3.10 Air Quality

3.10.1 Introduction

Before passage of the Clean Air Act (CAA) of 1970, it was recognized that transportation is a major contributor to air pollution. Since passage of the CAA, air quality in most U.S. metropolitan areas, including the Colorado Springs urbanized area, has improved. While some of the improvement in air quality resulted from local implementation of air quality control strategies, a greater share resulted from continuing advances in motor vehicle and fuels technologies.

The Clean Air Act charged the Environmental Protection Agency with developing and enforcing regulations that govern air quality. In 1971, EPA established National Ambient Air Quality Standards (NAAQS) designed to protect the public from adverse health effects associated with air pollution. EPA established standards for six "criteria" pollutants:

- Carbon monoxide (CO)
- Ozone (ground level) (O_3)
- Oxides of nitrogen (NO_x)
- Oxides of sulfur (SO_x)
- Fine particulate matter, 10 microns or smaller in aerodynamic diameter (PM_{10})
- Lead (Pb)

By 2030, traffic volumes are projected to grow in response to continuing development that is both currently approved and planned. The proposed improvements along Woodmen Road are designed to accommodate the projected traffic levels in the area.

Without the proposed improvements, the majority of intersections along the corridor would operate at a failing Level of Service (LOS). Even with the improvements, three intersections (Woodmen Road/Lexington Drive, Woodmen Road/Rangewood Drive, and Woodmen Road/Duryea Drive) will operate at LOS D. Therefore, in accordance with state and federal guidance, these intersections were evaluated to ensure that carbon monoxide (CO) levels would not exceed NAAQS.

Air Pollution

"Air Pollution" is a general term that refers to one or more substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or reducing human or animal health. Regulations for air pollutant emissions exist to protect human health and welfare and the environment.

Air pollution from roadway use includes:

- Carbon monoxide, ozone, and other pollutants associated with mobile source tailpipe emissions
- Suspended particulates (PM_{10}) from sand, dirt, and vehicle exhaust

Air Quality Acronyms

APCD – Air Pollution Control Division

AQCC – Air Quality Control Commission

CAA – Clean Air Act

CDPHE – Colorado Department of Public Health and Environment

CO – carbon monoxide

CSUA – Colorado Springs Urbanized Area

NAAQS – National Ambient Air Quality Standards

NO_2 – nitrogen dioxide

NOx – oxides of nitrogen

O_3 – ozone

Pb – lead

ppm – parts per million

PM_{10} – particulate matter less than 10 microns in diameter

SO_2 – sulfur dioxide

SOx – oxides of sulfur

ug/m^3 – micrograms per cubic meter

Particulate matter (PM_{10}) emissions, primarily dust, will also occur during construction activities. However, dust will be controlled though Best Management Practices (BMPs), and emissions will be temporary in nature.

Table 3.10-1 presents a summary of impacts to air quality and Proposed Action mitigation measures associated with the Woodmen Road Corridor project.

Table 3.10-1
Impacts to Air Quality and Proposed Mitigation

Topic	No Action Alternative Impacts	Proposed Action Impacts	Proposed Action Mitigation
Conformity with CO and PM_{10} standards	Attainment for CO and PM_{10}	Attainment for CO and PM_{10}	None needed
CO	15 intersections along Woodmen Road will degrade to a LOS F by 2030, and 19 will degrade to LOS D	Three intersections along Woodmen Road will operate at LOS D by 2030	None needed
Regional haze (O_3 and PM_{10})	No impact on visibility or regional haze to nearby national parks and wilderness (Class I) areas	No impact on visibility or regional haze to nearby national parks and wilderness (Class I) areas	None needed
Air toxics	Not applicable	Not applicable	Not applicable

Transportation/Air Quality Conformity Requirements

"Conformity" provisions were added to the CAA in 1977, and strengthened in 1990, to provide a strong link between the important issues of transportation improvements and protection of air quality.

The conformity regulations apply in areas that currently, or have in the past, violated the NAAQS for one or more pollutants. The conformity regulations ensure that federally funded or approved transportation plans, programs and projects do not cause or contribute to exceedances of NAAQS. The conformity regulations apply to the Pikes Peak Region because of past violations of the carbon monoxide standards. In 1999, EPA redesignated Colorado Springs as an attainment/maintenance area.

Colorado Air Quality Control Commission Regulation No. 10, *Criteria for Analysis of Conformity*, enacts the federal conformity requirements as part of Colorado's State Implementation Plan (SIP) for air quality. As part of the Colorado SIP development process, an emissions budget for CO is established for non-attainment and attainment/maintenance areas to maintain the NAAQS.

Scoping and Agency Coordination

The scope, methodology, and underlying assumptions for assessment of potential air quality impacts associated with the proposed Woodmen Road capacity improvements were determined with input from the Pikes Peak Area Council of Governments (PPACG), the Air Pollution Control Division (APCD) of the CDPHE, and the CDOT Environmental Programs Branch. The base transportation data set was initially obtained from PPACG. This data includes definitions of the existing base-year regional transportation network and the conforming 2030 fiscally constrained Regional Transportation Plan (RTP) network used for the current, approved Pikes Peak regional air quality conformity demonstration.

Following completion of traffic forecasts and traffic operations analyses, an air quality-scoping meeting was held with APCD and CDOT Environmental Programs staff. PPACG was then asked to confirm project assumptions included in the fiscally constrained RTP and the associated Air Quality Conformity Demonstration. A letter of concurrence from PPACG is included in Chapter 9, *Agency Correspondence*.

The Proposed Action is consistent with the RTP. The Pikes Peak Region's RTP addresses corridor-level capacity improvements, including the need for system capacity enhancements, by calling for additional through laneage.

All identified RTP improvements incorporate necessary intersection upgrades as required to achieve criteria levels of service (peak hour Level of Service [LOS] D minimum). The 2030 fiscally-constrained, conforming RTP includes widening Woodmen Road to six lanes from I-25 to Powers Boulevard and four lanes from Powers Boulevard to US 24. The 2030 RTP also includes Woodmen Road interchanges at Academy Boulevard, Union Boulevard, and Powers Boulevard. The grade-separated interchange at Powers Boulevard, included in the 2030 RTP, will be constructed by CDOT and is included in the No Action Alternative.

Definitions

Conformity – metropolitan planning organizations are required to develop forecasts of emissions of air pollutants from vehicular traffic and to ensure that projected future emissions are within limits of "emissions budgets" and result in attainment of the NAAQS.

Non-Attainment – a geographic area that does not meet the USEPA standards of a criteria air pollutant.

Attainment – a geographic area in which levels of a criteria air pollutant meet the health-based primary standard (NAAQS) for the pollutant.

CO Maintenance Plan – a plan developed by metropolitan planning organizations and approved by USEPA that sets strategies and emissions budgets to avoid violation of the NAAQS for CO and "maintain" attainment status.

Emissions Budget – these budgets are established to ensure that the region can meet national ambient air quality standards.

State Implementation Plan – a detailed description of the programs a state will use to carry out its responsibilities in reducing air pollution under the CAA.

Traffic Operations Analysis

Queuing and excessive stop-delay at signalized intersections produce increased local CO concentrations due to concentrated emissions from idling vehicles. Intersection LOS is used as an indicator of whether increased emission concentration may result in localized exceedances of the CO standard. Analysis of CO "hot spot" impacts is conducted for intersections in which traffic operations are expected to fall below LOS C. The following traffic assumptions, analysis methodology, and data were used to evaluate existing and future traffic operations along Woodmen Road for air quality screening purposes:

- Base year 2000 traffic volumes were reconciled to the PPACG 2000 Regional Transportation Model and 2000 U.S. Census data.
- The current PPACG Fiscally Constrained Regional Transportation Plan/Model was used as the basis to forecast traffic volumes.
- Current and historical traffic counts and growth rates were used as a basis to adjust PPACG Model volumes.
- Intersection LOS analysis was completed for the base year (2000) and the 2030 RTP planning horizon, using peak hour volume estimates and projections.
- Intersection LOS was determined based on Transportation Research Board Highway Capacity Manual criteria.

CDOT Environmental Programs and the CDPHE APCD reviewed and concurred with the results of the air quality modeling (see Chapter 9, *Agency Correspondence*).

3.10.2 Affected Environment

Meteorology and Climate

The geographical and meteorological characteristics of the study area contribute to current air quality conditions. The study area is located along the foothills of the Rocky Mountains. It is in the subdrainage basin of Monument and Fountain creeks, which drain into the Arkansas River south of the area.

The climate is moderate, with low humidity and average daily maximum temperatures ranging from approximately 42°F in January to 85°F in July. The region is semi-arid, with average annual precipitation of 16.4 inches.

Air Quality and Pollutant Levels

The Colorado Springs region is designated as an attainment/maintenance area for carbon monoxide. According to the carbon monoxide maintenance plan for the Colorado Springs attainment/maintenance area, mobile source (motor vehicle) emissions of CO resulting from the regional transportation system (including the Proposed Action) must not exceed the regional CO emissions budget of 531 tons per day. Projected CO emissions from the PPACG *2030 Regional Transportation Plan* and the *2005-2010 Transportation Improvement Program* conformity analyses are presented in Table 3.10-2.

Table 3.10-2
Projected Mobile-Source Carbon Monoxide Emissions with Implementation of the Regional Long-Range Transportation Plan

Year	CO Emissions (tons per day)
2010	312.6
2020	278.2
2030	306.8
Regional Emissions Budget	**531.0**

Source: Pikes Peak Area Council of Governments

The Colorado Springs Region is in attainment of all other criteria pollutants. Ozone levels, while currently below NAAQS, have been increasing since 1997. PPACG and the CDHPE APCD are initiating proactive efforts to reduce the potential for a future violation of the federal 8-hour O_3 standard (0.08 ppm). Because stop-and-go traffic results in higher emissions of O_3 precursor pollutants (hydrocarbons and NO_x) than traffic at moderate, free-flow speeds, measures that improve traffic flow figure prominently in the control strategies. Additionally, because of monitored violations of the 8-hour standard in Denver in 2002 and 2003, the EPA is requiring Denver's gasoline to have lower volatility (Reid Vapor Pressure) than was allowed in previous years. This is expected to reduce ozone precursor emissions. The Denver Region initiated the use of low volatility fuels beginning in the summer of 2004. Since Colorado Springs receives fuel from the same refinery and supply system, the new reduced-volatility fuel is already being sold in the Pikes Peak Region. Importantly, this fuel is used not only for on-road motor vehicles, but also in gasoline-powered non-road vehicles (e.g. construction equipment) as well as gasoline-powered tools (lawnmowers) and generators. Emissions reductions due to this and other control measures in the Denver area are expected to slow the upward trend in ozone that has been observed in the Pikes Peak Region.

On December 18, 2003, the Colorado Air Quality Control Commission approved the *2nd Revised Carbon Monoxide Maintenance Plan* for the Colorado Springs attainment/maintenance area. The direct final rule for the new SIP emissions budget was published in the Federal Register on September 7, 2004, and became effective November 7, 2004. The revised plan is based on the MOBILE 6.2 emission factor model, and resulted in a CO mobile source emissions budget of 531 tons per day. The revised plan also eliminated the Vehicle Inspection/Maintenance Program because the program was no longer needed to maintain the CO standard.

The *PPACG 2030 Regional Transportation Plan*, which reflects the Proposed Action, meets the 531 tons per day CO emissions budget.

3.10.3 Environmental Impacts

No Action Alternative

Level of Service (LOS)

LOS is a method of describing the relative "busyness" of an intersection and is represented by the letters A through F, much like a report card.

"LOS A" generally represents the most favorable driving conditions. "LOS F" represents the least favorable, or failing.

The No Action Alternative would meet the air quality conformity requirements on a regional basis based on the approved, currently applicable CO emission budget. Traffic congestion under this scenario would reduce travel speeds and increase emissions per mile traveled. However, the total daily tons of CO from mobile sources would not exceed the region's current mobile source CO emissions budget.

The No Action Alternative does not include any roadway capacity improvements. Under this scenario, signalized intersection LOS for the majority of the intersections along Woodmen Road are expected to degrade to LOS F by the year 2030.

Proposed Action

The Proposed Action, as part of the *PPACG 2030 Regional Transportation Plan* and the *2005-2010 Transportation Improvement Plan (TIP)*, would meet current air quality conformity requirements. The Proposed Action would add two travel lanes, one in each direction, to Woodmen Road. With the addition of mainline through capacity, only three intersections are predicted to operate at LOS D in 2030.

Analysis of Localized Carbon Monoxide Concentrations

Air quality conformity regulations require analysis of localized CO concentrations at the project level, rather than the regional level. Microscale, CO "hot-spot" modeling is used to predict CO concentrations at specific project locations, such as signalized intersections. This is done to determine whether the air quality standard would be exceeded, potentially resulting in a violation of the CO standard.

EPA modeling guidance requires hot-spot modeling for intersections that currently operate, or are predicted to operate, at LOS D, E, or F. All signalized intersections along Woodmen Road were evaluated using SYNCHRO traffic operations analysis software to determine current and future LOS. Based on the analysis, three intersections (Woodmen Road/Lexington Drive, Woodmen Road/Rangewood Drive, and Woodmen Road/Duryea Drive) are predicted to operate at LOS D for at least 1 hour of the day under the Proposed Action.

Hot-spot modeling was performed for each of the three intersections, using the EPA approved CAL3QHC Model, in conjunction with MOBILE 6.2 emission factors, and assuming worst-case meteorological conditions. The resulting 2030 CO 8-hour concentrations are presented in Table 3.10-3.

Table 3.10-3
Proposed Action Localized Carbon Monoxide Concentrations Analysis Results, 2030

Intersection		Modeled 8-hour Concentration (parts per million)	Background Concentration (parts per million	Total Predicted 8-hour Average Concentration (parts per million)
Woodmen Road/Lexington Drive (AM)		2.55	3.0	5.55
Woodmen Road/Lexington Drive (PM)		2.55	3.0	5.55
Woodmen Road/Rangewood Dr. (AM)		2.69	3.0	5.69
Woodmen Road/Duryea Drive (PM)		3.23	3.0	6.23

Note: The 8-hour standard is 9.0 parts per million.

3.10.4 Other Air Quality Issues

Regional Haze/Visibility

Emissions from mobile sources, including highway motor vehicles, trains, aircraft, and non-road vehicles, such as snowmobiles and all-terrain vehicles, contribute to visibility degradation throughout the country. Although the relative contribution of mobile source emissions is not as great as contributions from other sources, direct emissions and re-entrained road dust from motor vehicles contribute to urban plumes that are transported for long distances.

The CAA requires states to protect visibility and reduce visibility impairments in 156 "Class I" areas in the United States. Class I areas are defined as national parks and wilderness areas, over a certain size, that were in existence as of August 1997. There are 12 Class I areas in Colorado: the closest to this project are the Great Sand Dunes National Park and Rocky Mountain National Park. Due to the distance, location, and terrain between the parks and the Woodmen Road Project, the Proposed Action is not expected to affect visibility or regional haze in these areas.

The CAA and U.S. EPA's 1999 Regional Haze Rule require states to develop plans to improve visibility in 10-year increments, with the goal of reaching natural background conditions within 60 years.

The Colorado Department of Public Health and Environment (CDPHE) is currently developing its first 10-year plan and is coordinating with CDOT and the urban area metropolitan planning organizations to ensure that these agencies' long-range travel forecasts are incorporated into the plan.

With respect to the Proposed Action, emissions from travel on Woodmen Road in future years are incorporated into the state's visibility plan, which is required by federal law to demonstrate the necessary visibility improvements in Class I areas. Given the small incremental impact of this project and the large-scale nature of visibility transport, it is not practical to attempt to model the visibility impacts of the project alternatives. However, USEPA-mandated improvements in vehicle emissions technology over the next 20 years, and ongoing dust emissions control measures, will reduce emissions regardless of the alternative chosen, resulting in visibility improvements state-wide.

Air Toxics

In addition to the National Ambient Air Quality Standards (NAAQS), the USEPA also regulates air toxics (See Additional Air Toxics Information on page 189). The Clean Air Act identifies 301 compounds that mostly originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). Of these compounds, the USEPA has identified 21 that are emitted from motor vehicles and are known or suspected to cause cancer or other serious health effects. These compounds, known as Mobile Source Air Toxics (MSATs) include various volatile organic compounds, such as acetaldehyde, benzene, formaldehyde, acrolein, and 1, 3 butadiene, as well as metals, diesel particulate matter, and diesel exhaust organic gases. Some of these toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics result from engine wear or from impurities in oil or gasoline.

The USEPA has existing and newly promulgated mobile source control programs that include the reformulated gasoline program, national low emission vehicle standards, Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and the proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 1990 and 2020, the USEPA expects that these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 67 to 76 percent, and will reduce on-highway diesel particulate matter emissions by 90 percent.

The analysis of air toxics is an emerging field, however. To date, the USEPA – the lead Federal agency responsible for the scientific study of air pollutants and for the development of national air quality standards -- has not developed National Ambient Air Quality Standards for MSATs or national project level guidelines or guidance for studying MSATs under various climatic and geographic situations. EPA has also not established toxicity factors for diesel particulate matter. Without standards and guidance for MSATs, accurate and reliable estimates of actual human health or environmental impacts from MSATs that may result from transportation projects are not scientifically possible at this time.

However, the U.S. Department of Transportation and FHWA are currently working with the USEPA to develop and evaluate the technical tools necessary to perform air toxics analysis, including improvements to emissions models and air quality dispersion models. FHWA's ongoing work in air toxics includes a research program to determine and quantify the contribution of mobile sources to air toxic emissions, the establishment of policies for addressing air toxics in environmental reports, and the assessment of scientific literature on health impacts associated with motor vehicle toxic emissions.

Although reliable quantitative methods do not exist to accurately estimate the health impacts of MSATs, it is possible to qualitatively assess future MSAT emissions. Because the amount of MSATs emitted are proportional to the amount of vehicle miles traveled (VMT) and congestion, it is possible to compare the difference in VMT and congestion between the Proposed Action and the No Action alternatives. This comparison will indicate which alternative is likely to produce greater MSAT emissions in the future, assuming that other variables, such as the mix of vehicle types and age, are the same. VMT information for the No Action and Proposed Action in the year 2030 was obtained from the Pikes Peak Area Council of Governments (PPACG). The PPACG regional air quality model is based upon the peak hour traffic conditions. For the regional air quality planning area, the peak hour VMT in 2030 for the Proposed Action Alternative will be slightly higher (less than 0.08%) than the No Action. Therefore, based on this trend in VMT, total MSAT emissions are likely to be slightly lower in the future for the No Action than the Proposed Action Alternative. However, congestion on Woodmen Road is expected to be less for the Proposed Action than the No Action Alternative which may offset this small difference. This is explained in more detail in Chapter 10, Additional Air Quality Information.

The science and modeling of project specific MSAT impacts has not developed to the point where there is certainty or acceptance by the scientific community. Accordingly, information is not available on MSAT impacts for the No Action and the Proposed Action alternatives evaluated in this EA, and the means to obtain this information have not been fully developed. When information and measure are not available to evaluate the impacts of a project, Federal regulations require a detailed explanation. This explanation is provided in Additional Air Quality Information on page 305 under the heading, "Unavailable Information for Project Specific MSAT Impact Analysis."

3.10.5 Cumulative Impacts

According to a 2003 CDOT regional cumulative effects analysis (RCEA) entitled, *Sustaining Nature and Community in the Pikes Peak Region*, rapid regional population growth since the late 1950s has substantially increased the amount of "human activity" that causes air pollution – a trend expected to continue into the foreseeable future. The current population of the Colorado Springs area is more than 515,000, and by the year 2030, the Pikes Peak Area Council of Governments expects the population of the region to increase to more than 855,000 residents. As the population increases, so will new housing, commercial and office space, and industrial plants. With more people, there will likely be more vehicles on the roadway system, as well as other sources of air pollution, such as home and office heating units, off-road construction equipment like bulldozers and generators, gasoline-powered lawn and garden equipment, and highly volatile industrial chemicals.

Currently, the Pikes Peak Region is an attainment/maintenance area for carbon monoxide and is an attainment area for the other criteria pollutants, including particulate matter and ozone. Of the six air pollutants for which there are national ambient air quality standards, the Pikes Peak Region has no current or projected difficulties in meeting four of them: oxides of nitrogen and sulfur, fine particulate matter, and lead. Trends for two -- carbon monoxide and ozone – indicate a need for continued monitoring and planning by PPACG to assure long-term compliance with the standards for these two pollutants. However, the cumulative impact of the Proposed Action for all criteria pollutants -- the incremental difference when the impact from the Proposed Action is added to the impacts of other reasonably foreseeable actions -- will not result in a change in the attainment/maintenance designation for carbon monoxide or the attainment status of the other criteria pollutants. This determination is documented in the conforming 2030 Regional Transportation Plan.

The cumulative impacts to regional air quality from mobile sources are evaluated in a long-range transportation plan prepared by a metropolitan planning organization, such as PPACG, under federal conformity regulations. The 2030 Regional Transportation Plan is, then, the regional cumulative effects analysis for air quality in the Pikes Peak region. This conforming plan provides an assessment of the predicted future CO emissions from all reasonably foreseeable transportation actions needed to accommodate future population and employment growth, including the Proposed Action Alternative.

Included in the analysis for the 2030 Regional Transportation Plan are not only roadway improvements like the Proposed Action, but also proposed improvements to other modes, such as transit and bike and pedestrian trails. These elements, along with anticipated changes in travel behavior (for example, the number and purpose of trips per household and the length of those trips), have been used by PPACG to forecast future CO emissions and compare them with adopted emission budgets to determine conformity. The reasonably foreseeable actions contained in the 2030 Regional Transportation Plan do not exceed emission budgets.

For localized CO, the cumulative impact from the Proposed Action is estimated by adding background emissions to the results of the modeled CO concentrations for 2030 to arrive at a future 8-hour concentration. The modeled CO concentrations are those attributable to the Proposed Action, while the background concentrations represent CO contributed by all other reasonably foreseeable actions.

The cumulative effect is shown in the final column of Table 3.10-3. The results show that the Proposed Action, when added to all other reasonably foreseeable actions, will not result in an exceedance of the 8-hour CO standard of 9.0 parts per million.

As pointed out in the regional cumulative effects study, *Sustaining Nature and Community in the Pikes Peak Region*, "To remain in compliance with air quality standards, ways must be found to reduce the amount of pollution generated per person as the number of people in the region continues to grow." Some strategies suggested in the study to reduce CO include policy decisions that could reduce vehicle use by encouraging mixed use development along transportation corridors, and higher density development in growth areas. Other policies could address pollution from wood-burning stoves and fireplaces and from portable gas-powered equipment. For a reduction in ozone, additional vehicle control technologies may be required at the national level, as well as further restrictions on the use of a wide range of chemicals including solvents and paints.

3.10.6 Mitigation for the Proposed Action

Because there would be no adverse air quality impacts as a result of the Proposed Action, further design or operational mitigation is not required. Dust control practices will be required during construction, in accordance with Colorado Air Quality Control Commission Regulation No. 1 regarding fugitive dust emissions. Additional construction-related mitigation measures are outlined in Section 3.4, *Construction Impacts*.

Transit Service

Woodmen Road has been identified as a potential corridor for development of enhanced transit service, including rapid transit alternatives. Air quality plans for the region currently do not include or rely upon rapid transit services for any emissions reduction credit. Although transit service implementation plans for the corridor are still preliminary, the Proposed Action does not preclude future enhanced transit service. This approach is consistent with regional land use and transportation policies that call for reduced reliance on single-occupant motor vehicles.