US 50 Corridor East

US 50 Corridor East Tier 1 Final Environmental Impact Statement and Record of Decision

Air Quality Technical Memorandum

December 2017

Table of Contents

Chapter Pages

Tables

Figures

1. Project Overview

The US 50 Corridor East Tier 1 Environmental Impact Statement (US 50 Tier 1 EIS) was initiated by the project's lead agencies, the Colorado Department of Transportation (CDOT) and the Federal Highway Administration (FHWA). The purpose of the US 50 Tier 1 EIS is to provide, within the framework of the National Environmental Policy Act of 1969 (NEPA), a corridor location decision for U.S. Highway 50 (US 50) from Pueblo, Colorado, to the vicinity of the Colorado-Kansas state line that CDOT and the communities can use to plan and program future improvements, preserve right of way, pursue funding opportunities, and allow for resource planning efforts.

The US 50 Tier 1 EIS officially began in January 2006 when the Notice of Intent was published in the *Federal Register*. The US 50 Tier 1 EIS project area (Figure 1-1) is the area in which US 50 Tier 1 EIS alternatives were assessed. This area traverses nine municipalities and four counties in the Lower Arkansas Valley of Colorado. The nine municipalities include (from west to east) the city of Pueblo, town of Fowler, town of Manzanola, city of Rocky Ford, town of Swink, city of La Junta, city of Las Animas, town of Granada, and town of Holly. The four counties that fall within this project area are Pueblo, Otero, Bent, and Prowers counties.

The project area does not include the city of Lamar. A separate Environmental Assessment (EA), the *US 287 at Lamar Reliever Route Environmental Assessment*, includes both US 50 and U.S. Highway 287 (US 287) in its project area, since they share the same alignment. The Finding of No Significant Impact (FONSI) for the project was signed November 10, 2014. The EA/FONSI identified a proposed action that bypasses the city of Lamar to the east. The proposed action of the *US 287 at Lamar Reliever Route Environmental Assessment* begins at the southern end of US 287 near County Road (CR) C-C and extends nine miles to State Highway (SH) 196. Therefore, alternatives at Lamar are not considered in this US 50 Tier 1 EIS.

Figure 1-1. US 50 Tier 1 EIS Project Area

2. Resource Definition

The U.S. Environmental Protection Agency (EPA) sets standards for the amount of certain pollutants that can be in the air before they become harmful to public health and the environment. Air quality is measured by the amount of these pollutants in the air when compared to these standards.

3. Applicable Laws, Regulations, and Guidance

In addition to adhering to NEPA and its regulations (23 Code of Federal Regulations [CFR] 771), the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and the Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21), regulations and guidance provided within the Clean Air Act of 1990 (CAA) also were followed during this analysis of air quality.

3.1. Clean Air Act of 1990

The Clean Air Act of 1990 and its associated regulations are the basic federal statutes and regulations governing air pollution. The provisions that are potentially relevant to this project are the National Ambient Air Quality Standards (NAAQS) (CAA 2003, part 50), the transportation conformity rules (CAA 2003, part 93), and mobile source air toxics (MSATs). Each of these provisions is discussed below.

3.1.1. National Ambient Air Quality Standards

The Clean Air Act of 1990 requires the EPA to establish NAAQS for pollutants considered harmful to public health and the environment (CAA 2003, part 50). Primary standards set limits to protect public health, including the health of "sensitive" populations, such as people with asthma, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA has established NAAQS for six principal pollutants, which are called "criteria" pollutants. They are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), particulate matter with particle diameters of 10 microns or less (respirable particulate matter) (PM_{10}), particulate matter with diameters of 2.5 microns or less (fine particulate matter) ($PM_{2.5}$), and sulfur dioxide (SO_2). The NAAQS are summarized in Appendix C.

3.1.2. Transportation Conformity Rules

The transportation conformity rule focuses on the conformity of transportation plans, programs, and projects that are developed, funded, or approved by the U.S. Department of Transportation and by metropolitan planning organizations or other recipients of federal funds (CAA 2003, part 93). These regulations set forth policy, criteria, and procedures for demonstrating and assuring conformity of such activities to an applicable implementation plan developed pursuant to the Clean Air Act of 1990. A determination of conformity is made by the metropolitan planning organization and the U.S. Department of Transportation.

The transportation conformity regulations require that transportation projects that are regionally important, federally funded, or both demonstrate transportation conformity to state implementation and maintenance plans. These regulations require that the project:

- Be included in a fiscally constrained regional transportation plan,
- Be included in a fiscally constrained transportation improvement plan, and
- Not cause or contribute to any new or existing violations of NAAQS.

3.1.3. Mobile Source Air Toxics

In addition to the NAAQS, the Clean Air Act of 1990 requires the EPA to regulate air toxics. MSATs are a subset of the air toxics defined by the Clean Air Act of 1990. MSATs are compounds emitted from highway vehicles and non-road equipment. Some air toxic compounds are present in vehicle fuel and are emitted into 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. Some air toxics also result from engine wear or from impurities in oil or gasoline used in vehicles.

The EPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline substantially over the next several decades. Based on current and future pollution control measures, an analysis of national trends with the EPA's MOVES2014 model forecasts a combined reduction of 83 percent in the total annual emission rate for priority MSATs from 2010 to 2050, while vehicle-miles of travel are projected to increase by 102 percent (FHWA 2016).

FHWA provides guidance on how to analyze MSATs during NEPA documentation. The most recent guidance is titled *Updated Interim Guidance on Mobile Source Air Toxics Analysis in NEPA Documents*, published on October 18, 2016.

4. Methodology

The US 50 Corridor East project is a Tier 1 EIS. "Tiering" for this process means that the work involved will be conducted in two phases, or tiers, as follows:

- Tier 1—A broad-based (i.e., corridor level) NEPA analysis and data collection effort. The goal of Tier 1 is to determine a general corridor location (not a roadway footprint). Data sources will include existing quantitative data, qualitative information, or both. Mitigation strategies (not necessarily specific mitigation activities) and corridor-wide mitigation opportunities will be identified. Additionally, the Tier 1 EIS will identify sections of independent utility (SIUs) and provide strategies for access management and corridor preservation.
- Tier 2—A detailed (i.e., project level) NEPA analysis and data collection effort. The goal of Tier 2 studies will be to determine an alignment location for each SIU identified in Tier 1. Data sources will include project-level data, including field data collection when appropriate. Tier 2 studies will provide project-specific impacts, mitigation, and permitting for each proposed project.

Resource methodology overviews were developed to identify and document which resource evaluation activities would be completed during the Tier 1 EIS, and which would be completed during Tier 2 studies. These overviews are intended to be guidelines to ensure that the Tier 1 EIS remains a broad-based analysis, while clarifying (to the public and resource agencies) when particular data and decisions would be addressed in the tiered process.

These overviews were approved by FHWA and CDOT in 2005, and they were agreed upon by the resource agencies during the project's scoping process between February and April of 2006.

Each overview summarizes the following information for the given resource:

- Relevant data or information sources—the types of corridor-level data that will be collected and the sources of those data
- Data collection and analysis methodology—how the data collection and analysis will be completed
- Project area—defined as one to four miles wide surrounding the existing US 50 facility beginning in Pueblo, Colorado, at Interstate 25 (I-25) and extending to the Colorado-Kansas state line (resources will be reviewed within this band, and it is the same for all resources)
- Effects—the type(s) of effect(s) to be identified
- Mitigation options—how mitigation will be addressed
- Deliverables—how the activities above will be documented
- Regulatory guidance/requirements—a list of applicable laws, regulations, agreements, and guidance that will be followed during the review of the resources

These overviews were used by the project's resource specialists as guidelines to ensure that their activities were relevant to the Tier 1 decision (i.e., corridor location). As the resource specialists conducted their work, data sources or analysis factors were added or removed. The final actions of the resource specialists are described below. The resource methodology overview for air quality is attached to this technical memorandum as Appendix A for reference only. Additionally, abbreviations and acronyms used in this report are listed in Appendix B.

4.1. Relevant Data or Information Sources

The following data and information sources were used for this analysis of air quality:

- Colorado Climate Center (CCC), Natural Resources Conservation Service (NRCS), and Western Regional Climate Center (WRCC)—regional and local meteorological conditions

- EPA and Colorado Department of Public Health and Environment (CDPHE)—current pollutant levels by county
- EPA National Emissions Inventory
- EPA—NAAQS and attainment status by county
- CDOT—current (2008) and projected future (2040) traffic volumes on US 50 in southeastern Colorado

4.2. Data Collection and Analysis Methodology

The following tasks were completed during this review of air quality and are described in detail below (all tasks were completed on a county level for Pueblo, Otero, Bent, and Prowers counties unless otherwise noted).

- Collection and review of air quality emissions inventory data
- Collection and review of air quality emissions monitoring data
- Collection and review of greenhouse gas emissions inventory data
- Review of attainment status
- Review of traffic volumes on US 50
- Identification of air quality-sensitive receptors (in the project area only)

Air emissions inventory data were obtained from a public database maintained by the CDPHE. This emissions information is broken out by area source, point source, highway vehicle, and off-highway vehicle emission categories based on the 2011 emissions inventory. These data provide a reasonable base from which to compare potential project emissions. Emissions monitoring and attainment status data (i.e., NAAQS data) were obtained from the EPA's public database. These data are used in this analysis to evaluate potential changes in air quality. Also, CDOT traffic data were obtained to evaluate how predicted (i.e., future) changes in traffic volumes on US 50 could affect air quality in the project area. Air quality-sensitive receptors were located to determine how the Build Alternatives could affect them.

4.3. Project Area

The project area for the US 50 Tier 1 EIS has been defined as one to four miles wide surrounding the existing US 50 facility and extending from Pueblo, Colorado, at I-25 to the Colorado-Kansas state line (Figure 1-1). The project area encompasses the study area limits, which is where the Tier 1 corridor alternatives considered by this project would be located.

The study area is 1,000 feet wide centered on the corridor alternatives, beginning on or near the existing US 50 at I-25 in Pueblo, Colorado, and extending to just east of Holly, Colorado, in the vicinity of the Colorado-Kansas state line. The limits of the project were approved by the lead agencies and other project stakeholders during the US 50 Tier 1 EIS's scoping activities.

4.4. Effects

This analysis of air quality consisted of a qualitative assessment of whether the Build Alternatives would likely cause a violation in the NAAQS in the project area. Potential effects to air quality-sensitive receptors also were considered.

4.5. Mitigation Options

Air quality would not be affected by the US 50 Tier 1 EIS because no construction-related activities would be authorized. Therefore, mitigation options for the Build Alternatives will be evaluated as part of Tier 2 studies.

4.6. Deliverables

This Air Quality Technical Memorandum is the primary deliverable being produced for the US 50 Tier 1 EIS related to air quality issues.

5. Existing Conditions

The following sections describe the climate, air quality status, and traffic conditions on US 50 in Pueblo, Otero, Bent, and Prowers counties.

5.1. Climate

Eastern Colorado lies within the rain shadow east of the Rocky Mountains. The climate of the Great Plains grasslands is a semi-arid regime with characteristic low relative humidity, abundant sunshine, infrequent rains and snow, moderate to high wind movement, and a large seasonal range in temperature (CCC 2007). Winters are cold and dry, and summers warm to hot. The mean annual temperature is approximately 54 degrees Fahrenheit throughout most of the project area and ranges from roughly 52 degrees Fahrenheit at Pueblo to 55 degrees at Las Animas (WRCC 2006). The average annual maximum temperature is nearly 72 degrees Fahrenheit compared to an average annual minimum temperature of roughly 36 degrees (WRCC 2006). Extreme summer temperatures can be above 100 degrees Fahrenheit, and extreme winter temperatures can fall below zero degrees Fahrenheit (WRCC 2006).

The mean annual precipitation ranges from over 11 inches per year at La Junta to nearly 16 inches at Holly, and the average mean is about 13 inches across the project area (WRCC 2006). Extreme fluctuations in annual precipitation occur, and have been recorded from a low of almost 4 inches at La Junta to a high of just over 29 inches at Holly. The majority of the precipitation (70 percent to 80 percent) occurs as rain from April through September. Periods of high winds occur in late February, March, and April. The frost-free period ranges from 100 days at Pueblo to over 170 days at Holly (WRCC 2006). The moisture and soil temperature regimes are described as ustic or as aridic and mesic (NRCS 2002).

5.2. Air Quality

CDPHE air emissions inventory data for Pueblo, Otero, Bent, and Prowers counties is presented in Table 5-1. Communities along US 50 have industrial as well as agricultural-based economies. Thus, air quality is affected by dust from local agricultural plowing, unpaved roads and open lands, highway and off-highway vehicle emissions, commercial manufacturing, and industrial activities. As shown in Table 5-1, the major producers of air emissions include highway and off-highway vehicles. Carbon monoxide (CO), oxides of nitrogen (NOx), sulfur dioxide (SO_2), and volatile organic compounds (VOC) emissions are emitted by highway and off-highway vehicles and also are attributed to point sources such as fuel combustion equipment at industrial facilities. The majority of the particulate matter emissions are area source emissions, such as from agricultural activities. Biogenic sources, such as trees and vegetation, contribute to background emissions of nitrogen and VOCs.

Table 5-1. Air Emissions Inventory for Pueblo, Otero, Bent, and Prowers Counties by Source Category (2011)

County	Source Category[1]	Tons per Year					
		CO	NO_X	PM_{10}	SO_2	VOC	Benzene
Pueblo	Area	5,154.51	327.69	6,892.93	15.37	2,007.93	38.91
	Point	2,933.74	5,774.66	1,119.49	3,201.08	886.57	9.41
	Highway vehicles	24,254.60	2,354.99	105.86	7.40	2,320.23	62.33
	Off-highway vehicles	5,093.64	520.64	63.06	2.64	491.60	14.99
	Railroads	179.39	1,251.50	40.79	12.59	65.60	N/A[2]
	Subtotal	**37,615.88**	**10,229.48**	**8,222.13**	**3,239.08**	**5,771.93**	**125.64**
Otero	Area	830.92	48.46	1,425.58	2.09	323.47	6.52
	Point	141.21	160.37	65.73	0.36	115.85	0.88
	Highway vehicles	3,408.20	332.31	14.09	1.05	326.84	8.82
	Off-highway vehicles	801.74	101.45	9.64	0.39	101.94	3.47
	Railroads	98.29	688.18	22.45	6.91	35.31	N/A[2]
	Subtotal	**5,280.36**	**1,330.77**	**1,537.49**	**10.80**	**903.41**	**19.69**
Bent	Area	73.46	12.39	1,714.53	0.23	84.94	0.46
	Point	165.62	178.93	29.47	0.64	26.13	0.66
	Highway vehicles	937.68	107.71	4.29	0.36	89.74	2.29
	Off-highway vehicles	836.75	132.03	10.31	0.39	242.76	8.31
	Railroads	113.51	769.01	25.84	8.02	38.45	N/A[2]
	Subtotal	**2,127.02**	**1,200.07**	**1,784.44**	**9.64**	**482.02**	**11.72**
Prowers	Area	173.21	28.82	4,220.25	0.58	290.93	1.17
	Point	262.91	636.66	125.30	40.01	113.52	0.52
	Highway vehicles	4,366.09	358.32	14.88	0.99	424.58	11.58
	Off-highway vehicles	1,143.71	553.41	50.82	2.13	133.12	3.83
	Railroads	22.01	149.31	4.92	1.55	7.32	N/A[2]
	Subtotal	**5,967.93**	**1,726.52**	**4,416.17**	**45.26**	**969.47**	**17.10**
ALL	**TOTAL**	**50,991.19**	**14,486.84**	**15,960.23**	**3,304.78**	**8,126.83**	**174.15**

[1]Emissions sources provided in five categories: Area, Point, Highway vehicles, Off-Highway Vehicles, or Railroads.
[2]Benzene emissions from railroads were not reported as part of the 2011 emissions inventory in these counties.
CO = carbon monoxide
NO_x = oxides of nitrogen
PM_{10} = respirable particulate matter
SO_2 = sulfur dioxide
VOC = volatile organic compounds
Source: CDPHE 2011

Greenhouse gas emissions data for Pueblo, Otero, Bent, and Prowers counties also were evaluated. Data were collected from EPA's National Emissions Inventory (NEI), which is an estimate of greenhouse gas emissions collected from air emissions sources nationwide. Data are collected from state, local, and Tribal agencies and supplemented by the EPA. Greenhouse gas emissions by source for Pueblo, Otero, Bent, and Prowers counties are presented in Table 5-2. As the table shows, the major producers of greenhouse gas emissions are highway, off-highway vehicles, agricultural/forestry activities, fugitive dust, and other combustion. In Pueblo County, additional industrial sources make up more of the emissions, including fuel

combustion from electric utilities and other industrial processes. Biogenic sources of greenhouse gas emissions also were prevalent in all four counties.

Table 5-2. 2014 Greenhouse Gas Emissions NEI Data for Pueblo, Otero, Bent, and Prowers Counties by Emission Source

Greenhouse Gas Emissions Source	2014 Greenhouse Gas Emissions (tons/year)			
	Pueblo	Otero	Bent	Prowers
Fuel Combustion Electric Utilities	10,156.42	14.30	1.18	—
Fuel Combustion Industrial	527.28	135.74	292.27	356.81
Fuel Combustion Other	1,813.87	328.07	172.78	206.06
Chemical and Allied Product Manufactured Good MFG	35.93	—*	—	—
Metals Processing	1,523.62	—	—	—
Petroleum and Related Industries	54.82	20.88	64.84	82.53
Other Industrial Processes	3,158.64	78.48	20.57	106.31
Solvent Utilization	1,284.96	131.35	49.06	163.84
Storage and Transport	565.77	124.91	7.12	55.61
Waste Disposal and Recycling	112.95	17.88	2.91	19.03
Highway Vehicles	19,627.18	2,035.00	738.32	1,755.44
Off-Highway	6,998.02	1,776.41	2,043.89	1,796.24
Biogenic	19,343.33	10,761.29	13,559.00	13,606.24
Agriculture/Forestry	656.74	2,416.73	1,605.39	9,316.58
Other Combustion	432.01	2,531.41	150.08	35.23
Other Fugitive Dust	6,186.22	1,572.90	614.81	1,456.00
Total	**72,477.76**	**21,945.35**	**19,322.22**	**28,955.92**

Source: EPA 2014
No data

Additionally, Pueblo, Otero, and Bent counties are currently designated as “unclassifiable/ attainment” and a portion of Prowers County near Lamar is designated as “maintenance” area for PM_{10} under the NAAQS (EPA Green Book, June 2017). Monitor value data for Pueblo and Prowers counties are available from the EPA’s public database, but only for fine particulate matter ($PM_{2.5}$) and respirable particulate matter (PM_{10}). Other contaminants are not monitored currently in these counties. A summary of these monitored values is presented in Table 5-3. Monitor value data are not available in the EPA’s database for Bent and Otero counties (i.e., ambient air is not currently monitored in these counties). The data in Table 5-3 show no exceedance of the NAAQS for $PM_{2.5}$ and PM_{10}.

Table 5-3. Monitored Values Summary for Pueblo and Prowers Counties

County	Year	98th Percentile 24-hour Value for $PM_{2.5}$ ($\mu g/m^3$)	Annual Mean Value for $PM_{2.5}$ ($\mu g/m^3$)	2nd 24-hour Value for PM_{10} ($\mu g/m^3$)	Annual Mean Value for PM_{10} ($\mu g/m^3$)
Pueblo	1996			49	26
	1997			56	27
	1998			52	25
	1999	13	6.8	51	25
	2000	20	7.8	64	24
	2001	19	8.5	63	25
	2002	17	7.8	61	27
	2003	17	7.6	64	25
	2004	16	6.8	56	23
	2005	13	7.2	50	22
	2006	19	8.6	53	23
	2007	15	7.2	46	24
	2008	15	7.4	118	29
	2009	17	7.4	85	36
	2010	14	6.2	55	19
	2011	14	5.7	52	20
	2012	17	6.6	50	21
	2013	17	6.5	62	20
	2014	12	5.7	77	21
	2015	21	5.1	46	17
Prowers	1996			80	24
	1997			98	23
	1998			100	26
	1999			145	29
	2000			136	29
	2001			133	31
	2002			138	31
	2003			120	29
	2004			82	24
	2005			110	21
	2006			127	24
	2007			82	26
	2008			114	28
	2009			171	27
	2010			92	27

Table 5-3. Monitored Values Summary for Pueblo and Prowers Counties (continued)

County	Year	98th Percentile 24-hour Value for $PM_{2.5}$ ($\mu g/m^3$)	Annual Mean Value for $PM_{2.5}$ ($\mu g/m^3$)	2nd 24-hour Value for PM_{10} ($\mu g/m^3$)	Annual Mean Value for PM_{10} ($\mu g/m^3$)
Prowers	2011			108	27
	2012			103	26
	2013			141	25
	2014			102	24
	2015			78	19
	NAAQS	**35**	**12.0**	**150**	**50**

Blank entries = no monitoring data available
$PM_{2.5}$ = fine particulate matter
PM_{10} = respirable particulate matter
$\mu g/m^3$ = micrograms per cubic meter
Source: EPA 2015

Even though Lamar is not located in the project area, it was included here because the community is designated as "attainment/maintenance" under the NAAQS. In Lamar, particulate matter was monitored at levels that violated pollutant standards in the 1980s, but this was primarily due to other sources of pollution, with minimal contribution from motor vehicle use. More recent violations occurred in 1996, 1999, and 2000 due to high wind conditions. The state of Colorado determined, and the EPA agreed, that high wind events caused these violations, which would not have occurred otherwise (CDPHE 2001). In 2005, the EPA approved a maintenance attainment plan, documenting that the past problem had been remedied, the air quality standard had been met for 10 years, and no further violations were anticipated in the foreseeable future (EPA 2005).

Air quality sensitive receptors in the project area were identified. The vast majority of these receptors are located within the cities and towns along US 50. Very few receptors were identified outside these areas. This is because urban development in the Lower Arkansas Valley is concentrated within these municipalities. Land outside town generally is used for farming or ranching and only inhabited by the farmers and ranchers who own the land.

Implementation of the Build Alternatives would likely be federally funded and considered regionally significant. US 50 through the Lower Arkansas Valley is listed as a high priority for improved mobility and safety in the Southeast Transportation Planning Region's 2040 Regional Transportation Plan and the Pueblo Area Council of Governments 2040 Long-Range Transportation Plan (PACOG 2015).

5.3. Traffic Conditions

Along US 50 in the Lower Arkansas Valley, emissions from motor vehicles contribute to air pollution; however, emissions levels have never been high enough to cause a violation of air pollution standards outside of the Lamar PM_{10} maintenance area. As shown in Figure 5-1, the average traffic volume on US 50 was roughly 5,500 vehicles per day (vpd) in 2011. This figure ranged widely from roughly 13,500 vpd in Pueblo to about 1,700 vpd from Holly to the Colorado-Kansas state line. In contrast, I-25 through Pueblo averaged approximately 47,846 vpd in 2012 (CDOT 2012).

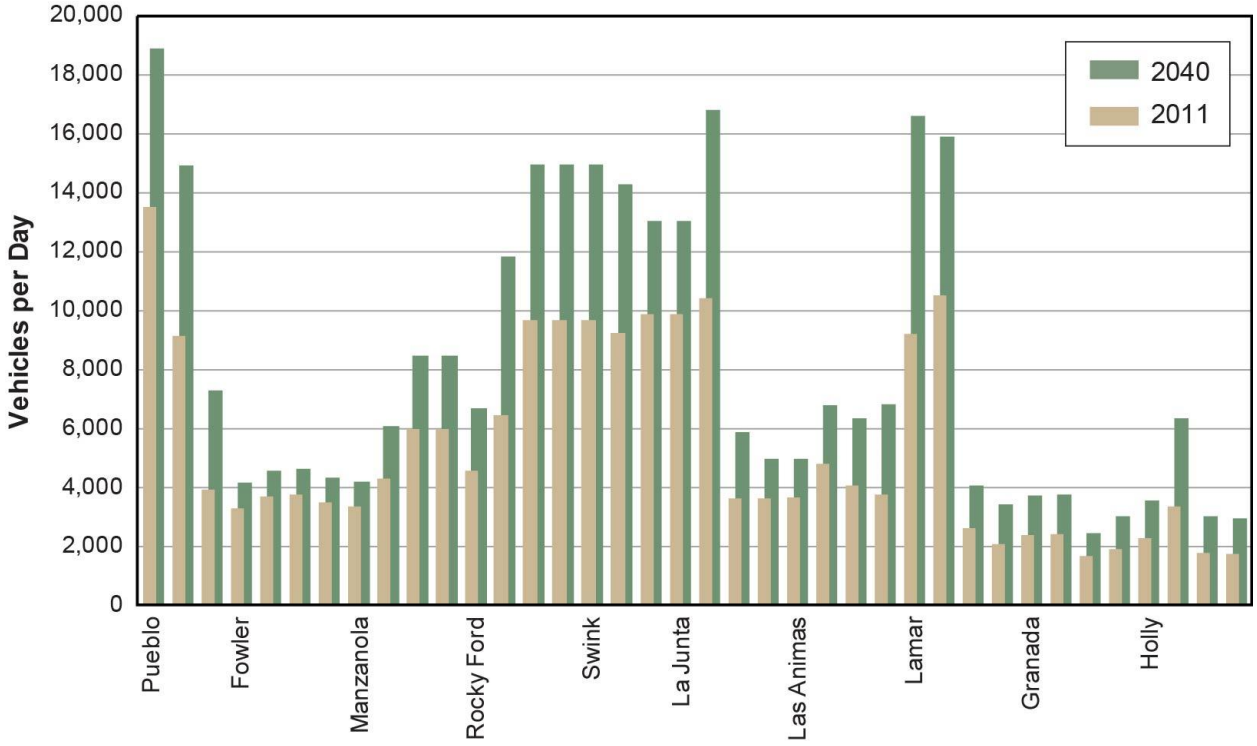

Figure 5-1. Average Annual Daily Traffic on I-25 through Pueblo and on US 50 in the Lower Arkansas Valley (2011 and projected 2040)

On average, traffic volumes are expected to rise by approximately 52 percent by 2040 (see Figure 5-1) along the US 50 corridor. The traffic volumes on U.S 50 in Pueblo will increase by 40 percent adding just over 5,500 vpd between 2011 and 2040. The most substantial increase in vpd is expected to occur in the town of La Junta. Traffic through La Junta is projected to increase by 60 percent, adding 6,000 vpd (CDOT 2012). Despite these increases in traffic, future volumes are not expected to cause a violation in pollution standards in any of the communities along the US 50 corridor.

Additionally, traffic data show that nearly 12 percent of the vehicles driving on US 50 in 2012 were commercial trucks. This proportion varied widely along the corridor, from six percent in Pueblo to more than 25 percent near the Colorado-Kansas state line (CDOT 2012). This is important because commercial trucks generally have diesel engines, and these engines produce emissions that are considered a pollutant of concern for sensitive sites, such as schools, hospitals, and elder care facilities. The percentage of commercial trucks on the highway is expected to remain about the same through 2040 (CDOT 2012). However, while a sizable percentage of the vehicles driving on US 50 are commercial trucks, vehicle-related pollution has not been an issue along US 50 in the Lower Arkansas Valley, and it is not expected to be an issue through 2040. Additionally, recent advances in diesel technology have already reduced emissions from these types of engines, and this trend is expected to continue into the future (Trucking Industry Mobility and Technology Coalition [TIMTC] 2010).

6. Effects

The following sections discuss the potential of the No-Build Alternative and the Build Alternatives to affect air quality in the project area.

6.1. No-Build Alternative

Under the No-Build Alternative, only minor and isolated construction would occur. Routine maintenance and repairs would be made as necessary to keep US 50 in usable condition, including standard overlays and repairs of weather- or crash-related damage. Additionally, smaller scale improvements may be undertaken, such as short passing lanes and other minor safety improvements. However, no direct effects to air quality are expected.

Several conditions will continue to affect air quality in the Lower Arkansas Valley, including the following:

- Between 2011 and 2040, average traffic volumes on US 50 through project corridor are expected to increase by approximately 52 percent, so there will be more motor vehicles producing emissions (CDOT 2012). However, continued improvements in fuel and motor vehicle technologies are expected to result in lower emission rates for engine- and exhaust-related criteria pollutants, MSATs, and greenhouse gases (GHGs) in the future. These reductions could offset some of the expected emissions increases from additional traffic.
- Non-vehicle-related sources of air pollution will continue to affect air quality. Feedlots, which generate large amounts of animal waste in a concentrated area, are one of these sources. There are eight feedlots located along or near US 50 in the Lower Arkansas Valley, and several of them are located directly adjacent to the highway (Tranel 2008).
- Communities are actively pursuing economic diversification, which could include new emission sources (i.e., more industrial activity). However, assuming that any new emission generators comply with established air quality regulations, there is no reason to anticipate any air quality problems stemming from these facilities for the foreseeable future.
- Soils in the area are sensitive to disturbances that cause airborne dust and debris. Highway construction activities will temporarily increase the number of sources of dust. These impacts can be reduced with the use of spraying and other dust control measures.

6.2. Build Alternatives

The Build Alternatives consist of constructing a four-lane expressway on or near the existing US 50 from I-25 in Pueblo, Colorado, to approximately one mile east of Holly, Colorado. There are a total of 30 Build Alternatives. In Pueblo, three Build Alternatives are proposed that either improve US 50 on its existing alignment and/or reroute it to the north to utilize SH 47. East of Pueblo, the remaining 27 Build Alternatives are divided into nine between-town alternatives and 18 around-town alternatives. The nine between-town alternatives improve US 50 on its current alignment, with the exception of near Fort Reynolds, where there is an alternative to realign the roadway to the south. The 18 around-town alternatives propose relocating US 50 from its current through-town route at Fowler, Manzanola, Rocky Ford, Swink, La Junta, Las Animas, Granada, and Holly. Figure 6-1 provides an overview of the Build Alternatives as proposed.

In the aforementioned eight communities, the average traffic volume in 2011 was just over 5,600 vpd (CDOT 2012). In 2040, this figure is expected to rise by approximately 56 percent to just over 8,800 vpd (CDOT 2012).The Build Alternatives would move a portion of this traffic out of town, potentially improving air quality in these downtown areas. Many of these communities have expressed a desire to revitalize their downtowns, making them more suitable for pedestrians (CDOT 2006a). The Build Alternatives could help those communities reach this goal by improving air quality in these areas.

Although traffic volumes on US 50 in the project area are expected to increase up to 52 percent, the increased number of vehicles averages 8,800 vpd (CDOT 2012). These volumes are not expected to cause a violation in pollution standards in any of the communities along US 50 in the Lower Arkansas Valley.

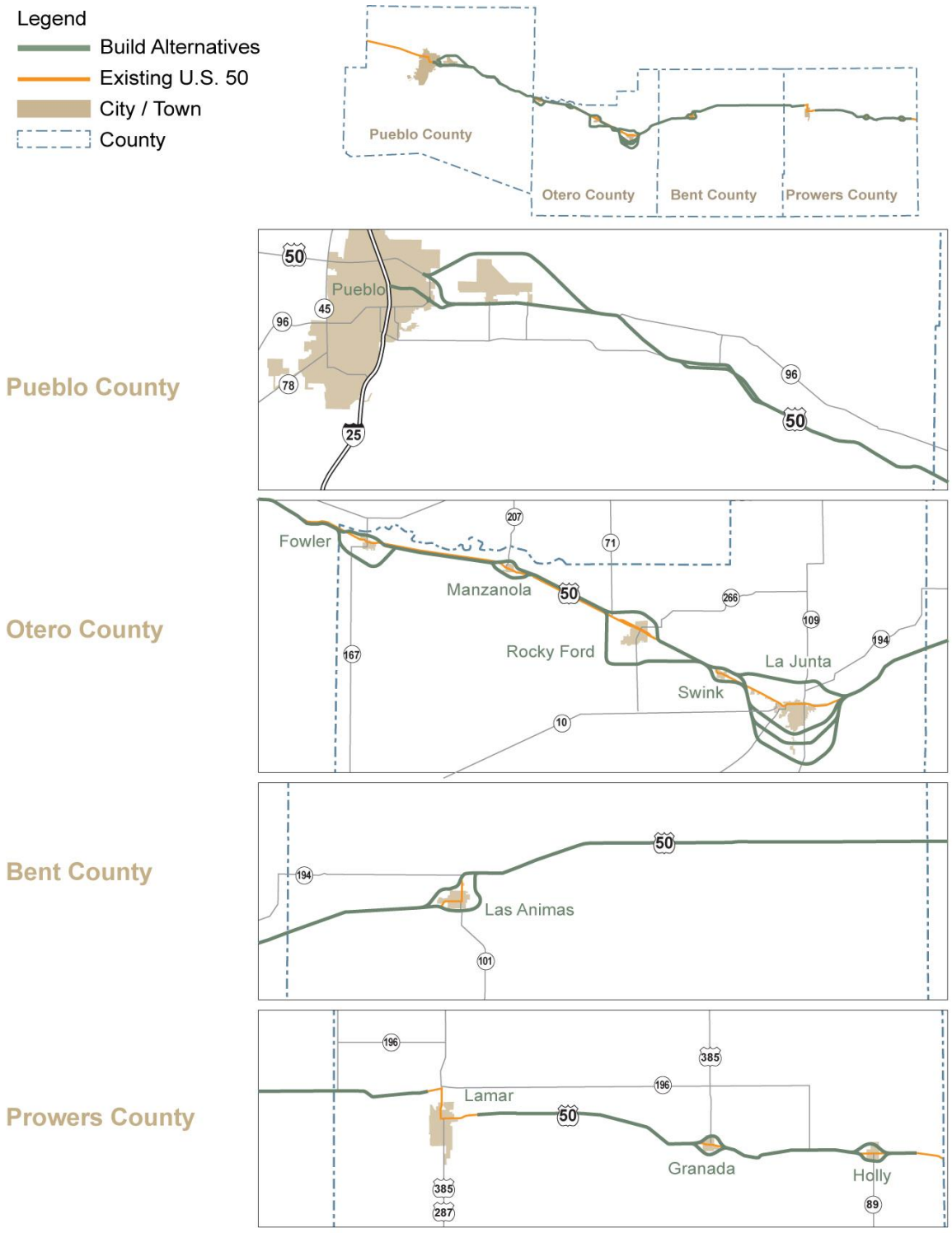

Figure 6-1. Build Alternatives Overview

Air quality effects from the Build Alternatives would include air contaminant emissions from combustion of fuel in vehicles, idling of vehicles, re-entrained road dust, and fugitive dust generated by construction activities during Tier 2 studies. Rerouting US 50 to around-town locations at eight municipalities would remove emissions originating from traffic on the highway, including commercial trucks, away from populated areas in town to the less populated periphery of these communities.

6.2.1. Sensitive Receptors

Most sensitive receptor sites, such as schools, hospitals, and elder care facilities, are located in town, so the Build Alternatives would move traffic away from these locations. However, the Build Alternatives would move the highway closer to sensitive receptors at locations in Alternative 2: Fort Reynolds Realignment, Alternative 2: Swink South, Alternative 2: La Junta South, Alternative 1: Las Animas North, and Alternative 1: Holly North. With the exception of alternatives in Swink and Holly, the Build Alternatives would locate the highway farther than 1,000 feet from sensitive receptor locations. Impacts at Swink and Holly are described below.

Potential Effect on Air Quality

The Build Alternatives would move US 50 to around-town locations in eight communities: Fowler, Manzanola, Rocky Ford, Swink, La Junta, Las Animas, Granada, and Holly. This would move traffic, and resulting emissions, from populated areas in town to less populated areas outside of town.

Section 10: Swink

Alternative 1: Swink North would reroute US 50 traffic farther away from the school complex than it is today, potentially reducing pollutant levels at the site. Alternative 2: Swink South would reroute US 50 traffic closer to the public school complex, which includes an elementary school and a junior-senior high school. Schools generally are considered sensitive sites in air quality analyses because of the large number of children, who may be more susceptible to the effects of pollution. While this alternative does have the potential to increase pollutant levels (caused by vehicle emissions) above the levels experienced today, this change is not expected to increase pollutant levels enough to exceed EPA standards at this location.

Section 20: Holly

Alternative 1: Holly North would reroute US 50 traffic closer to the Holly Junior-Senior High School and would potentially increase pollutant levels (caused by vehicle emissions) from the levels experienced today. Alternative 2: Holly South would move the highway farther from the school than it is today, potentially reducing pollutant levels at the site.

6.2.2. Construction Activities

Construction activities resulting from Tier 2 studies are expected to produce air pollutant emissions from the use of construction equipment and dust emissions from ground disturbance. These emissions would result in minor, short-term effects on air quality in the immediate vicinity of the activities. However, it also is expected that clean vehicle technologies would be applied to construction equipment. Therefore, it is likely that the equipment used to construct the Build Alternatives in the future would produce fewer emissions than today's equipment. More specific effects to air quality by construction-related activities should be identified during Tier 2 studies.

6.2.3. Other Considerations

Additionally, any Tier 2 studies that include improvements in the Lamar maintenance area for PM10 must comply with applicable transportation conformity rules.

The purpose of the US 50 Tier 1 EIS is to improve safety and mobility for local, regional, and long-distance users of US 50 through the Lower Arkansas Valley. It is important to state that existing mobility issues on the highway are not related to traffic congestion. There are no traffic congestion problems on this portion of the highway at this time, and congestion is not expected to become an issue in the foreseeable future. Addressing existing safety and mobility issues on the highway will be accomplished by correcting roadway

deficiencies, while balancing the mobility and access needs of these users and providing flexibility to meet future travel demands. This project has been determined to generate minimal air quality effects for criteria pollutants regulated by the Clean Air Act of 1990 (and its amendments) and has not been linked with any special concerns about MSATs. As such, this project will not result in changes in traffic volumes, vehicle mix, basic project location, or any other factor that would cause an increase in effects from MSATs from the project when compared to the No-Build Alternative.

Moreover, the EPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline substantially over the next several decades. Based on current and future pollution control measures, an analysis of national trends with the EPA's MOVES2014 model forecasts a combined reduction of 83 percent in the total annual emission rate for priority MSATs from 2010 to 2050, while vehicle miles of travel are projected to increase by 102 percent (FHWA 2016). This will reduce both the background level of MSATs as well as the possibility of even minor MSAT emissions from this project.

7. Mitigation Strategies

Since the ultimate roadway footprint would be identified during Tier 2 studies, this Tier 1 analysis cannot identify specific air quality effects from the Build Alternatives. However, the following mitigation strategies have been developed to ensure that negative effects are minimized during Tier 2 studies. Other appropriate mitigation strategies to reduce air quality effects will be developed as needed during Tier 2 studies as well.

- Dust control—techniques include watering the areas disturbed by construction
- CDOT air quality directive—CDOT should implement the appropriate air quality mitigation measures included in CDOT Air Quality Policy Directive #1901

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Appendices

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Appendix A. Resource Methodology Overview for Air Quality

This resource methodology overview is attached to this technical memorandum for reference only. The lead agencies for the US 50 Tier 1 EIS (CDOT and FHWA) drafted resource methodology overviews to identify and document which resource evaluation activities would be completed during the Tier 1 EIS, and which would be completed during Tier 2 studies (see Table A-1). These overviews were intended to be guidelines to ensure that the Tier 1 EIS remained a broad-based analysis, while clarifying (to the public and resource agencies) when particular data and decisions would be addressed in the tiered process. These overviews were approved by the lead agencies, and they were agreed upon by the resource agencies during the project's scoping process. They were used subsequently by the project's resource specialists as guidelines to ensure that their activities were relevant to the Tier 1 (corridor location) decision.

Table A-1. Resource Methodology Overview for Air Quality

Methodology Overview	Air Quality	
	Tier 1	**Tier 2**
Relevant Data/ Information Sources	• Local meteorological conditions and pollutant levels • NAAQS/attainment status	Update Tier 1 data collection sufficiently for standard NEPA documentation
Collection and/or Analysis Methodology	Collect existing data related to attainment status within the corridor	• Document regulatory requirements, including a summary of potential health effects of criteria pollutants • Document local meteorological conditions and air quality monitored data in study area • Identify attainment status of towns within corridor • Outline conformity requirements for projects proposed in maintenance areas
Project Area	One to four miles wide surrounding the existing US 50 facility beginning at I-25 in Pueblo to the vicinity of the Colorado-Kansas state line	Non-attainment or maintenance areas within Tier 2 specific SIU corridor boundaries
Impacts	Identify maintenance areas within the study area and qualitatively determine if the proposed action would likely cause or nearly cause a violation in the NAAQS	• Summarize attainment status-related information • Develop acceptable methodology for analysis, coordinating between Air Pollution Control Division and EPA • Air Pollution Control Division to perform regional and corridor analysis with EPA coordination • Perform $PM_{2.5}$ and PM_{10} hotspot analysis consistent with EPA guidance
Mitigation Options	None expected	Methods to reduce airborne dust during construction
Deliverables	Air Quality Technical Memorandum outlining air quality attainment status and recommendations for projects to be included in the State Implementation Plan modeling	Air Quality Technical Report outlining the potential air quality impacts as appropriate for Tier 2 SIUs level of NEPA documentation and a determination of conformity for projects located in maintenance areas
Regulatory Guidance/ Requirements	• Transportation Equity Act of the 21st Century, Sections 1110 and 6101 • FHWA Technical Advisory T6640.8a • Applicable SIP Plan • Clean Air Act of 1990 (42 USC 7400; 23 USC 109(j); 23 USC 149; 23 USC 102(a); and 23 USC 110(c)) • 40 CFR Parts 51 and 93 • 23 CFR 770	

Appendix B. Abbreviations and Acronyms

CAA	Clean Air Act of 1990
CCC	Colorado Climate Center
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon monoxide
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
GHG	Greenhouse gas
MAP-21	Moving Ahead for Progress in the 21st Century Act of 2012
MSAT	Mobile source air toxic
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NRCS	Natural Resources Conservation Service
O_3	Ozone
Pb	Lead
$PM_{2.5}$	Fine particulate matter
PM_{10}	Coarse particulate matter
SH	State Highway
SIU	Section of independent utility
SO_2	Sulfur dioxide
TIMTC	Trucking Industry Mobility and Technology Coalition
US 287	U.S. Highway 287
US 50	U.S. Highway 50
US 50 Tier 1 EIS	U.S. Highway 50 Tier 1 Environmental Impact Statement
USC	United States Code
VMT	Vehicle miles traveled
vpd	Vehicles per day
WRCC	Western Regional Climate Center

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Appendix C. National Ambient Air Quality Standards

Criteria Pollutants

The EPA has established NAAQS for six principal pollutants, or "criteria" pollutants, which are listed in Table C-1 below and described in more detail below. Primary standards set limits to protect public health, including the health of "sensitive" populations such as people with asthma, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Table C-1. NAAQS Criteria Pollutants

Criteria Pollutant	Primary Standards	Averaging Times	Secondary Standards
CO (Carbon monoxide)	9 ppm (10 mg/m^3)	8-hour[1]	None
	35 ppm (40 mg/m^3)	1-hour[1]	None
Pb (Lead)	0.15 µg/m^3	Quarterly Average	Same as Primary
NO_2 (Nitrogen dioxide)	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
	100 ppb	1-hour[3]	None
PM_{10} (Coarse particulate matter)	Revoked[2]	Annual (Arithmetic Mean)	
	150 µg/m^3	24-hour[3a]	Same as Primary
$PM_{2.5}$ (Fine particulate matter)	12 µg/m^3	Annual[4] (Arithmetic Mean)	15 µg/m^3 Annual[4]
	35 µg/m^3	24-hour[5]	Same as Primary
O_3 (Ozone)	0.070 ppm	8-hour[6]	Same as Primary
SO_2 (Sulfur dioxide)	75 ppb[7]	1-hour	
	—	3-hour	0.5 ppm[1]

[1]Not to be exceeded more than once per year.
[2]The annual average standard for PM_{10} was revoked by EPA in a rule-making in September 2006. The previous standard was 50 µg/m^3.
[3]This standard is obtained from the 98th percentile, averaged over three years.
[3a]Not to be exceeded once per year on average over 3 years.
[4]To attain this standard, the three-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15 µg/m^3.
[5]This standard was revised from 65 to 35 µg/m^3 by EPA in a rule-making in September 2006, and will be implemented over a lengthy period. To attain this standard, the three-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3.
[6]EPA lowered the ozone standard from 0.08 ppm to 0.070 ppm on December 28, 2015. To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour ozone average concentrations measured at each monitor within an area over each year must not exceed 0.070 ppm.
[7]This standard was set in a ruling on June 2, 2010. It will be measured from the 99th percentile of 1-hour daily maximum concentrations averaged over three years.
Source: EPA 2015 (40 CFR part 50)

Carbon Monoxide

CO is a colorless, odorless, tasteless gas. It may temporarily accumulate at harmful levels, especially in calm weather during winter and early spring, when fuel combustion reaches a peak and CO is chemically more stable due to the low temperatures. CO usually dissipates quickly over a large area, posing minimal threat to human health. Transportation activities, indoor heating, and open burning are among the anthropogenic (i.e., manmade) sources of CO.

Nitrogen Dioxide

NO_2, nitric oxide, and nitrate radical are collectively called NO_x. These three species are interrelated, often changing from one form to another in chemical reactions. NO_2 is the species commonly measured in ambient air monitors. NO_x generally are emitted in the form of nitric oxide, which is oxidized to NO_2. The principal manmade source of NO_x is fuel combustion in motor vehicles and power plants. Reactions of NO_x with other atmospheric chemicals can lead to the formation of ozone and acidic precipitation.

Ozone

Ground-level ozone is a secondary pollutant, formed from daytime reactions of NO_x and volatile organic compounds rather than being directly emitted by natural and anthropogenic sources. Volatile organic compounds, for which no NAAQS are established, are released in industrial processes and from evaporation of organic liquids, such as gasoline and solvents.

Fine Particulate Matter and Respirable Particulate Matter

Particulate matter is separated into two different sizes for purposes of the NAAQS: fine particulate matter and respirable particulate matter. Respirable particulate matter is considered inhalable and fine particulate matter is considered to be in the respirable range, meaning these particles can reach the alveolar region of the lungs and penetrate deeper than respirable particulate matter. There are many sources of particulate matter, both natural and manmade, including dust from construction activities, industrial activities, and combustion of fuels.

Lead

Dominant industrial sources of lead emissions include waste oil and solid waste incineration, iron and steel production, lead smelting, and battery and lead alkyl manufacturing. The lead content of motor vehicle emissions, which was the major source of lead in the past, has significantly declined with the widespread use of unleaded fuel.

Sulfur Dioxide

SO_2 is emitted in natural processes, such as volcanic activity, and by anthropogenic sources such as combustion of fuels containing sulfur, sulfuric acid manufacturing, etc. SO_2 emissions in the atmosphere can lead to the formation of acidic precipitation (i.e., acid rain).

National Ambient Air Quality Standards Compliance (Attainment vs. Non-Attainment)

The Clean Air Act of 1990 also requires the EPA to assign a designation for each area of the United States regarding compliance with the NAAQS. The EPA categorizes the level of compliance or noncompliance as follows:

- Attainment—an area that meets the NAAQS for any pollutant
- Maintenance—an area that currently meets the NAAQS, but has previously been out of compliance
- Non-attainment—an area that does not meet the NAAQS or that contributes to ambient air quality in a nearby area that does not meet the NAAQS.
- Unclassifiable—any area that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

The EPA delegates authority for air quality monitoring and compliance to the CDPHE. The CDPHE takes the lead in air quality planning and the development of air quality-related strategies, as well as specific programs to reduce air contaminant emissions.

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