



**COLO R A D O**

**Air Pollution Control Division**

Department of Public Health & Environment

Technical Services Program

# 2024 Ambient Air Monitoring Network Plan





This report is available electronically at [http://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx](http://www.colorado.gov/airquality/tech_doc_repository.aspx)

**COLORADO  
AMBIENT AIR MONITORING  
NETWORK PLAN  
2024**

Air Pollution Control Division  
APCD-TS-B1  
4300 Cherry Creek Drive South  
Denver, Colorado  
80246-1530  
(303) 692-1530

June 28, 2024

---

# Contents

---

<b>Table of Contents</b>	<b>iii</b>
<b>List of Figures</b>	<b>vi</b>
<b>List of Tables</b>	<b>vii</b>
<b>Glossary of Terms</b>	<b>viii</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Overview of the Colorado Air Monitoring Network . . . . .	1
1.1.1 APCD Monitoring History . . . . .	2
1.1.2 APCD Monitoring Operations . . . . .	2
1.1.3 Network Modification Procedures . . . . .	2
1.1.4 Description of Monitoring Regions in Colorado . . . . .	3
1.1.4.1 Central Mountains Region . . . . .	3
1.1.4.2 Denver Metro / North Front Range Region . . . . .	4
1.1.4.3 Eastern High Plains Region . . . . .	4
1.1.4.4 Pikes Peak Region . . . . .	5
1.1.4.5 San Luis Valley Region . . . . .	5
1.1.4.6 South Central Region . . . . .	5
1.1.4.7 Southwestern Region . . . . .	5
1.1.4.8 Western Slope Region . . . . .	5
1.1.5 Statewide Population Statistics . . . . .	6
1.1.6 Monitoring Site Locations and Parameters Monitored . . . . .	9
<b>2 Carbon Monoxide (CO)</b>	<b>11</b>
2.1 Denver Metro/North Front Range Region . . . . .	11
2.2 Pikes Peak Region . . . . .	12
2.3 Recent and Planned Changes in CO Monitoring . . . . .	12
<b>3 Ozone (O<sub>3</sub>)</b>	<b>13</b>
3.1 Denver Metro/North Front Range Region . . . . .	13
3.2 Pikes Peak Region . . . . .	14
3.3 Western Slope Region . . . . .	15
3.4 Southwestern Region . . . . .	15
3.5 Recent and Planned Changes in O <sub>3</sub> Monitoring . . . . .	15
<b>4 Nitrogen Dioxide/Reactive Oxides of Nitrogen (NO<sub>2</sub>/NO<sub>y</sub>)</b>	<b>16</b>
4.1 Denver Metro/North Front Range Region . . . . .	16
4.2 Recent and Planned Changes in NO <sub>2</sub> /NO <sub>y</sub> Monitoring . . . . .	16

<b>5 Sulfur Dioxide (SO<sub>2</sub>)</b>	<b>18</b>
5.1 Denver Metro/North Front Range Region . . . . .	18
5.2 Pikes Peak Region . . . . .	18
5.3 Recent and Planned Changes in SO <sub>2</sub> Monitoring . . . . .	18
<b>6 Particulate Matter (PM)</b>	<b>20</b>
6.1 Continuous PM Monitoring . . . . .	21
6.2 Denver Metro/North Front Range Region . . . . .	22
6.3 Eastern High Plains . . . . .	23
6.4 Pikes Peak Region . . . . .	23
6.5 South Central Region . . . . .	24
6.6 Central Mountain Region . . . . .	25
6.7 Western Slope Region . . . . .	25
6.8 Southwestern Region . . . . .	26
6.9 Recent and Planned Changes in PM Monitoring . . . . .	26
<b>7 Lead</b>	<b>28</b>
7.1 Planned Changes in Lead Monitoring . . . . .	28
<b>8 Meteorological Measurements</b>	<b>29</b>
8.1 Recent and Planned Changes in Meteorological Monitoring . . . . .	29
<b>9 PAMS (Photochemical Assessment Monitoring Station) Monitoring</b>	<b>30</b>
9.1 Recent and Planned Changes in PAMS Monitoring . . . . .	30
<b>10 Quality Assurance</b>	<b>31</b>
10.1 Continuous Monitors . . . . .	31
10.2 Particulate Monitors . . . . .	31
10.3 Meteorological Monitors . . . . .	31
<b>11 Summary of Network Changes</b>	<b>32</b>
11.1 Completed and Planned Changes . . . . .	32
<b>12 CFR Requirements Summary</b>	<b>34</b>
<b>Appendix A: Monitoring Site Descriptions</b>	<b>A-1</b>
<b>Appendix B: Public Comments and Responses</b>	<b>B-1</b>

---

## List of Figures

---

1.1	Counties and multi-county monitoring regions discussed in this report . . . . .	3
1.2	Population in Colorado from 1970 to 2030 . . . . .	8
1.3	Map of Colorado and the Denver metropolitan area showing the location of all monitoring sites operated by the APCD . . . . .	10

---

## List of Tables

---

1.1	Population estimates and projections by county and Metropolitan Statistical Area (MSA) . . . . .	6
1.1	Population estimates and projections by county and Metropolitan Statistical Area (MSA) . . . . .	7
1.2	Summary of parameters monitored at APCD monitoring sites discussed in this report . . . . .	9
2.1	Summary of CO values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023 . . . . .	11
2.2	Summary of CO values recorded at the Highway 24 (Colorado Springs) station during 2023. . . . .	12
3.1	EPA’s minimum ozone monitoring requirements . . . . .	13
3.2	Summary of O <sub>3</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023 . . . . .	14
3.3	Summary of O <sub>3</sub> values recorded at monitoring stations in the Pikes Peak region during 2023. Sites having three-year NAAQS values in excess of 70 ppb are indicated by asterisks. . . . .	15
3.4	Summary of O <sub>3</sub> values recorded at monitoring stations in the Western Slope region during 2023 . . .	15
3.5	Summary of O <sub>3</sub> values recorded at the monitoring station in the Southwest region during 2023. . . . .	15
4.1	Summary of NO <sub>2</sub> values recorded at monitoring stations in the Denver Metro / Northern Front Range region during 2023 . . . . .	17
5.1	Summary of SO <sub>2</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023. . . . .	19
5.2	Summary of SO <sub>2</sub> values recorded at the Highway 24 monitoring site in Colorado Springs . . . . .	19
6.1	EPA’s minimum PM <sub>10</sub> monitoring requirements . . . . .	20
6.2	EPA’s minimum PM <sub>2.5</sub> monitoring requirements . . . . .	20
6.3	Summary of PM <sub>10</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023 . . . . .	22
6.4	Summary of PM <sub>2.5</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023 . . . . .	22
6.5	Summary of PM <sub>10</sub> values recorded at monitoring stations in the Eastern High Plains region during 2023, with proposed exceptional events included. . . . .	23
6.6	Summary of PM <sub>10</sub> values recorded at the Colorado College station during 2023. . . . .	23
6.7	Summary of PM <sub>2.5</sub> values recorded at the Colorado College station during 2023 . . . . .	23
6.8	Summary of PM <sub>10</sub> values recorded at the Pueblo monitoring station during 2023 . . . . .	24
6.9	Summary of PM <sub>2.5</sub> values recorded at the Pueblo monitoring station during 2023 . . . . .	24
6.10	Summary of PM <sub>10</sub> values recorded at monitoring stations in the Central Mountains region during 2023	25
6.11	Summary of PM <sub>10</sub> values recorded at monitoring sites in the Western Slope region during 2023 . . .	25
6.12	Summary of PM <sub>2.5</sub> values recorded at the Grand Junction - Powell Bldg. monitoring site during 2023	25
6.13	Summary of PM <sub>10</sub> values recorded at monitoring sites in the Southwest region during 2023 . . . . .	26



## Glossary of Terms

APCD	Air Pollution Control Division
AQS	Air Quality System (EPA database)
CAMP	Continuous Air Monitoring Program
CBSA	Core-Based Statistical Area
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
CMZ	Community Monitoring Zone
CO	Carbon monoxide
CSN	Carbon Speciation Network
EPA	U.S. Environmental Protection Agency
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NATTS	National Air Toxics Trends Stations
NO	Nitric oxide
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Reactive nitrogen oxides
NO <sub>y</sub>	Total reactive nitrogen
NPS	National Park Service
O <sub>3</sub>	Ozone
Pb	Lead
PM <sub>2.5</sub>	Particulate matter with an equivalent diameter less than or equal to 2.5 μm
PM <sub>10</sub>	Particulate matter with an equivalent diameter less than or equal to 10 μm
ppb	Parts per billion (one part in 10 <sup>9</sup> )
ppm	Parts per million (one part in 10 <sup>6</sup> )
PMSA	Primary Metropolitan Statistical Area
PSD	Prevention of Significant Deterioration
PWEI	Population Weighted Emissions Index
QA/QC	Quality Assurance/Quality Control
SIP	State Implementation Plan
SLAMS	State or Local Air Monitoring Stations
SO <sub>2</sub>	Sulfur dioxide
SPM	Special Purpose Monitor
TSP	Total Suspended Particulates
μg	Microgram (10 <sup>-6</sup> grams)
VOC	Volatile Organic Compound

---

## Introduction

---

The Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division's (APCD) 2024 Ambient Air Monitoring Network Plan is an examination and evaluation of the APCD's network of air pollution monitoring stations. The Annual Network Plan is required by Title 40, Code of Federal Regulations, Part 58.10(a) and provides the general reasoning for the APCD's ambient air monitoring strategy, the location of each monitor, the highest pollutant concentrations, and the type and frequency of measurements taken at each location. The Network Plan is also a simple accounting of monitoring site changes that have taken place over the past year and changes that are expected for the year ahead. It is due on or before July 1<sup>st</sup> of each year to the U.S. Environmental Protection Agency (EPA) after a 30-day public comment period.

This plan was made available for public comment from 5/24/2024 to 6/24/2024.

### 1.1 Overview of the Colorado Air Monitoring Network

The APCD currently conducts air quality and meteorological monitoring operations at 44 locations statewide. Ozone (O<sub>3</sub>) and particulate matter (PM) monitors, including those for particulate matter less than 10 μm in diameter (PM<sub>10</sub>) and particulate matter less than 2.5 μm in diameter (PM<sub>2.5</sub>), are the most abundant and widespread monitors in the network. Currently, there are PM<sub>10</sub> monitors at 16 separate locations, PM<sub>2.5</sub> monitors at 19 locations, O<sub>3</sub> monitors at 22 locations, carbon monoxide (CO) monitors at five locations, nitrogen dioxide (NO<sub>2</sub>) monitors at seven locations, and sulfur dioxide (SO<sub>2</sub>) monitors at three locations. The APCD also operates 16 meteorological sites statewide for the continuous measurement of wind speed, wind direction, resultant speed, resultant direction, standard deviation of horizontal wind direction, and temperature.

A majority of the gaseous monitoring conducted by the APCD occurs in the Front Range region, with a particular focus on the Denver Metro area. Three of the O<sub>3</sub> monitoring sites that are located on the Western Slope and have data included in this report are operated and maintained by a third party contractor, Air Resource Specialists (ARS). These are the Rifle, Palisade, and Cortez monitoring sites. ARS keeps the sites in proper working order and performs calibrations, data retrieval, and data validation, while the APCD uploads data to the EPA's Air Quality System (AQS) database and conducts independent audits of the sites for Quality Assurance (QA) purposes.

Within the particulate sampling network, the APCD operates both continuous and filter-based sampling methods for PM<sub>10</sub> and PM<sub>2.5</sub>. Continuous monitors sample without the need for subsequent filter retrieval and laboratory analysis, which is required for filter-based equipment. Thus, these monitors can continuously record concentrations and send the results back to APCD headquarters on a nearly instantaneous basis. Currently, twelve sites are equipped to measure continuous PM<sub>10</sub> and, of those twelve sites, one is located at a site which also has a filter-based PM<sub>10</sub> monitor. Of the 20 PM<sub>2.5</sub> monitoring sites, 19 measure PM<sub>2.5</sub> on a continuous basis, four of these sites also having filter-based samplers. All real-time continuous PM<sub>10</sub> and PM<sub>2.5</sub> data is reported on the CDPHE website. <sup>1</sup>

---

<sup>1</sup><https://www.colorado.gov/airquality/report.aspx>

### 1.1.1 APCD Monitoring History

The State of Colorado has been monitoring air quality statewide since the mid-1960s when high volume and tape particulate samplers, dustfall buckets, and sulfation candles were the state of the art for defining the magnitude and extent of the very visible air pollution problem. Monitoring for gaseous pollutants (CO, SO<sub>2</sub>, NO<sub>2</sub>, and O<sub>3</sub>) began in 1965 when the federal government established the CAMP monitoring station in downtown Denver at the intersection of 21<sup>st</sup> Street and Broadway, which was the area that was thought at the time to represent the best site for detecting maximum levels of most of the pollutants of concern. Instruments were primitive by comparison with those of today and were frequently out of service.

Under provisions of the original Federal Clean Air Act of 1970, the Administrator of the U.S. EPA established National Ambient Air Quality Standards (NAAQS) designed to protect the public's health and welfare. Standards were set for total suspended particulates (TSP), CO, SO<sub>2</sub>, NO<sub>2</sub>, and O<sub>3</sub>. In 1972, the first State Implementation Plan (SIP) was submitted to the EPA. It included an air quality surveillance system in accordance with EPA regulations of August 1971. That plan proposed a monitoring network of 100 monitors (particulate and gaseous) statewide. The system established as a result of that plan and subsequent modifications consisted of 106 monitors.

The 1977 Clean Air Act Amendments required States to submit revised SIPs to the EPA by January 1, 1979. The portion of the Colorado SIP pertaining to air monitoring was submitted separately on December 14, 1979, after a comprehensive review, and upon approval by the Colorado Air Quality Control Commission. The 1979 EPA requirements as set forth in 40 CFR 58.20 have resulted in considerable modification to the network. These and subsequent modifications were made to ensure consistency and compliance with Federal monitoring requirements. Station location, probe siting, sampling methodology, QA practices, and data handling procedures are all maintained throughout any changes made to the network.

Historically, 36 of the 44 current APCD monitoring locations have been in operation for 10 or more years, 23 of these sites have been in operation for 20 or more years, and 14 of the monitoring locations have been in operation for more than 30 years. Conversely, 9 of the 44 current monitoring locations have been in operation for less than 10 years.

### 1.1.2 APCD Monitoring Operations

The APCD attempts to operate all of its monitors for, at least, a full calendar year, beginning sampling operations of new monitors in January and terminating existing monitors in December. Circumstances both in and out of the APCD's control can make that desired schedule difficult to achieve. In addition, the APCD does not own either the land or the buildings where most of the monitors are located, and it is becoming increasingly difficult to get property owner's permission for use due to perceived risk. Building roof remodeling and demolition projects can also lead to a loss of sampling time and access to locations.

When modifications to the State and Local Air Monitoring Station (SLAMS) network are required, the APCD will provide the appropriate modification forms prior to any implementation to EPA Region 8 for their approval. All currently operating SLAMS monitors have been approved by EPA. With the exception of some vegetation issues or tall trees, of which APCD has received waivers from EPA, all sites currently meet the requirements set forth in 40 CFR 58, Appendices A, C, D, and E.

### 1.1.3 Network Modification Procedures

The APCD develops changes to its monitoring network in several ways. In the past, new monitoring locations have been added as a result of community concerns about air quality. Other monitors have been established as a result of special studies, such as the O<sub>3</sub> monitoring in Aurora, Rifle, Cortez, Palisade, and Black Hawk.

The most common reasons for monitors being removed from the network are that either the land or building is modified, such that the site no longer meets current EPA siting criteria, the property ownership changes, or the area surrounding the monitor is being modified in a way that necessitates a change in the monitoring location. A current example of this is the Platteville Atmospheric Observatory (PAO) site, which was relocated to the La Salle location nearby due to the APCD's loss of access to the PAO property. Monitors are also removed from the network after review of the data shows that the levels have dropped to the point where it is no longer necessary to continue monitoring at that location or if the data obtained from a site is redundant with another monitoring site or if access to the site becomes too restrictive.

For example, the Welch site was closed in 2020 and relocated to Evergreen because this monitor was redundant with other ozone monitoring sites in the Denver Metro/North Front Range Region.

Finally, all monitors are reviewed on a regular basis to determine if they are continuing to meet their monitoring objectives. If the population, land use, or vegetation around the monitor has changed significantly since the monitor was established, a more suitable location for the monitor may be examined. An example of this is the O<sub>3</sub> monitor previously located at the Aspen Park monitoring site, which was shut down on September 16, 2019 and relocated to the Black Hawk monitoring station. A detailed scientific evaluation of the present monitoring network configuration can be found in the APCD’s 2020 Ambient Air Monitoring Network Assessment.<sup>2</sup>

### 1.1.4 Description of Monitoring Regions in Colorado

The state has been divided into eight multi-county areas that are generally based on topography and have similar airshed characteristics. These areas are the Central Mountains, Denver Metro/North Front Range, Eastern High Plains, Pikes Peak, San Luis Valley, South Central, Southwestern, and Western Slope regions. Figure 1.1 shows the approximate boundaries of these regions.

A map of APCD air quality monitoring stations is shown in Figure 1.3 and the parameters monitored at each location are given in Table 1.2. Detailed site descriptions can be found in Appendix A.

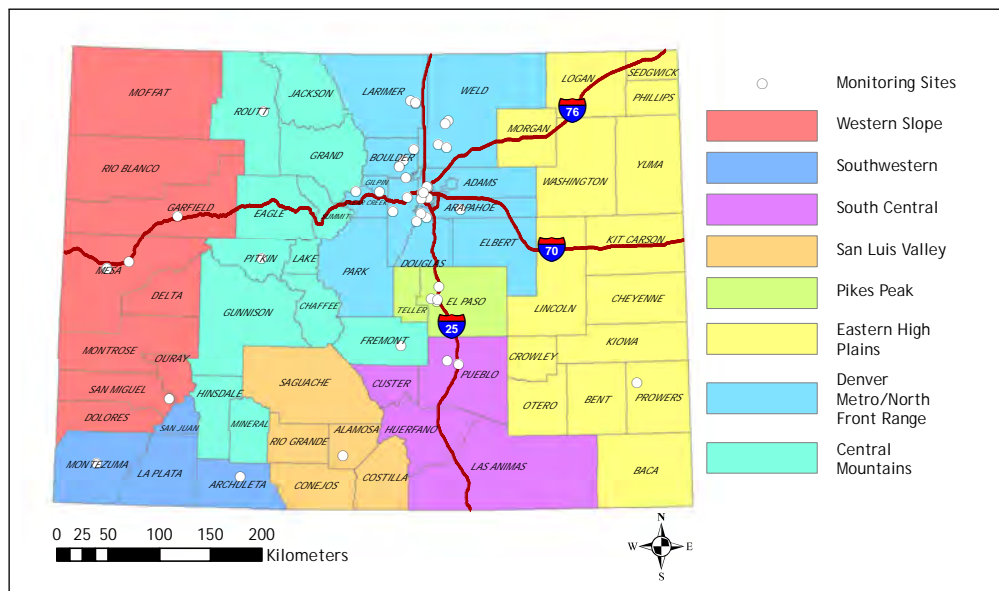


Figure 1.1: Counties and multi-county monitoring regions discussed in this report.

#### 1.1.4.1 Central Mountains Region

The Central Mountains region consists of 12 counties in the central area of the state. The Continental Divide passes through much of this region. Mountains and mountain valleys are the dominant landscape features. Leadville, Steamboat Springs, Cañon City, Salida, Buena Vista, and Aspen represent the larger communities. The population of this region is approximately 242,137, according to the 2020 U.S. Census. Skiing, tourism, ranching, mining, and correctional facilities are the primary industries. The Black Canyon of the Gunnison National Park is located in this region. All of the area complies with federal air quality standards.

The primary monitoring concern in this region is centered around particulate pollution from wood burning and road dust. During 2023, there were three PM<sub>10</sub> monitoring sites operated by the APCD in the Central Mountains region (Aspen, Steamboat Springs, and Cañon City). There is also one O<sub>3</sub> monitor located at the Mines Peak site.

<sup>2</sup>[https://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx?action=open&file=2020\\_CO\\_5yr\\_Network\\_Assessment.pdf](https://www.colorado.gov/airquality/tech_doc_repository.aspx?action=open&file=2020_CO_5yr_Network_Assessment.pdf)

**1.1.4.2 Denver Metro / North Front Range Region**

The Denver Metro/North Front Range region includes Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson, Larimer, Park, and Weld counties. This 13 county region comprises the largest population base in the state of Colorado with approximately 4,016,921 people living in the area, according to the 2020 U.S. Census. This region includes Rocky Mountain National Park and several other wilderness areas.

Since 2002, the region complied with all NAAQS, except for ozone. The area has been exceeding the EPA's current ozone standards since the early 2000s, and in 2007 was formally designated as a "nonattainment" area. This designation was re-affirmed in 2012 when the EPA designated the region as a "marginal" nonattainment area after a more stringent ozone standard was adopted in 2008. The Denver Metro / North Front Range region failed to attain the 2008 ozone standard and was moved up to the next level of classification, a "moderate" area in May of 2016. The EPA released a more stringent eight-hour ozone standard on October 1, 2015. Colorado submitted area designation recommendations for the eight-hour 2015 ozone standard in 2016, based on the data from the 2013-2015 monitoring period. The EPA finalized area designations for the 2015 eight-hour ozone standard of 0.070 ppm (70 ppb) nationwide in April of 2018, designating the Denver Metro/Northern Front Range region as nonattainment with a marginal area classification. In January 2020, EPA designated the Denver Metro/Northern Front Range area as a "serious" nonattainment area under the 2008 ozone standard. In November 2022, the EPA designated the area as a "severe" nonattainment area under the 2008 ozone standard.

In the past, the Denver-metropolitan area has violated health-based air quality standards for carbon monoxide and fine particles. In response, RAQC, CAQCC, and the APCD developed, adopted, and implemented air quality improvement plans to reduce each of these pollutants.

For the rest of the Northern Front Range, Fort Collins, Longmont, and Greeley were nonattainment areas for carbon monoxide in the 1980s and early 1990s, but have met the federal standards since 1995. Air quality improvement plans have been implemented for each of these communities.

There are currently 67 air quality and meteorological monitors at 27 individual sites in the Northern Front Range Region. There are 4 CO monitors, 16 O<sub>3</sub> monitors, seven NO<sub>2</sub> monitors, three SO<sub>2</sub> monitors, as well as seven PM<sub>10</sub> monitors, 14 PM<sub>2.5</sub> monitors, and 14 meteorological towers. There are also two air toxics monitoring sites, one located at the Birch Street site (previously located at CAMP and moved during 2023), and one in Platteville (La Salle). The Birch Street site monitors urban air toxics, while the Platteville site monitors air toxics and ozone precursors in a region of oil and gas development. In addition, there is one site (DESCI) that measures visual range by use of a nephelometer and a transmissometer.

**1.1.4.3 Eastern High Plains Region**

The Eastern High Plains region encompasses the fifteen counties on the plains of eastern Colorado. The area is semiarid and often windy. The area's population is approximately 133,477, according to the 2020 U.S. Census. Its major population centers have developed around farming, ranching, and trade centers such as Sterling, Fort Morgan, Limon, La Junta, and Lamar. The agricultural base includes both irrigated and dry land farming. With concurrences by EPA on Exceptional Event Reports for high wind dust events submitted by the APCD, all of the Eastern High Plains region complies with federal air quality standards.

Historically, there have been a number of communities in the Eastern High Plains Region that were monitored for particulates and meteorology but not for any of the gaseous pollutants. In the northeast along the I-76 corridor, the communities of Sterling, Brush, and Fort Morgan have been monitored. Along the I-70 corridor, only the community of Limon has been monitored for particulates. Along the US-50/Arkansas River corridor, the Division has monitored for particulates in the communities of La Junta and Rocky Ford. These monitoring sites were all discontinued in the late 1970s through early 1990s after a review showed that the concentrations were well below the standards and trending downward.

There is currently one PM<sub>10</sub> and PM<sub>2.5</sub> monitoring site in this region. The site is located in the city of Lamar.

**1.1.4.4 Pikes Peak Region**

The Pikes Peak region includes El Paso and Teller counties. The area has a population of approximately 756,489, according to the 2020 U.S. Census. Eastern El Paso County is rural prairie, while the western part of the region is mountainous. The U.S. Government is the largest employer in the area, and major industries include Fort Carson and the U.S. Air Force Academy in Colorado Springs, which are both military installations. Aerospace and technology are also large employers in the area. All of the area is currently in compliance with federal air quality standards, although there have been recent exceedances of ozone standards. Two exceedances of the SO<sub>2</sub> standard were observed at the Highway 24 site during 2014-2015; however, these elevated values did not result in a violation of the NAAQS and SO<sub>2</sub> concentrations trended downward at the Highway 24 site during 2015-2023. The Highway 24 site was ultimately closed and SO<sub>2</sub> monitoring was discontinued due to low concentrations and significant reductions in emissions over the past decade (see chapter 5).

Currently, there is one CO monitor and two O<sub>3</sub> monitors in the Pikes Peak region, as well as one PM<sub>10</sub> monitor and one PM<sub>2.5</sub> monitor. Most of these monitors are located in the populous city of Colorado Springs.

**1.1.4.5 San Luis Valley Region**

Colorado's San Luis Valley region is located in the south central portion of Colorado and is comprised of a broad alpine valley situated between the Sangre de Cristo Mountains on the northeast and the San Juan Mountains of the Continental Divide to the west. The valley is some 114 km wide and 196 km long, extending south into New Mexico. The average elevation is 2290 km. Principal towns include Alamosa, Monte Vista, and Del Norte. The population of this area is approximately 46,150, according to the 2020 U.S. Census. Agriculture and tourism are the primary industries. The valley is semiarid and croplands of potatoes, head lettuce, and barley are typically irrigated. The valley is home to Great Sand Dunes National Park.

There is currently one PM<sub>10</sub> and PM<sub>2.5</sub> monitoring site in this region. The site is located at Adams State College in the city of Alamosa.

**1.1.4.6 South Central Region**

The South Central region is comprised of Pueblo, Huerfano, Las Animas, and Custer counties. Its population is approximately 194,758, according to the 2020 U.S. Census. Population centers include Pueblo, Trinidad, and Walsenburg. The region has rolling semiarid plains to the east and is mountainous to the west. All of the area complies with federal air quality standards. In the past the APCD has conducted particulate monitoring in both Walsenburg and Trinidad, but that monitoring was discontinued in 1979 and 1985, respectively, due to low concentrations.

There is currently one particulate sampler (a T640x FEM monitor for real-time PM<sub>10</sub> and PM<sub>2.5</sub> monitoring) operated in the South Central Region. This sampler is located at a site in the city of Pueblo. Additionally, ozone and meteorological monitoring were initiated in Pueblo West in February of 2023.

**1.1.4.7 Southwestern Region**

The Southwestern region includes the Four Corners area counties of Montezuma, La Plata, Archuleta, and San Juan. The population of this region is approximately 98,122, according to the 2020 U.S. Census. The landscape includes mountains, plateaus, high valleys, and canyons. Durango and Cortez are the largest towns, while lands of the Southern Ute and Ute Mountain Ute tribes make up large parts of this region. The region is home to Mesa Verde National Park. Tourism and agriculture are the dominant industries, although the oil and gas industry is becoming increasingly important. All of the area complies with federal air quality standards.

There are currently two monitoring stations in the Southwestern region, one O<sub>3</sub> site in Cortez and one PM<sub>10</sub> site located in Pagosa Springs. PM monitoring in the city of Durango was discontinued at the end of 2018.

**1.1.4.8 Western Slope Region**

The Western Slope region includes nine counties on the far western border of Colorado. A mix of mountains on the east, and mesas, plateaus, valleys, and canyons to the west form the landscape of this region. Grand Junction is the largest urban area, and other cities include Telluride, Montrose, Delta, Rifle, Glenwood Springs, Meeker, Rangely, and

Craig. The population of this region is approximately 325,155, according to the 2020 U.S. Census. Primary industries include ranching, agriculture, mining, energy development, and tourism. Dinosaur and Colorado National Monuments are located in this region. The Western Slope, along with the Central Mountains, are projected to be the fastest growing areas of Colorado through 2020 with greater than two percent annual population increases, according to the Colorado Department of Local Affairs. All of the area complied with federal air quality standards during 2023.

Currently, there are two ozone monitoring sites (Rifle and Palisade) and two particulate monitoring sites (Telluride and Grand Junction) in the Western Slope region operated by the APCD. There are also two meteorological towers in this area (Palisade and Grand Junction). The APCD also works with the EPA to monitor air toxics at the Grand Junction Pitkin site as part of the EPA’s National Air Toxics Trends Stations (NATTS) monitoring network.

### 1.1.5 Statewide Population Statistics

Table 1.1 is a listing of the projected population statistics by county based on the 2020 U.S. Census. Counties have been grouped by Metropolitan Statistical Area (MSA) and by the multi-county monitoring regions described above.

Population growth in Colorado over time is plotted in Figure 1.2, which shows actual population values in each multi-county monitoring region for the period 1970-2020 and U.S. Census Bureau projections for the period 2021-2030.

Table 1.1: Population estimates and projections by county and Metropolitan Statistical Area (MSA).

Region/MSA/County	Actual Population			Projected Population		Avg. Annual Change (%)	
	2020	2025	2030	2020-25	2020-30		
<b>COLORADO</b>	<b>5,813,209</b>	<b>6,120,735</b>	<b>6,544,591</b>	<b>1.1</b>	<b>1.3</b>		
<b>CENTRAL MOUNTAINS</b>	<b>242,137</b>	<b>249,943</b>	<b>263,801</b>	<b>0.6</b>	<b>0.9</b>		
Chaffee	20,397	21,099	22,295	0.7	0.9		
Eagle	55,390	57,953	61,862	0.9	1.2		
Fremont	47,413	47,369	48,246	-0.0	0.2		
Grand	15,719	16,545	17,675	1.1	1.2		
Gunnison	17,522	17,988	18,703	0.5	0.7		
Hinsdale	827	868	914	1.0	1.1		
Jackson	1,367	1,307	1,272	-0.9	-0.7		
Lake	8,095	8,358	8,799	0.6	0.9		
Mineral	764	805	828	1.1	0.8		
Pitkin	17,591	17,614	17,909	0.0	0.2		
Routt	25,929	27,845	30,882	1.5	1.9		
Summit	31,123	32,192	34,416	0.7	1.1		
<b>DENVER METRO/NORTH FRONT RANGE</b>	<b>4,016,921</b>	<b>4,242,183</b>	<b>4,543,600</b>	<b>1.1</b>	<b>1.3</b>		
<i>BOULDER</i>	<i>328,006</i>	<i>334,735</i>	<i>351,743</i>	<i>0.4</i>	<i>0.7</i>		
Boulder	328,006	334,735	351,743	0.4	0.7		
<i>DENVER-AURORA-LAKEWOOD</i>	<i>2,996,432</i>	<i>3,153,963</i>	<i>3,351,783</i>	<i>1.1</i>	<i>1.2</i>		
Adams	523,709	558,063	612,890	1.3	1.7		
Arapahoe	661,363	695,723	733,504	1.0	1.1		
Broomfield	71,803	81,029	91,058	2.6	2.7		
Clear Creek	9,750	9,971	10,518	0.5	0.8		
Denver	735,822	773,264	818,733	1.0	1.1		
Douglas	356,811	381,544	408,671	1.4	1.5		
Elbert	27,286	31,130	35,970	2.8	3.2		
Gilpin	6,185	6,141	6,091	-0.1	-0.2		
Jefferson	584,725	597,384	613,270	0.4	0.5		
Park	18,978	19,714	21,078	0.8	1.1		
<i>FORT COLLINS</i>	<i>360,937</i>	<i>384,222</i>	<i>415,248</i>	<i>1.3</i>	<i>1.5</i>		
Larimer	360,937	384,222	415,248	1.3	1.5		
<i>GREELEY</i>	<i>331,546</i>	<i>369,263</i>	<i>424,826</i>	<i>2.3</i>	<i>2.8</i>		
Weld	331,546	369,263	424,826	2.3	2.8		
<b>EASTERN HIGH PLAINS</b>	<b>133,477</b>	<b>136,040</b>	<b>138,920</b>	<b>0.4</b>	<b>0.4</b>		
Baca	3,517	3,374	3,235	-0.8	-0.8		
Bent	5,368	5,204	5,079	-0.6	-0.5		

Table 1.1: Population estimates and projections by county and Metropolitan Statistical Area (MSA).

Region/MSA/County	Actual Population			Projected Population		Avg. Annual Change (%)	
	2020	2025	2030	2020-25	2020-30		
Cheyenne	1,819	1,813	1,801	-0.1	-0.1		
Crowley	6,049	6,131	6,262	0.3	0.4		
Kiowa	1,390	1,356	1,304	-0.5	-0.6		
Kit Carson	7,131	7,337	7,623	0.6	0.7		
Lincoln	5,717	6,093	6,457	1.3	1.3		
Logan	22,061	23,249	24,327	1.1	1.0		
Morgan	28,900	30,256	31,994	0.9	1.1		
Otero	18,151	17,801	17,290	-0.4	-0.5		
Phillips	4,248	4,176	4,120	-0.3	-0.3		
Prowers	12,084	11,881	11,764	-0.3	-0.3		
Sedgwick	2,217	2,234	2,208	0.2	-0.0		
Washington	4,721	4,851	4,916	0.6	0.4		
Yuma	10,104	10,284	10,540	0.4	0.4		
<b>PIKES PEAK</b>	<b>756,489</b>	<b>803,270</b>	<b>863,281</b>	<b>1.2</b>	<b>1.4</b>		
<i>COLORADO SPRINGS</i>	<i>756,489</i>	<i>803,270</i>	<i>863,281</i>	<i>1.2</i>	<i>1.4</i>		
El Paso	731,032	776,678	835,835	1.2	1.4		
Teller	25,457	26,592	27,446	0.9	0.8		
<b>SAN LOUIS VALLEY</b>	<b>46,150</b>	<b>46,912</b>	<b>47,832</b>	<b>0.3</b>	<b>0.4</b>		
Alamosa	16,223	17,139	18,044	1.1	1.1		
Conejos	8,136	8,059	8,113	-0.2	-0.0		
Costilla	3,847	3,790	3,744	-0.3	-0.3		
Rio Grande	11,138	11,106	11,099	-0.1	-0.0		
Saguache	6,806	6,818	6,832	0.0	0.0		
<b>SOUTH CENTRAL</b>	<b>194,758</b>	<b>198,081</b>	<b>206,613</b>	<b>0.3</b>	<b>0.6</b>		
Custer	5,053	4,946	5,028	-0.4	-0.0		
Huerfano	6,776	6,642	6,538	-0.4	-0.4		
Las Animas	14,386	14,110	13,869	-0.4	-0.4		
<i>PUEBLO</i>	<i>168,543</i>	<i>172,383</i>	<i>181,178</i>	<i>0.5</i>	<i>0.7</i>		
Pueblo	168,543	172,383	181,178	0.5	0.7		
<b>SOUTHWESTERN</b>	<b>98,122</b>	<b>104,556</b>	<b>113,027</b>	<b>1.3</b>	<b>1.5</b>		
Archuleta	14,137	14,856	16,242	1.0	1.5		
La Plata	56,970	61,520	66,972	1.6	1.8		
Montezuma	26,294	27,461	29,097	0.9	1.1		
San Juan	721	719	716	-0.1	-0.1		
<b>WESTERN SLOPE</b>	<b>325,155</b>	<b>339,750</b>	<b>367,517</b>	<b>0.9</b>	<b>1.3</b>		
Delta	31,108	31,497	32,952	0.3	0.6		
Dolores	2,017	1,934	1,880	-0.8	-0.7		
Garfield	60,795	64,517	70,422	1.2	1.6		
<i>GRAND JUNCTION</i>	<i>155,574</i>	<i>163,040</i>	<i>177,574</i>	<i>1.0</i>	<i>1.4</i>		
Mesa	155,574	163,040	177,574	1.0	1.4		
Moffat	13,181	13,039	13,032	-0.2	-0.1		
Montrose	42,999	45,558	50,355	1.2	1.7		
Ouray	4,931	5,028	5,204	0.4	0.6		
Rio Blanco	6,260	6,176	6,120	-0.3	-0.2		
San Miguel	8,290	8,961	9,978	1.6	2.0		



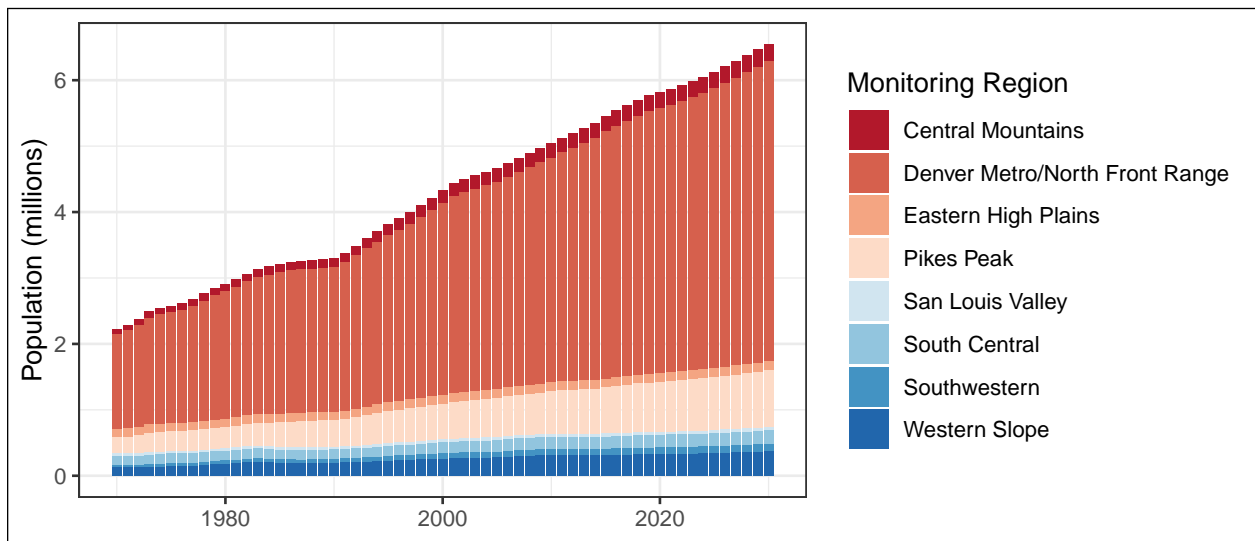


Figure 1.2: Population in Colorado from 1970 to 2030.

### 1.1.6 Monitoring Site Locations and Parameters Monitored

Table 1.2: Summary of parameters monitored at APCD monitoring sites discussed in this report.

AQS Site Number	Site Name	County	Parameters Monitored						
			O <sub>3</sub>	CO	NO <sub>2</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	Met
08-001-0010	Birch Street	Adams					X	X	
08-001-3001	Welby	Adams	X	X	X	X	X	X	X
08-003-0001	Alamosa - ASC	Alamosa					X	X	
08-005-0002	Highland Reservoir	Arapahoe	X						X
08-005-0005	Arapaho Community College (ACC)	Arapahoe						X	
08-005-0006	Aurora - East	Arapahoe	X						X
08-007-0001	Pagosa Springs School	Archuleta					X		
08-013-0003	Longmont - Municipal Bldg.	Boulder					X	X	
08-013-0012	Boulder Chamber of Commerce (CC)	Boulder					X	X	
08-013-0014	Boulder Reservoir	Boulder	X						X
08-013-1001	Boulder - CU	Boulder					X	X	
08-019-0006	Mines Peak	Clear Creek	X						
08-031-0002	CAMP	Denver	X	X	X	X	X	X	X
08-031-0013	National Jewish Health (NJH)	Denver						X	
08-031-0026	La Casa	Denver	X	X	X	X	X	X	X
08-031-0027	I-25: Denver	Denver		X	X			X	X
08-031-0028	I-25: Globeville	Denver			X			X	X
08-035-0004	Chatfield State Park	Douglas	X					X	X
08-041-0013	U.S. Air Force Academy (USAFA)	El Paso	X						
08-041-0015	Highway 24	El Paso		X		X			X
08-041-0016	Manitou Springs	El Paso	X						
08-041-0017	Colorado College	El Paso		X			X	X	
08-043-0003	Cañon City - City Hall	Fremont					X		
08-045-0012	Rifle - Health Dept.	Garfield	X						
08-047-0003	Black Hawk	Gilpin	X						
08-059-0006	Rocky Flats - N.	Jefferson	X		X				X
08-059-0011	NREL	Jefferson	X						
08-059-0014	Evergreen	Jefferson	X						X
08-069-0009	Fort Collins - CSU	Larimer						X	
08-069-0011	Fort Collins - West	Larimer	X						X
08-069-1004	Fort Collins - Mason	Larimer	X	X					X
08-077-0017	Grand Junction - Powell Bldg.	Mesa					X	X	
08-077-0018	Grand Junction - Pitkin	Mesa							X
08-077-0020	Palisade Water Treatment	Mesa	X						X
08-083-0006	Cortez - Health Dept.	Montezuma	X						
08-097-0008	Aspen	Pitkin					X		
08-099-0002	Lamar - Municipal Bldg.	Prowers					X	X	
08-101-0015	Pueblo - Fountain School	Pueblo					X	X	
08-101-0016	Pueblo West	Pueblo	X						X
08-107-0003	Steamboat Springs	Routt					X		
08-113-0004	Telluride	San Miguel					X		
08-123-0006	Greeley - Hospital	Weld						X	
08-123-0008	Platteville - Middle School	Weld						X	
08-123-0009	Greeley - Weld County Tower	Weld	X	X					X
08-123-0013	Platteville Atmospheric Observatory (PAO)	Weld	X		X				
08-123-0015	La Salle	Weld	X		X				

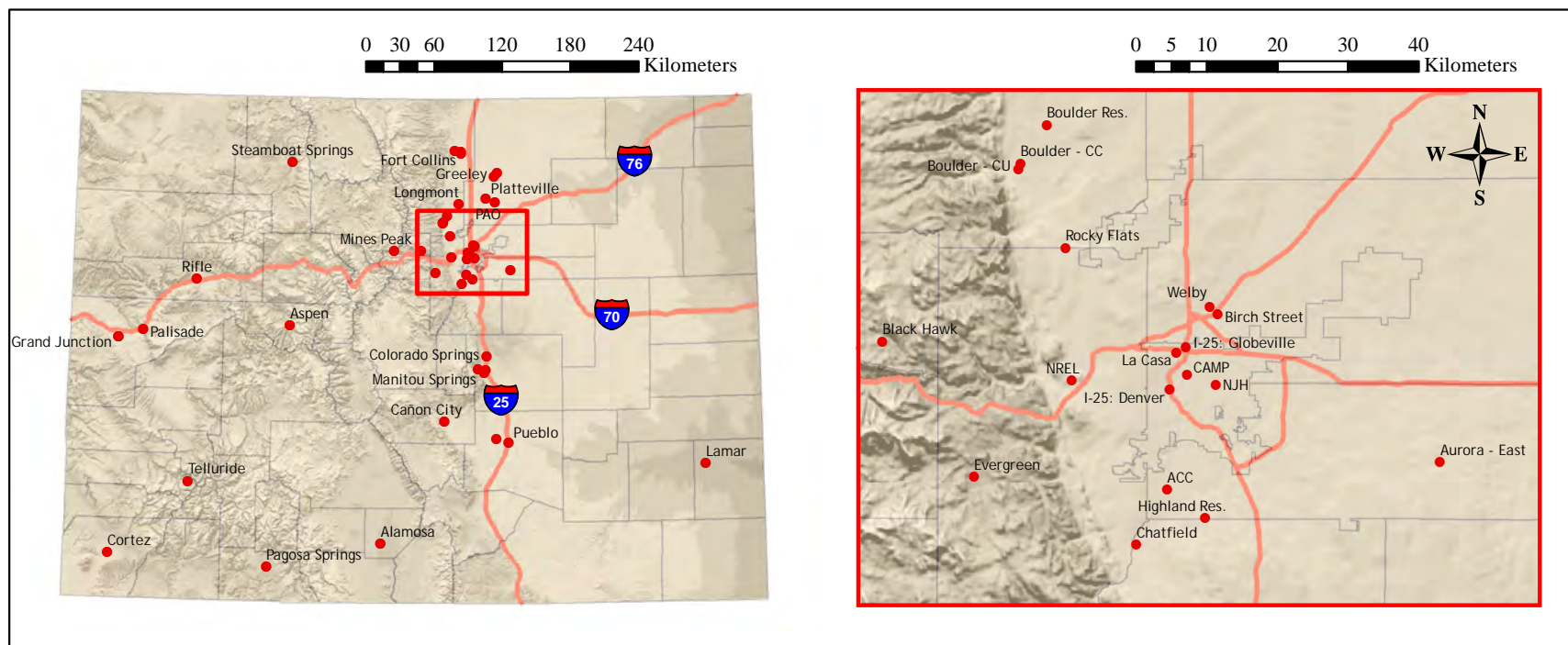


Figure 1.3: Map of Colorado with an inset map of the Denver metropolitan area showing the location of all monitoring sites operated by the APCD and listed in Table 1.2. For the purpose of improving the readability of the map, labels for monitoring sites in Fort Collins, Grand Junction, Pueblo and Colorado Springs have been combined under a single label. Detailed site information, including AQS identification numbers, site descriptions and histories, addresses and coordinates, monitoring start dates, site elevations, site orientation/scale designations, etc., can be found in Appendix A of this document.

---

## Carbon Monoxide (CO)

---

In 2024, the APCD will operate five CO monitors. Currently, the NAAQS for CO are primary standards, with a concentration level not to exceed 9 parts per million (ppm) in an eight-hour time period or 35 ppm in a one-hour period. There is no secondary standard for CO. CO levels have declined from a statewide maximum eight-hour value of 48.1 ppm in 1973 to a value of 2.0 ppm in 2023. The level of the standard has not been exceeded since 1999. The CO monitors currently operated by the APCD are associated both with State Maintenance Plan requirements and EPA requirements under the Code of Federal Regulations (CFR). However, the EPA has revised the minimum requirements for CO monitoring by requiring CO monitors to be sited near roads in certain urban areas. They are requiring a CO monitor to be located at one near-roadway NO<sub>2</sub> monitoring site. EPA is also specifying that monitors required in metropolitan areas of 2.5 million or more persons are to be operational by January 1, 2015, and that monitors required in Core-Based Statistical Areas (CBSAs) of one million or more persons are required to be operational by January 1, 2017. Currently, a CO monitor is located at the I-25 Denver near roadway NO<sub>2</sub> site to satisfy these requirements.

### 2.1 Denver Metro/North Front Range Region

The three major urban centers in the North Front Range Region include the greater Denver Metro area, and the Fort Collins and Greeley areas located in Larimer and Weld counties, respectively. Mobile sources are the main contributor to elevated CO in the Front Range region. However, controlled burns, wildfires, and biogenic influences, including oil and gas development, may also contribute to elevated CO levels. Weld County is also located in an area of significant oil and gas development. Table 2.1 lists the first and second maximum one-hour and eight-hour CO concentrations recorded in 2023 for the Denver Metro/North Front Range region.

Table 2.1: Summary of CO values recorded at monitoring stations in the Denver Metro / Northern Front Range region during 2023.

Site Name	County	CO 1-Hour Average (ppm)		CO 8-Hour Average (ppm)	
		1 <sup>st</sup> Max.	2 <sup>nd</sup> Max.	1 <sup>st</sup> Max.	2 <sup>nd</sup> Max.
Welby	Adams	1.8	1.6	1.3	1.2
CAMP	Denver	2.4	2.3	2.0	1.7
La Casa	Denver	2.1	1.8	1.5	1.4
I-25 Denver	Denver	2.5	2.4	1.8	1.8
Fort Collins - Mason	Larimer	1.8	1.7	1.1	1.1
Greeley - County Tower	Weld	1.2	1.1	0.8	0.7

## 2.2 Pikes Peak Region

The Pikes Peak Region is a very popular tourist area with rapid urban growth. The first and second maximum one-hour and eight-hour CO concentrations recorded in 2023 at the Highway 24 site are shown in Table 2.2.

Table 2.2: Summary of CO values recorded at the Highway 24 (Colorado Springs) station during 2023.

Site Name	County	CO 1-Hour		CO 8-Hour	
		Average (ppm)		Average (ppm)	
		1 <sup>st</sup> Max.	2 <sup>nd</sup> Max.	1 <sup>st</sup> Max.	2 <sup>nd</sup> Max.
Highway 24	El Paso	1.9	1.7	1.2	1.1

## 2.3 Recent and Planned Changes in CO Monitoring

The CO monitor at the Highway 24 site was moved to the preexisting Colorado College site (08-041-0017) on 1/1/2024.

CO monitoring was discontinued at the Welby site (08-001-3001) on 10/18/2023. CO monitoring was discontinued at the CAMP monitoring site (08-031-0002) on 10/12/23. These sites have both had active CO monitors for more than 50 years.

## 3

---

### Ozone (O<sub>3</sub>)

---

O<sub>3</sub> is an atmospheric oxidant composed of three oxygen atoms. It is not usually emitted directly into the air, but at ground-level is formed via photochemical reactions among NO<sub>x</sub> and volatile organic compounds (VOCs) in the presence of sunlight. Emissions from oil and gas production, motor vehicle exhaust, industrial facilities and electric utilities are some of the major sources of NO<sub>x</sub> and VOCs in Colorado, with on-road motor vehicles being the most significant source of NO<sub>x</sub> and oil and gas production being the most significant source of VOCs.

In March 2008, the U.S. EPA promulgated a new level of the NAAQS for O<sub>3</sub> of 0.075 ppm (75 ppb) as an annual fourth-highest daily maximum eight-hour concentration, averaged over three years. This made a significant change in the number of O<sub>3</sub> monitors that violated the standard at the time. On October 2015, the EPA again strengthened the NAAQS for ground level ozone to 70 ppb (effective December 28<sup>th</sup>, 2015). The APCD currently operates fifteen sites that have three-year design values (2021-2023) in excess of the current eight-hour O<sub>3</sub> NAAQS standard of 70 ppb. These sites are all located in the Front Range region and are: Welby (74), Highlands (77), Aurora East (73), Boulder Reservoir (75), CAMP (72), La Casa (75), Chatfield (81), Manitou Springs (71), Blackhawk (75), Rocky Flats North (80), NREL (80), Evergreen (75), Fort Collins West (76), Fort Collins Mason (71), and Greeley (71).

EPA's monitoring requirements for O<sub>3</sub> include placing a certain number of monitors in areas with high populations. For example, in Metropolitan Statistical Areas (MSAs) with a population greater than ten million people, EPA recommends the placement of at least four monitors in areas with design value concentrations that are greater than or equal to 85% of the O<sub>3</sub> standard. The largest MSA in Colorado is the Denver-Aurora-Lakewood Primary Metropolitan Statistical Area (PMSA). This PMSA includes the counties of Adams, Arapahoe, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson, and Park. There are seven different MSAs in Colorado. Table 3.1 below lists EPA's O<sub>3</sub> monitoring requirements. Each MSA is discussed further in the following subsections.

Table 3.1: EPA's minimum ozone monitoring requirements.

MSA Population	Most recent 3-year design	Most recent 3-year design
	value concentrations $\geq$ 85% of any O <sub>3</sub> NAAQS	value concentrations $<$ 85% of any O <sub>3</sub> NAAQS
>10 million	4	2
4-10 million	3	1
350,000-4 million	2	1
50,000-350,000	1	0

### 3.1 Denver Metro/North Front Range Region

Table 3.2 lists the first and fourth maximum eight-hour O<sub>3</sub> concentrations recorded in 2023 for the Denver Metro/North Front Range region. Also listed are the current three-year design values for each site with enough data available to calculate them.

Table 3.2: Summary of O<sub>3</sub> values recorded at monitoring stations in the Denver Metro / Northern Front Range region during 2023. Sites having three-year NAAQS values in excess of 70 ppb are indicated by asterisks.

Site Name	County	Ozone 8-Hour Average (ppb)		
		1 <sup>st</sup> Max.	4 <sup>th</sup> Max.	3-Year Ave. of 4 <sup>th</sup> Max. 8-Hr
Welby	Adams	74	70	74*
Highlands	Arapahoe	77	75	77*
Aurora East	Arapahoe	81	73	73*
Boulder Reservoir	Boulder	81	71	75*
CAMP	Denver	74	70	72*
La Casa	Denver	73	70	75*
Chatfield State Park	Douglas	83	76	81*
Black Hawk	Gilpin	79	73	75*
Rocky Flats - N.	Jefferson	83	77	80*
NREL	Jefferson	78	74	80*
Evergreen	Jefferson	79	74	75*
Fort Collins - West	Larimer	88	71	76*
Fort Collins - Mason	Larimer	78	67	71*
Greeley - County Tower	Weld	74	68	71*
PAO	Weld	70	68	74*

In the Denver Metro area, Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson counties have O<sub>3</sub> monitors. There are 14 monitors currently in operation in this area. There are two MSAs located in the Metropolitan Denver area. These are the Boulder MSA and the Denver-Aurora-Lakewood MSA, with populations of 328,006 and 2,996,432 respectively, according to the 2020 U.S. Census. Per EPA monitoring requirements, the Boulder MSA falls in the 50,000 to 350,000 population range and the Denver-Aurora-Lakewood MSA falls in the 350,000 to 4,000,000 range. The Boulder MSA therefore requires at least one monitor, and this requirement is satisfied by the monitor at Boulder Reservoir, which became operational in August of 2016. By EPA rules, the Denver-Aurora-Lakewood MSA requires at least two monitors. This requirement is satisfied by the remaining ten monitors that are placed throughout the Denver-Aurora-Lakewood MSA. The monitors located at Chatfield State Park, Rocky Flats - N., and NREL are the highest concentration monitors in the state.

Weld County is an area of extensive oil and gas development, an activity that generates regionally significant amounts of NO<sub>x</sub> and VOC emissions into the lower atmosphere. There are two MSAs located in Larimer and Weld counties. These are the Fort Collins MSA and the Greeley MSA, with populations of 360,937 and 331,546 respectively, according to the 2020 U.S. Census. Per EPA monitoring requirements, the Greeley MSA falls in the 50,000 to 350,000 population range and the Fort Collins MSA falls in the 350,000 to 4,000,000 range. The Greeley MSA therefore requires at least one monitor and the Fort Collins MSA requires at least two monitors. These requirements are satisfied by the monitors listed in Table 3.2. The monitor located at the Fort Collins West site is a highest concentration monitor for the Fort Collins MSA, while the Greeley - County Tower monitor serves the same purpose for the Greeley MSA.

All fifteen of the O<sub>3</sub> monitors shown in Table 3.2 have three-year design values above the current eight-hour ozone NAAQS of 0.070 ppm (70 ppb): Welby, Highlands, Aurora East, Boulder Reservoir, CAMP, La Casa, Chatfield State Park, Black Hawk, Rocky Flats N., NREL, Evergreen, Fort Collins West, Fort Collins Mason, Greeley - County Tower and PAO.

## 3.2 Pikes Peak Region

The first and fourth maximum eight-hour concentrations recorded in 2023 for each O<sub>3</sub> monitoring site in the Pikes Peak region are listed in Table 3.3 below. Also listed are the three year design values for each site.

The Colorado Springs MSA is the only MSA located in the Pikes Peak region. According to the 2020 U.S. Census, this

MSA has a population of 756,489. Per EPA monitoring requirements the Colorado Springs MSA falls in the 350,000 to 4,000,000 range and therefore requires at least two monitors. This requirement is satisfied by the monitors at the U.S. Air Force Academy and at Manitou Springs.

Table 3.3: Summary of O<sub>3</sub> values recorded at monitoring stations in the Pikes Peak region during 2023. Sites having three-year NAAQS values in excess of 70 ppb are indicated by asterisks.

Site Name	County	Ozone 8-Hour Average (ppm)		
		1 <sup>st</sup> Max.	4 <sup>th</sup> Max.	3-Year Ave. of 4 <sup>th</sup> Max.
U.S. Air Force Academy	El Paso	68	64	69
Manitou Springs	El Paso	70	69	71*

### 3.3 Western Slope Region

The first and fourth maximum eight-hour O<sub>3</sub> concentrations recorded in 2023 in the Western Slope region are listed in Table 3.4 below.

Table 3.4: Summary of O<sub>3</sub> values recorded at monitoring stations in the Western Slope region during 2023.

Site Name	County	Ozone 8-Hour Average (ppm)		
		1 <sup>st</sup> Max.	4 <sup>th</sup> Max.	3-Year Ave. of 4 <sup>th</sup> Max.
Rifle - Health Dept.	Garfield	66	55	59
Palisade Water Treatment	Mesa	63	61	63

The Grand Junction MSA is the only MSA located on the Western Slope. The Grand Junction MSA includes all of Mesa County and has a population of 155,574 according to the 2020 U.S. Census. Per EPA monitoring requirements, this MSA falls in the 50,000 to 350,000 population range, and thus requires one O<sub>3</sub> monitor. The monitor at the Palisade site satisfies this requirement, as well as the highest concentration monitor requirement.

### 3.4 Southwestern Region

The first and fourth maximum eight-hour concentrations recorded in 2023 at the Cortez - Health Dept. O<sub>3</sub> monitoring site are listed in Table 3.5 below. This is the only O<sub>3</sub> monitor located in the Southwestern Region.

Table 3.5: Summary of O<sub>3</sub> values recorded at the monitoring station in the Southwest region during 2023.

Site Name	County	Ozone 8-Hour Average (ppm)		
		1 <sup>st</sup> Max.	4 <sup>th</sup> Max.	3-Year Ave. of 4 <sup>th</sup> Max.
Cortez - Health Dept.	Montezuma	60	59	62

### 3.5 Recent and Planned Changes in O<sub>3</sub> Monitoring

O<sub>3</sub> monitoring was discontinued at the Platteville Atmospheric Observatory (PAO) site on 2/6/2024 and moved to the new La Salle site (08-123-0015) on 2/7/24.

O<sub>3</sub> monitoring will commence at two new sites in Larimer County (Timnath and Fossil Creek) in summer of 2024.



---

## Nitrogen Dioxide/Reactive Oxides of Nitrogen (NO<sub>2</sub>/NO<sub>y</sub>)

---

Currently, there are seven NO<sub>2</sub>/NO<sub>x</sub>/NO<sub>y</sub> monitoring locations in operation in the Denver Metro/North Front Range Region, three of which are relatively new sites. The Denver CAMP monitor exceeded the annual average NO<sub>2</sub> standard (53 ppb) in 1977 and the Welby monitor has never exceeded the standard. Concentrations have shown a gradual decline over the past 20 years and during the last decade the trend has been nearly flat, averaging between 20 and 30 ppb.

In January 2010, the EPA set a new primary one-hour NO<sub>2</sub> NAAQS that is in addition to the annual standard. The new standard, both primary and secondary, of 100 ppb is based on the three-year average of the 98<sup>th</sup> percentile of the yearly distribution of daily maximum one-hour concentrations.

The APCD began monitoring for NO<sub>y</sub> at the La Casa NCore site in January 2013. NCore sites are part of a national EPA network that monitors multiple pollutants at certain “core” sites around the country. NO<sub>y</sub> monitoring is a requirement for an NCore station, but there are no standards for NO<sub>y</sub>. The EPA has also established requirements for an NO<sub>2</sub> monitoring network that will include monitors at locations where maximum NO<sub>2</sub> concentrations are expected to occur, including within 50 meters of major roadways, as well as monitors sited to measure the area-wide NO<sub>2</sub> concentrations that occur more broadly across communities. Per these requirements, at least one monitor must be located near a major road in any urban area with a population greater than or equal to 500,000 people. A second monitor is required near another major road in areas with either: (1) population greater than or equal to 2.5 million people, or (2) one or more road segments with an annual average daily traffic count greater than or equal to 250,000 vehicles. Near roadway sites were installed at the I-25 Denver and I-25 Globeville sites to satisfy these requirements. These sites began operation in June 2013 and October 2015, respectively. In addition to the near roadway monitoring, there must be one monitoring station in each CBSA with a population of one million or more persons to monitor a location of expected highest NO<sub>2</sub> concentrations representing the neighborhood or larger spatial scales. The CAMP site satisfies the requirement for the neighborhood highest representative concentration site.

### 4.1 Denver Metro/North Front Range Region

The annual mean and 98<sup>th</sup> percentile one-hour concentrations recorded in 2023 for each NO<sub>2</sub> monitoring site in the Denver Metro/North Front Range region are listed in Table 4.1 below. Also listed are the three year design values for each site. The APCD currently monitors NO<sub>2</sub> only in this region. All of these monitors show values that are well below both the annual average NAAQS of 53 ppb and the one-hour NAAQS of 100 ppb.

The CAMP monitoring site was closed from October 14, 2023 to January 1, 2024 due to access issues, so the three-year design value is not currently valid for this site.

### 4.2 Recent and Planned Changes in NO<sub>2</sub>/NO<sub>y</sub> Monitoring

NO<sub>2</sub> monitoring was discontinued at the Platteville Atmospheric Observatory (PAO) site on 2/6/2024 and moved to the new La Salle site (08-123-0015) on 2/7/24.

4.2. RECENT AND PLANNED CHANGES IN NO<sub>2</sub>/NO<sub>y</sub> MONITORING

Table 4.1: Summary of NO<sub>2</sub> values recorded at monitoring stations in the Denver Metro / Northern Front Range region during 2023.

Site Name	County	NO <sub>2</sub> (ppb)		
		Annual Mean	98 <sup>th</sup> Percentile	3-Year Ave. of 98 <sup>th</sup> Percentile
Welby	Adams	15.9	56.2	56
CAMP	Denver	14.6	65.7	62 <sup>1</sup>
La Casa	Denver	14.8	55.2	56
I-25 Denver	Denver	20.9	61.5	60
I-25 Globeville	Denver	24.2	64.5	66
Rocky Flats - N.	Jefferson	2.8	31.5	27
PAO	Weld	7.0	47.4	46

NO<sub>2</sub> monitoring will commence at two new sites in Larimer County (Timnath and Fossil Creek) in summer of 2024.

---

## Sulfur Dioxide (SO<sub>2</sub>)

---

Currently, there are three SO<sub>2</sub> monitoring locations within the APCD's network. A new one-hour primary standard was finalized in June 2010. To attain that standard, the three-year average of the 99<sup>th</sup> percentile of daily maximum one-hour averages at each monitor within an area must not exceed 75 ppb. The secondary NAAQS is a three-hour average not to exceed 500 ppb more than once per year.

SO<sub>2</sub> monitoring requirements include the need for calculating a Population Weighted Emissions Index (PWEI). This figure is calculated for each MSA by multiplying the population of the MSA by the SO<sub>2</sub> emissions for that MSA and dividing by 1 million. This PWEI value is then used to determine areas in need of SO<sub>2</sub> monitoring. For any MSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO<sub>2</sub> monitors are required within that MSA. For any MSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO<sub>2</sub> monitors are required within that MSA. For any MSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO<sub>2</sub> monitor is required within that MSA. A sum of the most recent emissions data by county (2020) give a total for SO<sub>2</sub> emissions of 1,183 tons per year for the Denver PMSA. The calculated PWEI for this region is 3,547 million persons-tons per year. This indicates no minimum monitoring requirements for SO<sub>2</sub> in the Denver-Aurora-Lakewood MSA.

Using the same calculation for the Colorado Springs MSA, the calculated PWEI is 582 million persons-tons per year. This indicates no minimum monitoring requirements for SO<sub>2</sub> in the Colorado Springs MSA.

While there are no longer PWEI-based minimum monitoring requirements, the APCD will continue to conduct SO<sub>2</sub> monitoring at three locations in the Denver Metro/North Front Range Region during 2024.

### 5.1 Denver Metro/North Front Range Region

The annual mean and 99<sup>th</sup> percentile one-hour daily maximum concentrations recorded in 2023 for each SO<sub>2</sub> monitoring site in the Denver Metro/North Front Range region are listed in Table 5.1 below. Also listed are the three year design values for each site.

The CAMP monitoring site was closed from October 14, 2023 to January 1, 2024 due to access issues, so the three-year design value is not currently valid for this site.

### 5.2 Pikes Peak Region

### 5.3 Recent and Planned Changes in SO<sub>2</sub> Monitoring

SO<sub>2</sub> monitoring was discontinued at Highway 24 when this site was closed on 1/1/2024.

Table 5.1: Summary of SO<sub>2</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023.

Site Name	County	SO <sub>2</sub> (ppb)		
		Annual Mean	99 <sup>th</sup> Percentile	3-Year Ave. of 99 <sup>th</sup> Percentile
Welby	Adams	0.89	6	6
CAMP	Denver	0.52	5	5 <sup>1</sup>
La Casa	Denver	0.76	5	5

Table 5.2: Summary of SO<sub>2</sub> values recorded at the Highway 24 monitoring site in Colorado Springs during 2023.

Site Name	County	SO <sub>2</sub> (ppb)		
		Annual Mean	99 <sup>th</sup> Percentile	3-Year Ave. of 99 <sup>th</sup> Percentile
Highway 24	El Paso	0.65	5	7

---

## Particulate Matter (PM)

---

Sources of suspended particulate matter in ambient air include mobile and stationary sources (i.e., diesel trucks, wood burning stoves, power plants, etc.). Several industrial and manufacturing processes also contribute to elevated particulate levels. There are also a variety of agricultural sources of PM including feed lots, grazing, tilling, etc. Suspended particulates in the atmosphere vary widely in their chemical and physical composition. Particulate matter can be directly emitted or can be formed in the atmosphere when gaseous pollutants react to form particles.

Particle size is the factor most directly linked to the health impacts of atmospheric PM. Particles of less than 10 micrometers ( $\mu\text{m}$ ) in aerodynamic diameter ( $\text{PM}_{10}$ ) are inhalable and thus pose a health threat. Particles less than 2.5  $\mu\text{m}$  in aerodynamic diameter ( $\text{PM}_{2.5}$ ) can penetrate deeply into the alveoli, while the smallest particles, such as those less than 0.1  $\mu\text{m}$  in aerodynamic diameter (ultrafine particles), can penetrate all the way into the bloodstream. Exposure to such particles can affect the lungs, the heart, and the cardiovascular system. Particles with diameters between 2.5  $\mu\text{m}$  and 10  $\mu\text{m}$  ( $\text{PM}_{10-2.5}$ ) represent less of a health concern, although they can irritate the eyes, nose, and throat, and cause serious harm due to inflammation in the airways of people with respiratory diseases such as asthma, chronic obstructive pulmonary disease, and pneumonia. Note that  $\text{PM}_{10}$  encompasses all particles smaller than 10  $\mu\text{m}$ , including the  $\text{PM}_{2.5}$  and ultrafine fractions.

Table 6.1: EPA's minimum  $\text{PM}_{10}$  monitoring requirements.

<b>MSA Population</b>	<b>High Concentration<sup>1</sup></b>	<b>Medium Concentration<sup>2</sup></b>	<b>Low Concentration<sup>3,4</sup></b>
>1,000,000	6-10	4-8	2-4
500,000-1,000,000	4-8	2-4	1-2
250,000-500,000	3-4	1-2	0-1
100,000-250,000	1-2	0-1	0

<sup>1</sup>High concentration areas are those for which ambient  $\text{PM}_{10}$  data show ambient concentrations exceeding the  $\text{PM}_{10}$  NAAQS by 20 percent or more.

<sup>2</sup>Medium concentration areas are those for which ambient  $\text{PM}_{10}$  data show ambient concentrations exceeding 80 percent of the  $\text{PM}_{10}$  NAAQS.

<sup>3</sup>Low concentration areas are those for which ambient  $\text{PM}_{10}$  data show ambient concentrations less than 80 percent of the  $\text{PM}_{10}$  NAAQS.

<sup>4</sup>These minimum monitoring requirements apply in the absence of a design value.

Table 6.2: EPA's minimum  $\text{PM}_{2.5}$  monitoring requirements.

<b>MSA Population</b>	<b>Most recent 3-year design value <math>\geq 85\%</math> of any <math>\text{PM}_{2.5}</math> NAAQS</b>	<b>Most recent 3-year design value &lt; 85% of any <math>\text{PM}_{2.5}</math> NAAQS</b>
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-500,000	1	0

Table 6.1 and Table 6.2 list EPA's  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  monitoring requirements, respectively. Currently the APCD operates  $\text{PM}_{10}$  monitors at 17 different locations. Two of these sites use high-volume filter-based instruments, four sites use low-volume filter-based instruments, and one site has a continuous monitors collocated with an FRM (filter-based) instrument. There is one site with collocated high-volume  $\text{PM}_{10}$  samplers (CAMP) and there are two sites

## 6.1. CONTINUOUS PM MONITORING

with collocated low volume PM<sub>10</sub> samplers (La Casa and Grand Junction - Powell). The PM<sub>10</sub> NAAQS is a 24-hour average of 150  $\mu\text{g m}^{-3}$  not to be exceeded more than once per year on average over a three-year period. This average is also based on the monitoring frequency and the percent of valid data collected at a site.

PM<sub>2.5</sub> concentration values are reported in four different categories of readings by the APCD. Data from instruments sampling according to the Federal Reference Method (FRM) are reported with an 88101 parameter code, data from continuous samplers that reasonably compare to the FRM are reported with the 88500 parameter code, data from continuous samplers that don't compare reasonably to the FRM are reported with the 88501 parameter code, and speciation data is reported with the 88502 parameter code. Currently, there are filter-based PM<sub>2.5</sub> FRM instruments at five sites. Of these five sites, four are collocated with a continuous PM<sub>2.5</sub> monitor and one is collocated with another filter-based PM<sub>2.5</sub> FRM; 14 sites have continuous PM<sub>2.5</sub> but no filter-based FRM. Speciation analysis (laboratory analysis of PM<sub>2.5</sub> samples to characterize the different components of PM<sub>2.5</sub> in the atmosphere) is conducted at three sites; La Casa, Platteville, and Birch Street. All three speciation sites are collocated with a low volume filter-based FRM.

The annual PM<sub>2.5</sub> standard of 12  $\mu\text{g m}^{-3}$  is compared to the three-year average annual mean PM<sub>2.5</sub> concentration. The 24-hour PM<sub>2.5</sub> standard of 35  $\mu\text{g m}^{-3}$  is compared to the three-year average of the annual 98<sup>th</sup> percentile value.

### 6.1 Continuous PM Monitoring

All Federal Reference Method (FRM) monitors in the Colorado PM<sub>2.5</sub> network were in the past compared to the NAAQS. The FRM monitors are all filter-based 24-hour composite samplers. Due to advances in continuous particulate monitoring technology, the APCD now uses continuous PM monitors to compare to the PM<sub>2.5</sub> NAAQS. The GRIMM EDM 180 and the Teledyne T640 (and T640x) have received Federal Equivalent Method (FEM) designation for PM<sub>2.5</sub> from the EPA. The APCD replaced the first TEOM at CAMP in April of 2013 with a GRIMM EDM 180. The APCD has determined the GRIMM EDM 180 and the T640/T640x to be a very reliable and cost effective way to monitor ambient continuous particulate concentrations. The APCD currently operates 22 sites that use these instruments to compare to the PM<sub>10</sub> and PM<sub>2.5</sub> NAAQS.

## 6.2 Denver Metro/North Front Range Region

There were no violations of the PM<sub>10</sub> NAAQS in the Denver Metro/North Front Range region during 2023; however, several sites recorded 24-hour values in exceedance of the 24-hour PM<sub>2.5</sub> standard of 35  $\mu\text{g m}^{-3}$ , including Platteville, CAMP, Chatfield, NJH and Birch Street. Table 6.3 and Table 6.4 below list the PM<sub>10</sub> and PM<sub>2.5</sub> annual averages and design values recorded at each site in this region in 2023.

The Birch Street monitor has only been in operation since March 2021, so the design values for this site are not valid for NAAQS comparison. The CAMP monitoring site was closed from October 14, 2023 to January 1, 2024 due to access issues, so the three-year design value is not currently valid for this site. The Boulder - CU monitoring site has been operational only since August 2023, so the three-year design value is not currently valid for this site either.

Table 6.3: Summary of PM<sub>10</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023.

Site Name	County	PM <sub>10</sub> ( $\mu\text{g m}^{-3}$ )		
		Annual Average	24-Hr Max	3-Year Exceedances
Birch Street	Adams	30.3	98	0 <sup>1</sup>
Welby	Adams	28.5	95	0
Longmont	Boulder	19.3	41	0
Boulder Chamber of Comm.	Boulder	16.0	30	0
Boulder - CU	Boulder	14.8	35	0 <sup>2</sup>
CAMP	Denver	25.0	73	0 <sup>3</sup>
La Casa	Denver	20.7	49	0

Table 6.4: Summary of PM<sub>2.5</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023.

Site Name	County	PM <sub>2.5</sub> ( $\mu\text{g m}^{-3}$ )		
		Annual Average	Annual 98 <sup>th</sup> Percentile	3-Year Ave. of 98 <sup>th</sup> Percentile
Birch Street	Adams	8.3	23.7	23 <sup>4</sup>
Arapaho Comm. College	Arapahoe	5.4	16.0	17
Longmont	Boulder	6.6	19.0	32
Boulder Chamber of Comm.	Boulder	4.8	14.6	18
Boulder - CU	Boulder	4.1	12.3	12 <sup>5</sup>
CAMP	Denver	6.5	21.9	22 <sup>6</sup>
National Jewish Health	Denver	6.4	16.3	22
La Casa	Denver	6.3	16.6	19
I-25 Denver	Denver	7.7	19.2	18
I-25 Globeville	Denver	8.7	23.0	24
Chatfield State Park	Douglas	5.0	16.7	24
Fort Collins - CSU	Larimer	6.2	18.2	22
Greeley - Hospital	Weld	7.7	23.3	25
Platteville	Weld	7.7	21.9	23

### 6.3 Eastern High Plains

There was one violation of the PM<sub>10</sub> NAAQS in the Eastern High Plains region during 2023. The maximum 24-hour concentration of 160  $\mu\text{g m}^{-3}$  was recorded at the Lamar site on April 19 and was likely the result of wind blown dust (i.e., an exceptional event). Table 6.5 below lists the PM<sub>10</sub> annual average and design value recorded at the Lamar site in 2023.

Table 6.5: Summary of PM<sub>10</sub> values recorded at monitoring stations in the Eastern High Plains region during 2023, with proposed exceptional events included.

Site Name	County	PM <sub>10</sub> ( $\mu\text{g m}^{-3}$ )		
		Annual Average	24-Hr Max	3-Year Exceedances
Lamar - Mun. Bldg.	Prowers	27.2	160	1.7

### 6.4 Pikes Peak Region

There were no violations of the PM<sub>10</sub> or PM<sub>2.5</sub> NAAQS in the Pikes Peak region during 2023. Table 6.6 and Table 6.7 below list the PM<sub>10</sub> and PM<sub>2.5</sub> annual averages and design values recorded at the Colorado College monitoring site in 2023.

Table 6.6: Summary of PM<sub>10</sub> values recorded at the Colorado College station during 2023.

Site Name	County	PM <sub>10</sub> ( $\mu\text{g m}^{-3}$ )		
		Annual Average	24-Hr Max	3-Year Exceedances
Colorado College	El Paso	15.3	33	0

Table 6.7: Summary of PM<sub>2.5</sub> values recorded at the Colorado College station during 2023.

Site Name	County	PM <sub>2.5</sub> ( $\mu\text{g m}^{-3}$ )		
		Annual Average	Annual 98 <sup>th</sup> Percentile	3-Year Ave. of 98 <sup>th</sup> Percentile
Colorado College	El Paso	5.4	13.3	15



## 6.5 South Central Region

There were no violations of the PM<sub>10</sub> or PM<sub>2.5</sub> NAAQS in the South Central region during 2023. Table 6.8 and Table 6.9 below list the PM<sub>10</sub> and PM<sub>2.5</sub> annual averages and design values recorded at the Pueblo site in 2023.

Table 6.8: Summary of PM<sub>10</sub> values recorded at the Pueblo monitoring station during 2023.

Site Name	County	PM <sub>10</sub> (µg m <sup>-3</sup> )		
		Annual Average	24-Hr Max	3-Year Exceedances
Pueblo	Pueblo	24.8	64	1.1

Table 6.9: Summary of PM<sub>2.5</sub> values recorded at the Pueblo monitoring station during 2023.

Site Name	County	PM <sub>2.5</sub> (µg m <sup>-3</sup> )		
		Annual Average	Annual 98 <sup>th</sup> Percentile	3-Year Ave. of 98 <sup>th</sup> Percentile
Pueblo	Pueblo	5.2	10.4	16

## 6.6 Central Mountain Region

There were no violations of the PM<sub>10</sub> NAAQS in the Central Mountain region during 2023. Table 6.10 below lists the PM<sub>10</sub> 2023 annual average and design value recorded at each site in this region.

Table 6.10: Summary of PM<sub>10</sub> values recorded at monitoring stations in the Central Mountains region during 2023.

Site Name	County	PM <sub>10</sub> (µg m <sup>-3</sup> )		
		Annual Average	24-Hr Max	3-Year Exceedances
Cañon City	Fremont	16.3	95	0
Aspen	Pitkin	15.8	56	0
Steamboat Springs	Routt	16.1	69	0

## 6.7 Western Slope Region

There were no violations of the PM<sub>10</sub> or PM<sub>2.5</sub> NAAQS in the Western Slope region during 2023. Table 6.11 and Table 6.12 below list the PM<sub>10</sub> and PM<sub>2.5</sub> annual averages and design values recorded at each site in this region in 2023.

Table 6.11: Summary of PM<sub>10</sub> values recorded at monitoring sites in the Western Slope region during 2023.

Site Name	County	PM <sub>10</sub> (µg m <sup>-3</sup> )		
		Annual Average	24-Hr Max	3-Year Exceedances
Grand Junction - Powell Bldg.	Mesa	16.2	63	0
Telluride	San Miguel	12.9	62	0

Table 6.12: Summary of PM<sub>2.5</sub> values recorded at the Grand Junction - Powell Bldg. monitoring site during 2023.

Site Name	County	PM <sub>2.5</sub> (µg m <sup>-3</sup> )		
		Annual Average	Annual 98 <sup>th</sup> Percentile	3-Year Ave. of 98 <sup>th</sup> Percentile
Grand Junction - Powell Bldg.	Mesa	4.4	10.2	14

## 6.8 Southwestern Region

There was one violation of the PM<sub>10</sub> NAAQS in the Southwestern region during 2023. The maximum 24-hour concentration of 193  $\mu\text{g m}^{-3}$  was recorded at the Pagosa Springs site on April 3 and was likely the result of wind blown dust (i.e., an exceptional event). Table 6.13 below lists the PM<sub>10</sub> annual average and design value recorded at each site in this region in 2023.

Table 6.13: Summary of PM<sub>10</sub> values recorded at monitoring sites in the Southwest region during 2023, with proposed exceptional events included.

Site Name	County	PM <sub>10</sub> ( $\mu\text{g m}^{-3}$ )		
		Annual Average	24-Hr Max	3-Year Exceedances
Pagosa Springs School	Archuleta	24.3	193	1.7

## 6.9 Recent and Planned Changes in PM Monitoring

Over the recent months, several significant changes have been made to the PM monitoring network at various locations, emphasizing a shift toward more modern and efficient particulate matter monitoring equipment and methods. These changes span from equipment upgrades to method adjustments and are detailed below for each site:

### Birch Street (08-001-0010)

- Removed GRIMM monitor and installed a T640x FEM for real-time PM<sub>10</sub> and PM<sub>2.5</sub> monitoring on 7/26/2023.
- Replaced R&P Partisol PM<sub>10</sub> and PM<sub>2.5</sub> samplers with a Met One E sequential sampler on 12/13/2023.

### Welby (08-001-3001)

- High-volume PM<sub>10</sub> sampling was discontinued and collocated T640x FEM monitors for PM<sub>10</sub> and PM<sub>2.5</sub> were introduced.

### Boulder (08-013-0012 and 08-013-1001)

- Shut down Boulder Chamber of Commerce site on 1/2/2024, ending filter-based PM<sub>10</sub> and PM<sub>2.5</sub> sampling.
- Removed TEOM at Boulder - CU site and installed a T640x FEM for real-time PM<sub>10</sub> and PM<sub>2.5</sub> monitoring on 8/30/2023.

### Chatfield (08-035-0004)

- Filter-based PM<sub>2.5</sub> monitoring was discontinued on 9/30/2023.

### Pueblo - Fountain School (08-101-0015)

- High-volume PM<sub>10</sub> and Partisol samplers were discontinued on 9/15/2023.
- Installed a new T640x FEM for real-time PM<sub>10</sub> and PM<sub>2.5</sub> monitoring.

### Steamboat Springs (08-107-0003)

- High-volume PM<sub>10</sub> sampling was discontinued on 9/29/2023 and a new T640x was installed, reporting real-time FEM PM<sub>10</sub> measurements.

### Lamar (08-099-0002) and Cañon City (08-043-0003)

- High-volume PM<sub>10</sub> sampling was discontinued and T640x FEM monitors for PM<sub>10</sub> and PM<sub>2.5</sub> were introduced at both sites.

### Alamosa - ASC (08-003-0001)

- Installed a T640x FEM for real-time PM<sub>10</sub> and PM<sub>2.5</sub> monitoring on 10/25/2023.

### Pagosa Springs (08-007-0001) and Telluride (08-113-0004)

- Both locations saw the discontinuation of high-volume PM<sub>10</sub> sampling in late 2023 and new T640x analyzers were installed.

**Arapaho Community College (08-005-0005)**

- Low-volume Partisol PM<sub>2.5</sub> sampling was discontinued and a GRIMM analyzer was introduced, reporting valid data from 4/16/2024.

**Longmont (08-013-0003)**

- Filter-based instruments, including high-volume PM<sub>10</sub> and Partisol samplers, were discontinued in early 2024 and replaced with T640x FEM for real-time PM<sub>10</sub> and PM<sub>2.5</sub> monitoring.

**Planned Changes**

- **Platteville - Middle School (08-123-0008):** Planned removal of a PM<sub>2.5</sub> FRM Partisol and installation of a T640x FEM for real-time PM<sub>10</sub> and PM<sub>2.5</sub> monitoring.
- **Birch Street (08-001-0010):** Plans to discontinue low-volume PM<sub>10</sub> sampling on 7/1/2024.
- **Aspen (08-097-0008):** Plans to discontinue high-volume PM<sub>10</sub> sampling and introduce a T640x FEM for real-time PM<sub>10</sub> monitoring.
- **Grand Junction - Powell Bldg. (08-077-0017):** Plans to discontinue collocated low-volume PM<sub>10</sub> sampling.
- **CAMP (08-031-0002):** Plans to discontinue high-volume PM<sub>10</sub> sampling in 2024.
- **Timnath (Bethke Elementary):** Planned installation of a T640x FEM for real-time PM<sub>2.5</sub> monitoring.

---

## Lead

---

Lead sampling at the La Casa NCore site was discontinued in December 31 of 2015 due to low concentrations. The maximum quarterly lead concentration has generally been less than a tenth of the current 2008 standard. Additionally, Colorado has not recorded an exceedance of the previous lead standard ( $1.5 \mu\text{g m}^{-3}$  averaged over a calendar quarter) since the first quarter of 1980. The 2008 lead standard, which is  $0.15 \mu\text{g m}^{-3}$  averaged over any three rolling consecutive three-month periods, has not been exceeded using data from 2013 - 2015.

The U.S. EPA calculated emissions for lead at general aviation airports due to piston engine aircraft, which continue to use leaded aviation fuel. According to the EPA, Centennial Airport had the second highest lead emissions of any airport in the country at 1.18 tons per year (tpy) using data from the 2005 National Emissions Inventory (NEI). Since this emissions estimate exceeded the threshold for lead, the APCD located a lead sampling site at the Centennial Airport. This monitoring site was installed in March 2011 and the first sample was collected on April 3, 2011. The Centennial Airport TSP sampler was decommissioned in December of 2014 due to the site meeting its sampling requirements and it regularly showing concentrations well below that of the standard. The 2014 NEI report indicates that lead emissions from the Centennial Airport are approximately 0.77 tpy, which is below the 1 tpy threshold for monitoring and corroborates the decision to discontinue monitoring at this site.

Lead monitoring is required by EPA at one source-oriented SLAMS site located to measure the maximum lead concentration in ambient air resulting from each non-airport lead source which emits 0.50 or more tpy based on either the most recent National Emission Inventory (NEI) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) taking into account logistics and the potential for population exposure. Based on the 2014 NEI, there are no non-airport sources in Colorado that are over the 0.5 tpy threshold. There have been questions regarding the U.S. Army Fort Carson facility in Colorado Springs, which has at times reported potential emissions over 0.5 tpy in the Toxics Release Inventory (TRI). It is noted that the 2014 NEI reports 0.029 tpy for Fort Carson and both the 2014 and 2016 TRI report 0 tpy for fugitive and stack air emissions. Based on the APCD inventories, these emissions are actually from their Piñon Canyon training area in Las Animas County. This area is remote with only scattered ranches, approximately 25 miles to the northeast of the town of Trinidad and thus would not warrant monitoring due to a low potential for public exposure.

### 7.1 Planned Changes in Lead Monitoring

No changes in lead monitoring are planned for 2024. Ambient lead concentrations will still be measured at the  $\text{PM}_{2.5}$  speciation and IMPROVE sites throughout the state, as well as on the  $\text{PM}_{10}$  sampler at Grand Junction Powell (08-077-0017) as part of the NATTS project.

---

## Meteorological Measurements

---

Meteorological measurements taken by the APCD consist of wind speed, wind direction, and temperature; six sites are also equipped to measure relative humidity. Three sites also record temperature differential and total solar radiation, and the APCD is presently enhancing the meteorological network with barometric pressure and precipitation measurements at select sites. Sites equipped with meteorological monitoring equipment are indicated in Table 1.2.

### **8.1 Recent and Planned Changes in Meteorological Monitoring**

Meteorological monitoring was installed at the Fort Collins West site (08-069-0011) on 7/28/23. Meteorological monitoring was discontinued at PAO when this site was closed on 2/6/2024. Meteorological monitoring was also discontinued at CAMP and at Highway 24 in Colorado Springs when this site was closed on 1/1/2024. The upcoming Fossil Creek site in Larimer County will have be equipped with a met tower.

---

## **PAMS (Photochemical Assessment Monitoring Station) Monitoring**

---

In accordance with the EPA's 2015 revised ozone monitoring rule (80 CFR 65292), the state of Colorado is required to install and operate one Photochemical Assessment Monitoring Station (PAMS) site. The rule states that PAMS monitoring is to occur at all NCore sites from June 1 through August 31 in CBSAs with populations of 1,000,000 or more. The CDPHE operates the NAAQS air monitoring compliance network in Colorado and will be responsible for implementing these new monitoring requirements. Colorado's Rocky Flats PAMS site will measure, at a minimum, volatile organic compounds (VOCs), carbonyls, ozone, total reactive nitrogen ( $\text{NO}_y$ ), nitrogen dioxide ( $\text{NO}_2$ ), mixing layer height, wind speed, wind direction, relative humidity, temperature, atmospheric pressure, precipitation, total solar radiation, and ultraviolet radiation. All measurements will be collected and reported in hourly averages.

### **9.1 Recent and Planned Changes in PAMS Monitoring**

Gas chromatography operation began at the Colorado PAMS site (Rocky Flats - N.) on 08/14/2023. Carbonyl monitoring began on 6/17/2023.

---

## Quality Assurance

---

### 10.1 Continuous Monitors

The Technical Services Program (TSP) staff performs three types of gaseous analyzer performance checks: quality control checks, accuracy audits, and calibrations. The audits and calibrations challenge the analyzer with pollutant gases of known concentration within the range of the analyzer. The APCD Quality Assurance (QA) staff conducts independent accuracy audits on all of the instruments at least twice per year. The EPA's National Performance Audit Program (NPAP) also conducts independent audits on randomly selected sites within the network. The APCD Criteria Monitoring Unit (CMU) staff conducts quality control checks nominally once every week and calibrations once every calendar quarter. The details and minimum standards for this program are set out in the Code of Federal Regulations (Part 58 Ambient Air Quality Surveillance). The APCD always makes an effort to go above and beyond the minimum requirements. A complete description of these procedures is available in the APCD Quality Assurance Project Plan (QAPP) and the results are available from the APCD or through the national EPA AQS database.

### 10.2 Particulate Monitors

The audit checks performed on the particulate monitors consist of calibrated flow rate checks, as well as temperature and pressure sensor checks. The precision checks that are made on filter-based particulate monitors consist of collocated samplers that operate side-by-side and collect a sample from both samplers once every sixth day. The precision checks for continuous particulate monitors consist of monthly temperature, pressure, leak rate and flow rate verification checks. EPA requires a minimum of 15% of the FRM network to be collocated. By the end of 2023, Colorado maintained seven filter-based particulate monitoring sites (low-volume and high-volume), three of which had collocated instruments (CAMP, La Casa, and Grand Junction - Powell). The EPA also has a performance evaluation program (PEP), which checks the national network for bias by having a private contractor set up an independent filter-based low-volume FRM sampler next to the APCD's PM<sub>2.5</sub> sampler. All of the samples are then compared to ensure that the data are within federal limits and meet pre-established data quality objectives.

### 10.3 Meteorological Monitors

Semiannual calibrations and audits are performed on all APCD meteorological equipment to determine proper alignment and operation of the sensors. The details and minimum standards for this program are set out in the Code of Federal Regulations (Part 58 Ambient Air Quality Surveillance). A complete description of the procedures and the results are available from the APCD or in the APCD QAPP.



---

## Summary of Network Changes

---

Over the past year, several network changes occurred, and during the next year several more changes are planned. The section below summarizes these changes to the monitoring network.

### 11.1 Completed and Planned Changes

- **CO Monitoring:**

- Relocated the CO monitor from Highway 24 to the Colorado College site (08-041-0017) on 1/1/2024.
- Discontinued CO monitoring at the Welby (08-001-3001) and CAMP (08-031-0002) sites in October 2023, both after over 50 years of operation.

- **O<sub>3</sub> Monitoring:**

- Discontinued O<sub>3</sub> monitoring at the Platteville Atmospheric Observatory (PAO) site and moved the monitor to the La Salle site (08-123-0015) in February 2024.
- Will commence O<sub>3</sub> monitoring at new sites in Larimer County (Timnath and Fossil Creek) in summer 2024.

- **NO<sub>2</sub> Monitoring:**

- Similar relocation from the Platteville Atmospheric Observatory to the La Salle site in February 2024.
- New monitoring to start in Larimer County (Timnath and Fossil Creek) in summer 2024.

- **SO<sub>2</sub> Monitoring:**

- Discontinued SO<sub>2</sub> monitoring at Highway 24 when the site was closed on 1/1/2024.

- **PM Monitoring:**

- Numerous changes across sites, including the installation of T640x monitors and discontinuation of older equipment like high-volume PM<sub>10</sub> samplers and Partisol samplers throughout 2023 and early 2024.
- Notable site-specific changes include new equipment at Boulder, Pueblo Fountain School, Steamboat Springs, Lamar, Cañon City, Alamosa, Pagosa Springs, Telluride, Arapaho Community College, and Longmont.
- Planned changes include updates at Platteville - Middle School, Aspen, Grand Junction - Powell Bldg. and CAMP.

- **Meteorological Monitoring:**

- Installed a meteorological tower at the Fort Collins West site (08-069-0011) on 7/28/23.

- Discontinued meteorological monitoring at CAMP and Highway 24.
- Will commence meteorological monitoring at the new Fossil Creek site in summer 2024.
- **PAMS Monitoring:**
  - Gas chromatography operation began at the Colorado PAMS site (Rocky Flats - N.) on 08/14/2023.
  - Carbonyl monitoring began on 6/17/2023.

---

## CFR Requirements Summary

---

This section summarizes the requirements of 40 CFR 58, Appendices A, C, D, and E as they pertain to the CDPHE's ambient air monitoring network, as well as how these specific requirements are being met.

Appendix A of 40 CFR 58 covers the data quality assurance requirements for SLAMS, SPM, and PSD monitors. The requirements state the need for, and frequency of zero, span, and precision processes on the analyzer. It also specifies the auditing requirements for each monitor type. Audits of each particulate analyzer are performed on a quarterly basis and gaseous analyzers are audited twice annually. These results are tracked in a database at the CDPHE and are available upon request. A zero/span or a zero/precision routine is run on each of the gaseous monitoring instruments in the CDPHE's network on a nightly basis. These results are kept "in-house" at the CDPHE and are available on request. Manual quality control checks are performed on all gaseous instruments weekly and the results of these quality control tests are uploaded to EPA's national AQS database.

Appendix C of 40 CFR 58 specifies the criteria pollutant monitoring methods (manual analyzers or automated analyzers) which must be used in SLAMS and NCore stations that are a subset of SLAMS. Monitor types, sampling frequencies, and station descriptions are listed in Appendix A.

Appendix D of 40 CFR 58 specifies the network design criteria for ambient air quality monitoring. It covers monitoring objectives and spatial scales, general monitoring requirements, design criteria for NCore sites, pollutant specific design criteria for SLAMS sites, and design criteria for Photochemical Assessment Monitoring Stations (PAMS). These requirements are addressed in the individual pollutant sections.

Appendix E of 40 CFR 58 contains the specific location criteria applicable to SLAMS, NCore, and PAMS ambient air quality monitoring probes, inlets, and optical paths after the general location has been selected based on the monitoring objectives and spatial scale of representation discussed in Appendix D of 40 CFR 58. Adherence to these specific siting criteria is necessary to ensure the uniform collection of compatible and comparable air quality data. To ensure that all sites in the network meet the appropriate criteria, the CDPHE performs thorough site evaluations every two years. These evaluations include measurements of the probe heights and locations, as well as residence time determinations for each gaseous analytical instrument. The results are tracked in a database at the CDPHE and are available upon request.

## APPENDIX A: MONITORING SITE DESCRIPTIONS

This appendix provides detailed information for all monitoring sites considered in this Data Report. **Table A-1** summarizes the locations and monitoring parameters of each site currently in operation, by county, alphabetically. The shaded lines in the table list the site AQS identification numbers, address, site start-up date, elevation, and longitude and latitude coordinates. Beneath each site description the table lists each monitoring parameter in operation at that site, the orientation and spatial scale, which national monitoring network it belongs to, the type of monitor in use, and the sampling frequency. The parameter date is the date when valid data were first collected.

The following abbreviations are used in **Table A-1** below, with orientation (Orient) referring to the monitoring objective and scale referring to the size of the area that concentrations from the monitor represent.

### Orientation

P.O. - Population oriented

S.O. - Source oriented

Back - Background orientation

SPM - Special Purpose Monitor

H.C. - Highest Concentration

POC - Parameter Occurrence Code

SLAMS - State or Local Air Monitoring Stations

### Scale (Area Represented)<sup>1</sup>

Micro - Micro-scale (several m - 100 m)

Middle - Middle Scale (100 - 500 m)

Neigh - Neighborhood Scale (0.5 - 4 km)

Urban - Urban Scale (4 - 50 km)

Region - Regional Scale (50 - hundreds of km)

**Table A-1. Monitoring Locations and Parameters Monitored**

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
<b>Adams</b>						
080010010		7275 Birch St	Jul 2023	1569	39.8281	-104.93647
	PM <sub>10</sub>	3	Jul 2023	P.O. Neigh	TAPI - 640X	SLAMS
	PM <sub>2.5</sub>	3	Jul 2023	P.O. Neigh	TAPI - 640X	SLAMS
	PM <sub>10</sub>	1	Dec 2023	P.O. Neigh	Met One - E-Seq	SLAMS
	PM <sub>2.5</sub>	2	Dec 2023	P.O. Neigh	Met One - E-Seq	SLAMS
080013001	Welby	3174 E. 78TH AVE.	Jan 1975	1554	39.838119	-104.94984
	Temperature	1	Jan 1975		Met One - 062MP	OTHER
	Wind Speed	1	Jan 1992		RM Young - 05305V	OTHER
	Wind Direction	1	Jan 1992			OTHER
	SO <sub>2</sub>	2	Jan 2006	P.O. Neigh	TAPI - 100E	SLAMS
	O <sub>3</sub>	2	Sep 2007	P.O. Neigh	TAPI - T400	SLAMS
	PM <sub>10</sub>	2	Sep 2011	P.O. Neigh		SLAMS
	NO <sub>2</sub>	1	Nov 2019	P.O. Urban	TAPI - T200	SLAMS
	PM <sub>10</sub>	3	Jan 2023	P.O. Neigh		SLAMS

<sup>1</sup> "Appendix D to Part 58 – Network Design Criteria for Ambient Air Quality Monitoring," 40 Federal Register 58 (15 January 2015).

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
	PM <sub>2.5</sub>	3	Jan 2024	P.O. Neigh		SLAMS
	PM <sub>10</sub>	4	May 2024	P.O. Neigh		SLAMS
	PM <sub>2.5</sub>	4	May 2024	P.O. Neigh		SLAMS
<b>Alamosa</b>						
080030001	Alamosa - Adams State	208 EDMONT BLVD.	Oct 2023	2302	37.469391	-105.878691
	PM <sub>10</sub>	3	Oct 2023	P.O. Neigh		SLAMS
	PM <sub>2.5</sub>	3	Oct 2023	P.O. Neigh	InFlow - ADK	SLAMS
<b>Arapahoe</b>						
080050002	HIGHLAND RESERVOIR	8100 S. UNIVERSITY BLVD	Jun 1978	1747	39.567887	-104.957193
	O <sub>3</sub>	1	Sep 2015	H.C. Neigh	TAPI - T400	SLAMS
	Wind Speed	1	Sep 2015		Met One - 010C	OTHER
	Wind Direction	1	Sep 2015		Met One - 020C	OTHER
	Temperature	1	Sep 2015		Met One - 62	OTHER
080050005	Arapahoe Community College	6190 S. SANTA FE DR.	Mar 1999	1636	39.604399	-105.019526
	PM <sub>2.5</sub>	1	Jun 2003	P.O. Neigh		SLAMS
080050006	Aurora East	36001 E. Quincy Ave.	Jun 2009	1799	39.638522	-104.569335
	O <sub>3</sub>	1	Jun 2009	P.O. Urban	TAPI - T400	SLAMS
	Wind Speed	1	Jun 2009	P.O. Urban	Met One - 010C	OTHER
	Wind Direction	1	Jun 2009	P.O. Urban	Met One - 020C	OTHER
	Temperature	1	Jun 2009	P.O. Urban	Met One - 60	OTHER
<b>Archuleta</b>						
080070001	PAGOSA SPRINGS SCHOOL	309 LEWIS ST.	Jun 2001	2165	37.26842	-107.009659
	PM <sub>10</sub>	3	Nov 2023	P.O. Neigh		SLAMS
	PM <sub>10</sub>	4	Nov 2023	P.O. Neigh		SLAMS
<b>Boulder</b>						
080130003	LONGMONT - MUNICIPAL BLDG	350 KIMBARK ST.	Jan 1999	1520	40.164576	-105.100856
	PM <sub>2.5</sub>	1	Jun 2003	P.O. Neigh	R&P - Partisol 2025	SLAMS
	Temperature	3	Jul 2018	P.O. Neigh		SLAMS
	PM <sub>10</sub>	4	Jan 2024	P.O. Neigh		SLAMS

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
	PM <sub>2.5</sub>	4	Jan 2024	P.O. Neigh		SLAMS
080130014	Boulder Reservoir	5545 Reservoir Road.	Sep 2016	1586	40.070016	-105.220238
	O <sub>3</sub>	1	Sep 2016	P.O. Urban	TAPI - 400E	SLAMS
	Wind Speed	1	Sep 2016	P.O.	RM Young - 05305V	OTHER
	Wind Direction	1	Sep 2016	P.O.		OTHER
	Temperature	1	Sep 2016	P.O.	RM Young - 41372V	OTHER
	Relative Humidity	1	Sep 2016	P.O.		OTHER
080131001	BOULDER - CU-ATHENS	2102 ATHENS ST.	Aug 2023	1622	40.012969	-105.267212
	PM <sub>2.5</sub>	3	Aug 2023	P.O. Neigh	InFlow - IA	SLAMS
	PM <sub>10</sub>	3	Aug 2023	P.O. Neigh		SLAMS
<b>Clear Creek</b>						
080190006	Mines Peak	Near summit of Berthoud Pass off US Highway 40	Jul 2014	3806	39.794391	-105.76398
	O <sub>3</sub>	1	Jul 2014	Back Region	TAPI - T400	SPM
<b>Denver</b>						
080310002	DENVER - CAMP	2105 BROADWAY	Jan 1985	1593	39.751184	-104.987625
	Temperature	1	Jan 1985			OTHER
	Wind Speed	1	Jan 1992			OTHER
	Wind Direction	1	Jan 1992			OTHER
	SO <sub>2</sub>	1	Nov 2005	H.C. Neigh	TAPI - T100	SLAMS
	PM <sub>10</sub>	1	Oct 2011	H.C. Micro		SLAMS
	PM <sub>10</sub>	2	Oct 2011	H.C. Micro		SLAMS
	O <sub>3</sub>	6	Jan 2012	P.O. Neigh	TAPI - T400	SLAMS
	PM <sub>2.5</sub>	3	Apr 2013	H.C. Micro	Grimm - EDM 180	SPM
	NO <sub>2</sub>	1	Jan 2014	H.C. Neigh	TAPI - T200U	SLAMS
	PM <sub>2.5</sub>	1	Feb 2024	P.O. Micro	R&P - Partisol 2025	SLAMS
	PM <sub>2.5</sub>	2	Feb 2024	P.O. Micro	R&P - Partisol 2025	SLAMS
080310013	DENVER - NJH-E	14TH AVE. & ALBION ST.	Mar 2018	1620	39.738578	-104.939925
	Temperature	3	Mar 2018	P.O. Neigh		SLAMS
	PM <sub>2.5</sub>	23	Mar 2018	Neigh		SLAMS
	PM <sub>2.5</sub>	3	Jul 2023	P.O. Neigh	TAPI - 640	SPM

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
080310026	La Casa	4545 Navajo St.	Jan 2013	1602	39.77949	-105.00518
	CO	1	Jan 2013	P.O. Neigh	Thermo - 48i-TL	SLAMS
	NOy	1	Jan 2013	P.O. Neigh		SLAMS
	NOy - NO	1	Jan 2013	P.O. Neigh	TAPI - T200U-NOY	SLAMS
	O <sub>3</sub>	1	Jan 2013	P.O. Neigh	TAPI - T400	SLAMS
	Wind Speed	1	Jan 2013	P.O. Neigh	Met One - 010C	SLAMS
	Wind Direction	1	Jan 2013	P.O. Neigh	Met One - 020C	SLAMS
	Temperature	1	Jan 2013	P.O. Neigh	Met One - 010C	SLAMS
	Temperature	2	Jan 2013	P.O. Neigh	Met One - 010C	SLAMS
	SO <sub>2</sub>	1	Apr 2013	P.O. Neigh	TAPI - T100U	SLAMS
	NO <sub>2</sub>	1	Jul 2014	P.O. Neigh	TAPI - T500U	SLAMS
	Relative Humidity	1	Nov 2014	P.O. Neigh	Met One - 083E-1-35	SLAMS
	Solar radiation	1	Apr 2018	P.O. Neigh	KIPP&ZONEN - CMP11	SLAMS
	PM <sub>2.5</sub>	23	Dec 2018	Neigh		SLAMS
	PM <sub>2.5</sub>	3	Jul 2023	P.O. Neigh	TAPI - 640	SPM
	PM <sub>10</sub>	1	Apr 2024	P.O. Neigh	Met One - E-Seq	SLAMS
	PM <sub>10</sub>	2	Apr 2024	P.O. Neigh	Met One - E-Seq	SLAMS
PM <sub>2.5</sub>	1	Apr 2024	P.O. Neigh	Met One - E-Seq	SLAMS	
080310027	I-25	971 Yuma Street	Jun 2013	1583	39.73217	-105.0153
	CO	1	Jun 2013	P.O. Micro	Thermo - 48i-TL	SLAMS
	Wind Speed	1	Jun 2013	P.O.	Met One - 010C	OTHER
	Wind Direction	1	Jun 2013	P.O.	Met One - 020C	OTHER
	Temperature	1	Jun 2013	P.O.	RM Young - 41372V	OTHER
	PM <sub>2.5</sub>	3	Jan 2014	P.O. Micro	Grimm - EDM 180	SLAMS
	Relative Humidity	1	May 2020	P.O.	RM Young - 41372V	OTHER
	NO <sub>2</sub>	1	May 2021	P.O. Micro	TAPI - T200	SLAMS
	PM <sub>2.5</sub>	1	Sep 2023	P.O. Micro	R&P - Partisol 2025	SLAMS
080310028	Globeville	4903 Acoma St.	Oct 2015	1587	39.7861	-104.9886
	NO <sub>2</sub>	1	Oct 2015	P.O. Micro	TAPI - T200	SLAMS
	Temperature	1	Oct 2015	P.O.	RM Young - 41372V	OTHER
	Relative Humidity	1	Oct 2015	P.O.		OTHER

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
	PM <sub>2.5</sub>	3	Oct 2015	P.O. Micro	Grimm - EDM 180	SLAMS
	Wind Speed	1	Mar 2020	P.O.	RM Young - 05305V	OTHER
	Wind Direction	1	Mar 2020	P.O.		OTHER
<b>Douglas</b>						
080350004	Chatfield State Park	11500 N. Roxborough Park Rd.	Apr 2004	1676	39.534488	-105.070358
	O <sub>3</sub>	1	Apr 2004	H.C. Urban	TAPI - T400	SLAMS
	Wind Speed	1	Apr 2004		Met One - 010C	OTHER
	Wind Direction	1	Apr 2004		Met One - 020C	OTHER
	Temperature	1	Apr 2004		Met One - 62	OTHER
	PM <sub>2.5</sub>	23	Jun 2017	Neigh		SLAMS
	PM <sub>2.5</sub>	3	Jul 2023	P.O. Neigh	TAPI - 640	SPM
<b>El Paso</b>						
080410013	U.S. AIR FORCE ACADEMY	ROAD 640, USAF ACADEMY	Jun 1996	1971	38.958341	-104.817215
	O <sub>3</sub>	1	Aug 2010	H.C. Urban	TAPI - T400	SLAMS
080410016	MANITOU SPRINGS	101 BANKS PL.	Apr 2004	1955	38.853097	-104.901289
	O <sub>3</sub>	1	Oct 2007	H.C. Neigh	TAPI - T400	SLAMS
080410017	COLORADO SPRINGS - COLLEGE COLLEGE	130 W. CACHE LA Poudre	Jun 2016	1832	38.848014	-104.828564
	PM <sub>2.5</sub>	3	Jun 2016	P.O. Neigh	Grimm - EDM 180	SLAMS
	PM <sub>10</sub>	1	Jan 2017	P.O. Neigh	R&P - Partisol 2025	SLAMS
	CO	1	Dec 2023	P.O. Neigh	Thermo - 48i-TL	SLAMS
<b>Fremont</b>						
080430003	CANON CITY - CITY HALL	128 MAIN ST.	Oct 2023	1626	38.43829	-105.24504
	PM <sub>10</sub>	3	Oct 2023	P.O. Neigh		SLAMS
<b>Garfield</b>						
080450012	Rifle-Health Dept	195 W. 14th St.	Jun 2008	1640	39.54182	-107.784125
	O <sub>3</sub>	1	Jun 2008	P.O. Neigh		SLAMS
080450019	Battlement Mesa	Garfield County - Battlement Mesa	Oct 2012	1690	39.43806	-108.02611
	NO <sub>2</sub>	1	Feb 2023	Back		SPM
	O <sub>3</sub>	1	Feb 2023	Back		SPM



AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
	Wind Speed	1	Feb 2023	Back		SPM
	Temperature	1	Feb 2023	Back		SPM
	Relative Humidity	1	Feb 2023	Back		SPM
	Barometric pressure	1	Feb 2023	Back		SPM
	PM <sub>10</sub>	2	Feb 2023	Back		SPM
	PM <sub>2.5</sub>	1	Feb 2023	Back		SPM
<b>Gilpin</b>						
080470003	Black Hawk	831 Miners Mesa Road, Black Hawk Colorado 80422	Jul 2019	2633	39.792519	-105.49127
	O <sub>3</sub>	1	Jul 2019	P.O. Urban	TAPI - 400E	SLAMS
<b>Jefferson</b>						
080590002	ARVADA	9101 W. 57TH AVE.	May 1990	1640	39.800333	-105.099973
	Temperature	1	May 1990			OTHER
	Wind Speed	1	Jan 1992			OTHER
	Wind Direction	1	Jan 1992			OTHER
080590006	ROCKY FLATS-N	16600 W COLO #128	Jun 1992	1802	39.912799	-105.188587
	Wind Speed	1	Jun 1992		RM Young - 05305V	OTHER
	Wind Direction	1	Jun 1992			OTHER
	Temperature	1	Jun 1992		RM Young - 41372V	OTHER
	O <sub>3</sub>	1	Sep 2005	H.C. Urban	TAPI - T400	SLAMS
	Temperature	2	May 2018		RM Young - 41372V	OTHER
	Relative Humidity	1	Jun 2018	Back Neigh		OTHER
	Barometric pressure	1	Jun 2018	Back Neigh	RM Young - 61302V	OTHER
	NO <sub>y</sub>	1	Feb 2019	H.C. Urban	TAPI - 501Y	SLAMS
	NO <sub>2</sub>	1	Feb 2019	Urban	TAPI - T500U	SLAMS
	NO <sub>y</sub> - NO	1	Feb 2019	H.C. Urban	TAPI - T200U-NOY	SLAMS
	Solar radiation	1	Jun 2019	Urban	KIPP&ZONEN - CMP11	SLAMS
080590011	NATIONAL RENEWABLE ENERGY LABS - NREL	2054 QUAKER ST.	Jun 1994	1832	39.743724	-105.177989
	O <sub>3</sub>	1	Feb 2011	H.C. Urban	TAPI - T400	SLAMS

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
080590014	Evergreen	5124 South Hatch Drive	Oct 2020	2225	39.620408	-105.33872
	O <sub>3</sub>	1	Oct 2020	P.O. Urban	TAPI - T400	SLAMS
	Wind Speed	1	Oct 2020	P.O. Urban	RM Young - 05305V	OTHER
	Wind Direction	1	Oct 2020	P.O. Urban		OTHER
	Temperature	1	Oct 2020	P.O. Urban	RM Young - 41372V	OTHER
	Relative Humidity	1	Oct 2020	P.O. Urban		OTHER
<b>Larimer</b>						
080690009	FORT COLLINS - CSU - Edison	251 EDISON DR.	Jun 2015	1524	40.571288	-105.079693
	PM <sub>2.5</sub>	3	Jun 2015	P.O. Neigh	Grimm - EDM 180	SLAMS
080690011	FORT COLLINS - WEST	3416 LA PORTE AVE.	May 2006	1571	40.592543	-105.141122
	O <sub>3</sub>	1	May 2006	H.C. Urban	TAPI - 400E	SLAMS
	Wind Speed	1	Aug 2023	Urban	RM Young - 05305V	SPM
	Wind Direction	1	Aug 2023	Urban		SPM
	Temperature	1	Aug 2023	Urban	RM Young - 41372V	SPM
	Temperature	2	Aug 2023	Urban	RM Young - 41372V	SPM
	Relative Humidity	1	Aug 2023	Urban	RM Young - 41372V	SPM
	Solar radiation	1	Aug 2023	Urban	KIPP&ZONEN - CMP11	SPM
	Barometric pressure	1	Aug 2023	Urban	RM Young - 61402V	SPM
	080690015	Fossil Creek	3340 CO 392	May 2024	1489	40.48346
NO <sub>2</sub>		1	May 2024	H.C. Urban		SLAMS
O <sub>3</sub>		1	May 2024	H.C. Urban		SLAMS
Wind Speed		1	May 2024	Urban		SPM
Wind Direction		1	May 2024	Urban		SPM
Temperature		1	May 2024	Urban		SPM
Temperature		2	May 2024	Urban		SPM
Relative Humidity		1	May 2024	Urban		SPM
Solar radiation		1	May 2024	Urban		SPM
Barometric pressure		1	May 2024	Urban		SPM
080691004	Fort Collins - CSU - S. Mason	708 S. Mason St.	Jan 1981	1524	40.57747	-105.07892

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
	Temperature	1	Jan 1981			OTHER
	Wind Speed	1	Jan 1992			OTHER
	Wind Direction	1	Jan 1992			OTHER
	O <sub>3</sub>	1	May 2004	P.O. Neigh	TAPI - T400	SLAMS
	CO	1	May 2016	P.O. Neigh	Thermo - 48i-TL	SLAMS
<b>Mesa</b>						
080770017	GRAND JUNCTION - POWELL BLDG	650 SOUTH AVE.	Dec 2003	1398	39.063798	-108.561173
	PM <sub>10</sub>	2	Nov 2010	P.O. Neigh	R&P - Partisol 2025	SLAMS
	PM <sub>10</sub>	1	Dec 2010	P.O. Neigh	R&P - Partisol 2025	SLAMS
	PM <sub>2.5</sub>	3	Jan 2014	P.O. Neigh	Grimm - EDM 180	SLAMS
080770018	GRAND JUNCTION - PITKIN	645 1/4 PITKIN AVE.	Jan 2004	1398	39.064289	-108.56155
	Wind Speed	1	Jan 2004			OTHER
	Wind Direction	1	Jan 2004			OTHER
	Temperature	1	Jan 2004			OTHER
	Relative Humidity	1	Nov 2014			OTHER
	Barometric pressure	1	Sep 2020			OTHER
080770020	Palisade-Water Treatment	865 Rapid Creek Rd.	May 2008	1521	39.130575	-108.313835
	O <sub>3</sub>	1	May 2008	P.O. Urban		SLAMS
	Wind Speed	1	May 2008	P.O. Urban		SPM
	Wind Direction	1	May 2008	P.O. Urban		SPM
	Temperature	1	May 2008	P.O. Urban		SPM
<b>Montezuma</b>						
080830006	Cortez - Health Dept	106 W. North Street	Jun 2008	1890	37.350054	-108.592334
	O <sub>3</sub>	1	Jun 2008	P.O. Neigh		SLAMS
<b>Pitkin</b>						
080970008	Aspen Yellow Brick Building	215 N. Garmisch	Jan 2015	2408	39.19296	-106.82323
	PM <sub>10</sub>	1	Jan 2015	P.O. Neigh		SLAMS
	PM <sub>10</sub>	3	Jun 2024	P.O. Neigh	TAPI - 640X	SLAMS
	PM <sub>2.5</sub>	3	Jun 2024	P.O. Neigh	InFlow - ADK	SLAMS

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
<b>Prowers</b>						
080990002	Lamar Municipal Bldg	104 E. PARMENTER ST.	Oct 2023	1107	38.084688	-102.618641
	PM <sub>10</sub>	3	Oct 2023	P.O. Neigh		SLAMS
	PM <sub>2.5</sub>	3	Oct 2023	P.O. Neigh	InFlow - ADK	SLAMS
<b>Pueblo</b>						
081010015	Pueblo - Fountain School	925 N. GLENDALE AVE.	Sep 2023	1433	38.276099	-104.597613
	PM <sub>10</sub>	3	Sep 2023	P.O. Neigh		SLAMS
	PM <sub>2.5</sub>	3	Sep 2023	P.O. Neigh	InFlow - JD	SLAMS
081010016		803 South Cellini Circle	Feb 2023	1564	38.30333	-104.7225
	O <sub>3</sub>	1	Feb 2023	H.C. Neigh	TAPI - T400	SLAMS
	Wind Speed	1	Mar 2023	H.C. Neigh	RM Young - 05305V	SLAMS
	Wind Direction	1	Mar 2023	H.C. Neigh		SLAMS
	Temperature	1	Mar 2023	H.C. Neigh	RM Young - 41372V	SLAMS
<b>Routt</b>						
081070003	Steamboat Springs	136 6TH ST.	Sep 2023	2054	40.485201	-106.831625
	PM <sub>10</sub>	4	Sep 2023	P.O. Neigh		SLAMS
<b>San Miguel</b>						
081130004	Telluride	333 W. COLORADO AVE.	Nov 2023	2684	37.937872	-107.813061
	PM <sub>10</sub>	3	Nov 2023	P.O. Neigh		SLAMS
<b>Weld</b>						
081230006	Greeley - Hospital	1516 HOSPITAL RD.	Jun 2016	1441	40.414877	-104.70693
	PM <sub>2.5</sub>	3	Jun 2016	P.O.	Grimm - EDM 180	SLAMS
081230008	Platteville - Middle School	1004 MAIN ST.	Jun 2024	1469	40.209387	-104.82405
	PM <sub>2.5</sub>	3	Jun 2024	P.O. Region	TAPI - 640	SLAMS
081230009	Greeley - Weld County Tower	3101 35TH AVE.	Jun 2002	1484	40.386368	-104.73744
	O <sub>3</sub>	1	Jan 2004	P.O. Neigh	TAPI - T400	SLAMS
	Wind Speed	1	Feb 2012	P.O.	Met One - 010C	OTHER
	Wind Direction	1	Feb 2012	P.O.	Met One - 020C	OTHER
	Temperature	1	Feb 2012	P.O.	Met One - 060A	OTHER

AQS #	Site Name	Address	Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type
	CO	1	Apr 2016	P.O. Neigh	Thermo - 48i-TL	SLAMS
081230015	La Salle Tower	18490 County Road 38	Feb 2024	1719	40.2614	-104.70645
	NO <sub>2</sub>	1	Feb 2024	S.O. Region	TAPI - T200	SLAMS
	O <sub>3</sub>	1	Feb 2024	S.O. Region	TAPI - T400	SLAMS

**Adams County Birch Street, 7275 Birch Street (08 001 0010):**

The Birch Street site in Adams County, which started operations on March 1, 2021, is situated in a mixed-use area that includes residential, commercial, and industrial zones. Located north of Denver's Central Business District, near the Platte River Valley, it lies downstream from Denver's urban air mass. The site is surrounded by educational institutions, with an elementary school to the south, a middle school to the north, and a high school to the southeast. Additionally, a significant industrial region borders it to the south and east, with gravel pits approximately one kilometer to the west and northwest.

This location serves as a replacement for the former Tri County Health Department site in Commerce City, which was decommissioned due to roofing renovations on its building. Monitoring of PM<sub>10</sub> and PM<sub>2.5</sub> at the site commenced in August 2016, ensuring continued environmental oversight in the region.

**Welby, 3174 E. 78<sup>th</sup> Avenue (08 001 3001):**

Situated 8 miles north-northeast of Denver's Central Business District (CBD) along the South Platte River, the monitoring site is strategically placed to assess the nocturnal air mass drainage from the Denver metropolitan area and the thermally driven daytime flows upriver. Data indicate that elevated CO levels correlate with winds from the south-southwest, a direction that not only aligns with five of the six major local sources but also with the primary drainage winds of the South Platte River. This monitor is part of the SLAMS network and focuses on population exposure at a neighborhood scale.

CO monitoring at this site commenced in 1973 and ran until the spring of 1980, after which it was paused until October 1986. It resumed under a special study initiative. Since January 1988, there have been no exceedances of either the one-hour or eight-hour CO standards at Welby. In recent years, the primary importance of this monitor has shifted towards serving as an indicator of changes in the Air Quality Index (AQI).

O<sub>3</sub> (ozone) monitoring started in July 1973 at Welby. The monitor has recorded no exceedances of the former one-hour O<sub>3</sub> standard since 1998, indicating improvements in local air quality over time.

**Alamosa - Adams State College, 208 Edgemont Blvd. (08 003 0001):**

The Alamosa – Adams State College monitoring site is situated on the science building grounds of Adams State College, primarily surrounded by residential areas. The site experiences the most traffic from US 160, which runs through the town center. Although adjacent to this highway, its location is sufficiently distant to reduce direct impacts on PM<sub>10</sub> levels.

There is no meteorological data available from the vicinity. The predominant source of particulate matter at this location is wind-blown dust. Established in 1973 initially as a Total Suspended Particulates (TSP) monitor, the site transitioned to monitoring PM<sub>10</sub> particles in June 1990. It functions as a population-oriented, neighborhood-scale State and Local Air Monitoring Stations (SLAMS) monitor with a daily sampling regime.

**Highland Reservoir, 8100 S. University Boulevard (08 005 0002):**

The Highlands monitoring site was established in June 1978, initially intended as a background location. However, due to

urban expansion and the construction of C-470, it has evolved into a long-term trend site that tracks air quality changes in the region. Although positioned near the southern edge of high urban ozone concentrations, it might not be situated at the area of maximum concentrations. The site functions as a population-oriented neighborhood scale SLAMS monitor.

Meteorological monitoring at the site commenced in July 1978. In September 2010, the site and its meteorological tower were moved approximately 30 meters east to accommodate the construction of an emergency generator system, which is located about 20 meters northwest of the new site location. Due to significant construction activities on the property, the Highlands monitoring site was temporarily shut down from October 2013 to September 2015.

#### **Arapahoe Community College (ACC), 6190 S. Santa Fe Drive (08 005 0005):**

The ACC monitoring site is strategically situated in the southern suburbs of metropolitan Denver, specifically on the south side of Arapahoe Community College in a lesser-used parking area. Located at 6190 S. Santa Fe Drive, Littleton, near the boundary with Englewood, this site lies close to the base of the Platte River Valley along Highway 85. A residential zone extends eastward, across the railroad and Light Rail tracks.

The PM<sub>2.5</sub> monitor is housed within a mobile shelter, offering unobstructed 360-degree exposure, advantageous for accurate atmospheric sampling. Its proximity to the Platte River enhances its ability to capture potential high concentrations of PM<sub>2.5</sub> pollutants, especially during periods characterized by upslope airflow and temperature inversions in the valley. Despite this, the pollutant concentrations here are generally lower compared to other areas in Denver due to its southern, less populated location.

Wind patterns predominantly from the south-southwest and south, with secondary winds from the north and north-northeast, support the site's compliance with neighborhood scale monitoring as per federal guidelines (40 CFR, Part 58, Appendix D). The location qualifies as a population-oriented neighborhood scale SLAMS (State and Local Air Monitoring Stations) site, effectively meeting all required criteria for such designation.

#### **Aurora – East, 36001 Quincy Ave (08 005 0006):**

The Aurora East monitoring site commenced operations in June 2009. Positioned along the eastern border of the former Lowry bombing range, this site is situated on a flat, grassy plain. Its primary purpose is to serve as a regional facility, assisting in monitoring the easternmost spread of high urban ozone (O<sub>3</sub>) concentrations. Notably, the site is located outside the swiftly expanding urban area near Aurora Reservoir, providing a strategic vantage for regional air quality assessment. Initially established as a Special Purpose Monitor (SPM) for regional assessment, Aurora East was upgraded to a State and Local Air Monitoring Station (SLAMS) in 2013, enhancing its role in environmental monitoring and data collection.

#### **Pagosa Springs School, 309 Lewis Street (08 007 0001):**

The Pagosa Springs monitoring station was originally situated on the roof of the Town Hall from April 24, 2000, until May 2001. Due to the planned demolition of the Town Hall, the PM<sub>10</sub> monitor was subsequently moved to Pagosa Springs Middle School, where sampling began on June 7, 2001.

Located near the center of town adjacent to Highway 160, the Pagosa Springs School site is nestled in a valley surrounded by hills, typical of a small-town setting spread across a large area. The San Juan River flows through the southern part of town, enhancing the site's characteristic small bowl-like landscape. This area, primarily consisting of a commercial strip along Highway 160 and single-family homes, represents typical residential neighborhood exposure. Historically, Pagosa Springs was designated as a PM<sub>10</sub> nonattainment area, leading to the implementation of a State Implementation Plan (SIP) due to a few exceedances of PM<sub>10</sub> concentrations in the late 1990s.

Wind patterns in this region predominantly come from the north, with secondary winds from the north-northwest and south, aligning with the valley's topography. McCabe Creek flows north-south near the former meteorological station at the Town Hall. Notably, the highest wind gusts are recorded from the west and southwest during regional dust storms. The site functions as a population-oriented neighborhood scale SLAMS monitor.

**Longmont – Municipal Bldg., 350 Kimbark Street (08 013 0003):**

Longmont, a medium-sized community on Colorado's Front Range, is strategically located between the Denver/Boulder Metro area and Fort Collins. Situated about 30 miles north of Denver and roughly six miles east of the foothills along St. Vrain Creek, Longmont combines suburban and rural characteristics. The town serves partly as a residential area for people working in the Denver-Boulder region. Longmont stands at an elevation of 4,978 feet, with nearby Front Range peaks reaching up to 14,000 feet. The area benefits from low humidity, modest precipitation, and plentiful sunshine.

The town has been monitoring air quality since 1985, starting with PM<sub>10</sub> monitors and expanding to include PM<sub>2.5</sub> monitors in 1999. Longmont's prevailing winds, which generally flow from the north to the west, are influenced by the St. Vrain Creek Canyon. The PM<sub>10</sub> monitoring station is centrally located amidst commercial and residential zones, offering optimal assessment of particulate matter exposure to the population. This location adheres to federal guidelines as outlined in 40 CFR, Part 58, Appendix D, qualifying it as a neighborhood scale SLAMS monitor.

In an effort to comply with EPA regulations, a collocated sampler was added in September 2014 to fulfill the high-volume collocation requirements for PM<sub>10</sub>.

**Boulder Chamber of Commerce, 2440 Pearl Street (08 013 0012):**

The city of Boulder is situated at the eastern edge of the Rocky Mountain foothills, with most of the urban area extending across the rolling plains. The Boulder PM<sub>2.5</sub> monitoring site is located about 7,000 feet east of the Front Range foothills and roughly 50 feet south of a minor tributary of Boulder Creek, the principal waterway traversing the city.

PM<sub>10</sub> monitoring at this site commenced in December 1994, and PM<sub>2.5</sub> monitoring started in January 1999. The dominant wind direction recorded at the nearest Air Pollution Control Division meteorological station (Rocky Flats – North) generally flows from the west, with significant contributions from the west-northwest and west-southwest directions.

The site, situated between Pearl Street and Folsom Street, falls under the middle traffic category but has been designated to represent a neighborhood scale in alignment with the federal guidelines stipulated in 40 CFR, Part 58 and Appendix D. This site serves as a population-oriented State and Local Air Monitoring Station (SLAMS) and operates on a 1-in-6-day sampling schedule, effectively capturing neighborhood-scale air quality data.

**Boulder Reservoir, 5545 Reservoir Road (08 013 0014):**

Boulder, located approximately 30 miles northwest of Denver, manages the Boulder Reservoir, which spans 700 acres and serves as both a multi-use recreational facility and a water storage site. This reservoir, which is owned by the city, is operated by the Northern Colorado Water Conservancy District primarily for water supply purposes. Situated about 5.5 miles northeast of Boulder, the reservoir was established as a replacement for the South Boulder Creek site. The latter was closed on January 1, 2016, due to overgrown large trees that could not be removed and thus failed to meet the necessary siting criteria.

The Boulder Reservoir functions as a key urban-scale SLAMS (State and Local Air Monitoring Stations) site, focusing on high concentration measurements. It has been active since September 2016, monitoring ozone levels and various meteorological parameters to assess air quality and environmental conditions.

**Boulder – CU - Athens, 2102 Athens Street (08 013 1001):**

The Boulder - CU monitoring site is conveniently situated adjacent to a lightly used parking lot, positioned directly north of the site and south of the University of Colorado's football practice fields. This strategic location offers an excellent representation of the neighborhood's particulate levels. The site has been operational since November 2004, providing valuable data that helps in assessing and managing air quality in the area.

**Mines Peak, Near summit of Berthoud Pass off US Highway 40 (08 019 0006):**

The Mines Peak site, located in Clear Creek County, sits atop Mines Peak near the summit of Berthoud Pass off US

Highway 40 at an impressive elevation of 12,487 feet. This remote, high-elevation site provides a unique vantage point for monitoring air quality in an area far from urban pollution sources.

Ozone monitoring at Mines Peak began on July 1, 2014, as part of an initiative to measure ozone levels in this remote, elevated environment. Due to challenges in controlling the shelter temperature, this site operates as a Special Purpose Monitor (SPM). Consequently, the ozone data collected here is not used for regulatory purposes, such as comparison to the National Ambient Air Quality Standards (NAAQS).

Only ozone levels are monitored at Mines Peak. The site poses accessibility challenges, especially during the winter months, when heavy snow accumulation can make it difficult to reach.

#### **CAMP, 2105 Broadway (08 031 0002):**

The City and County of Denver, situated about 30 miles east of the Rocky Mountains foothills, features a landscape of gently rolling hills and is traversed by the Platte River running southwest to northeast near its downtown. Air quality monitoring at the downtown Continuous Air Monitoring Program (CAMP) site began in February 1965, with the aim to assess pollution exposure in the central business district. This site, positioned in a high-traffic street canyon, often records significant pollution episodes primarily due to its topography and urban setting.

Updates to the monitoring equipment include the replacement of the carbon monoxide (CO) monitor in April 2017 with a Thermo 48iTLE trace level monitor to better detect lower concentration levels. Additionally, various other pollutants have been monitored over the years: Nitrogen dioxide (NO<sub>2</sub>) monitoring started in January 1973, sulfur dioxide (SO<sub>2</sub>) in January 1967, and ozone (O<sub>3</sub>) has been tracked intermittently since 1972, with the current monitor operational since February 2012. Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) monitoring began in 1986 and 1999 respectively, with continuous enhancements to technology, most recently in April 2013 when a GRIMM EDM 180 continuous monitor was installed.

Furthermore, meteorological monitoring commenced in January 1965. The site experienced a temporary pause from June 1999 to July 2000 due to construction activities. This historical and ongoing monitoring is crucial for understanding and managing air quality in Denver's urban environment.

#### **National Jewish Health, 14<sup>th</sup> Avenue & Albion Street (08 031 0013):**

This site is situated three miles east of the Central Business District (CBD) in Denver, near the bustling intersection of Colorado Boulevard and Colfax Avenue. It has been operational since 1982, following the relocation from two previous sites located just west of its current position. Initially, the first site was briefly active for a few months, then moved to a corner within the laboratory building at the same intersection.

The data collected from this continuous particulate monitor is utilized specifically for short-term forecasting and public notifications, rather than for comparison with the National Ambient Air Quality Standards (NAAQS). The monitoring equipment installed at this location is designed to serve as a population-oriented, middle-scale special project monitor. This setup helps in assessing the immediate environmental impacts on the surrounding community.

#### **DESCI:**

A visibility site was installed in Denver in late 1990 using a long-path transmissometer. Visibility in the downtown area is monitored using a receiver located near Cheesman Park at 1901 E. 13th Avenue, and a transmitter located on the roof of the Federal Building at 1929 Stout Street. Renovations at the Federal Building forced the transmissometer to temporarily move to 1255 19th Street in 2010, and quality control measurements showed no meaningful difference between old and new locations. This instrument directly measures light extinction, which is proportional to the ability of atmospheric particles and gases to attenuate image-forming light as it travels from an object to an observer. The station also monitors relative humidity in order to resolve low visibility because of fog or rain.

#### **La Casa, 4587 Navajo Street (08 031 0026):**

The La Casa site, established in January 2013, serves as the NCore site for the Denver Metropolitan area, replacing the



former Denver Municipal Animal Shelter (DMAS) site due to a land use change. Located in northwest Denver, La Casa features a comprehensive array of monitoring equipment including trace gas/precursor-level CO and NO<sub>y</sub> analyzers, and trace-level SO<sub>2</sub>, O<sub>3</sub>, and meteorological and particulate monitors. All these instruments started operation in January 2013.

Certified by the EPA in 2013, La Casa adheres to NCore compliance standards and focuses on neighborhood-scale monitoring. The site hosts both PM<sub>10</sub> and PM<sub>2.5</sub> monitoring, employing a pair of collocated low volume PM<sub>10</sub> samplers, a LO-Vol PM<sub>2.5</sub>, and other specialized instruments on the shelter roof. These measurements are particularly valuable for calculating PM<sub>10-2.5</sub>, or coarse particulate matter.

In early 2015, the site upgraded its PM<sub>2.5</sub> monitoring capabilities by replacing the TEOM/FDMS with a GRIMM EDM 180 continuous monitor, which simultaneously measures PM<sub>10</sub> and PM<sub>2.5</sub> concentrations. Lead monitoring, which began in January 2013, was discontinued on December 31, 2015, due to persistently low concentrations. Consequently, the EPA has eliminated the lead monitoring requirement for all NCore sites. However, ambient lead levels will continue to be assessed at designated PM<sub>2.5</sub> speciation and IMPROVE sites across the state, as well as at the PM<sub>10</sub> sampler at Grand Junction Powell (08 077 0017) as part of the National Air Toxics Trends Stations project.

#### **I-25 Denver, 913 Yuma Street (08 031 0027):**

The I-25 Denver site, established in June 2013, functions as a mandated EPA near-roadway NO<sub>2</sub> monitoring location. It employs chemiluminescence to measure NO, NO<sub>2</sub>, and NO<sub>x</sub> levels. Additionally, the site is equipped with advanced tools for environmental monitoring, including a Teledyne API Model 633 Black Carbon Aethalometer for trace-level carbon monoxide, and a filter-based sequential Federal Reference Method (FRM) sampler that collects PM<sub>2.5</sub> on a 1 and 6-day schedule. Continuous PM<sub>10</sub> and PM<sub>2.5</sub> levels are monitored using a GRIMM EDM 180. The site also records various meteorological parameters to support and enhance the accuracy of its air quality measurements. These comprehensive monitoring activities help assess and manage air quality effectively in the area.

#### **I-25 Globeville, 4905 Acoma Street (08 031 0028):**

The I-25 Globeville site, established on October 1, 2015, serves as a crucial monitoring station for nitrogen dioxide (NO<sub>2</sub>) near roadways as mandated by the Environmental Protection Agency (EPA). This site employs chemiluminescence technology to measure nitrogen oxides (NO, NO<sub>2</sub>, and NO<sub>x</sub>) levels. Additionally, it is equipped with instruments to continuously monitor particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) using a GRIMM EDM 180 instrument. The facility also includes sensors that track various meteorological parameters to provide comprehensive environmental data. This integration of technologies ensures accurate and reliable monitoring of air pollutants that are critical for assessing air quality and implementing appropriate public health safeguards.

#### **Chatfield State Park, 11500 N. Roxborough Park Road (08 035 0004):**

Chatfield State Park became a designated monitoring location following the 1993 Summer Ozone (O<sub>3</sub>) Study. Initially, the monitoring equipment was installed at the campground office but was subsequently moved to a more secluded spot on the south side of the park near the park offices. This new location was chosen over the Corps of Engineers Visitor Center across the reservoir due to its distance from the traffic on C-470, which could influence the readings. Situated in the South Platte River drainage area, this site is strategically positioned to monitor the formation of ozone coming from the southwest of the Denver metropolitan area.

Monitoring for PM<sub>2.5</sub>, or fine particulate matter, commenced in 2004 with the installation of a continuous monitor. The following year, an FRM (Federal Reference Method) sequential filter-based monitor was added to enhance data collection. Additionally, meteorological monitoring began in April 2004, providing comprehensive environmental data to assess air quality and atmospheric conditions in the area.

#### **Colorado Springs, USAFA Road 640 (08 041 0013):**

The United States Air Force Academy has been selected as the new site for a maximum concentration ozone (O<sub>3</sub>) monitoring station, replacing the previous monitor at Chestnut Street (08 041 0012). Predictive modeling in the Colorado

Springs area suggests that elevated O<sub>3</sub> levels are typically found along the Monument Creek drainage north of the central business district (CBD) of Colorado Springs, or to a lesser degree, along the Fountain Creek drainage to the west of the CBD. Consequently, the decision was made to position the new monitoring station near the Monument Creek drainage, approximately 9 miles north of the CBD. This site is strategically located near the southern entrance of the Air Force Academy, distanced from any major roads to avoid vehicular emissions. It serves as a population-oriented urban scale State and Local Air Monitoring Station (SLAMS).

#### **Colorado Springs Hwy-24, 690 W. Highway 24 (08 041 0015):**

The Highway 24 monitoring site is strategically positioned to the west of Interstate 25 and to the east of the intersection of U.S. Highway 24 and 8th Street. It lies approximately 0.8 miles west of the Colorado Springs Central Business District. Established in November 1998, this site replaced the Tejon Street CO monitor and is located in the Fountain Creek drainage area. It is situated in one of the busiest traffic zones in Colorado Springs, where vehicle congestion often occurs, particularly due to a traffic light at 8th Street. As such, it is an excellent location for the State and Local Air Monitoring Stations (SLAMS) network to track peak CO levels originating from both vehicular emissions and nearby industrial activities, including a power plant. This site provides detailed, micro-scale environmental monitoring that was previously unattainable in the region.

In response to the population growth identified in the 2010 census, an SO<sub>2</sub> monitor was installed at this site in January 2013. To further enhance monitoring capabilities, the Air Pollution Control Division (APCD) added an RM Young meteorological tower in August 2014, which includes a relative humidity (RH) sensor. This addition aids in comprehensive air quality assessment at the site.

#### **Manitou Springs, 101 Banks Place (08 041 0016):**

The Manitou Springs ozone monitoring site, situated 4 miles west of Colorado Springs, was established in response to concerns that urban ozone concentrations were extending along the Fountain Creek drainage, and the existing monitoring network was insufficient. Operations at the Manitou Springs site commenced in April 2004. This monitor is strategically placed in the foothills above Colorado Springs, at the rear of the city maintenance facility. To date, it has not detected ozone levels exceeding current environmental standards. The site functions as a population-oriented, neighborhood-scale State and Local Air Monitoring Station (SLAMS), aimed at providing accurate local air quality data.

#### **Colorado College, 130 W. Cache la Poudre Street (08 041 0017):**

The Colorado College monitoring site was established in January 2007 following revisions in particulate regulations that mandated a continuous PM<sub>2.5</sub> monitor in Colorado Springs. The Air Pollution Control Division (APCD) decided to place this new PM<sub>2.5</sub> monitor alongside existing filter-based monitors from the RBD site at the Colorado College location. This arrangement included an FRM PM<sub>2.5</sub> monitor, and in November 2007, a low volume FEM PM<sub>10</sub> monitor was also added. The continuous monitor commenced operations in April 2008.

By summer 2016, the filter-based PM<sub>2.5</sub> FRM instrument was removed, and the GRIMM EDM 180 was designated as the primary sampler for comparison against the PM<sub>2.5</sub> NAAQS standards. Additionally, a low volume filter-based PM<sub>10</sub> sampler, operating on a 1-in-6 day schedule, is currently in use at the site.

The nearest meteorological site is located at the Highway 24 monitoring site. The wind patterns at the Colorado College site are influenced by its proximity to Fountain Creek, resulting in light drainage winds that typically flow north and south along the creek. The three monitoring stations at this location are part of the SLAMS network, focusing on neighborhood-scale population monitoring for PM<sub>10</sub> and PM<sub>2.5</sub> levels.

#### **Cañon City - City Hall, 128 Main Street (08 043 0003):**

Located 39 miles west of Pueblo, Cañon City began its particulate monitoring on January 2, 1969, with the installation of a Total Suspended Particulate (TSP) monitor on the roof of the courthouse building at 7th Avenue and Macon Street. In October 2004, this monitoring site was relocated to the top of the City Hall building.

The PM<sub>10</sub> monitoring site in Cañon City commenced operations in December 1987. On May 6, 1988, the Macon Street monitor recorded a PM<sub>10</sub> concentration of 172 µg/m<sup>3</sup>, marking the only occurrence where either the 24-hour or annual National Ambient Air Quality Standards (NAAQS) were exceeded since the initiation of PM<sub>10</sub> monitoring in the area. The monitor at this site operates on a neighborhood scale under the State and Local Air Monitoring Stations (SLAMS) network, following a 1-in-6-day sampling schedule.

**Rifle – Health Dept., 195 14<sup>th</sup> Ave (08 045 0012):**

The Rifle Health monitoring site is situated at the Garfield County Health Department building, approximately one kilometer north of Rifle's downtown area, adjacent to the Garfield County Fairgrounds. Positioned uphill from the downtown, the site is surrounded by a residential area to the north and a commercial district to the east. Established in June 2008, the site serves as a key location for measuring ozone (O<sub>3</sub>) levels in Rifle. As the largest population center in the oil and gas-impacted region of the Grand Valley, Rifle's air quality is of particular concern. This site is classified as a State and Local Air Monitoring Station (SLAMS) and operates at a neighborhood scale, providing crucial environmental health data to the community.

**Black Hawk, 195 14<sup>th</sup> Ave (08 047 0003):**

The Black Hawk Site was selected as the replacement for the Aspen Park Site, which failed to meet the EPA's siting requirements due to tree obstructions. This decision followed findings from a recent Front Range ozone study which detected higher ozone concentrations at Black Hawk compared to other sites evaluated in the study. Situated at an elevation of 2,633 meters, the Black Hawk monitoring station has been operational since July 2019. This location is now critical for ongoing environmental monitoring and research into regional ozone levels.

**Rocky Flats North, 16600 W. Highway 128 (08 059 0006):**

The Rocky Flats - North site is situated on the south side of Colorado Highway 128, approximately 1.25 miles west of Indiana Street, north-northeast of the former plant. This site was established in June 1992, featuring an O<sub>3</sub> monitor and meteorological equipment as part of the Air Pollution Control Division's (APCD) initial monitoring efforts around the Rocky Flats Environmental Technology Site.

During the Summer 1993 Ozone Study, this site recorded some of the highest ozone (O<sub>3</sub>) levels among all monitoring locations, leading to its permanent inclusion in the APCD's O<sub>3</sub> monitoring network. The Rocky Flats - North monitor often records levels exceeding the current standards, classifying it as a high-concentration urban scale State and Local Air Monitoring Station (SLAMS).

In line with the EPA's 2015 revised ozone monitoring rule (80 CFR 65292), Colorado is mandated to establish and maintain a Photochemical Assessment Monitoring Station (PAMS) at all NCore sites in metropolitan areas with populations over 1,000,000, from June 1 to August 31 annually. The PAMS site at Rocky Flats - North will monitor various atmospheric conditions and pollutants including volatile organic compounds, ozone, nitrogen oxides, and meteorological parameters on an hourly basis. APCD plans to start operations for volatile organic compounds and carbonyl measurements by mid-summer 2023.

**NREL Solar Radiation Research Laboratory, 2054 Quaker Street (08 059 0011):**

The National Renewable Energy Laboratory (NREL) is situated on the southern edge of South Table Mountain, close to Golden. It was initially included in the Summer 1993 Ozone Study due to its unique location. Observations during this study revealed elevated ozone concentrations, prompting its designation as a permanent monitoring site in 1994. Since then, NREL has consistently recorded some of the highest eight-hour ozone (O<sub>3</sub>) levels in the Denver area, often surpassing the existing environmental standards. This ongoing issue highlights the site's critical role in regional air quality monitoring and environmental research.

**Evergreen, 5124 S. Hatch Dr. (08 059 0014):**

The Evergreen Site was chosen to replace the now-closed Welch Site, which was deemed redundant due to the presence of other ozone monitoring facilities in the Denver Metro/North Front Range Region. Located in a densely populated area in the western foothills south of the I-70 corridor—an area previously unmonitored but suspected to have elevated ozone levels based on special studies—the Evergreen Site expands the scope of ozone monitoring. Situated at an elevation of 2,225 meters, this site has been operational since September 2020. This strategic placement ensures more comprehensive air quality monitoring across the region.

**Fort Collins – CSU – Edison, 251 Edison Street (08 069 0009):**

Fort Collins, despite being one of the largest cities along the Front Range, does not meet the population criteria required by federal regulations to necessitate a particulate monitor. In the summer of 2016, the Air Pollution Control Division (APCD) removed the filter-based Federal Reference Method (FRM) PM<sub>2.5</sub> sampler. Subsequently, the GRIMM EDM 180, a continuous particulate monitor, was designated as the primary method for comparisons with the PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS).

Currently, the monitoring site is equipped with filter-based, high-volume PM<sub>10</sub> neighborhood scale State and Local Air Monitoring Stations (SLAMS) that operate on a one-in-three-day schedule. Additionally, there is a continuous GRIMM EDM 180 monitor in place that measures both PM<sub>10</sub> and PM<sub>2.5</sub> particulates. This setup ensures ongoing assessment and compliance with environmental standards, despite the initial absence of a federally required monitor due to population thresholds.

**Fort Collins - West, 3416 W. La Porte Avenue (08 069 0011):**

The Fort Collins-West ozone monitoring station commenced operations in May 2006. It was strategically located based on predictive modeling and to fulfill permit requirements for a significant source within the Fort Collins region. During its inaugural season, the data indicated that this station consistently recorded higher ozone concentrations compared to the monitor at 708 S. Mason Street. The Fort Collins-West station is designed as an urban-scale SLAMS (State and Local Air Monitoring Stations) site, focusing on capturing areas with the highest concentration levels. Moreover, plans are in place to enhance the station by mid-2023 with the addition of a meteorological tower. This new feature will measure wind speed, wind direction, temperature, and relative humidity, providing a more comprehensive understanding of local air quality conditions.

**Fort Collins- Mason, 708 S. Mason Street (08 069 1004):**

The facility at 708 S. Mason Street, operational since December 1980, is situated one block west of College Avenue in the Central Business District. It has occasionally exceeded air quality standards, notably the one-hour carbon monoxide (CO) standard of 35 ppm, which was surpassed on December 1, 1983, at both 4:00 PM and 5:00 PM with levels of 43.9 ppm and 43.2 ppm, respectively. Additionally, the eight-hour CO standard of 9 ppm was exceeded annually from 1980 to 1989, with the most recent exceedances occurring on January 31 and December 6, 1991, registering 9.8 ppm and 10.0 ppm.

Despite not meeting the population requirements for mandatory CO monitoring under federal regulations, Fort Collins, one of the largest cities along the Front Range, was designated a nonattainment area for CO in the mid-1970s after exceeding the eight-hour standard in 1974 and 1975. In response, the CO monitor was upgraded in May 2016 to a Thermo 48i-TLE trace level instrument, enhancing the State Maintenance Plan (SMP) for CO. The site also includes a population-oriented neighborhood scale SLAMS monitor.

Ozone (O<sub>3</sub>) monitoring started at the site in 1980 and continues to the present. Meteorological monitoring commenced on January 1, 1981. The meteorological tower was relocated in March 2012 during the Mason Street Redevelopment Project, moving from a freestanding structure to one mounted on the south side of the shelter.

**Grand Junction - Powell, 650 South Avenue (08 077 0017):**

Grand Junction, the largest city on Colorado's Western Slope, is situated in the expansive valley of the Colorado River. The monitoring equipment is installed on county-owned buildings located on the city's south side, near the southern edge of the central business district and close to the industrial areas adjacent to the train tracks. This site is approximately a half-mile north of the river and a quarter-mile east of the railroad yard.

In the summer of 2016, the primary filter-based Federal Reference Method (FRM) was replaced, and the GRIMM EDM 180 continuous particulate monitor was designated as the primary instrument for comparison against the PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS). Currently, the GRIMM monitors continuously measure both PM<sub>2.5</sub> and PM<sub>10</sub>. Additionally, two low-volume filter-based collocated PM<sub>10</sub> monitors operate at the site, following a sampling schedule of one day in three and one day in six, respectively.

**Grand Junction - Pitkin, 645¼ Pitkin Avenue (08 077 0018):**

In 2004, meteorological monitors equipped with sensors for measuring wind speed, wind direction, and temperature were installed. Subsequently, on January 5, 2015, the meteorological tower was upgraded with RM Young meteorological sensors, which included a relative humidity (RH) sensor.

Additionally, this site is integrated into the National Air Toxics Trends Station Network. This network is a significant project managed by the Environmental Protection Agency (EPA) and aims to monitor and assess the levels of urban air toxics across the United States. This initiative helps in understanding and managing air quality issues related to toxic pollutants in urban environments.

**Palisade Water Treatment, Rapid Creek Rd (08 077 0020):**

The Palisade site is situated at the Palisade Water Treatment Plant, approximately 4 kilometers east-northeast of downtown Palisade, near the entrance of De Beque Canyon. This location is relatively isolated, far from any large population centers. Established to monitor potential peak ozone (O<sub>3</sub>) concentrations, the site aims to capture data on how summertime up-flow conditions can lead to increased ozone levels in this topographically unique area. Ozone and meteorological monitoring began in May 2008. The facility serves as a special-purpose, urban-scale monitor designed to study specific environmental conditions and their effects on air quality.

**Cortez, 106 W. North St (08 083 0006):**

The Cortez monitoring site is situated at the Montezuma County Health Department building in downtown Cortez, Colorado. As the largest population center in Montezuma County, located in the state's southwest corner, Cortez is strategically important for environmental monitoring.

The site was equipped with an ozone (O<sub>3</sub>) monitor in response to local concerns about potential high ozone levels resulting from emissions by nearby oil, gas, and power plants, many of which are located in New Mexico. Ozone monitoring began in May 2008. Additionally, particulate matter (PM<sub>2.5</sub>) monitoring started on June 20, 2008. However, PM<sub>2.5</sub> monitoring was discontinued in July 2015 after fulfilling all sampling requirements and consistently recording low PM<sub>2.5</sub> concentrations.

The Cortez site operates as an urban scale State and Local Air Monitoring Station (SLAMS), focusing on tracking air quality and assessing compliance with environmental standards. This ongoing monitoring is crucial for ensuring the health and safety of the area's residents and the environment.

**Aspen Yellow Brick School, 215 North Garmisch (08 097 0008):**

Aspen is located at the upper end of a steep mountain valley and is not served by an interstate highway. Previously classified as nonattainment for PM<sub>10</sub>, Aspen is now adhering to an attainment/maintenance plan for air quality. The geographical configuration of the valley tightens at the lower end, making it an effective trap for pollutants.

The area experiences significant seasonal population increases due to winter skiing and summer mountain activities, further exacerbated by a substantial number of commuters traveling daily from communities as far as 41 miles northeast, including Glenwood Springs. These factors collectively contribute to heightened traffic and pollution levels.

To monitor air quality, Aspen utilizes advanced equipment including a high-volume filter-based PM<sub>10</sub> monitor and a continuous PM<sub>10</sub>/PM<sub>2.5</sub> GRIMM EDM 180 monitor. Additionally, a neighborhood scale SLAMS high volume PM<sub>10</sub> monitor operates on a 1-in-3 sample schedule, helping track and manage particulate matter in the air. This comprehensive monitoring is crucial for maintaining air quality and ensuring public health in the region.

#### **Lamar Municipal Building, 104 Parmenter Street (08 099 0002):**

Established in January 1996, the Lamar Municipal site was chosen for its central location, making it more accessible to the population compared to the previously used Power Plant site. The latter was situated on the northern edge of Lamar and remained operational until its decommissioning in 2012. Both sites have experienced exceedances of the 24-hour air quality standard for particulate matter (PM<sub>10</sub>), which is set at 150 µg/m<sup>3</sup>. Additionally, it is common for both locations to record 24-hour average concentrations above 100 µg/m<sup>3</sup>.

The Power Plant site was ultimately shut down due to its failure to meet essential siting criteria. On the other hand, the Lamar Municipal Building now supports neighborhood-scale State and Local Air Monitoring Stations (SLAMS) with high-volume PM<sub>10</sub> monitors that operate on a daily sampling schedule. This setup ensures continuous monitoring and assessment of air quality to better protect the health of the local community.

#### **Pueblo Fountain School, 925 N. Glendale Ave (08 101 0015):**

Pueblo, the third largest city in the state excluding Metropolitan Denver, is characterized by rolling plains and moderate slopes with elevations ranging between 4,474 and 4,814 feet. It is located approximately 25 miles west of the Rocky Mountain Front Range, with Pikes Peak visible on clear days.

Meteorologically, Pueblo enjoys mild weather, boasting an average of about 300 sunny days per year. Winds typically flow up the valley from the southeast during the day and down the valley from the west at night. The average wind speed varies, ranging from 7 miles per hour in the fall and early winter to 11 miles per hour in the spring.

Previously, the official site was situated on the roof of the Public Works Building at 211 E. D Street, a relatively flat area two blocks northeast of the Arkansas River. In June 2011, operations were relocated to the Magnet School site due to the construction of a new multi-story building that significantly altered the flow dynamics at the original site. Traffic and distance estimates for the surrounding streets are classified as middle scale, in line with federal standards specified in 40 CFR, Part 58, Appendix D.

#### **Pueblo West, 803 S Cellini Cir. (08 101 0016):**

The Pueblo West Sampling Station was established to monitor ozone (O<sub>3</sub>), wind speed, wind direction, and temperature in the Pueblo West Urban Area. Located just north of the Pueblo Reservoir, this facility commenced operations in early 2023. The data collected at this site supports environmental and meteorological assessments and helps in understanding the local climate dynamics. This initiative is part of a broader effort to maintain and improve air quality and overall environmental health in the region.

#### **Steamboat Springs, 136 6<sup>th</sup> Street (08 107 0003):**

Like many ski towns, Steamboat Springs faces environmental challenges such as wintertime inversions, high traffic, wood smoke, and the use of street sand. These issues are compounded by temperature inversions that trap pollutants in the valley, exacerbating air quality concerns.

The first air quality monitoring site in Steamboat Springs was established in June 1985 at 929 Lincoln Avenue. In October 1986, it was relocated to a more central and accessible location at 136 6th Street. This site provides a better representation of the population's exposure to pollutants. It employs high-volume filter-based sampling to monitor PM<sub>10</sub>, a particulate

matter that can adversely affect respiratory health. Operating under a daily sampling schedule, this site serves as a neighborhood-scale State and Local Air Monitoring Station (SLAMS), focusing on assessing air quality and the associated risks to the community.

**Telluride, 333 W. Colorado Avenue (08 113 0004):**

Telluride is a high-altitude ski town nestled in a narrow box canyon with the San Miguel River flowing through its southern end. The town spans approximately half a mile from north to south. During winter, the unique topography of this mountain valley often leads to temperature inversions that can persist for several days. These inversions have the potential to trap air pollution close to the ground, exacerbating environmental concerns.

The valley, primarily oriented east to west, is particularly susceptible to trapping air pollutants. This is because the prevailing westerly winds, common at this latitude, are hindered by the valley's closed eastern end. In response to these environmental challenges, the area is monitored by a population-oriented neighborhood scale SLAMS (State and Local Air Monitoring Stations) system. This system operates on a sampling schedule of every third day, helping to track and manage air quality in Telluride effectively.

**Greeley Hospital, 1516 Hospital Road (08 123 0006):**

The Greeley PM<sub>10</sub> and PM<sub>2.5</sub> monitoring station is situated atop a hospital office building at 1516 Hospital Road. In the summer of 2016, filter-based samplers were replaced with the GRIMM EDM 180, a continuous particulate monitor now serving as the primary device for NAAQS comparisons. This station operates at a neighborhood scale under the State and Local Air Monitoring Stations (SLAMS) program. It is positioned near Greeley Central High School to the east and is surrounded by a mix of residential and commercial areas, making it ideal for monitoring population exposure at the neighborhood scale. The site conforms to federal guidelines for neighborhood scale monitoring as per 40 CFR, Part 58, based on its distance and traffic from major streets.

Local winds predominantly come from the northwest, often at speeds below 5 mph, with secondary winds from the north, north-northwest, and east-southeast. The most recent wind data available is from December 1986 to November 1987. Residential growth is expanding to the west and north, with significant industrial development anticipated to the west. Historically, there were feedlots approximately 11 miles east of Greeley, and another closer to the town's east edge that ceased operations in early 1999 after its purchase by the town in 1997.

**Platteville, 1004 Main Street (08 123 0008):**

Platteville is situated just west of Highway 85 along the Platte River valley, about five miles east of I-25, with an elevation of 4,825 feet. The region is marked by its relatively flat terrain and is located approximately one mile east of the South Platte River. Historically, the National Oceanic and Atmospheric Administration managed a network of meteorological monitors called the Prototype Regional Observational Forecasting System Mesonet in northern Colorado's Front Range from the early to mid-1990s. Data from this period indicate that Platteville is one of the last areas to experience the dispersal of cold air pools formed by temperature inversions during winter, largely due to solar heating.

The unique geographical features of the Platte River Valley, including its upslope and downslope air flows between Denver and Greeley, make Platteville an excellent location for monitoring PM<sub>2.5</sub> and performing chemical speciation sampling. This latter activity has been ongoing since 2001.

The monitoring station is located at 1004 Main Street, housed within the South Valley Middle School. The setup includes easy roof access for equipment installation and maintenance. The site features three monitors: two are regional scale monitors aimed at population studies—one part of the SLAMS network and the other for additional speciation. The third is a neighborhood-scale supplemental speciation monitor. The PM<sub>2.5</sub> filter-based FRM SLAMS monitor operates on a 1 in 3-day sample schedule, and the other two monitors operate on a 1 in 6-day schedule. This configuration aligns with the regional transport scale as per federal guidelines outlined in 40 CFR, Part 58, Appendix D.

**Greeley, Weld County Tower, 3101 35<sup>th</sup> Avenue (08 123 0009):**

The Weld County Tower O<sub>3</sub> monitor commenced operations in June 2002, following the sale of the building at 811 15th Street, which was set for repurposing. This site, located in a densely populated area, generally registers higher pollution levels compared to its predecessor. It functions as a neighborhood-scale SLAMS (State and Local Air Monitoring Stations) monitor, focusing on the community's air quality.

The carbon monoxide monitoring that was previously conducted at the Greeley West Annex site ceased in June 2015, when the equipment was relocated to the Weld County Tower site. Carbon monoxide monitoring at this new location started in April of 2015 using a Thermo 48C monitor. An upgrade was made on April 28, 2016, when the Thermo 48C was replaced with a Thermo 48iTLE trace level analyzer, enhancing the precision of the measurements.

Additionally, meteorological monitoring was initiated at the Weld County Tower site in February 2012, providing further environmental data to support air quality assessments.

**Platteville Atmospheric Observatory (PAO), 17065 County Rd 28 (08 123 0013):**

On June 12, 2020, the Air Pollution Control Division (APCD) initiated monitoring of ozone, nitrogen dioxide, and meteorological conditions at the NOAA facility near Platteville, Colorado. This activity aligns with the findings from the 2017 Western Air Quality Study Monitoring Network Assessment, which specifically recommended the establishment of nitrogen dioxide monitoring within the Denver-Julesburg Basin—an area previously underserved and unmonitored. The PAO air monitoring site was strategically set up to gather critical data on nitrogen dioxide levels in this region, enhancing our understanding and management of air quality in the basin.

**La Salle, 18490 County Road 38 (08 123 0015):**

The La Salle site, located in Weld County at 18490 County Road 38, serves the city of La Salle and its surrounding areas. This site began operations on February 6, 2024, established to replace the former Platteville Atmospheric Observatory (PAO) site, which was decommissioned due to loss of access to the land.

Situated in an area with significant oil and gas development, the La Salle site addresses related air quality concerns. The 2017 Western Air Quality Study Monitoring Network Assessment highlighted the need for nitrogen dioxide monitoring within the Denver-Julesburg Basin, an area that was previously underserved and lacked sufficient monitoring. The PAO site was initially set up to gather crucial data on nitrogen dioxide levels in this region, and the La Salle site continues this mission.

At La Salle, both ozone and nitrogen dioxide (NO<sub>2</sub>) levels are measured, providing vital information to enhance our understanding and management of air quality in the basin. The data collected at this site is expected to be comparable to that gathered at the former PAO site, ensuring continuity and reliability in air quality monitoring for the region.



## Appendix B - Public Comments and Responses

This appendix includes information regarding the required public comment period, comments received and APCD responses.

Per 40 CFR 58.10, a 30-day public comment period is required before submitting the Annual Network Plan to EPA. APCD posted notice of this Annual Network Plan on May 24, 2024 on the APCD website at: <https://www.colorado.gov/pacific/cdphe/air-division-public-comment> and [https://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx](https://www.colorado.gov/airquality/tech_doc_repository.aspx). The public comment period was open through June 24, 2024.

The APCD received two sets of comments on this Annual Network Plan during the public comment period. The APCD appreciates the time and effort taken to develop these comments. The comments are presented below along with the APCD's responses.

## Public Comments Received and APCD Responses:

### Commenter #1 (Karen Artell):

I live in Fort Collins in Larimer County. As you know the City and a portion of Larimer County are within the severe ozone nonattainment area. The west Fort Collins ozone monitor has a history of some of the highest ozone level readings in Colorado. The predominant contributor of ozone precursors for northern Colorado is oil and gas development to the east in Weld County.

I'm pleased that ozone and NO<sub>2</sub> monitoring will start at two new sites in Larimer County (Timnath and Fossil Creek) this summer and that meteorological monitoring was installed at the west Fort Collins site on 7/28/23.

It's my understanding, according to APCD and Larimer County staff, that a regulatory ozone monitor is planned for west Loveland at Mehaffey Park. This monitor will fill in the gap of regulatory monitors up against the foothills between Fort Collins and Longmont and provide much needed new air quality data.

### APCD Responses to Commenter #1:

*We appreciate your concern about air quality issues. Efforts over the past year with Larimer County and the City of Fort Collins have been successful, but they are ongoing. We continue to work with Larimer County on obtaining land use agreements for a site that has been initially identified in West Loveland near Mehaffey Park and are confident that this ozone site will become operational within the year.*

### Commenter #2 (Annareli Morales, Weld County Department of Public Health and Environment):

#### Request Public Information and Data from PAMS Monitoring

We are looking forward to the additional Photochemical Assessment Monitoring Stations (PAMS) being deployed in the Front Range. We request that more information be made public regarding new site installation plans and existing infrastructure, perhaps having an easily found map with all sites and what they measure on the APCD air toxics website. We would also request that the APCD begin sharing data from already commissioned sites (Rocky Flats) with the public in an accessible website with plain language information to increase scientific literacy on air toxics. If that is already in the works, please provide an estimate date of public release.

#### Propose Adding Meteorology to Greeley Hospital

Based on the draft 2024 Plan Table 1.2, several monitoring sites have meteorological equipment collocated with particulate monitoring, namely Welby, CAMP, La Casa, I-25 Denver, I-25, Globeville, and Chatfield State Park. We request that meteorological equipment be added to the Greeley Hospital site as well. We do believe the entire PM<sub>2.5</sub> network would benefit from collocated horizontal wind speed and direction to allow for the correlation of

PM2.5 concentrations to wind direction. Collocated meteorological data would provide additional information to assess PM2.5 transport patterns and evaluate the potential influence of nearby sources of PM2.5, which Weld County commented on last year on the draft 2023 Ambient Air Monitoring Network Plan. This is especially relevant with the lower PM2.5 NAAQS.

### **Encourage More Monitoring Efforts in the Front Range**

Given the growth of the Colorado Front Range region, we want to recommend increased monitoring beyond the Metropolitan Statistical Areas (MSA) requirements outlined in 40 CFR Appendix D to Part 58. Currently, EPA monitoring requirements are being met for both the number of monitors and the type of pollutants monitored for the MSAs in the Denver Metro / North Front Range Region. However, given the increasing population trajectory we would urge the APCD to consider adding more monitoring to increase resolution and help inform future decision making.

### **Ozone Precursor Sources**

We again request changes regarding the description of ozone precursor sources in the draft 2024 Plan. We request the removal of the statement “Weld County is an area of significant oil and gas development, which potentially contributes to ozone forming compounds or ‘precursors’ in the lower atmosphere” on page 14 and similar statement on page 11. We ask that Weld County be provided equal treatment as other counties. As shown in Table 3.2 of the draft 2024 Plan, nine (9) other counties in the State have a 3-year average of the 4th max ozone concentrations higher than Weld County, yet Weld County is the only one specifically mentioned to have ozone precursor emissions. Why? This comment and request is identical to comments submitted by Weld County on the draft 2023 Plan. Last year, APCD’s response to Weld County’s comment stated that the oil and gas emissions accounted for 50% of all volatile organic compound (VOC) emissions in the region. While this response is accurate, this is misleading because modeling studies have shown the top source sectors that contribute to local ozone formation are not oil and gas sources, rather the top source sectors are mobile sources, nonelectric generating point sources, construction equipment, and lawn and garden equipment. The source apportionment data shows that light duty vehicles and lawn and garden equipment cumulatively contribute up to 37% of the ozone formed from local emission sources at monitors Fort Collins-West, National Renewable Energy Laboratory, Rocky Flats-North, and Welby in the front range ozone nonattainment area (NAA). Yet these source types and the areas with notable emissions of these source types are not mentioned in the draft 2024 Plan. This is an important discrepancy that has the potential to misinform readers and adversely and inaccurately affect Weld County. We encourage the APCD to remove statements about Weld County or adjust the draft 2024 Plan to more thoroughly and accurately describe the sources of ozone precursors.

### **Request APCD’s Response to Comments Demonstrate Commitment to Meaningful Incorporation of Public Input**

Weld County is concerned about APCD’s previous responses to comments submitted on past plans. APCD provided response to our comments submitted in 2022 and 2023 and only on one occasion has made changes to the Monitoring Network Plans in response to our comments. Comments made last year were (1) requesting CDPHE’s rationale for adding three new ozone monitoring sites in Larimer County and information on their locations, (2) details regarding

the ozone and meteorological monitoring station removal from Fort Collins - Mason, (3) the inclusion of ongoing air toxics monitoring done by APCD at the Missile Site Park Monitoring location into the network plan, (4) the removal of Weld County's name when referencing ozone precursor sources, and (5) addressing our concerns regarding PM2.5 exceedances influenced by exceptional events. As a local government, Weld County would like to collaborate with the APCD towards our common goal of improved air quality in the Front Range. To that end, Weld County would appreciate if future comment opportunities allowed APCD sufficient time to meaningfully incorporate public input into the final plan and more fully consider requested changes, i.e., more than two weeks. We understand there are deadlines, however it does not bode well for public trust and meaningful involvement if public comments are perceived as "box checking" exercises.

#### **APCD Responses to Commenter #1:**

##### ***Request Public Information and Data from PAMS Monitoring***

*We appreciate your suggestion to include information about additional Volatile Organic Compound (VOC) monitoring. However, the only Photochemical Assessment Monitoring Station (PAMS) in operation in the Air Pollution Control Division (APCD) regulatory network is at Rocky Flats North, as described in Section 9 of the Annual Network Plan. Data from this site will be reported to the Air Quality System following Environmental Protection Agency guidelines and deadlines.*

*There are three other precursor VOC monitoring stations modeled after the PAMS program currently in operation by the APCD that are not part of the regulatory network. Since the Annual Network Plan concerns only the regulatory network the additional VOC monitoring stations are not described. The data from these sites will be made publicly available in analogous reports that are currently in development. An effort is underway at the APCD to provide air toxics, ozone precursors including PAMS, and special study data in the coming years. We are working with air toxics and toxicology specialists, and will work with local agencies and the public, to develop clear language to accompany the data on this front end. A completion date is not currently known.*

##### ***Propose Adding Meteorology to Greeley Hospital***

*We thank you for your suggestion to include wind direction at all PM2.5 monitoring locations. With currently available data, Colorado has no PM2.5 monitors that are out of compliance with the new lower PM2.5 NAAQS. The sites listed in Weld County's comments are all locations that monitor for multiple pollutants. APCD's limited resources for meteorology have been applied to locations where multiple pollutants are measured. Generally, PM2.5 monitors that are single-pollutant sites are located on rooftops, including Greeley Hospital. This siting increases the cost of installation and logistical complexity of high-quality meteorology equipment and is outside of the funding resources of the APCD.*

##### ***Encourage More Monitoring Efforts in the Front Range***

*We share the concern about population trajectories and increased resolution in our monitoring network. The APCD is working within its resources to expand monitoring where possible with input from local agencies. In the past year, APCD has worked with local agencies to open two ozone and NOx monitoring stations, and has renovated much of the*

existing PM network with real-time analyzers replacing filter-based analyzers as described in Section 6.9 in the Annual Monitoring Plan. The APCD continues to pursue grants from the Federal Government to increase monitoring in the coming years across Colorado and will continue to work with local agencies concerning changes or possible improvements in the regulatory network.

#### *Ozone Precursor Sources*

We understand your concern regarding the specific mention of Weld County in the context of ozone precursor emissions. Our goal is to ensure that the information presented in our plans is both accurate and clear.

The statement, "Weld County is an area of significant oil and gas development, which potentially contributes to ozone forming compounds or 'precursors' in the lower atmosphere," is based on robust data and reflects the substantial impact of oil and gas activities in the region. This sector is a major source of VOC and NOx emissions, which are critical ozone precursors. The significant scale of these activities in Weld County warrants specific mention due to their potential impact on regional air quality. However, we have adopted the suggestion to more thoroughly describe the various sources of ozone precursors, which we have done in the following paragraph from page 13:

***"Ozone is an atmospheric oxidant composed of three oxygen atoms. It is not usually emitted directly into the air, but at ground-level is formed via photochemical reactions among NOx and volatile organic compounds (VOCs) in the presence of sunlight. Emissions from oil and gas production, motor vehicle exhaust, industrial facilities and electric utilities are some of the major sources of NOx and VOCs in Colorado, with on-road motor vehicles being the most significant source of NOx and oil and gas production being the most significant source of VOCs."***

We have also changed the sentence singled out in this comment (on page 14):

***"Weld County is an area of extensive oil and gas development, an activity that generates regionally significant amounts of NOx and VOC emissions into the lower atmosphere."***

As previously mentioned, oil and gas activities in Weld County account for approximately 50% of all VOC emissions in the Denver Metro/North Front Range ozone nonattainment area. Additionally, oil and gas sources from Weld County alone are the second largest contributors of NOx emissions in the entire region. This substantial contribution highlights the importance of monitoring and mitigating emissions from this sector to improve air quality.

We acknowledge that other sources also significantly contribute to ozone formation. In the section describing ozone monitoring in the Denver Metro/North Front Range Region, our report includes the statement: "Emissions from industrial facilities and electric utilities, oil and gas development, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NOx and Volatile Organic Compounds (VOCs) in the atmosphere." This demonstrates our recognition of the diverse sources of ozone precursors. Detailed emissions and traffic density data for various regions across the state are summarized in our 5-Year Monitoring Network Assessment.

*While we recognize the concerns raised by Weld County, the specific mention of Weld County in the context of oil and gas development is based on significant and unique contributions to ozone precursor emissions that have been widely documented. The fact that other counties have high ozone concentrations does not diminish the relevance of emissions from Weld County, which can potentially influence air quality across the region.*

***Request APCD's Response to Comments Demonstrate Commitment to Meaningful Incorporation of Public Input***

*We acknowledge the feedback provided by Weld County in previous years and recognize the importance of incorporating public input into our planning processes. Over the years, we have diligently reviewed and responded to each of the comments submitted by Weld County. During this time, we have made several changes to our Monitoring Network Plans based on suggestions received from community members and local governments (including Weld County), demonstrating our commitment to considering public feedback.*

*While we carefully review and respond to all comments that we receive, it is important to note that changes are made based on a variety of factors, including scientific data, financial constraints, regulatory requirements, and overall feasibility. We strive to balance these considerations to ensure the most effective air quality monitoring strategies.*

***Specific Actions and Transparent Communication:***

***Detailed Responses:*** *We provide detailed responses to each comment during the public comment process, outlining the rationale behind our decisions. This includes both the suggestions we adopt and those we do not, with explanations for each.*

***Earlier Comment Period:*** *We will endeavor to provide a draft for public comment earlier in the year in the future, allowing more time for thorough review and response to all feedback received.*

***Meetings for Direct Engagement:*** *We are committed to continue meeting with Weld County to facilitate direct engagement and discussion of our plans. These sessions are designed to provide transparency and foster collaborative dialogue.*