



**COLORADO**

**Air Pollution Control Division**

Department of Public Health & Environment

Technical Services Program

# 2020 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  
2020**

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

May 21, 2020

---

# 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 Western Slope Region . . . . .	12
2.4 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>17</b>
4.1 Denver Metro/North Front Range Region . . . . .	17
4.2 Recent and Planned Changes in NO <sub>2</sub> /NO <sub>y</sub> Monitoring . . . . .	17

<b>5 Sulfur Dioxide (SO<sub>2</sub>)</b>	<b>19</b>
5.1 Denver Metro/North Front Range Region . . . . .	19
5.2 Pikes Peak Region . . . . .	20
5.3 Planned Changes in SO <sub>2</sub> Monitoring . . . . .	20
<b>6 Particulate Matter (PM)</b>	<b>21</b>
6.1 Continuous PM Monitoring . . . . .	22
6.2 Community Monitoring Zones . . . . .	22
6.3 Denver Metro/North Front Range Region . . . . .	23
6.4 Eastern High Plains . . . . .	23
6.5 Pikes Peak Region . . . . .	24
6.6 South Central Region . . . . .	24
6.7 Central Mountain Region . . . . .	25
6.8 Western Slope Region . . . . .	25
6.9 Southwestern Region . . . . .	26
6.10 Planned Changes in PM Monitoring . . . . .	26
<b>7 Lead</b>	<b>27</b>
7.1 Planned Changes in Lead Monitoring . . . . .	27
<b>8 Meteorological Measurements</b>	<b>28</b>
8.1 Recent and Planned Changes in Meteorological Monitoring . . . . .	28
<b>9 PAMS (Photochemical Assessment Monitoring Station) Monitoring</b>	<b>29</b>
<b>10 Quality Assurance</b>	<b>30</b>
10.1 Continuous Monitors . . . . .	30
10.2 Particulate Monitors . . . . .	30
10.3 Meteorological Monitors . . . . .	30
<b>11 Summary of Network Changes</b>	<b>31</b>
11.1 Completed Changes . . . . .	31
11.2 Planned Changes . . . . .	31
<b>12 CFR Requirements Summary</b>	<b>32</b>
<b>Appendix A: Monitoring Site Descriptions</b>	<b>A1</b>
<b>Appendix B: Network Modification Forms</b>	<b>B1</b>
<b>Appendix C: Public Comments and Responses</b>	<b>C1</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 2020 . . . . .	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 2019 . . . . .	11
2.2	Summary of CO values recorded at the Highway 24 (Colorado Springs) station during 2019. . . . .	12
2.3	Summary of CO values recorded at the Grand Junction - Pitkin station during 2019 . . . . .	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 2019 . . . . .	14
3.3	Summary of O <sub>3</sub> values recorded at monitoring stations in the Pikes Peak region during 2019. . . . .	15
3.4	Summary of O <sub>3</sub> values recorded at monitoring stations in the Western Slope region during 2019 . . . . .	15
3.5	Summary of O <sub>3</sub> values recorded at the monitoring station in the Southwest region during 2019. . . . .	15
4.1	Summary of NO <sub>2</sub> values recorded at monitoring stations in the Denver Metro / Northern Front Range region during 2019 . . . . .	18
5.1	Summary of SO <sub>2</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2019. . . . .	20
5.2	Summary of SO <sub>2</sub> values recorded at the Highway 24 monitoring site in Colorado Springs . . . . .	20
6.1	Summary of PM <sub>10</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2019 . . . . .	23
6.2	Summary of PM <sub>2.5</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2019 . . . . .	23
6.3	Summary of PM <sub>10</sub> values recorded at monitoring stations in the Eastern High Plains region during 2019, with proposed exceptional events included. . . . .	23
6.4	Summary of PM <sub>10</sub> values recorded at the Colorado College station during 2019. . . . .	24
6.5	Summary of PM <sub>2.5</sub> values recorded at the Colorado College station during 2019 . . . . .	24
6.6	Summary of PM <sub>10</sub> values recorded at the Pueblo monitoring station during 2019 . . . . .	24
6.7	Summary of PM <sub>2.5</sub> values recorded at the Pueblo monitoring station during 2019 . . . . .	24
6.8	Summary of PM <sub>10</sub> values recorded at monitoring stations in the Central Mountains region during 2019 . . . . .	25
6.9	Summary of PM <sub>10</sub> values recorded at monitoring sites in the Western Slope region during 2019 . . . . .	25
6.10	Summary of PM <sub>2.5</sub> values recorded at the Grand Junction - Powell Bldg. monitoring site during 2019 . . . . .	25
6.11	Summary of PM <sub>10</sub> values recorded at monitoring sites in the Southwest region during 2019 . . . . .	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) 2020 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 5/22/2020 to 6/22/2020.

### 1.1 Overview of the Colorado Air Monitoring Network

The APCD currently conducts air quality and meteorological monitoring operations at 43 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 15 separate locations, PM<sub>2.5</sub> monitors at 17 locations, O<sub>3</sub> monitors at 20 locations, carbon monoxide (CO) monitors at seven locations, nitrogen dioxide (NO<sub>2</sub>) monitors at six locations, and sulfur dioxide (SO<sub>2</sub>) monitors at four locations. The APCD also operates 17 meteorological sites statewide for the continuous measurement of wind speed, wind direction, resultant speed, resultant direction, standard deviation of horizontal wind direction, and temperature. Additionally, relative humidity is also monitored at seven of these locations. Total solar radiation is also currently monitored at two sites and precipitation and barometric pressure are monitored at one location.

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>2.5</sub> and PM<sub>10</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, eight are located at sites also having filter based PM<sub>10</sub> monitors. Of the 17 PM<sub>2.5</sub> monitoring sites, 14 measure PM<sub>2.5</sub> on a continuous basis, 10 of these sites also having filter based samplers.

### 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, 35 of the 43 current APCD monitoring locations have been in operation for 10 or more years, 21 of these sites have been in operation for 20 or more years, and 11 of the monitoring locations have been in operation for more than 30 years. Conversely, 8 of the 43 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 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 few current examples of this are the South Boulder Creek monitoring station and the relocation of the Alsup Elementary school site. The South Boulder Creek site was relocated to the Boulder Reservoir because it had large trees that violated EPA siting requirements. The site also had been negatively impacted by floods in the area. The Alsup Elementary school site was relocated nearby to the Tri-County Health Department building due to a roofing project and some access issues at the

## 1.1. OVERVIEW OF THE COLORADO AIR MONITORING NETWORK

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.

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 (see section 3.5). A detailed scientific evaluation of the present monitoring network configuration can be found in the APCD's 2020 Ambient Air Monitoring Network Assessment.<sup>1</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.

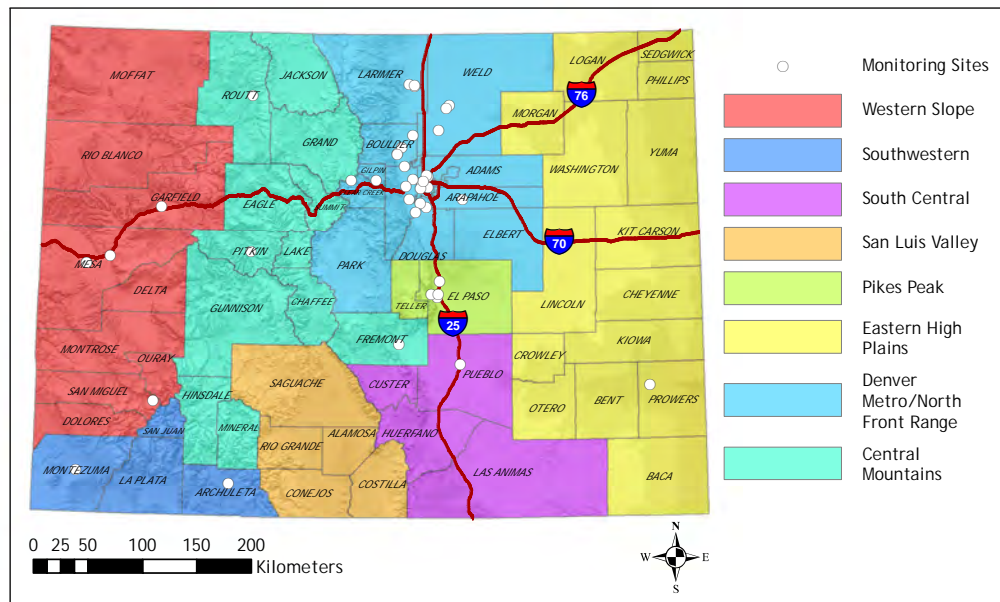


Figure 1.1: Counties and multi-county monitoring regions discussed in this report.

#### 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 247,676, according to the 2010 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 2019, there were three particulate monitoring sites operated by the APCD in the Central Mountains

<sup>1</sup>[http://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx](http://www.colorado.gov/airquality/tech_doc_repository.aspx)

region (Aspen, Steamboat Springs, and Cañon City). APCD does not currently operate any gaseous monitors in this region.

#### 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 4,080,201 people living in the area, according to the 2010 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. A moderate area ozone SIP was developed by the Regional Air Quality Control Council (RAQC) with support from APCD and was approved by the Colorado Air Quality Control Commission (CAQCC) in 2016. The EPA has recently proposed portions of the Denver Metro/North Front Range region ozone SIP for approval. 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. The EPA designated the Denver Metro/Northern Front Range region as nonattainment with a marginal area classification.

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 50 air quality and meteorological monitors at 26 individual sites in the Northern Front Range Region. There are six CO monitors, 15 O<sub>3</sub> monitors, six NO<sub>2</sub> monitors, three SO<sub>2</sub> monitors, as well as six 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 CAMP, and one at Platteville. The CAMP 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 136,096, according to the 2010 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> monitoring site in Lamar. As of 2015, with EPA concurrence, the APCD no longer operates a stand-alone background PM<sub>2.5</sub> monitoring site, but relies on data from the IMPROVE monitoring network.

The IMPROVE monitors are an EPA/National Park Service network that operates in park and wilderness areas, with a focus on monitoring visual air quality (visibility).

#### **1.1.4.4 Pikes Peak Region**

The Pikes Peak region includes El Paso and Teller counties. The area has a population of approximately 761,598, according to the 2010 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. Two exceedances of the SO<sub>2</sub> standard were observed at the Highway 24 site during 2014-2015; however, these elevated values have not yet resulted in a violation of the NAAQS and SO<sub>2</sub> concentrations have been trending downward at the Highway 24 site since 2016.

Currently, there is one CO monitor, one SO<sub>2</sub> monitor, and two O<sub>3</sub> monitors in the Pikes Peak region, as well as one PM<sub>10</sub> monitor, one PM<sub>2.5</sub> monitor, and one meteorological site.

#### **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 46,824, according to the 2010 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 are currently no APCD air monitoring operations active in this region. PM monitoring in the city of Alamosa was discontinued at the end of 2018 due to the low concentrations observed there.

#### **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 197,946, according to the 2010 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 are currently two particulate monitors (one PM<sub>10</sub> monitor and one PM<sub>2.5</sub> monitor) operated in the South Central Region, both at a site located in the city of Pueblo.

#### **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 104,677, according to the 2010 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 332,174, according to the 2010 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 2019.

Currently, there are two ozone monitoring sites and two particulate monitoring sites in the Western Slope region operated by the APCD. 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 2010 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 1970-2010 and U.S. Census Bureau projections for the period 2011-2020.

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

Region/MSA/County	Actual Population		Projected Population		Avg. Annual Change (%)	
	2010	2015	2020	2010-15	2010-20	
<b>COLORADO</b>	<b>5,049,935</b>	<b>5,448,055</b>	<b>5,907,199</b>	<b>1.6</b>	<b>1.7</b>	
<b>CENTRAL MOUNTAINS</b>	<b>225,793</b>	<b>231,715</b>	<b>247,676</b>	<b>0.5</b>	<b>1.0</b>	
Chaffee	17,835	18,603	20,267	0.9	1.4	
Eagle	52,064	53,320	57,571	0.5	1.1	
Fremont	46,856	46,659	47,801	-0.1	0.2	
Grand	14,790	14,602	16,330	-0.3	1.0	
Gunnison	15,314	16,097	17,202	1.0	1.2	
Hinsdale	825	767	847	-1.4	0.3	
Jackson	1,417	1,353	1,333	-0.9	-0.6	
Lake	7,288	7,502	7,777	0.6	0.7	
Mineral	728	729	762	0.0	0.5	
Pitkin	17,147	17,845	18,562	0.8	0.8	
Routt	23,451	24,310	26,461	0.7	1.3	
Summit	28,078	29,928	32,760	1.3	1.7	
<b>DENVER METRO/NORTH FRONT RANGE</b>	<b>3,406,613</b>	<b>3,743,663</b>	<b>4,080,201</b>	<b>2.0</b>	<b>2.0</b>	
<i>BOULDER</i>	<i>295,610</i>	<i>318,570</i>	<i>336,446</i>	<i>1.6</i>	<i>1.4</i>	
Boulder	295,610	318,570	336,446	1.6	1.4	
<i>DENVER-AURORA-LAKEWOOD</i>	<i>2,556,218</i>	<i>2,807,692</i>	<i>3,044,102</i>	<i>2.0</i>	<i>1.9</i>	
Adams	443,709	489,923	542,609	2.1	2.2	
Arapahoe	574,808	629,066	676,371	1.9	1.8	
Broomfield	56,098	64,656	75,627	3.1	3.5	
Clear Creek	9,083	9,392	9,634	0.7	0.6	
Denver	604,875	680,658	733,765	2.5	2.1	
Douglas	287,119	322,198	351,801	2.4	2.3	
Elbert	23,140	24,640	30,247	1.3	3.1	
Gilpin	5,461	5,824	6,048	1.3	1.1	
Jefferson	535,648	564,619	599,448	1.1	1.2	
Park	16,277	16,716	18,551	0.5	1.4	
<i>FORT COLLINS</i>	<i>300,545</i>	<i>332,830</i>	<i>363,216</i>	<i>2.1</i>	<i>2.1</i>	
Larimer	300,545	332,830	363,216	2.1	2.1	
<i>GREELEY</i>	<i>254,240</i>	<i>284,571</i>	<i>336,437</i>	<i>2.4</i>	<i>3.2</i>	
Weld	254,240	284,571	336,437	2.4	3.2	
<b>EASTERN HIGH PLAINS</b>	<b>136,777</b>	<b>134,108</b>	<b>136,096</b>	<b>-0.4</b>	<b>-0.0</b>	
Baca	3,765	3,594	3,496	-0.9	-0.7	
Bent	6,523	5,847	5,817	-2.1	-1.1	

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

Region/MSA/County	Actual Population			Projected Population		Avg. Annual Change (%)	
	2010	2015	2020	2010-15	2010-20		
Cheyenne	1,811	1,830	1,849	0.2		0.2	
Crowley	5,850	5,569	5,420	-1.0		-0.7	
Kiowa	1,410	1,396	1,352	-0.2		-0.4	
Kit Carson	8,259	8,219	7,705	-0.1		-0.7	
Lincoln	5,502	5,549	5,830	0.2		0.6	
Logan	22,291	22,122	23,080	-0.2		0.4	
Morgan	28,213	28,230	29,285	0.0		0.4	
Otero	18,875	18,265	18,373	-0.6		-0.3	
Phillips	4,467	4,307	4,287	-0.7		-0.4	
Prowers	12,527	11,905	11,955	-1.0		-0.5	
Sedgwick	2,403	2,389	2,380	-0.1		-0.1	
Washington	4,851	4,834	4,949	-0.1		0.2	
Yuma	10,030	10,052	10,310	0.0		0.3	
<b>PIKES PEAK</b>	<b>650,640</b>	<b>699,609</b>	<b>761,599</b>	<b>1.5</b>		<b>1.7</b>	
<i>COLORADO SPRINGS</i>	<i>650,640</i>	<i>699,609</i>	<i>761,599</i>	<i>1.5</i>		<i>1.7</i>	
El Paso	627,238	676,178	735,478	1.6		1.7	
Teller	23,402	23,431	26,121	0.0		1.2	
<b>SAN LOUIS VALLEY</b>	<b>45,415</b>	<b>45,246</b>	<b>46,824</b>	<b>-0.1</b>		<b>0.3</b>	
Alamosa	15,454	15,968	16,910	0.7		0.9	
Conejos	8,293	8,074	8,088	-0.5		-0.2	
Costilla	3,549	3,572	3,778	0.1		0.6	
Rio Grande	12,018	11,413	11,444	-1.0		-0.5	
Saguache	6,101	6,219	6,602	0.4		0.8	
<b>SOUTH CENTRAL</b>	<b>185,734</b>	<b>188,170</b>	<b>197,947</b>	<b>0.3</b>		<b>0.7</b>	
Custer	4,248	4,457	4,755	1.0		1.2	
Huerfano	6,639	6,456	6,614	-0.6		-0.0	
Las Animas	15,383	14,061	14,048	-1.7		-0.9	
<i>PUEBLO</i>	<i>159,464</i>	<i>163,196</i>	<i>172,529</i>	<i>0.5</i>		<i>0.8</i>	
Pueblo	159,464	163,196	172,529	0.5		0.8	
<b>SOUTHWESTERN</b>	<b>89,753</b>	<b>94,099</b>	<b>104,677</b>	<b>1.0</b>		<b>1.7</b>	
Archuleta	12,082	12,417	13,953	0.6		1.5	
La Plata	51,443	54,857	60,917	1.3		1.8	
Montezuma	25,515	26,129	29,088	0.5		1.4	
San Juan	713	696	719	-0.5		0.1	
<b>WESTERN SLOPE</b>	<b>309,210</b>	<b>311,445</b>	<b>332,175</b>	<b>0.1</b>		<b>0.7</b>	
Delta	30,897	29,973	31,038	-0.6		0.0	
Dolores	2,084	1,972	2,065	-1.1		-0.1	
Garfield	56,153	57,779	64,119	0.6		1.4	
<i>GRAND JUNCTION</i>	<i>146,587</i>	<i>149,023</i>	<i>156,922</i>	<i>0.3</i>		<i>0.7</i>	
Mesa	146,587	149,023	156,922	0.3		0.7	
Moffat	13,812	12,884	13,191	-1.3		-0.4	
Montrose	41,179	40,795	44,144	-0.2		0.7	
Ouray	4,471	4,647	5,093	0.8		1.4	
Rio Blanco	6,634	6,529	6,551	-0.3		-0.1	
San Miguel	7,393	7,843	9,050	1.2		2.2	



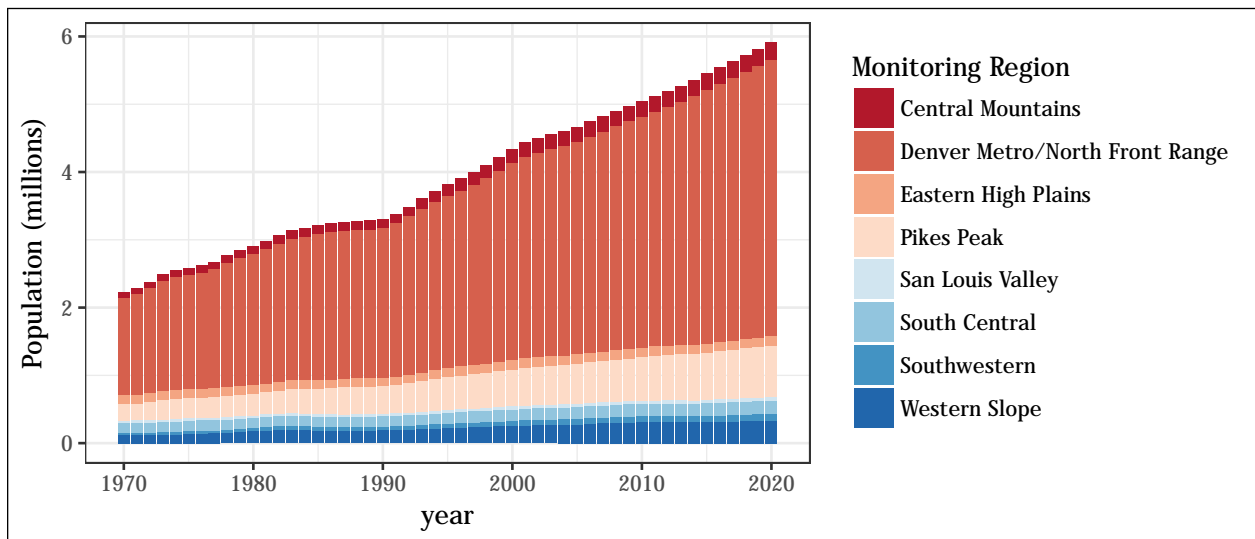


Figure 1.2: Population in Colorado from 1970 to 2020.

### 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
08-001-0008	Tri County Health (TCH)	Adams					X	X	
08-001-3001	Welby	Adams	X	X	X	X	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	
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	
08-043-0003	Cañon City - City Hall	Fremont					X		
08-045-0012	Rifle - Health Dept.	Garfield	X						
08-047-0003	Black Hawk	Gilpin	X						
08-059-0002	Arvada	Jefferson							X
08-059-0005	Welch	Jefferson	X						X
08-059-0006	Rocky Flats - N.	Jefferson	X		X				X
08-059-0011	NREL	Jefferson	X						
08-069-0009	Fort Collins - CSU	Larimer						X	
08-069-0011	Fort Collins - West	Larimer	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		
08-101-0015	Pueblo - Fountain School	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

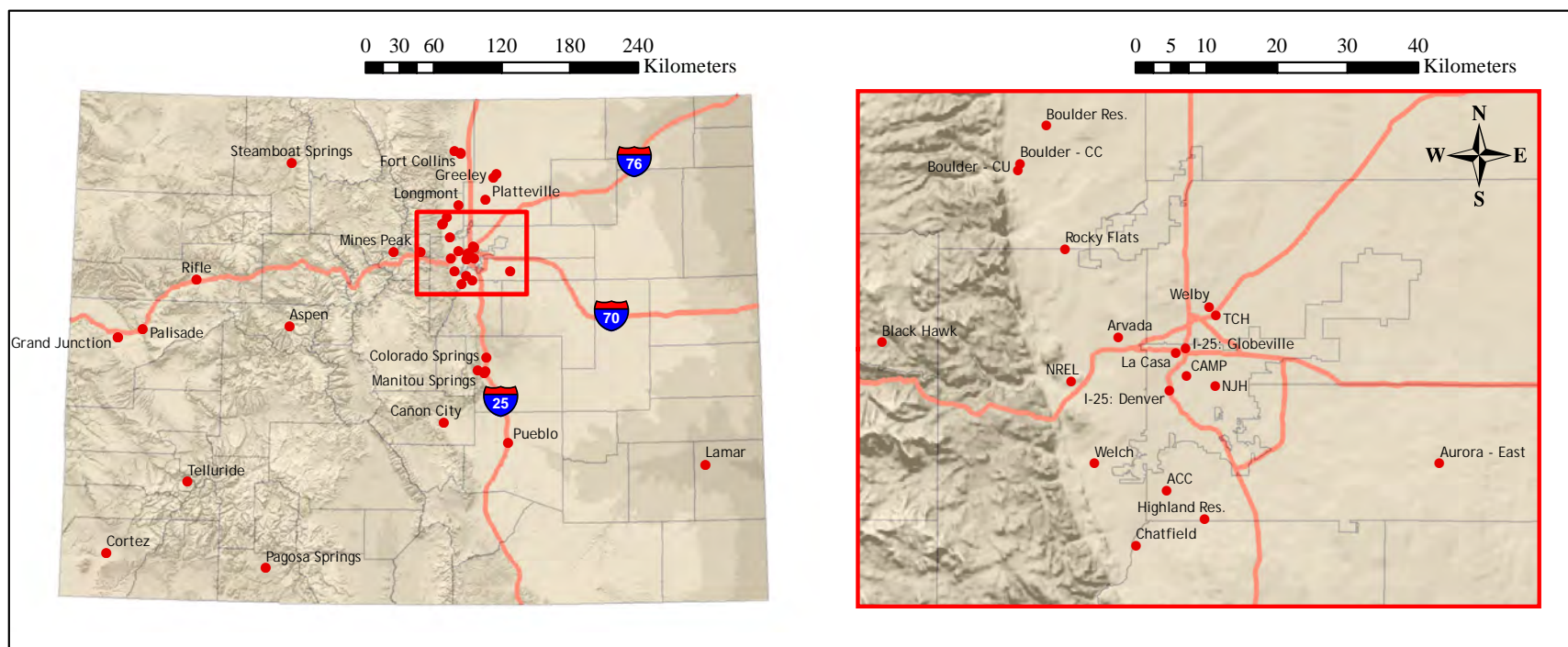


Figure 1.3: Map of Colorado with an inset map of the Denver metropolitan area showing the location of all monitoring sites operated by the APCD and listed in Table 1.2. For the purpose of improving the readability of the map, labels for monitoring sites in Fort Collins, Grand Junction, and Colorado Springs 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 2020, the APCD will operate seven 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 2.1 ppm in 2019. 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, wild fires, 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 2019 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 2019.

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	1.7	1.4	1.3
CAMP	Denver	2.5	2.4	1.9	1.6
La Casa	Denver	1.8	1.7	1.3	1.3
I-25 Denver	Denver	2.8	2.6	2.1	2.0
Fort Collins - Mason	Larimer	2.1	2.1	1.5	1.3
Greeley - County Tower	Weld	1.3	1.3	1.0	0.8

## 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 2019 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 2019.

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	2.7	2.6	1.7	1.6

## 2.3 Western Slope Region

Population in the Western Slope region is not evenly distributed among the counties and ranges from 146,587 people in Mesa County to 7,393 in San Miguel County, according to the 2010 U.S. Census. Grand Junction is the largest city on the western slope with an estimated 2019 population of 62,475. This is due in large part to the transient oil/gas working population associated with the boom in drilling in this area. Table 2.3 lists the first and second maximum one-hour and eight-hour CO concentrations recorded in 2019 for the Western Slope region. The Grand Junction - Pitkin CO monitor was removed on 6/1/2019. Therefore, the data in the table below is based on only five months of monitoring.

Table 2.3: Summary of CO values recorded at the Grand Junction - Pitkin station during 2019.

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.
Grand Junction - Pitkin	Mesa	1.7	1.1	0.7	0.7

## 2.4 Recent and Planned Changes in CO Monitoring

The Grand Junction - Pitkin CO monitor was removed on 6/1/2019. This CO monitor is being discontinued because it has met its monitoring objectives and can no longer be justified with observed monitored values reporting well below the NAAQS and continuing to drop. There are no continuing CO monitoring requirements for the Grand Junction area as it has not been designated as non-attainment and therefore no maintenance monitoring is required.

There are no planned changes to the CO network for 2020.

## 3

---

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

---

In March 2008, the U.S. EPA promulgated a new level of the NAAQS for O<sub>3</sub> of 0.075 ppm 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 0.070 ppm (70 ppb), effective December 28<sup>th</sup>, 2015. The APCD currently operates seven sites that have three-year design values (2017-2019) in excess of the current eight-hour O<sub>3</sub> NAAQS standard. These sites are all located in the Denver Metro / Northern Front Range region and are: Highlands (74 ppb), Boulder Reservoir (73 ppb), Chatfield State Park (78 ppb), Welch (71 ppb), Rocky Flats North (76 ppb), Fort Collins West (75 ppb), and NREL (77 ppb).

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.

<b>MSA Population</b>	<b>Most recent 3-year design value concentrations &gt; 85% of any O<sub>3</sub> NAAQS</b>	<b>Most recent 3-year design value concentrations &lt; 85% of any O<sub>3</sub> NAAQS</b>
>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

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 NO<sub>x</sub> and Volatile Organic Compounds (VOCs) in the atmosphere. In the presence of sunlight, NO<sub>x</sub> and VOCs chemically react to form ground level ozone. Table 3.2 lists the first and fourth maximum eight-hour O<sub>3</sub> concentrations recorded in 2019 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.

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

Table 3.2: Summary of O<sub>3</sub> values recorded at monitoring stations in the Denver Metro / Northern Front Range region during 2019. 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	66	60	65
Highlands	Arapahoe	82	73	74*
Aurora East	Arapahoe	70	66	69
Boulder Reservoir	Boulder	73	69	73*
CAMP	Denver	73	67	68
La Casa	Denver	72	65	68
Chatfield State Park	Douglas	87	78	78*
Welch	Jefferson	77	72	71*
Rocky Flats - N.	Jefferson	75	72	76*
NREL	Jefferson	79	75	77*
Aspen Park	Jefferson	67	63	67
Fort Collins - West	Larimer	79	71	75*
Fort Collins - Mason	Larimer	68	64	67
Greeley - County Tower	Weld	69	63	70

area. These are the Boulder MSA and the Denver-Aurora-Lakewood MSA, with populations of 295,610 and 3,160,316 respectively, according to the 2010 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 significant oil and gas development, which potentially contributes to ozone forming compounds or “precursors” in 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 300,545 and 254,240 respectively, according to the 2010 U.S. Census. Per EPA monitoring requirements, these MSAs fall in the 50,000 to 350,000 population range and each area therefore requires at least one highest concentration O<sub>3</sub> monitor. 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.

Seven 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): Highlands, Boulder Reservoir, Chatfield State Park, Welch, Rocky Flats N., NREL, and Fort Collins West. The Aspen Park station was closed on 9/16/2019 and therefore did not collect a full year of data.

## 3.2 Pikes Peak Region

The first and fourth maximum eight-hour concentrations recorded in 2019 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 2010 U.S. Census, this MSA has a population of 650,640. 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.

Ozone data for the U.S. Air Force Academy site was invalidated from 12/4/2018 to 5/17/2019 due to sample line configuration issues and an ozone analyzer malfunction which resulted in a negative signal drift and bias. The

Table 3.3: Summary of O<sub>3</sub> values recorded at monitoring stations in the Pikes Peak region during 2019.

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	69	65	69
Manitou Springs	El Paso	70	64	68

bias was initially identified by Colorado Springs Utilities on 4/12/2019, verified by CDPHE shortly after, and was ultimately corrected on 5/17/19 with the installation of a new analyzer. Because the monitor did not meet completeness requirements for 2019, the annual and three-year design values are not valid for NAAQS comparison.

### 3.3 Western Slope Region

The first and fourth maximum eight-hour O<sub>3</sub> concentrations recorded in 2019 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 2019.

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	62	57	60
Palisade Water Treatment	Mesa	65	63	65

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 146,587 according to the 2010 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 2019 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 2019.

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	64	60	62

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

The APCD commenced ozone monitoring at a new air monitoring site located at the City of Black Hawk's Miners Mesa facility (Denver Metro/North Front Range Region) on 7/9/2019. This site replaced the Aspen Park air monitoring site, which was closed because it no longer met federal siting criteria due to nearby trees, as set forth in 40 CFR Part 58 Appendix E. The Aspen Park site was originally installed in 2009 to provide ozone monitoring in the foothills



west of Denver, a previously unmonitored area. The Black Hawk location has been selected because it furthers ozone monitoring in a previously unmonitored area, and for its potential representative exposure of ozone to populations in the western foothills north of the I-70 corridor.

The APCD is proposing to commence ozone and meteorological monitoring at a new air monitoring site located near the Wilmot Elementary School in Evergreen, CO (Denver Metro/North Front Range Region). This site will replace the Welch monitoring site, which is located in Morrison, CO. The Welch site is being closed because of its redundancy with other ozone monitoring sites in the Denver Metro/North Front Range Region, as identified in the APCD's 2015 Ambient Air Monitoring Network Assessment.<sup>1</sup> The Evergreen location has been selected because it expands ozone monitoring into a populous area in the western foothills south of the I-70 corridor, an unmonitored area where special studies have indicated potentially elevated ozone concentrations. It is the APCD's intention to install the Evergreen site prior to the closure of the Welch site and operate them concurrently for a minimum of 6 months prior to the Welch site closure.

The APCD is proposing to commence ozone, nitrogen dioxide, and meteorological monitoring at NOAA PAO facility near Platteville, CO. The PAO air monitoring site will be installed to obtain nitrogen dioxide data in the Denver-Julesberg Basin. The location and need for this site was identified in the 2017 Western Air Quality Study Monitoring Network Assessment, where a key finding was the recommendation for nitrogen dioxide monitoring in the underserved/unmonitored Denver-Julesberg Basin.

The APCD is also planning to commence ozone monitoring in the city of Pueblo as its current population is over 100,000. Planning and site selection are underway. The APCD is also currently evaluating alternate sites in southwest Colorado to replace the Cortez site, which is located in the city.

---

<sup>1</sup>[http://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx](http://www.colorado.gov/airquality/tech_doc_repository.aspx)

---

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

---

Currently, there are six 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. A second near roadway site was installed and began NO<sub>2</sub> monitoring in October 2015 at 4905 Acoma St. to satisfy the requirement for a second near-roadway site. 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. The EPA has also designated the Welby site as a Regional Administrator required site.

### 4.1 Denver Metro/North Front Range Region

The annual mean and 98<sup>th</sup> percentile one-hour concentrations recorded in 2019 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 APCD commenced NO<sub>2</sub> monitoring at the Rocky Flats - N. site on 2/1/2019 per PAMS monitoring requirements, 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

A NO<sub>2</sub> monitor was installed at the Rocky Flats site on 2/1/2019.

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 2019.

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	16.6	61.8	60
CAMP	Denver	18.6	66.0	67
La Casa	Denver	18.4	60.0	59
I-25 Denver	Denver	24.1	69.4	65
I-25 Globeville	Denver	26.7	68.7	69
Rocky Flats - N.	Jefferson	3.6	28.8	-

The APCD will commence NO<sub>2</sub> monitoring at the new PAO air monitoring station during 2020 (see section 3.5).

---

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

---

Currently, there are four 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. In the past, SO<sub>2</sub> had never approached the level of any of the standards until an SO<sub>2</sub> analyzer was added at the Highway 24 site in Colorado Springs in 2013; this site exceeded the level of the one-hour standard in 2013 on 3/22/13 and 4/16/13 (one-hour concentrations of 99 ppb and 81 ppb, respectively), again on 7/3/2014 (82 ppb), and once again on 3/29/2015 (87 ppb). Each exceedance of the standard was a single occurrence of a concentration above the specified NAAQS concentration and did not take into account the three-year averaging period necessary to determine compliance with the standard. Since the installation in 2013, the Highway 24 site has not had an actual violation of the SO<sub>2</sub> standard when calculating the 99<sup>th</sup> percentile across the three-year window. The 2013-2015 three-year design value was 56 ppb at this location, which is below the 75 ppb standard level. Examination of wind direction and speed in combination with higher concentrations of SO<sub>2</sub> at the site indicated the Martin Drake Power Plant as one potential source. Working with the APCD, Colorado Springs Utilities (CSU) completed meteorological monitoring at its Martin Drake Power Plant from October 2015 through January 2017. The division coordinated with CSU to conduct SO<sub>2</sub> modeling using this validated on-site meteorological data. CSU submitted modeling that followed an approved Division and EPA modeling protocol. This protocol process included Division and EPA review as well as public comment. Results from this study, which considered a number of different scenarios, demonstrated current compliance with the one-hour SO<sub>2</sub> NAAQS. The APCD also monitors meteorology at the Highway 24 site. The current three-year design value (2017-2019) for the Highway 24 site in Colorado Springs is 13 ppb, well below the 75 ppb standard.

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. A sum of the most recent emissions data by county (2008) give a total for SO<sub>2</sub> emissions of 15,235 tons per year for the Denver PMSA. The calculated PWEI for this region is 37,930 million persons-tons per year. This indicates the need for one SO<sub>2</sub> monitor in the Denver-Aurora-Lakewood MSA according to EPA monitoring requirements.

Using the same calculation for the Colorado Springs MSA, the calculated PWEI is 8,207 million persons-tons per year. Because of the increase in population in Colorado Springs, there is a need for one SO<sub>2</sub> monitor in this MSA. The monitors listed in the sections below meet these requirements.

### 5.1 Denver Metro/North Front Range Region

The annual mean and 99<sup>th</sup> percentile one-hour daily maximum concentrations recorded in 2019 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.

Table 5.1: Summary of SO<sub>2</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2019.

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	0.88	5.7	9
CAMP	Denver	0.69	6.6	8
La Casa	Denver	0.71	7.1	10

## 5.2 Pikes Peak Region

In January of 2013 an SO<sub>2</sub> monitor was added to the Highway 24 monitoring station in Colorado Springs.

Table 5.2: Summary of SO<sub>2</sub> values recorded at the Highway 24 monitoring site in Colorado Springs during 2019.

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	0.92	9.6	13

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

There are no planned changes in 2020 for the SO<sub>2</sub> monitoring network at this time.

---

## 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.

Currently the APCD operates  $\text{PM}_{10}$  monitors at 15 different locations. Eleven of these sites use high-volume filter based instruments, four sites use low-volume filter based instruments, and eight sites have continuous monitors collocated with FRM (filter based) instruments. There are two sites with collocated high-volume samplers (CAMP and Longmont), and two sites with collocated low volume  $\text{PM}_{10}$  samplers (La Casa and Grand Junction - Powell). The  $\text{PM}_{10}$  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.

$\text{PM}_{2.5}$  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 17 filter-based  $\text{PM}_{2.5}$  FRM instruments at 9 sites. Of the 9 sites, six are collocated with a continuous instrument and one is collocated with another filter-based FRM; seven sites (National Jewish Hospital, Boulder - CU Athens, I-25: Globeville, Fort Collins CSU, Grand Junction Powell, Greeley Hospital, Colorado College) have continuous  $\text{PM}_{2.5}$  but no filter-based FRM. Speciation analysis (laboratory analysis of  $\text{PM}_{2.5}$  samples to characterize the different components of  $\text{PM}_{2.5}$  in the atmosphere) is conducted at three sites; La Casa, Platteville, and Tri County Health. All three speciation sites are collocated with a low volume filter based FRM.

The annual  $\text{PM}_{2.5}$  standard of  $12 \mu\text{g m}^{-3}$  is compared to the three-year average annual mean  $\text{PM}_{2.5}$  concentration. The 24-hour  $\text{PM}_{2.5}$  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  $PM_{2.5}$  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  $PM_{2.5}$  NAAQS. The GRIMM EDM 180 and the Teledyne T640 have received Federal Equivalent Method (FEM) designation for  $PM_{2.5}$  from the EPA. The sites that use these instruments to compare to the  $PM_{2.5}$  NAAQS are: National Jewish Health (08-031-0013), I-25 Denver (08-031-0027), I-25 Globeville (08-031-0028), Colorado College (08-041-0017), Fort Collins CSU (08-069-0009), Grand Junction Powell Bldg. (08-077-0017), and Greeley - Hospital (08-123-0006). 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 to be a very reliable and cost effective way to monitor ambient continuous particulate concentrations.

The APCD currently employs two (one  $PM_{10}$ ) TEOM continuous particulate monitors for forecasting and advising the public of air quality alerts. The TEOM 1400ab with 8500 FDMS is a federally equivalent monitor; however frequent monitor problems and APCD concerns regarding equivalency designation have forced the APCD to consider these instruments not suitable for regulatory purposes. The following sites currently have TEOM continuous  $PM_{2.5}$  monitors that are not intended for comparison with the NAAQS: Boulder - CU Athens (08-013-1001), and Welby (08-001-3001).

## 6.2 Community Monitoring Zones

Community monitoring zones are an additional method of defining an area for comparison with the  $PM_{2.5}$  NAAQS where data from two or more monitoring sites are averaged together for comparison with the standard. Currently, the APCD does not employ this technique anywhere in the state.

The definition of community monitoring zone (CMZ) in 40 CFR Part 58.1 is as follows: “Community monitoring zone (CMZ) means an optional averaging area with established, well defined boundaries, such as county or census block, within a Monitoring Planning Area (MPA) that has relatively uniform concentrations of annual  $PM_{2.5}$  as defined by appendix N of part 50 of this chapter. Two or more community oriented SLAMS monitors within a CMZ that meet certain requirements as set forth in appendix N of part 50 of this chapter may be averaged for making comparisons to the annual  $PM_{2.5}$  NAAQS.” The CMZ is an optional technique that averages 24-hour  $PM_{2.5}$  concentrations from two or more monitors located in the same community.

If the  $PM_{2.5}$  monitoring network is changed by the creation/change of a CMZ or changing the location of a violating monitor, then the APCD will ask EPA Region VIII for approval via the current network modification process and then notify the appropriate governments of affected communities. The APCD will also provide the proposed changes to the affected communities and concerned citizens on our website. A public comment period will be open for thirty days prior to the APCD selecting a new site.

### 6.3 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 2019; however, several sites recorded 24-hour average values in exceedance of the 24-hour PM<sub>2.5</sub> standard of 35 µg m<sup>-3</sup>, including Tri County Health, Longmont, CAMP, NJH, La Casa, I-25 Denver, I-25 Globeville, Chatfield State Park, Fort Collins CSU, and Greeley - Hospital. Table 6.1 and Table 6.2 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 2019. The NJH PM<sub>2.5</sub> monitor has only been in operation since 2018, so the three-year design value is not valid for this site.

Table 6.1: Summary of PM<sub>10</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2019.

Site Name	County	PM <sub>10</sub> (µg m <sup>-3</sup> )		
		Annual Average	24-Hr Max	3-Year Exceedances
Tri-County	Adams	34.6	119	0.3
Welby	Adams	30.7	90	0
Longmont	Boulder	20.9	58	0
Boulder Chamber of Comm.	Boulder	23.8	53	0
CAMP	Denver	29.9	79	0
La Casa	Denver	22.2	61	0

Table 6.2: Summary of PM<sub>2.5</sub> values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2019.

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
Tri-County	Adams	9.0	22.6	25
Arapaho Comm. College	Arapahoe	6.0	26.6	22
Longmont	Boulder	7.4	35.7	28
Boulder Chamber of Comm.	Boulder	5.8	19.0	19
CAMP	Denver	7.0	23.8	21
National Jewish Health	Denver	7.5	23.7	-
La Casa	Denver	7.5	22.0	21
I-25 Denver	Denver	8.1	23.0	23
I-25 Globeville	Denver	10.0	28.9	25
Chatfield State Park	Douglas	6.2	25.1	30
Fort Collins - CSU	Larimer	6.0	19.7	19
Greeley - Hospital	Weld	9.1	25.7	24
Platteville	Weld	7.3	22.9	20

### 6.4 Eastern High Plains

There were no violations of the PM<sub>10</sub> NAAQS in the Eastern High Plains region during 2019. Table 6.3 below lists the PM<sub>10</sub> annual average and design value recorded at the Lamar site in 2019.

Table 6.3: Summary of PM<sub>10</sub> values recorded at monitoring stations in the Eastern High Plains region during 2019, with proposed exceptional events included.

Site Name	County	PM <sub>10</sub> (µg m <sup>-3</sup> )		
		Annual Average	24-Hr Max	3-Year Exceedances
Lamar - Mun. Bldg.	Prowers	17.6	105	0.3



## 6.5 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 2019. Table 6.4 and Table 6.5 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 2019.

Table 6.4: Summary of PM<sub>10</sub> values recorded at the Colorado College station during 2019.

Site Name	County	PM <sub>10</sub> (µg m <sup>-3</sup> )		
		Annual Average	24-Hr Max	3-Year Exceedances
Colorado College	El Paso	17.1	38	0

Table 6.5: Summary of PM<sub>2.5</sub> values recorded at the Colorado College station during 2019.

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
Colorado College	El Paso	5.7	13.2	15

## 6.6 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 2019. 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 Pueblo site in 2019.

Table 6.6: Summary of PM<sub>10</sub> values recorded at the Pueblo monitoring station during 2019.

Site Name	County	PM <sub>10</sub> (µg m <sup>-3</sup> )		
		Annual Average	24-Hr Max	3-Year Exceedances
Pueblo	Pueblo	17.9	89	2.2

Table 6.7: Summary of PM<sub>2.5</sub> values recorded at the Pueblo monitoring station during 2019.

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	5.5	8.4	13

## 6.7 Central Mountain Region

There was one violation of the PM<sub>10</sub> NAAQS in the Central Mountain region during 2019. The maximum 24-hour concentration of 228  $\mu\text{g m}^{-3}$  was recorded at the Steamboat Springs site on April 1. This exceedance was due to dust from sweeping an adjacent parking lot and has been discussed with the city. The second highest 24-hour average PM<sub>10</sub> concentration recorded at this site in 2019 was 73  $\mu\text{g m}^{-3}$ . Table 6.8 below lists the PM<sub>10</sub> 2019 annual average and design value recorded at each site in this region. The Cañon City PM<sub>10</sub> monitor did not meet completeness requirements during 2019 and so does not have a valid three-year design value.

Table 6.8: Summary of PM<sub>10</sub> values recorded at monitoring stations in the Central Mountains region during 2019.

Site Name	County	PM <sub>10</sub> ( $\mu\text{g m}^{-3}$ )		
		Annual Average	24-Hr Max	3-Year Exceedances
Cañon City	Fremont	14.8	31	-
Aspen	Pitkin	12.3	50	0
Steamboat Springs	Routt	16.6	228	0.3

## 6.8 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 2019. Table 6.9 and Table 6.10 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 2019.

Table 6.9: Summary of PM<sub>10</sub> values recorded at monitoring sites in the Western Slope region during 2019.

Site Name	County	PM <sub>10</sub> ( $\mu\text{g m}^{-3}$ )		
		Annual Average	24-Hr Max	3-Year Exceedances
Grand Junction - Powell Bldg.	Mesa	15.2	47	0
Telluride	San Miguel	14.0	61	0

Table 6.10: Summary of PM<sub>2.5</sub> values recorded at the Grand Junction - Powell Bldg. monitoring site during 2019.

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
Grand Junction - Powell Bldg.	Mesa	5.5	14.5	6

## 6.9 Southwestern Region

There were no violations of the PM<sub>10</sub> NAAQS in the Southwestern region during 2019. Table 6.11 below lists the PM<sub>10</sub> annual average and design value recorded at each site in this region in 2019.

Table 6.11: Summary of PM<sub>10</sub> values recorded at monitoring sites in the Southwest region during 2019.

Site Name	County	PM <sub>10</sub> (µg m <sup>-3</sup> )		
		Annual Average	24-Hr Max	3-Year Exceedances
Pagosa Springs School	Archuleta	18.2	88	0
Durango	La Plata	18.6	68	0

## 6.10 Planned Changes in PM Monitoring

The APCD will commence PM<sub>2.5</sub> monitoring at the new Boulder SEEC monitoring trailer during 2020. This site will replace the Boulder - CU Athens site, which is currently not well sited due to the seasonal presence of large obstructions.

---

## 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 2017 - 2019.

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 2017 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 2017 National Emissions Inventory, monitoring requirements are not being met. There is one non-airport point source that is over 0.5 tons per year of air emissions (Rocky Mountain Bottle Company). Thus, a monitor is required to be placed near the site to determine compliance with the NAAQS. Alternatively, modeling is possible as a scientifically justifiable method to ensure compliance with the NAAQS.

### 7.1 Planned Changes in Lead Monitoring

Ambient lead concentrations will continue to 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. Lead monitoring and/or modeling will also be initiated to determine NAAQS compliance for the Rocky Mountain Bottle Co. facility.

---

## 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. Two 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

The Aspen Park meteorological and ozone site was shut down on 9/16/2019. The APCD has added extra monitoring capabilities to the Rocky Flats North site in an effort to supplement PAMS monitoring: a barometer was installed on 6/1/2018, a total solar radiation sensor was installed on 6/26/2019, a solar UV sensor was installed on 7/11/2019, and precipitation measurements began on 12/18/2019.

In 2020 the APCD will commence meteorological monitoring at the Black Hawk, PAO, and Evergreen monitoring sites. The APCD also plans to relocate the meteorological monitoring at the Fort Collins Mason site to Fort Collins West. Meteorological monitoring at the Welch site will be discontinued when the site is relocated to Evergreen.

---

## **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.

Based on 40 CFR part 58, Appendix D, State air monitoring agencies are required to begin making PAMS measurements at their NCore location(s) by June 1, 2019. EPA is to provide the equipment and operational funding in support of PAMS monitoring. To date, the EPA has provided funding for the purchase of an auto-gas chromatograph, ceilometer, and true nitrogen dioxide analyzer. This equipment has been subsequently purchased and installed at the Rocky Flats North air monitoring site. The EPA has announced that funding for additional equipment and operations will not be available in time to begin making PAMS measurements by June 1, 2019. Because of this, the EPA has proposed an extension of the PAMS start date from June 1, 2019 to June 1, 2021. This extension was published as a final rule in the Federal Register on January 8, 2020. As a result of this extension, the CDPHE will not begin making PAMS measurements at the Rocky Flats site until June 1, 2021, pending the availability of federal funds for equipment and operations.

---

## 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 Gaseous and Meteorology Monitoring (GMM) staff conducts quality control checks nominally once every two weeks 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 2019, Colorado maintained 19 filter based particulate monitoring sites (low-volume and high-volume), five of which had collocated instruments (CAMP, Adams County, Longmont, 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

Annual 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 Changes

- The Grand Junction - Pitkin CO monitor was removed on 6/1/2019.
- The Aspen Park O<sub>3</sub> monitoring site was closed and relocated to Black Hawk, which began operation on 7/9/2019.
- NO<sub>2</sub> and NO<sub>y</sub> monitoring commenced at the Rocky Flats North site on 2/1/2019.

### 11.2 Planned Changes

- The Welch O<sub>3</sub> and meteorological monitoring site will be closed and relocated to Evergreen.
- O<sub>3</sub>, NO<sub>2</sub>, and meteorological monitoring will commence at the new PAO site in Platteville, CO.
- Meteorological monitoring will commence at the Black Hawk site.
- Meteorological monitoring at Fort Collins Mason will be relocated to Fort Collins West.
- O<sub>3</sub> monitoring will begin at a new site in the city of Pueblo. Site selection is underway.
- The Boulder - CU Athens PM<sub>2.5</sub> monitoring site will be closed and relocated to Boulder - SEEC.
- Site selection and planning will begin for lead monitoring near Rocky Mountain Bottle Company.
- Alternate sites will be evaluated for the replacement of the Cortez O<sub>3</sub> monitoring site.



---

## 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  
 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	Sample
<b>Adams</b>							
08 001 0008	<i>Tri County Health</i>	4201 E 72 <sup>nd</sup> Ave.		Jul-16	1,574	39.82835	-104.93836
	PM <sub>10</sub>	1	Jul-16	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 1
	PM <sub>2.5</sub>	2	Jul-16	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 6
	PM <sub>2.5</sub>	3	Jul-16	P.O. Neigh	GRIMM EDM 180	SPM	Continuous
	PM <sub>2.5</sub> Speciation	5	Jul-16	P.O. Neigh	SASS	Trends Spec.	1 in 6
	PM <sub>2.5</sub> Carbon	5	Jul-16	P.O. Neigh	URG 3000N	Trends Spec.	1 in 6
08 001 3001	<i>Welby</i>	3174 E. 78 <sup>th</sup> Ave.		Jul-73	1,554	39.838119	-104.94984
	CO (Trace)	1	Jul-73	P.O. Neigh	THERMO 48i-TLE	SLAMS	Continuous
	SO <sub>2</sub>	2	Jul-73	P.O. Neigh	TAPI 100E	SLAMS	Continuous
	NO/NO <sub>x</sub>	2	Jan-76	P.O. Urban	TAPI 200UP	SPM	Continuous
	NO <sub>2</sub>	1	Jan-76	P.O. Urban	TAPI 200EU	SLAMS	Continuous
	O <sub>3</sub>	2	Jul-73	P.O. Neigh	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	Jan-75	P.O. Neigh	MET-ONE	SPM	Continuous
	PM <sub>10</sub>	1	Feb-92	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 6
PM <sub>10</sub>	3	Jun-90	P.O. Neigh	TEOM 1400AB	SLAMS	Continuous	
<b>Arapahoe</b>							
08 005 0002	<i>Highland Reservoir</i>	8100 S. University Blvd		Jun-78	1,747	39.567887	-104.957193
	O <sub>3</sub>	1	Jun-78	P.O. Neigh	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	Jul-78	P.O. Neigh	MET-ONE	SPM	Continuous

<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	Sample
08 005 0005	<i>Arapahoe Community College (ACC)</i>	6190 S. Santa Fe Dr.		Dec-98	1,636	39.604399	-105.019526
	PM <sub>2.5</sub>	1	Mar-99	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 3
08 005 0006	<i>Aurora - East</i>	36001 E. Quincy Ave.		Apr-11	1,552	39.63854	-104.56913
	O <sub>3</sub>	1	Apr-09	P.O. Region	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	Jun-09	P.O. Neigh	MET-ONE	SPM	Continuous
<b>Archuleta</b>							
08 007 0001	<i>Pagosa Springs School</i>	309 Lewis St.		Aug-75	2,165	37.26842	-107.009659
	PM <sub>10</sub>	3	Sep-90	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 1
<b>Boulder</b>							
08 013 0003	<i>Longmont - Municipal Bldg.</i>	350 Kimbark St.		Jun-85	1,520	40.164576	-105.100856
	PM <sub>10</sub>	2	Sep-85	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 6
	PM <sub>10</sub> Collocated	2	Sep-14	P.O. Micro	SA/GMW 1200	SLAMS	1 in 6
	PM <sub>2.5</sub>	1	Jan-99	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 3
	PM <sub>2.5</sub>	3	Nov-05	P.O. Neigh	TEOM 1400AB	SPM	Continuous
08 013 0012	<i>Boulder Chamber of Commerce</i>	2440 Pearl St.		Dec-94	1,619	40.021097	-105.263382
	PM <sub>10</sub>	1	Oct-94	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 6
	PM <sub>2.5</sub>	1	Jan-99	P.O. Middle	R&P PARTISOL 2025	SLAMS	1 in 3
08 013 0014	<i>Boulder Reservoir</i>	5565 N. 51 <sup>st</sup>		Sep-16	1,586	40.070016	-105.220238
	O <sub>3</sub>	1	Sep-16	H.C. Urban	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp/RH	1	Sep-16	H.C. Urban	RM YOUNG	SPM	Continuous
08 013 1001	<i>Boulder - CU Athens</i>	2102 Athens St.		Dec-80	1,622	40.012969	-105.264212
	PM <sub>2.5</sub>	3	Feb-04	H.C. Urban	TEOM FDMS	SPM	Continuous
<b>Clear Creek</b>							
08-019- 0006	<i>Mines Peak</i>	Mines Peak Road		Jun-14	3,807	39.794376	-105.763993
	O <sub>3</sub>	1	Jun-14	Other	TAPI 400	SPM	Continuous

AQS #	Site Name	Address		Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type	Sample
<b>Denver</b>							
08 031 0002	CAMP	2105 Broadway		Jan-65	1,593	39.751184	-104.987625
	CO (Trace)	2	Jan-71	P.O. Micro	THERMO 48i-TLE	SLAMS	Continuous
	SO <sub>2</sub>	1	Jan-67	P.O. Neigh	TAPI 100E	SLAMS	Continuous
	O <sub>3</sub>	6	Mar-12	P.O. Neigh	TAPI 400E	SLAMS	Continuous
	NO/NO <sub>x</sub>	1	Jan-73	Other	TAPI 200EU	Other	Continuous
	NO <sub>2</sub>	1	Jan-73	P.O. Neigh	TAPI 200EU	SLAMS	Continuous
	WS/WD/Temp	1	Jan-65	P.O. Neigh	MET-ONE	SPM	Continuous
	PM <sub>10</sub>	1	Aug-86	P.O. Micro	SA/GMW 1200	SLAMS	1 in 6
	PM <sub>10</sub> Collocated	2	Dec-87	P.O. Micro	SA/GMW 1200	SLAMS	1 in 6
	PM <sub>10</sub>	3	Apr-13	P.O. Micro	GRIMM EDM 180	SLAMS	Continuous
	PM <sub>2.5</sub>	1	Jan-99	P.O. Micro	R&P PARTISOL 2025	SLAMS	1 in 1
	PM <sub>2.5</sub> Collocated	2	Sep-01	P.O. Micro	R&P PARTISOL 2025	SLAMS	1 in 6
PM <sub>2.5</sub>	3	Apr-13	P.O. Micro	GRIMM EDM 180	SPM	Continuous	
08 031 0013	National Jewish Health	14 <sup>th</sup> Ave. & Albion St.		Jan-83	1,620	39.738578	-104.939925
	PM <sub>2.5</sub>	3	Oct-03	P.O. Neigh	TAPI T640	SPM	Continuous
	PM <sub>10</sub>	3	Mar-18	P.O. Neigh	TAPI T640	SPM	Continuous
08 031 0016	DESCI	1901 E. 13 <sup>th</sup> Ave.		Dec-90	1,623	39.7357	-104.9582
	Transmissometer	1	Dec-89	Other	OPTEC LPV-3	SPM	Continuous
	Nephelometer	1	Dec-00	Other	OPTEC NGN-2	SPM	Continuous
	Relative Humidity	1	Dec-89	Other	RM YOUNG	SPM	Continuous

AQS #	Site Name	Address		Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type	Sample
08 031 0026	<i>La Casa</i>	<i>4587 Navajo St.</i>		<i>Oct-13</i>	<i>1,594</i>	<i>39.779429</i>	<i>-105.005174</i>
	CO (Trace)	1	Oct-12	P.O. Neigh	THERMO 48i-TLE	NCore	Continuous
	SO <sub>2</sub> (Trace)	1	Oct-12	P.O. Neigh	TAPI 100EU	NCore	Continuous
	NO <sub>y</sub>	1	Oct-12	P.O. Neigh	TAPI 200EU	NCore	Continuous
	CAPS NO <sub>2</sub>	1	Jul-14	P.O. Neigh	TAPI 500U	NCore	Continuous
	O <sub>3</sub>	1	Oct-12	Neigh/Urban	TAPI 400E	NCore	Continuous
	WS/WD/Temp	1	Oct-12	P.O. Neigh	MET-ONE	NCore	Continuous
	Relative Humidity	1	Oct-12	P.O. Neigh	MET-ONE	NCore	Continuous
	Total Solar Radiation	1	Apr-18	P.O. Neigh	KIPP & ZONEN	NCore	Continuous
	Temp Differential (Upper/Lower)	2	Oct-12	P.O. Neigh	MET-ONE	NCore	Continuous
	PM <sub>10</sub>	1	Oct-12	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 3
	PM <sub>10</sub> Collocated	2	Oct-12	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 6
	PM <sub>10</sub>	3	Feb-14	P.O. Neigh	GRIMM EDM 180	SLAMS	Continuous
	PM <sub>2.5</sub>	1	Oct-12	P.O. Neigh	R&P PARTISOL 2025	NCore	1 in 3
	PM <sub>2.5</sub>	3	Feb-14	P.O. Neigh	GRIMM EDM 180	SLAMS	Continuous
	PM <sub>2.5</sub> Speciation	5	Oct-12	P.O. Neigh	SASS	Supplem. Speciation	1 in 3
PM <sub>2.5</sub> Carbon	5	Oct-12	P.O. Neigh	URG 3000N	Supplem. Speciation	1 in 3	
08 031 0027	<i>I-25: Denver</i>	<i>971 W. Yuma Street</i>		<i>Jun-13</i>	<i>1,586</i>	<i>39.732146</i>	<i>-105.015317</i>
	CO (Trace)	1	Jun-13	Near Road	THERMO 48i-TLE	SLAMS	Continuous
	NO <sub>2</sub>	1	Jun-13	Near Road	TAPI 200E	SLAMS	Continuous
	NO/NO <sub>x</sub>	1	Jun-13	Near Road	TAPI 200E	SPM	Continuous
	WS/WD/Temp	1	Jun-13	Near Road	MET-ONE	SPM	Continuous
	PM <sub>10</sub>	3	Dec-13	Near Road	GRIMM EDM 180	SLAMS	Continuous
	PM <sub>2.5</sub>	1	Jan-14	Near Road	R&P PARTISOL 2025	SLAMS	1 in 6
	PM <sub>2.5</sub>	3	Dec-13	Near Road	GRIMM EDM 180	SLAMS	Continuous
PM <sub>2.5</sub> Carbon	5	Oct-13	Near Road	API 633	SPM	Continuous	
08 031 0028	<i>I-25: Globeville</i>	<i>4905 Acoma Street</i>		<i>10/1/2015</i>	<i>1,587</i>	<i>39.785823</i>	<i>-104.988857</i>
	NO <sub>2</sub>	1	10/1/2015	Near Road	TAPI 200E	SLAMS	Continuous
	NO/NO <sub>x</sub>	1	10/1/2015	Near Road	TAPI 200E	SPM	Continuous
	WS/WD/Temp/RH	1	10/1/2015	Near Road	RM YOUNG	SPM	Continuous
	PM <sub>10</sub>	3	10/1/2015	Near Road	GRIMM EDM 180	SLAMS	Continuous
	PM <sub>2.5</sub>	3	10/1/2015	Near Road	GRIMM EDM 180	SLAMS	Continuous

AQS #	Site Name	Address		Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type	Sample
<b>Douglas</b>							
08 035 0004	Chatfield State Park	11500 N. Roxborough Pk. Rd		Apr-04	1,676	39.534488	-105.070358
	O <sub>3</sub>	1	May-05	H.C. Urban	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	Apr-04	P.O. Neigh	MET-ONE	SPM	Continuous
	PM <sub>2.5</sub>	1	Jul-05	P.O. Neigh	R&P PARTISOL 2025	SPM	1 in 3
	PM <sub>2.5</sub>	3	May-04	P.O. Neigh	TAPI T640	SPM	Continuous
PM <sub>10</sub>	3	Jun-17	P.O. Neigh	TAPI T640	SPM	Continuous	
<b>El Paso</b>							
08 041 0013	U. S. Air Force Academy	USAFA Rd. 640		May-96	1,971	39.958341	-104.817215
	O <sub>3</sub>	1	Jun-96	H.C. Urban	TAPI 400E	SLAMS	Continuous
08 041 0015	Highway 24	690 W. Hwy. 24		Nov-98	1,824	39.830895	-104.839243
	CO (Trace)	1	Nov-98	P.O. Micro	THERMO 48i-TLE	SLAMS	Continuous
	SO <sub>2</sub>	1	Jan-13	P.O. Micro	TAPI 100EU	SLAMS	Continuous
	WS/WD/Temp	1	Aug-14	P.O. Micro	RM YOUNG	SPM	Continuous
	Relative Humidity	1	Aug-14	P.O. Micro	RM YOUNG	SPM	Continuous
08 041 0016	Manitou Springs	101 Banks Pl.		Apr-04	1,955	38.853097	-104.901289
	O <sub>3</sub>	1	Apr-04	H.C. Neigh	TAPI 400E	SLAMS	Continuous
08 041 0017	Colorado College	130 W. Cache La Poudre		Dec-07	1,832	38.848014	-104.828564
	PM <sub>10</sub>	1	Dec-07	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 6
	PM <sub>10</sub>	3	Jun-16	P.O. Neigh	GRIMM EDM 180	SLAMS	Continuous
	PM <sub>2.5</sub>	3	Dec-07	P.O. Neigh	GRIMM EDM 180	SLAMS	Continuous
<b>Fremont</b>							
08 043 0003	Cañon City - City Hall	128 Main St.		Oct-04	1,626	38.43829	-105.24504
	PM <sub>10</sub>	1	Oct-04	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 6
<b>Garfield</b>							
08 045 0012	Rifle - Health Dept.	195 W. 14th Ave.		Jun-08	1,629	39.54182	-107.784125
	O <sub>3</sub>	1	Jun-08	P.O. Neigh	TAPI 400E	SLAMS	Continuous
<b>Gilpin</b>							
08-047- 0003	Black Hawk	831 Miners Mesa Rd.		Jul-19	2,633	39.792519	-105.491272
	O <sub>3</sub>	1	Jul-19	P.O. Micro	TAPI 400E	SPM	Continuous
<b>Jefferson</b>							
08 059 0002	Arvada	9101 W. 57th Ave.		Jan-73	1,640	39.800333	-105.099973
	WS/WD/Temp	1	Jan-75	P.O. Neigh	MET-ONE	SPM	Continuous

AQS #	Site Name	Address		Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type	Sample
08 059 0005	<i>Welch</i>	<i>12400 W. Hwy. 285</i>		<i>Aug-91</i>	<i>1,742</i>	<i>39.638781</i>	<i>-105.13948</i>
	O <sub>3</sub>	1	Aug-91	P.O. Urban	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	Nov-91	P.O. Neigh	MET-ONE	SPM	Continuous
08 059 0006	<i>Rocky Flats North</i>	<i>16600 W. Hwy. 128</i>		<i>Jun-92</i>	<i>1,802</i>	<i>39.912799</i>	<i>-105.188587</i>
	NO <sub>y</sub>	1	Oct-20	P.O. Neigh	TAPI 200EU	PAMS	Continuous
	CAPS NO <sub>2</sub>	1	Jul-20	P.O. Neigh	TAPI 500U	PAMS	Continuous
	O <sub>3</sub>	1	Sep-92	H.C. Urban	TAPI 400E	PAMS	Continuous
	Precipitation	1	Jul-19	P.O. Neigh	RM Young	PAMS	Continuous
	Relative Humidity	1	Jul-19	P.O. Neigh	RM Young	PAMS	Continuous
	Total Solar Radiation	1	Jul-19	P.O. Neigh	KIPP & ZONEN	PAMS	Continuous
WS/WD/Temp	1	Sep-92	P.O. Neigh	RM Young	PMAS	Continuous	
08 059 0011	<i>NREL</i>	<i>2054 Quaker St.</i>		<i>Jun-94</i>	<i>1,832</i>	<i>39.743724</i>	<i>-105.177989</i>
	O <sub>3</sub>	1	Jun-94	H.C. Urban	TAPI 400E	SLAMS	Continuous
<b>Larimer</b>							
08 069 0009	<i>Fort Collins - CSU</i>	<i>251 Edison Dr.</i>		<i>Dec-98</i>	<i>1,524</i>	<i>40.571288</i>	<i>-105.079693</i>
	PM <sub>10</sub>	3	Jun-15	P.O. Neigh	GRIMM EDM 180	SPM	Continuous
	PM <sub>2.5</sub>	3	Jun-15	P.O. Neigh	GRIMM EDM 180	SPM	Continuous
08 069 0011	<i>Fort Collins - West</i>	<i>3416 La Porte Ave.</i>		<i>May-06</i>	<i>1,571</i>	<i>40.592543</i>	<i>-105.141122</i>
	O <sub>3</sub>	1	May-06	H.C. Urban	TAPI 400E	SLAMS	Continuous
08 069 1004	<i>Fort Collins - Mason</i>	<i>708 S. Mason St.</i>		<i>Dec-80</i>	<i>1,524</i>	<i>40.57747</i>	<i>-105.07892</i>
	CO (Trace)	1	Dec-80	P.O. Neigh	THERMO 48i-TLE	SLAMS	Continuous
	O <sub>3</sub>	1	Dec-80	P.O. Neigh	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	Jan-81	P.O. Neigh	MET-ONE	SPM	Continuous
<b>Mesa</b>							
08 077 0017	<i>Grand Junction - Powell Bldg.</i>	<i>650 South Ave.</i>		<i>Feb-02</i>	<i>1,398</i>	<i>39.063798</i>	<i>-108.561173</i>
	PM <sub>10</sub> & NATTS Metals	3	Jan-05	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 3
	PM <sub>10</sub> Collocated & NATTS	4	Mar-05	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 6
	PM <sub>10</sub>	3	Jan-14	P.O. Neigh	GRIMM EDM 180	SPM	Continuous
	PM <sub>2.5</sub>	3	Jan-14	P.O. Neigh	GRIMM EDM 180	SPM	Continuous
08 077 0018	<i>Grand Junction - Pitkin</i>	<i>645 1/4 Pitkin Ave.</i>		<i>Jan-04</i>	<i>1,398</i>	<i>39.064289</i>	<i>-108.56155</i>
	WS/WD/Temp	1	Jan-04	P.O. Neigh	RM YOUNG	SPM	Continuous
	Relative Humidity	1	Jan-04	P.O. Neigh	RM YOUNG	SPM	Continuous

AQS #	Site Name	Address		Site Start	Elevation (m)	Latitude	Longitude
	Parameter	POC	Start	Orient/Scale	Monitor	Type	Sample
08 077 0020	Palisade Water Treatment	Rapid Creek Rd.		May-08	1,512	39.130575	-108.313853
	O <sub>3</sub>	1	Apr-08	P.O. Urban	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	Apr-08	P.O. Neigh	RM YOUNG	SPM	Continuous
<b>Montezuma</b>							
08 083 0006	Cortez - Health Dept.	106 W. North St.		Jun-06	1,890	37.350054	-108.592337
	O <sub>3</sub>	1	Jun-08	P.O. Urban	TAPI 400E	SLAMS	Continuous
<b>Pitkin</b>							
08 097 0006	Aspen	215 N. Garmisch St.		Jan-15	2,408	39.192958	-106.823257
	PM <sub>10</sub>	1	Feb-15	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 3
<b>Prowers</b>							
08 099 0002	Lamar - Municipal Bldg.	104 E. Parmenter St.		Dec-76	1,107	38.084688	-102.618641
	PM <sub>10</sub>	2	Mar-87	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 1
<b>Pueblo</b>							
08 101 0015	Pueblo - Fountain School	925 N. Glendale Ave.		Jun-11	1,433	38.276099	-104.597613
	PM <sub>10</sub>	1	Apr-11	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 3
	PM <sub>2.5</sub>	1	Apr-11	P.O. Neigh	R&P PARTISOL 2025	SLAMS	1 in 3
<b>Routt</b>							
08 107 0003	Steamboat Springs	136 6th St.		Sep-75	2,054	40.485201	-106.831625
	PM <sub>10</sub>	2	Mar-87	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 1
<b>San Miguel</b>							
08 113 0004	Telluride	333 W. Colorado Ave.		Mar-90	2,684	37.937872	-107.813061
	PM <sub>10</sub>	1	Mar-90	P.O. Neigh	SA/GMW 1200	SLAMS	1 in 3
<b>Weld</b>							
08 123 0006	Greeley - Hospital	1516 Hospital Rd.		Apr-67	1,441	40.414877	-104.70693
	PM <sub>10</sub>	2	Feb-99	P.O. Neigh	GRIMM EDM 179	SPM	Continuous
	PM <sub>2.5</sub>	3	Feb-99	P.O. Neigh	GRIMM EDM 180	SPM	Continuous
08 123 0008	Platteville - Middle School	1004 Main St.		Dec-98	1,469	40.209387	-104.82405
	PM <sub>2.5</sub>	1	Aug-99	P.O. Region	R&P PARTISOL 2025	SLAMS	1 in 3
	PM <sub>2.5</sub> Speciation	5	Aug-99	P.O. Region	SASS	Spec. Trends	1 in 6
	PM <sub>2.5</sub> Carbon	5	Apr-11	P.O. Neigh	URG 3000N	Spec. Trends	1 in 6
08 123 0009	Greeley - County Tower	3101 35th Ave.		Jun-02	1,484	40.386368	-104.73744
	O <sub>3</sub>	1	Jun-02	H.C. Neigh	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	Feb-12	P.O. Neigh	MET-ONE	SPM	Continuous
	CO (Trace)	1	Apr-16	P.O. Neigh	THERMO 48i-TLE	SLAMS	Continuous



**Tri County Health Dept. - Commerce City, 4201 E. 72<sup>nd</sup> Ave. (08 001 0008):**

Tri County Health Dept. - Commerce City site is in a predominantly residential area with a large commercial and industrial district. It is located north of the Denver Central Business District (CBD) near the Platte River Valley, downstream from the Denver urban air mass. There are three schools in the immediate vicinity, an elementary school to the south, a middle school to the north, and a high school to the southeast. There is a large industrial area to the south and east, and gravel pits about a kilometer to the west and northwest.

This is a replacement site for the Alsup Elementary school (08-001-0006) site which was dismantled due to a roofing project on the building.

PM<sub>10</sub> and PM<sub>2.5</sub> monitoring began in August of 2016. There is a collocated PM<sub>2.5</sub> FRM along with a continuous PM<sub>2.5</sub> GRIMM EDM dust monitor, a filter based low volume PM<sub>10</sub> monitor, a trends speciation monitor, and a PM<sub>2.5</sub> carbon monitor all in operation.

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

Located 8 miles north-northeast of the Denver Central Business District (CBD) on the bank of the South Platte River, this site is ideally located to measure nighttime drainage of the air mass from the Denver metropolitan area and the thermally driven, daytime upriver flows. The monitoring shows that high CO levels are associated with winds from the south-southwest. While this is the direction of five of the six major sources in the area, it is also the direction of the primary drainage winds along the South Platte River. This monitor is in the SLAMS network, and is population oriented for a neighborhood scale.

CO monitoring began in 1973 and continued through the spring of 1980. Monitoring was stopped from the spring of 1980 until October 1986 when it began again as a special study. Welby has not recorded an exceedance of either the one-hour or eight-hour CO standard since January 1988. In the last few years, its primary value has been as an indicator of changes in the air quality index (AQI).

O<sub>3</sub> monitoring began at Welby in July of 1973. The Welby monitor has not recorded an exceedance of the old one-hour O<sub>3</sub> standard since 1998. However, the trend in the 3-year average of the 4<sup>th</sup> maximum eight-hour average has been increasing since 2002.

The Welby NO<sub>2</sub> monitor began operation in July 1976. The site's location provides an indication of possible exceedance events before they hit the Denver-Metro area. The site serves as a good drainage location, but it may be a target for deletion or relocation farther down the South Platte River Valley from Denver due to growth in trees that are not allowed to be removed.

The Welby SO<sub>2</sub> monitor began operation in July of 1973.

PM<sub>10</sub> monitoring began at Welby in June and July of 1990 with a high volume PM<sub>10</sub> monitor and a PM<sub>10</sub> continuous TEOM monitor. Meteorological monitoring began in January of 1975.

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

The Highlands site began operation in June of 1978. It was intended to be a background location. However, with urban growth and the construction of C-470, it has become a long-term trend site that monitors changes in the air quality of the area. It is currently believed to be near the southern edge of the high urban O<sub>3</sub> concentrations although it may not be in the area of maximum concentrations. This is a population oriented neighborhood scale SLAMS monitor.

Meteorological monitoring began in July of 1978.

In September of 2010 the site and meteorological tower were relocated to the east by approximately 30 meters to allow for the construction of an emergency generator system. This emergency generator system is located approximately 20 meters northwest of the new site location. The Highlands monitoring site had to be shut down from approximately Oct. of 2013 to Sept. of 2015 due to major construction activities on the property. The site is currently back up and monitoring for ozone and meteorological parameters.

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

The ACC site is located in south suburban metropolitan Denver. It is located on the south side of the Arapahoe Community College in a distant parking lot. The site is near the bottom of the Platte River Valley along Santa Fe Drive

(Hwy. 85) in the city of Littleton. It is also near the city of Englewood. There is a large residential area located to the east across the railroad and Light Rail tracks. The PM<sub>2.5</sub> monitor is located on a mobile shelter in the rarely used South parking lot. Located at 6190 S. Santa Fe Drive, this small trailer is close to the Platte River and the monitor has excellent 360° exposure. Based on the topography and meteorology of the area ACC is in an area where PM<sub>2.5</sub> emissions may collect. This location may capture high concentrations during periods of upslope flow and temperature inversion in the valley. However, since it is further south in a more sparsely populated area, the concentrations are usually not as high as other Denver locations.

Winds are predominately out of the south-southwest and south, with secondary winds out of the north and north-northeast (upslope). Observed distances and traffic estimates easily fall into the neighborhood scale in accordance with federal guidelines found in the 40 CFR, Part 58, Appendix D. The site meets all other neighborhood scale criteria, making the monitor a population oriented neighborhood scale SLAMS monitor on a 1 in 3 day sample schedule.

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

The Aurora East site began operation in June 2009. It is intended to act as a regional site and aid in the determination of the eastern most extent of the high urban O<sub>3</sub> concentrations. It is located along the eastern edge of the former Lowry bombing range, on a flat, grassy plains area. This site is currently outside of the rapid urban growth area taking place around Aurora Reservoir. This was a special purpose monitor (SPM) for a regional scale, and became a SLAMS monitor in 2013.

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

The Pagosa Springs site was located on the roof of the Town Hall from April 24, 2000 through May 2001. When the Town Hall building was planned to be demolished, the PM<sub>10</sub> monitor was relocated to the Pagosa Springs Middle School and the first sample was collected on June 7, 2001.

The Pagosa Springs School site is located next to Highway 160 near the center of town. Pagosa Springs is a small town spread over a large area. The San Juan River runs through the south side of town. The town sits in a small bowl like setting with hills all around. A small commercial strip area along Highway 160 and single-family homes surrounds this location. It is representative of residential neighborhood exposure. Pagosa Springs was a PM<sub>10</sub> nonattainment area and a SIP was implemented for this area. PM<sub>10</sub> concentrations were exceeded a few times in the late 1990s.

Winds for this area predominantly blow from the north, with secondary winds from the north-northwest and the south. The predominant wind directions closely follow the valley topography in this rugged terrain. McCabe Creek, which is very near the meteorological station that was on the Town Hall building, runs north-south through this area. However, the highest wind gusts come from the west and southwest during regional dust storms. This is a population oriented neighborhood scale SLAMS monitor on a daily sampling schedule.

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

The town of Longmont is a growing, medium sized Front Range community. Longmont is located between the Denver/Boulder Metro-area and Fort Collins. Longmont is both suburban and rural in nature. The town of Longmont is located approximately 30 miles north of Denver along the St. Vrain Creek and is about six miles east of the foothills. Longmont is partly a bedroom community for the Denver-Boulder area. The elevation is 4978 feet. The Front Range peaks rise to an elevation of 14,000 feet just to the west of Longmont. In general, the area experiences low relative humidity, light precipitation and abundant sunshine.

The station began operations in 1985 with the installation of PM<sub>10</sub> followed by PM<sub>2.5</sub> monitors in 1999.

Longmont's predominant wind direction is from the north through the west due to winds draining from the St. Vrain Creek Canyon. The PM<sub>10</sub> site is near the center of the city near both commercial and residential areas. This location provides the best available monitoring for population exposure to particulate matter. The distance and traffic estimate for the controlling street easily falls into the neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, and Appendix D. This is a population oriented neighborhood scale SLAMS monitor on a 1 in 6 day sample schedule. In September of 2014 APCD installed a collocated sampler at the site to meet EPA PM<sub>10</sub> high volume collocation requirements.

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

The city of Boulder is located on the eastern edge of the Rocky Mountain foothills. Most of the city sits on rolling plains. The Boulder PM<sub>2.5</sub> site is approximately 7,000 feet east of the base of the Front Range foothills and about 50 feet south of a small branch of Boulder Creek, the major creek that runs through Boulder.

PM<sub>10</sub> monitoring began at this site in December of 1994, while the PM<sub>2.5</sub> monitoring did not begin until January of 1999.

The predominant wind direction at the APCD's closest meteorological site (Rocky Flats - North) is from the west with secondary maximum frequencies from the west-northwest and west-southwest. The distance and traffic estimate for Pearl Street and Folsom Street falls into the middle scale, but the site has been justified to represent a neighborhood scale site in accordance with federal guidelines found in 40 CFR, Part 58 and Appendix D. This is a population oriented neighborhood scale SLAMS monitoring site on a 1 in 6 day sample schedule.

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

The city of Boulder is located about 30 miles to the northwest of Denver. The Boulder Reservoir is a 700 acre multi-use recreation and water storage facility owned and managed by the city of Boulder. It is operated as a water supply by the Northern Colorado Water Conservancy District. The Reservoir is located about 5.5 miles to the North East of the city of Boulder. This site is a replacement site for the South Boulder Creek site which was shut down January 1<sup>st</sup>, 2016 due to large trees that had grown over the years that could not be removed, making the site no longer meet siting criteria.

The Boulder Reservoir is a highest concentration oriented urban scale SLAMS monitor. The site monitors for ozone and meteorological parameters and has been sampling since September of 2016.

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

The Boulder - CU site is located at the edge of a low usage parking lot to the immediate north of the site and south of the University of Colorado football practice fields. This location provides a good neighborhood representation for particulates. The site houses a continuous TEOM particulate monitor inside the shelter. The site began operation in November 2004. A dome is erected each fall over the practice field and remains inflated until early spring when it is removed for the summer months.

**Mines Peak - Mines Peak Rd. (08 019 0006):**

The Mines Peak ozone monitor began operation in June 2014 in support of the FRAPPE and Discover-AQ studies. The site is located in a Colorado Office of Information and Technology communication tower atop Mines Peak at an elevation of 3,807 meters.

The site resides in Clear Creek County approximately 1200 meters east southeast of Berthoud Pass along US Hwy 40. This site was retained in operation as a special purpose site after the FRAPPE and Discover-AQ studies for its unique attribute to measure local and regional background ozone concentrations. This site has proven to be very informative in identifying and quantifying stratospheric ozone events in the North Front Range area. Because of its unique location and limited year round access, the ozone analyzer cannot be operated to meet regulatory requirements, and thus the site has been classified as "non-regulatory" and cannot be used to show attainment of National Ambient Air Quality Standards.

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

The City and County of Denver is located approximately 30 miles east of the foothills of the Rocky Mountains. Denver sits in a basin, and the terrain of the city is characterized as gently rolling hills, with the Platte River running from southwest to northeast, just west of the downtown area. The CAMP site is located in downtown Denver.

CO monitoring began in February 1965 as a part of the Federal Continuous Air Monitoring Program. It was established as a maximum concentration (micro-scale), population-oriented monitor. The CAMP site measures the exposure of the people who work or reside in the central business district (CBD). Its location in a high traffic street canyon causes this site to record most of the high pollution episodes in the metro area. The street canyon effect at CAMP results in variable wind directions for high CO levels and as a result wind direction is less relevant to high concentrations than

wind speed. Wind speeds less than 1 mph, especially up-valley, combined with temperature inversions trap the pollution in the area. The CO monitor was updated to a Thermo 48iTLE trace level monitor in April 2017 to better characterize lower level concentrations seen in recent years.

Sampling for all parameters at the site was discontinued from June of 1999 to July of 2000 for the construction of a new building.

The NO<sub>2</sub> monitor began operation in January 1973 at this location.

The SO<sub>2</sub> monitor began operation in January 1967.

O<sub>3</sub> monitoring began originally in 1972 and has been intermittently monitored through January 2008. The current O<sub>3</sub> monitor began operation in February 2012.

The PM<sub>10</sub> monitoring began in 1986 with the installation of collocated monitors, and was furthered by the addition of a continuous monitor in 1988.

The PM<sub>2.5</sub> monitoring began in 1999 with a sequential filter based FRM monitor. A continuous TEOM FEM PM<sub>2.5</sub> monitor was installed in February of 2001 and an FDMS was installed on the instrument November 1, 2003. In April 2013, the TEOM/FDMS was replaced with a GRIMM EDM 180 continuous monitor, which concurrently measures both PM<sub>10</sub> and PM<sub>2.5</sub>.

Meteorological monitoring began at this site in January of 1965.

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

This site is located three miles east of the Denver CBD, close to a very busy intersection (Colorado Boulevard and Colfax Avenue). The current site began operations in 1982. Two previous sites were located just west of the current location. The first operated for only a few months before it was moved to a new site in the corner of the laboratory building at the corner of Colorado Boulevard and Colfax Avenue. Data from this continuous TEOM particulate monitor is not compared with the NAAQS. It is used for short term forecasting and public notifications. The monitor here is a population oriented middle scale special project monitor.

#### **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 was established in January of 2013 as a replacement for the Denver Municipal Animal Shelter (DMAS) site when a land use change forced the relocation of the site. The La Casa location has been established as the NCore site for the Denver Metropolitan area. In late 2012 the DMAS site was decommissioned and moved to the La Casa site in northwest Denver and includes a trace gas/precursor-level CO analyzer, and a NO<sub>y</sub> analyzer, in addition to the trace level SO<sub>2</sub>, O<sub>3</sub>, meteorology, and particulate monitors are located here. La Casa has been certified in 2013 as an NCore-compliant site by the EPA. The site represents a population oriented neighborhood scale monitoring area.

The trace level SO<sub>2</sub>, CO, and NO<sub>y</sub> analyzers began operation in January 2013.

The meteorological monitoring began at La Casa in January 2013.

PM<sub>10</sub> monitoring began at La Casa in January 2013. Currently, there is a pair of collocated low volume PM<sub>10</sub> samplers, and a Lo-Vol PM<sub>2.5</sub> on the shelter roof. The Lo-vol PM<sub>10</sub> concentrations are very useful as they are used in conjunction with the PM<sub>2.5</sub> measurements to calculate PM<sub>10-2.5</sub> or coarse PM.

PM<sub>2.5</sub> monitoring began at La Casa in January 2013 with an FRM filter-based monitor, a continuous TEOM/FDMS FEM instrument, a supplemental PM<sub>2.5</sub> speciation monitor, and a carbon speciation monitor. In early 2015, the TEOM/FDMS

was replaced with a GRIMM EDM 180 continuous monitor, which concurrently measures both PM<sub>10</sub> and PM<sub>2.5</sub>.

PM<sub>10</sub>/lead monitoring began in January 2013. Lead monitoring at La Casa was discontinued December 31<sup>st</sup>, 2015 due to extremely low concentrations measured at the site. EPA has removed the lead monitoring requirement from all NCore sites due to the low concentrations measured throughout the country. Ambient lead concentrations will still be measured at the PM<sub>2.5</sub> speciation and IMPROVE sites throughout the state, as well as on 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 is an EPA-required near roadway NO<sub>2</sub> monitoring site. It was established in June 2013. It is measuring NO/NO<sub>2</sub>/NO<sub>x</sub> by chemiluminescence. Trace level CO, Teledyne API Model 633 Black Carbon Aethalometer, PM<sub>2.5</sub> with a filter based sequential FRM on a 1 and 6 day schedule, continuous PM<sub>10</sub> & PM<sub>2.5</sub> (with a GRIMM EDM 180), and meteorological parameters are also measured here.

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

The I-25 Globeville site is a second EPA-required near roadway NO<sub>2</sub> monitoring site. It was established Oct. 1<sup>st</sup>, 2015. It is measuring NO/NO<sub>2</sub>/NO<sub>x</sub> by chemiluminescence. The site is also equipped with sensors to measure meteorological parameters and continuous PM<sub>10</sub> and PM<sub>2.5</sub> with a GRIMM EDM 180 instrument.

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

The Chatfield State Park location was established as the result of the 1993 Summer O<sub>3</sub> Study. The original permanent site was located at the campground office. This site was later relocated on the south side of Chatfield State Park at the park offices. This location was selected over the Corps of Engineers Visitor Center across the reservoir because it was more removed from the influence of traffic along C-470. Located in the South Platte River drainage, this location is well suited for monitoring southwesterly O<sub>3</sub> formation in the Denver metro area.

PM<sub>2.5</sub> monitoring began at this site in 2004 with the installation of a continuous monitor, and was furthered by the addition of an FRM sequential filter based monitor in 2005. Meteorological monitoring began in April of 2004.

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

The United States Air Force Academy site was installed as a replacement maximum concentration O<sub>3</sub> monitor for the Chestnut Street (08 041 0012) site. Modeling in the Colorado Springs area indicates that high O<sub>3</sub> concentrations should generally be found along either the Monument Creek drainage to the north of the Colorado Springs central business district (CBD), or to a lesser extent along the Fountain Creek drainage to the west of the CBD. The decision was made to locate this site near the Monument Creek drainage, approximately 9 miles north of the CBD. This location is near the south entrance of the Air Force Academy but away from any roads. This is a population oriented urban scale SLAMS monitor.

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

The Highway 24 site is located just to the west of I-25 and just to the east of the intersection of U.S. Highway 24 and 8<sup>th</sup> Street, approximately 0.8 miles to the west of the Colorado Springs CBD. Commencing operation in November 1998, this site is a replacement for the Tejon Street (08 041 0004) CO monitor. The site is located in the Fountain Creek drainage and is in one of the busiest traffic areas of Colorado Springs. Additionally, traffic is prone to back-up along Highway 24 due to a traffic light at 8<sup>th</sup> Street. Thus, this site is well suited for the SLAMS network to monitor maximum concentrations of CO in the area both from automotive sources and also from nearby industry, which includes a power plant. It also provides a micro-scale setting for the Colorado Springs area, which has not been possible in the past.

In January of 2013 an SO<sub>2</sub> monitor was added to Highway 24 to meet monitoring criteria for an increased population found during the 2010 census. To supplement SO<sub>2</sub> monitoring at the site, APCD added an RM Young meteorological tower in August of 2014, which also includes an RH sensor.

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

The Manitou Springs ozone site is located 4 miles west of Colorado Springs. It was established because of concern that the high concentration urban O<sub>3</sub> area was traveling farther up the Fountain Creek drainage and the current monitoring network was not adequate. The Manitou Springs monitor began operations in April 2004. It is located in the foothills above Colorado Springs in the back of the city maintenance facility. It has not recorded any levels greater than the current standard. This is a population-oriented neighborhood scale SLAMS monitor.

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

The Colorado College monitoring site was established in January, 2007 after the revised particulate regulations required that Colorado Springs have a continuous PM<sub>2.5</sub> monitor. The APCD elected to collocate the new PM<sub>2.5</sub> monitor with the corresponding filter-based monitors from the RBD site at the Colorado College location, which included an FRM PM<sub>2.5</sub> monitor and added a low volume FEM PM<sub>10</sub> monitor in November, 2007. The continuous monitor began operation in April of 2008. In the summer of 2016 the filter based PM<sub>2.5</sub> FRM instrument was removed and the GRIMM EDM 180 was designated as the primary sampler used to compare to the PM<sub>2.5</sub> NAAQS. Currently there is also a low volume filter-based PM<sub>10</sub> sampler operated on a 1 in 6 day schedule at the site.

The nearest representative meteorological site is located at the Highway 24 monitoring site. Wind flows at the Colorado College site are affected by its proximity to Fountain Creek, so light drainage winds will follow the creek in a north/south direction. The three monitoring sites here are population-oriented neighborhood scale monitors on the SLAMS network (PM<sub>10</sub> and PM<sub>2.5</sub>).

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

Cañon City is located 39 miles west of Pueblo. Particulate monitoring began on January 2, 1969 with the operation of a TSP monitor located on the roof of the courthouse building at 7<sup>th</sup> Avenue and Macon Street. The Macon Street site was relocated to the top of the City Hall building in October of 2004.

The Cañon City PM<sub>10</sub> site began operation 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>. This is the only exceedance of either the 24-hour or annual NAAQS since PM<sub>10</sub> monitoring was established at Cañon City. This is a population oriented neighborhood scale SLAMS monitor on a 1 in 6 day sample schedule.

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

The Rifle Health site is located at the Garfield County Health Department building. The site is approximately 1 kilometer to the north of the downtown area and next to the Garfield County fairgrounds. The site is uphill from the downtown area. A small residential area is to the north and a commercial area to the east. This site was established to measure O<sub>3</sub> in Rifle, which is the largest population center in the oil and gas impacted area of the Grand Valley. Monitoring commenced in June 2008. This is a SLAMS site with a neighborhood scale.

**Black Hawk, 831 Miners Mesa Rd. (08 047 0003):**

The Black Hawk Site was selected to replace the Aspen Park Site that no longer met EPA siting requirements for tree obstruction. The Black Hawk site was chosen because it was found, during a recent Front Range ozone study, to have elevated ozone concentrations as compared to the other sites in the study. The Black Hawk monitoring location sits at an elevation of 2,633 meters and has been in operation since July of 2019.

**Arvada, 9101 57<sup>th</sup> Avenue (08 059 0002):**

The city of Arvada is located 15 miles west-northwest of the Denver central business district (CBD). The Arvada site began operation before 1973. It is located to the northwest of the Denver CBD near the western end of the diurnal midday wind flow of the high concentration urban O<sub>3</sub> area. As a result, when conditions are proper for daylong O<sub>3</sub> production, this site has received some of the highest levels in the city. In the early and mid-1990s, these wind patterns caused Arvada to have the most exceedances in the metro area. In the 5-Year Network Assessment Plan the Arvada site was deemed to be redundant. The last valid O<sub>3</sub> sample was taken 12/31/2011, and the instrument was

removed shortly after that. Meteorological monitoring began in 1975 and continues today.

**Welch, 12400 W. Highway 285 (08 059 0005):**

The APCD conducted a short-term O<sub>3</sub> study on the grounds of Chatfield High School from June 14, 1989 until September 28, 1989. The Chatfield High School location was chosen because it sits on a ridge southwest of the Denver CBD. Wind pattern studies showed a potential for elevated O<sub>3</sub> levels in the area on mid to late afternoon summer days. There were no exceedances of the NAAQS recorded at the Chatfield High School site, but the levels were frequently higher than those recorded at the other monitoring sites south of the metro area.

One finding of the study was the need for a new, permanent site further north of the Chatfield High School location. As with most Denver locations, the predominant wind pattern is north/south. The southern flow occurs during the upslope, daytime warming period. The northern flow occurs during late afternoon and nighttime when drainage is caused by cooling and settling. The major drainages of Bear Creek and Turkey Creek were selected as target downwind transport corridors. These are the first major topographical features north of the Chatfield High School site. A point midway between the valley floor (Englewood site) and the foothill's hogback ridge was modeled to be the best estimate of the maximum downwind daytime transport area. These criteria were used to evaluate available locations. The Welch site best met these conditions. This site is located off State Highway 285 between Kipling Street and C-470. This is a population oriented urban scale SLAMS monitor.

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

The Rocky Flats North (RFN) site is located north-northeast of the former plant on the south side of Colorado Highway 128, approximately 1¼ miles to the west of Indiana Street. The site began operation in June of 1992 with the installation of an O<sub>3</sub> monitor and meteorological monitors as a part of the first phase of the APCD's monitoring effort around the Rocky Flats Environmental Technology Site.

O<sub>3</sub> monitoring began as a part of the Summer 1993 Ozone Study. The monitor recorded some of the highest O<sub>3</sub> levels of any of the sites during that study. Therefore, it was included as a regular part of the APCD O<sub>3</sub> monitoring network. The Rocky Flats - N monitor frequently exceeds the current standard. This is a highest concentration-oriented urban scale SLAMS monitor.

The RFN site is now being converted to a Photochemical Assessment Monitoring Station (PAMS). This station, in addition to O<sub>3</sub>, now monitors for NO<sub>y</sub> and NO<sub>2</sub>. When the PAMS site is complete it will offer extensive meteorological monitoring to include total solar, precipitation, and atmospheric profiling. In addition, the PAMS will monitor for SO<sub>2</sub>, CO, particulate monitoring (PM<sub>10</sub> and PM<sub>2.5</sub>), and VOC monitoring by use of an Auto Gas Chromatograph (auto-GC).

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

The National Renewable Energy Laboratory (NREL) site is located on the south rim of South Table Mountain, near Golden, and was part of the Summer 1993 Ozone Study. Based on the elevated concentrations found at this location during the study, it was made a permanent monitoring site in 1994. This site typically records some of the higher eight-hour O<sub>3</sub> concentrations in the Denver area. It frequently exceeds the current standard.

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

Fort Collins does not have the population to require a particulate monitor under Federal regulations. However, it is one of the largest cities along the Front Range. In the summer of 2016 APCD removed the filter based FRM PM<sub>2.5</sub> sampler and designated the GRIMM EDM 180 continuous particulate monitor as the primary method for PM<sub>2.5</sub> NAAQS comparisons. On January 1<sup>st</sup>, 2019, the APCD discontinued Hi-Vol PM10 sampling leaving only a continuous GRIMM EDM 180 that measures PM<sub>10</sub> and PM<sub>2.5</sub> at the site.

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

The Fort Collins-West ozone monitor began operation in May of 2006. The location was established based on modeling and to satisfy permit conditions for a major source in the Fort Collins area. The levels recorded for the first season of operation showed consistently higher concentrations than the 708 S. Mason Street monitor. This is a highest

concentration oriented urban scale SLAMS monitor.

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

The 708 S. Mason Street site began operation in December 1980 and is located one block west of College Avenue in the Central Business District. The one-hour CO standard of 35 ppm as a one-hour average has only been exceeded on December 1, 1983, at 4:00 P.M. and again at 5:00 P.M. The values reported were 43.9 ppm and 43.2 ppm respectively. The eight-hour standard of 9 ppm was exceeded one or more times a year from 1980 through 1989. The last exceedances were in 1991 on January 31 and December 6 when values of 9.8 ppm and 10.0 ppm respectively were recorded.

Fort Collins does not have the population to require a CO monitor under Federal regulation. However, it is one of the largest cities along the Front Range and was declared in nonattainment for CO in the mid-1970s after exceeding the eight-hour standard in both 1974 and 1975. In May of 2016 the CO monitor was upgraded to a Thermo 48i-TLE trace level instrument. The current level of monitoring is in part a function of the resulting CO State Maintenance Plan (SMP) for the area. It is a population oriented neighborhood scale SLAMS monitor.

O<sub>3</sub> monitoring began in 1980, and continues today.

Meteorological monitoring began at the site January 1<sup>st</sup>, 1981. In March 2012 the meteorological tower was relocated from a freestanding tower on the west side of the shelter to a shelter mounted tower on the south side of the shelter due to the Mason Street Redevelopment Project.

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

Grand Junction is the largest city on the western slope. It is located in the broad valley of the Colorado River. The monitors are on county owned buildings in the south side of the city. This site is on the southern end of the central business district and close to the industrial area along the train tracks. It is about a half a mile north of the river and about a quarter mile east of the railroad yard. In the summer of 2016 the primary filter based FRM was removed and the GRIMM EDM 180 continuous particulate monitor was designated as the primary to compare to the PM<sub>2.5</sub> NAAQS. Currently the GRIMM monitors for continuous PM<sub>2.5</sub> and PM<sub>10</sub> and there are also two low volume filter based collocated PM<sub>10</sub> monitors operated at the site on a 1 in 3 day and 1 in 6 day sample schedule.

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

Meteorological monitors were installed in 2004, and include wind speed, wind direction, and temperature sensors. The meteorological tower was outfitted January 5<sup>th</sup>, 2015 with RM Young meteorological sensors, including a RH sensor. This site is also part of the National Air Toxics Trends Station Network. This network is a national EPA project to assess levels of urban air toxics around the country.

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

The Palisade site is located at the Palisade Water Treatment Plant. The site is 4 km to the east-northeast of downtown Palisade, just into the De Beque Canyon area. The site is remote from any significant population and was established to measure maximum concentrations of O<sub>3</sub> that may result from summertime up-flow conditions into a topographical trap. Ozone and meteorological monitoring commenced in May 2008. This is an urban scale special purpose monitor.

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

The Cortez site is located in downtown Cortez at the Montezuma County Health Department building. Cortez is the largest population center in Montezuma County in the southwest corner of Colorado.

The O<sub>3</sub> monitor was established to address community concerns of possible high O<sub>3</sub> from oil and gas and power plant emissions in the area. Many of these sources are in New Mexico. Ozone monitoring commenced in May 2008 and the first PM<sub>2.5</sub> filter was sampled June 20<sup>th</sup>, 2008. PM<sub>2.5</sub> monitoring was discontinued at the site in July of 2015 due to the site completing sampling requirements and the site returning low PM<sub>2.5</sub> concentrations. This site is an urban scale SLAMS monitor.



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

Aspen is at the upper end of a steep mountain valley. Aspen does not have an interstate highway running through it. Aspen was classified as nonattainment for PM<sub>10</sub>, but it is now under an attainment/maintenance plan. The valley is more restricted at the lower end, and thus forms a tighter trap for pollutants. The transient population due to winter skiing and summer mountain activities greatly increases the population and traffic during these seasons. There is also a large down valley population that commutes to work each day from as far away as the Glenwood Springs area, which is 41 miles to the northeast. Aspen currently has a high volume filter based PM<sub>10</sub> monitor operated by the CDPHE-APCD, and a continuous PM<sub>10</sub>/PM<sub>2.5</sub> GRIMM EDM 180 monitor operated by Pitkin County.

The population oriented neighborhood scale SLAMS high volume PM<sub>10</sub> monitor is operating on a 1 in 3 sample schedule.

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

The Lamar Municipal site was established in January of 1996 as a more population oriented location than the Power Plant. The Power Plant site was located on the northern edge of town (until it was decommissioned in 2012) while the Municipal site is near the center of the town. Both sites have recorded exceedances of the 24-hour standard of 150 µg/m<sup>3</sup>, and both sites regularly record values above 100µg/m<sup>3</sup> as a 24-hour average. The Power Station site in Lamar has been shut down, because it did not meet siting criteria. The Lamar Municipal Building location houses population oriented neighborhood scale SLAMS high-volume PM<sub>10</sub> monitors on a daily sample schedule.

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

Pueblo is the third largest city in the state, not counting communities that are part of Metropolitan Denver. Pueblo is principally characterized by rolling plains and moderate slopes with elevations ranging from 4,474 feet to 4,814 feet (1,364 to 1,467 m). The Rocky Mountain Front Range is about 25 miles (40 km) west and the sight of Pikes Peak is easily visible on a clear day.

Meteorologically, Pueblo can be described as having mild weather with an average of about 300 days of sunshine per year. Generally, wind blows up valley from the southeast during the day and down valley from the west at night. Pueblo experiences average wind speed ranges from 7 miles per hour in the fall and early winter to 11 miles per hour in the spring.

This site was formerly located on the roof of the Public Works Building at 211 E. D St., in a relatively flat area found two blocks northeast of the Arkansas River. At the end of June in 2011 the Public Works site was shut down and moved to the Magnet School site as the construction of a new multi-story building caused a major change in the flow dynamics of the site. The new site began operations in 2011. The distance and traffic estimate for the surrounding streets falls into the middle scale in accordance with federal guidelines found in 40 CFR, Part 58, and Appendix D.

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

Like other ski towns, Steamboat Springs has problems with wintertime inversions, high traffic density, wood smoke, and street sand. These problems are exacerbated by temperature inversions that trap the pollution in the valleys.

The first site began operation in Steamboat Springs in June 1985 at 929 Lincoln Avenue. It was moved to the current location in October 1986. The 136 6<sup>th</sup> Street location not only provides a good indication of population exposure, since it is more centrally located, but it has better accessibility than the previous location. This site monitors for PM<sub>10</sub> with high volume filter based sampling. This is a population oriented neighborhood scale SLAMS monitor on a daily sample schedule.

**Telluride, 333 W. Colorado Avenue (08 117 0002):**

Telluride is a high mountain ski town in a narrow box end valley. The San Miguel River runs through the south end of town, which is only about ½ mile wide from north to south. The topography of this mountain valley regime creates temperature inversions that can last for several days during the winter. Temperature inversions can trap air pollution close to the ground. Telluride sits in a valley that trends mainly east to west, which can trap air pollutants more effectively since the prevailing winds in this latitude are westerly and the San Miguel River Valley is closed off on the east end. This is a population oriented neighborhood scale SLAMS monitor on a 1 in 3 day sample schedule.

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

The Greeley PM<sub>10</sub> and PM<sub>2.5</sub> continuous monitor is located on the roof of a hospital office building at 1516 Hospital Road. In the summer of 2016 the filter Based FRM was removed from the site and the GRIMM EDM 180 continuous particulate monitor was designated as the primary monitor for PM<sub>2.5</sub> NAAQS comparisons. On January 1<sup>st</sup>, 2019, the APCD discontinued Hi-Vol PM10 sampling leaving only a continuous GRIMM EDM 180 that measures PM<sub>10</sub> and PM<sub>2.5</sub> at the site. This is a population-oriented neighborhood scale SLAMS site. Greeley Central High School is located immediately to the east of the monitoring site. Overall, this is in an area of mixed residential and commercial development that makes it a good population-exposure, neighborhood scale monitor. The distance and traffic estimate for the most controlling street easily falls into the neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58.

Winds in this area are primarily out of the northwest, with dominant wind speeds less than 5 mph. Secondary winds are from the north, north-northwest and east-southeast, with the most frequent wind speeds also being less than 5 mph. The most recent available wind data for this station is for the period December 1986 to November 1987. Predominant residential growth patterns are to the west and north with large industrial growth expected to the west. There are two feedlots located about 11 miles east of the town. There was a closer feedlot on the east edge of town, but it was shut down in early 1999, after the town of Greeley purchased the land in 1997.

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

Platteville is located immediately west of Highway 85 along the Platte River valley bottom approximately five miles east of I-25, at an elevation of 4,825 feet. The area is characterized by relatively flat terrain and is located about one mile east of the South Platte. The National Oceanic and Atmospheric Administration operated the Prototype Regional Observational Forecasting System Mesonet network of meteorological monitors from the early 1990s through the mid-1990s in the northern Colorado Front Range area. Based on this data, the area around Platteville is one of the last places in the wintertime that the cold pool of air that is formed by temperature inversions will burn off. This is due to solar heating. The upslope/down slope Platte River Valley drainage and wind flows between Denver and Greeley make Platteville a good place to monitor PM<sub>2.5</sub>. These characteristics also make it an ideal location for chemical speciation sampling, which began at the end of 2001 and is currently still monitoring.

The Platteville site is located at 1004 Main Street at the South Valley Middle School, located on the south side of town on Main Street. The school is a one-story building and it has a roof hatch from a locked interior room providing easy access to its large flat roof. There is a 2-story gym attached to the building approximately 28 meters to the Northwest of the monitor. The location of the Platteville monitor falls into the regional transport scale in accordance with federal guidelines found in 40 CFR, Part 58, and Appendix D. There are three monitors here. Two are population-oriented regional scale monitors, one of which is on the SLAMS network and the other is for supplemental speciation. The PM<sub>2.5</sub> filter based FRM SLAMS monitor is operating on a 1 in 3 day sample schedule, while the speciation monitor is operating on a 1 in 6 day schedule. The remaining monitor is a population oriented neighborhood scale supplemental speciation monitor on a 1 in 6 day sample schedule.

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

The Weld County Tower O<sub>3</sub> monitor began operation in June 2002. The site was established after the 811 15<sup>th</sup> Street building was sold and was scheduled for conversion to other uses. The Weld County Tower site has generally recorded levels greater than the old site. This is a population-oriented neighborhood scale SLAMS monitor. The Greeley West Annex carbon monoxide monitoring site was dismantled in June of 2015 and moved to the Weld County Tower site. Carbon Monoxide monitoring began at the Weld County Tower site in April of 2015 with a Thermo 48C monitor. The CO monitor at Weld County Tower was upgraded from a Thermo 48C to a Thermo 48iTLE trace level analyzer on April 28<sup>th</sup>, 2016.

Meteorological monitoring began in February of 2012.

# APPENDIX B: NETWORK MODIFICATION FORMS



**COLORADO**  
Department of Public  
Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

Richard Payton  
8P-AR  
US Environmental Protection Agency Region VIII  
1595 Wynkoop Street  
Denver, CO 80202-1129

Date: July 1, 2020

Dear Mr. Payton:

The Colorado Department of Public Health and Environment's Air Pollution Control Division (APCD) is submitting one network site modification request form for the proposed opening of an air quality monitoring site in Evergreen, Colorado. The site's common name, AQS ID, and proposed action are as follows:

Evergreen (Jefferson County)  
AQS ID: 08-059-TBD (est. 0014)  
Address: 5124 S Hatch Dr., Evergreen, CO 80439  
Action: Open - Ozone and Meteorological

The APCD is proposing to commence ozone and meteorology monitoring at a new air monitoring site located near the Wilmot Elementary School in Evergreen, CO, at lat: 39.620433, lon: -105.338740. This site will replace the Welch air monitoring site, which is located at 12400 W. U.S. Highway 285, Morrison, CO. The Welch site is being closed because of its redundancy with other air monitoring sites in the Denver Metro area, as identified in APCD's 2015 Ambient Air Monitoring Network Assessment. The Evergreen location has been selected because it expands ozone monitoring into a populous area in the western foothills south of the I-70 corridor, an unmonitored area where special studies have shown potential elevated ozone concentrations. It is the APCD's intention to install the Evergreen site prior to the closure of the Welch site and operate them concurrently for a minimum of 6 months prior to the Welch site closure.

This letter and associated form has been made available for a 30-day public comment period as part of APCD's 2020 Ambient Air Monitoring Network Plan on the Division's website prior to submittal to the Environmental Protection Agency. Any comments, if received, will have be included and commented on as part of the 2020 Ambient Air Monitoring Network Plan. Enclosed is the associated Ambient Air Monitoring Network Modification Request Form. If you have any questions or need further information, you can reach me at (303) 692-3232.

Sincerely,

A handwritten signature in black ink that reads "Sajid Hashmi".

Gregory Harshfield  
Gaseous and Meteorological Monitoring Supervisor

cc: Gordon Pierce

Enclosures:

Attachment 1: Evergreen (open) - Ambient Air Monitoring Network Modification Form

Attachment 1

Evergreen (open) - Ambient Air Monitoring Network Modification Form

**EPA REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM**

(VERSION 2, 4/1/04)

DATE: 7/1/2020	CITY: 5124 S Hatch Dr, Evergreen, CO 80439	STATE: CO
----------------	--------------------------------------------	-----------

AQS SITE ID: TBD (est. 08-059-0014)	SITE NAME: Evergreen
-------------------------------------	----------------------

PROPOSED MODIFICATION/REASON WHY: Open - the Evergreen site is being opened as a replacement to the Welch site with the objective of increasing the amount of monitoring in populous areas in the Northern Front Range Foothills, an unmonitored area where special studies have shown potential elevated ozone concentrations.

AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
Ozone	SPM			X		Teledyne 400
Met Tower	SPM					RMyoung

PROPOSED SAMPLING START/END: Start Date 7/1/2020

**ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:**

LOCATION (LAT./LONG. OR UTM 'S): lat: 39.620433, lon: -105.338740, WGS84

SITE ELEVATION (M. MSL): 2225 Meters      PROBE HEIGHT (M. AGL): TBD

DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS

UNRESTRICTED AIR FLOW: 360 DEG.

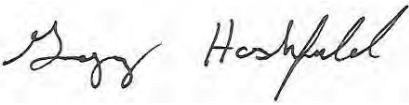
DISTANCE TO FLUES/INCINERATORS (M): Not applicable

DISTANCE TO INTERSECTIONS (M): 210 Meters (North)      DISTANCE FROM SUPPORTING STRUCTURES (M):  
VERT. \_\_\_TBD\_\_\_      HORIZ. \_\_\_TBD\_\_\_

DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
~ 121 Meters	Hazel Rd.	West				
~ 117 Meters	S. Hatch Dr.	North Northwest				
~ 205 Meters	Buffalo Park Rd.	North Northeast				

DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS
None		None		

CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.



Printed Name: Gregory Harshfield Signature:

FOR EPA USE ONLY: Received Date: \_\_\_\_\_ Follow-up Actions: \_\_\_\_\_ Approval Status  
 Given: \_\_\_\_\_ Email Response Date: \_\_\_\_\_ Letter Response Date: \_\_\_\_\_

**FOR METEOROLOGICAL PARAMETERS ONLY:**

MONITORING PURPOSE/OBJECTIVES: Monitor meteorology to assess ozone monitoring results.

PROPOSED MONITORING SCHEDULE/DURATION: Open

PROPOSED START / REMOVAL DATE  
 OR DATE STARTED / REMOVED: Start Date TBD (est. 7/1/2020)

DATA ACQUISITION SYSTEM:

PRIMARY: Agilaire 8864

BACKUP: None

EQUIPMENT MANUFACTURER/MODEL: R.M. Young

WILL THE DATA BE USED FOR MODELING? YES NO

IS SITE REQUIRED FOR SIP? YES NO

UNRESTRICTED AIRFLOW? YES NO

DISTANCE TO TREE DRIPLINE (M): None

NEARBY TERRAIN: SMOOTH ROLLING ROUGH

PARAMETERS:	APPLICABLE √ those that apply	SENSOR HT (M)
WIND SPEED/DIRECTION	Yes	10 M
SOLAR RADIATION		
RELATIVE HUMIDITY	Yes	7.0 M
PRESSURE		
SIGMA THETA	Yes	10 M
PRECIPITATION		
TEMPERATURE	Yes	7.0 M
OTHER (DESCRIBE)		

TOPOGRAPHIC FEATURES (E.G HILLS, MOUNTAINS, VALLEYS, RIDGES, BODIES OF WATER):

Mountain valley

COMMENTS:

**FORM KEY:**

**PAGE 1:**

MONITOR TYPE: NAMS = 1, SLAMS = 2, SPM = 3, TRIBAL = A  
 SITE ELEVATION = GROUND LEVEL ELEVATION  
 PROBE HEIGHT (M. AGL) = PROBE HEIGHT METERS ABOVE GROUND LEVEL





**COLORADO**  
Department of Public  
Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

Richard Payton  
8P-AR  
US Environmental Protection Agency Region VIII  
1595 Wynkoop Street  
Denver, CO 80202-1129

Date: July 1, 2020

Dear Mr. Payton:

The Colorado Department of Public Health and Environment's, Air Pollution Control Division (APCD) is submitting one network site modification request form for the proposed opening of an air quality monitoring site at the National Oceanic and Atmospheric Administration's (NOAA) Platteville Atmospheric Observatory (PAO) facility. The site's common name, AQS ID, and proposed action are as follows:

PAO (Weld County)

AQS ID: 08-123-TBD (est. 0010)

Address: 17065 County Rd 28, Platteville CO, 80651

Open - Oxides of Nitrogen, Ozone, and Meteorological

The APCD is proposing to commence nitrogen dioxide, ozone, and meteorology monitoring at NOAA PAO facility near Platteville, CO, at lat: 40.181624, lon: -104.726145. The PAO air monitoring site will be installed to obtain nitrogen dioxide data in the Denver-Julesberg Basin. The location and need for this site was identified in the 2017 Western Air Quality Study Monitoring Network Assessment, where a key finding was the recommendation for nitrogen dioxide monitoring in the underserved/unmonitored Denver-Julesberg Basin. The APCD concurs with this finding.

This letter and associated form has been made available for a 30-day public comment period as part of APCD's 2020 Ambient Air Monitoring Network Plan on the Division's website prior to submittal to the Environmental Protection Agency. Any comments, if received, will be included and commented on as part of the 2020 Ambient Air Monitoring Network Plan. Enclosed is the associated Ambient Air Monitoring Network Modification Request Form. If you have any questions or need further information, you can reach me at (303) 692-3232.

Sincerely,

A handwritten signature in black ink that reads "Gregory Harshfield". The signature is written in a cursive style.

Gregory Harshfield

Gaseous and Meteorological Monitoring Supervisor

cc: Gordon Pierce

Enclosures:

Attachment 1: Platteville Atmospheric Observatory (open) - Ambient Air Monitoring Network Modification Form

Attachment 1

Platteville Atmospheric Observatory (open) - Ambient Air Monitoring  
Network Modification Form

**EPA REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM**

(VERSION 2, 4/1/04)

DATE: 7/1/2020	CITY: Platteville, CO	STATE: CO
----------------	-----------------------	-----------

AQS SITE ID: TBD (est. 08-123-001o)	SITE NAME: PAO - Platteville Atmospheric Observatory
-------------------------------------	------------------------------------------------------

PROPOSED MODIFICATION/REASON WHY: Open - New site to be installed to obtain nitrogen dioxide concentration data in the Denver-Julesberg Basin

AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
Nitrogen Dioxide	SPM		X			Teledyne 200
Ozone	SPM			X		Teledyne 400
Met Tower	SPM					RMYoung

PROPOSED SAMPLING START/END: Start Date 7/1/2020

**ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:**

LOCATION (LAT./LONG. OR UTM 'S): lat: 40.181624, lon: -104.726145, WGS84

SITE ELEVATION (M. MSL): 1520 Meters      PROBE HEIGHT (M. AGL): TBD

DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS

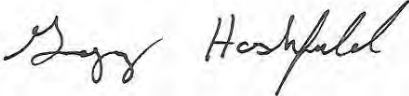
UNRESTRICTED AIR FLOW: 360 DEG.

DISTANCE TO FLUES/INCINERATORS (M): Not applicable

DISTANCE TO INTERSECTIONS (M): 2490 Meters (East Northeast)      DISTANCE FROM SUPPORTING STRUCTURES (M): VERT. \_\_\_TBD\_\_\_ HORIZ. \_\_\_TBD\_\_\_

DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
~260 Meters	County Road 28	northwest				
~2360 Meters	County Road 33	west				
~7830 Meters	Hwy 85	west				

DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS
~650 Meters (O&G wells)	northwest	None		
~560 Meters (O&G wells)	northeast			
~460 Meters (O&G wells)	southwest			

~~604 Meters (O&G wells)	southeast			
<p>CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Printed Name: Gregory Harshfield    Signature: _____</p>				
<p>FOR EPA USE ONLY: Received Date: _____ Follow-up Actions: _____ Approval Status _____  Given: _____ Email Response Date: _____ Letter Response Date: _____</p>				
<b><u>FOR METEOROLOGICAL PARAMETERS ONLY:</u></b>				
MONITORING PURPOSE/OBJECTIVES: Monitor meteorology to support nitrogen dioxide and ozone monitoring results.				
PROPOSED MONITORING SCHEDULE/DURATION: Open				
PROPOSED START / REMOVAL DATE OR DATE STARTED / REMOVED: Start Date TEB (est. 7/1/2020)				
DATA ACQUISITION SYSTEM:				
PRIMARY: Agilaire 8872	PARAMETERS:	APPLICABLE √ those that apply	SENSOR HT (M)	
BACKUP: None	WIND SPEED/DIRECTION	Yes	10 M	
EQUIPMENT MANUFACTURER/MODEL: R.M Young	SOLAR RADIATION			
	RELATIVE HUMIDITY	Yes	7.0 M	
WILL THE DATA BE USED FOR MODELING? <b>YES</b> NO	PRESSURE			
IS SITE REQUIRED FOR SIP? YES <b>NO</b>	SIGMA THETA	Yes	10 M	
UNRESTRICTED AIRFLOW? YES <b>NO</b>	PRECIPITATION			
DISTANCE TO TREE DRIPLINE (M): None	TEMPERATURE	Yes	7.0 M	
NEARBY TERRAIN: <u>SMOOTH</u> ROLLING ROUGH	OTHER (DESCRIBE)			
TOPOGRAPHIC FEATURES (E.G HILLS, MOUNTAINS, VALLEYS, RIDGES, BODIES OF WATER):  Plains				
COMMENTS:				
<p><b>FORM KEY:</b>  <b>PAGE 1:</b></p> <p>MONITOR TYPE: NAMS = 1, SLAMS = 2, SPM = 3, TRIBAL = A  SITE ELEVATION = GROUND LEVEL ELEVATION  PROBE HEIGHT (M. AGL) = PROBE HEIGHT METERS ABOVE GROUND LEVEL</p>				



**COLORADO**  
Department of Public  
Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

Richard Payton  
8P-AR  
US Environmental Protection Agency Region VIII  
1595 Wynkoop Street  
Denver, CO 80202-1129

Date: July 1, 2020

Dear Mr. Payton:

The Colorado Department of Public Health and Environment's Air Pollution Control Division (APCD) is submitting one network site modification request form for the proposed closure and decommissioning of the Welch air monitoring site. The site's common name, AQS ID, and proposed action are as follows:

Welch (Jefferson County)

AQS ID: 08-059-0005

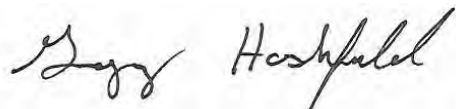
Address: 12400 W. U.S. Highway 285, Morrison, CO

Action: Closure - Ozone and Meteorological

The Welch site is located at a Colorado Department of Transportation maintenance facility along U.S. Hwy 285, approximately 870 meters southwest of the U.S. Hwy 285/Simms interchange, at lat: 39.638782, lon: -105.139505. This site was originally installed in August 1991 to provide ozone monitoring along the foothills west of Denver, to evaluate population exposure in a previously unmonitored area. This site was identified in APCD's 2015 Ambient Air Monitoring Network Assessment as a candidate for closure because it shows a high level of redundancy with other sites in the Denver Metro region. Due to this redundancy, it is the APCD's opinion that the closure of this site will free up additional resources and allow for new monitoring within population areas in the Northern Front Range foothills, an unmonitored area where special studies have shown potential elevated ozone concentrations. The APCD plans to replace this site with a site near Wilmot Elementary School in Evergreen Colorado. It is the APCD's intention to install the Wilmot site prior to the closure of the Welch site and operate them concurrently for a minimum of 6 months prior to the Welch site closure. The actual closure date of the Welch site is estimated to be on December 31, 2020.

This letter and associated form has been made available for a 30 day public comment period as part of APCD's 2020 Ambient Air Monitoring Network Plan on the Division's website prior to submittal to the Environmental Protection Agency. Any comments, if received, will have be included and commented on as part of the 2020 Ambient Air Monitoring Network Plan. Enclosed is the associated Ambient Air Monitoring Network Modification Request Form. If you have any questions or need further information, you can reach me at (303) 692-3232.

Sincerely,

A handwritten signature in black ink that reads "Gregory Harshfield". The signature is written in a cursive style with a large initial "G".

Gregory Harshfield  
Gaseous and Meteorological Monitoring Supervisor

cc: Gordon Pierce

Enclosures:

Attachment 1: Welch (closure) - Ambient Air Monitoring Network Modification Form

Attachment 1

Welch (closure) - Ambient Air Monitoring Network Modification Form



**EPA REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM**

(VERSION 2, 4/1/04)

DATE: 7/1/2020	CITY: 12400 W. U.S. Highway 285, Morrison, CO	STATE: CO
----------------	-----------------------------------------------	-----------

AQS SITE ID: 08-059-0005	SITE NAME: Welch
--------------------------	------------------

PROPOSED MODIFICATION/REASON WHY: Closure - The Welch site is being closed because it shows a high degree of redundancy with other sites in the Denver Metro area. The APCD proposes to relocate this site further west into the Northern Front Range Foothills near the Wilmot Elementary school in Evergreen CO.

AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
Ozone	SLAMS			X		Teledyne 400
Met Tower	SPM					Met One

PROPOSED SAMPLING START/END: End Date 12/31/2020

**ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:**

LOCATION (LAT./LONG. OR UTM 'S): lat: 39.638782, lon: -105.139505, WGS84

SITE ELEVATION (M. MSL): 1743 Meters      PROBE HEIGHT (M. AGL): 5.4 M

DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS

UNRESTRICTED AIR FLOW: 360 DEG.

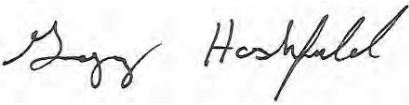
DISTANCE TO FLUES/INCINERATORS (M): Not applicable

DISTANCE TO INTERSECTIONS (M): 35 Meters      DISTANCE FROM SUPPORTING STRUCTURES (M):  
 VERT. >1.7      HORIZ. >0.6

DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
~ 21 Meters	W. Quincy Ave	South	28000	2018		
~ 43 Meters	U.S. Hwy 285	North				

DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS
None		None		

CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.



Printed Name: Gregory Harshfield Signature:

FOR EPA USE ONLY: Received Date: \_\_\_\_\_ Follow-up Actions: \_\_\_\_\_ Approval Status  
 Given: \_\_\_\_\_ Email Response Date: \_\_\_\_\_ Letter Response Date: \_\_\_\_\_

**FOR METEOROLOGICAL PARAMETERS ONLY:**

MONITORING PURPOSE/OBJECTIVES: Monitor meteorology to assess ozone monitoring results.

PROPOSED MONITORING SCHEDULE/DURATION: Discontinue

PROPOSED START / REMOVAL DATE  
 OR DATE STARTED / REMOVED: End Date 12/31/2020

DATA ACQUISITION SYSTEM:

PRIMARY: Agilaire 8832

BACKUP: None

EQUIPMENT MANUFACTURER/MODEL: Met One

WILL THE DATA BE USED FOR MODELING? YES NO

IS SITE REQUIRED FOR SIP? YES NO

UNRESTRICTED AIRFLOW? YES NO

DISTANCE TO TREE DRIPLINE (M): None

NEARBY TERRAIN: SMOOTH ROLLING ROUGH

PARAMETERS:	APPLICABLE √ those that apply	SENSOR HT (M)
WIND SPEED/DIRECTION	Yes	10 M
SOLAR RADIATION		
RELATIVE HUMIDITY		
PRESSURE		
SIGMA THETA	Yes	10 M
PRECIPITATION		
TEMPERATURE	Yes	7.0 M
OTHER (DESCRIBE)		

TOPOGRAPHIC FEATURES (E.G HILLS, MOUNTAINS, VALLEYS, RIDGES, BODIES OF WATER):

open rolling plains

COMMENTS: This site will have run from August 1991 thru December 2020.

**FORM KEY:**

**PAGE 1:**

MONITOR TYPE: NAMS = 1, SLAMS = 2, SPM = 3, TRIBAL = A  
 SITE ELEVATION = GROUND LEVEL ELEVATION  
 PROBE HEIGHT (M. AGL) = PROBE HEIGHT METERS ABOVE GROUND LEVEL

Date: May 19, 2020

Richard Payton  
8P-AR  
US Environmental Protection Agency Region VIII  
1595 Wynkoop Street  
Denver, CO 80202-1129

Dear Mr. Payton,

As required, the Colorado Department of Public Health and Environment's (CDPHE) Air Pollution Control Division (APCD) is submitting a couple of network site modification request forms for a proposed network change. Site names, AQS ID and proposed actions are as follows:

New Boulder University Colorado SEEC SkyWatch Trailer site – 08-013-00xx (4001 Discovery Drive, Boulder CO 80309)

- Install API T640 (primary)

Boulder Athens St (2120 Athens St., Boulder, CO 80309) - 08-013-1001

- Remove PM2.5 TEOM/FDMS

**New Boulder site at University Colorado SEEC SkyWatch Trailer – AQS ID: 08-001-000x ()**

- The API T640 will be established as the primary PM2.5 sampler.

**Boulder Athens St AQS ID: 08-013-1001**

APCD will remove the redundant PM2.5 TEOM/FDMS continuous monitor

Enclosed are the associated Ambient Air Monitoring Network Modification Request Forms. If you have any questions or need further information, you can reach me at (303) 692-3235.

Sincerely,

Pat McGraw  
Particulate Monitoring Supervisor  
cc: Gordon Pierce  
Enclosures:

- Attachment 1: New Boulder site - Ambient Air Monitoring Network Modification Form
- Attachment 2: Boulder Athens Street - Ambient Air Monitoring Network Modification Form

# Attachment 1

## CU Boulder SEEC - Ambient Air Monitoring Network Modification Form

EPA REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM (VERSION 2, 4/1/04)						
DATE: 5/19/2020		CITY: Boulder			STATE: CO	
AQS SITE ID: 08-001-00xx			SITE NAME: CU Boulder SEEC			
PROPOSED MODIFICATION/REASON WHY: Better location for monitoring PM2.5. The previous location is too far west with prevailing west winds and a large dome is erected over the adjacent football fields during fall - winter seasons causing an obstruction to wind flow in the area.						
AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
PM2.5	SLAMS			X		API T640
PROPOSED SAMPLING START / REMOVAL DATE OR DATE STARTED / REMOVED: 08/01/2020						
<b>ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:</b>						
LOCATION (LAT./LONG. OR UTM'S): Lat = 40.010972° Long = -105.242288° WGS84						
SITE ELEVATION (M. MSL): 1603 Meters				PROBE HEIGHT (M. AGL): 4 Meters		
DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS	
12 m	East	33 m	South	21 m	CU SEEC building	
UNRESTRICTED AIR FLOW: >270 DEG						
DISTANCE TO FLUES/INCINERATORS (M): Not applicable.						
DISTANCE TO INTERSECTIONS (M): See below			DISTANCE FROM SUPPORTING STRUCTURES (M): VERT. <u>  0  </u> HORIZ. <u>  0  </u>			
DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
142 meters	Foothills Parkway	East	?	20??	Arterial	
335 meters	Colorado Avenue	South	?	20??	Collector	
DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS		
Not Applicable.	n/a	TBD				
CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.						
Printed Name: <u>Patrick R. McGraw</u>			Signature: <u><i>Patrick R. McGraw</i></u>			
FOR EPA USE ONLY: Received Date: _____ Follow-up Actions: _____ Approval Status Given: _____ Email Response Date: _____ Letter Response Date: _____						

## Attachment 2

### Boulder Athens Street - Ambient Air Monitoring Network Modification Form

EPA REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM (VERSION 2, 4/1/04)						
DATE: 5/19/2020		CITY: Boulder			STATE: CO	
AQS SITE ID: 08-013-1001			SITE NAME: Athens Street			
PROPOSED MODIFICATION/REASON WHY: Poor location for PM2.5 monitoring due to distance too far west with westerly wind flows and the CU football field erect a large dome over the practice fields from Fall through early spring causing a wind flow obstruction near the site.						
AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
PM2.5	SLAMS			Yes		TEOM/FDMS PM2.5 continuous
PROPOSED SAMPLING START / REMOVAL DATE OR DATE STARTED / To be Removed 1/1/2021						
ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS: All remain unchanged						
LOCATION (LAT./LONG. OR UTM'S):						
SITE ELEVATION (M. MSL):				PROBE HEIGHT (M. AGL):		
DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS	
UNRESTRICTED AIR FLOW: >270 DEG. >180 DEG. <CRITERIA_____360_____DEG.						
DISTANCE TO FLUES/INCINERATORS (M): Not Applicable.						
DISTANCE TO INTERSECTIONS (M): See Below.			DISTANCE FROM SUPPORTING STRUCTURES (M): VERT.____0.8____HORIZ.____1____			
DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)		DIRECTION TO AREA SOURCES	COMMENTS	
CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.						
Printed Name: <u>Patrick R. McGraw</u>			Signature: <u>Patrick R. McGraw</u>			
FOR EPA USE ONLY: Received Date: _____ Follow-up Actions: _____ Approval Status Given: _____ Email Response Date: _____ Letter Response Date: _____						

## Appendix C - 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 22, 2020 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 22, 2020. Notification was also sent out to interested parties, including the Air Quality Control Commission, the Regional Air Quality Council and the Pikes Peak Area Council of Governments, and was sent out to CDPHE listserves. Copies of the notifications are presented below.

The APCD received one comment on this Annual Network Plan during the public comment period. The APCD appreciates the time and effort that the commenter took to develop their comment. The comment is presented below the notifications, along with the APCD's response.

# May 22, 2020 Public Comment Notice Posting and Email:

6/24/2020 State.co.us Executive Branch Mail - Website update request

 STATE OF COLORADO

Pierce - CDPHE, Gordon <gordon.pierce@state.co.us>

---

## Website update request


2 messages

---

Pierce - CDPHE, Gordon <gordon.pierce@state.co.us> Fri, May 22, 2020 at 1:02 PM  
To: APCD Websters <apcd\_websters@state.co.us>

We have posted a couple of documents for public comment and would like them linked on the APCD "Public Comment Opportunities" page.

1. A screenshot of the web page that needs to be changed.



2. The URL  
<https://www.colorado.gov/pacific/cdphe/air-division-public-comment>

3. Exact wording for the change and which part of the web page needs to be changed  
**Add 2 new bullets:**

- 2020 Annual Network Monitoring Plan (comments due by 6/22/2020) [https://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx#network\\_plan](https://www.colorado.gov/airquality/tech_doc_repository.aspx#network_plan)
- 2020 5-Year Monitoring Network Assessment (comments due by 6/22/2020) [https://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx#5yr\\_assess](https://www.colorado.gov/airquality/tech_doc_repository.aspx#5yr_assess)

4. PDFs attached that need to be uploaded  
**none**

5. Date the change is needed by.  
**As soon as possible.**

If possible, I would also like the following to be sent out to the permitting actions listserv:

Pursuant to EPA requirements, the APCD has posted the following documents for a 30-day public comment period, which will end on 6/22/2020:

- 2020 Annual Network Monitoring Plan
- 2020 5-Year Monitoring Network Assessment

These documents can be found on the Technical Services webpage at: [https://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx](https://www.colorado.gov/airquality/tech_doc_repository.aspx). Final documents will be submitted to the EPA by 7/1/2020. Please send comments to [cdphe.commentsapcd@state.co.us](mailto:cdphe.commentsapcd@state.co.us).

Thanks,  
Gordon

---  
<https://mail.google.com/mail/u/0?ik=ef401eac2a&view=pt&search=all&permthid=thread-a%3Ar-1921792452902786481&siml=msg-a%3Ar379212457...> 1/2

6/24/2020

State.co.us Executive Branch Mail - Website update request

Gordon Pierce  
Program Manager  
Technical Services Program



4300 Cherry Creek Drive South, Denver, CO 80246-1530  
P 303.692.3238 | F 303.782.5493  
[gordon.pierce@state.co.us](mailto:gordon.pierce@state.co.us) | [www.colorado.gov/cdphe/apcd](http://www.colorado.gov/cdphe/apcd)

Are you curious about ground-level ozone in Colorado? Visit our [ozone webpage](#) to learn more.

---

**Lazalde - CDPHE, Angel** <[angel.lazalde@state.co.us](mailto:angel.lazalde@state.co.us)>  
To: "Pierce - CDPHE, Gordon" <[gordon.pierce@state.co.us](mailto:gordon.pierce@state.co.us)>  
Cc: APCD Websters <[apcd\\_websters@state.co.us](mailto:apcd_websters@state.co.us)>

Fri, May 22, 2020 at 1:20 PM

I am working on this now and will send you an email when I am done.

Angel Lazalde  
Program Assistant



Air Pollution Control Division | Stationary Sources  
Telephone: [303.692.3593](tel:303.692.3593) | Email: [angel.lazalde@state.co.us](mailto:angel.lazalde@state.co.us)

**Questions on Air Pollution Control Division operations during COVID-19 response? [Visit our FAQ Page.](#)**

[Quoted text hidden]

---

**Lazalde - CDPHE, Angel** <[angel.lazalde@state.co.us](mailto:angel.lazalde@state.co.us)>  
To: "Pierce - CDPHE, Gordon" <[gordon.pierce@state.co.us](mailto:gordon.pierce@state.co.us)>

Fri, May 22, 2020 at 1:40 PM

Hi, Gordon,

The webpage has been updated and listserv sent.

Have a great weekend!  
Angel Lazalde  
Program Assistant



Air Pollution Control Division | Stationary Sources  
Telephone: [303.692.3593](tel:303.692.3593) | Email: [angel.lazalde@state.co.us](mailto:angel.lazalde@state.co.us)

**Questions on Air Pollution Control Division operations during COVID-19 response? [Visit our FAQ Page.](#)**

[Quoted text hidden]

<https://mail.google.com/mail/u/0?ik=ef401eac2a&view=pt&search=all&permthid=thread-a%3Ar-1921792452902786481&simpl=msg-a%3Ar379212457...> 2/2



6/24/2020

State.co.us Executive Branch Mail - 2020 Network Plan and Network Assessment



STATE OF  
COLORADO

Pierce - CDPHE, Gordon <gordon.pierce@state.co.us>

---

## 2020 Network Plan and Network Assessment

1 message

---

**Pierce - CDPHE, Gordon** <gordon.pierce@state.co.us>

Fri, May 22, 2020 at 1:55 PM

To: Gordon Pierce - CDPHE <gordon.pierce@state.co.us>

Bcc: Garry Kaufman <garrison.kaufman@state.co.us>, Mark Mcmillan <mark.mcmillan@state.co.us>, Cindy Copeland <ccopeland@bouldercounty.org>, Cassie Archuleta <carchuleta@fcgov.com>, Gregg Thomas <Gregg.Thomas@denvergov.org>, Brian Hlavacek <bhlavacek@tchd.org>, Richard Payton <Payton.Richard@epa.gov>, Bruce Barker <bbarker@weldgov.com>, "Fallon, Gail" <fallon.gail@epa.gov>, Amanda Brimmer <abrimmer@raqc.org>, Samantha Bailey <sbailey@ppacg.org>

All:

Pursuant to EPA requirements, the APCD has posted the following documents for a 30-day public comment period, which will end on 6/22/2020:

- 2020 Annual Network Monitoring Plan
- 2020 5-Year Monitoring Network Assessment

These documents can be found on the Technical Services webpage at: [https://www.colorado.gov/airquality/tech\\_doc\\_repository.aspx](https://www.colorado.gov/airquality/tech_doc_repository.aspx). Final documents will be submitted to the EPA by 7/1/2020. Please send comments to [cdphe.commentsapcd@state.co.us](mailto:cdphe.commentsapcd@state.co.us).

—  
**Gordon Pierce**  
Program Manager  
Technical Services Program



**COLORADO**  
Air Pollution Control Division  
Department of Public Health & Environment


4300 Cherry Creek Drive South, Denver, CO 80246-1530  
P 303.692.3238 | F 303.782.5493  
[gordon.pierce@state.co.us](mailto:gordon.pierce@state.co.us) | [www.colorado.gov/cdphe/apcd](http://www.colorado.gov/cdphe/apcd)

Are you curious about ground-level ozone in Colorado? Visit our [ozone webpage](#) to learn more.

## Public Comments Received and APCD Responses:

### Comment #1:

6/24/2020 State.co.us Executive Branch Mail - Fwd: Comments on Colorado 2020 Annual Network Monitoring Plan and 2020 5-year monitoring net...

 **STATE OF COLORADO**

Pierce - CDPHE, Gordon <gordon.pierce@state.co.us>

---


**Fwd: Comments on Colorado 2020 Annual Network Monitoring Plan and 2020 5-year monitoring network assessment**

---

**Comments - CDPHE, APCD** <cdphe.commentsapcd@state.co.us> Tue, Jun 23, 2020 at 7:52 AM  
To: Gordon Pierce - CDPHE <gordon.pierce@state.co.us>

Hi,  
See the email below.

**Regulatory Compliance and Support Unit  
Planning and Policy Program**

 **COLORADO**  
Air Pollution Control Division  
Department of Public Health & Environment

P 303.692.3100 | F 303.782.0278  
4300 Cherry Creek Drive South, Denver, CO 80246-1530  
cdphe.commentsapcd@state.co.us

Are you curious about ground-level ozone in Colorado? Visit our [ozone webpage](#) to learn more.

----- Forwarded message -----  
From: **Robert Ukeiley** <RUkeiley@biologicaldiversity.org>  
Date: Mon, Jun 22, 2020 at 4:21 PM  
Subject: Comments on Colorado 2020 Annual Network Monitoring Plan and 2020 5-year monitoring network assessment  
To: cdphe.commentsapcd@state.co.us <cdphe.commentsapcd@state.co.us>  
Cc: Morales.Monica@epa.gov <Morales.Monica@epa.gov>, fallon.gail@epa.gov <fallon.gail@epa.gov>

Attached, please find comments requesting the Colorado Air Pollution Control Division add an additional ozone monitor to the foothills of Boulder County.

If you have any questions, please do not hesitate to ask.

Robert Ukeiley  
Senior Attorney – Environmental Health  
Center for Biological Diversity  
1536 Wynkoop St., Ste. 421  
Denver, CO 80202  
(720) 496-8568  
[rukeiley@biologicaldiversity.org](mailto:rukeiley@biologicaldiversity.org)

<https://mail.google.com/mail/u/0?ik=ef401eac2a&view=pt&search=all&permmsgid=msg-f%3A1670299289477276153&simpl=msg-f%3A16702992894...> 1/2



VIA EMAIL  
cdphe.commentsapcd@state.co.us

June 22, 2020

Colorado Air Pollution Control Division

RE: 2020 Annual Network Monitoring Plan  
2020 5-Year Monitoring Network Assessment

To whom it may concern:

On behalf of the Center for Biological Diversity and our thousands of members and supporters who are adversely impacted by air pollution in Colorado, I am writing to submit comments on the 2020 Annual Network Monitoring Plan and the 2020 5-Year Monitoring Network Assessment. We are requesting that an additional ozone monitor be added to the foothills of Boulder county.

In Oltmans, SJ, *et al.* 2019. Boundary layer ozone in the Northern Colorado Front Range in July–August 2014 during FRAPPE and DISCOVER-AQ from vertical profile measurements. *Elem Sci Anth*, 7: 6. DOI: <https://doi.org/10.1525/elementa.345>, attached, an esteemed group of researchers, mostly from Colorado, used several vertical profile observing platforms to monitor ozone. *Id.* at 2. The researchers determined that:

The association of high O<sub>3</sub> days at the BAO [Boulder Atmospheric Observatory] tower with transport from sectors with intense oil and natural gas production toward the northeast suggests emissions from this industry were an important source of O<sub>3</sub> precursors and are crucial in producing peak O<sub>3</sub> events in the NCFR [Northern Colorado Front Range]. Higher elevation locations to the west of the NCFR plains regularly experience higher O<sub>3</sub> values than those in the lower elevation NCFR locations. Exposure of populations in these areas is **not captured by the current regulatory network**, and likely underestimated in population O<sub>3</sub> exposure assessments.

*Id.* at 1, emphasis added.

In Brodin, M., *et al.*, 2010. Seasonal ozone behavior along an elevation gradient in the Colorado Front Range Mountains, *Atmospheric Environment* 44 (2010) 5305 -

5315, attached, "Ambient surface ozone was monitored for one year at seven sites along an elevation gradient from 1600 m to 3500 m above sea level (ASL) in Boulder County". *Id.* at 5305. This paper found that the majority, but not all, studies have found that average concentrations of ozone increase with elevation. *Id.* The study found that during what APCD considers the ozone "season", that is late April through early September, the highest ozone levels were observed at the middle elevations, that is Betasso, (1943 meters above sea level (m ASL)), Sugarloaf (2399 m ASL), Coughlin (2539 m ASL) and Niwot Ridge (3021 m ASL). *Id.* at 5311. See also Table 3 at 5314. These monitors with worse ozone were all above the City of Boulder monitor which was at 1608 m ASL. The current APCD monitor at Boulder Reservoir is at a similar elevation to the City of Boulder monitor in this study.

Thus, APCD should add an ozone monitor at a site above 1900 m ASL in Boulder County. We would suggest using one of the sites in the Brodin study, that is at Betasso Boulder County Open Space Park, the Sugarloaf fire state or Caughlin meadows. It should be relatively easy for APCD to obtain permission for a suitable site at these locations.

These areas, in addition to being residential neighborhoods, see significant high effort recreational use. Also, the studies indicate that these areas see differences in the times of day when ozone levels are highest. This is important information to protect the health of people in engaged in exercise in these areas. For example, a biker may think it is safe to bike in the morning or evening based on ozone levels at Boulder Reservoir even though that may not be true.

We are not suggesting, however, that APCD should remove the Boulder Reservoir site. As that site is co-located with excellent long term VOC collection, it has significant value.

We appreciate the installation of the Black Hawk ozone monitor and the plan to move a monitor to Evergreen. However, those monitors do not address our concerns.

First, we are not aware of any peer-reviewed literature showing those locations as having worse ozone levels than the locations of the current monitors. For example, the Oltmans paper focused on the area "from Boulder to Ft. Collins and the area to the east." Oltmans at 2. This area is north of Black Hawk and Evergreen. Second, the Black Hawk and Evergreen monitors are, or will be, south of Boulder County and thus further away from the major VOC emission sources in the DJ Basin in Weld County. Third, at least for Black Hawk, we are concerned the Black Hawk sits in a valley or depression. The Black Hawk monitor appears to be not be on a ridgetop and thus may not be adequately capturing the highest values.

Sincerely,

s/ Robert Ukeiley

Robert Ukeiley  
Senior Attorney – Environmental Health  
Center for Biological Diversity  
1536 Wynkoop St., Ste. 421  
Denver, CO 80202  
[rukeiley@biologicaldiversity.org](mailto:rukeiley@biologicaldiversity.org)  
(720) 496-8568

### **APCD Responses to Comment #1:**

1. The APCD agrees that high ozone levels can, and do occur in the foothills along the Colorado Front Range and that additional monitoring is desired. As pointed out, this has been seen during the 2014 FRAPPE study, and has also been seen by the APCD during a plains-to-divide ozone study during the summer of 2016. This APCD study, as well as other passive monitoring studies and meteorological evaluations in the past, has led to the establishment of the existing Black Hawk site and the proposal of the Evergreen site.

For the lower foothills west of Boulder, there is no specific ozone monitoring in place at this time. However, there is nearby monitoring that can be utilized. First, data from the National Park Service “Rocky Mountain” ozone site, located just to the north of Boulder County are available hourly at <https://www.nps.gov/subjects/air/current-data.htm?site=romo>. Second, the National Oceanographic and Atmospheric Administration operates an ozone site at Niwot Ridge, to the north-northwest of Nederland. While these data are not available to the public in real-time, the site does provide a long-term view of ozone in the higher elevation area. Both of these sites are over 2700m in elevation.

The APCD conducts targeted ozone studies every year, which are designed to evaluate ozone concentrations in areas where we have limited data, to determine areas where additional monitoring may be needed, and to provide information on more optimal monitoring locations. The 2016 study was one of these studies. The APCD feels that further foothills studies are needed to identify optimal areas prior to simply installing a monitor based on locations from the 2014 FRAPPE study. We unfortunately do not have the resources to add long-term sites in every area. A northern Colorado study was under consideration for summer 2020, but was put on hold due to Coronavirus impacts and travel restrictions. Studies are being planned for summer 2021 in northern Colorado and foothills areas, which can include Boulder County.

2. The APCD would note that the Black Hawk monitor is not in a valley, but is on a ridge almost 200m higher than the town of Black Hawk.