel reduces CO emissions by eleven percent from this general engine type. These benefits accrue exclusively when starting gasoline-powered engines under cold weather conditions. Since eleven percent of vehicle CO emissions occur

[2] EMFAC2002 Technical Support Documentation, Section 6.3, May 15, 2000, http://www.arb.ca.gov/msei/on-road/doctable_test.htm

during engine start-up, the eleven percent oxygenated fuel benefit was applied to eleven percent of the off-road gasoline-powered engine inventory. Calculation of the resultant emission factor is detailed in Table A-3.

Table A-3

Methodology for Estimating Off-Road Engine Oxygenate Adjustment

EMFAC Adjustment for Older On-Road Vehicles	Percent of CO Inventory Accruing During Engine Starts	Emissions Factor Applied to Off-Road Gasoline Powered Emissions
11%	11%	11% * 11% = .0121

Gasoline-powered vehicles contribute about 84 percent and 83 percent of the total off-road mobile source CO inventory in 2010 and 2015, respectively. The gasoline-powered portion of the emission inventory is multiplied by the 0.0121 adjustment factor to determine the maximum potential CO emissions increase due to use of non-oxygenated fuels, as shown in Table A-4.

Table A-4

Maximum Potential CO Emissions Adjustment for Discontinuing the Use of Oxygenated Gasoline in Off-Road Engines (SCAB, Winter Season Emission, TPD)

	2010	2015
Baseline Inventory	912	890
Percent gasoline-powered	84%	83%
Gasoline-powered inventory	766	739
Oxygenate adjustment factor	0.0121	0.0121
Potential emissions increase	9	9

Stationary and Area-wide Sources: Gasoline combustion at stationary and area-wide sources contributes only about 6 TPD CO emissions, or less than 0.002 of the entire CO inventory, in 2010 and 2015. The on-road and off-road methodologies, if applied to stationary and area-wide sources, indicate that less than a tenth of a ton per day of CO emissions would be foregone if oxygenates were eliminated. As such, the impact of non-oxygenated gasoline use for these sources is assumed to be negligible.

SUMMARY OF POTENTIAL CO EMISSIONS CHANGES

Table A-5 summarizes the maximum potential increase in wintertime CO emissions that could result from discontinuing the use of oxygenates in wintertime gasoline in the South Coast Air Basin. The actual change would be expected to be less.

Table A-5

Maximum Potential Increase in CO Emissions Adjustment from
Eliminating Wintertime Oxygenates from Gasoline
(SCAB, Winter Seasonal Emissions, TPD)

	2010	2015
On-Road Vehicles	23	16
Off-Road Engines	9	9
Stationary and Area Sources	0	0
Total	32	25

ATTACHMENT - 1

Air Quality Data Certification Letters to U.S. EPA

South Coast
Air Quality Management District
21865 E. Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 · http://www.aqmd.gov

June 26, 2002

Mr. John Kennedy, Chief
Technical Support Office
Air Division
U.S. EPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Mr. Kennedy,

The South Coast Air Quality Management District (SCAQMD) is responsible for submitting National Air Monitoring Station (NAMS) and State and Local Air Monitoring Station (SLAMS) air quality data to the Air Quality System (AQS) for those AQS monitors under the control of the SCAQMD. In accordance with 40 CFR Part 58, this letter certifies that the 2001 data for these monitors are complete and accurate to the best of my knowledge. This letter of certification fulfills the certification objectives of the Section 105 Grant for Fiscal Year 2002.

Additionally, all $PM_{2.5}$ data reported at local conditions submitted to AQS are also complete and are accurate to the best of my knowledge.

If you have any questions regarding this letter, please feel free to contact me at (909) 396-2105, or Henry Hogo, Assistant Deputy Executive Officer, at (909) 396-3184.

Sincerely,

Chung S. Liu
Deputy Executive Officer
Science & Technology Advancement

CL:TP:lw

cc: H. Hogo
M. Leonard

South Coast
Air Quality Management District
21865 E. Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 · www.aqmd.gov

June 10, 2003

Mr. John Kennedy, Chief
Technical Support Office
Air Division
U.S. EPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Mr. Kennedy,

The South Coast Air Quality Management District (SCAQMD) is responsible for submitting National Air Monitoring Station (NAMS) and State and Local Air Monitoring Station (SLAMS) air quality data to the Air Quality System (AQS) for those AQS monitors under the control of the SCAQMD. In accordance with 40 CFR Part 58, this letter certifies that the 2002 data for these monitors are complete and accurate to the best of my knowledge. This letter of certification fulfills the certification objectives of the Section 105 Grant for Fiscal Year 2003.

If you have any questions regarding this letter, please feel free to contact me at (909) 396-2105, or Henry Hogo, Assistant Deputy Executive Officer, at (909) 396-3184.

Sincerely,

Chung S. Liu
Deputy Executive Officer
Science & Technology Advancement

CL:HH:JEH:TP:tp

cc: H. Hogo
M. Leonard
J. Higuchi
T. Parsons

South Coast
Air Quality Management District
21865 E. Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 • www.aqmd.gov

October 7, 2004

Mr. Sean Hogan, Chief
Technical Support Office
Air Division
U.S. EPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Mr. Hogan,

The South Coast Air Quality Management District (SCAQMD) is responsible for submitting National Air Monitoring Station (NAMS) and State and Local Air Monitoring Station (SLAMS) air quality data to the Air Quality System (AQS) for those AQS monitors under the control of the SCAQMD. In accordance with 40 CFR Part 58, this letter certifies that the 2003 data for these monitors are complete and accurate to the best of my knowledge. This letter of certification fulfills the certification objectives of the Section 105 Grant for Fiscal Year 2004.

If you have any questions regarding this letter, please feel free to contact me at (909) 396-2105, or Henry Hogo, Assistant Deputy Executive Officer, at (909) 396-3184.

Sincerely,

Chung S. Liu
Deputy Executive Officer
Science & Technology Advancement

CL:HH:TP:tp

cc: H. Hogo
T. Parsons
R. Eden
M. Leonard

ATTACHMENT - 2

CO Modeling Attainment Demonstration
Extracted from the 2003 AQMP

Appendix V, Section 4

REVISION TO THE FEDERAL CARBON MONOXIDE ATTAINMENT DEMONSTRATION PLAN

INTRODUCTION

The South Coast Air Basin (Basin) has historically had a persistent carbon monoxide (CO) problem. However, there has been considerable improvement in CO air quality in the Basin from 1976 to 2002. In 1976, the federal and state 1-hour average (35 ppm and 20 ppm) and 8-hour average (both, 9.0 ppm) carbon monoxide standards were exceeded in the Basin.[1] In 1977 the federal 1-hour standard was met for the first time in the Basin, however the federal 8-hour standard continued to be exceeded over 100 days. With the turnover of older vehicles, introduction of cleaner fuels and implementation of control technology on industrial facilities, CO concentrations in the Basin have steadily declined. In 1990 CO concentrations exceeded the federal and state standards at 10 of 24 monitoring stations. In 1995, only 4 of 20 monitoring stations in the Basin exceeded the respective standards. Also in 1995, the state 1-hour CO standard (20 ppm) was met for the first time. By 2000, the federal 8-hour standard was exceeded at only 3 of 26 monitoring stations in the Basin and on only two days. (A full description of current CO air quality is contained in Appendix II of the 2003 AQMP)

In November 1990, Congress enacted a series of amendments to the Clean Air Act intended to intensify the air pollution control effort across the nation. One of the primary goals of the 1990 Clean Air Act (CAA) was an overhaul of the planning provisions for those areas not currently meeting the National Ambient Air Quality Standards (NAAQS). The CAA identifies specific emission reduction goals, requires demonstration of reasonable further progress, and incorporates more stringent sanctions for failure to attain or to meet interim milestones. Under the CAA, the South Coast Air Basin is designated as a serious nonattainment area for carbon monoxide and is required to implement emissions reduction measures as "expeditiously as practicable" in order to attain federal carbon monoxide standards.

A Federal Attainment Plan for Carbon Monoxide (CO Plan) was approved by the District Governing Board on November 12, 1992 and submitted to the U.S. Environmental Protection Agency (EPA). The CO Plan was designed to demonstrate the attainment of the NAAQS by 2000. The Plan was revised in the 1994 and 1997 Air Quality Management Plans (AQMP) to incorporate updated VMT and emissions projections and a revised control strategy. The 1997 AQMP was approved by the District Governing Board on November 15, 1996.

In 2001, the Basin met both the federal and state 8-hour CO standards for the first time at all monitoring stations. The Basin peak 8-hour average concentration of 7.7 ppm was measured at the Lynwood air monitoring station. However, during a particularly stagnant morning, (January 8, 2002), the CO 8-hour standard was exceeded at Lynwood.

[1] The federal 8-hour average CO standard is defined at 9.00 ppm. A violation of the standard occurs if thea 8-hour average concentration equals or exceeds 9.50 ppm.

The highest 8-hour average CO concentration measured at Lynwood reached 10.7 ppm, approximately 113 percent of the federal standard. The 1-hour average peak CO concentration at Lynwood was measured at 16 ppm,. While the 8-hour federal standard was exceeded at Lynwood on January 8th, it proved to be the only location and day in 2002 with 8-hour average CO concentrations recorded above 9.5 ppm. The provisions specified in CAA defining attainment of the federal 8-hour average CO standard allows for no more than one day and location to exceed 9.5 ppm in a two year period. In accordance with the CAA, the Basin is currently in compliance with the federal 8-hour standard.

The 2003 revision to the CO Plan provides a duel purpose: it replaces the 1997 attainment demonstration that lapsed at the end of 2000, and provides the basis for a CO maintenance plan for the future. Although trend of reducing future carbon monoxide emissions is expected to continue, the 2003 AQMP does not include a request for EPA to consider re-designation of the Basin's CO attainment status at this time.

The 2003 CO Plan revision reflects several updates to the 1997 CO Plan. The plan incorporates new forecasts of VMT, updated emissions factors from ARB's on-road EMFAC2002 program (ARB, 2002), and revisions to the Direct Travel Impact Model (DTIM4). The "hot-spot" modeling methodology remains the same as in the 1997 CO Plan. The 2003 CO plan uses the CAMx regional air quality model to take advantage of the more state of science advection, and dispersion schemes and layer structure. In addition, a new CO episode, October 31-November 1, 1997 replaces the 1989 episode used in the previous plans. The of the new episode satisfies with EPA's policy to examine episodes that are less than 10-years old and are consistent with the ongoing air quality trend. An additional benefit of the new episode is to make use of the enhanced meteorological and air monitoring that took place during the SCOS97 air monitoring program. A detailed discussion on the modeling methodology and CO episode follows.

CARBON MONOXIDE EMISSIONS

Introduction

In order to propose effective control measures, it is first necessary to identify the sources of pollution and to quantify the type and amount of emissions they contribute. This chapter summarizes the updated carbon monoxide emissions inventory for the Basin. A more detailed description of inventory requirements and procedures can be found in the 2003 AQMP, Appendix III.

Planning Inventory

The planning emissions inventory is developed based on the winter period (defined as November through April) in which ambient concentrations of carbon monoxide in the Basin are highest.

The 1992 CO Plan was based on the 1990 carbon monoxide emission inventory submitted to U.S. EPA by the California Air Resources Board (ARB) in May 1992. This inventory was developed based on U.S. EPA guidance (EPA, 1991). The ARB also submitted 1989 and 2000 modeling emissions inventories in May 1992, which were used in the 1992 CO Plan attainment demonstration. The 1992 CO Plan used the EMFAC7EP emission factor program and vehicle miles traveled (VMT) estimates and projections from the 1991 AQMP. The District committed to revising the CO Plan when updated emission factors and VMT forecasts became available. The 1994 Revision to the CO Plan uses emissions factors generated by the ARB EMFAC7F program and VMT forecasts prepared by the Southern California Association of Governments (SCAG) for the 1994 AQMP. Again, the 1997 CO plan used SCAG's updated VMT forecast and ARB's EMFAC7G on-road emissions factor program. The 2003 AQMP, including the 2003 CO Plan revision, uses the latest VMT forecast provided by SCAG and ARB's current on-road emissions factor program EMFAC2002.

VMT Forecast

SCAG is responsible for preparing the VMT forecasts, estimating actual VMT, and annual reporting. The emission forecasts for all future years reflect demographic and economic growth forecasts by SCAG. Section 187(a)(2)(A) of the CAA requires carbon monoxide nonattainment areas to forecast VMT for each year prior to the attainment year. The first set of forecasts was generated with the SIP revision (November 15, 1992) and included forecasts for all subsequent years up to the year of attainment. The revised VMT forecast for the 2003 AQMP is presented in Table 4-1 for 1997 through 2006. The VMT forecasts for 1997, 2002 and 2006 were provided by SCAG. Estimated VMT for the interim years were interpolated. DTIM4 was used to distribute growth among the different vehicle categories for all years with the exceptions of 2001, and 2004 which were interpolated.

The VMT forecast is provided beyond the original 2000 attainment date. The VMT forecast includes the 1997 base-year, the 2000 original attainment date, the 2002 extended attainment date for the Basin (had the 2-year extension for the CO attainment demonstration been applied for and granted) and 2006 the milestone year for attaining the federal PM_{10} standard. The VMT forecast for 2003 through 2006 is provided to support a weight of evidence demonstration that future year CO emissions will continue to lower, thus minimizing the likelihood that the CO 8-hour standard will be exceeded.

TABLE 4-1

Daily Vehicle Miles Traveled (VMT) Forecasts (x 100,000 miles) from 1997 through 2006for the South Coast Air Basin

Year	Light-Duty Passenger Cars	Light-Duty Trucks	Medium-Duty Trucks	Heavy-Duty Trucks	Urban and School Bus	Motor-cycles and Motor-homes	All Vehicles
1997	1819	838	192	193	13	19	3074
1998	1814	867	196	195	14	18	3104
1999	1824	894	203	199	14	19	3153
2000	1844	905	205	202	15	19	3190
2001	1864	915	207	208	15	20	3228
2002	1883	925	209	214	15	20	3266
2003	1904	933	211	220	16	21	3304
2004	1937	946	214	231	16	22	3314
2005	1970	959	216	241	16	22	3324
2006	1970	957	214	247	16	23	3427

Emissions Projection

The future year baseline emissions are projected from the 1997 emission inventory and include emission reductions from rules and regulations adopted as of September 30, 2002. On-road mobile source carbon monoxide emissions have increased about 21 percent in the 1997 base year relative to the earlier submittals due to refinements in VMT and emissions factors. Table 4-2 presents the on-road vehicle emissions for 1997 out to 2006. .

TABLE 4-2

Carbon Monoxide Emissions (tons/day) Projected from 1997 through 2006 for the South Coast Air Basin

Year	Light-Duty Passenger Cars	Light-Duty Trucks	Medium-Duty Trucks	Heavy-Duty Trucks	Urban and School Buses	Motor-cycles and Motor - homes	All Vehicles
1997	2453	1522	363	540	37	112	5027
2000	2056	1288	313	362	35	98	4152
2002	1673	1042	253	308	32	94	3402
2003	1519	953	234	288	31	93	3118
2005	1278	815	204	254	29	88	2668
2006	1172	761	194	240	28	85	2480

Planning Emissions Inventory

Table 4-3 shows a summary of the carbon monoxide planning emissions by major source category for the years 1997 and 2002. In 1997, on-road mobile sources contribute nearly 78 percent of the total emissions. Other mobile sources and stationary sources contributed 18 percent and 4 percent, respectively, of the carbon monoxide emissions in the year 1997. The relative contribution of on-road mobile sources decreases to 70 percent in the year 2002 to, as adopted regulations and vehicle fleet turnover reduce emissions despite the increase in VMT. On-road mobile source contributions in 2006 are expected to be reduced an additional 27 percent over the 2002 to 2,480 tons per day.

Section 187(d)(1) of the Clean Air Act requires a milestone demonstration by March 31, 1996 to determine whether the CO emissions reductions required by December 31, 1995 have been achieved. The District provided a 1995 CO emission inventory to the U.S. EPA by the required deadline.

TABLE 4-3

Carbon Monoxide Emissions By Major Source Category for the Years 1997 and 2002
Carbon Monoxide Planning Inventories (tons/day)

Source Category	1997	2002
Stationary Sources		
Fuel Combustion	38	41
Waste Disposal	1	1
Petroleum Production		
& Marketing	5	5
Industrial Processes	4	5
Miscellaneous Processes	203	315
(Including Waste Burning)		
Total Stationary Sources	251	367
Mobile Sources		
On-Road Vehicles	5027	3402
Other Mobile	1182	1065
Total Mobile Sources	6209	4467
Total	6460	4835

MODELING METHODOLOGY

Introduction

U.S. EPA guidance requires that the modeling analysis include both areawide and hot-spot modeling. An areawide analysis is performed to determine regional CO concentrations by applying a regional air quality simulation model. A "hot-spot" analysis provides CO concentrations at specified heavily traveled intersections. The 2003 revision to the CO Plan uses Comprehensive Air Quality Model with Extensions

(CAMx) air quality simulation model to assess regional CO concentrations and CAL3QHC to perform the hot-spot analysis. This chapter describes the carbon monoxide (CO) modeling approach used to demonstrate attainment of the federal 8-hour CO standard of 9.5 ppm. The 1992 CO Plan and 1994 AQMP provide additional supporting documentation describing the modeling procedures.

Regional Modeling Analysis

The October 31-November 1, 1997 meteorological episode resulted in the Basin's highest measured 8-hour average carbon monoxide concentration (17 ppm) since 1996. The peak concentration was measured at the Lynwood, the air monitoring station that has historically measured the Basin's highest CO concentrations and the greatest frequency of days exceeding the federal standard. The two-day episode took place during mid-fall on a Friday night and Saturday morning under very stagnant conditions. The episode took place on the weekend following the reversion to standard time. The following sections describe the meteorological and air quality characteristics of the October 31-November 1, 1997 August 1997 episode, the input preparation procedures used to develop the model input file for CAMx, and the respective model performance.

Episode Selection

For the 2003 revision to the CO Plan, the October 31-November 1, 1997 carbon monoxide meteorological episode replaces the December 1989 episode. The episode was selected for three principal reasons. First, the episode is more recent that the December 1989 episode that occurred over ten year ago. EPA's guidance for regional modeling recommends the use of meteorological episodes for air quality attainment demonstrations that are less than ten years old to ensure consistency in the trends of emissions. The 1997 episode occurred after the 1996 California Phase II fuel reformulation program in a period where the fuel is consistent with that used in 2002, the year selected for this attainment demonstration. Second, the October 31-November 1, 1997 episode measured the second highest 8-hour average carbon monoxide concentrations in the Basin since fuel reformulation was implemented. (On January 12, 1996, a 17.3 ppm 8-hour average CO concentration was measured at Lynwood). Third, episode took place during the SCOS97 monitoring program, with its enhanced network of surface and upper air meteorological monitoring. The SCOS97 monitoring was designed specifically to provide the data requirement for sate-of-the-art regional air quality models.

Basin carbon monoxide episodes typically occur during the months of December and January during long cold nights that enhance nocturnal inversions creating a very stable environment. The episodes fall into two categories: a one-day morning peak that builds in the early morning hours and is enhanced by morning rush hour emissions. The second type of episode spans two days, commencing at the evening rush hour and building through the night into the following morning. The peak concentrations are often measured around midnight, gradually falling through the early morning hours on the second day. The severity of the episode is defined as the combination of local emissions being enhanced by the regional re-circulation of urban, carbon monoxide emissions from the Central Los Angeles metropolitan area back to the South Central Los Angeles area. The December 1989 episode, analyzed in the 1994 and 1997 CO Plan is characteristic of the 2-day episode. The October 31-November 1, 1997 episode is also in this category.

A statistical model was developed to better characterize the October 31-November 1, 1997 episode relative to the seven year post fuel reformulation period. Multi-variate regression was conducted using 8-hour average concentrations of Lynwood carbon monoxide and surface and upper air meteorological data for 1996. The equation developed from the analysis was applied to the meteorological data for the seven-year period to predict Lynwood carbon monoxide and establish a daily ranking. The log linear regression included surface pressure gradient data (wind forcing), the vertical temperature structure of the near surface boundary layer and the number of hours of daylight. The October 31-November 1, 1997 episode ranked in the 94th percentile of the distribution (2557 cases). However when the number of hours in the day were normalized for all days to reflect the October 31-November 1, 1997 period the ranking reaches the 98th percentile and is equivalent to that of January 12, 1996 when the peak carbon monoxide concentration was observed for the seven year period. For reference, January 8, 2002, the last day that 8-hour average carbon monoxide concentrations exceeded the standard ranked in the 95th percentile of the distribution.

The meteorological profile characterizing the top ranked carbon monoxide days is provided in Table 4-4. In general, high carbon monoxide concentrations occur when summer strength high pressure aloft envelops the Basin coupled with offshore pressure gradients that stagnate local winds. The upper level high acts to enhance the nocturnal radiation inversion, effectively restricting air flow to a shallow layer near the ground. The offshore tendency in the pressure gradients act to stagnate the see breeze early in the afternoon and direct the regional drift of urban carbon monoxide south from Central Los Angeles.

Episode Characterization

The meteorological setting characterizing the October 31-November 1, 1997 episode has been characterized as a part of the SCOS97 monitoring program. The episode has been documented in a special edition of Atmospheric Environment through a special secession of the AWMA Annual Conference, held in San Diego, June 1999. The following subsections examine the observed synoptic and mesoscale meteorological profiles as well as the carbon monoxide air quality that was measure during the October 31-November 1, 1997 episode.

Table 4-4

Meteorological Profile of High Carbon Monoxide Episodes

Variable	Value	Std. Dev	Units	Time
VBG 500 Mb Pressure Surface Height	5823	54	M	0400 PST
Summation Surface Pressure Gradient [LGB-DAG+RIV-DAG+SAN-LAS]	-18.9	4.9	Mb	0700 PST
LAX-SFO Surface Pressure Gradient	-4.5	2.1	Mb	0700 PST
950 Mb Temperature	17.8	3.0	^oC	0400 PST
Inversion Top Temperature	18.7	3.7	^oC	0400 PST
Inversion Strength	7.4	2.9	^oC	0400 PST

Synoptic Setting

A strong ridge of high pressure aloft developed over the west coast of California during the last week in October, 1997 and remained in place into the first week of November 1997. The ridge strengthened significantly between the morning (0400 PST)of October 30th and the same time on the 31st with the height of the 500 mb level increasing approximately 70 m in a 24 hour period. The center of the high measure 5930 m located over the Southern California bight, positioned to bring the maximum level of subsidence to the Basin, enhancing the nocturnal inversion. (The 5920 m height at the 500 Mb pressure surface measured at Vandenburg Air Force Base is two standard deviations above the average defining the high carbon monoxide episodes). Figure 4-1 illustrates the upper level pattern observed on October 31, 1997.

Mesoscale Setting

The mesoscale setting for the October31-November 1, 1997 episode was dominated by developing offshore pressure gradients characterized by high pressure building into the Great Basin and a local thermal trough off the San Diego Coast. Figure 4-2 depicts the 2200 PST surface pressure analysis for October 31, 1997. The orientation of the pressure gradient was from north to south with summation pressure gradients increasing offshore from –5.9 Mb at 0700 PST on the 31st to –14.2 Mb at 0700 PST on the 1st. The net result of the increasing offshore gradients was to stagnate winds in the coastal portion of the Basin in the early evening. Velocities at most of the stations registered calm or 1-2 mph. Only a weak northeast to southwest gradient flow was observed throughout the night generating a mass drift from Central LA and the south San Gabriel

Valley back towards Lynwood following the Los Angeles and San Gabriel River valleys. (The Los Angeles and San Gabriel River valleys are typically identified by the river channels and are bordered by a moderate elevation gain in the terrain to the west of the City of Lynwood).

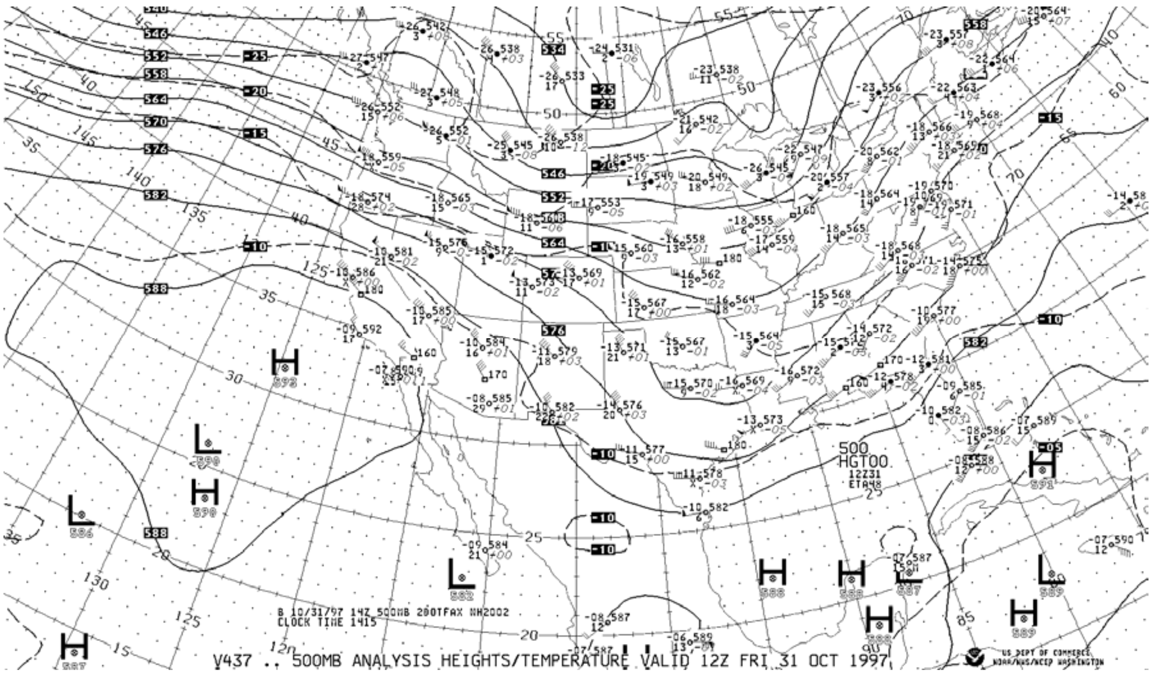

Figure 4-1

500 Mb Pressure surface contour patterns on Friday October 31, 1997 at 0400 PST

The nocturnal inversion that developed over the Basin was greatly enhanced by the subsidence from aloft. The temperature measured at the at 950 Mb level from the San Diego sounding at 0400 PST on November 1st reached 26.8 ^{o}C while the inversion top temperature reached 28 ^{o}C. . The inversion strength calculated for coastal Southern California was 11.9 ^{o}C. In all, the vertical temperature structure was at a minimum of one to two standard deviations more stagnant than the typical carbon monoxide episode.

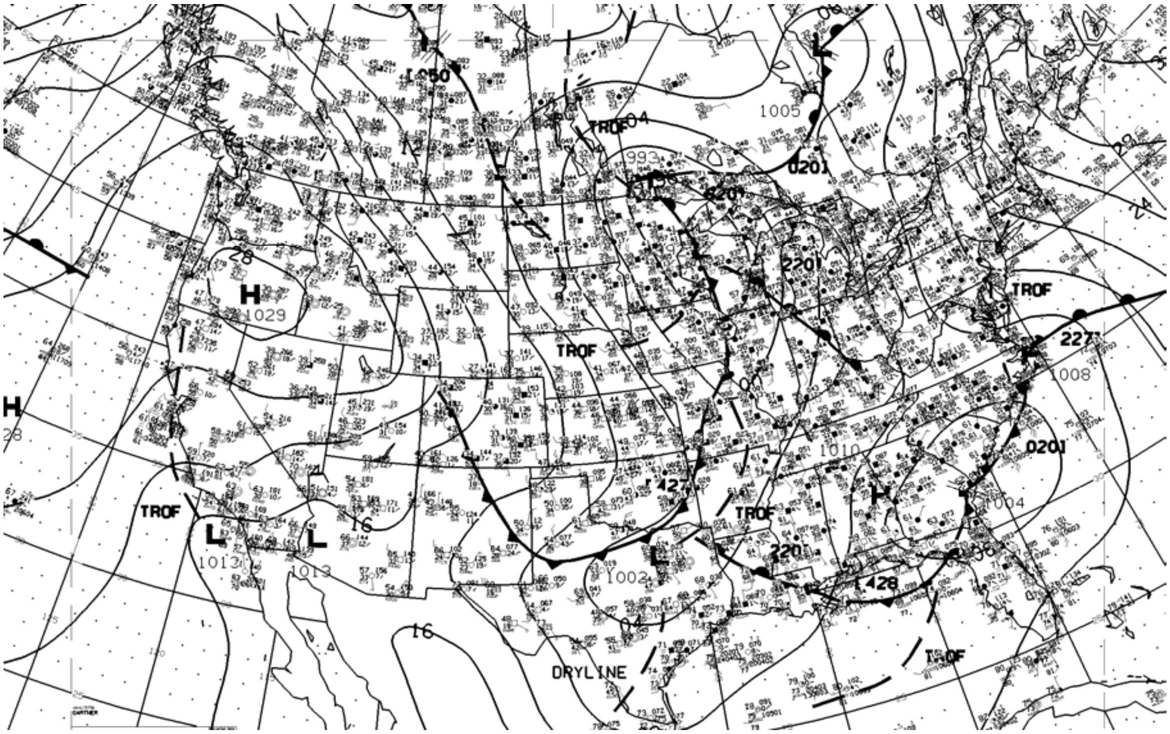

Figure 4-2

Surface Pressure Analysis on Friday October 31, 1997 at 2200 PST

Air Quality Setting

The air quality profile that emerged during the October 31-November 1, 1997 episode followed the meteorological setting for local stagnation being enhance by regional drift of carbon monoxide from the Central L.A. (downtown) area. Carbon monoxide concentrations were background during the afternoon hours of October 31st but began to rise as the sunset and the Friday traffic phased into rush hour. Hourly averaged concentrations climbed to approximately 9 ppm throughout the coastal plain by midnight on October 31st with carbon monoxide levels reaching a peak 1-hour level of 19 ppm at Lynwood. The rise (approximately 4 ppm per hour) in CO at Lynwood occurred through local emissions from the surrounding freeways and major arterial and from the emissions that drain through the coastal plain.

By midnight, concentrations of carbon monoxide began to fall at Central LA, Pico Rivera West L.A. and the San Fernando Valley air monitoring stations. Concentrations at Lynwood held steady for three hours while carbon monoxide at Hawthorne rose through 0600 PST on November 1st. The maximum 8- hour average at Lynwood reached 17.0 ppm at 0400 PST on November 1st and Hawthorne reached 10 ppm at 0700 PST.

Model Selection

CAMx was selected for the regional modeling demonstration. CAMx is a state-of-the-art regional photochemical model that uses multiple terrain following layers with fixed thickness, and the Bott advection solver for mass transport. The CAMx carbon monoxide simulations were run with the Carbon Bond IV (CB-IV) chemistry module using full chemistry. The MM5 prognostic and CALMET meteorological models were used to generate objective/diagnostic wind and mixing fields for the analysis. Estimates of horizontal and vertical diffusivity were generated from the CALMET meteorological fields as input to the modeling simulation. The simulations were run on the SCOS97 modeling domain (see Figure 4-3) using a five kilometer squared grid.

Meteorological Modeling and Input Fields

Meteorological modeling was performed by coupling the meteorological fields generated from the MM5 prognostic model with objective data and diagnostic options of the CALMET meteorological model. The output of the MM5 prognostic meteorological model was used as a “first guess” wind assumption for the CALMET simulation. Observational data used to drive the simulation was acquired from the SCOS97 field-monitoring program. CALMET was run using 17 vertical layers with the lowest layer consisting of 20 m in depth. Wind and temperature data were mapped to CAMX using layer interpolation.

Hourly upper air temperature and wind data measured at twelve radar wind profiler and radio acoustic sounding systems (RWP/RASS) augmented the twice daily routine rawindsonde profiles measured at Vandenburg Air Force Base and Miramar Naval Air Station. The RWP/RASS measure winds to three kilometers above ground level (AGL) at approximately 150 m range gates. Temperature profiles routinely reached one kilometer AGL at the same measurement levels.

Surface wind, temperature and humidity and cloud cover data from 238 monitoring sites comprised the basis of the surface meteorological fields. The data incorporated measurements from several monitoring networks including the District, Ventura County APCD, San Diego County APCD, California Irrigation Management System (CIMIS), FAA's METAR, Remote Automatic Weather System (RAWS), National Parks Networks (NPS) and Bureau of Land Management (BLM) networks. Figure 4-3 shows the location of surface meteorological stations.

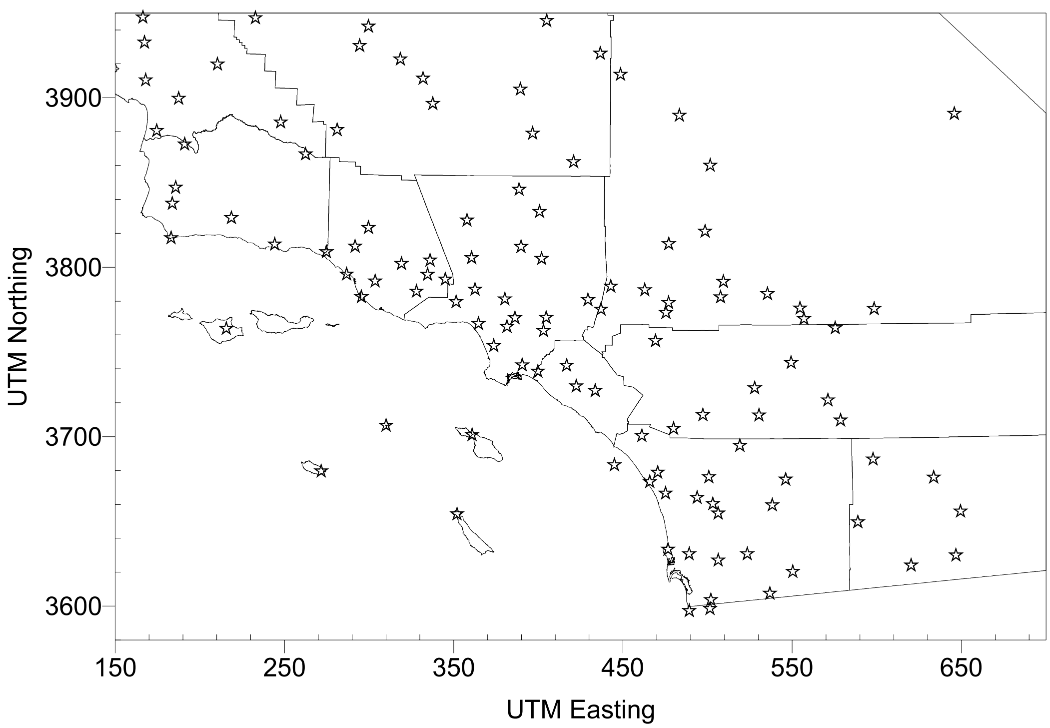

Figure 4-3

Surface Meteorological Stations

Mixing height fields were calculated directly from the CALMET analysis of the surface and vertical meteorological data. The minimum mixing height was set to 50 m. and the minimum diffusivity coefficient was set to 0.1 cm^2/sec. The vertical and horizontal dispersion coefficients (diffusivity) were calculated using an algorithm that employs formulas proposed by Holtslag and Nieuwstadt (1986), Wyngaard (1985, 1988), Businger (1982), and Tennekes (1982). The algorithm calculates various parameters such as local momentum flux, friction velocity, local sensible heat flux, and Monin-Obukhov Length. The atmospheric layer is divided into regions according to the combination of the mixing depth, elevation above the ground and Monin-Obukhov Length. The diffusivity formulation is grid based and the minimum vertical diffusivity coefficient was set to 0.1 cm^2/sec.

Trajectory Analysis

Figures 4-4 through 4-7 depict the time series (3-hour intervals, beginning at 1500 PST) of carbon monoxide transport simulated using the MM5/CALMET wind fields. The trajectory illustrates the transport of carbon monoxide emissions injected into the Central L.A. grid and it movement during the early evening-late night hours of October 31st. The simulation illustrates the ability of the wind field to characterize the regional drift of carbon monoxide that contributed to background concentrations at Lynwood that night and the following morning.

CAMx Initial and Boundary Conditions

Initial conditions used by the CAMx simulation were derived from hourly observational data measured by the District and neighboring air quality agencies. The lateral boundary and top boundaries were set at “EPA Clean” North American continental average concentrations. Table 4-5 summarizes the species concentrations.

Base Year Emissions

The 1997 base year emissions inventory totaled 6425 tons of carbon monoxide per day. The total is approximately 35 tons lower that the 1997 tonnage listed in the planning inventory. The modeling inventory reflects day specific ambient temperature corrections made to mobile and other source operating conditions.

Day-of-Week Diurnal Traffic Patterns

One additional import segment of data acquired as part of the SCOS97 monitoring program was the hourly vehicle count data monitored in Basin by the 11 Caltrans weigh-in-motion (WIM) stations. The hourly vehicle count profiles were day and location specific. The profiles were collected over during the course of the SCOS97 program and were aggregated into typical day-of-week patterns. The day pattern stratifies vehicle counts by hour and provides an improved characterization of the diurnal traffic patterns. The data is expressed as an hourly frequency of the total daily vehicle use (e.g. hour 0-1 2 percent of the total traffic volume fro the 24-hour period). The vehicle count data illustrates the different traffic patterns observed on weekdays (Thursday is used as a surrogate), Friday and Saturday. Figure 4-8 illustrates the Thursday, Friday and Saturday patterns for vehicle use by hour of day. This data was used to refine the traffic patterns defined by the DTIM4 transportation model.

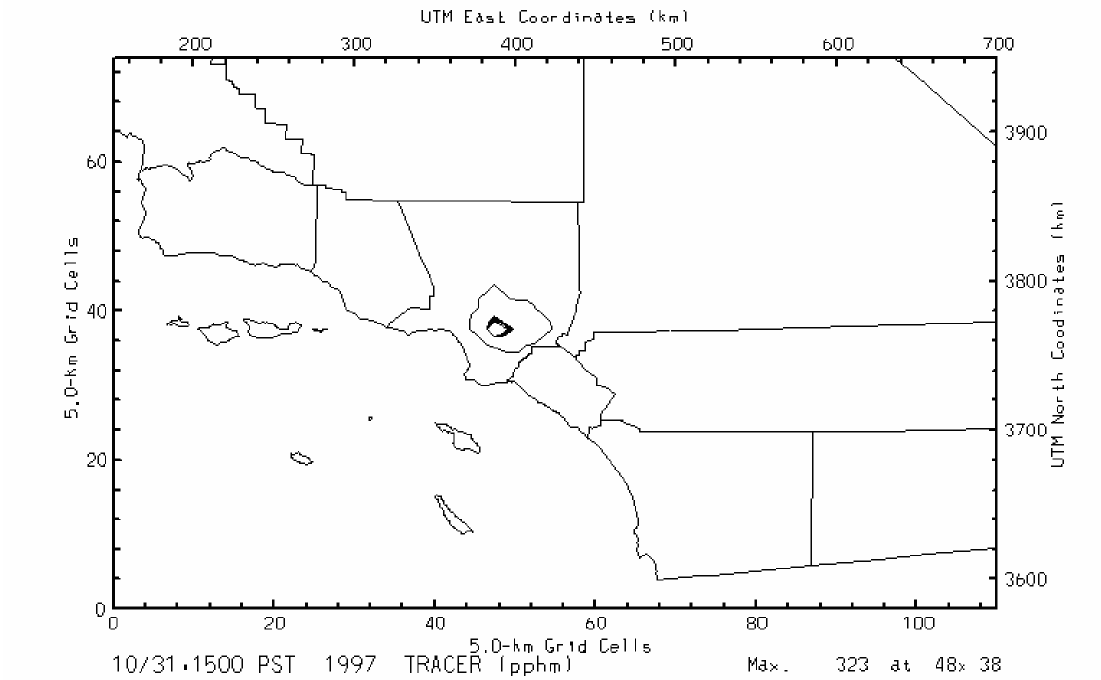

Figure 4-4

Simulated Carbon Monoxide Tracer Release 1500 PST, October 31, 1997

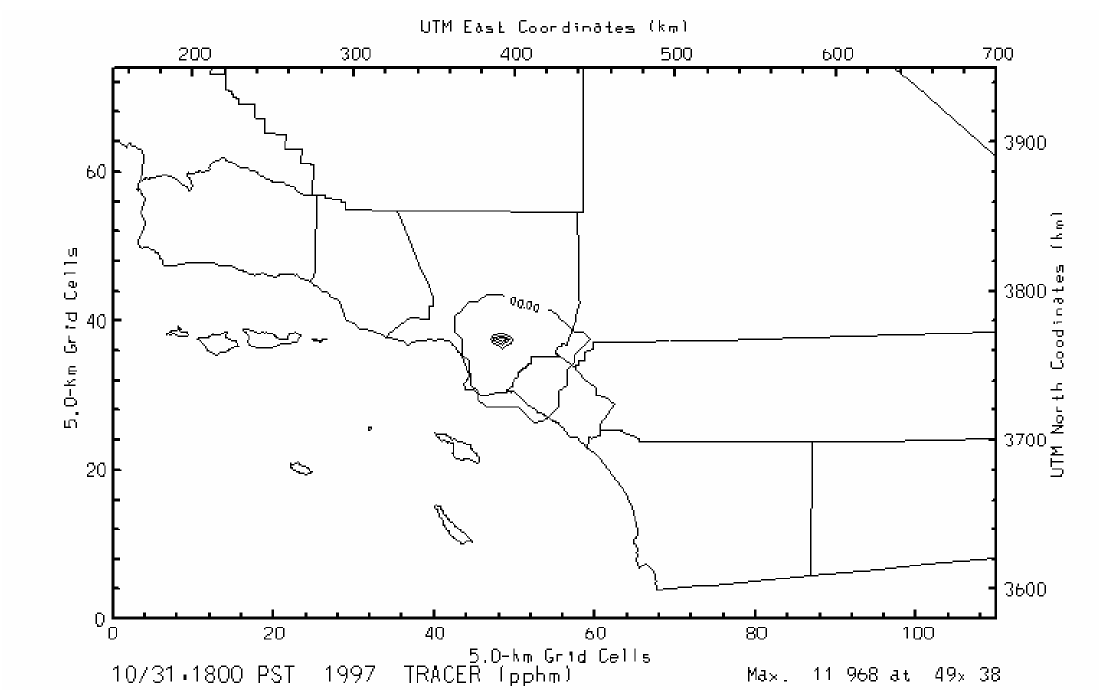

Figure 4-5

Simulated Carbon Monoxide Tracer Release 1800 PST, October 31, 1997

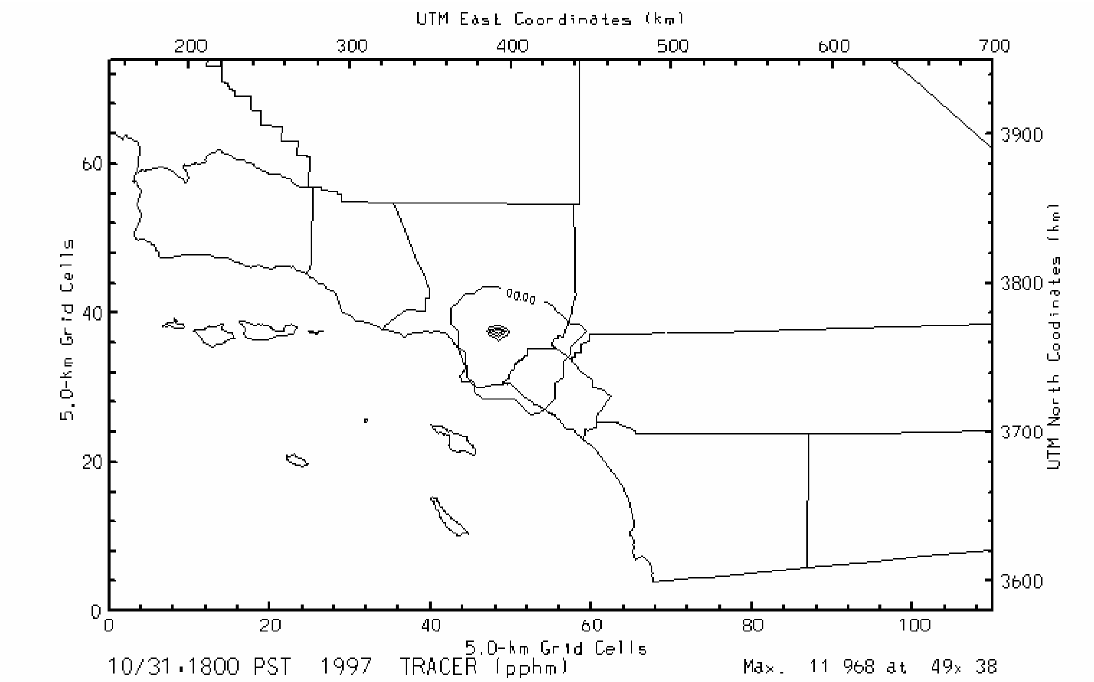

Figure 4-6

Simulated Carbon Monoxide Tracer Release 2100 PST, October 31, 1997

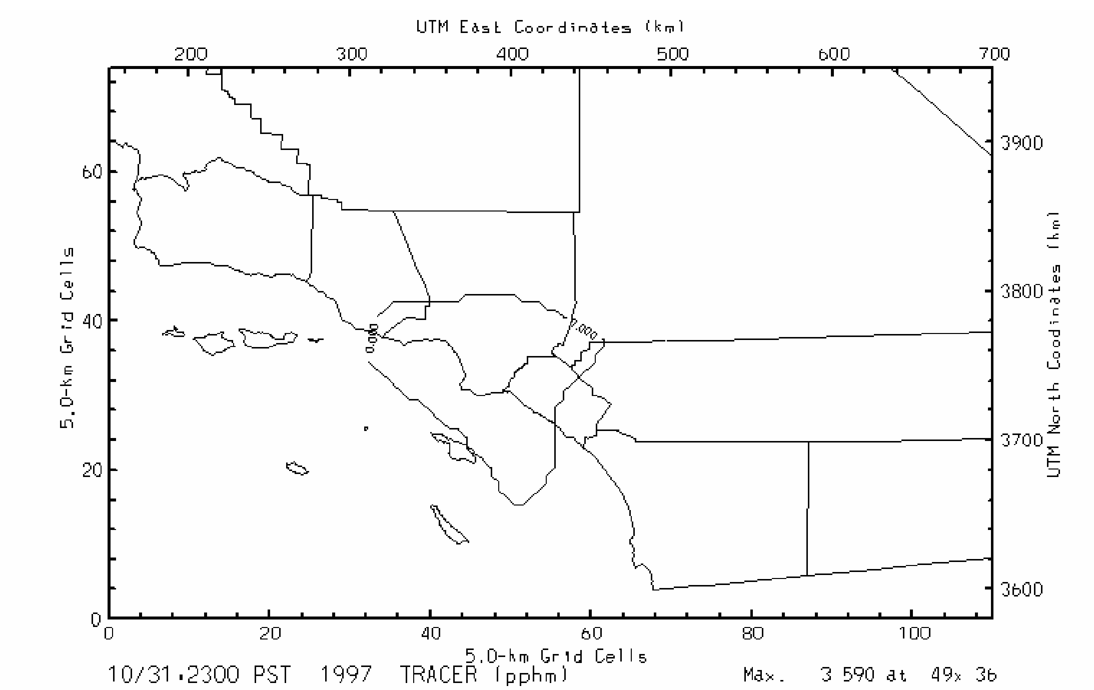

Figure 4-7

Simulated Carbon Monoxide Tracer Release 2300 PST, October 31, 1997

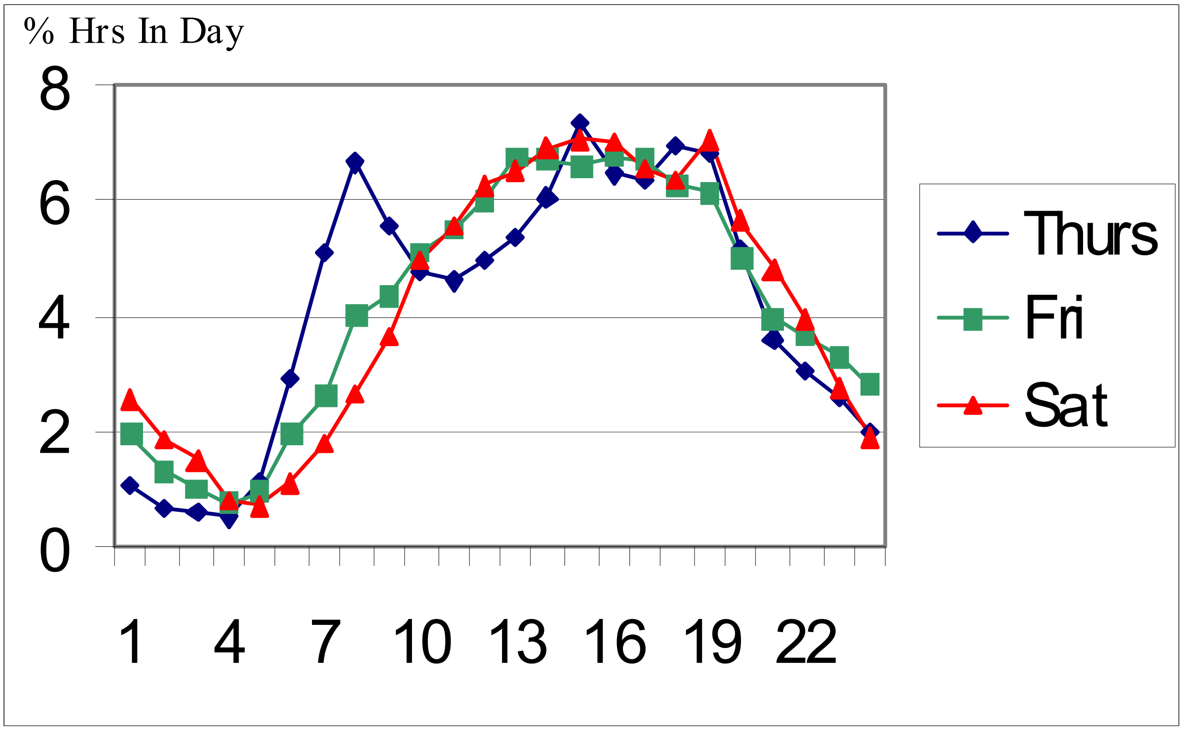

Figure 4-8

Diurnal Vehicle Usage Distribution from Caltrans Weigh-In-Motion Station Data

Base Year Model Performance

Table 4-6 shows the performance statistics for the CAMx simulation using the 1997 baseline emissions inventory. Shown in Table 4-6 are the paired peak prediction accuracy (paired in space) and U.S. EPA-suggested two statistical performance measures. The accuracy of the peak 8-hour average prediction was -12 percent and -24 percent for unpaired and paired peak prediction, respectively. The paired absolute error marginally exceeds the performance goal of 25 to 30 percent. The simulation is within the temporal absolute error of two hours.

Table 4-5

EPA Clean Top and Lateral Boundary Concentrations

Species	Concentration(ppm)
NO	0.0010000
NO2	0.0020000
O3	0.0400000
OLE	0.0002760
PAR	0.0137000
TOL	0.0001640
XYL	0.0000900
FORM	0.0019280
ALD2	0.0005080
ETH	0.0004680
CRES	0.0000100
OPEN	0.0000100
PNA	0.0000100
NXOY	0.0000100
NO3	0.0000100
PAN	0.0000100
CO	0.2000000
HONO	0.0000100
H2O2	0.0000100
HNO3	0.0000100
SO2	0.0100000
SO4	0.0001000
AERO	3.0000000

TABLE 4-6

Performance Statistics for the October 31-November 1, 1997 CO Episode

Performance Measure	CAMx	U.S. EPA-Suggested Measures
Peak 8-Hour Station Prediction	13.0 ppm	--
Peak 8-Hour Regional Prediction	14.9 ppm	--
Peak 8-Hour Measurement	17.0 ppm	--
Paired Highest 8-Hour Prediction Accuracy	-24%	--
Unpaired Highest 8- Hour Prediction Accuracy	-12 %	+/- 30-35 %
Average Absolute Error in 8-Hour Peak Prediction	39 %	25-30 %
Average Absolute Error in the Predicted Time of the 8-Hour Peak Concentration for Station Pairs > 5.0 ppm	1.6 hours	2 hours

Figures 4-11 and 4-12 provide the temporal station model carbon monoxide performance for the coastal Basin stations for the 1-hour and 8-hour average concentrations respectively. The solid line depicts the predicted trend with observations depicted as squares. The CAMx simulation captures the diurnal trend observed at Lynwood during the night of October 31st and morning of November 1st. The general tendency for the model is to under-predict regional carbon monoxide concentrations. However, this tendency is consistent with the use of a 5 kilometer grid where emissions and transported carbon monoxide is uniformly distributed throughout the grid.

Figures 4-13 through 4-16 present the CAMx predicted carbon monoxide spatial distribution for 1500, 1800, 2100 and 2300 PST on October 31, 1997. As is depicted in the sequence, carbon monoxide builds from the early evening, peaking over South Central Los Angeles near midnight. The carbon monoxide levels also rise throughout the Basin and Ventura and San Diego in response to the stagnant conditions.

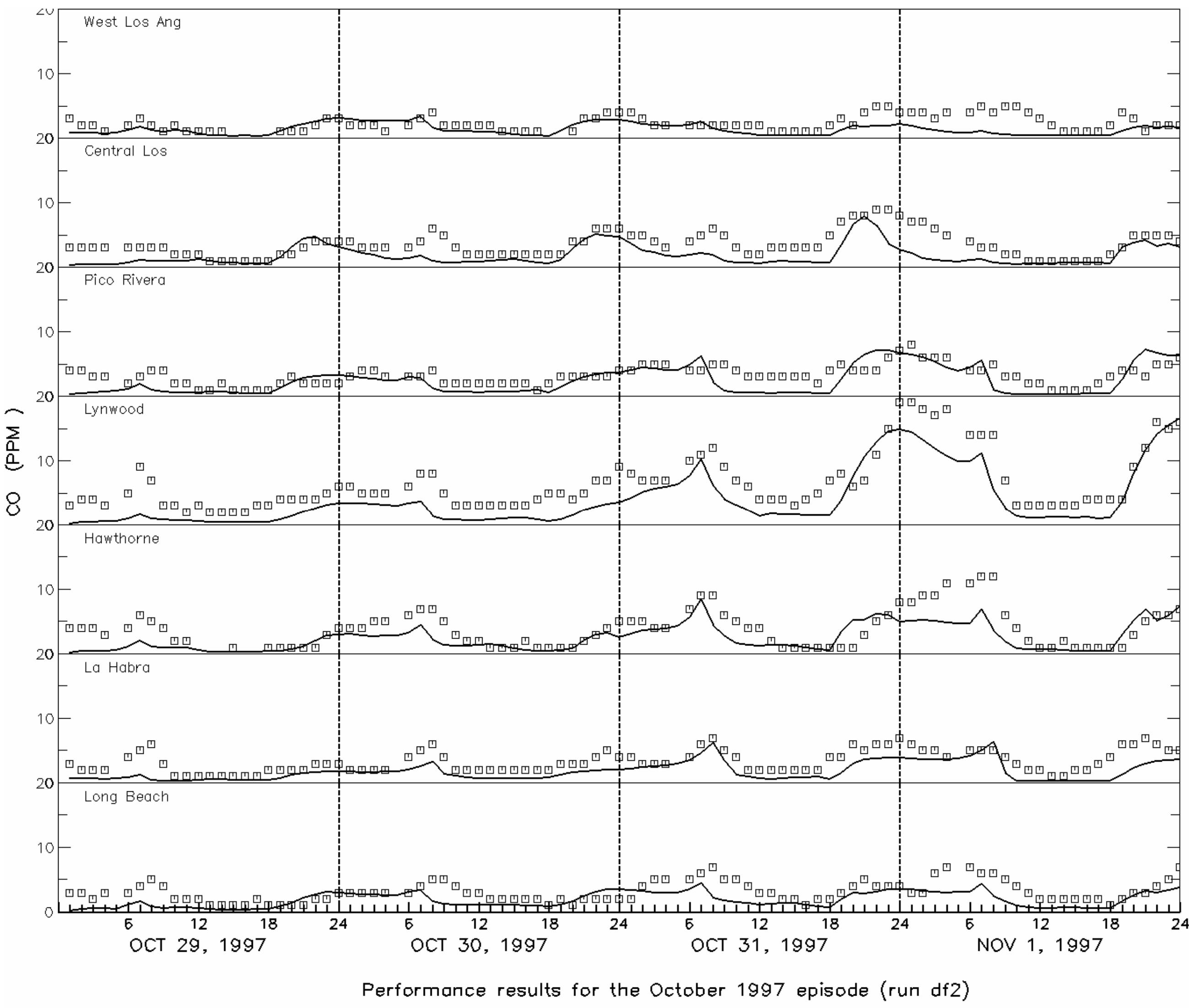

Figure 4-11

CAMx Simulated vs. Observed 1-hour Average Carbon Monoxide for the October 31-November 1, 1997 Meteorological Episode

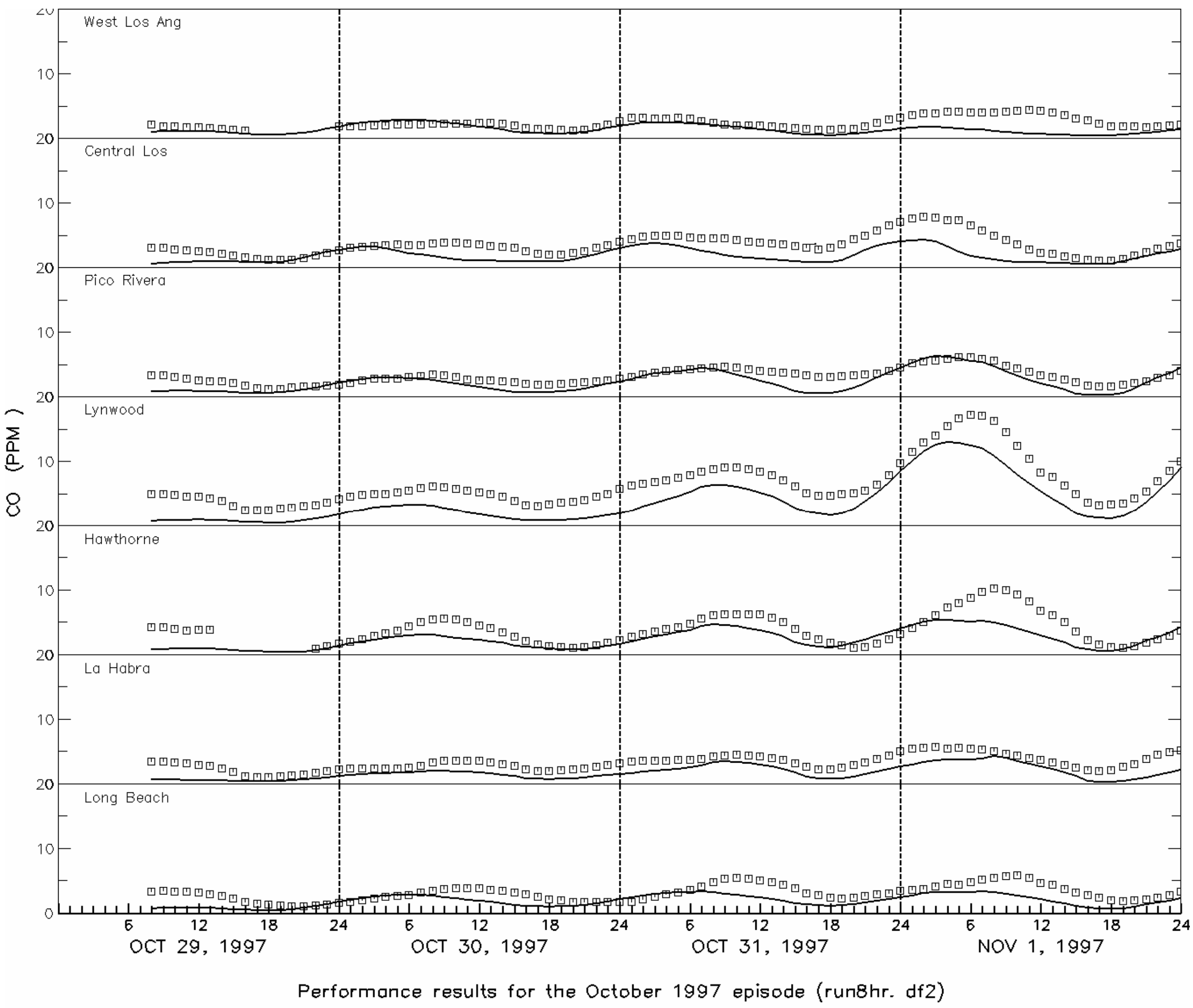

Figure 4-12

CAMx Simulated vs. Observed 8-hour Average Carbon Monoxide for the October 31-November 1, 1997 Meteorological Episode

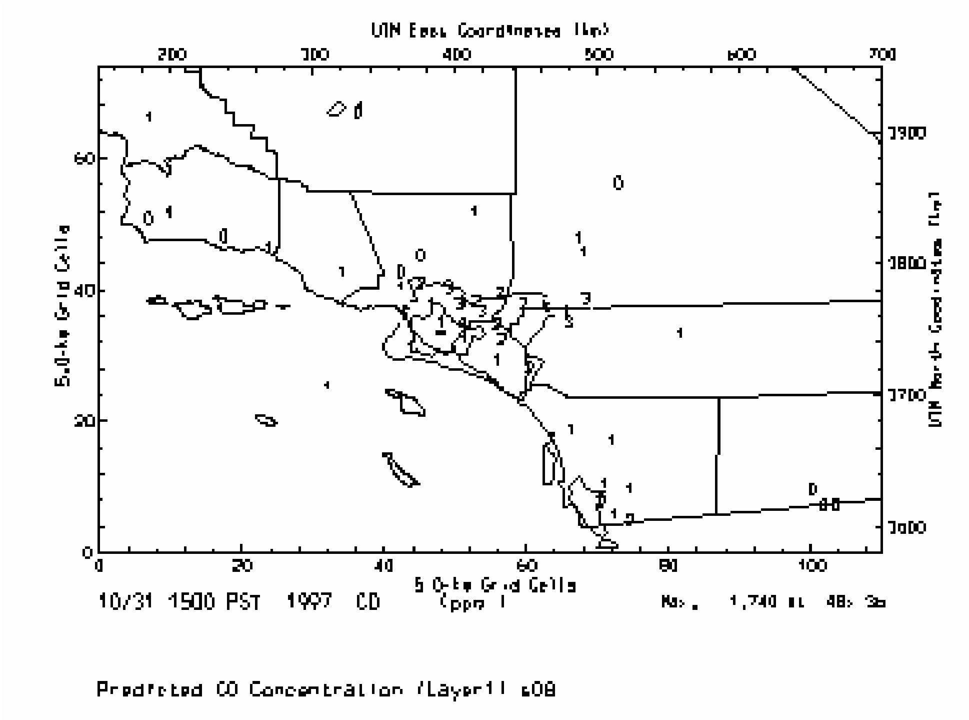

Figure 4-13

CAMx Simulated Regional Carbon Monoxide 1500 PST, October 31, 1997

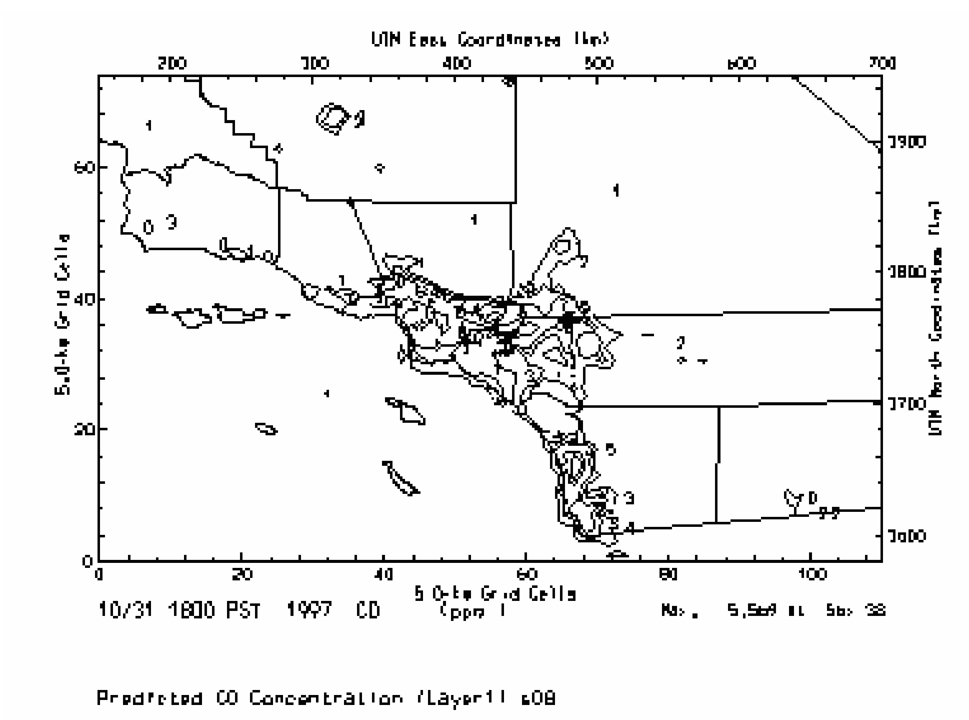

Figure 4-14

CAMx Simulated Regional Carbon Monoxide 1800 PST, October 31, 1997

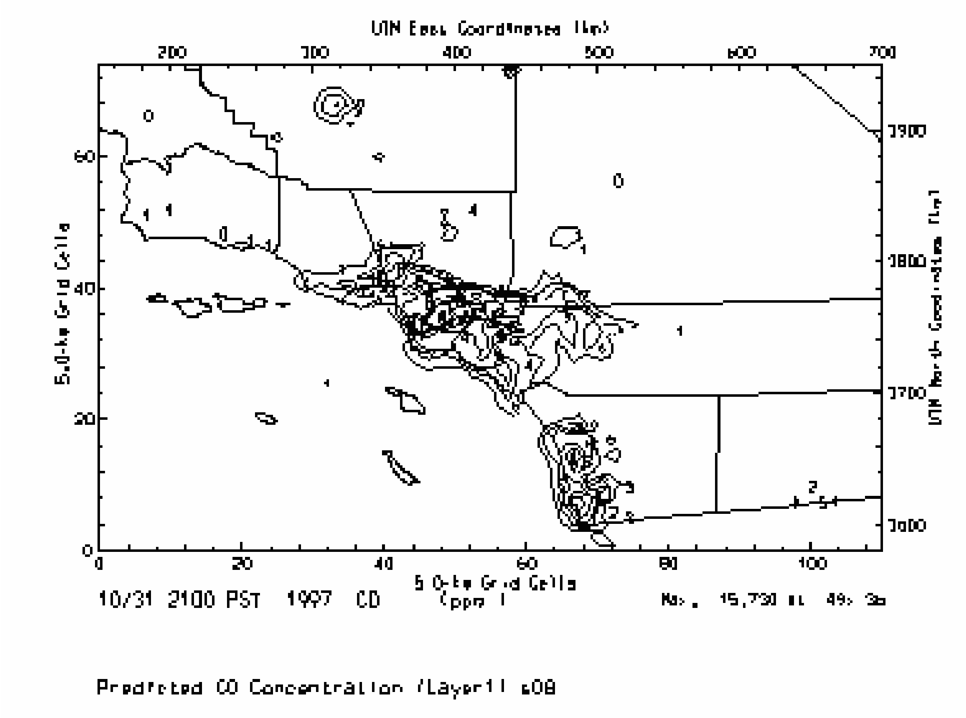

Figure 4-15

CAMx Simulated Regional Carbon Monoxide 2100 PST, October 31, 1997

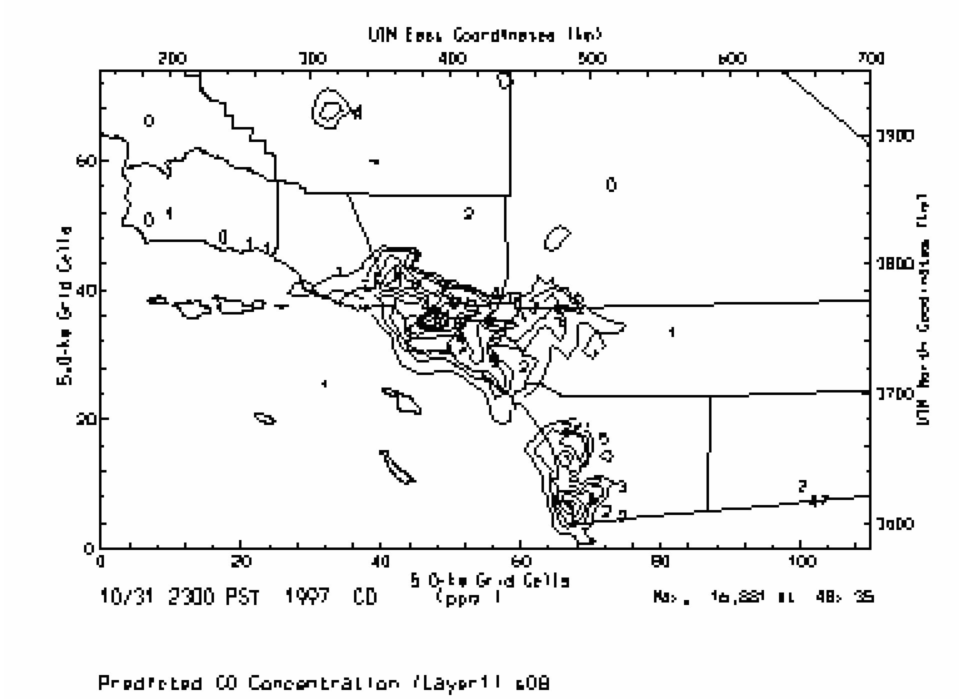

Figure 4-16

CAMx Simulated Regional Carbon Monoxide 2300 PST, October 31, 1997

Hot Spot Analysis

The hot-spot analysis was performed using CAL3QHC. CAL3QHC is a model developed to predict the level of CO or other inert pollutant concentration emitted from motor vehicles at roadway intersections. CAL3QHC inputs include roadway geometry, receptor locations, meteorological conditions and vehicular emissions rate. A general description of the selection of the hot spot intersection, model input assumptions, and model application was presented in the 1992 CO Plan and is not repeated here.

The CAL3QHC model was applied to the four intersections listed in Table 4-7 to estimate the CO impacts from motor vehicles traveling at roadway intersections. CO concentrations were estimated for both the 1997 base year and for the year 2002 based on projected traffic volume and emission factors. The October 31-November 1, 1997 episode specific meteorological conditions for the grid cell hosting the intersection was used for the simulation. Tables 4-8, 4-9, and 4-10 show the model predicted and calculated CO concentration at the selected intersection in the years 1997 and 2002.

TABLE 4-7

Selected Intersections for the CAL3QHC
Hot Spot Modeling Analysis

Intersection	Receptor	Description
Long Beach Blvd. /Imperial Highway	Lynwood Air Monitoring Station	The Lynwood air monitoring stations consistently records the highest 8-hour CO concentrations in the Basin each year
Wilshire Blvd./ Veteran Ave.	No Air Monitoring	The most congested intersection in Los Angeles county. The average daily traffic volume is about 100,000 vehicles/day.
Highland Ave./ Sunset Blvd.	No Air Monitoring Station	One of the most congested intersections in the city of Los Angeles. The intersection study has been conducted and traffic data is available.
Century Blvd./ La Cienega Blvd.	No Air Monitoring Station	One of the most congested intersections in the city of Los Angeles. The intersection study has been conducted and traffic data is available.

TABLE 4 -8

Emissions Predicted by EMFAC2002 in Year 1997 and 2002

	Wilshire - Veteran		Sunset - Highland		La Cienega - Century		Long Beach - Imperial	
	AM	PM	AM	PM	AM	PM	AM	PM
a) EMFAC2002 Emission Variables (1997)								
Running Exhaust Emission Factor (g/mile)	11.57	11.96	13.31	12.72	11.82	11.66	11.92	11.93
Idling Emission Factor (g/min)	2.13	2.18	2.43	2.32	2.19	2.15	2.22.	2.18
b) EMFC2002 Emission Variables (2002)								
Running Exhaust Emission Factor (g/mile)	7.20	7.21	7.22	7.98	7.31	7.24	7.35	7.48
Idling Emission Factor (g/min)	1.24	1.24	1.25	1.30	1.27	1.25	1.28	1.28

TABLE 4-9

1997 1-Hour Average Carbon Monoxide Concentrations
Calculated from the CAL3QHC Model

	Morning*	Afternoon+	Peak++
Wilshire - Veteran	7.7	5.7	--
Sunset - Highland	6.9	7.3	--
La Cienega - Century	6.4	5.2	--
Long Beach - Imperial	5.1	5.2	2.2

* Morning : 7-8 a.m. for La Cienega - Century, 11-12 a.m. for Sunset - Highland, 8-9 for Wilshire-Veteran, and 7-8 a.m. for Long Beach - Imperial

\+ Afternoon : 3-4 p.m. for Sunset - Highland, 3-4 p.m. for Wilshire - Veteran, 4-5 p.m. for Long Beach - Imperial, and 6-7 p.m. for La Cienega - Century

++ Peak : 11-12 p.m. (concentration at the hour of the observed peak). Peak is only provided for the Long Beach/Imperial intersection since it is intersection associated with the regional peak at Lynwood.

TABLE 4-10

Year 2002 1-Hour Average Carbon Monoxide Concentrations
Calculated from the CAL3QHC Model

	Morning*	Afternoon+	Peak++
Wilshire-Veteran	4.6	3.5	--
Sunset-Highland	4.0	4.5	--
La Cienega-Century	3.7	3.1	--
Long Beach-Imperial	3.0	3.1	1.2

* Morning : 7-8 a.m. for, La Cienega - Century, 8-9 a.m. for Wilshire - Veteran, 7-8 a.m. for Long Beach - Imperial, and 8-9 a.m. for Sunset - Highland

\+ Afternoon : 3-4 p.m. for Sunset - Highland, 5-6 p.m. for Wilshire - Veteran, 4-5 p.m. and Long Beach - Imperial, and. 6-7 p.m. for and La Cienega - Century

++ Peak : 11-12 p.m. (concentration at the hour of the observed peak)). Peak is only provided for the Long Beach/Imperial intersection since it is intersection associated with the regional peak at Lynwood.

FUTURE AIR QUALITY PROJECTIONS

Introduction

Air quality modeling is an integral part of the planning process to achieve clean air. Based on U.S. EPA's modeling guidelines, CAMx is used for the areawide analysis, and CAL3QHC, a roadway intersection model, is used to calculate carbon monoxide concentrations near intersections. The CAMx model results are used to evaluate the effectiveness of control measures in attaining the federal 8-hour air quality standard for carbon monoxide in the year 2002. U.S. EPA's modeling guidelines recommend that the results from CAL3QHC and CAMx be combined to give a total concentration that is used for attainment demonstration purposes. However, conclusions from a 1989 study, conducted by ARB and the District in the vicinity of the Lynwood area, indicate that the areawide and 'hot-spot' model results should not be combined. The study indicates that the CO measurements at the Lynwood monitoring station are representative of the entire Lynwood area. Based on the conclusions of the Lynwood study, the areawide analysis and the "hot-spot" analysis results for the attainment demonstration are not combined. A more detailed discussion of this subject can be found in the 1992 CO Plan.

Emissions

The 2002 modeling emission inventory consists of area, point and mobile sources. More than 90 percent of CO emissions are from mobile sources. Area source and point source CO emissions are only 9 percent of the total inventory. The carbon monoxide modeling analysis for the Basin uses a grid level emission inventory representing day-specific mobile source emissions.

The 1997 and 2002 carbon monoxide emissions used in the CAMx modeling analysis are shown in Table 4-12. The emissions estimates include the emission reductions from all air quality rules and regulations adopted prior to September 30, 2002, including the effect of the enhanced I/M program and the oxygenated fuel regulation. The emissions presented in this table reflect the revised VMT forecast from SCAG and the latest version of ARB's on-road emission factor program, EMFAC2002.

TABLE 4-12

Baseline and Projected Future Basin Carbon Monoxide Emissions (tons/day)

Case	On-Road Mobile	Others	Total
1997	5223	1202	6425
2002	3259	1116	4375

Modeling Results

CAMx Regional Simulation

Table 4-13 presents the projected carbon monoxide concentrations for the Basin and at the Lynwood station in the years 1997 and 2002. The predicted maximum 8-hour concentration of 14.9 ppm occurred in the Lynwood area at the same time (0400 PST) as the measured maximum 8-hour concentration of 17.0 ppm on November 1, 1997. The predicted maximum 8-hour concentration is within the model peak performance goal recommended by the U.S. EPA. The predicted regional 1-hour average concentration is 16.7 whereas the observed value was 19 ppm. The maximum predicted 8-hour carbon monoxide concentration at the Lynwood station is 13.0 ppm.

TABLE 4-13

Peak Carbon Monoxide Concentrations (ppm) Predicted by CAMx for the Basin

Scenario	Regional Maximum (8-hour Average)	Maximum Lynwood (8-hour Average)	Regional Maximum (1-hour Average)
1997 Base	14.9	13.0	16.7
2002 Base	9.9	8.7	10.8

In the 2002 modeling analysis the predicted regional maximum 8-hour average concentration is reduced by 34 percent from 1997 to 9.9 ppm. The 2002 predicted 8-hour average concentration at the Lynwood monitor is reduced by 33 percent to 8.7 ppm. The regional maximum 1-hour average concentration drops by 36 percent in 2002 to 10.8 ppm. The time of the peak 8-hour averages (both regional and at Lynwood) remained at 0400 PST.

The carbon monoxide air quality projections are based on CAMx and CAL3QHC simulations analyses for the fall meteorological episode. The October 31-November 1, 1997 episode recorded maximum 1-hour and 8-hour average carbon monoxide concentrations of 19.0 ppm and 17.0 ppm, respectively. These were the highest recorded values in the Basin since 1996. The 2002 predicted 8-hour average maximum concentration closely matches the maximum observed carbon monoxide concentration measured at Lynwood in 2002 (10.1 ppm on January 8th). However, the concentration exceeds the federal and state levels by a marginal amount.

Linear Rollback of CAMx Simulation Results

Figure 4-17 depicts the trend of EMFAC2002 projected carbon monoxide emissions for 1997 through 2005. On-road CO emissions from vehicles that are the primary contributors to urban carbon monoxide episodes are projected to decrease by an average of seven percent per year in 2003 through 2005. Total CO emissions reductions for all categories are projected to be reduced between 5 and 6 percent per year through 2005.

A linear rollback approach is used to evaluate CO concentrations beyond 2002. It assumes that the ambient concentrations above background levels are directly proportional to the emissions in the immediately adjacent areas. With CO being essentially inert, this assumption is reasonable. In mathematical terms, the rollback relationship can be written as follows:

$$C_p = [(C_b - k) \bullet Q_p/Q_b] + k$$

where C_p and C_b are the future year and baseline CO concentrations, respectively; Q_p and Q_b are the future year and baseline CO emission rates, respectively; and k denotes the global background CO concentration. It is assumed that global background CO concentrations are negligible; therefore the above equation simplifies to

$$C_p = C_b \bullet Q_p/Q_b$$

For the 2003 AQMP CO attainment demonstration, linear roll back is used to extend the CAMx simulated regional maximum 8-hour average concentration beyond 2002 to predict carbon monoxide concentrations for 2003, 2004 and 2005. Using linear rollback, the CAMx 2002 base year simulation and the projected reduction in CO emissions, the predicted carbon monoxide maximum 8-hour concentration is expected to be reduced to 9.1 ppm in 2003, 8.4 ppm in 2004 and 7.8 ppm in 2005. The continued reductions in carbon monoxide emissions are expected to maintain the attainment of the federal 8-hour standard demonstrated through observations in 2001 and 2002. The California 8-hour average carbon monoxide standard is projected to be met in 2004. The results are summarized in Table 4-14.

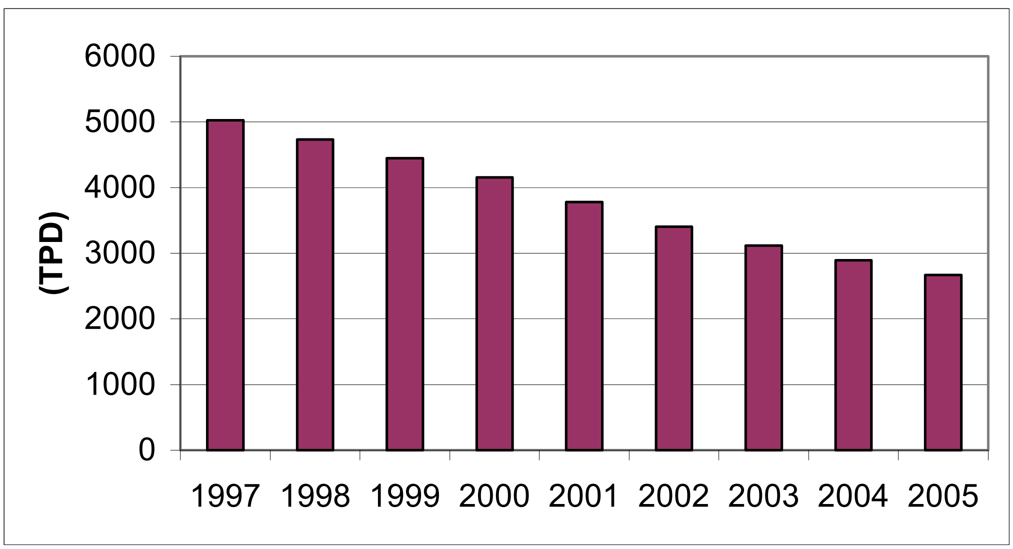

FIGURE 4-17

EMFAC2002 Projected On-Road Carbon Monoxide Emissions for 1997 Through 2005

TABLE 4-14

Carbon Monoxide Emissions and Model-Predicted Concentrations

Year/Scenario	CO-Planning Inventory (tons/day)	8-hr Maximum Concentration (ppm)	1-hr Maximum Concentration (ppm)
1997 Baseline	6460	14.9	16.7
2002 Baseline	4835	9.9	10.8
2003 Predicted	4527	9.1	9.9
2004 Predicted	4278	8.4	9.2
2005 Predicted	4029	7.8	8.5

CAL3QHC Modeling Results and Combined "Hot Spot" and Areawide Maximum Analysis

The maximum CAL3QHC 8-hour average concentrations projected at the four roadway intersections (regardless of time of day) and the CAL3QHC 8-hour average concentrations projected for the hour coincident with the occurrence of the CAMx simulated area-wide maximum impact are presented in Table 4-15. Also presented are the CAMx projected area-wide maximum concentrations for the grid cell hosting the intersection and the sum of the CAMx projected area-wide maximum and the CAL3QHC 8-hour average concentrations projected for that hour. Linear rollback is used to extend the CAL3QHC "hot spot" intersection and the CAMx area-wide grid cell simulations from 2002 through 2005. The CAL3QHC analysis was conducted using the actual meteorological conditions for the episode. It should be noted that the projected maximum concentrations from the CAMx and CAL3QHC do not occur at the same time of the day and cannot be directly added. (The "hot spot" predicted carbon monoxide 8-hour average maximum concentrations at the intersections occurred between 1200 and 1400 PST).

Projected maximum "hot-spot" concentrations in the year 2002 are between 2.3 and 3.8 ppm. CAMx projected area-wide carbon monoxide peak 8-hour average concentrations (for the grid cell hosting the intersection) in the year 2002 are between 1.6 and 9.2 ppm. The highest CAMx simulated 8-hour carbon monoxide concentration occurs at Lynwood, the highest "hot-spot" concentration does not occur at Lynwood, but at intersections in Hollywood and Westwood. The maximum eight hour average "hot-spot" concentration predicted for the intersection of Imperial and Long Beach Blvd. at the time of the observed maximum (0600 PST) values 0.8 ppm.

Adding the 2002 Lynwood 0600 PST 8-hour average "hot spot" intersection impact to the CAMx predicted 0600 PST 8-hour average for the grid cell hosting the Lynwood monitoring station results in a total impact of 10.0 ppm. This value is close to the 2002 observed maximum 8-hour average concentration (10.7 ppm) at Lynwood on January 8^{th} (meteorologically ranked 95^{th} percentile, or an expected frequency of occurrence on 15 days per year). The comparison provides a measure of confirmation in the modeling analyses and 2002 emissions estimates. Extending this analysis beyond 2002 using the projected 6.4 percent annual reduction in mobile source carbon monoxide emissions between 2002 and 2003 demonstrates that Lynwood, and with it the Basin, will attain the federal CO standard in 2003. Additional 5.6 percent annual reductions in mobile source carbon monoxide emissions in each of the two following years are expected to minimize the likelihood for the carbon monoxide standard to be exceeded in the future.

As discussed in the 1992 CO Plan, peak carbon monoxide concentrations are due to unique meteorological and topographical conditions, and not due to the impact of particular intersections. This is based on the results of a 1991 Lynwood Carbon Monoxide Study prepared for the ARB. This is also confirmed by the minimal CAL3QHC predicted intersection impact (less than 1.0 ppm for 2002) during the early morning hours. It is inappropriate to combine the maximum area-wide analysis and the maximum "hot-spot" analysis results for Lynwood in the attainment demonstration because the timing of the simulated peaks are not aligned. However, when the timed intersection and area-wide grid cell peaks are combined, a more realistic assessment arises. This analysis, as does the regional simulation, demonstrates that the federal carbon monoxide standard will be attained in 2003. Furthermore, both analyses indicate that the California carbon monoxide standard will be attained in 2004.

CONCLUSION

The Clean Air Act requires that an attainment demonstration be performed as part of a plan submittal. Ambient monitoring data for 2001 and 2002 have provided the basis for a future change of the Basin attainment status for the 8-hour NAAQS from severe non-attainment to attainment. This attainment demonstration has been conducted to serve as confirmation to the observed trend and to provide a foundation for the development of a future maintenance plan for the Basin. Per the U.S. EPA recommendation, a region-wide modeling analysis using a regional air quality simulation model-CAMx and a hot-spot modeling analysis using CAL3QHC were performed. These analyses confirm through model predictions of the expected 2002 maximum 8-hour average carbon monoxide concentrations that the Basin's projection to achieve the NAAQS by 2002 without additional control of CO is consistent with the observed trend. Furthermore, projected continued annual CO emission reductions will keep the Basin in attainment and further improve CO air quality to meet the California 8-hour average CO standard by 2004.

TABLE 4-15

Projected 8-hour Carbon Monoxide Concentrations (ppm)
at Various Intersections Located in the South Coast Air Basin

Year	Maximum Areawide	Maximum "Hot Spot"	Time of Maximum "Hot Spot"	Time of Maximum Areawide	"Hot Spot" at time of Maximum Areawide	Maximum Areawide and "Hot Spot" at time of Maximum Areawide
Long Beach Blvd. and Imperial Hwy. located in Lynwood						
1997	14.5	4.2	1300 PST	0600 PST	1.5	16.0
2002	9.2	2.3			0.8	10.0
2003	8.6	2.2			0.7	9.3
2004	8.1	2.0			0.7	8.8
2005	7.7	1.9			0.7	8.4
Wilshire Blvd. and Veteran Ave. located in Westwood						
1997	2.3	5.8	1400 PST	1100 PST	4.6	6.9
2002	1.6	3.4			2.9	4.5
2003	1.5	3.2			2.7	4.2
2004	1.4	3.0			2.6	4.0
2005	1.3	2.8			2.4	3.7
Sunset Blvd. and Highland Ave. located in Hollywood						
1997	3.3	6.6	1400 PST	0300 PST	3.5	6.8
2002	2.1	3.8			2.0	4.1
2003	2.0	3.6			1.9	3.9
2004	1.9	3.4			1.8	3.7
2005	1.8	3.2			1.7	3.5
La Cienega Blvd. And Century Blvd. Located in Inglewood						
1997	8.0	4.5	1200 PST	0800 PST	3.0	11.0
2002	4.5	2.6			1.7	6.2
2003	4.2	2.5			1.6	5.8
2004	4.0	2.3			1.5	5.5
2005	3.8	2.2			1.4	5.2

ATTACHMENT - 3

CARB Assessment 549:
South Coast Air Basin
CO Maintenance Plan Winter Emissions
for Calendar Years 2004, 2009, and 2015

Assessment 549: South Coast Air Basin CO Maintenance Plan Winter Emissions for Calendar Years 2004, 2009, and 2015

Ms. Sylvia Oey requested estimates of motor vehicle carbon monoxide emissions for the South Coast Air Basin, for calendar years 2004, 2009, and 2015, in support of the South Coast CO Maintenance Plan.

METHODOLOGY

To estimate emissions in 2015, staff ran EMFAC2002, v2.2 (Apr03), South Coast Air Basin by subarea, winter season, interpolating vehicle populations from calendar year 2010 and 2020 populations found in **Assessment 410, South Coast SIP Inventory** (April 2003). To estimate emissions in 2009, staff ran EMFAC with vehicle populations interpolated from those found for calendar year 2006 and 2010 in the same assessment. To estimate 2004 emissions, staff ran EMFAC with vehicle populations extrapolated (backcast) from the same calendar year 2006 and 2010 populations. The scenario used from Assessment 410 was not the SIP baseline including transportation control measures and 2001 RTP growth assumptions, however. Rather, the SCAG baseline results were used at the request of the South Coast Air Quality Management District. That scenario was described in Assessment 410 as follows:

> *SCAG has provided baseline case EMFAC input files, which contain travel model outputs based on 1998 socioeconomic data (2.5% higher population and employment growth in 2010) and a more limited set of transportation projects (new mixed flow projects included, high occupancy vehicle and transit projects excluded). The baseline cases were provided for calendar years 2006, 2010 and 2020.*

Staff entered interpolated and extrapolated populations for ten of the thirteen motor vehicle classes, by county, into EMFAC2002 to generate VMT and emissions estimates. EMFAC default population estimates were retained for motor homes, urban buses and school buses, as SCAG does not estimate activity for these vehicles.

RESULTS

The results are summarized in the table below, relative to the 2001 RTP Plan Case that was the basis of the 2003 SIP baseline (including TCMs and a lower growth forecast). Calculations are found in the file *SC 2009 Interpolated Veh Pop - 020305.xls*

Assessment 549: South Coast Air Basin CO Maintenance Plan Winter Emissions for Calendar Years 2004, 2009, and 2015

South Coast Air Basin
Winter Carbon Monoxide Emissions

	2004	***2006***	***2009***	***2010***	***2015***	***2020***
SCAG 2001 RTP Baseline Case						
VMT (thousands)	337,575	354,061	378,779	387,411	420,656	454,687
CO (tons per day)	**2888**	2566	**2114**	2018	**1428**	1078
SCAG 2001 RTP Plan Case						
VMT (thousands)	---	344,337	---	362,023	---	410,111
CO (tons per day)	---	2480	---	1858	---	941