

Medford Carbon Monoxide Limited Maintenance Plan

By: Oregon Department of Environmental Quality

June, 2015



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State Implementation Plan Revision

Medford Carbon Monoxide Limited
Maintenance Plan

A Limited Maintenance Plan

for Carbon Monoxide

The Medford Urban Growth Boundary

**State of Oregon Clean Air Act
Implementation Plan**

**Scheduled for public comment
August 14, 2015**

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- Appendix A: EPA 1995 Paisie Memo
- Appendix B: Medford 2008 Emission Inventory
- Appendix C: EPA 2012 Approval Letter for removal of the CO monitor
- Appendix D: Inventory Preparation and Quality Assurance Plan

Acknowledgments

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Executive Summary

Medford, Oregon violated the national air quality standard for carbon monoxide in the 1970s and 1980s. Conditions have progressively improved and Medford has not violated the carbon monoxide (CO) standard since 1991. In 2001 Oregon submitted a ten-year CO Maintenance Plan to EPA and requested that Medford be redesignated to attainment. EPA approved the request as a revision to the State Implementation Plan (SIP) September 23, 2002.

Oregon has now prepared this second ten-year CO Maintenance Plan that indicates how Medford will continue to maintain the CO standard through September 23, 2022--the end of the second maintenance plan period. Once adopted by the Oregon Environmental Quality Commission this plan will be submitted to the EPA as a further revision of the SIP.

High levels of CO have been traditionally caused by motor vehicles emissions. The improvement of CO concentrations over previous decades is largely due to modern vehicle emission control systems which have reduced CO emissions dramatically. Ambient CO concentrations in Medford declined to such low levels that the CO measurement equipment was removed after 2009. Because CO is so low this plan qualifies to use a Limited Maintenance Plan (LMP which streamlines requirements for SIP approval. This technique is available to maintenance areas that have a design value of no higher than 7.65 ppm which is 85 percent of the 8-hour CO standard. By comparison Medford has a design value of 2.4 ppm or 27 percent of the standard.

All maintenance plans including LMPs need to establish the relationship between CO emissions and measured ambient CO concentrations. To speed development of this plan, the Rogue Valley Council of Governments contracted with Sierra Research to do assemblable much of the Medford CO Emissions Inventory. DEQ and Sierra Research began with the EPA's 2008 National Emission Inventory (NEI) to quantify CO emissions in the Medford area.

This plan retains the control and contingency measures from the first CO maintenance plan. The primary control measure has been the emission standards for new motor vehicles under the Federal Motor Vehicle Control Program. Another significant measure that continues is the New Source Review Program with Best Available Control Technology (BACT).

Another requirement for a LMP is to maintain a method of determining if an area's air quality degrades to the point where a violation could occur. Because the Medford CO monitor has been removed, DEQ will use an alternate method to verify that the area continues to attain the CO standard. This will be done by DEQ tracking CO emissions every three years through the Statewide Emission Inventory, which is submitted to EPA for inclusion in the National Emission Inventory. DEQ will evaluate any emissions increase to determine if it will trigger measures in the Contingency Plan. These include resuming ambient CO monitoring in Medford, and if needed, forming an advisory committee to develop new strategies to prevent or correct any violation of the CO standard.

Plan Structure

This SIP revision includes the compliance history for Medford and describes how the area met and will continue to meet the standard. This document is organized as follows:

Section 1 – Introduction. Describes the purpose of this second maintenance plan, and summary on the CO standard.

Section 2 – Geographic Area. Describes the geographic area covered by the maintenance plan,

Section 3 – History of the Carbon Monoxide Problem. Summarizes Medford CO compliance history and past CO monitoring data and trends.

Section 4 – Limited Maintenance Plan Option. Describes the criteria an area must meet to qualify for this option and how Medford qualifies.

Section 5 – Emission Inventory. Includes historical information on the most significant CO emission categories from the original maintenance plan and an updated inventory on these categories.

Section 6 – Continuing Control Measures. Lists the measures that were in the original CO maintenance plan, and how these measures will be continued under this LMP.

Section 7 – Verification of Continued Attainment. Describes how compliance will be tracked and confirmed.

Section 8 – Contingency Plan. Describes the contingency measures that apply should a violation occur in the future.

Appendices – Supporting documentation for this LMP.

1. Introduction

This State Implementation Plan revision documents that the area within the Medford Urban Growth boundary will continue to meet the National Ambient Air Quality Standard (NAAQS) for CO through 2022. This plan also describes steps that must be taken if the area's carbon monoxide concentrations deteriorate to an actionable level. This plan is a "limited maintenance plan" developed in accordance with the federal Clean Air Act and the policies of the U.S. Environmental Protection Agency (EPA). See the 1995 "Paisie Memo provided in Appendix A.

The Clean Air Act requires EPA to set air quality standards to protect public health for six common air pollutants, including carbon monoxide. In 1971 EPA set the national ambient air quality standard for carbon monoxide. Carbon monoxide is a colorless, odorless gas that decreases the oxygen carrying capacity of the blood. High concentrations can severely impair the function of oxygen-dependent tissues, including the brain, heart, and muscle. Prolonged exposure to even low levels can aggravate existing conditions in people with heart disease or circulatory disorders. Motor vehicles are the primary source of CO in Oregon.

EPA established the national ambient air quality standard for CO at 35 parts per million (ppm) for a 1-hour average and 9 ppm for an 8-hour average. Two exceedances within one calendar year constitute a violation. Like most areas of the country that failed to meet the CO standard, Medford failed to meet the 8-hour portion of the standard¹.

2. Geographic Area

The City of Medford is located in southwestern Oregon, West of the Cascade Mountains in the Rogue River Valley. The city is approximately 26 square miles in area, and the population in 2013 was 77,677. The surrounding hills can trap air pollution under stable meteorological conditions (inversions). These conditions exist most frequently during the winter and were associated with the majority of past carbon monoxide violations.

Figure 1 shows the Medford Urban Growth Boundary which is also the geographic area subject to this limited maintenance plan.

¹ 40CFR part 50.8 states that standards defined in parts per million should be compared "in terms of integers with fractional parts of 0.5 or greater rounding." This led to an interpretation by EPA that any 8-hour CO concentration of less than 9.5 ppm would be equivalent to attainment. Therefore, concentrations at or above 9.5 ppm represent an exceedance of the standard. Two exceedances in one calendar year constitute a violation.

Medford area into compliance. An updated control strategy was submitted in 1982 which was revised in 1985 to include a state-operated vehicle inspection program.

Following adoption of the 1990 Clean Air Act Amendments, EPA classified Medford as a moderate CO nonattainment area with a design value of 12.1 ppm. The CO nonattainment boundary was defined as the Medford, Oregon Urban Growth Boundary (UGB) used for comprehensive land use planning under state law. In 2001, DEQ demonstrated that Medford had attained the 8-hour CO standard with a design value of 7.5 ppm and submitted a maintenance plan showing how the area would continue to meet the CO standard into the future. EPA approved the maintenance plan and redesignated Medford to attainment for CO effective September 23, 2002.

Since then, CO concentrations continued to improve and CO monitoring was ended after 2009 with EPA's approval. Now DEQ is submitting a second CO maintenance plan with a design value of 2.4 ppm CO based on ambient monitoring from 2008 and 2009. This second CO plan is based on EPA guidance for limited maintenance plans as detailed by a memo from Joe Paisie dated October 6, 1995 and an email from Meg Patulski dated October 4, 2005.

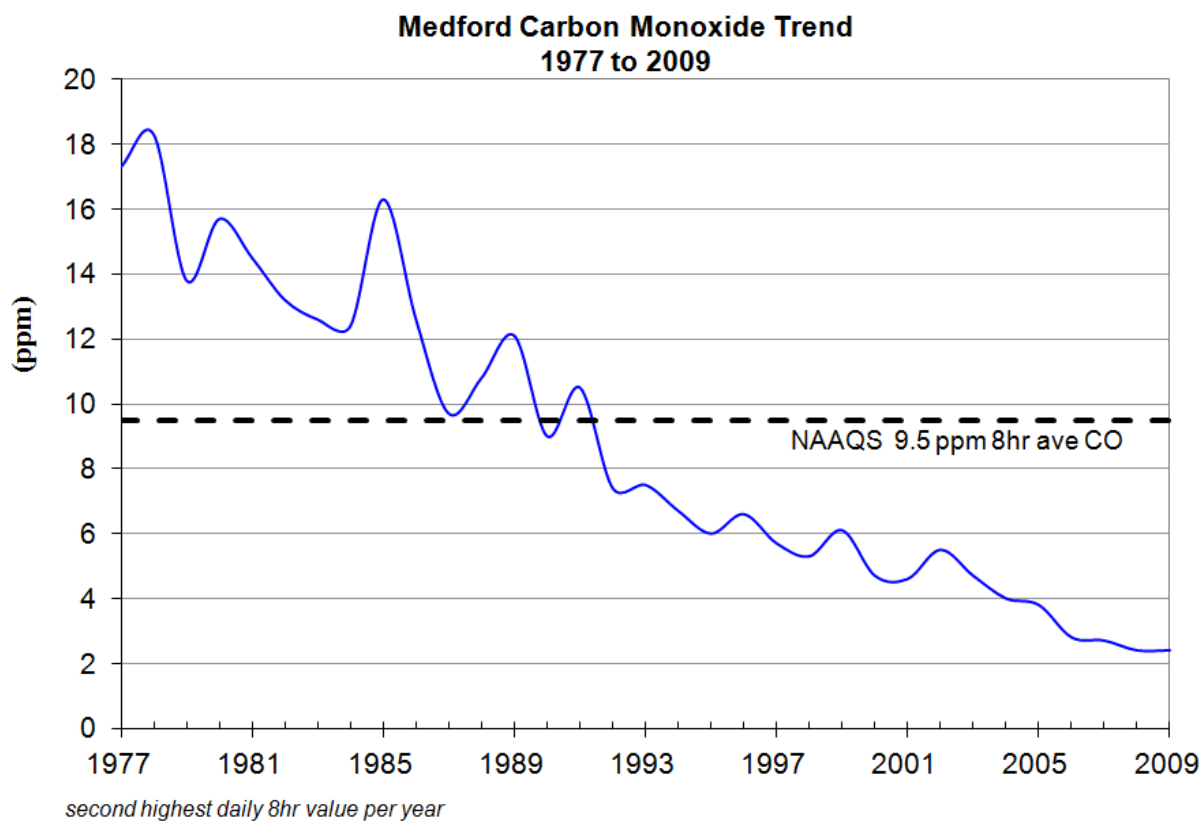
Historically, several carbon monoxide monitoring sites in the Medford nonattainment area exceeded the 8-hour NAAQS for CO. Exceedances were recorded for approximately half of the year in the late 1970s. However, because the control measures in the State Implementation Plan (SIP) were effective at reducing CO emissions, Medford air quality has met the CO standard since 1992. This is consistent with CO emission inventories from 1993 and 2008 which show that CO emissions in Medford continued to decline.

Table 1. Medford Carbon Monoxide Concentrations 1977-2009

8-hour CO Averages		
Year	Maximum	2 nd Highest
1977	21.8	17.3
1978	19.8	18.3
1979	16.2	13.8
1980	19.2	15.7
1981	14.9	14.5
1982	14.3	13.2
1983	15.8	12.6
1984	15.2	12.4
1985	16.9	16.3
1986	12.7	12.6
1987	12.9	9.7
1988	12.2	10.8
1989	12.2	12.1
1990	9.2	9.0
1991	11.9	10.5
1992	7.4	7.4
1993	8.5	7.5
1994	7.4	6.7
1995	6.1	6.0
1996	6.7	6.6
1997	7.3	5.7
1998	5.5	5.3
1999	6.8	6.1
2000	4.8	4.7
2001	4.8	4.6
2002	5.9	5.5
2003	5.0	4.7
2004	4.0	4.0
2005	4.4	3.8
2006	2.9	2.8
2007	3.1	2.7
2008	2.6	2.4
2009	2.4	2.4

(When multiple monitors operated in a given year, values shown are from the CO monitor with the highest second-high measurement.)

Figure 2. Medford Carbon Monoxide Trend 2nd highest 8-hour average, 1977-2009



4. Limited Maintenance Plan Option

EPA developed the Limited Maintenance Plan (LMP) option for areas with little risk of re-violating the carbon monoxide standard (see 1995 Paisie Memo, Appendix A). EPA allows states to use this policy to prepare the required second 10-year maintenance plans, if the monitoring data show the design value is at or below 85 percent of the 8-hour CO standard, or 7.65 ppm. Determining the design value in this case is based on the higher of the two annual second highs in a two year calendar period. The Medford 8-hour design value is 2.4 ppm, based on the two most recent years of data (2008 and 2009). This is 27 percent of the the 8-hour standard and far below the 85 percent level at which an area is eligible for the LMP option.

The LMP approach does not require future year emission projections or a maintenance demonstration. A LMP must include an attainment inventory, provisions for verification of continued attainment, a contingency plan and a statement regarding conformity determinations. Due to the low measured CO values in Medford over the past 22 years, DEQ does not anticipate that CO levels will approach levels that would exceed or violate the 8-hour CO standard, and as noted above, has never exceeded the 1-hour CO standard.

5. Emission Inventory

The Medford Carbon Monoxide (CO) Maintenance Area has met the National Ambient Air Quality Standards (NAAQS) for carbon monoxide. On September 23, 2002 EPA redesignated the area to attainment and approved Medford's CO Maintenance Plan submitted in 2001. This current limited maintenance plan inventory is for 2008, and is provided as part of a new maintenance plan showing that the area will continue to comply with published EPA requirements. The principal components for development and documentation that have been addressed in this inventory include stationary point sources, stationary area sources, non-road sources, on-road mobile sources, quality assurance implementation, and emissions summaries. The geographic focus for this 2008 emission inventory is the Medford CO Maintenance Area, which is defined as the Medford Urban Growth Boundary (UGB).

The following table summarizes contributions by source category for annual and seasonal CO emissions within the Medford UGB for 2008.

Table 2. Medford UGB 2008 CO Annual and Seasonal Emissions Inventory

Source Type	----- Annual -----		----- CO Season -----	
	(tpy)	(% of Category)	(tpy)	(% of Category)
Stationary Point Sources	2,376.1	15%	13,159	16%
Stationary Area Sources	3,333.1	21%	30,399	37%
Non-Road Mobile Sources	4,488.2	28%	10,061	12%
On-Road Mobile Sources	5,730.0	36%	28,731	35%
	-----	-----	-----	-----
Total within Medford UGB	15,927.4	100%	82,350	100%

During the average CO season 2008 day, on-road mobile sources contribute 35% of the total carbon monoxide (CO) air emissions in the Medford UGB. Gasoline vehicles contribute 97% of the CO emissions within the on-road mobile category, whereas diesel vehicles contribute 3% of the on-road mobile category.

Stationary area sources comprise 37% of the total CO air emissions in the Medford UGB on a CO season day. Within the area source category, residential wood combustion accounts for 49% of the emissions. Wood combustion in non-certified woodstoves and inserts accounts for 28% of the total area source emissions. Prescribed burning accounts for 47% of the total area source emissions on a CO season day.

Non-road mobile sources contribute 12% of the total CO on an average winter day. Within this category, 4-cycle engines comprise 79% of the total emissions.

Permitted stationary point sources comprise 16% of the CO air emissions in the Medford UGB on an average CO season day. This category includes permitted stationary sources with both federal Title V and state Air Contaminant Discharge Permits. There are 37 point sources within the Medford UGB and a 25-mile buffer zone around the UGB.

Emissions summaries for CO have decreased for both annual and season day as compared to the 1993 attainment year EI. Annual emissions have decreased 24%, and seasonal emissions have decreased 27% compared to the 1993 attainment year EI.

Details of the Oregon 2008 Medford UGB CO Limited Maintenance Plan Emission Inventory from point, area, non-road, and on-road mobile sources are presented in the full emission inventory included as Appendix B. The relative percentage of annual and seasonal CO emissions from stationary point, stationary area, non-road mobile, and on-road mobile sources are shown in Figures 3 and 4.

A detailed breakdown of the 2008 CO emission inventory is provided in Appendix B.

Figure 3. 2008 Medford Annual CO Emissions

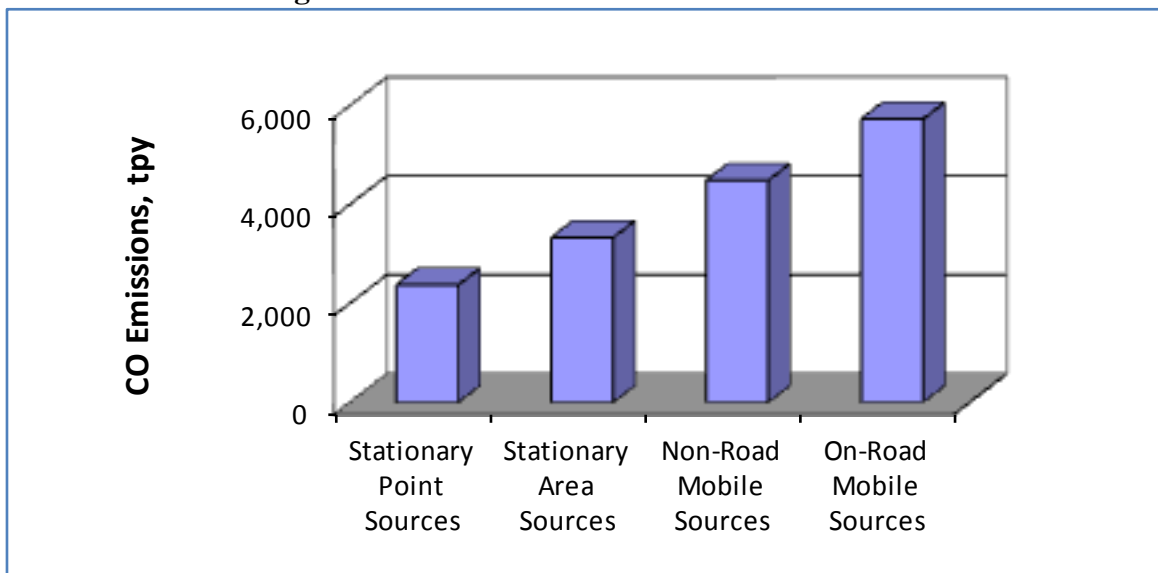
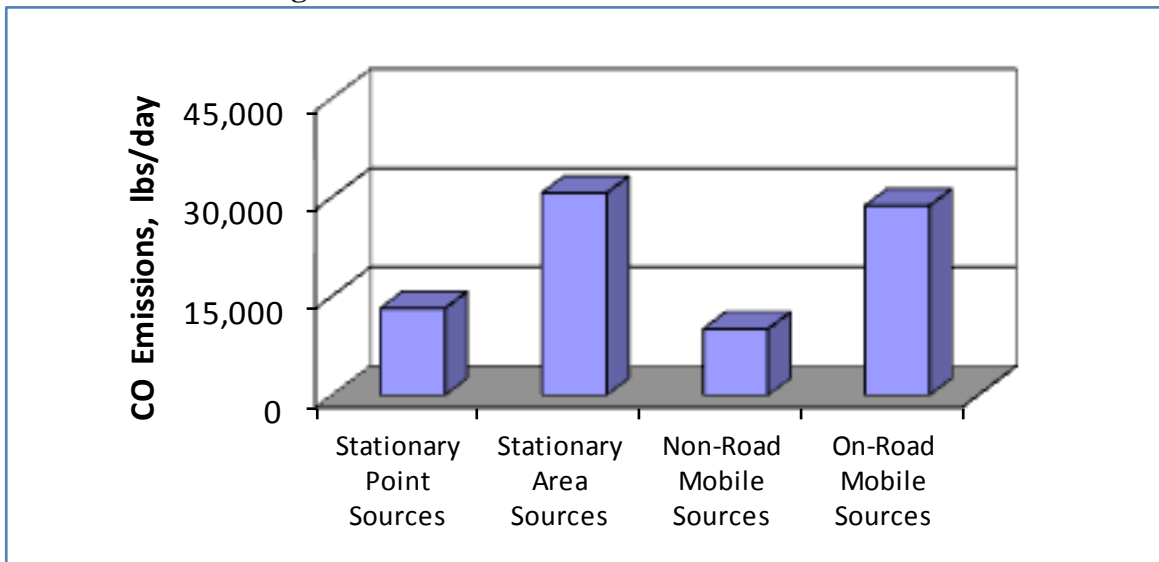


Figure 4. 2008 Medford Seasonal CO Emissions



6. Continuing Control Measures

To qualify for the LMP option, the control measures from the first CO maintenance plan must remain in place and unchanged. The primary control measure has been the emission standards for new motor vehicles under the Federal Motor Vehicle Control Program. Other control measures have been the Motor Vehicle Inspection program, New Source Review program and a Woodstove Curtailment program.

Federal Motor Vehicle Emission Control Program

This limited maintenance plan continues to rely on federal emission standards for new motor vehicles. These requirements include the federal Tier II emission standards for new light and medium duty cars and trucks as well as standards for heavy duty on-road and non-road vehicles.

As noted in Table 2 above, on-road mobile sources are responsible for the highest annual CO concentrations in Medford. That is because cars and trucks moving through an area can assemble in significant numbers at areas of heavy traffic. The highest CO concentrations typically occur in a small region near a congested intersection as CO dissipates quickly as it moves away from its point of emission.

Emission reductions mandated by the Federal Motor Vehicle Emission Control Program have been primarily responsible for the large decrease in ambient CO concentrations in the past. Before CO

emissions were regulated, a typical car of the 1950s emitted approximately 87 grams of CO per mile. Since then, federal rules have lowered CO emissions to the point where today's federal Tier II requirements limit cars to no more than 3.4 grams CO per mile - a 95% reduction of CO. This program will continue to be an effective control for on-road mobile source emissions in the future.

Major New Source Review

Under this limited maintenance plan, the emission control requirement for new or expanding major industry in Medford area will continue to require Best Available Control Technology (BACT). BACT technology provides a high level of control while allowing some flexibility and consideration of the cost effectiveness of different control options.

Woodsmoke Curtailment

As noted in the previous section, residential wood combustion is a leading source of CO emissions from stationary area sources. As shown in Table 2, stationary area sources represent 21 percent of the total annual and 37 percent of seasonal CO emissions in Medford. Woodsmoke emission control efforts have significantly reduced emissions through emission certification standards for new stoves, woodstove change-out programs to encourage removal of non-certified stoves, and a local voluntary curtailment program to reduce wood burning during stagnant weather periods. These efforts will be continued under this limited maintenance plan, and are expected to provide modest reductions in CO emissions in Medford.

Conformity requirements

Federal transportation conformity rules (40 CFR 51.390 and 93.100 et. seq.) and general conformity rules (40 CFR 51.851 and 93.150 et. seq.) continue to apply under a limited maintenance plan. However, as noted in the Paisie Memo these requirements are greatly simplified. Under a LMP vehicle emissions are not considered to be constraining so a Motor Vehicle Emissions Budget is not required. During future transportation conformity determinations, regional emissions analyses are not required (including modeling) as vehicle emissions are assumed to comply.²

7. Verification of Continued Attainment

As described in this plan, CO levels in the Medford UGB have declined progressively since 1991. CO concentrations are not expected to increase significantly or threaten compliance with the CO standard. Given that the Medford CO monitor was removed after 2009, another method of verifying continued attainment with the CO standard is needed.

DEQ will calculate CO emissions every three years as part of the Statewide Emission Inventory, which is submitted to EPA for inclusion in the National Emission Inventory (NEI). DEQ will review

² See Paisie Memo in Appendix A for additional information on conformity requirements.

the NEI estimates to identify increases over the 2008 emission levels and report on them in the annual network plan for the applicable year. Because on-road motor vehicles and stationary area sources emit the most CO in Medford, these categories will be the focus of this review. Any increase in CO emissions will be evaluated by DEQ to verify it is not due to a change in emission calculation methodology, an exceptional event, or other factor not representative of an actual emissions increase. DEQ will consider a 10 percent increase over 2008 emission levels to be a “significant” emission increase for the purpose of triggering the Contingency Plan described in Section 8. Emission categories to be assessed for a significant increase are the total annual emissions, total seasonal emissions, annual or seasonal on-road emissions plus annual or seasonal area source emissions.

8. Contingency Plan

Section 175(A) of the Clean Air Act requires a maintenance plan to include contingency measures necessary to ensure prompt correction of any future violation of the the air quality standard. The first Medford maintenance plan contained contingency measures that would be implemented based on monitoring data--if CO concentrations exceeded 90 percent of the 8-hour standard (8.1 ppm) or if a violation of the standard were to occur. Since the Medford CO monitor was removed in 2009, these contingency measures are no longer applicable. Other contingency measures are needed that are appropriate for areas such as Medford that are at low risk of violating the CO standard.

This LMP has three phases of contingency measures typically have several steps for action depending on the severity of air quality conditions. The following apply to this limited maintenance plan:

Phase 1. If DEQ’s three-year periodic review of CO emissions shows a significant increase in emissions, as described in Section 8 of this plan, DEQ will resume monitoring ambient CO in Medford.

Phase 2. If the highest measured 8-hour CO concentration in a given year in Medford exceeds 7.65 ppm (the level at which an area is eligible for a Limited Maintenance plan), DEQ will evaluate the cause of the CO increase, and consider forming an advisory committee to recommend corrective strategies. Within 6 months of the validated 7.65 ppm or higher CO concentration, DEQ will prepare a list of strategies to prevent or correct a violation of the 8-hour CO standard. This list is to facilitate a choice of strategies that might be implemented to reduce ambient CO concentrations.

The contingency strategies that will be considered include, but are not limited to:

- Improvements to parking and traffic circulation
- Aggressive signal retiming program
- Increased transit funding
- More stringent vehicle Inspection/Maintenance requirements, and
- Accelerated bicycle and pedestrian improvements.

DEQ (and the advisory group if needed) may also choose to conduct further evaluation, to determine if other strategies are necessary, or to take no further action if the problem was caused by an exceptional event.

Phase 3. If a violation of the CO standard occurs, and is validated by DEQ, in addition to Phase 2 above, DEQ will replace the requirement for new and expanding industry to apply Best Achievable Control Technology (BACT) with the requirement to apply Lowest Achievable Emission Rate (LAER) technology. In addition, DEQ will reinstate the requirement for new and expanding industry to offset any new CO emissions. More CO emission reduction measures identified in the evaluation of contingency Phase 2 may also be considered. Committing to further study in this way gives DEQ flexibility in choosing an appropriate approach should the need arise.