The Missoula County Carbon Monoxide Redesignation Request and Maintenance Plan

Prepared for the Missoula City-County Air Pollution Control Board
By the Missoula City-County Health Department

March 7, 2005

This request and maintenance plan was approved by the
Missoula City-County Air Pollution Control Board on Thursday, January 20, 2005;
Missoula County Commissioners on January 26, 2005; and
Missoula City Council on March 7, 2005.

For more information or to be added to the Interested Parties list for air quality information, please contact Shannon Therriault at 258-4755 or therriaults@ho.missoula.mt.us

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LIST OF ACRONYMS AND ABBREVIATIONS

ADT - Average Daily Traffic
AIRS – Aerometric Information Retrieval System
ARM – Administrative Rules of Montana
BER –Montana Board of Environmental Review
Board – The Missoula City-County Air Pollution Control Board
CAA –federal Clean Air Act
CAAA –federal Clean Air Act Amendments of 1990
CFR – Code of Federal Regulations
CO – Carbon Monoxide
COHb – Carboxyhemoglobin
CMAQ – Congestion Mitigation and Air Quality
DEQ –The Montana Department of Environmental Quality
DHES –Montana Department of Health and Environmental Science (predecessor to DEQ)
EPA –The United States Environmental Protection Agency
E.I. – Emission Inventory
Emission Control Program –Federal Motor Vehicle Emissions Control Program
^{o}F - Degrees Fahrenheit
FR – Federal Register
Health Department - Missoula City-County Health Department
MCA – Montana Code Annotated
MCCAPCP –Missoula City-County Air Pollution Control Program
MNR – Monitoring Network Review
MPO – Metropolitan Planning Organization
MT - Montana
MTBE – Methyl Tertiary Butyl Ether
NAA - Non-attainment Area
NAAQS – National Ambient Air Quality Standards
PPM – Parts per Million
PSD – Prevention of Significant Deterioration
QAPP – Quality Assurance Project Plan
R- Range
RACM – Reasonably Available Control Measures
RACT - Reasonably Available Control Technology
RWB – Residential Wood Burning
S - Section
SIP – State Implementation Plan
SLAMS – State and Local Air Monitoring Stations
T - Township
TRS - Township, Range and Section
TTAC - Transportation Technical Advisory Committee
U.S.C. –United States Code
VMT – Vehicle Miles Traveled

EXECUTIVE SUMMARY

Missoula, Montana was designated as a non-attainment area for carbon monoxide (CO) in 1978 because of repeated violations of the 8-hour averaged National Ambient Air Quality Standard (NAAQS) in 1977 and early 1978. Most of the problem centered on a congested intersection, known as "Malfunction Junction," where three major streets (Brooks, South and Russell) come together. However, some violations could also be attributed to residential wood burning. The community took several steps to reduce the ambient levels of CO, including intersection changes, woodstove regulations and outdoor burning regulations. Missoula also relied on the federal motor vehicle emission reduction program to reduce CO emissions. However, Missoula continued to violate the NAAQS until 1992, when it was required to implement an oxygenated fuels program during November, December, January and February. Since the program began in November 1992, Missoula has not recorded a violation of the NAAQS.

Between 1990 and 2000, CO emissions in the Missoula area decreased by 40% (See Table 2-4). The biggest reductions were from on-road motor vehicles and woodstoves. However, in 2000, these two sources still represented over 95% of the CO emissions in the non-attainment area. The remaining sources, industry, natural gas combustion, off-road vehicles and railroads, were responsible for less than 5% of the CO emissions on a typical winter weekday.

In this document, Missoula demonstrates how it meets the five required elements for redesignation.

1. Missoula currently meets the NAAQS for carbon monoxide. Missoula has not exceeded the CO NAAQS since 1992.

2. Missoula has an approved State Implementation Plan (SIP). The plan was first approved on January 16, 1986. Updates and revisions have occurred since then with the most recent approval by the United States Environmental Protection Agency (EPA) on November 15, 2001.

3. Missoula's improvements are permanent and attributable to enforceable measures which include stationary source permitting, outdoor burning permitting, solid fuel burning device restrictions and the oxygenated fuels program. These control measures have contributed to a 40% reduction in CO emissions between 1990 and 2000.

4. Missoula has fulfilled all requirements in the federal Clean Air Act (CAA).

5. As part of this request Missoula submits a comprehensive maintenance plan that meets the requirements of the CAA §175A. The maintenance plan demonstrates that Missoula will continue to meet the NAAQS through the year 2020.

The Missoula City-County Air Pollution Control Board will work diligently to assure that Missoula will not violate the federal standards in the future.

1.0 BACKGROUND INFORMATION

1.1 INTRODUCTION

The State of Montana and the Missoula City-County Air Pollution Control Board (Board), which serves as the area's lead air quality planning agency, request that the United States Environmental Protection Agency (EPA) redesignate the Missoula non-attainment area to attainment/ maintenance status for the National Ambient Air Quality Standards (NAAQS) for carbon monoxide.

Sections 1.0 and 3.0 and Appendices A and B of this document are provided as background information only and are not to be construed to be part of the State's official submittal to EPA.

Section 2.0 of this document, which includes a discussion of the requirements for redesignation and the Maintenance Plan, along with Appendices C and D comprise the State's official submittal to EPA. The Maintenance Plan, which is being submitted for inclusion in the State's federally enforceable State Implementation Plan (SIP), provides for maintenance of the federal 8-hour standard for carbon monoxide in the Missoula area through the year 2020. The Maintenance Plan was approved by the Missoula City-County Air Pollution Control Board on January 20, 2005, by the Missoula County Commissioners on January 26, 2005, and by the Missoula City Council on March 7, 2005 and complies with all State and federal requirements.

1.2 NATIONAL AMBIENT AIR QUALITY STANDARDS FOR CARBON MONOXIDE

On April 30, 1971, EPA established two NAAQS for carbon monoxide (CO): a rolling 8-hour averaged concentration of 9.0 parts per million (ppm) and a 1-hour concentration of 35 ppm.[1] Because Missoula has never recorded an exceedance of the 1-hour standard, only the 8-hour standard is addressed in this document. A violation of the 8-hour CO NAAQS occurs when two non-overlapping values of 9.5 ppm or higher are recorded during the calendar year.

The Clean Air Act (CAA) guides how the NAAQS are established, reviewed and revised by EPA. The CAA §109(b)(1) defines primary standards as "ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health." As a result, the Administrator sets a standard that will protect the most sensitive sub-population from adverse effects. The air quality criteria are to reflect the latest scientific information useful in indicating the kind and extent of all identifiable effects on public health or welfare that may be expected from the presence of the pollutant in ambient air.[2]

[1] US Environmental Protection Agency, 2000, *Air Quality Criteria for Carbon Monoxide*, EPA 600/P-99/001F, Office of Research and Development, Washington, D.C. 20460, page 1-2. (www.epa.gov/ncea/pdfs/coaqcd.pdf)
[2] US Environmental Protection Agency, 2000, Air *Quality Criteria for Carbon Monoxide*, page 1-1.

1.3 HEALTH EFFECTS OF CARBON MONOXIDE

Carbon monoxide is a colorless, odorless, tasteless, non-irritating gas that enters the body through the lungs where it is absorbed by the bloodstream. It combines with hemoglobin in the red blood cells, creating carboxyhemoglobin (COHb). Hemoglobin normally picks up oxygen from the lungs and carries it to the tissues. However, CO is able to attach to hemoglobin 200-230 times more readily than oxygen. As a result, when CO is present, it out-competes the oxygen and reduces the amount of oxygen the red blood cells can supply to the body. Compounding the effects of exposure is the long half-life (about 5 hours) of COHb in the blood. As a result of its long half-life, the amount of oxygen being distributed throughout the body is reduced even after exposure has ended.

The health effects of CO exposure depend on the amount and length of exposure, as well as the individual's health condition.[3] Exposure to higher levels of CO can cause headaches, dizziness, nausea and difficulty concentrating. Other effects include fatigue, loss of visual acuity and mental confusion. At high enough levels, CO can cause disorientation, unconsciousness, and even death.

At the lower levels more commonly associated with ambient air, the health effects of carbon monoxide are less well known. Studies have found that for healthy individuals, exposure to CO reduces the ability to sustain peak exercise, but it probably does not affect most people's ability to perform normal, everyday activities.[4] There are, however, subpopulations that are more negatively affected by low levels of CO.

In the 1999 review of the CO standard, EPA concluded that the health effects of greatest concern were cardiovascular effects.[5] Normal, healthy individuals have mechanisms to counter increased CO levels. Their bodies increase blood flow, allowing more blood and more oxygen to get to the tissues. However, many individuals with cardiovascular diseases (which include disorders of the heart and blood vessels) have a markedly reduced circulatory capacity and lack the ability to compensate by increasing blood flow to the tissues.

Cardiovascular disease is the leading cause of death in the United States. In 2000, it caused forty percent of all deaths.[6] That same year, over sixty percent of all death certificates listed it as a primary or contributing cause of death. One in five Americans, approximately 61.8 million people, has some form of cardiovascular disease. As a result, an increase in air pollution that affects morbidity (illness) or mortality (death) in the population could have a large impact on public health and health care costs.

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[3] Consumer Product Safety Commission, Undated, "Carbon Monoxide Questions and Answers," Document #466, Washington, D.C. (www.cpsc.gov/cpscpub/pubs/466.html)
[4] US Environmental Protection Agency, 2000, *Air Quality Criteria for Carbon Monoxide*, page 7-5.
[5] US Environmental Protection Agency, 2000, *Air Quality Criteria for Carbon Monoxide*, page 1-3.
[6] American Heart Association, 2002, *Heart Disease and Stroke Statistics – 2003 Update*, Dallas, Texas, page 5. (www.amercianheart.org)

In addition to affecting those with cardiovascular disease, low levels of CO potentially affect other groups.[7] These include:

- Fetuses, whose hemoglobin has a higher affinity for CO than adults and who could be more affected by a decrease in available oxygen;
- Newborn infants, who take in more air relative to their body weight and whose blood has a lower capacity to carry oxygen than most adults;
- Pregnant women, who also take in more air and have a tendency to be anemic (which reduces the oxygen-carrying capacity of blood);
- The elderly, whose ability to take up oxygen declines with age. CO exposure can further impair oxygen delivery to the tissues and limit the ability to meet daily metabolic requirements;
- People with anemia, who have low blood hemoglobin values and in some cases produce CO internally;
- Individuals with chronic obstructive pulmonary disease (for example, emphysema, bronchitis and asthma), whose lungs' ability to exchange air is impaired;
- People at high altitudes, who have not yet adapted to the lower oxygen content of the air;
- People using medicinal or recreational drugs with central nervous system depressant properties; and
- People exposed to chemical substances (such as methylene chloride), which increase internal CO production.

1.4 MISSOULA'S CARBON MONOXIDE PROBLEM

Missoula is located in the Rocky Mountains of western Montana. The Missoula urban area, home to about 69,000 people, is situated in a deep mountain valley, with the surrounding hills rising two to three thousand feet over the valley floor. Because of Missoula's meteorology and topography, winter temperature inversions that trap pollution are common. This situation has led to this relatively small urban area being designated as a non-attainment area for both particulate and CO.

CO is the product of incomplete combustion of carbon-containing fuels. Typical sources include vehicles, wood-burning stoves and fireplaces, coal burning, industry, outdoor burning and wildfires. Nationally, in 1970, on-road vehicles accounted for more than 68% of all CO emissions.[8] As a result, high concentrations of CO often occurred along heavily traveled roadways, especially at congested intersections. When the State was setting up the CO monitoring network in 1977, the objective was to monitor the most congested intersection in each of the larger towns. Malfunction Junction, where three major streets, Brooks, South and Russell, come together, was the obvious choice in Missoula. That intersection had long been the

[7] US Environmental Protection Agency, 2000, *Air Quality Criteria for Carbon Monoxide*, pages 7-6 – 7-10.

[8] U.S. Environmental Protection Agency, 2000, *National Air Pollutant Emission Trends, 1900 – 1998*, EPA-454/R-00-002, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, page 3-9. (www.epa.gov/ttn/chief/trends/trends98/chapter3.pdf)

site of lengthy waits and accidents. How to fix the Junction had been the subject of community debate for more than ten years.

Monitoring results from December 1977 and January 1978 showed that Missoula had a problem with CO – there were 135 exceedances of the NAAQS in 1977 and 100 more in 1978. Subsequent work showed that vehicles were the largest contributor to Missoula's CO problem, with wood burning also playing a major role. The Missoula City-County Health Department initially hoped that some minor intersection improvements and the Federal Motor Vehicle Emission Control Program would solve Missoula's CO problem, but exceedances of the NAAQS continued into the 1980's. Through public education and then by adopting a series of increasingly stringent regulations, Missoula worked on reducing residential wood burning (RWB) emissions (in part because of CO, but also because RWB had been identified as the largest source of particulate emissions in the valley). Missoula tried to reduce vehicle emissions by improving traffic flow through the intersection, and then, when required by the 1990 Clean Air Act Amendments (CAAA), implemented an oxygenated fuel program. The oxygenated fuel program produced dramatic results. Missoula has not recorded an 8-hour value over 9 ppm since the community started using oxygenated fuels in the fall of 1992.

However, in 1996, modeling of CO concentrations at the Brooks/South/Russell intersection showed there was still a potential problem.[9] Based on the worst case scenario, it was possible Missoula would violate the standard even with oxygenated fuel use and with the projected improvements in the motor vehicle fleet from the Federal Motor Vehicle Emission Control Program. As a result, the Missoula community committed to fixing the traffic congestion problem at that intersection, electing to realign South Avenue so that it no longer entered the intersection. This project will greatly reduce delays at the intersection and allow for the synchronization of traffic lights along Brooks Street. This will ease congestion at other intersections along the corridor as well. Modeling shows that with the realignment of South Avenue, Missoula will not violate the CO standard under worst-case conditions at any location around the intersection.

In a 1992 study by Benjamin Schmidt, the Health Department looked at other potential hotspots around town.[10] The study showed that Brooks/South/Russell had the highest CO readings, thereby affirming Missoula's focus on that intersection. Since 1992, traffic has increased on Reserve Street, a north-south arterial, because of road widening and commercial development. Several intersections along this arterial are congested, including Highway 93 and Reserve; South and Reserve; and Mullan and Reserve. In 2002/2003 these intersections had a similar amount of traffic to the Brooks/South/Russell intersection, as shown in Table 1-1 below.[11]

[9] HNTB Corporation, May 1996, *Intersection Air Quality Modeling Analysis Technical Report for the Brooks/South/Russell Intersection Transportation Improvement Project (South Avenue Realignment Alternative)*, page 15.

[10] Benjamin Schmidt, April 1993, *Missoula, Montana Carbon Monoxide Saturation Study December 5, 1992 to December 20, 1992*, Missoula City-County Health Department, Missoula, MT 59802.

[11] Mike Kress, Transportation Planner at the Office of Planning and Grants, December 29, 2004, personal communication with Shannon Therriault.

Table 1-1 Daily Average Number of Vehicles Traveling through Various Missoula Intersections (Using 2002 and 2003 traffic count data)

Intersection	Average Daily Vehicles (ADT)	Percentage of B/S/R ADT
Brooks, South and Russell (B/S/R)	49,330	100
Reserve and Mullan	52,560	106.6
Reserve and South Third West	45,090	91.4
Reserve and South Avenue	50,110	101.6
Reserve and US Highway 93	47,615	96.5

All of these intersections are very similar in terms of traffic loads. Reserve/Mullan and Reserve/South carry 6.6% and 1.6% more ADT, respectively, when compared to Brooks/South/Russell, while Reserve/South Third and Reserve/Highway 93 carry 8.6% and 3.5% less traffic, respectively, than Brooks/South/Russell. However, the Reserve Street intersections are "normal" four-way intersections, with larger right-of-ways and road widths than Brooks/South/Russell. Therefore, idling cars are spread further apart over longer distances. As a result, less CO accumulates in the immediate vicinity of the Reserve Street intersections than at Brooks/South/Russell, where three major streets come together causing idling cars to be in closer proximity to each other.

Another factor to consider is background concentrations of CO. The Department compared the total 2000 CO emissions for a typical winter weekday (a CO season day) for the four emission inventory grids surrounding each intersection.[12] These emissions were from on-road vehicles, wood stoves, industry, railroads, non-road motors and natural gas combustion. Table 1-2 shows that the Brooks/South/Russell intersection is surrounded by grids with higher CO emissions than any of the Reserve Street intersections.

Table 1-2 Total Daily Carbon Monoxide Emissions from the Four Emission Inventory Grids Closest to Various Missoula Intersections

Intersection	Total Daily CO Emissions from Surrounding Grids (kg CO/ CO Day)	Percentage of B/S/R Total Daily CO Emissions	2000 CO Emission Inventory Grid Numbers
Brooks, South and Russell (B/S/R)	13,227	NA	100, 101, 113, 114
Reserve and Mullan	5339	40	60, 61, 73, 74
Reserve and South Third West	6740	51	86, 87, 99, 100
Reserve and South Avenue	8187	62	99, 100, 112, 113
Reserve and US Highway 93	8411	64	112, 113, 125, 126

The grids closest to the Mullan and Reserve intersection (the intersection with the highest traffic) have only 40% of the emissions produced in the grids surrounding the Brooks/South/Russell

[12] Cain, Cyra. July 2004, *2000 Missoula, Montana,Carbon Monoxide Emission Inventory*, Department of Environmental Quality Permitting and Compliance Division, Air Resources Management Bureau, Analytical Services Section. Helena, MT 59620, Appendix A.

intersection. As a result of the unique geometry of the Brooks/South/Russell intersection, combined with the fact that area emissions are 36-60% lower at the other intersection, it is reasonable to assume that Brooks/South/Russell intersection is still the area with the greatest CO concentrations.

In addition, the levels of CO at the Malfunction Junction monitor are well below the federal standard of not more than one reading over 9 ppm, averaged over 8 hours. Based on data from the last five years, the highest second maximum CO reading at the monitor was 3.9 ppm, which is 57% below the federal standard. The Department computed the highest second maximum concentration at the modeled worst receptor at Brooks/South/Russell at 7.9 ppm, which is 12% below the standard. With these margins of safety, even looking at the worst-case scenario, there is no reason to believe that CO concentrations at any of these other intersections are not also below the standard.

1.5 REDESIGNATION PROCESS

The Clean Air Act allows states to ask EPA to redesignate non-attainment areas as long as those areas have fulfilled five specific criteria: they must have attained the NAAQS; they must have a fully approved State Implementation Plan; they must demonstrate that air quality improvements are permanent and enforceable; they must have fulfilled CAA §110 and Part D; and they must have a fully approved maintenance plan. The CAA requires that maintenance plans include adequate provisions to ensure attainment of the NAAQS for at least ten years after redesignation. Because EPA has up to 18 months to approve a plan, maintenance plans need to cover at least twelve years. (The plan included in this request demonstrates continued attainment of the standard until 2020.) Eight years after EPA approves a redesignation request, the State must submit a second 10-year maintenance plan (again, including 2 additional years to allow for EPA approval.) As a result, Missoula will submit a second plan in 2013 (or 2014) showing Missoula will continue to meet the NAAQS until at least 2025 (or 2026).

For most parts of Montana, the Department of Environmental Quality (DEQ) prepares redesignation requests and other State Implementation Plan documents. However, through an agreement with the Department of Health and Environmental Sciences (DHES), the predecessor of DEQ, and a proclamation of the Governor of Montana, the Missoula City-County Air Pollution Control Board performs these activities with the assistance of DEQ.[13] As a result, the Missoula City-County Health Department has prepared this document for the Board. DEQ has provided invaluable assistance by helping with research, coordinating with EPA, performing essential emission inventory and modeling work, and reviewing draft documents.

In an effort to coordinate with the transportation planning process, DEQ used the transportation data and planning assumptions from the 2004 Missoula Transportation Plan Update (originally planned for completion in 2002) for the modeling, emission inventory and projections needed for redesignation.

[13] 44 FR 45420

2.0 REDESIGNATION REQUEST AND MAINTENANCE PLAN

The State of Montana and the Missoula City-County Air Pollution Control Board request that EPA redesignate the Missoula non-attainment area to attainment/ maintenance status for the NAAQS for carbon monoxide. The current boundaries of the Missoula non-attainment area for carbon monoxide were published in the Federal Register (FR) on November 6, 1991.[14] The non-attainment area, which is illustrated in Figure 2-1, includes the areas within the following Township (T), Range (R) and Sections (S):

T 12, R 19, Sections 4, 5, 6, and 7;
T 13, R 19, Sections 2, 5, 7, 8, 11, 14 – 24 and 26 – 34;
T 13, R 20, Sections 23 – 26, 35 and 36; and
T 14, R 19, Sections 29 and 32.

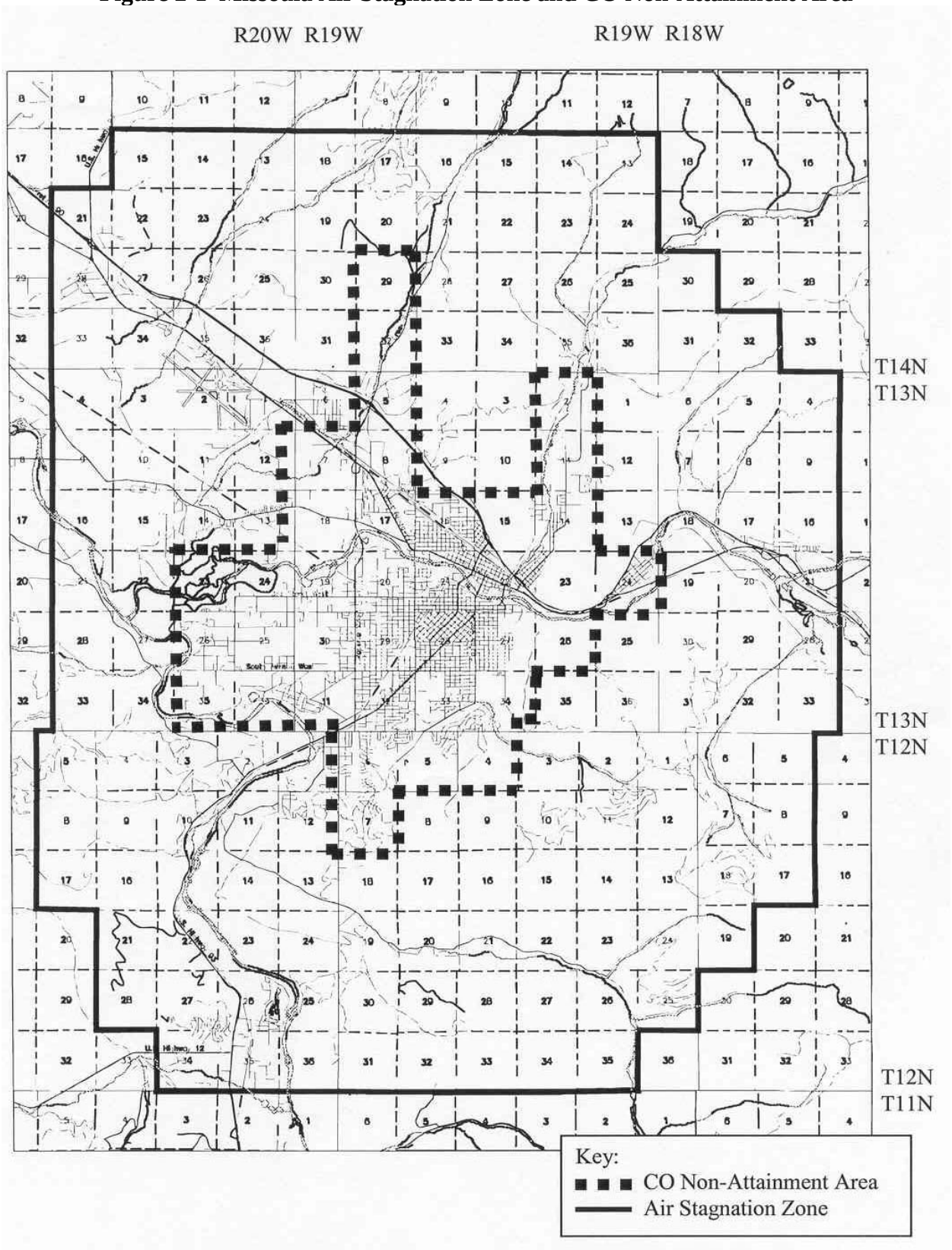
This request has been developed using guidance from the 1990 CAAA and the September 4, 1992 EPA memo from John Calcagni to the EPA Regional Directors.[15] The CAA §107(d)(3)(E) defines the five required criteria of a redesignation request. The criteria are as follows:

Criterion 1: Attainment of the Applicable National Ambient Air Quality Standard
Criterion 2: State Implementation Plan Approved by EPA [under 7410(k) – CAA §110]
Criterion 3: Permanent and Enforceable Improvements in Air Quality
Criterion 4: Fulfillment of CAA §110 and Part D Requirements
Criterion 5: Fully Approved Maintenance Plan under CAA §175A

Missoula has fulfilled Criteria 1-4, as demonstrated by this document, and submits a Maintenance Plan developed in accordance with CAA §175A with this request.

[14] 56 FR 56694
[15] John Calcagni, 1992, *Procedures for Processing Requests to Redesignate Areas to Attainment*, Memorandum to Regional Air Directors, Environmental Protection Agency.

Figure 2-1 Missoula Air Stagnation Zone and CO Non-Attainment Area



2.1 CRITERION 1: ATTAINMENT OF NAAQS

2.1.1 AMBIENT AIR QUALITY DATA

Ambient CO data was collected at the Missoula Malfunction Junction State and Local Air Monitoring Stations (SLAMS) site (30-063-0005) located at the intersection of Brooks, South and Russell Streets.[16] Data was collected and quality assured in accordance with 40 CFR Part 58 and recorded in the EPA Aerometric Information Retrieval System (AIRS). EPA has approved this SLAMS site and the data collected.

Until 1998, Missoula monitored CO at the Malfunction Junction site for the entire year. However, once it was well established that CO violations occurred now only in the late fall and winter, Missoula was able to reduce its monitoring to the first and last quarter of the calendar year (January through March and October through December, respectively.)

Figure 2-2 Malfunction Junction Monitoring Site

[16] The monitoring site is officially known as the "Malfunction Junction" SLAMS site, and so it is referred to as the "Malfunction Junction" monitoring site in this document. However, the intersection itself is referred to as the "Brooks/South/Russell intersection" or "Brooks/South/Russell" in this document.

The EPA Quick Look Report for this monitoring site contains data from 2000, 2001, 2002 and 2003, representing the 8 most recent quarters of CO monitoring data.[17] The data is summarized in the table below (Table 2-1). The site recorded no violations of the CO NAAQS during this period.

Table 2-1 8-Hour Averaged Carbon Monoxide Levels in ppm at Malfunction Junction Monitor, Missoula, MT[18]
Site 30-063-0005, Method 093

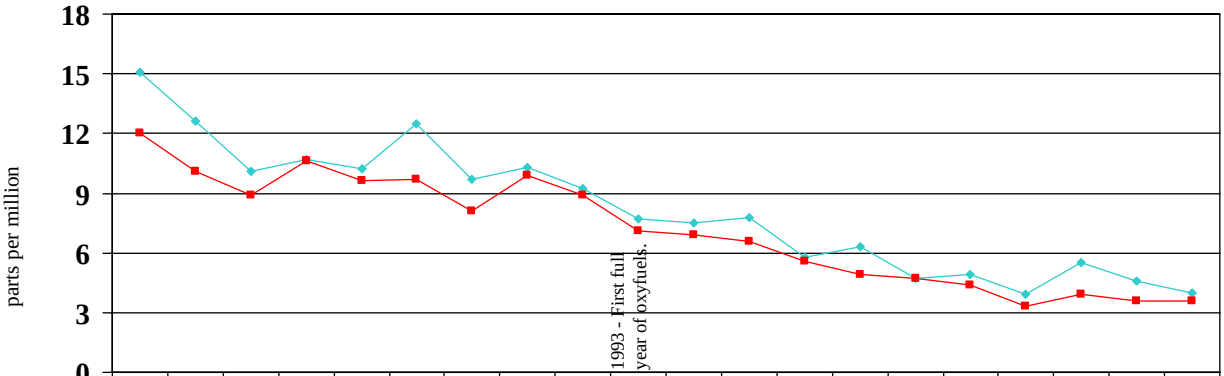
Year	Number of Observations	1ST Maximum 1-Hr	2ND Maximum 1-Hr	Observations over 35 ppm	1ST Maximum 8-Hr	2ND Maximum 8-Hr	Number of Observations Over 9 ppm
2000	4354	5.4	4.9	0	3.9	3.3	0
2001	4171	7.0	6.6	0	5.5	3.9	0
2002	4168	5.7	5.2	0	4.6	3.6	0
2003	3579	4.5	4.4	0	4.0	3.6	0

In 1992, the Health Department conducted a CO saturation study that confirmed that the Brooks/South/Russell intersection had the highest concentrations of carbon monoxide in Missoula.[19] As a result, the State and EPA agreed that the Health Department only had to monitor at the Brooks/South/Russell intersection.

Figure 2-3 shows that Missoula last violated the CO NAAQS in 1991. A violation of the 8-hour CO NAAQS occurs when two non-overlapping exceedances of the 8-hour standard are recorded during a calendar year. In 1992, Missoula only had one instance where the 8-hour average went above 9 ppm and that was before the oxygenated fuels went into effect in the fall of that year.

[17] United States Environmental Protection Agency, September 10, 2003 and April 27, 2004, *United States Environmental Protection Agency Air Quality System Quick Look Report* (AMP450).
[18] United States Environmental Protection Agency, September 10, 2003 and April 27, 2004, *United States Environmental Protection Agency Air Quality System Quick Look Report* (AMP450).
[19] Schmidt, 1993.

Figure 2-3 Missouri CO Levels 1982-2003, Malfunction Junction Monitor
1st and 2nd Highest 8-Hour Average



	82	83	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000	2001	2002	2003
1st	15.1	12.6	10.1	10.7	10.2	12.5	9.7	10.3	9.2	7.7	7.5	7.8	5.8	6.3	4.7	4.9	3.9	5.5	4.6	4
2nd	12	10.1	8.9	10.6	9.6	9.7	8.1	9.9	8.9	7.1	6.9	6.6	5.6	4.9	4.7	4.4	3.3	3.9	3.6	3.6

Federal 8-Hour Average Standard = 9 parts per million, not to be exceeded more than once per calendar year. No data available for 1984 or 1985.

2.1.2 SUPPLEMENTAL EPA-APPROVED AIR QUALITY MODELING

Since a small number of monitors may not be representative of area wide air quality, some places have to use dispersion modeling to more fully evaluate sources' impacts and to determine the locations of expected high CO concentrations. However, moderate CO non-attainment areas with design values below 12.7 ppm do not have to do supplemental air quality modeling in order to be redesignated.[20] Missoula is a moderate non-attainment area with a design value is 9.7 ppm, so dispersion modeling is not required. The design value is the highest second maximum value from a monitoring site within two consecutive calendar years. The two years of CO data are considered separately to determine the second maximum value for each year. For example, in 1988 and 1989, the second highest recorded 8-hour average for each year was 9.6 ppm and 9.7 ppm, respectively, therefore Missoula's design value was determined to be 9.7 ppm, which was the highest of the two second highest values.

2.2 CRITERION 2: APPROVED STATE IMPLEMENTATION PLAN

2.2.1 1977 CLEAN AIR ACT AMENDMENTS

The Clean Air Act Amendments of 1977 required EPA to establish the attainment status of all states in relation to the NAAQS. On March 3, 1978, EPA published the list of non-attainment areas, thereby designating the area within the Missoula city limits as non-attainment for CO.[21] As a result, Montana was required to prepare a plan to come into compliance with the standard. This plan is known as a State Implementation Plan or SIP. The Clean Air Act Amendments of 1977 required states to submit the necessary plan revisions to EPA by January 1, 1979.

[20] John Calcagni, 1992.
[21] 43 FR 9009

In 1978, DHES hired a contractor to model CO concentrations at the Brooks/South/Russell intersection to evaluate the extent of Missoula's CO problem. None of the available models could accommodate Missoula's situation, with its stagnant air, high background levels of CO, mid-level elevations and complicated meteorology. As a result, they were not able to find a model that could produce realistic results. Since the scope of Missoula's non-attainment area could not be determined and suspected violations at other locations could not be verified, Missoula could not complete the work needed to develop a CO SIP by the January 1, 1979 deadline.

In April 1978, Montana Governor Thomas Judge submitted a letter to EPA, certifying that the Missoula City-County Air Pollution Control Board had primary responsibility for preparing the area's non-attainment plans. Once plans were developed and approved at the local level, they were submitted to the Governor via DHES, who in turn submitted them to EPA.

Following this process, the State submitted a SIP revision to EPA in April 1979 with a schedule for developing a Missoula CO control plan. The schedule called for updating the CO emission inventory, developing a calibrated model for Brooks/South/Russell by February 1980, selecting potential control measures by April 1980 and modeling control measures by May 1980.[22] On August 2, 1979, EPA proposed to reject the Missoula CO portion of the SIP because the control plan was inadequate.[23] On March 4, 1980, EPA formally disapproved Missoula's plan, but stated that if Montana submitted a control plan by August 15, 1980, they would not impose federal funding limitations authorized under Sections 176 and 316 of the Clean Air Act.[24]

When the State did not submit a control plan by August 15, 1980, EPA imposed a moratorium on the construction and modification of major stationary sources of carbon monoxide, as required by CAA §110(a)(2)(1) and 40 CFR 52.24. [25]

On August 14, 1981, the State submitted a control plan that relied on projected federal automobile emission standards and reconstruction of the intersection of Brooks Street, South Avenue and Russell Street. However, since the reconstruction would not be completed until 1985, the modeling predicted that it would not be possible to attain the standard by December 31, 1982 as required by the Clean Air Act. The modeling did show that by 1987, CO concentrations at the intersection would be reduced to 8.33 ppm for an 8-hour average, which was below the standard of 9.0 ppm. As a result, the submittal included a request to extend the attainment deadline from 1982 to 1987. On July 5, 1983, EPA proposed to approve the control plan, but to deny the deadline extension and continue the industrial construction ban for the Missoula area.[26] EPA argued that in order to be eligible for an extension, Missoula would have had to request it with the initial submittal in 1979.

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[22] Joe Carvitti, 1980, *Missoula, Montana Carbon Monoxide Analysis*, prepared for the Department of Health and Environmental Science, Helena, Montana by PEDCo Environmental, Inc., Cincinnati, Ohio.
[23] 44 FR 45420
[24] 45 FR 14072
[25] 48 FR 30698
[26] 48 FR 30696

Missoula completed the intersection reconstruction in the fall of 1985. EPA approved the Missoula CO SIP on January 16, 1986, lifting the construction ban on industrial sources. However, in doing so, EPA expressed concern about the potential impact of residential wood burning on attainment.[27] Missoula did not violate the CO NAAQS in 1986, but by 1987 Missoula was once again violating the federal standard.

On June 6, 1988, in response to the Mitchell-Conte amendment of the Budget Reconciliation Act of 1987, EPA published a new list of CO non-attainment areas.[28] At that point, EPA increased the size of several CO non-attainment areas, including Missoula's, to incorporate the entire county. They reasoned that suburban and rural areas impact urban air quality and that attainment could only be achieved by controlling emissions throughout the region. EPA did concede that in certain locations CO violations could be attributed to localized traffic problems (or "hotspots") and agreed to consider requests to modify non-attainment area boundaries in such instances.

The Health Department and DHES felt it was unreasonable to designate all of Missoula County as non-attainment. On June 8, 1988, the State submitted a request to reduce the CO non-attainment boundary to coincide with the nearest section line outside the city limits. The State argued that 80% of the Missoula County population resided in the urban area and that mountains separated much of the outlying area from the urban airshed. The rest of the county was considered "rural" or "remote", and no areas outside the initial study area were expected to reach a population of 50,000 by the year 2000. DHES submitted additional required technical support documentation on April 12, 1989. On November 6, 1991, EPA approved the revised boundaries.[29]

On June 17, 1988, EPA notified Montana that the Missoula CO SIP was substantially inadequate because of continued exceedances of the 8-hour CO NAAQS at Malfunction Junction. In accordance with its Post-1987 Attainment Policy, EPA required Montana to submit a new plan that demonstrated attainment within three to five years of plan approval. The State also had to complete a new CO emission inventory for Missoula. In November 1989, Montana submitted a 1988 base year CO emission inventory to EPA.

2.2.2 1990 Clean Air Act Amendments

The Clean Air Act Amendments of 1990 authorized EPA to classify CO non-attainment areas based on the severity of the air pollution problem. They based the classification on CO design values. The design value represents the highest second highest value from a monitoring site within two consecutive calendar years. Individual years of CO data are separately considered to determine the second maximum value for each year. Non-attainment areas with CO design values of less than 9.1 ppm were determined to be unclassified (but still non-attainment areas); areas with CO design values between 9.1 ppm and 16.4 ppm were designated as moderate; and those areas with design values above 16.4 ppm were classified as serious. Moderate areas were further broken down into moderate-1 and moderate-2, with a design value between 9.1 ppm – 12.7 ppm and 12.8 ppm – 16.4 ppm, respectively.

[27] 51 FR 2397
[28] 53 FR 20722
[29] 56 FR 56694

Based on monitoring at the Brooks/South/Russell intersection from 1987 through 1988, Missoula's design value was 9.7 ppm. As a result, on November 6, 1991, EPA classified Missoula as a moderate-1 non-attainment area for CO[30]. This designation required Missoula to develop a new base year inventory for 1990 and to establish an oxygenated fuel program by November 1, 1992.

The Health Department and DHES completed a 1990 base year emission inventory and submitted it to EPA on July 18, 1995. In addition to the base year inventory, the Clean Air Act Amendments require moderate CO non-attainment areas to submit emission inventories every three years. In 2000, the State submitted the 1993 and 1996 emissions inventories to EPA for approval. In 2003 (later revised in 2004), the state submitted a 2000 emission inventory.

In June 1992, Missoula incorporated an oxygenated fuels program into the Missoula City-County Air Pollution Control Program. It was approved by the Montana Board of Environmental Review (BER) in September 1992, and implemented that November. On November 6, 1992, the State submitted the oxygenated fuels program to EPA for approval. On November 8, 1994, EPA approved the SIP revisions containing Missoula's oxygenated gasoline program.[31]

The Montana Clean Air Act requires local programs to have rules consistent with and at least as stringent as state regulations. As a result, Missoula has to periodically update and revise its Program to keep up with changes in the state's rules and laws. Once approved at the local level by the Board, the Missoula City Council and the Missoula County Commissioners, it is reviewed by the Montana BER. Once approved by BER, the new or modified rules can be implemented, and then, if appropriate, the Governor will submit changes to EPA for inclusion into the SIP. Using this procedure, EPA approved revisions on December 13, 1994 regarding CO contingency measures and on December 6, 1999 regarding an update to the SIP narrative. [32, 33]

On October 31, 1997, the Montana BER approved revisions to the Missoula program regarding general definitions, open burning, and criminal penalties. The fine was increased from $1000 to $10,000 per day of violation. EPA approved the changes with a direct final rule on January 3, 2000.[34]

On November 17, 2000, the Montana BER approved revisions to the Missoula air rules that included extensive renumbering of the regulations. In addition, changes were made to chapters regarding program authority and administration, definitions, failure to attain standards, emergency episode planning, general provisions, standards for stationary sources, outdoor burning, fugitive particulate, solid fuel burning devices, fuels, motor vehicles, enforcement and administrative procedures, and penalties. In most cases, the rule revisions were to allow for easier use through reorganization, to clarify existing policy, and/or to ensure consistency with the Montana and Federal Clean Air Acts. The Governor requested that these be incorporated into

[30] 56 FR 56694
[31] 59 FR 55585
[32] 59 FR 64133
[33] 64 FR 68034
[34] 65 FR 16

the SIP in a letter dated April 30, 2001. On November 15, 2001, EPA proposed a direct final rule that approved the changes as submitted, resulting in a fully approved SIP.[35]

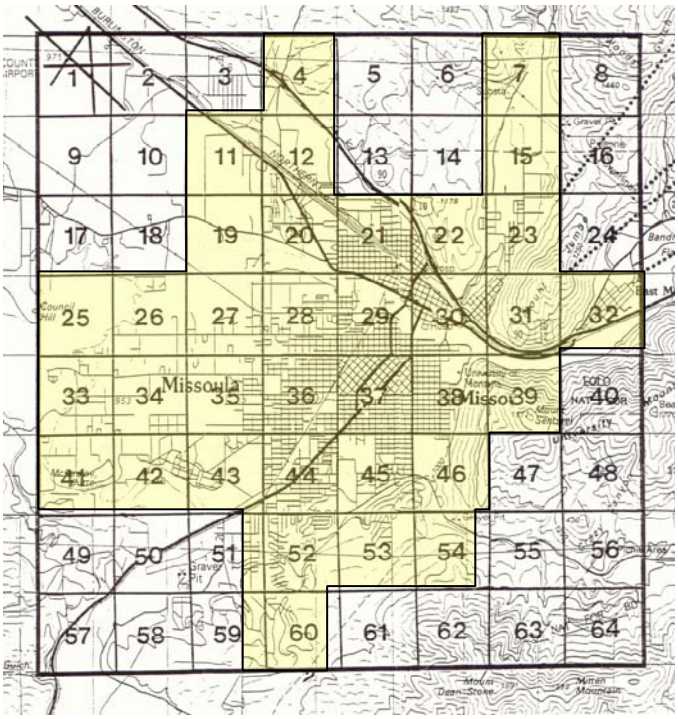
2.3 CRITERION 3: PERMANENT AND ENFORCEABLE IMPROVEMENTS

2.3.1 OVERVIEW

The State must demonstrate, based on CAAA §107(d)(3)(E), that the improvement in air quality leading to attainment of the NAAQS is based on permanent and enforceable measures, and that the reductions are not the result of temporary reductions in emissions or unusually favorable meteorology.

To illustrate that the improvements are permanent and enforceable, DEQ compared 1990 emissions to 2000 emissions. A direct comparison of non-attainment area emissions was not possible, as the 1990 Baseline Emission Inventory did not include Sections 29 and 32 of Township 14, Range 19, which are part of the current non-attainment area. The 1990 inventory tabulated emissions in an 8 x 8 mile grid, so DEQ used that as the basis for comparison.[36] Figure 2 -4 shows the 1990 E.I. area, hereinafter referred to as the "Missoula area" in this section.

Figure 2-4 1990 Baseline Emission Inventory Area (Missoula Area) with Grid Numbers



CO emissions in the Missoula area decreased by 40% between 1990 and 2000. Table 2-2 illustrates these changes by source category.

[35] 66 FR 57391

[36] The 2000 CO emissions in this discussion vary from those used in the maintenance plan (Section 2.5), because the maintenance plan uses 2000 emissions from only the non-attainment area.

Table 2-2 Missoula Area CO Emissions[37]
Comparison between 1990 and 2000

Source	1990 Emissions[38] (tons/ CO day)	2000 Emissions[39] (tons/CO day)	Change from 1990 to 2000 (tons/ CO day)	Percent Change
Aircraft Exhaust	0.49	0.40	-0 .09	-18
Industrial Processes	0.35	0.26	-0 .09	- 26
Natural Gas	0.16	0.28	+ 0.12	+ 75
Non-road Motors	Not Included	2.39	+ 2.39	NA
On-road Vehicles	70.44	52.65	- 17.79	- 25
Railroad	0.29	0.05	-0 .24	- 83
Residential Wood Burning	32.82	6.71	-26.11	- 80
TOTAL	104.55	62.74	-41.80	- 40

The 2000 emission inventory indicates that the two largest sources of CO in the Missoula valley are residential wood burning and on-road vehicles. These two sources, which together made up 95% of the 2000 CO season day emissions in the Missoula area, decreased dramatically between 1990 and 2000: 80% for residential wood burning and 25% for on-road vehicles. It is reasonable to attribute the reductions from both these sources to the implementation of federal, state and local controls. These controls are explained in more detail in Section 2.3.2, "Control Measures".

In 2000, all the other sources combined comprised only 5% of the CO winter weekday emissions in the Missoula area. Industrial emissions, which contributed about 0.41% of the daily wintertime CO emissions in 2000, decreased between 1990 and 2000, in part, because of the 1996 closure of White Pine and Sash, a precision milling and wood-treating factory. Natural gas combustion emissions increased 75% during the same time period and accounted for 0.45 % of the total 2000 CO emissions. Railroad emissions also accounted for a very small percent of the total 2000 CO emissions. Unfortunately, comparing emissions from 1990 to 2000 is difficult because the method for calculating emissions changed between 1990 and 2000.

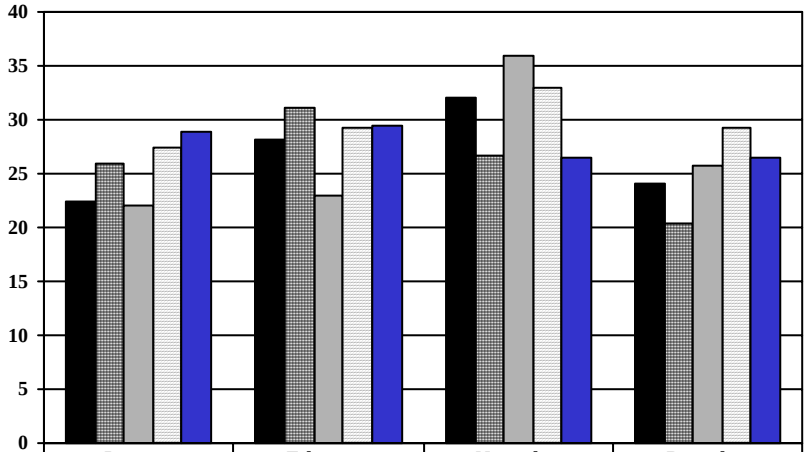
A downturn in the economy is clearly not responsible for the improved ambient CO levels in Missoula. Between 1990 and 2000, the City of Missoula's population increased by 32.9%, growing from 42,918 to 57,053 people according to the U.S. Census Bureau.[40] The county's population increased 21.8% during that same period.[41] With the population increases have come

[37] Emissions were compared for the 1990 Emission Inventory Area. The 2000 Emission Inventory Area was quite a bit bigger, but only those emissions from the grids studied in 1990 were included for this comparison.
[38] Jerry Schneider, Ken Anderson and Mike Kress, 1992, *1990 Base Year Carbon Monoxide Emission Inventory, State of Montana – Missoula County*, Air Quality Bureau, Department of Health and Environmental Sciences, Helena, MT 59620, page 23.
[39] Cain, July 2004, *2000 Emission Inventory*, page 90.
[40] United States Census Bureau, 2003, *Geographic Comparison Table GCT-Pa. Age, Sex and Group Quarters: 1990* http://factfinder.census.gov/servlet/GCTTable?_ts=81449261812 and Quick Tables, *DP-1. Profile of General Demographic Characteristics, Data Set: Census 2000 Summary File (SF 1) 100 % Data, Geographic Area: Missoula city, Montana*, http://factfinder.census.gov/servlet/GCTTable?_ts=81449261812.
[41] United States Census Bureau, 2003, State and County Quickfacts, July 14, 2003. http://quickfacts.census.gov/qfd/states/30/30063.html

corresponding increases in employment activities and traffic. Within the 1990 CO emission inventory area, vehicle miles traveled (VMT) grew from 908,105 in 1990 to 1,033,465 in 2000, a 14% increase.[42] It can be assumed that, absent current measures, growth in population, employment and traffic would increase CO emissions and the potential for elevated CO concentrations, not the other way around.

Favorable meteorology does not appear to be responsible for the improvement in CO levels. Since the introduction of oxygenated fuels in November 1992, CO design values for Missoula ranged between 8.9 and 3.3 ppm. Except for 2001, the design values show a clear downward trend (Figure 2-3). In the same time period, average monthly temperatures have varied, with some years above the 30-year average and other years below (Figure 2-5). [43,44]

Figure 2-5 Average Monthly Temperatures in Degrees Fahrenheit (^{o}F) for Missoula, MT



	January	February	November	December
30-year Average	22.4	28.2	32.1	24.1
2000	25.9	31.2	26.6	20.4
2001	22.1	22.9	35.9	25.8
2002	27.5	29.2	33	29.3
2003	28.9	29.5	26.4	26.5

2.3.2 CONTROL MEASURES

The State concludes that the following permanent and enforceable control measures have resulted in the improvement in air quality in Missoula. At this time, no changes are proposed to these regulations and programs. Below is a brief description of each of these measures:

[42] Schneider, Anderson and Kress, 1992, page 17 and Cain, 2004, "2000 Emission Inventory," page 52.
[43] Western Regional Climate Center, National Oceanic and Atmospheric Administration, www.wrcc.dri.edu/cgi-bin/cliGCStT.pl?mtmiss, updated June 24, 2004.
[44] National Weather Service, Missoula, Montana, *Preliminary Local Climatological Data (WS Form F-6)*, http://www.wrh.noaa.gov/climate/?wfo=mso, October 11, 2004.

2.3.2.1 Oxygenated Fuels

As required by the Clean Air Act Amendments of 1990, Missoula incorporated an oxygenated fuels program into its regulations in November 1992. From November 1 through the last day of February, all gasoline sold within the control area must have a minimum oxygen content of 2.7% by weight. In the first season of implementation, the area fuel was oxygenated with methyl tertiary butyl ether (MTBE). However, because of ~~a~~ public concern about the health effects of this chemical, Missoula reached a voluntary agreement with the area fuel distributors to use ethanol, and not MTBE, as the oxygenate.[45]

This program has had dramatic results on Missoula's ambient wintertime CO levels. Since the oxygenated fuels program was implemented in the fall of 1992, Missoula has not exceeded an 8-hour average of 9 ppm for CO.

2.3.2.2 Federal Motor Vehicle Emission Control Program

The Federal Motor Vehicle Emission Control Program (Emission Control Program) has dramatically reduced CO emissions through a continuing process of requiring manufacturers to produce vehicles that meet lower and lower emission standards.

The Emission Control Program began in 1966 when Congress required minimal emission controls on all 1968 and later cars. Next, the Clean Air Act of 1970 called for a 90 percent reduction in automobile emissions, requiring new cars to meet a 3.4 grams per mile CO standard by 1975. In 1975, the automobile industry introduced the first catalytic converters and, with them, unleaded gasoline became commercially available. But the new car fleet was not able to meet the 3.4 gram per mile standard until 1981, when most new cars had sophisticated three-way catalysts and on-board diagnostic computers with oxygen sensors. Congress delayed implementation of the standard several times, in order to give the industry enough time to find practical, technological solutions.

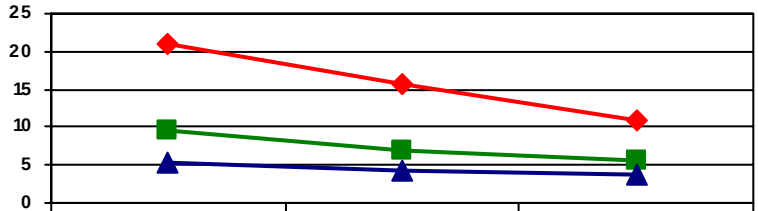
After that, in 1990, Congress amended the CAA, directing EPA to create Tier I vehicle emission standards and to study whether more stringent Tier II standards would be needed for American cities to meet the NAAQS in the future. The Tier I standards, which went into effect in 1994, did not change the CO emission requirements for light duty cars, but lowered the CO emission standard for light duty trucks to 4.4 grams of CO per mile. In 1992, EPA set CO emission limits at cold temperatures (20^{o}F), when CO emissions are generally at their highest. Then in 2000, EPA finalized the Tier II standards, requiring light duty trucks and sports utility vehicles to match the emission rates of passenger cars at 3.4 grams of CO per mile.

While not the purpose of the model, the effect of Emission Control Program can clearly be seen in the 1996 air quality modeling completed for the Brooks/South/Russell intersection changes. (The modifications are discussed in more detail in Section 2.3.2.4, "Changes in Transportation Infrastructure.") HNTB Corporation modeled a "no-action alternative" that took into account

[45] Oxyfuel Panel, February 16, 1993, *Response to Chairman Schweber's Charge Dated January 7, 1993*, Memorandum to the Air Pollution Control Board.

continued use of oxygenated fuels, decreasing woodstove use and the effect of the Emission Control Program on CO concentrations at three intersections.[46]

Figure 2-6 Intersection Modeling
No Action Alternative, Peak 8-Hour Averaged CO Concentrations in ppm



	1993	1996	2015
Brooks/South/Russell	21.1	15.6	10.8
Brooks/Fairview	9.6	6.9	5.5
Brooks/East South	5.3	4.2	3.6

As this modeling shows, federal standards will continue to provide emission reduction benefits as older vehicles are retired and vehicles meeting the newest standards replace them in the fleet.

2.3.2.3 Residential Wood Burning Regulations

Wood smoke is a source of CO. In the late 1970s and mid-1980s, the Health Department recorded violations of the CO standard in low traffic, residential areas. These violations could be attributed primarily to residential wood burning instead of vehicle exhaust. In addition, Missoula's base year 1990 carbon monoxide emissions inventory indicated that residential wood combustion was responsible for 26.1% of Missoula's wintertime CO emissions.

To reduce the amount of CO emitted from residential wood burning, Missoula adopted progressively more stringent solid fuel burning device regulations.[47] Currently, the only new solid fuel burning devices permitted in the Air Stagnation Zone by Missoula's air regulations are pellet stoves. Additionally, the regulations require that most woodstoves be removed at the time of sale of the property. As a result, far less wood is now burned in Missoula than in the past, as shown by the summary of residential wood burning (RWB) surveys in Table 2-3. The last woodstove survey for the Missoula area was completed in 1996. However, it is reasonable to assume that the amount of wood burned in the Missoula area has continued to decline because of the regulations prohibiting the installation of new wood burning devices and those requiring most wood stoves be removed from the property at the time of sale.

[46] HNTB Corporation, 1996, *Intersection Air Quality Modeling Analysis Technical Report for the Brooks/South/Russell Intersection Transportation Improvement Project (South Avenue Realignment Alternative),* page 15.
[47] The woodstove regulations were also aimed at reducing particulate pollution in the Missoula valley.

Table 2-3 Woodstove Survey Comparison, 1977 – 1996[48]

Survey Year	Number of Households	Number of Households Burning Wood	% Households Burning Wood	Tons of Wood Burned	Tons of CO Emitted
1977	21,305	8,032	37.7	25,912	2,462
1980	21,970	11,666	53.1	54,120	5,141
1983	22,875	11,483	50.2	40,296	6,363
1986	23,325	10,193	43.7	33,174	6,316
1992	26,930	6,732	25.0	22,297	3,595
1996	27,205	5,332	19.6	15,151	1,569

2.3.2.4 Changes in Transportation Infrastructure

When Missoula was designated as non-attainment in 1978, the City's engineering department was already planning to improve traffic flow at the Brooks/South/Russell intersection. The project, which was to be completed by 1985, restricted left turns and added right turn and departure lanes. The model showed that it would improve the worst days at the junction, but would not get rid of violations entirely until 1987 (as a result of projected decreased in automobile emissions based on the federal emission standards.) After completion of the intersection project in late 1985, Missoula briefly attained the standard, but a little over a year later, Missoula once again violated the 8-hour CO NAAQS.

In 1991, as Montana's only moderate CO non-attainment area, Missoula received $27 million in federal transportation funding from the Congestion Mitigation Air Quality Improvement (CMAQ) Program, to be spent over six years. The purpose of the funding was to help non-attainment areas come into compliance with the NAAQS. In 1993, the Brooks/South/Russell intersection was identified as one of the projects to receive CMAQ funding. The City undertook a long and involved public process to find a solution the community would accept that would solve the congestion and air quality problems at the intersection. Many alternatives were explored, including an overpass, an underpass, various roundabouts, system improvements to surrounding arterials, traffic demand management, an urban interchange, and a combination of an overpass or underpass with other system improvements. Most of these alternatives were eliminated because they would not solve the air quality problem at the intersection. The overpass alternative, which would significantly reduce the CO at the intersection, was overwhelmingly rejected by the public. Finally, the City settled on an at-grade realignment of South Avenue, so that South Avenue would no longer enters the intersection.

Air quality modeling done in 1996 showed that, given worst-case meteorological conditions, Missoula would exceed the national ambient air quality standards for CO if nothing were done at the intersection.[49] However, with the project, Missoula would continue to attain the standard with current controls at least through 2015.

[48] Otis, 1977; Church, 1981; Steffel, 1983; Eco-Resource Systems, 1986; Economic Consultants Northwest, 1992; Ganesan, 1997.
[49] HNTB, page 15.

Table 2-4 Brooks/South/Russell Intersection 8-Hour Maximum Carbon Monoxide Concentrations (ppm)

Alternative	1993	1998	2015
Existing/No Action	21.1	15.6	10.8
South Ave. Realignment	NA	8.3	6.6

HNTB Corporation incorporated several assumptions into the model, including the continued use of oxygenated fuels, decreasing CO background levels as more woodstoves are removed from homes, and an improving vehicle fleet, as older vehicles are replaced with newer, lower CO-emitting models. As a result, the "Existing/No Action" alternative showed that CO levels decrease over the years. However, that decrease by itself could not assure that Missoula would not have a violation of the NAAQS. In addition, at some point, the improvements from fleet turn-over could be overwhelmed by growing congestion and increasing VMT.

The realignment project simplifies the intersection, reducing the projected peak-hour delay from 120 seconds to 20 seconds. It also allows better synchronization of all the traffic lights along the Brooks Street from Reserve to Mount, which will reduce congestion along the whole corridor. The City Council held a public hearing in September of 1997 and approved the project that October. In April 1999, the City Council and the community reaffirmed its commitment to the project. Final design and right-of-way acquisition have been completed and MDT has awarded the construction contract. The project is expected to be completed by the end of 2005.

In addition to reconstructing the Brooks/South/Russell intersection, Missoula has invested in other transportation projects designed to reduce CO emissions. For example, the City replaced traffic signals at 50 locations in order to assist in the synchronization of traffic signals to reduce delays and congestion. Many other projects were designed to promote the use of transit and non-motorized transportation, in an effort to curb the increase of vehicle miles traveled each day in the Missoula area. These include several transit projects, such as replacing old diesel buses with cleaner running models, building a downtown transfer center, establishing a downtown circulator trolley, improving amenities at bus stops, installing bike racks on the buses and enhancing transit operations. They also include several new sidewalks, walkways, bike lanes, two pedestrian bridges, a bike shelter at city hall, and funding for the City's Bicycle Pedestrian Coordinator and Missoula In Motion, an organization that promotes transportation demand management strategies.

2.3.2.5 Outdoor Burning

Like woodstoves, outdoor burning is a source of CO. Missoula's outdoor burning regulations severely limit the amount of outdoor burning that occurs in December, January and February, the months in which Missoula has violated the 8-hour CO standard. The impact of outdoor burning on CO levels is minimized by outdoor burning regulations that:

- Require a permit for every burn;

- Allow only untreated lumber and natural vegetation to be disposed of through outdoor burning. (In the Air Stagnation Zone, there are additional restrictions that prohibit the burning of piles of leaves or grass);
- Require burners to call the Outdoor Burning Hotline on the day they wish to burn for notification of any fire hazard or air quality restrictions that may be in effect;
- Establish an Impact Zone to allow for more stringent restrictions in the areas around the urban core;
- Establish burning seasons to reduce the generation and accumulation of smoke; and
- Prohibit all outdoor burning in the winter months of December, January and February, except ceremonial bonfires, emergency burning and essential wintertime burning.

These components have reduced the contribution of outdoor burning to the carbon monoxide levels in the non-attainment area, especially during the critical months of November through February.

2.4 CRITERION 4: FULFILLMENT OF CLEAN AIR ACT REQUIREMENTS

For the purposes of redesignation, an area must meet all of the general non-attainment area requirements of the CAA §110 and Part D. All of §110(a)(2) have been met by Missoula and/or the State of Montana, including:

1. The establishment and implementation of enforceable emission limits;
2. Monitoring, compiling and analyzing of ambient air quality data;
3. Construction reviews and permitting of new and modified major stationary sources;
4. Consulting with and providing for the participation of local governments affected by the plan;
5. Assurance that Missoula and the State of Montana have adequate funds and authority to enforce the SIP and associated regulations; and
6. Permit fees for stationary sources.

Montana state law and a June 1991 stipulation between the Health Department and DHES delineate the responsibility and authority between the local and state entities. As permitted by the Clean Air Act of Montana, the Health Department has jurisdiction over all air pollution sources within the City and County of Missoula except sources that require the preparation of an environmental impact statement pursuant to Title 75, Chapter 1, part 2; sources that are subject to regulation under the Montana Major Facility Siting Act, as provided in Title 75, Chapter 20; and sources that have the potential to emit 250 tons or more a year of any pollutant, subject to regulation under Title 75, Chapter 2 that were not regulated by the County before January 1, 1991, and any sources that the Montana Board of Environmental Review has retained exclusive jurisdiction over. The Health Department and DEQ further coordinate activities with an annual contract and quarterly reports.

Part D of the CAA, pertaining to non-attainment plan provisions, requires the following items be addressed:

1. The implementation of reasonably available control measures, including reasonable available control technologies (RACT) for existing sources;
2. Reasonable further progress toward meeting attainment;
3. A current emissions inventory and periodic inventories every 3 years until attainment;
4. The identification and quantification of allowable emissions for new and modified stationary sources;
5. A stationary source permitting program;
6. Other measures such as enforceable emission limitations, other control measures, schedule for compliance;
7. Compliance with CAA §110 provisions; and
8. Contingency measures.

The EPA-approved SIP for Missoula already includes the provisions required by CAA §110(a)(2) and Part D. Missoula updated its program on November 17, 2000 (the date it was approved by the BER and could be implemented), in part to ensure Missoula met all the requirements of the federal CAA in preparation for submitting this redesignation request. EPA approved the extensive rewrite and reorganization of the Missoula Program on November 15, 2001.[50]

Other Part D requirements that are applicable in non-attainment and maintenance areas include the general transportation conformity provisions of CAA § 176(c). These provisions ensure that federally funded or approved projects and actions conform to the Missoula CO SIP before the transportation plan, projects or programs are implemented. EPA approved Montana's revised conformity regulations on November 19, 2001.[51]

2.5 CRITERION 5: MAINTENANCE PLAN

The Clean Air Act §107(d)(3)(E) stipulates that for a non-attainment area to be redesignated, EPA must approve a maintenance plan that meets the requirements of CAA §175A. The maintenance plan is a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least ten years after redesignation by EPA.

EPA has established the core provisions listed below as necessary for approval of maintenance plans.

Provision 1. Attainment Emission Inventory
Provision 2. Maintenance Demonstration
Provision 3. Approved Monitoring Network and Verification of Continued Attainment
Provision 4. Control Plan
Provision 5. Contingency plan
Provision 6. Conformity Determinations under the Maintenance Plan
Provision 7. Maintenance Plan Revisions

[50] 66 FR 57391
[51] 66 FR 57882

2.5.1 ATTAINMENT EMISSION INVENTORY

DEQ completed Missoula's 2000 CO emission inventory (E.I.) in June 2003 and submitted it to Tim Russ at EPA, Region VIII in Denver, Colorado on June 9, 2003. DEQ later revised the inventory and resubmitted it to EPA in August 2004. The results of the inventory for the non-attainment area are summarized below.

Emissions are calculated for a "CO season day," which is the day of the week with the highest average daily traffic (ADT) within the CO season. The "CO season" is defined as the three consecutive months with the highest number of NAAQS violations. In Missoula, a "CO season day" is an average weekday in December, January and February.

DEQ calculated emissions from seven source categories: industry, natural gas combustion, non-road gasoline and diesel exhaust, on-road gasoline and diesel exhaust, railroad locomotive exhaust and residential wood burning. Using actual (instead of permitted) industrial emissions, the total CO emissions for a CO season day was 107,455 pounds, or 53.7 tons. Table 2-5 lists the total CO season day emissions, percentage contributions and ranking for sources in the non-attainment area.

Table 2-5 2000 Season Day Total CO Emissions, Percentages, And Rank of Six Source Categories in the Missoula CO Non-Attainment Area[52]

Source	CO Season Day Emissions (pounds/ day)	CO Season Day Emissions (tons/ day)	Percentage Contribution (%)[a]	Rank of Emissions
Industrial Processes	590	0.30	0.55	5
Natural Gas Combustion	1,010	0.51	0.94	4
Non-road Gas and Diesel Motor Exhaust[53]	3,853	1.93	3.58	3
On-road Vehicle Exhaust	89,722	44.86	83.50	1
Railroad Locomotive Exhaust	61	0.03	0.06	6
Residential Wood Burning	12,220	6.11	11.37	2
Total	107,455	53.74	100.00	

a. Variance may occur due to rounding conventions.

[52] Cain, 2004, *2000 Emission Inventory*, Table 5.3A, page 82.

[53] The Non-road vehicle emissions were different in the 2000 CO Emission Inventory (Cain, July 2004) and the Redesignation Demonstration (Cain, October 18, 2004) because EPA, Region 8 required DEQ to use a newer method for assessing non-road emissions for the Redesignation Demonstration but did not require that the attainment inventory be updated. The number used for the Redesignation Demonstration was 10,058.49 pounds of CO emitted in the Missoula Non-Attainment area each day, a 161% increase. It also increased the ranking of Non-road Exhaust to 2, while lowering the rank of Residential Wood Burning to 3.

On-road vehicle exhaust contributed the highest amount of CO (83.5%), with residential wood burning a distant second at 11.4%. The other sources combined contributed less than 6% to the total CO emissions.

2.5.2 MAINTENANCE DEMONSTRATION

As required by CAA §175(A), redesignation requests must be accompanied by a SIP revision that demonstrates maintenance of the NAAQS for at least 10 years after redesignation. According to EPA guidance, Missoula is not required to perform area wide dispersion modeling for this demonstration.[54] However, hot-spot modeling, which typically predicts CO concentrations at intersections, is recommended when an area's high CO levels are primarily due to localized traffic problems. This situation exists in Missoula, and as a result, DEQ modeled CO concentrations at the Brooks/South/Russell intersection. In addition, DEQ projected future year emissions to assess the area wide picture and to provide the necessary information for deriving a CO budget for transportation conformity (discussed in Section 2.5.2.2). Both the modeling and the future year emission projections show that Missoula will continue to meet the NAAQS.

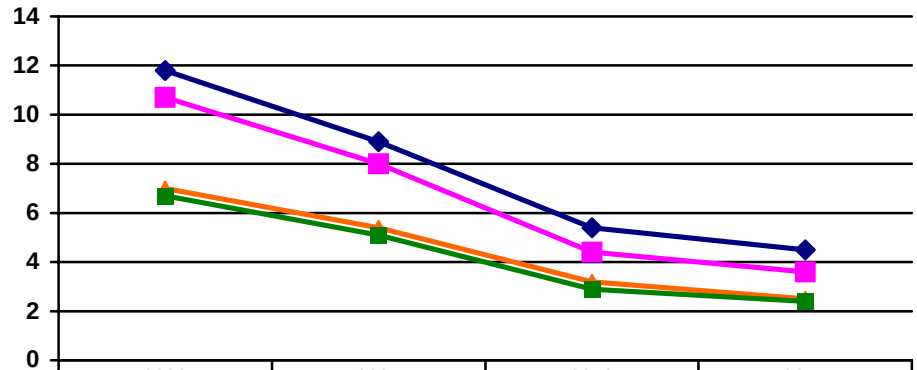
2.5.2.1 Brooks/South/Russell Modeling

DEQ conducted computer modeling to assess transportation-related emissions generated near the Brooks/South/Russell intersection.[55] All other emissions, including industry, wood burning, natural gas combustion, non-road sources and transportation-related emissions from other roads, were accounted for as part of the "background," but were not specifically modeled. DEQ used traffic patterns, the layout of the intersection, characteristics of the vehicle fleet and meteorological data to predict ambient CO concentrations in the area of the Brooks/South/Russell intersection. DEQ assumed that the committed intersection project described in Section 2.3.2.4 would be completed between 2005 and 2010. Consistent with EPA guidance, DEQ modeled CO concentrations at 60 receptor points around the intersection, including the monitoring site. As with past modeling and monitoring, this model found that the monitor is not located in the area of highest CO concentrations at the intersection. The actual point of highest concentration varied, depending on the meteorological data that was used. While the model predicted a violation of the 8-hour NAAQS of 9 ppm at a point near the intersection in 2000, it did not predict any violations at the monitoring location or at any of the receptor sites in future years (2005, 2010 and 2015). Figure 2-7 summarizes the results from the modeling.

[54] Calcagni, 1992.

[55] Cain, Cyra. October 21, 2004, *Cal3QHCR Modeling Analysis for Missoula, Montana, Redesignation to Carbon Monoxide NAAQS Attainment*, Department of Environmental Quality Permitting and Compliance Division, Air Resources Management Bureau, Analytical Services Section. Helena, MT 59620.

Figure 2-7 Modeled 8-Hr CO Concentrations at Brooks/South/Russell



	2000	2005	2010	2015
Highest 8-Hr concentration	11.8	8.9	5.4	4.5
2nd Highest 8-Hr concentration	10.7	8	4.4	3.6
Highest 8-Hr concentration at monitor	7	5.4	3.2	2.5
2nd Highest 8-Hr concentration at monitor	6.7	5.1	2.9	2.4

The procedures used for this modeling can be found in Appendix C.

2.5.2.2 Emission Projections

The second approach looks at total predicted CO emissions in the maintenance area rather than ambient concentrations. DEQ based the projections, estimated for a CO season day, on the 2000 attainment inventory and growth predictions.[56] The sources that were evaluated include industrial point sources, natural gas combustion, non-road engine exhaust, on-road engine exhaust, railroad locomotive exhaust and residential wood burning. The attainment inventory also assessed aircraft emissions, but these were not included in the projections since the airport lies outside the non-attainment area. Appendix D contains the projections document, including the procedures DEQ used.

Overall, the future emission projections show significant decreases in emissions: 21%, 30 %, 34% and 36 % in 2005, 2010, 2015 and 2020 respectively. The two largest categories of emitters, on-road vehicle exhaust and residential wood burning, which together make up almost 90% of the 2000 emissions, show significant decreases over time. For on-road gasoline and diesel vehicles the large decreases can be attributed primarily to fleet turnover. Missoula has a significant number of older, more polluting cars and trucks (older than 1976 model year) that were built before modern federal emission standards took effect. As these vehicles are removed from the fleet, overall emissions decrease. In addition, while the CO emissions limitation for light-duty cars has not changed recently, EPA required car manufacturers to meet the emission limitation even in cold temperatures (when emissions are at their highest) in 1992 and adopted new limitations in 1994 for light-duty trucks. As a result, as older cars and trucks are replaced

[56] Cyra Cain, October 18, 2004, *Redesignation Demonstration for the Missoula, Montana, Carbon Monoxide Nonattainment Area.* Montana Department of Environmental Quality, Permitting and Compliance Division, Air Resources Management Bureau, Analytical Services Section. Helena, MT 59620.

with newer vehicles, less CO is emitted from the vehicle fleet as a whole. The emission reductions have such a large effect that, at this point, they offset the projected increases in vehicle miles traveled. The decreases in woodstove emissions can be attributed to Missoula's woodstove regulations which prohibit the installation of new woodstoves (except certain pellet stoves), and require many older, higher emitting stoves to be removed from the house at the time of sale. Table 2-6 lists the projected emissions from each type of source.

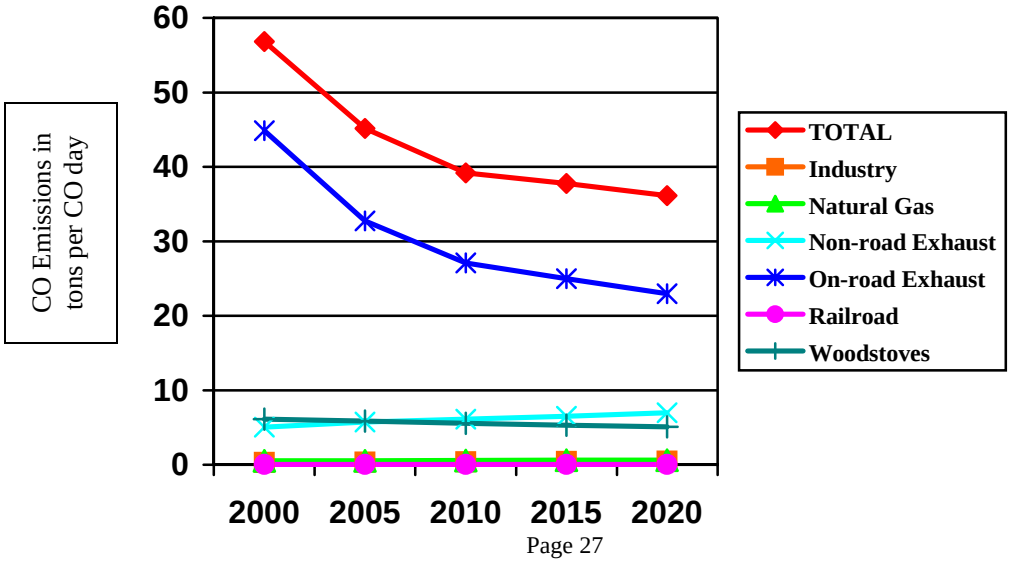
Table 2-6 CO Season Day Emissions in Tons from 2000 to 2020 in the Missoula CO NAA

Source Category	2000 CO Daily Emissions (tons/day)[a]	2005 CO Daily Emissions (tons/day)[a]	2010 CO Daily Emissions (tons/day)[a]	2015 CO Daily Emissions (tons/day)[a]	2020 CO Daily Emissions (tons/day)[a]
Non-utility Industrial Point Sources	.30	.33	.37	.41	.46
Natural Gas Combustion	.50	.53	.56	.59	.62
Non-road Gasoline and Diesel Engine Exhaust	5.03	5.70	6.10	6.48	6.96
On-road Gasoline and Diesel Vehicle Exhaust	44.86	32.73	27.10	24.97	22.98
Railroad Locomotive Exhaust	.03	.03	.04	.04	.05
Residential Wood Burning	6.11	5.84	5.54	5.29	5.07
Total	56.83	45.16	39.71	37.78	36.14
Difference From 2000 Emissions	0.00	11.67	17.12	19.04	20.69

a. Variance may occur due to rounding conventions.

Figure 2-8 graphically illustrates the trends and magnitude of each source of CO over time.

Figure 2-8 CO Emissions in Tons by Source from 2000 to 2020



As with the modeling done for the Brooks/South/Russell intersection, the projections show Missoula will continue to attain the NAAQS into the future.[57]

2.5.3 MONITORING NETWORK AND VERIFICATION OF CONTINUED ATTAINMENT

CO compliance monitoring in the Missoula area, including the Malfunction Junction location, will continue in accordance with the Quality Assurance Project Plan (QAPP), the EPA Quality Assurance Manual (EPA-600/9-76-005, revised December 1984), 40 CFR Part 50 including Appendix C, and 40 CFR Part 58 including Appendices A through G. The State will continue to regularly submit accuracy data for the Missoula CO site and precision data for the Montana CO network to EPA through the federal Precision and Accuracy Reporting System.

DEQ and the Health Department intend to operate the Malfunction Junction site for the foreseeable future. If measured mobile source parameters (e.g., VMT, congestion, fleet mix, etc.) change significantly over time, the Health Department will perform the appropriate studies (like bag sampling) to determine whether additional and/or re-sited monitors are necessary. Any future changes in CO monitoring will be addressed in the annual Montana Network Review (MNR). The State will submit an EPA network modification request form for EPA approval before making any changes. Missoula will also conduct emergency episode CO monitoring, if necessary, in accordance with Missoula's Emergency Episode Avoidance Plan. [58]

2.5.4 CONTROL PLAN

Missoula will continue to maintain the NAAQS and prevent backsliding by keeping essential programs in place, including stationary source permitting, outdoor burning permitting, solid fuel burning device restrictions and the oxygenated fuels program. These programs are contained within the Missoula City-County Air Pollution Control Program, are already a part of the SIP, and are not being revised at this time.

When the required Maintenance Plan revision is submitted to EPA (eight years after redesignation is approved) the Heath Department will review all control programs and determine the effectiveness and necessity of each to maintain the NAAQS. If warranted, this assessment could occur prior to the Maintenance Plan revision. If any changes to Missoula regulations or the Maintenance Plan are necessary within the first maintenance period, they will be forwarded to EPA for approval after local and state approval.

2.5.5 CONTINGENCY PLAN

CAA §175A(d) requires that the maintenance plan contain contingency provisions to assure that the State will promptly correct any violation of the carbon monoxide standard which occurs after redesignation to attainment. The primary elements of the contingency plan are 1) a list of potential contingency measures, 2) tracking and triggering mechanisms to determine when the

[57] The projections do limit sources' potential to emit CO. Only on-road transportation is limited by a budget, as established in Section 2.5.6.
[58] Missoula City-County Air Pollution Control Program, Appendix B, November 17, 2000.

contingency measures are needed, and 3) a description of the process for recommending and implementing the contingency measures.

Implementation of the contingency plan does not automatically require a revision of the SIP, nor is the area necessarily redesignated once again to non-attainment. Instead, the State will have an appropriate time frame to correct a violation by implementing one or more of the contingency measures. In the event that violations continue to occur after contingency measures have been implemented, additional contingency measures will be implemented until the violations are corrected.

2.5.5.1 List of Potential Contingency Measures.

CAA §175A(d) requires the Maintenance Plan to include as potential contingency measures all of the carbon monoxide control measures contained in the SIP before redesignation. Missoula is not removing or modifying any control measures at this time. In addition, the Missoula City-County Air Pollution Control Program currently contains CO contingency measures, which are not being changed as part of this redesignation request, including:

a. Expansion of the oxygenated fuel program to other months besides November, December, January and February as described in Rules 1.103 and 10.110 of the Missoula City-County Air Pollution Control Program.

b. Further restricting woodstove burning as described in Rules 1.103 and 9.119 of the Missoula City-County Air Pollution Control Program.

If necessary, Missoula will evaluate other potential strategies, including but not limited to increasing oxygenated fuel content up to 3.1% by weight, constructing transportation projects and implementing transportation control measures, in order to address any future violations in the most appropriate and effective manner possible.

2.5.5.2 Tracking

The primary tracking plan for the Missoula area consists of continuous carbon monoxide monitoring by the Health Department as described above. The Health Department will notify the Board, local governments, DEQ and EPA of any exceedance of the carbon monoxide standard within 45 days of occurrence.

The ongoing transportation planning process carried out by the Missoula Transportation Policy Coordinating Committee in coordination with the Health Department, the Missoula Department of Transportation, DEQ, and EPA will serve as another means of tracking mobile source emissions into the future. In this process, actual VMT and emission trends will be compared to the modeled projections.

2.5.5.3 Triggering

A trend of increasing CO concentrations or a single 8-hour average of 9.5 ppm or higher may trigger a voluntary, local process by the Board to identify and evaluate potential contingency measures. However, the only federally enforceable trigger for mandatory implementation of

contingency measures is a violation of the carbon monoxide standard. Specifically, this would be two or more values of 9.5 ppm or higher during a calendar year.

2.5.5.4 Process for Implementing Contingency Measures

Missoula will implement the contingency measures outlined in the Missoula City-County Air Pollution Control Plan within sixty (60) days of notification by the DEQ and EPA that the area has violated the carbon monoxide NAAQS. If those measures are not adequate, the Board, in conjunction with the Air Quality Advisory Council, will initiate a process to evaluate other potential measures. The Health Department and Council will recommend measures to the Board within 180 days of notification. The Board will then hold a public hearing to consider the recommendations, along with any other contingency measures the Board believes may be appropriate to effectively address the violation. Any new regulations must also be approved by the Missoula City Council, the Missoula County Commissioners and the Montana Board of Environmental Review. The necessary contingency measures will be adopted and implemented within one year of the Health Department being notified of the violation.

2.5.6 CONFORMITY DETERMINATIONS UNDER MAINTENANCE PLANS

The conformity provisions ensure that federally funded or approved projects and actions are consistent with the air quality planning goals of the Missoula CO control plan. The original transportation conformity rule of November 24, 1993 and the original general conformity rule of November 30, 1993 each provided important guidance with respect to non-attainment areas and maintenance areas operating under maintenance plans.[59] The current provisions that apply for transportation conformity are found in 40 CFR 93 Subpart A and for general conformity in Subpart B. Furthermore, the EPA's transportation conformity rule was recently revised on July 1, 2004.[60] Under either rule, conformity can be demonstrated by indicating that the expected emissions from planned actions are consistent with the emissions budget for the area.

For the Missoula CO maintenance area, total carbon monoxide emissions must be lower than those of 2000 (the base year.) The Missoula area on-road vehicle emissions budgets are:

44.86 tons per day for 2005 through 2009
43.22 tons per day for 2010 through 2019
42.67 tons per day for 2020 and beyond

The emissions budgets are derived by taking the difference between the base year (2000) total emissions and future year total emissions as computed in the Redesignation Demonstration completed by DEQ.[61] This difference is the safety margin. For example,

2010 Safety Margin = Total 2000 CO Emissions - Total 2010 CO Emissions

The safety margin, less one ton, is added to the projected on-road vehicle emissions for each year to arrive at the on-road vehicle emissions budget. For example,

[59] 58 FR 62188, 58 FR 63214
[60] 69 FR 40004
[61] Cain, Cyra, October 18, 2004, *Redesignation Demonstration*, page 3.

2010 On-Road Emission Budget = On Road Vehicle Emission Budget + Safety Margin – 1 Ton

The results are shown in Table 2-7.

Table 2-7 On-Road Vehicle Emissions Budget and Calculations for 2000, 2010 and 2020

Year	**On-Road Vehicle Emissions** (tons per day)	**Total emissions** (tons per day)	**Safety Margin** (tons)	**Available Safety Margin** Minus 1 ton	**On-Road Vehicle Emissions budget** (tons per day)
2000	44.86	56.83	NA	NA	44.86
2010	27.10	39.71	17.12	16.12	43.22
2020	22.98	36.14	20.69	19.69	42.67

Three emission budgets are calculated for the Missoula CO non-attainment area. The first applies to the years 2005 through 2009; the second applies to 2010 through 2019 and the third applies to 2020 and beyond.

The budgets that are established in this plan apply to on-road transportation only. Budgets for other sources are not established by this maintenance plan.

2.5.7 MAINTENANCE PLAN REVISIONS

The CAA requires that a Maintenance Plan revision be submitted to EPA eight years after the original redesignation request and maintenance plan are approved. The purpose of the revision is to show how an area will continue to meet the NAAQS for an additional ten years following the initial ten-year period. The Health Department and the DEQ commit to developing and submitting a revised Maintenance Plan eight years after EPA redesignates the Missoula non-attainment area to attainment.

3.0 CONCLUSION

Missoula has satisfied all the criteria of CAA §107(d)(3)(E) for EPA to redesignate Missoula to attainment. This request specifically demonstrates attainment of the 8-hour CO NAAQS showing no monitored violation since 1992. It demonstrates Missoula has an approved SIP, that the improvements are permanent and based on enforceable measures, and that there is a plan for continued maintenance of the NAAQS.

APPENDIX A: GLOSSARY

Air Stagnation Zone – A specific geographic area delineation in the greater Missoula urban area, roughly 4 ½ miles beyond the city limits, that is relevant to various Missoula City-County Air Pollution Control Program Rules.

Ambient Air – That portion of the atmosphere, external to buildings, to which the general public has access.

Attainment Area – An area considered to have air quality as good as or better than the National Ambient Air Quality Standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.

Carbon Monoxide (CO) -- A colorless, odorless gas, which is toxic because of its tendency to reduce the oxygen-carrying capacity of the blood.

Clean Air Act (CAA) & Clean Air Act Amendments (CAAA) – The original Clean Air Act was passed in 1963, but our national air pollution control program is actually based on the 1970 version of the law. The 1990 Clean Air Act Amendments are the most far-reaching revisions of the 1970 law.

Conformity – Conformity is a means to: (1) ensure Federal activities do not interfere with the budgets in the SIPs; (2) ensure actions do not cause or contribute to new violations; and (3) ensure attainment and maintenance of the NAAQS. There are two sets of regulations; Transportation Conformity Regulations (applicable to highways and mass transit) and General Conformity Regulations (applicable to everything else).

Design Value – The design values are used by EPA to classify non-attainment areas. The design value represents the second highest annual value from a monitoring site within two consecutive calendar years. Individual years of CO data are separately considered to determine the second maximum value for each year.

Areas with CO design values of less than 9.1 ppm were determined to be unclassified (but still non-attainment areas); areas with CO design values between 9.1 ppm and 16.4 ppm were designated as moderate; and those areas with design values above 16.4 ppm were classified as serious. Moderate areas were further broken down into moderate-1 and moderate-2, with a design value between 9.1 – 12.7 ppm and 12.8 – 16.4 ppm, respectively.

Missoula's CO design value is 9.6 ppm.

Emission – The release of an air pollutant into the outdoor atmosphere.

Environmental Protection Agency (EPA) – The federal agency responsible for regulating air quality.

Inversion – An anomaly in the normal positive atmospheric lapse rate (normally temperatures decrease with increasing altitude). This usually refers to a thermal inversion, in which a layer of warmer air occurs above a layer of cooler air.

Maintenance Areas – Areas that previously did not meet National Ambient Air Quality Standards, but have been redesignated by EPA and have an approved Maintenance Plan in place.

Metropolitan Planning Organization (MPO) – the organization designated to coordinate transportation planning in the state's urban areas (over 50,000 population). In Missoula, the MPO is the Missoula Planning Policy Committee and is staffed by the transportation planners from the Office of Planning and Grants.

National Ambient Air Quality Standards (NAAQS) for CO – EPA has two standards for CO:

- a rolling 8-hour average concentration of 9.0 ppm, and
- a 1-hour concentration of 35 ppm.

The national standard for carbon dioxide allows for no more than one value above 9 ppm for the 8-hour standard and 35 ppm for the 1-hour standard in a calendar year.

Non Attainment Areas – Areas designated by EPA where monitoring has shown that the NAAQS have not been met. Areas with CO design values of less than 9.1 ppm were determined to be unclassified (but still non-attainment areas) ; areas with CO design values between 9.1 ppm and 16.4 ppm were designated as moderate; and those areas with design values above 16.4 ppm were classified as serious. Moderate areas were further broken down into moderate-1 and moderate-2, with a design value between 9.1ppm – 12.7 ppm and 12.8 ppm – 16.4 ppm, respectively.

Oxygenated Fuels – Gasoline which has been blended with alcohols or ethers that contain oxygen in order to reduce carbon monoxide and other emissions. In Missoula County oxygenated fuels have a minimum oxygen content of 2.7% by weight and are required between November 1 and the last day of February.

Reasonably Available Control Technology (RACT). -- Devices, systems, process modifications or other apparatus or techniques determined on a case-by-case basis to be reasonably available, taking into account the necessity of imposing such controls in order to attain and maintain a national or Montana ambient air quality standard, the social, energy, environmental, and economic impacts of such controls and alternative means of providing for attainment and maintenance of such standard.

State Implementation Plan (SIP) – A detailed description of the programs and regulations a state will use to carry out its responsibilities under the Clean Air Act. The Clean Air Act requires that EPA approve each SIP. Members of the public are given opportunities to participate in review and approval of state implementation plans.

Vehicle Miles Traveled (VMT) – A measure of both the volume and extent of motor vehicle operation; the total number of vehicle miles traveled within a specified geographical area over a given period of time.

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