2004 Revision to the California State Implementation Plan for Carbon Monoxide

Updated Maintenance Plan
For Ten Federal Planning Areas

Adopted by the California Air Resources Board
July 22, 2004

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California Environmental Protection Agency
AIR RESOURCES BOARD

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DOCUMENT AVAILABILITY

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PUBLIC WORKSHOP

Staff will hold a public workshop to discuss the proposed Plan:

July 13, 2004 from 2:00 p.m. – 3:00 p.m.
California Environmental Protection Agency, Room 720
1001 I Street, Sacramento, California

AIR RESOURCES BOARD HEARING

The Board will consider this item and others during its regular meeting:

Begins July 22, 2004 at 9:00 a.m. and may continue July 23, 2004 at 8:30 a.m.
California Environmental Protection Agency, Central Valley Auditorium, Second Floor
1001 I Street, Sacramento, California

Prior to the hearing, the public may submit written comments through regular mail, e-mail or fax. To be considered by the Board, written comments not physically submitted at the hearing must be **received no later than 12:00 noon, July 21, 2004**, and sent to:

Clerk of the Board
Air Resources Board
1001 I Street, 23rd Floor
Sacramento, California 95814

or by e-mail to: cosip@listserv.arb.ca.gov
or by facsimile transmission to the Clerk of the Board at (916) 322-3928

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ACKNOWLEDGEMENTS

We would like to thank the staff of the local air districts and transportation planning agencies in the ten carbon monoxide maintenance areas who provided data and information in the development of this Plan.

This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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EXECUTIVE SUMMARY

The dramatic reduction in carbon monoxide (CO) levels across California is one of the biggest success stories in air pollution control. Air Resources Board (ARB or Board) requirements for cleaner vehicles, equipment, and fuels have cut peak CO levels in half since 1980, despite growth. All areas of the State designated as nonattainment for the federal 8-hour CO standard[1] in 1991 now attain the standard, including the Los Angeles urbanized area. Even the Calexico area of Imperial County on the congested Mexican border had no violations of the federal CO standard in 2003. Only the South Coast and Calexico continue to violate the more protective State 8-hour CO standard, with declining levels beginning to approach that standard.

With the support of the affected local air pollution control and air quality management districts (districts), ARB adopted a State Implementation Plan (SIP) revision in 1996 documenting that ten areas had attained the federal 8-hour CO air quality standard between 1992-1995 and demonstrating how they would continue to maintain compliance with that standard.

Bakersfield Metropolitan Area	Modesto Urbanized Area
Chico Urbanized Area	Sacramento Urbanized Area
Fresno Urbanized Area	San Diego Area
Lake Tahoe North Shore Area	San Francisco-Oakland-San Jose Area
Lake Tahoe South Shore Area	Stockton Urbanized Area

In response, the U.S. Environmental Protection Agency (U.S. EPA) approved the 1996 SIP revision and formally redesignated these ten areas to attainment in 1998.

The Board formally amended the approved CO Maintenance Plan in 1998. As part of the phaseout of methyl tertiary butyl ether (MTBE), the Board rescinded its requirement for most California counties that oxygenates be added to gasoline in the wintertime, a control measure identified in the 1996 CO Maintenance Plan. ARB concluded that stricter vehicle emission standards would more than make up for the CO reductions foregone as a result of this action. ARB submitted two SIP revisions in 1998: a rule amendment to remove the wintertime oxygenates provision for the specified counties from the approved regulation in the SIP, and a revised CO Maintenance Plan demonstrating that the ten areas would continue to attain the CO standard with the then-current control program. U.S. EPA has not yet acted on these submittals. This proposed revision reflects our 1998 submittals.

By 2003, all ten maintenance areas were monitoring CO levels 30 to 90 percent below the federal 8-hour CO standard. These levels, together with declining emissions due to an ever-cleaner vehicle fleet, provide assurance that the ten areas will continue to attain the standard by a generous margin.

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[1] The federal CO standard is 9 parts per million (ppm) averaged over 8 hours. To determine attainment, the greater of the second high levels measured at a site in each of two consecutive years (known as the design value) is compared to the standard. With federal rounding conventions, a design value of up to 9.4 ppm equals attainment.

Monitoring Shows Ambient CO Levels Are Far Below Federal Standard

CO Maintenance Area	Attainment Level (ppm)	Monitored CO Value in 2003 (ppm)	Percent Below Attainment Level (as of 2003)
Bakersfield	9.4	2.5	77%
Chico	9.4	3.4	64%
Fresno	9.4	4.3	54%
Lake Tahoe North Shore[1]	9.4	0.9[1]	90%
Lake Tahoe South Shore	9.4	6.5	31%
Modesto	9.4	3.7	61%
Sacramento	9.4	4.2	55%
San Diego	9.4	4.1	56%
San Francisco – Oakland – San Jose	9.4	4.9	48%
Stockton	9.4	3.2	66%

[1] Data for 1993 - 1995 were collected at the Tahoe City site, which subsequently was closed in June 1995. Data for 2000 were collected at a site in Incline Village, which was closed in August 2001 because of very low values. Although Incline Village is in the State of Nevada, the design value is included here to give an indication of CO values at Lake Tahoe North Shore.

We propose to update the CO SIP for the ten federal maintenance areas to:

- Extend the 1996 CO Maintenance Plan demonstration to 2018, reflecting the existing CO control program[2] without wintertime oxygenates.
- Incorporate significant improvements to the emissions inventory for past, present, and future years -- especially new motor vehicle estimates using the current emissions model (EMFAC2002) and latest transportation planning assumptions.
- Revise the on-road vehicle emission budgets for transportation conformity based on the improved inventory.

This SIP revision would benefit air quality and public health by:

- Demonstrating that ARB regulations will continue to cut CO emissions, thereby reducing public exposure, especially in high traffic areas.
- Setting a new emission baseline that uses the most current data and reflects the benefits of additional controls on motor vehicles, off-road equipment, and fuels.
- Tightening the emission benchmark for on-road motor vehicles required to ensure that transportation plans and projects will not cause or contribute to new violations of the federal CO standard.

Recommendation

ARB staff recommends that the Board adopt this proposed 2004 Revision to the California State Implementation Plan for Carbon Monoxide – Updated Maintenance Plan for Ten Federal Planning Areas (2004 Update) for submittal to U.S. EPA and federal approval.

[2] Reflects State, local, and federal regulations adopted as of the end of 2002.

I. BACKGROUND

CO is a colorless and odorless gas that is directly emitted as a product of combustion. The highest concentrations are generally associated with cold stagnant weather conditions that occur during winter. In contrast to ozone, which tends to be a regional pollutant, CO problems tend to be localized.

High CO levels are a health concern because the pollutant is readily absorbed through the lungs into the blood, where it binds with hemoglobin and reduces the ability of the blood to carry oxygen. As a result, insufficient oxygen reaches the heart, brain, and other tissues. The harm caused by CO can be critical for people with heart disease, chronic lung disease, or anemia. Even healthy people exposed to high levels of CO can experience headaches, fatigue, slow reflexes, and dizziness.

Both ARB and U.S. EPA have established health-based air quality standards for CO, measured over one hour and eight hours. Prior to the 1990s, many urban areas in California routinely violated the State and federal 8-hour standards for CO. Ambient CO levels have dropped statewide in response to continued emission reductions. This proposed SIP revision focuses solely on the federal 8-hour CO standard.

In 1991, U.S. EPA designated eleven areas in California as nonattainment of the federal 8-hour CO standard. By 1995, CO levels in ten[3] of these areas met the air quality test for attainment (we refer to these collectively as the CO maintenance areas):

Bakersfield Metropolitan Area	Modesto Urbanized Area
Chico Urbanized Area	Sacramento Urbanized Area[4]
Fresno Urbanized Area	San Diego Area[5]
Lake Tahoe North Shore Area[6]	San Francisco-Oakland-San Jose Area[7]
Lake Tahoe South Shore Area[8]	Stockton Urbanized Area

The Clean Air Act (Act) (section 107(d)(3)(E)) defines the applicable requirements for an area to be formally redesignated to attainment:

(1) show that monitored air quality meets the federal standard;
(2) have a fully approved SIP under section 110(k) of the Act;
(3) show that the air quality improvement is permanent and enforceable;
(4) meet applicable requirements under section 110 and part D of the Act; and
(5) have a fully approved maintenance plan pursuant to section 175A of the Act.

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[3] The eleventh nonattainment area – the Los Angeles urbanized area – has now attained the federal 8-hour CO standard as well. The local district is preparing a separate maintenance plan and request for redesignation.
[4] Urbanized parts of Sacramento, Placer, and Yolo Counties.
[5] Western part of County only.
[6] Placer County part of Lake Tahoe Air Basin.
[7] Urbanized parts of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.
[8] El Dorado County part of Lake Tahoe Air Basin.

In 1996, ARB adopted and submitted a CO Maintenance Plan[9] for the ten areas listed above and requested that they be redesignated to attainment for the federal 8-hour CO standard. U.S. EPA found that the State satisfied all five criteria based on the 1996 CO Maintenance Plan and prior SIP submittals for other elements. U.S. EPA acted to approve the 1996 CO Maintenance Plan as part of the California SIP, and redesignated the ten areas effective June 1, 1998[10].

The 1996 CO Maintenance Plan showed how each area would continue to attain the standard through 2010. The Act requires the initial maintenance plan to cover at least a ten-year period, with a second SIP revision due within eight years of redesignation to demonstrate that the area will maintain the standard for another ten years (i.e., a full 20 years from the date of redesignation to attainment, or 2018 in this case).

Having already satisfied the five requirements for redesignation, this proposed 2004 revision to the CO SIP for the ten areas focuses on updating the fifth element by extending the maintenance plan through 2018. This Update complies with the Act's requirements in section 175A for maintenance plans, by including:

- Air quality data that demonstrate the ten areas continue to be in attainment.
- Emissions forecasts that demonstrate the ten areas will remain in attainment for the full 20-year period through 2018.
- Contingency emission reductions from adopted ARB measures that generate progressively more benefits over time, effectively decreasing CO emissions during the remainder of the maintenance period well below the levels that resulted in attainment.
- Continued air monitoring to verify the attainment status of the redesignated areas.

[9] The 1996 CO Maintenance Plan was adopted on April 26, 1996. A copy of the Plan is available on ARB's website at: http://www.arb.ca.gov/planning/sip/co/co.htm.
[10] Federal Register, Volume 63, Number 61, 15305-15312, March 31, 1998.

II. MAINTENANCE DEMONSTRATION

The 2004 Update relies on a combination of two approaches to demonstrate maintenance of the CO standard through 2018 -- monitored air quality trends showing a decline in wintertime CO levels between 1993 and 2003, and significant reductions in CO emissions projected from 1993 through 2018.

A. Air Quality Monitoring

1. Monitoring Data

Table 1 shows that CO design values for sites with operating monitors have declined 30 to 60 percent overall between the applicable attainment period (1992-1995) and 2003, and are well below the federal standard.

Table 1
Design Values for the Federal 8-hour CO Standard
(ppm)

CO Maintenance Area	Attainment Period		1995	2000	2003
Bakersfield	1992-1994	6.1	6.1	5.2	2.5
Chico	1993-1995	5.4	5.0	4.0	3.4
Fresno	1993-1995	9.1	8.5	7.6	4.3
Lake Tahoe North Shore [1]	1993-1994	3.8	3.2	0.9	N/A
Lake Tahoe South Shore [2]	1993-1994	7.4	6.8	4.3	6.5
Modesto	1993-1994	6.6	6.3	6.3	3.7
Sacramento Area	1993-1995	9.1	8.0	6.2	4.2
San Diego	1993-1994	7.0	7.4	4.9	4.1[3]
San Francisco – Oakland – San Jose	1993-1994	7.2	7.5	6.9	4.9
Stockton	1993-1994	7.5	7.5	6.3	3.2

[1] Data for 1993 - 1995 were collected at the Tahoe City site, which subsequently was closed in June 1995. Data for 2000 were collected at a site in Incline Village, which was closed in August 2001 because of very low values. Although Incline Village is in the State of Nevada, the design value is included here to give an indication of CO values at Lake Tahoe North Shore.

[2] Data for 1993 - 1995 were collected at the South Lake Tahoe – Stateline site. Data for 2000 - 2003 were collected at the Harvey's Casino site in Nevada. Harvey's is a "microscale" monitoring site, which means that it provides values that are only representative of a very small area; such sites are also prone to greater fluctuations in the monitored data.

[3] San Diego recorded unusually high CO values in late October 2003 during the extensive wildfires that impacted air quality throughout Southern California. The San Diego Air Pollution Control District, when reporting the monitoring data to U.S. EPA, informed U.S. EPA that it was flagging the CO values for October 28 as having been affected by an exceptional event. ARB staff excluded CO values recorded from 10/26/03-11/01/03 to calculate a representative 2003 design value for trends evaluation in this report.

The CO air quality data in Table 1 are contained in California's Aerometric Data Analysis System (ADAM) database and retrievable from U.S. EPA's Aerometric Information Retrieval System (AIRS). ARB staff reviewed the data for completeness, especially for the winter months of November, December, and January, when CO concentrations are highest. To determine 8-hour CO design values for each of the ten

maintenance areas, ARB observed U.S. EPA protocols[11] and identified the maximum and second maximum (non-overlapping) 8-hour CO values at each site for each of the most recent two years of data. The design value for each area is the site that has the highest second high value.

2. Monitoring Network

The network of monitoring stations that provide the data used to demonstrate attainment and maintenance consist of State and Local Air Monitoring Stations, together with the National Air Monitoring Stations. ARB and U.S. EPA review the adequacy of the network annually as part of the development of the State and Local Air Monitoring Network Plan, required by Title 40 Code of Federal Regulations (CFR), Part 58. Appendix A lists the monitoring stations in the ten CO maintenance areas, including each station's location, beginning and ending date of operation, and the agency responsible for monitoring at that station.

ARB and affected local air districts will continue to collect air quality data in the CO maintenance areas for use in demonstrating ongoing attainment. In addition, ARB will annually review data from the two most recent consecutive years to verify continued attainment of the federal standard.

B. Emissions Estimates

All of the CO emission estimates presented in this 2004 Update are in tons per day (tpd) during the winter season. We used current information on emissions and activity to produce the estimates, which may differ significantly from the 1996 CO Plan in historical years. Although the maintenance areas typically include only the urbanized portion of a county, we report the emissions for the entire county within the applicable air basin. The 1996 CO Plan approved by U.S. EPA relied on the same approach.

The dominant source of CO emissions in all areas is on-road motor vehicles. This 2004 Update uses the current version of California's motor vehicle emission model EMFAC2002, version 2.2, with the latest travel activity developed by local transportation planning agencies. Vehicle emission projections in the 1996 CO Maintenance Plan were based on the now outdated EMFAC7F model. EMFAC2002 includes more recent information on: the number and types of vehicles, additional adopted controls for vehicles and fuels, emission testing results from thousands of vehicles, evaporative emissions, and Californian's driving habits. U.S. EPA approved EMFAC2002 for use in SIPs and transportation conformity on April 1, 2003.

The emissions for stationary, area, and off-road mobile sources reflect the ARB-district inventory improvement efforts conducted to support recent air quality field studies and develop plans for ozone and particulate matter. We projected the CO emissions for these categories using the Central California Ozone Study (CCOS) inventory,

[11] For further information on how design values are derived, please refer to U.S. EPA's website at: http://www.epa.gov/oar/oaqps/greenbk/laxton.html

version 2.10. ARB made significant changes to the activity data for lawn/garden/utility equipment in 2003 as part of a regulatory development effort. Improved information showed more pieces of this equipment throughout California. Because these gasoline engines emit CO, we adjusted the CCOS 2.10 inventory outputs for this category to reflect the activity changes. Other recent California SIP revisions submitted in 2003-2004 include the same activity assumptions for this equipment.

1. Statewide Trends

Although this Plan focuses on the ten maintenance areas, it is useful to look at statewide CO emission trends by major source category to provide a context for what is happening across California. Table 2 shows the statewide winter CO emissions for informational purposes. The steep decline in total CO emissions (63 percent between 1993 and 2018) is driven by the 84 percent reduction in on-road motor vehicle emissions. Stationary and areawide source emissions are projected to increase slightly during the same period, due to the expected growth in residential fuel combustion associated with population increases.

Table 2
Statewide CO Emission Trends
((Winter Seasonal Emissions in Tons per Day)

Source Category	**1993**	**2003**	**2010**	**2018**
Stationary Sources	480	450	490	500
Area-Wide Sources	2,620	2,780	2,800	2,840
On-Road Mobile Sources	17,230	8,310	5,050	2,850
Off-Road Mobile Sources	3,300	2,680	2,450	2,610
Total	**23,630**	**14,220**	**10,790**	**8,800**

2. Emissions in Ten CO Maintenance Areas

Table 3 shows our current estimate of total winter CO emissions in each maintenance area for: 1993 (the common attainment year), 2003 (current data), 2010 (the out year of the 1996 CO Maintenance Plan for comparison) and 2018 (the horizon or out year of this 2004 Update). The data show that estimated 2003 emissions are 20-42 percent below 1993 attainment year levels; by 2018, emissions are projected to be 30-69 percent below attainment year levels.

Table 3
Total CO Emissions in Each Maintenance Area
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	Area Included in Inventory	1993	2003	2010	2018
Bakersfield	Western Kern County	478	298	234	191
Chico	Butte County	232	164	134	113
Fresno	Fresno County	627	400	302	244
Lake Tahoe North Shore	Eastern Placer County	25	19	16	14
Lake Tahoe South Shore	Eastern El Dorado County	61	49	45	43
Modesto	Stanislaus County	331	206	151	120
Sacramento	Sacramento County, Yolo County, Western Placer County	1125	658	487	388
San Diego	San Diego County	1889	1101	829	643
San Francisco-Oakland-San Jose	San Francisco Bay Area Air Basin	4254	2645	1716	1322
Stockton	San Joaquin County	433	258	188	153

Compared to the projections in the 1996 CO Maintenance Plan, these 1993 year emissions are generally higher due to improved estimates for motor vehicles and gasoline equipment, but lower by 2010 in response to additional controls adopted since the 1996 Plan was developed. This steeper decline in emissions over time adds to the strength of the maintenance demonstration in the 2004 Update.

Using today's inventory, CO emissions in 2003, 2010, and 2018 are significantly lower than the 1993 levels that resulted in attainment. This occurs despite growth in population and vehicle miles traveled due to the benefits of increasingly tighter emission standards for new engines, fuel requirements, and turnover of the vehicle fleet to lower-emitting models.

Appendix B shows the CO winter inventory for each of the ten maintenance areas over multiple years, summarized by source category. Documentation of the on-road motor vehicle inventory and the adjustment to lawn and garden equipment activity are available on ARB's website at: http://www.arb.ca.gov/planning/sip/co/co.htm. More extensive levels of emission detail for CCOS 2.10 and links to inventory methods are available on ARB's website at: http://www.arb.ca.gov/app/emsinv/ccos/index.php.

C. Change to Wintertime Oxygenates Provision

The approved 1996 CO Maintenance Plan lists wintertime oxygenated gasoline as a recent control measure that contributed to attainment of the CO standard. Oxygenates reduce CO emissions by promoting more complete fuel combustion. Beginning in 1992, ARB required oxygenates in gasoline during the specified "winter" months, generally October through February. MTBE was the refiners' oxygenate of choice at this time.

In response to subsequent concerns about the impacts of MTBE on drinking water (via migration from leaking fuel storage tanks into groundwater and direct exhaust from

watercraft engines to surface water), ARB took action in August 1998 to rescind the wintertime oxygenates provision in the State's reformulated gasoline regulation in all areas other than Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial Counties.

1. Impact of Removing Wintertime Oxygenates

The Board concluded that the wintertime oxygenates requirement was not needed to ensure continued CO attainment in the ten maintenance areas. Staff analyses showed that the increase in CO emissions without wintertime oxygenates would be more than offset by the benefits of additional vehicle controls adopted since the 1996 CO Maintenance Plan. Thus, CO emissions were projected to decrease far below 1995 levels, declining annually from turnover of the vehicle fleet to cleaner models.

2. Corresponding SIP Revisions

ARB submitted amendments to its Phase 2 reformulated gasoline regulations (including deletion of the wintertime oxygenates requirement in much of the State) to U.S. EPA in September 1998 as a revision to the original fuels regulations that had previously been approved into the SIP.

The Board then amended the 1996 CO Maintenance Plan in November 1998 (1998 CO Plan) and submitted it to U.S. EPA for approval as a SIP revision in December 1998. Appendix C includes Board Resolution 98-52 (November 19, 1998) adopting the 1998 CO Plan. The Board found that even without wintertime oxygen in gasoline, updated emissions in the ten maintenance areas remain below the attainment levels. The Board further found that the contingency measures in CO SIP that are being or will be implemented, coupled with fleet turnover, provide an ample margin of safety to maintain the CO standard. The Board also directed that ARB staff review CO monitoring data in the areas no longer subject to the wintertime oxygen requirement and "if [CO] violations are monitored in any of the areas, staff will propose that appropriate action be taken regarding reinstatement of the minimum wintertime oxygen content in gasoline as previously contained in section 2262.5, title 13, CCR, in the area at the beginning of the following winter season."

U.S. EPA has not acted on the regulatory SIP revision or the 1998 CO Plan.

3. Conclusions Confirmed by New Data

Between 1998 and 2000, wintertime oxygenates were phased out of California gasoline, except in the Los Angeles urbanized area and Calexico. Table 1 showed that for the ten areas, CO values actually measured in ambient air during winter 2000 (without wintertime oxygenates) were lower than the CO values recorded in the 1992-1995 attainment period.

For all areas except Lake Tahoe, Table 4 shows that current estimates (without wintertime oxygenates) of the percent emission reduction to be achieved between 1993 and 2010 are 12-31 percent greater than those projected in the 1996 CO Maintenance Plan over the same period. The percent change in emissions for the two Lake Tahoe areas is essentially the same as in the 1996 Plan. We attribute the lack of comparable reductions in Lake Tahoe to significantly higher growth in the number of vehicles and the miles traveled during this time period, which consumes the benefits of the additional controls reflected in this 2004 Plan.

Table 4
Comparison of Change in Projected CO Emissions from 1993 to 2010
(Winter Seasonal Emissions)

CO Maintenance Area	Percent Reduction from 1993-2010	
	1996 Plan	2004 Plan
Bakersfield	20	51
Chico	19	42
Fresno	26	52
Lake Tahoe - North Shore	36	36
Lake Tahoe - South Shore	28	26
Modesto	25	54
Sacramento	38	57
San Diego	44	56
San Francisco-Oakland-San Jose	43	60
Stockton	29	57

D. Fresno Area Rollback Analysis

By virtue of its CO design value and original classification, the Fresno Area was the only one of the ten areas subject to U.S. EPA's policy that maintenance demonstrations use the same modeling approach as the CO attainment demonstration. The attainment demonstration in Fresno's 1992 *Carbon Monoxide Nonattainment Plan* relied on a rollback analysis that presumed CO air quality levels change in direct proportion to emissions. The 1996 CO Maintenance Plan also included a rollback analysis for the Fresno area that projected continued maintenance.

We updated the rollback analysis with new CO emissions and air quality data, consistent with the one included in the approved Fresno attainment demonstration. The results in Table 5 project that design values in 2003, 2010, and 2018 will be far below the federal 8-hour CO standard. For the horizon year of the maintenance period in 2018, the rollback analysis shows a design value 62 percent below the level associated with the 1993-1995 attainment period. The analysis demonstrates that the Fresno area will be able to maintain the CO standard by a considerable margin, despite the 84 percent projected increase in vehicle miles traveled between 1993 and 2018.

Table 5
CO Rollback Analysis for Fresno Area
(Winter Seasonal Emissions)

Fresno Urbanized Area	1993	2003	2010	2018
All Sources of CO in the Emission Inventory (Tons per Day)	627	400	302	244
Projected Design Value for All Sources in the Inventory (in ppm)[1]	9.1[2]	5.8	4.4	3.5
On-Road Motor Vehicle Portion of the CO Emission Inventory (Tons per Day)	450	236	141	77
Projected Design Value for On-Road Motor Vehicle Portion of the Inventory (in ppm)[3]	9.1	4.8	2.9	1.6
Vehicle Miles Traveled (in thousands)	15,987	20,624	24,895	29,487

[1]The design value for the forecast year is derived by multiplying the 1993-1995 attainment design value by the forecast year emission inventory, and dividing the total by the 1993 emission inventory.
[2]1993-1995 attainment design value.
[3]The design value for the on-road motor vehicle portion in the forecast year is derived by multiplying the 1993-1995 design values for the on-road motor vehicle portion of the inventory by the motor vehicle portion of the emission inventory for the forecast year, and dividing the total by the 1993 emission inventory for on-road motor vehicles.

E. Contingency Measures

One of the federal Clean Air Act requirements for maintenance plans is to identify contingency measures to offset any unexpected increases in emissions and ensure maintenance of the standard. The traditional view is to hold contingency measures in reserve and implement them only if an area violates the standard.

However, California's ongoing motor vehicle program creates a unique situation that allows ARB to offer, as contingency, a number of adopted measures that are already being implemented and reducing emissions far below attainment levels. These regulations continued to cut CO emissions despite increases in growth in passenger vehicles and vehicle miles traveled. The margin by which these regulations bring CO levels even further below the standard serves to satisfy the contingency requirement and provide additional public health benefit now by lowering CO exposure. Table 6 shows the State's contingency measures in the 1996 CO Maintenance Plan. U.S. EPA approved California's approach as part of the 1996 Plan, finding that these measures would provide sufficient reductions in future years to guarantee an ample margin of safety to ensure maintenance.

Table 6
Adopted Contingency Measures
in the 1996 CO Maintenance Plan

Implementation Date	Contingency Measure
1996	Improved Basic Inspection and Maintenance (I/M) Program (Bay Area[1], Chico, North and South Shore Lake Tahoe)
1996	Enhanced I/M Program (Bakersfield, Fresno, Modesto, Sacramento Area, San Diego, Stockton)
1996	On-Board Diagnostics II (statewide measure)
1996	California Cleaner-Burning Gasoline (statewide measure)
1997	Off-Highway Recreational Vehicles (statewide measure)
1999	Lawn and Garden Equipment - Tier II (statewide measure)
1996-2003+	Low-Emission Vehicles and Clean Fuels I – Post 1995 Standards (statewide measure)

[1]Measure included prior to change in State law that applied Enhanced I/M in the Bay Area.

Since 1996, ARB has adopted additional measures that have multi-pollutant benefits and that will contribute to ongoing reductions in CO emissions. These measures include tighter emission standards for cars, trucks, buses, off-road equipment (like forklifts, lawn and garden equipment, and marine pleasurecraft). The future year reductions from the new measures substantially increase the margin of compliance to ensure maintenance of the standard and address contingency requirements. We propose to go a step further by setting the on-road motor vehicle emission budgets at levels well below the 1993 attainment inventory.

Table 7 shows that the combination of the proposed motor vehicle emission budgets and projected emissions from off-road mobile, stationary, and areawide sources in this 2004 Update will provide reductions of 10-40 percent beyond the levels needed for attainment. These are the contingency emission reductions for the 2004 Update.

Table 7
Contingency Emission Reductions

CO Maintenance Area	Percent Emission Reduction in 2018 Beyond Attainment Levels[1]
Bakersfield	36%
Chico	27%
Fresno	35%
Lake Tahoe North Shore	16%
Lake Tahoe South Shore	10%
Modesto	37%
Sacramento	37%
San Diego	40%
San Francisco-Oakland-San Jose	39%
Stockton	38%

[1]Degree to which maximum emissions under this Plan are below the 1993 levels that brought attainment.

III. TRANSPORTATION CONFORMITY REQUIREMENTS

The federal transportation conformity regulation[12] 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 transportation plans, programs, and projects conform to these "emission budgets."

A. Budget Approach

Motor vehicle emission budgets have typically been derived from the projected inventory in each area. For recent 1-hour ozone maintenance plans in California, the transportation budgets were derived from projected vehicle emissions in (or close to) the horizon year of those plans, which represented ten years from the anticipated redesignation to attainment. It was important to preserve all the expected emission reductions for ozone precursors, beyond the attainment levels for the 1-hour standard, because of the need to ensure progress towards the more health-protective federal 8-hour and State ozone standards.

This 2004 Update is a rather novel situation for these ten areas of California – it's the second decade of maintenance; future vehicle emissions are way, way below the levels that resulted in attainment of the federal 8-hour CO standard; and there are no more health-protective CO goals to be achieved. Table 8 shows the steep decline in projected motor vehicle emissions for each area, for informational purposes only.

Table 8
On-Road Motor Vehicle CO Emission Inventory
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	Area Included in Inventory	1993	2003	2010	2018
Bakersfield	Western Kern County	347	177	112	66
Chico	Butte County	138	75	46	23
Fresno	Fresno County	450	236	141	77
Lake Tahoe North Shore	Eastern Placer County	18	10	7	4
Lake Tahoe South Shore	Eastern El Dorado County	32	18	13	7
Modesto	Stanislaus County	246	126	74	42
Sacramento	Sacramento County, Yolo County, Western Placer County	857	410	244	96
San Diego	San Diego County	1,472	728	457	249
San Francisco-Oakland-San Jose[1]	San Francisco Bay Area Air Basin	3,314	1,840	979	563
Stockton	San Joaquin County	326	162	97	55

[1] Reflects Basic I/M program in place through mid-2003. The Enhanced I/M program that was implemented in late 2003 will provide further reductions.

[12] U.S. EPA maintains online information on its transportation conformity program, including access to relevant rulemakings, policy guidance, and reports at: http://www.epa.gov/otaq/transp/traqconf.htm.

There is a spectrum of acceptable approaches that could be taken to establish transportation budgets for these ten CO maintenance areas. At one end, the budget could be based on the 1993 emission levels that resulted in attainment – the 1996 CO Maintenance Plan used this approach. On the other end, the budget could be based on 2018 emissions – but these numbers are less than one-fifth of the attainment levels. Some of the available extra vehicle reductions are needed to compensate for small emission increases in other source categories by 2018.

B. Proposed Transportation Emission Budgets

Deciding what level to propose for the CO maintenance budgets was a joint policy call. ARB staff developed the proposal through the transportation conformity interagency consultation process with local, State, and federal air and transportation agencies representing the ten CO maintenance areas.

Table 9 shows the proposed budgets, which are derived from 2003 CO emissions, as determined by ARB's EMFAC2002 model, with minor adjustments. The travel activity data used with EMFAC2002 emission rates were updated by the local transportation agencies, and reflect the latest planning assumptions in force at the time the budgets were developed. We then rounded the projected emissions up to the next highest ten tons, except for the Tahoe areas (rounded up to the next highest one ton).

Table 9
Proposed On-Road Motor Vehicle CO Emission Budgets
Applicable to All Future Years
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	Area Included in Budget	Emission Budget	
		2003	2018
Bakersfield	Western Kern County	180	180
Chico	Butte County	80	80
Fresno	Fresno County	240	240
Lake Tahoe North Shore	Eastern Placer County	11	11
Lake Tahoe South Shore	Eastern El Dorado County	19	19
Modesto	Stanislaus County	130	130
Sacramento	Sacramento County, Yolo County, Western Placer County	420	420
San Diego	San Diego County	730	730
San Francisco-Oakland-San Jose	San Francisco Bay Area Air Basin	1850	1850
Stockton	San Joaquin County	170	170

These emission budgets will apply to all subsequent analysis years as required by the federal conformity regulation, including: any interim year conformity analyses, the 2018 horizon year, and years beyond 2018. These budgets will become effective upon a finding of budget adequacy by U.S. EPA, typically 90 days after submittal of a SIP revision.

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 8 and 9. We display the calculations here to compare the proposed budgets against the two ends of the spectrum discussed earlier as the possible basis for those budgets -- the 1993 vehicle inventory that resulted in attainment and the projected 2018 vehicle inventory. Column C shows the extent to which the proposed budgets are lower than attainment emissions; column F shows the extent to which the proposed budgets are higher than projected emissions in the last year of the maintenance period. The proposed budgets are close to the mid-point between these ends of the range, with a slight bias towards preserving more emission reductions beyond the levels needed for attainment.

Table 10
Comparison of Proposed Motor Vehicle Budgets to Projected Vehicle Inventories
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	(A) Projected 1993 Vehicle Inventory	(B) Proposed 2018 Emission Budget	(C) Difference (A) – (B)	(D) Proposed 2018 Emission Budget	(E) Projected 2018 Vehicle Inventory	(F) Difference (D) – (E)
Bakersfield	347	180	167	180	66	114
Chico	138	80	58	80	23	57
Fresno	450	240	210	240	77	163
Lake Tahoe North Shore	18	11	7	11	4	7
Lake Tahoe South Shore	32	19	13	19	7	12
Modesto	246	130	116	130	42	88
Sacramento	857	420	437	420	96	324
San Diego	1,472	730	742	730	249	481
San Francisco-Oakland-San Jose	3,314	1,850	1,464	1,850	563	1,287
Stockton	326	170	156	170	55	115

C. Further Illustration that Budgets are Adequate for Maintenance

The proposed budgets represent a health-protective middle ground, providing a comfortable increment of extra reductions to ensure maintenance and offsetting the small emission increases expected from growth in areawide and stationary sources. To further illustrate that basing the proposed budgets on 2003 vehicle emissions ensures maintenance, we provide two analyses using monitored air quality data and a maximum emissions scenario.

1. Air Quality Basis

Table 11 shows that by 2003, all areas were already monitoring CO levels 31 to 90 percent below the federal 8-hour CO standard -- a significant margin of safety for continued maintenance with vehicle emissions at 2003 levels. This comparison also provides evidence that removal of wintertime oxygenates from gasoline did not interfere with the ability of these areas to maintain the standard. In fact, the comparison shows that the additional controls phased in by 2003 will continue to ensure attainment by a generous margin.

Table 11
Monitored CO Levels in 2003 versus Level Needed to Attain Standard

CO Maintenance Area	Level to Attain Standard (ppm)	Design Value in 2003 (ppm)	Percent Below Attainment (as of 2003)
Bakersfield	9.4	2.5	77%
Chico	9.4	3.4	64%
Fresno	9.4	4.3	54%
Lake Tahoe North Shore	9.4	0.9[1]	90%
Lake Tahoe South Shore	9.4	6.5	31%
Modesto	9.4	3.7	61%
Sacramento	9.4	4.2	55%
San Diego	9.4	4.1	56%
San Francisco – Oakland – San Jose	9.4	4.9	48%
Stockton	9.4	3.2	66%

[1]Data for 1993 - 1995 were collected at the Tahoe City site, which subsequently was closed in June 1995. Data for 2000 were collected at a site in Incline Village, which was closed in August 2001 because of very low values. Although Incline Village is in the State of Nevada, the design value is included here to give an indication of CO values at Lake Tahoe North Shore.

2. Emissions Basis

Another way to look at the combined effect of the budgets and emissions from other sources is to compare the resulting maximum emissions that could be allowed with this Plan Update to the 1993 emission levels that resulted in attainment. Table 12 shows the 1993 attainment emissions, the maximum potential 2018 emissions (based on the emission budgets for on-road vehicles, plus projected 2018 levels for off-road mobile, stationary, and areawide sources), and the resulting percent emission reduction below attainment levels.

Table 12
Percent Reduction in CO Emissions Using Maximum Levels in 2018
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	1993 Inventory	Maximum Potential 2018 Emissions[1]	Percent Reduction
Bakersfield	478	305	36%
Chico	232	170	27%
Fresno	627	407	35%
Lake Tahoe North Shore	25	21	16%
Lake Tahoe South Shore	61	55	10%
Modesto	331	208	37%
Sacramento	1125	712	37%
San Diego	1889	1124	40%
San Francisco-Oakland-San Jose	4254	2609	39%
Stockton	433	268	38%

[1] Motor vehicle emission budgets + 2018 stationary, areawide, and off-road inventories.

IV. POTENTIAL IMPACTS

A. Environmental Impacts

The 2004 CO Plan Update relies on adopted regulations for continued emission reductions. When first adopted, each regulation was evaluated for potential environmental impacts as part of an extensive public process. The Board approved the California Environmental Quality Act analysis as part of each rulemaking. Because there are no new controls proposed in the 2004 CO Plan Update, there is no possibility that the 2004 CO Plan Update will have a significant adverse effect on the environment.

B. Environmental Justice

The 2004 CO Plan Update demonstrates that CO emissions, already well below attainment levels, will continue to drop even further into the foreseeable future. CO levels are highly correlated to populated areas with high traffic -- freeways and heavily traveled roads in close proximity to residential areas, schools, and other sensitive sites. As CO emissions decrease, so too will public exposure in nearby communities. However, local governments and transportation agencies should consider and address the potential for high localized CO levels from new transportation systems and projects that may be sited in close proximity to populated areas.

C. Economic Impacts

The 2004 CO Plan Update relies on adopted regulations for continued emission reductions. When first adopted, each regulation was evaluated for its potential economic impacts. The Board approved the economic analysis as part of each rulemaking. Because there are no new controls proposed in the 2004 CO Plan Update, there will be no potential economic impacts as a result of the 2004 CO Plan Update.

APPENDIX A

Carbon Monoxide Air Monitoring Network

AREA	STATION NAME AND LOCATION	BEG DATE	END DATE	AGENCY
Bakersfield	225 Chester Ave., Bakersfield	01-Jan-72	30-Apr-94	ARB
	3311 Manor St., Oildale	01-Jan-80	31-Jul-94	ARB
	5558 California Ave., Bakersfield	01-Mar-94		ARB
	1128 Golden State Hwy, Bakersfield	01-Jun-94		San Joaquin
Chico	468 Manzanita Ave., Chico	01-Jan-79		ARB
	101 Salem St., Chico	01-Jan-81	19-Feb-98	ARB
Fresno	3250 E. Olive St., Fresno	01-Jan-76	01-Jan-90	ARB
	9240 S. Riverbend, Parlier	01-Jan-84	05-Jan-94	San Joaquin
	4706 E. Drummond St., Fresno	01-Jan-85		San Joaquin
	Sierra Skypark #2, Fresno	01-Jan-87		San Joaquin
	3425 N. First St., Fresno	01-Jan-90		ARB
	908 N. Villa Ave., Clovis	01-Sep-90		San Joaquin
	1145 Fisher St., Fresno	27-Oct-93	31-May-00	ARB
Lake Tahoe South Shore	Stateline-4045 HWY 50, South Lake Tahoe	01-Jan-80	31-Oct-98	ARB
	Stateline – Harvey's Hotel	01-Oct-99		Nevada
	3337 Sandy Way, South Lake Tahoe	01-Dec-92		ARB
Lake Tahoe North Shore	165 River Road, Tahoe City	01-Nov-92	30-Jun-95	ARB
	846 Tahoe Blvd, Incline Village	01-May-99	31-Aug-01	Washoe County, NV
Modesto	814 14th St., Modesto	01-Jan-81		ARB
	900 S. Minaret St., Turlock	01-Apr-92		San Joaquin
Sacramento	7823 Blackfoot Way, North Highlands	01-Jan-80		Sacramento
	7400 Sunrise Blvd., Citrus Heights	01-Feb-80	18-Mar-93	ARB
	3535 El Camino & Watt, Sacramento	15-Dec-80		Sacramento
	Del Paso Manor-2701 Avalon Dr., Sacramento	01-Jan-81		Sacramento
	1309 T. St., Sacramento	01-Dec-88		ARB
	7926 Earhart Dr., Sacramento	01-Mar-89	31-Oct-97	Sacramento
	5000 Rocklin Road, Rocklin	01-Dec-91	12-May-96	ARB
	40 Sutter St., Woodland	01-Jan-92	31-Dec-93	Yolo-Solano
	23 Russel Blvd., Davis	01-Jan-94	28-Feb-95	Yolo-Solano
San Diego	80 E. J St., Chula Vista	01-Aug-74		San Diego
	80 E. Valley Pkwy., Escondido	01-Jan-79		San Diego
	5555 Overland Ave., San Diego	01-Jan-79	4-Jan-99	San Diego
	1133 Union St., San Diego	01-Jan-81		San Diego
	1155 Redwood Ave., El Cajon	01-Jan-82	7-Jan-99	San Diego
	1701 Mission Ave., Oceanside	01-Jan-84	10-Mar-99	San Diego
	330A 12th Ave., San Diego	01-Jun-89		San Diego
	1100 Paseo International, San Diego	01-Feb-90		San Diego

AREA	STATION NAME AND LOCATION	BEG DATE	END DATE	AGENCY
San Francisco Bay Area	897 Barron Ave., Redwood City	01-Jan-67		Bay Area
	534 4th St., San Rafael	01-Jan-67		Bay Area
	939 Ellis St., San Francisco	01-Jan-69		Bay Area
	40733 Chapel Way, Fremont	01-Aug-70		Bay Area
	1144 13th St., Richmond	01-Jan-73	6-May-99	Bay Area
	304 Tuolumne St., Vallejo	01-Jan-76		Bay Area
	822 Alice St., Oakland	01-Jan-80		Bay Area
	2975 Treat Blvd., Concord	21-Feb-80		Bay Area
	2614 Old 1st. St., Livermore	01-Jan-81	30-Nov-99	Bay Area
	10 Arkansas St., San Francisco	01-Jan-86		Bay Area
	120B N 4th St., San Jose	01-Aug-72		Bay Area
	1866 W. San Carlos St., San Jose	01-Jul-89	20-Apr-95	Bay Area
	583 W. 10th St., Pittsburg	01-Jan-68		Bay Area
	2552 Jefferson Ave., Napa	01-Jan-73		Bay Area
	837 5th St., Santa Rosa	01-Jan-81		Bay Area
Stockton	Hazelton-HD., Stockton	01-Jan-63		ARB
Stockton	4310 Claremont, Stockton	01-Jan-82	31-Dec-00	ARB

For various reasons, six monitoring stations (in five areas) that were operating in 1992 and 1993 were replaced, relocated, or removed from service:

- The original Bakersfield monitoring site on Chester Street was closed in April 1994 and moved to the present location on California Avenue.
- The Chico site on Salem Street was closed in 1998 because it was found to be redundant with the Manzanita Avenue site.
- The Fresno monitoring site on Fisher Street was closed in 2000 after parallel monitoring demonstrated that the First Street site was representative of the Fisher site.
- The Tahoe City site on the Lake Tahoe North Shore operated from 1993 through 1995 and was then closed due to low concentrations (maximum 8-hour concentration was 4.7 ppm).
- ARB lost the lease to the Lake Tahoe South Shore site at Stateline in 1998. It was replaced with a site at Harvey's Casino. Although Harvey's is located in Nevada, U.S. EPA staff has indicated it is willing to consider the Harvey's site as representative for CO data for all of the Lake Tahoe Air Basin, both North and South shores.
- The Claremont site in Stockton was closed in 2000. The Hazelton Street site replaces Claremont as the primary CO monitor in Stockton.

Both U.S. EPA and ARB have approved all remaining sites for monitoring CO levels in the ten planning areas.

APPENDIX B

Winter Seasonal CO Emissions Inventory For Ten Areas

(In Tons Per Day)

(By Major Source Category)

Note: Appendix displays only source categories with reported emissions in each area. If reported emissions are less than 0.05 tons per day, the table shows 0.0.

Bakersfield

Winter Season CO Emissions in Tons Per Day

(Kern County)

Major Source Category	1993	2003	2010	`2018
ELECTRIC UTILITIES	0.4	0.2	0.2	0.2
COGENERATION	5.6	7.7	8.9	9.7
OIL AND GAS PRODUCTION (COMBUSTION)	17.8	10.4	11.0	11.4
PETROLEUM REFINING (COMBUSTION)	0.3	0.4	0.4	0.4
MANUFACTURING AND INDUSTRIAL	1.1	1.6	1.9	2.1
FOOD AND AGRICULTURAL PROCESSING	2.4	2.3	2.2	2.2
SERVICE AND COMMERCIAL	1.2	2.7	2.9	3.0
OTHER (FUEL COMBUSTION)	0.8	0.4	0.2	0.2
INCINERATORS	0.0	0.0	0.0	0.0
OIL AND GAS PRODUCTION	0.1	0.1	0.1	0.1
PETROLEUM REFINING	0.0	0.2	0.2	0.2
CHEMICAL	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.1	0.0	0.0	0.1
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	25.0	25.7	26.6	27.9
FIRES	0.1	0.1	0.1	0.2
WASTE BURNING AND DISPOSAL	11.2	10.8	10.5	10.3
LIGHT DUTY PASSENGER (LDA)	109.1	54.5	31.5	17.2
LIGHT DUTY TRUCKS - 1 (LDT1)	86.9	44.6	25.7	14.0
LIGHT DUTY TRUCKS - 2 (LDT2)	55.0	29.5	20.0	11.7
MEDIUM DUTY TRUCKS (MDV)	16.7	12.5	8.7	5.6
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	22.8	4.1	2.1	1.5
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	3.2	1.4	0.9	0.5
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	17.2	7.3	4.4	2.4
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	12.4	5.5	3.4	1.8
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.1	0.1	0.2	0.2
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.2	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.8	0.9	1.0	1.0
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	5.8	3.9	3.3	2.8
MOTORCYCLES (MCY)	6.5	4.6	4.6	3.9
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.1	0.2	0.2	0.2
HEAVY DUTY GAS URBAN BUSES (UB)	2.5	2.5	2.5	1.4
SCHOOL BUSES (SB)	1.5	0.8	0.8	0.6
MOTOR HOMES (MH)	6.4	4.7	2.7	0.7
AIRCRAFT	19.5	23.2	25.9	27.6
TRAINS	1.5	1.8	2.0	2.2
RECREATIONAL BOATS	2.2	2.4	2.3	3.4
OFF-ROAD RECREATIONAL VEHICLES	4.7	4.6	5.1	5.7
OFF-ROAD EQUIPMENT	32.3	22.3	17.8	16.1
FARM EQUIPMENT	4.5	3.5	3.1	3.0
TOTAL	**477.9**	**297.9**	**233.5**	**191.4**

Chico

Winter Season CO Emissions in Tons Per Day

(Butte County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	1.1	0.6	0.6	0.6
MANUFACTURING AND INDUSTRIAL	0.4	0.4	0.4	0.4
FOOD AND AGRICULTURAL PROCESSING	0.0	0.0	0.0	0.0
SERVICE AND COMMERCIAL	0.1	0.1	0.1	0.1
OTHER (FUEL COMBUSTION)	0.4	0.2	0.2	0.1
PETROLEUM MARKETING	0.0	0.0	0.0	0.0
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.0	0.0	0.0
WOOD AND PAPER	0.0	0.1	0.2	0.2
RESIDENTIAL FUEL COMBUSTION	35.1	33.3	32.7	32.8
FIRES	0.1	0.1	0.1	0.1
WASTE BURNING AND DISPOSAL	20.7	20.6	20.5	20.3
LIGHT DUTY PASSENGER (LDA)	45.5	25.6	14.4	6.6
LIGHT DUTY TRUCKS - 1 (LDT1)	35.4	19.7	12.3	5.6
LIGHT DUTY TRUCKS - 2 (LDT2)	18.1	10.6	6.7	3.5
MEDIUM DUTY TRUCKS (MDV)	8.1	6.1	3.8	2.1
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	9.7	1.7	0.8	0.5
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.6	0.2	0.1	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	6.7	3.0	1.6	0.6
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	5.9	3.3	2.3	0.9
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.0	0.0	0.0
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.0	0.0	0.0	0.0
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.1	0.1	0.2	0.1
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	1.1	0.7	0.6	0.4
MOTORCYCLES (MCY)	2.2	1.4	1.2	1.2
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	1.0	0.6	0.5	0.3
SCHOOL BUSES (SB)	0.4	0.2	0.2	0.1
MOTOR HOMES (MH)	3.4	2.2	1.4	0.3
AIRCRAFT	3.0	4.1	5.0	5.6
TRAINS	0.5	0.6	0.6	0.7
RECREATIONAL BOATS	1.8	1.9	1.6	2.2
OFF-ROAD RECREATIONAL VEHICLES	12.5	13.2	14.7	16.5
OFF-ROAD EQUIPMENT	15.0	11.4	9.5	9.2
FARM EQUIPMENT	3.0	2.4	2.1	1.9
TOTAL	**231.8**	**164.2**	**134.2**	**113.3**

Fresno

Winter Season CO Emissions in Tons Per Day

(Fresno County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.1	0.1	0.2	0.4
COGENERATION	1.2	0.4	0.4	0.8
OIL AND GAS PRODUCTION (COMBUSTION)	6.9	4.7	4.6	4.2
MANUFACTURING AND INDUSTRIAL	0.2	0.2	0.2	0.2
FOOD AND AGRICULTURAL PROCESSING	2.3	2.3	2.2	2.2
SERVICE AND COMMERCIAL	0.4	0.5	0.6	0.6
OTHER (FUEL COMBUSTION)	1.4	0.8	0.6	0.4
INCINERATORS	0.0	0.0	0.0	0.0
COATINGS AND RELATED PROCESS SOLVENTS	0.0	0.0	0.0	0.0
OTHER (CLEANING AND SURFACE COATINGS)	0.0	0.0	0.0	0.0
PETROLEUM MARKETING	0.0	0.0	0.0	0.1
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.1	0.1	0.2	0.2
GLASS AND RELATED PRODUCTS	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	38.7	39.6	41.3	44.2
FIRES	0.4	0.5	0.5	0.5
WASTE BURNING AND DISPOSAL	32.6	31.9	31.4	30.8
LIGHT DUTY PASSENGER (LDA)	163.9	86.4	47.9	24.8
LIGHT DUTY TRUCKS - 1 (LDT1)	98.6	54.2	30.6	16.0
LIGHT DUTY TRUCKS - 2 (LDT2)	69.9	38.3	24.6	13.6
MEDIUM DUTY TRUCKS (MDV)	20.6	15.8	10.4	6.4
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	26.0	5.1	2.3	1.6
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	2.7	1.3	0.9	0.5
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	25.5	9.0	5.1	2.5
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	18.9	8.1	4.8	2.4
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.1	0.1	0.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.9	0.9	1.0	0.9
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	5.9	3.9	3.2	2.5
MOTORCYCLES (MCY)	5.0	4.5	4.3	3.5
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.2	0.2	0.2	0.1
HEAVY DUTY GAS URBAN BUSES (UB)	4.1	2.3	1.8	1.2
SCHOOL BUSES (SB)	1.9	1.0	0.7	0.4
MOTOR HOMES (MH)	5.9	4.6	2.8	0.8
AIRCRAFT	19.4	20.2	21.9	23.2
TRAINS	0.3	0.4	0.4	0.5
RECREATIONAL BOATS	2.6	2.7	2.3	3.2
OFF-ROAD RECREATIONAL VEHICLES	12.4	12.5	13.8	15.5
OFF-ROAD EQUIPMENT	44.0	36.0	30.9	29.4
FARM EQUIPMENT	14.5	11.6	10.1	9.7
TOTAL	**627.2**	**400.1**	**302.4**	**243.8**

Lake Tahoe North Shore

Winter Season CO Emissions in Tons Per Day

(Placer County – Lake Tahoe Air Basin)

Major Source Category	1993	2003	2010	2018
MANUFACTURING AND INDUSTRIAL	0.0	0.0	0.0	0.0
SERVICE AND COMMERCIAL	0.0	0.0	0.0	0.0
OTHER (FUEL COMBUSTION)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	2.1	2.5	2.6	2.8
FIRES	0.0	0.0	0.0	0.0
WASTE BURNING AND DISPOSAL	2.8	3.0	3.2	3.3
LIGHT DUTY PASSENGER (LDA)	4.5	2.4	1.2	0.5
LIGHT DUTY TRUCKS - 1 (LDT1)	0.7	0.1	0.1	0.0
LIGHT DUTY TRUCKS - 2 (LDT2)	4.1	2.6	2.0	1.3
MEDIUM DUTY TRUCKS (MDV)	6.0	4.0	3.0	1.9
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	0.7	0.1	0.0	0.0
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.1	0.0	0.0	0.0
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	0.3	0.1	0.1	0.1
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	0.3	0.2	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.0	0.0	0.0	0.0
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	0.0	0.0	0.0	0.0
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.4	0.4	0.4	0.2
MOTOR HOMES (MH)	0.5	0.3	0.1	0.0
RECREATIONAL BOATS	0.6	0.7	0.6	0.9
OFF-ROAD RECREATIONAL VEHICLES	1.2	1.2	1.4	1.5
OFF-ROAD EQUIPMENT	1.2	1.0	0.9	0.9
TOTAL	**25.4**	**18.7**	**15.8**	**13.6**

Lake Tahoe South Shore

Winter Season CO Emissions in Tons Per Day

(El Dorado County – Lake Tahoe Air Basin)

Major Source Category	1993	2003	2010	2018
MANUFACTURING AND INDUSTRIAL	0.0	0.0	0.0	0.0
SERVICE AND COMMERCIAL	0.0	0.0	0.0	0.0
OTHER (FUEL COMBUSTION)	0.0	0.0	0.0	0.0
SEWAGE TREATMENT	0.1	0.1	0.1	0.1
MINERAL PROCESSES	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	16.8	18.4	19.0	19.9
FIRES	0.0	0.0	0.0	0.0
WASTE BURNING AND DISPOSAL	0.0	0.0	0.0	0.0
LIGHT DUTY PASSENGER (LDA)	8.0	4.8	3.3	1.4
LIGHT DUTY TRUCKS - 1 (LDT1)	1.0	0.2	0.1	0.0
LIGHT DUTY TRUCKS - 2 (LDT2)	8.0	4.7	3.3	2.0
MEDIUM DUTY TRUCKS (MDV)	9.9	6.2	4.4	2.8
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	1.6	0.2	0.1	0.1
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.3	0.2	0.2	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	1.0	0.5	0.3	0.2
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	0.7	0.1	0.1	0.0
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.0	0.0	0.0	0.0
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	0.0	0.0	0.0	0.0
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.7	0.5	0.4	0.2
MOTOR HOMES (MH)	0.7	0.6	0.4	0.1
AIRCRAFT	1.4	2.3	2.8	3.2
RECREATIONAL BOATS	1.3	1.5	1.4	2.1
OFF-ROAD RECREATIONAL VEHICLES	5.8	6.2	7.0	7.8
OFF-ROAD EQUIPMENT	4.0	2.9	2.5	2.5
TOTAL	**61.4**	**49.4**	**45.3**	**42.6**

Modesto

Winter Season CO Emissions in Tons Per Day

(Stanislaus County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.0	0.7	0.8	0.8
COGENERATION	0.0	0.0	0.0	0.0
OIL AND GAS PRODUCTION (COMBUSTION)	0.0	0.0	0.0	0.0
PETROLEUM REFINING (COMBUSTION)	0.0	0.0	0.0	0.0
MANUFACTURING AND INDUSTRIAL	0.1	0.1	0.1	0.1
FOOD AND AGRICULTURAL PROCESSING	0.2	0.2	0.2	0.2
SERVICE AND COMMERCIAL	0.1	0.5	0.5	0.5
OTHER (FUEL COMBUSTION)	0.8	0.4	0.3	0.2
INCINERATORS	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.0	0.0	0.0
GLASS AND RELATED PRODUCTS	0.0	0.0	0.0	0.0
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	19.8	21.3	22.5	24.1
FIRES	0.1	0.2	0.2	0.2
WASTE BURNING AND DISPOSAL	26.4	24.9	24.0	23.0
LIGHT DUTY PASSENGER (LDA)	86.9	46.6	25.6	13.8
LIGHT DUTY TRUCKS - 1 (LDT1)	55.2	28.2	15.8	8.6
LIGHT DUTY TRUCKS - 2 (LDT2)	34.6	19.8	12.6	7.3
MEDIUM DUTY TRUCKS (MDV)	11.2	8.6	5.7	3.7
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	15.3	2.4	1.1	0.9
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	1.5	0.6	0.4	0.2
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	13.2	4.9	2.8	1.4
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	13.1	4.7	2.3	1.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.1	0.1	0.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.0	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.4	0.4	0.5	0.4
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	3.1	1.8	1.5	1.3
MOTORCYCLES (MCY)	3.6	2.5	2.2	1.8
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.1	0.1	0.1	0.1
HEAVY DUTY GAS URBAN BUSES (UB)	1.9	1.4	1.1	0.7
SCHOOL BUSES (SB)	0.9	0.5	0.4	0.2
MOTOR HOMES (MH)	4.9	3.7	2.2	0.6
AIRCRAFT	3.8	4.0	4.3	4.5
TRAINS	0.2	0.2	0.3	0.3
RECREATIONAL BOATS	1.0	1.0	0.8	1.0
OFF-ROAD RECREATIONAL VEHICLES	2.5	2.0	2.1	2.4
OFF-ROAD EQUIPMENT	23.1	18.9	16.4	16.0
FARM EQUIPMENT	6.7	5.3	4.7	4.5
TOTAL	**330.8**	**206.0**	**151.2**	**120.0**

Sacramento Area – Placer

Winter Season CO Emissions in Tons Per Day

(Placer County – Sacramento Valley Air Basin)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.0	0.0	0.0	0.0
MANUFACTURING AND INDUSTRIAL	1.8	1.1	1.2	1.4
FOOD AND AGRICULTURAL PROCESSING	0.0	0.0	0.0	0.0
SERVICE AND COMMERCIAL	0.4	0.5	0.6	0.6
OTHER (FUEL COMBUSTION)	0.3	0.2	0.1	0.1
INCINERATORS	0.0	0.0	0.0	0.0
CHEMICAL	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.1	0.1	0.1
WOOD AND PAPER	0.0	0.0	0.0	0.1
RESIDENTIAL FUEL COMBUSTION	29.1	34.3	36.6	38.9
FIRES	0.0	0.0	0.0	0.0
WASTE BURNING AND DISPOSAL	17.4	17.3	17.3	17.3
LIGHT DUTY PASSENGER (LDA)	38.3	23.7	14.1	7.7
LIGHT DUTY TRUCKS - 1 (LDT1)	24.9	15.3	9.1	4.9
LIGHT DUTY TRUCKS - 2 (LDT2)	17.4	10.6	7.5	4.6
MEDIUM DUTY TRUCKS (MDV)	6.5	5.5	4.0	2.7
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	6.8	1.3	0.4	0.2
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.8	0.3	0.1	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	3.5	1.8	0.9	0.4
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	3.5	2.2	1.0	0.4
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.0	0.0	0.0
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.0	0.0	0.0	0.0
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.1	0.1	0.1	0.1
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	0.6	0.5	0.3	0.2
MOTORCYCLES (MCY)	2.2	1.8	1.0	0.4
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.4	0.3	0.3	0.2
SCHOOL BUSES (SB)	0.4	0.2	0.1	0.1
MOTOR HOMES (MH)	2.2	1.6	1.0	0.3
AIRCRAFT	0.7	0.7	0.7	0.7
TRAINS	0.5	0.6	0.6	0.7
RECREATIONAL BOATS	6.6	7.4	7.0	10.3
OFF-ROAD RECREATIONAL VEHICLES	0.8	0.7	0.7	0.8
OFF-ROAD EQUIPMENT	14.1	11.3	10.2	9.7
FARM EQUIPMENT	0.9	0.8	0.7	0.6
TOTAL	**180.0**	**140.2**	**115.9**	**103.7**

Sacramento Area - Sacramento

Winter Season CO Emissions in Tons Per Day

(Sacramento County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.1	0.4	0.4	0.4
COGENERATION	3.7	0.0	0.0	0.0
OIL AND GAS PRODUCTION (COMBUSTION)	0.3	0.2	0.3	0.2
MANUFACTURING AND INDUSTRIAL	0.2	0.2	0.2	0.2
FOOD AND AGRICULTURAL PROCESSING	0.1	0.0	0.0	0.0
SERVICE AND COMMERCIAL	1.7	2.7	2.8	2.8
OTHER (FUEL COMBUSTION)	1.4	0.9	0.6	0.4
LANDFILLS	0.0	0.1	0.1	0.1
INCINERATORS	0.0	0.0	0.0	0.0
OTHER (WASTE DISPOSAL)	0.0	0.0	0.0	0.0
PRINTING	0.0	0.0	0.0	0.0
CHEMICAL	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.4	0.4	0.5
WOOD AND PAPER	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	65.6	65.6	69.3	74.4
FIRES	0.4	0.4	0.4	0.5
WASTE BURNING AND DISPOSAL	4.2	4.1	4.1	4.1
LIGHT DUTY PASSENGER (LDA)	257.3	121.1	67.7	35.3
LIGHT DUTY TRUCKS - 1 (LDT1)	124.2	56.1	32.1	17.2
LIGHT DUTY TRUCKS - 2 (LDT2)	93.9	43.3	29.7	17.7
MEDIUM DUTY TRUCKS (MDV)	32.1	19.7	13.9	9.0
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	28.3	5.3	2.1	1.2
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	5.0	1.9	0.9	0.4
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	36.1	12.8	7.3	3.6
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	47.2	19.5	9.0	3.3
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.1	0.1	0.1	0.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	1.1	1.1	1.0	0.8
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	5.4	3.4	2.5	1.8
MOTORCYCLES (MCY)	8.2	4.9	3.4	2.0
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.4	0.3	0.3	0.2
HEAVY DUTY GAS URBAN BUSES (UB)	5.4	2.6	1.6	0.9
SCHOOL BUSES (SB)	1.8	1.1	1.0	0.8
MOTOR HOMES (MH)	9.1	6.4	4.5	1.7
AIRCRAFT	2.4	2.9	3.3	3.5
TRAINS	0.6	0.7	0.7	0.8
SHIPS AND COMMERCIAL BOATS	0.2	0.1	0.1	0.1
RECREATIONAL BOATS	7.5	8.3	8.1	12.2
OFF-ROAD RECREATIONAL VEHICLES	4.2	3.3	3.5	4.0
OFF-ROAD EQUIPMENT	72.8	55.7	47.6	43.0
FARM EQUIPMENT	2.6	2.1	1.8	1.7
TOTAL	**823.6**	**447.8**	**320.8**	**245.1**

Sacramento Area - Yolo

Winter Season CO Emissions in Tons Per Day

(Yolo County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.0	0.6	0.6	0.6
COGENERATION	0.0	0.0	0.0	0.0
MANUFACTURING AND INDUSTRIAL	0.0	0.0	0.0	0.0
FOOD AND AGRICULTURAL PROCESSING	0.3	0.4	0.4	0.4
SERVICE AND COMMERCIAL	0.0	0.1	0.1	0.1
OTHER (FUEL COMBUSTION)	0.6	0.2	0.1	0.1
SEWAGE TREATMENT	0.0	0.0	0.0	0.0
INCINERATORS	0.0	0.0	0.0	0.0
COATINGS AND RELATED PROCESS SOLVENTS	0.0	0.0	0.0	0.0
PRINTING	0.0	0.0	0.0	0.0
ADHESIVES AND SEALANTS	0.0	0.0	0.0	0.0
OIL AND GAS PRODUCTION	0.0	0.0	0.0	0.0
PETROLEUM MARKETING	0.0	0.1	0.2	0.2
CHEMICAL	0.5	0.5	0.5	0.5
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.3	0.3	0.4
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	7.4	7.1	7.1	7.3
FIRES	0.0	0.0	0.0	0.0
WASTE BURNING AND DISPOSAL	2.3	2.3	2.2	2.2
LIGHT DUTY PASSENGER (LDA)	32.1	17.6	10.0	5.4
LIGHT DUTY TRUCKS - 1 (LDT1)	17.8	9.0	5.1	2.7
LIGHT DUTY TRUCKS - 2 (LDT2)	12.3	6.6	4.3	2.6
MEDIUM DUTY TRUCKS (MDV)	4.6	3.4	2.3	1.5
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	5.5	0.9	0.3	0.2
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.4	0.2	0.1	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	8.8	1.8	0.9	0.5
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	7.0	1.7	0.7	0.3
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.0	0.0	0.0
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.0	0.0	0.0	0.0
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.3	0.3	0.3	0.2
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	2.1	1.3	0.9	0.6
MOTORCYCLES (MCY)	1.2	1.1	0.9	0.7
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.5	0.3	0.2	0.2
SCHOOL BUSES (SB)	0.3	0.2	0.1	0.1
MOTOR HOMES (MH)	1.3	1.1	0.7	0.3
AIRCRAFT	0.8	0.8	0.8	0.8
TRAINS	0.0	0.0	0.0	0.0
SHIPS AND COMMERCIAL BOATS	0.1	0.1	0.1	0.1
RECREATIONAL BOATS	1.7	1.8	1.7	2.4
OFF-ROAD RECREATIONAL VEHICLES	0.7	0.5	0.6	0.7
OFF-ROAD EQUIPMENT	9.5	7.8	6.5	6.2
FARM EQUIPMENT	2.9	2.4	2.0	1.8
TOTAL	**121.2**	**70.4**	**50.1**	**39.1**

San Diego

Winter Season CO Emissions in Tons Per Day

(San Diego County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	2.7	9.7	26.8	30.1
COGENERATION	4.0	2.1	2.2	2.4
MANUFACTURING AND INDUSTRIAL	0.2	1.4	2.2	2.9
FOOD AND AGRICULTURAL PROCESSING	36.3	28.3	25.7	23.0
SERVICE AND COMMERCIAL	0.5	0.2	0.3	0.3
OTHER (FUEL COMBUSTION)	3.4	4.0	3.9	3.8
SEWAGE TREATMENT	0.0	0.1	0.1	0.1
LANDFILLS	0.0	0.1	0.1	0.1
INCINERATORS	0.0	0.0	0.0	0.0
OTHER (WASTE DISPOSAL)	0.0	0.0	0.0	0.0
PETROLEUM REFINING	0.2	0.0	0.0	0.0
MINERAL PROCESSES	0.4	0.1	0.2	0.2
OTHER (INDUSTRIAL PROCESSES)	0.0	0.3	0.3	0.4
RESIDENTIAL FUEL COMBUSTION	104.4	105.6	110.8	118.2
FIRES	0.6	0.6	0.7	0.7
WASTE BURNING AND DISPOSAL	10.9	10.4	10.1	9.7
LIGHT DUTY PASSENGER (LDA)	704.3	349.3	210.7	109.4
LIGHT DUTY TRUCKS - 1 (LDT1)	270.6	126.3	78.0	38.5
LIGHT DUTY TRUCKS - 2 (LDT2)	211.8	105.0	77.6	41.9
MEDIUM DUTY TRUCKS (MDV)	80.3	51.9	29.1	22.7
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	60.8	9.1	3.6	2.8
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	6.3	2.5	1.3	0.8
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	35.8	12.8	7.5	3.9
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	27.8	16.1	8.4	3.6
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.1	0.3	0.3	0.3
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.2	0.2	0.2	0.2
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	1.4	1.7	1.8	1.5
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	10.2	7.6	6.7	4.7
MOTORCYCLES (MCY)	22.6	17.6	13.2	12.2
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.6	0.6	1.2	0.5
HEAVY DUTY GAS URBAN BUSES (UB)	7.3	5.4	8.0	2.9
SCHOOL BUSES (SB)	3.4	1.9	1.3	0.8
MOTOR HOMES (MH)	28.4	20.1	7.8	2.5
AIRCRAFT	19.0	18.4	19.0	19.5
TRAINS	0.1	0.1	0.1	0.1
SHIPS AND COMMERCIAL BOATS	4.5	4.4	4.4	4.4
RECREATIONAL BOATS	23.7	25.9	24.5	36.1
OFF-ROAD RECREATIONAL VEHICLES	16.1	13.1	14.0	15.7
OFF-ROAD EQUIPMENT	186.5	144.2	124.5	123.6
FARM EQUIPMENT	4.1	3.3	2.9	2.6
TOTAL	**1,889.4**	**1,100.8**	**829.3**	**643.1**

San Francisco – Oakland – San Jose

Winter Season CO Emissions in Tons Per Day

(San Francisco Bay Area Air Basin)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	6.1	7.2	15.1	15.1
COGENERATION	1.5	2.8	3.0	3.2
OIL AND GAS PRODUCTION (COMBUSTION)	0.0	0.0	0.0	0.0
PETROLEUM REFINING (COMBUSTION)	4.5	4.9	5.4	5.9
MANUFACTURING AND INDUSTRIAL	6.7	12.5	13.6	15.1
FOOD AND AGRICULTURAL PROCESSING	0.3	0.1	0.2	0.2
SERVICE AND COMMERCIAL	2.6	4.1	4.5	4.9
OTHER (FUEL COMBUSTION)	14.1	8.2	6.1	5.5
SEWAGE TREATMENT	0.0	0.0	0.0	0.0
INCINERATORS	0.3	0.1	0.1	0.1
SOIL REMEDIATION	0.0	0.0	0.0	0.0
OTHER (WASTE DISPOSAL)	0.0	0.0	0.0	0.0
COATINGS AND RELATED PROCESS SOLVENTS	0.0	0.0	0.0	0.0
PRINTING	0.0	0.0	0.0	0.0
OIL AND GAS PRODUCTION	0.0	0.0	0.0	0.0
PETROLEUM REFINING	1.4	1.3	1.4	1.6
CHEMICAL	26.1	0.1	0.1	0.1
FOOD AND AGRICULTURE	0.0	0.3	0.3	0.3
MINERAL PROCESSES	0.1	0.1	0.1	0.1
METAL PROCESSES	0.0	0.1	0.1	0.1
WOOD AND PAPER	0.0	0.0	0.0	0.0
ELECTRONICS	0.0	0.0	0.0	0.0
OTHER (INDUSTRIAL PROCESSES)	0.1	1.2	1.3	1.4
RESIDENTIAL FUEL COMBUSTION	270.6	283.4	276.5	272.9
FIRES	3.7	3.1	3.3	3.4
WASTE BURNING AND DISPOSAL	9.1	18.4	18.5	18.5
OTHER (MISCELLANEOUS PROCESSES)	1.5	1.5	1.5	1.5
LIGHT DUTY PASSENGER (LDA)	1,604.2	913.0	442.0	232.1
LIGHT DUTY TRUCKS - 1 (LDT1)	514.4	290.0	147.7	82.1
LIGHT DUTY TRUCKS - 2 (LDT2)	456.8	255.5	156.7	100.9
MEDIUM DUTY TRUCKS (MDV)	206.6	148.1	97.1	68.4
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	138.3	28.4	10.7	6.6
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	18.8	9.2	4.8	2.5
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	118.9	44.8	23.8	13.0
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	92.4	44.4	20.6	9.6
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.2	0.5	0.6	0.5
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.5	0.5	0.6	0.4
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	4.7	5.4	5.2	4.2
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	23.0	16.2	12.0	9.0
MOTORCYCLES (MCY)	68.3	36.5	22.9	12.4
HEAVY DUTY DIESEL URBAN BUSES (UB)	3.3	3.2	3.0	2.7
HEAVY DUTY GAS URBAN BUSES (UB)	17.3	13.3	12.4	10.3
SCHOOL BUSES (SB)	6.0	3.5	2.7	2.1
MOTOR HOMES (MH)	40.7	27.6	16.0	6.1
AIRCRAFT	53.6	39.9	44.7	48.4
TRAINS	1.8	2.1	2.3	2.6
SHIPS AND COMMERCIAL BOATS	3.0	3.1	3.4	3.6
RECREATIONAL BOATS	24.3	25.8	23.1	32.6
OFF-ROAD RECREATIONAL VEHICLES	29.7	3.5	2.6	2.1
OFF-ROAD EQUIPMENT	473.0	374.7	305.8	316.4
FARM EQUIPMENT	5.6	6.5	4.1	3.7
TOTAL	**4,253.8**	**2,645.3**	**1,715.9**	**1,322.2**

Stockton

Winter Season CO Emissions in Tons Per Day

(San Joaquin County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.0	1.3	1.3	1.8
COGENERATION	0.0	0.0	0.0	0.1
OIL AND GAS PRODUCTION (COMBUSTION)	0.1	0.1	0.1	0.1
MANUFACTURING AND INDUSTRIAL	1.3	1.8	1.9	2.0
FOOD AND AGRICULTURAL PROCESSING	0.8	0.7	0.7	0.7
SERVICE AND COMMERCIAL	0.4	0.5	0.5	0.5
OTHER (FUEL COMBUSTION)	1.9	0.4	0.3	0.2
INCINERATORS	0.0	0.0	0.0	0.0
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0
METAL PROCESSES	0.1	0.1	0.1	0.1
GLASS AND RELATED PRODUCTS	0.0	0.0	0.0	0.0
ELECTRONICS	0.0	0.0	0.0	0.0
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	23.6	24.2	24.9	26.3
FIRES	0.1	0.1	0.1	0.1
WASTE BURNING AND DISPOSAL	16.6	16.1	15.8	15.4
LIGHT DUTY PASSENGER (LDA)	127.7	67.9	38.9	20.8
LIGHT DUTY TRUCKS - 1 (LDT1)	66.8	30.9	18.0	10.0
LIGHT DUTY TRUCKS - 2 (LDT2)	45.0	24.3	15.8	9.6
MEDIUM DUTY TRUCKS (MDV)	15.0	11.2	7.7	5.3
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	17.4	3.2	1.2	0.7
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	1.6	0.7	0.4	0.2
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	15.6	5.9	3.2	1.5
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	18.5	5.2	2.1	1.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.1	0.1	0.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.5	0.6	0.6	0.5
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	3.8	2.3	1.8	1.2
MOTORCYCLES (MCY)	4.9	3.2	2.7	1.7
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.1	0.1	0.1	0.1
HEAVY DUTY GAS URBAN BUSES (UB)	2.4	1.4	1.4	1.0
SCHOOL BUSES (SB)	0.9	0.5	0.3	0.3
MOTOR HOMES (MH)	5.9	4.1	2.7	1.0
AIRCRAFT	3.8	5.0	5.9	6.6
TRAINS	0.6	0.8	0.8	0.9
SHIPS AND COMMERCIAL BOATS	0.2	0.2	0.2	0.2
RECREATIONAL BOATS	10.5	11.7	11.1	16.5
OFF-ROAD RECREATIONAL VEHICLES	2.3	1.9	2.0	2.2
OFF-ROAD EQUIPMENT	36.9	25.8	20.6	19.1
FARM EQUIPMENT	7.1	5.7	5.0	4.8
TOTAL	**432.7**	**257.7**	**188.5**	**152.7**

APPENDIX C

Board Resolution 98-52, November 19, 1998

State of California
AIR RESOURCES BOARD

Resolution 98-52

November 19, 1998

Agenda Item No.: 98-11-4

WHEREAS, sections 39600 and 39601 of the Health and Safety Code authorize the Air Resources Board (ARB or Board) to adopt standards, rules and regulations and to do such acts as may be necessary for the proper execution of the powers and duties granted to and imposed upon the Board by law;

WHEREAS, section 39602 of the Health and Safety Code designates the ARB as the state air pollution control agency for all purposes and set forth in federal law and as the state agency responsible for the preparation of any State Implementation Plan (SIP) required by the federal Clean Air Act (CAA; 42 U.S.C. sections 7401 et seq.);

WHEREAS, on September 13, 1985, the U.S. Environmental Protection Agency (U.S. EPA) promulgated a national ambient air quality standard (NAAQS) for carbon monoxide (CO) of 9 parts per million (ppm) (eight hour average);

WHEREAS, under CAA sections 107(d)(4)(A) and 186(a)(1), the following ten areas were designated as nonattainment for CO and classified as "moderate" or unclassified:

Bakersfield Metropolitan Area
Chico Urbanized Area
Fresno Urbanized Area
Lake Tahoe North Shore Area
Lake Tahoe South Shore Area
Modesto Urbanized Area
Sacramento Area
San Diego Area
San Francisco-Oakland-San Jose Area
Stockton Urbanized Area

WHEREAS, CAA section 107(d)(3)(D) provides that any state may request the U.S. EPA to redesignate an area from nonattainment to attainment for the NAAQS;

WHEREAS, on April 25, 1996, the Board approved Resolution 96-13 which adopted the CO Redesignation Request and Maintenance Plan for the ten CO nonattainment areas and directed the Executive Officer to submit the plan to U.S. EPA as a SIP revision;

WHEREAS, on March 31, 1998, the U.S. EPA proposed approval of the CO Redesignation Request and Maintenance Plan as a direct final rule (FR Vol. 63, No. 61, pp. 15305-15312);

WHEREAS, the direct final rule became effective on June 1, 1998;

WHEREAS, the maintenance demonstration contained in the approved CO Maintenance Plan contains emission estimates incorporating the effects of the wintertime requirement for oxygen in gasoline, as specified in section 2262.5, title 13, California Code of Regulations (CCR);

WHEREAS, on August 27, 1998, the Board approved Resolution 98-37, which amends section 2262.5, title 13, CCR to rescind the wintertime oxygen requirement in gasoline in certain CO attainment areas of the state;

WHEREAS, the Board's action to remove the wintertime oxygen requirement makes it necessary to amend the maintenance demonstration in the approved SIP for Carbon Monoxide to reflect the Board's action;

WHEREAS, the Board staff has prepared a revision to the SIP for Carbon Monoxide which incorporates the effects of the removal of the wintertime oxygen requirement in gasoline;

WHEREAS, the California Environmental Quality Act and ARB regulations provide that no project that may have significant adverse environmental impacts shall be approved as originally proposed if feasible alternatives or mitigation measures are available to reduce or eliminate such impacts;

WHEREAS, the Board in Resolution 98-37, which approved the amendments eliminating the wintertime oxygen requirement, found that:

1. To the extent that refiners and importers reduce the amount of oxygen in gasoline in response to the wintertime oxygen amendments, CO emissions from motor vehicles operating on that gasoline will increase as a result of the reduced oxygen content;

2. Even in a worst case scenario, vehicular CO emissions under the partial elimination of the wintertime minimum oxygen requirements would remain less than they were in 1995, and would decline annually from the turnover of the vehicle fleet to new vehicles; and

3. The limitations incorporated into the wintertime oxygen amendments will assure that any CO emission increases resulting from the amendments will not interfere with the attainment or maintenance of the federal or state ambient CO standards.

WHEREAS, the Board reaffirms the above findings in Resolution 98-37, and further finds that:

1. Even with no wintertime oxygen in gasoline, the emission levels in all of the 10 federal planning areas remain below the 1995 attainment levels as determined in the Carbon Monoxide Redesignation Request and Maintenance Plan;

2. The contingency measures in the Carbon Monoxide SIP that are being implemented or will be implemented, coupled with vehicle fleet turnover, provide an ample margin of safety to maintain the CO standard; and

3. This action will not have a significant adverse impact on the environment, since this action simply revises the maintenance demonstration to reflect the Board's previous action eliminating the wintertime oxygen requirement.

WHEREAS, the Board directs ARB staff to review carbon monoxide air quality data in the areas no longer subject to the wintertime oxygen requirement; if violations are monitored in any of the areas, staff will propose that appropriate action be taken regarding reinstatement of the minimum wintertime oxygen content in gasoline as previously contained in section 2262.5, title 13, CCR, in the area at the beginning of the following winter season.

NOW, THEREFORE BE IT RESOLVED that the Board hereby adopts the Revision to the State Implementation Plan for Carbon Monoxide and directs the Executive Officer to forward the revision to the U.S. EPA for inclusion in the SIP.

BE IT FURTHER RESOLVED, that the Board certifies that the SIP revision was adopted after notice and public hearing as required by 40 CFR 51.102, and directs the Executive Officer to submit the appropriate supporting documentation to the U.S. EPA along with the SIP revision.

I hereby certify that the above is a true and correct copy of Resolution 98-52, as adopted by the Air Resources Board.

/s/

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Pat Hutchens, Clerk of the Board