COLORADO

Air Pollution Control Division

Department of Public Health & Environment

Technical Services Program

2024 Ambient Air Monitoring Network Plan

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COLORADO
AMBIENT AIR MONITORING NETWORK PLAN

2024

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Contents

List of Figures

List of Tables

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_2	Nitrogen dioxide
NO_x	Reactive nitrogen oxides
NO_y	Total reactive nitrogen
NPS	National Park Service
O_3	Ozone
Pb	Lead
$PM_{2.5}$	Particulate matter with an equivalent diameter less than or equal to 2.5 μm
PM_{10}	Particulate matter with an equivalent diameter less than or equal to 10 μm
ppb	Parts per billion (one part in 10^9)
ppm	Parts per million (one part in 10^6)
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_2	Sulfur dioxide
SPM	Special Purpose Monitor
TSP	Total Suspended Particulates
μg	Microgram (10^{-6} grams)
VOC	Volatile Organic Compound

1

Introduction

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

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

1.1 Overview of the Colorado Air Monitoring Network

The APCD currently conducts air quality and meteorological monitoring operations at 44 locations statewide. Ozone (O_3) and particulate matter (PM) monitors, including those for particulate matter less than 10 μm in diameter (PM_{10}) and particulate matter less than 2.5 μm in diameter ($PM_{2.5}$), are the most abundant and widespread monitors in the network. Currently, there are PM_{10} monitors at 16 separate locations, $PM_{2.5}$ monitors at 19 locations, O_3 monitors at 22 locations, carbon monoxide (CO) monitors at five locations, nitrogen dioxide (NO_2) monitors at seven locations, and sulfur dioxide (SO_2) monitors at three locations. The APCD also operates 16 meteorological sites statewide for the continuous measurement of wind speed, wind direction, resultant speed, resultant direction, standard deviation of horizontal wind direction, and temperature.

A majority of the gaseous monitoring conducted by the APCD occurs in the Front Range region, with a particular focus on the Denver Metro area. Three of the O_3 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_{10} and $PM_{2.5}$. 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_{10} and, of those twelve sites, one is located at a site which also has a filter-based PM_{10} monitor. Of the 20 $PM_{2.5}$ monitoring sites, 19 measure $PM_{2.5}$ on a continuous basis, four of these sites also having filter-based samplers. All real-time continuous PM_{10} and $PM_{2.5}$ data is reported on the CDPHE website. [1]

[1] https://www.colorado.gov/airquality/report.aspx

1.1.1 APCD Monitoring History

The State of Colorado has been monitoring air quality statewide since the mid-1960s when high volume and tape particulate samplers, dustfall buckets, and sulfation candles were the state of the art for defining the magnitude and extent of the very visible air pollution problem. Monitoring for gaseous pollutants (CO, SO_2, NO_2, and O_3) began in 1965 when the federal government established the CAMP monitoring station in downtown Denver at the intersection of 21^{st} 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_2, NO_2, and O_3. In 1972, the first State Implementation Plan (SIP) was submitted to the EPA. It included an air quality surveillance system in accordance with EPA regulations of August 1971. That plan proposed a monitoring network of 100 monitors (particulate and gaseous) statewide. The system established as a result of that plan and subsequent modifications consisted of 106 monitors.

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

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

1.1.2 APCD Monitoring Operations

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

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

1.1.3 Network Modification Procedures

The APCD develops changes to its monitoring network in several ways. In the past, new monitoring locations have been added as a result of community concerns about air quality. Other monitors have been established as a result of special studies, such as the O_3 monitoring in Aurora, Rifle, Cortez, Palisade, and Black Hawk.

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

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

Finally, all monitors are reviewed on a regular basis to determine if they are continuing to meet their monitoring objectives. If the population, land use, or vegetation around the monitor has changed significantly since the monitor was established, a more suitable location for the monitor may be examined. An example of this is the O_3 monitor previously located at the Aspen Park monitoring site, which was shut down on September 16, 2019 and relocated to the Black Hawk monitoring station. A detailed scientific evaluation of the present monitoring network configuration can be found in the APCD's 2020 Ambient Air Monitoring Network Assessment.[2]

1.1.4 Description of Monitoring Regions in Colorado

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

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

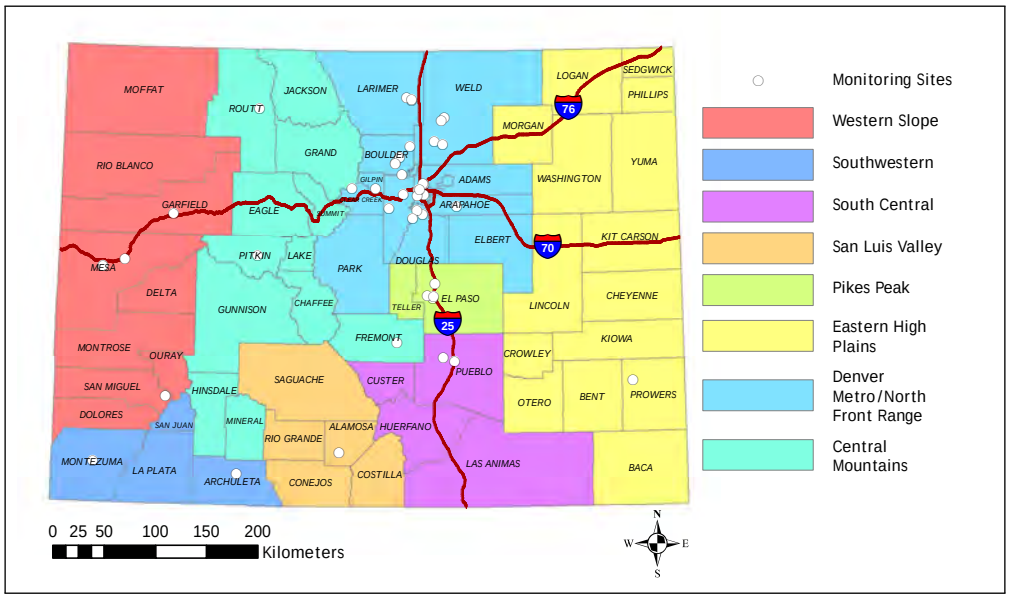

Figure 1.1: Counties and multi-county monitoring regions discussed in this report.

1.1.4.1 Central Mountains Region

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

The primary monitoring concern in this region is centered around particulate pollution from wood burning and road dust. During 2023, there were three PM_{10} monitoring sites operated by the APCD in the Central Mountains region (Aspen, Steamboat Springs, and Cañon City). There is also one O_3 monitor located at the Mines Peak site.

[2] https://www.colorado.gov/airquality/tech_doc_repository.aspx?action=open&file=2020_CO_5yr_Network_Assessment.pdf

1.1.4.2 Denver Metro / North Front Range Region

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

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

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

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

There are currently 67 air quality and meteorological monitors at 27 individual sites in the Northern Front Range Region. There are 4 CO monitors, 16 O_3 monitors, seven NO_2 monitors, three SO_2 monitors, as well as seven PM_{10} monitors, 14 $PM_{2.5}$ monitors, and 14 meteorological towers. There are also two air toxics monitoring sites, one located at the Birch Street site (previously located at CAMP and moved during 2023), and one in Platteville (La Salle). The Birch Street site monitors urban air toxics, while the Platteville site monitors air toxics and ozone precursors in a region of oil and gas development. In addition, there is one site (DESCI) that measures visual range by use of a nephelometer and a transmissometer.

1.1.4.3 Eastern High Plains Region

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

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

There is currently one PM_{10} and $PM_{2.5}$ monitoring site in this region. The site is located in the city of Lamar.

1.1.4.4 Pikes Peak Region

The Pikes Peak region includes El Paso and Teller counties. The area has a population of approximately 756,489, according to the 2020 U.S. Census. Eastern El Paso County is rural prairie, while the western part of the region is mountainous. The U.S. Government is the largest employer in the area, and major industries include Fort Carson and the U.S. Air Force Academy in Colorado Springs, which are both military installations. Aerospace and technology are also large employers in the area. All of the area is currently in compliance with federal air quality standards, although there have been recent exceedances of ozone standards. Two exceedances of the SO_2 standard were observed at the Highway 24 site during 2014-2015; however, these elevated values did not result in a violation of the NAAQS and SO_2 concentrations trended downward at the Highway 24 site during 2015-2023. The Highway 24 site was ultimately closed and SO_2 monitoring was discontinued due to low concentrations and significant reductions in emissions over the past decade (see chapter 5).

Currently, there is one CO monitor and two O_3 monitors in the Pikes Peak region, as well as one PM_{10} monitor and one $PM_{2.5}$ monitor. Most of these monitors are located in the populous city of Colorado Springs.

1.1.4.5 San Luis Valley Region

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

There is currently one PM_{10} and $PM_{2.5}$ monitoring site in this region. The site is located at Adams State College in the city of Alamosa.

1.1.4.6 South Central Region

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

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

1.1.4.7 Southwestern Region

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

There are currently two monitoring stations in the Southwestern region, one O_3 site in Cortez and one PM_{10} site located in Pagosa Springs. PM monitoring in the city of Durango was discontinued at the end of 2018.

1.1.4.8 Western Slope Region

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

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

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

1.1.5 Statewide Population Statistics

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

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

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

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

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

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

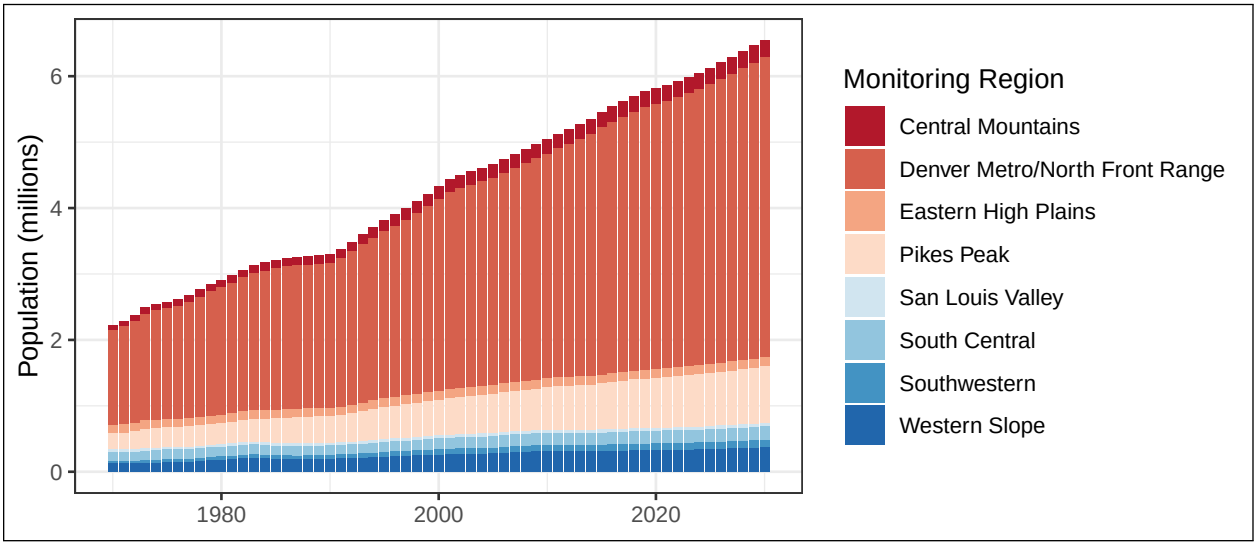

Figure 1.2: Population in Colorado from 1970 to 2030.

1.1.6 Monitoring Site Locations and Parameters Monitored

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

AQS Site Number	Site Name	County	Parameters Monitored						
			O_3	CO	NO_2	SO_2	PM_{10}	$PM_{2.5}$	Met
08-001-0010	Birch Street	Adams					X	X	
08-001-3001	Welby	Adams	X	X	X	X	X	X	X
08-003-0001	Alamosa - ASC	Alamosa					X	X	
08-005-0002	Highland Reservoir	Arapahoe	X						X
08-005-0005	Arapaho Community College (ACC)	Arapahoe						X	
08-005-0006	Aurora - East	Arapahoe	X						X
08-007-0001	Pagosa Springs School	Archuleta					X		
08-013-0003	Longmont - Municipal Bldg.	Boulder					X	X	
08-013-0012	Boulder Chamber of Commerce (CC)	Boulder					X	X	
08-013-0014	Boulder Reservoir	Boulder	X						X
08-013-1001	Boulder - CU	Boulder					X	X	
08-019-0006	Mines Peak	Clear Creek	X						
08-031-0002	CAMP	Denver	X	X	X	X	X	X	X
08-031-0013	National Jewish Health (NJH)	Denver						X	
08-031-0026	La Casa	Denver	X	X	X	X	X	X	X
08-031-0027	I-25: Denver	Denver		X	X			X	X
08-031-0028	I-25: Globeville	Denver			X			X	X
08-035-0004	Chatfield State Park	Douglas	X					X	X
08-041-0013	U.S. Air Force Academy (USAFA)	El Paso	X						
08-041-0015	Highway 24	El Paso		X		X			X
08-041-0016	Manitou Springs	El Paso	X						
08-041-0017	Colorado College	El Paso		X			X	X	
08-043-0003	Cañon City - City Hall	Fremont					X		
08-045-0012	Rifle - Health Dept.	Garfield	X						
08-047-0003	Black Hawk	Gilpin	X						
08-059-0006	Rocky Flats - N.	Jefferson	X		X				X
08-059-0011	NREL	Jefferson	X						
08-059-0014	Evergreen	Jefferson	X						X
08-069-0009	Fort Collins - CSU	Larimer						X	
08-069-0011	Fort Collins - West	Larimer	X						X
08-069-1004	Fort Collins - Mason	Larimer	X	X					X
08-077-0017	Grand Junction - Powell Bldg.	Mesa					X	X	
08-077-0018	Grand Junction - Pitkin	Mesa							X
08-077-0020	Palisade Water Treatment	Mesa	X						X
08-083-0006	Cortez - Health Dept.	Montezuma	X						
08-097-0008	Aspen	Pitkin					X		
08-099-0002	Lamar - Municipal Bldg.	Prowers					X	X	
08-101-0015	Pueblo - Fountain School	Pueblo					X	X	
08-101-0016	Pueblo West	Pueblo	X						X
08-107-0003	Steamboat Springs	Routt					X		
08-113-0004	Telluride	San Miguel					X		
08-123-0006	Greeley - Hospital	Weld						X	
08-123-0008	Platteville - Middle School	Weld						X	
08-123-0009	Greeley - Weld County Tower	Weld	X	X					X
08-123-0013	Platteville Atmospheric Observatory (PAO)	Weld	X		X				
08-123-0015	La Salle	Weld	X		X				

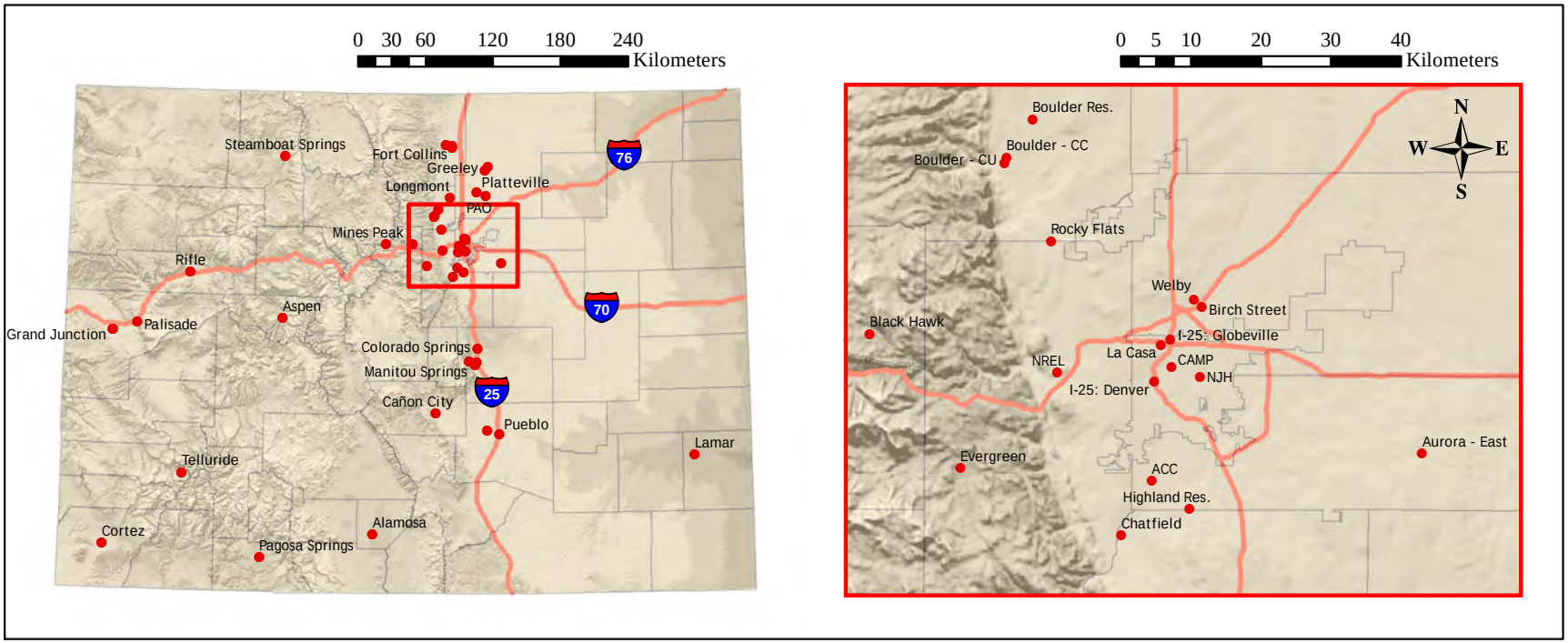

Figure 1.3: Map of Colorado with an inset map of the Denver metropolitan area showing the location of all monitoring sites operated by the APCD and listed in Table 1.2. For the purpose of improving the readability of the map, labels for monitoring sites in Fort Collins, Grand Junction, Pueblo and Colorado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

2

Carbon Monoxide (CO)

In 2024, the APCD will operate five CO monitors. Currently, the NAAQS for CO are primary standards, with a concentration level not to exceed 9 parts per million (ppm) in an eight-hour time period or 35 ppm in a one-hour period. There is no secondary standard for CO. CO levels have declined from a statewide maximum eight-hour value of 48.1 ppm in 1973 to a value of 2.0 ppm in 2023. The level of the standard has not been exceeded since 1999. The CO monitors currently operated by the APCD are associated both with State Maintenance Plan requirements and EPA requirements under the Code of Federal Regulations (CFR). However, the EPA has revised the minimum requirements for CO monitoring by requiring CO monitors to be sited near roads in certain urban areas. They are requiring a CO monitor to be located at one near-roadway NO_2 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_2 site to satisfy these requirements.

2.1 Denver Metro/North Front Range Region

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

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

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

2.2 Pikes Peak Region

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

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

Site Name	County	CO 1-Hour Average (ppm)		CO 8-Hour Average (ppm)	
		1^{st} Max.	2^{nd} Max.	1^{st} Max.	2^{nd} Max.
Highway 24	El Paso	1.9	1.7	1.2	1.1

2.3 Recent and Planned Changes in CO Monitoring

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

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

3

Ozone (O_3)

In March 2008, the U.S. EPA promulgated a new level of the NAAQS for O_3 of 0.075 ppm (75 ppb) as an annual fourth-highest daily maximum eight-hour concentration, averaged over three years. This made a significant change in the number of O_3 monitors that violated the standard at the time. On October 2015, the EPA again strengthened the NAAQS for ground level ozone to 70 ppb (effective December 28^{th}, 2015). The APCD currently operates fifteen sites that have three-year design values (2021-2023) in excess of the current eight-hour O_3 NAAQS standard of 70 ppb. These sites are all located in the Front Range region and are: Welby (74), Highlands (77), Aurora East (73), Boulder Reservoir (75), CAMP (72), La Casa (75), Chatfield (81), Manitou Springs (71), Blackhawk (75), Rocky Flats North (80), NREL (80), Evergreen (75), Fort Collins West (76), Fort Collins Mason (71), and Greeley (71).

EPA's monitoring requirements for O_3 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_3 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_3 monitoring requirements. Each MSA is discussed further in the following subsections.

Table 3.1: EPA's minimum ozone monitoring requirements.

MSA Population	**Most recent 3-year design value concentrations $\geq$ 85% of any O_3 NAAQS**	**Most recent 3-year design value concentrations $<$ 85% of any O_3 NAAQS**
>10 million	4	2
4-10 million	3	1
350,000-4 million	2	1
50,000-350,000	1	0

3.1 Denver Metro/North Front Range Region

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_x and Volatile Organic Compounds (VOCs) in the atmosphere. In the presence of sunlight, NO_x and VOCs chemically react to form ground level ozone. Table 3.2 lists the first and fourth maximum eight-hour O_3 concentrations recorded in 2023 for the Denver Metro/North Front Range region. Also listed are the current three-year design values for each site with enough data available to calculate them.

In the Denver Metro area, Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson counties have O_3 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_3 values recorded at monitoring stations in the Denver Metro / Northern Front Range region during 2023. Sites having three-year NAAQS values in excess of 70 ppb are indicated by asterisks.

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

area. These are the Boulder MSA and the Denver-Aurora-Lakewood MSA, with populations of 328,006 and 2,996,432 respectively, according to the 2020 U.S. Census. Per EPA monitoring requirements, the Boulder MSA falls in the 50,000 to 350,000 population range and the Denver-Aurora-Lakewood MSA falls in the 350,000 to 4,000,000 range. The Boulder MSA therefore requires at least one monitor, and this requirement is satisfied by the monitor at Boulder Reservoir, which became operational in August of 2016. By EPA rules, the Denver-Aurora-Lakewood MSA requires at least two monitors. This requirement is satisfied by the remaining ten monitors that are placed throughout the Denver-Aurora-Lakewood MSA. The monitors located at Chatfield State Park, Rocky Flats - N., and NREL are the highest concentration monitors in the state.

Weld County is an area of significant oil and gas development, which 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 360,937 and 331,546 respectively, according to the 2020 U.S. Census. Per EPA monitoring requirements, the Greeley MSA falls in the 50,000 to 350,000 population range and the Fort Collins MSA falls in the 350,000 to 4,000,000 range. The Greeley MSA therefore requires at least one monitor and the Fort Collins MSA requires at least two monitors. These requirements are satisfied by the monitors listed in Table 3.2. The monitor located at the Fort Collins West site is a highest concentration monitor for the Fort Collins MSA, while the Greeley - County Tower monitor serves the same purpose for the Greeley MSA.

All fifteen of the O_3 monitors shown in Table 3.2 have three-year design values above the current eight-hour ozone NAAQS of 0.070 ppm (70 ppb): Welby, Highlands, Aurora East, Boulder Reservoir, CAMP, La Casa, Chatfield State Park, Black Hawk, Rocky Flats N., NREL, Evergreen, Fort Collins West, Fort Collins Mason, Greeley - County Tower and PAO.

3.2 Pikes Peak Region

The first and fourth maximum eight-hour concentrations recorded in 2023 for each O_3 monitoring site in the Pikes Peak region are listed in Table 3.3 below. Also listed are the three year design values for each site.

The Colorado Springs MSA is the only MSA located in the Pikes Peak region. According to the 2020 U.S. Census, this MSA has a population of 756,489. Per EPA monitoring requirements the Colorado Springs MSA falls in the 350,000 to 4,000,000 range and therefore requires at least two monitors. This requirement is satisfied by the monitors at the

U.S. Air Force Academy and at Manitou Springs.

Table 3.3: Summary of O_3 values recorded at monitoring stations in the Pikes Peak region during 2023. Sites having three-year NAAQS values in excess of 70 ppb are indicated by asterisks.

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

3.3 Western Slope Region

The first and fourth maximum eight-hour O_3 concentrations recorded in 2023 in the Western Slope region are listed in Table 3.4 below.

Table 3.4: Summary of O_3 values recorded at monitoring stations in the Western Slope region during 2023.

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

The Grand Junction MSA is the only MSA located on the Western Slope. The Grand Junction MSA includes all of Mesa County and has a population of 155,574 according to the 2020 U.S. Census. Per EPA monitoring requirements, this MSA falls in the 50,000 to 350,000 population range, and thus requires one O_3 monitor. The monitor at the Palisade site satisfies this requirement, as well as the highest concentration monitor requirement.

3.4 Southwestern Region

The first and fourth maximum eight-hour concentrations recorded in 2023 at the Cortez - Health Dept. O_3 monitoring site are listed in Table 3.5 below. This is the only O_3 monitor located in the Southwestern Region.

Table 3.5: Summary of O_3 values recorded at the monitoring station in the Southwest region during 2023.

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

3.5 Recent and Planned Changes in O_3 Monitoring

O_3 monitoring was discontinued at the Platteville Atmospheric Observatory (PAO) site on 2/6/2024 and moved to the new La Salle site (08-123-0015) on 2/7/24.

O_3 monitoring will commence at two new sites in Larimer County (Timnath and Fossil Creek) in summer of 2024.

4

Nitrogen Dioxide/Reactive Oxides of Nitrogen (NO_2/NO_y)

Currently, there are seven $NO_2/NO_x/NO_y$ 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_2 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_2 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^{th} percentile of the yearly distribution of daily maximum one-hour concentrations.

The APCD began monitoring for NO_y 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_y monitoring is a requirement for an NCore station, but there are no standards for NO_y. The EPA has also established requirements for an NO_2 monitoring network that will include monitors at locations where maximum NO_2 concentrations are expected to occur, including within 50 meters of major roadways, as well as monitors sited to measure the area-wide NO_2 concentrations that occur more broadly across communities. Per these requirements, at least one monitor must be located near a major road in any urban area with a population greater than or equal to 500,000 people. A second monitor is required near another major road in areas with either: (1) population greater than or equal to 2.5 million people, or (2) one or more road segments with an annual average daily traffic count greater than or equal to 250,000 vehicles. Near roadway sites were installed at the I-25 Denver and I-25 Globeville sites to satisfy these requirements. These sites began operation in June 2013 and October 2015, respectively. In addition to the near roadway monitoring, there must be one monitoring station in each CBSA with a population of one million or more persons to monitor a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales. The CAMP site satisfies the requirement for the neighborhood highest representative concentration site.

4.1 Denver Metro/North Front Range Region

The annual mean and 98^{th} percentile one-hour concentrations recorded in 2023 for each NO_2 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_2 only in this region. All of these monitors show values that are well below both the annual average NAAQS of 53 ppb and the one-hour NAAQS of 100 ppb.

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

4.2 Recent and Planned Changes in NO_2/NO_y Monitoring

NO_2 monitoring was discontinued at the Platteville Atmospheric Observatory (PAO) site on 2/6/2024 and moved to the new La Salle site (08-123-0015) on 2/7/24.

Table 4.1: Summary of NO_2 values recorded at monitoring stations in the Denver Metro / Northern Front Range region during 2023.

Site Name	County	NO_2 (ppb)		
		Annual Mean	98^{th} Percentile	3-Year Ave. of 98^{th} Percentile
Welby	Adams	15.9	56.2	56
CAMP	Denver	14.6	65.7	62[1]
La Casa	Denver	14.8	55.2	56
I-25 Denver	Denver	20.9	61.5	60
I-25 Globeville	Denver	24.2	64.5	66
Rocky Flats - N.	Jefferson	2.8	31.5	27
PAO	Weld	7.0	47.4	46

NO_2 monitoring will commence at two new sites in Larimer County (Timnath and Fossil Creek) in summer of 2024.

5

Sulfur Dioxide (SO_2)

Currently, there are three SO_2 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^{th} percentile of daily maximum one-hour averages at each monitor within an area must not exceed 75 ppb. The secondary NAAQS is a three-hour average not to exceed 500 ppb more than once per year.

SO_2 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_2 emissions for that MSA and dividing by 1 million. This PWEI value is then used to determine areas in need of SO_2 monitoring. For any MSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO_2 monitors are required within that MSA. For any MSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO_2 monitors are required within that MSA. For any MSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO_2 monitor is required within that MSA. A sum of the most recent emissions data by county (2020) give a total for SO_2 emissions of 1,183 tons per year for the Denver PMSA. The calculated PWEI for this region is 3,547 million persons-tons per year. This indicates no minimum monitoring requirements for SO_2 in the Denver-Aurora-Lakewood MSA.

Using the same calculation for the Colorado Springs MSA, the calculated PWEI is 582 million persons-tons per year. This indicates no minimum monitoring requirements for SO_2 in the Colorado Springs MSA.

While there are no longer PWEI-based minimum monitoring requirements, the APCD will continue to conduct SO_2 monitoring at three locations in the Denver Metro/North Front Range Region during 2024.

5.1 Denver Metro/North Front Range Region

The annual mean and 99^{th} percentile one-hour daily maximum concentrations recorded in 2023 for each SO_2 monitoring site in the Denver Metro/North Front Range region are listed in Table 5.1 below. Also listed are the three year design values for each site.

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

5.2 Pikes Peak Region

5.3 Recent and Planned Changes in SO_2 Monitoring

SO_2 monitoring was discontinued at Highway 24 when this site was closed on 1/1/2024. The APCD further plans to discontinue SO_2 monitoring at the CAMP monitoring station in 2024.

Table 5.1: Summary of SO_2 values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023.

Site Name	County	SO_2 (ppb)		
		Annual Mean	99^{th} Percentile	3-Year Ave. of 99^{th} Percentile
Welby	Adams	0.89	6	6
CAMP	Denver	0.52	5	5[1]
La Casa	Denver	0.76	5	5

Table 5.2: Summary of SO_2 values recorded at the Highway 24 monitoring site in Colorado Springs during 2023.

Site Name	County	SO_2 (ppb)		
		Annual Mean	99^{th} Percentile	3-Year Ave. of 99^{th} Percentile
Highway 24	El Paso	0.65	5	7

6

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 (μm) in aerodynamic diameter (PM_{10}) are inhalable and thus pose a health threat. Particles less than 2.5 μm in aerodynamic diameter ($PM_{2.5}$) can penetrate deeply into the alveoli, while the smallest particles, such as those less than 0.1 μm 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 μm and 10 μm ($PM_{10\text{-}2.5}$) 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 PM_{10} encompasses all particles smaller than 10 μm, including the $PM_{2.5}$ and ultrafine fractions.

Table 6.1: EPA's minimum PM_{10} monitoring requirements.

MSA Population	High Concentration[1]	Medium Concentration[2]	Low Concentration[3,4]
>1,000,000	6-10	4-8	2-4
500,000-1,000,000	4-8	2-4	1-2
250,000-500,000	3-4	1-2	0-1
100,000-250,000	1-2	0-1	0

[1]High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM_{10} NAAQS by 20 percent or more.
[2]Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80 percent of the PM_{10} NAAQS.
[3]Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80 percent of the PM_{10} NAAQS.
[4]These minimum monitoring requirements apply in the absence of a design value.

Table 6.2: EPA's minimum $PM_{2.5}$ monitoring requirements.

MSA Population	Most recent 3-year design value $\geq$ 85% of any $PM_{2.5}$ NAAQS	Most recent 3-year design value $<$ 85% of any $PM_{2.5}$ NAAQS
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-500,000	1	0

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

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

$PM_{2.5}$ 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 filter-based $PM_{2.5}$ FRM instruments at five sites. Of these five sites, four are collocated with a continuous $PM_{2.5}$ monitor and one is collocated with another filter-based $PM_{2.5}$ FRM; 14 sites have continuous $PM_{2.5}$ but no filter-based FRM. Speciation analysis (laboratory analysis of $PM_{2.5}$ samples to characterize the different components of $PM_{2.5}$ in the atmosphere) is conducted at three sites; La Casa, Platteville, and Birch Street. All three speciation sites are collocated with a low volume filter-based FRM.

The annual $PM_{2.5}$ standard of 12 $\mu g\ m^{-3}$ is compared to the three-year average annual mean $PM_{2.5}$ concentration. The 24-hour $PM_{2.5}$ standard of 35 $\mu g\ m^{-3}$ is compared to the three-year average of the annual 98^{th} 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 (and T640x) have received Federal Equivalent Method (FEM) designation for $PM_{2.5}$ from the EPA. The APCD replaced the first TEOM at CAMP in April of 2013 with a GRIMM EDM 180. The APCD has determined the GRIMM EDM 180 and the T640/T640x to be a very reliable and cost effective way to monitor ambient continuous particulate concentrations. The APCD currently operates 22 sites that use these instruments to compare to the PM_{10} and $PM_{2.5}$ NAAQS.

6.2 Denver Metro/North Front Range Region

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

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

Table 6.3: Summary of PM_{10} values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023.

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

Table 6.4: Summary of $PM_{2.5}$ values recorded at monitoring stations in the Denver Metro/Northern Front Range region during 2023.

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

6.3 Eastern High Plains

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

Table 6.5: Summary of PM_{10} values recorded at monitoring stations in the Eastern High Plains region during 2023, with proposed exceptional events included.

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

6.4 Pikes Peak Region

There were no violations of the PM_{10} or $PM_{2.5}$ NAAQS in the Pikes Peak region during 2023. Table 6.6 and Table 6.7 below list the PM_{10} and $PM_{2.5}$ annual averages and design values recorded at the Colorado College monitoring site in 2023.

Table 6.6: Summary of PM_{10} values recorded at the Colorado College station during 2023.

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

Table 6.7: Summary of $PM_{2.5}$ values recorded at the Colorado College station during 2023.

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

6.5 South Central Region

There were no violations of the PM_{10} or $PM_{2.5}$ NAAQS in the South Central region during 2023. Table 6.8 and Table 6.9 below list the PM_{10} and $PM_{2.5}$ annual averages and design values recorded at the Pueblo site in 2023.

Table 6.8: Summary of PM_{10} values recorded at the Pueblo monitoring station during 2023.

Site Name	County	PM_{10} ($\mu g\ m^{-3}$)		
		Annual Average	24-Hr Max	3-Year Exceedances
Pueblo	Pueblo	24.8	64	1.1

Table 6.9: Summary of $PM_{2.5}$ values recorded at the Pueblo monitoring station during 2023.

Site Name	County	$PM_{2.5}$ ($\mu g\ m^{-3}$)		
		Annual Average	Annual 98^{th} Percentile	3-Year Ave. of 98^{th} Percentile
Pueblo	Pueblo	5.2	10.4	16

6.6 Central Mountain Region

There were no violations of the PM_{10} NAAQS in the Central Mountain region during 2023. Table 6.10 below lists the PM_{10} 2023 annual average and design value recorded at each site in this region.

Table 6.10: Summary of PM_{10} values recorded at monitoring stations in the Central Mountains region during 2023.

Site Name	County	PM_{10} ($\mu g\ m^{-3}$)		
		Annual Average	24-Hr Max	3-Year Exceedances
Cañon City	Fremont	16.3	95	0
Aspen	Pitkin	15.8	56	0
Steamboat Springs	Routt	16.1	69	0

6.7 Western Slope Region

There were no violations of the PM_{10} or $PM_{2.5}$ NAAQS in the Western Slope region during 2023. Table 6.11 and Table 6.12 below list the PM_{10} and $PM_{2.5}$ annual averages and design values recorded at each site in this region in 2023.

Table 6.11: Summary of PM_{10} values recorded at monitoring sites in the Western Slope region during 2023.

Site Name	County	PM_{10} ($\mu g\ m^{-3}$)		
		Annual Average	24-Hr Max	3-Year Exceedances
Grand Junction - Powell Bldg.	Mesa	16.2	63	0
Telluride	San Miguel	12.9	62	0

Table 6.12: Summary of $PM_{2.5}$ values recorded at the Grand Junction - Powell Bldg. monitoring site during 2023.

Site Name	County	$PM_{2.5}$ ($\mu g\ m^{-3}$)		
		Annual Average	Annual 98^{th} Percentile	3-Year Ave. of 98^{th} Percentile
Grand Junction - Powell Bldg.	Mesa	4.4	10.2	14

6.8 Southwestern Region

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

Table 6.13: Summary of PM_{10} values recorded at monitoring sites in the Southwest region during 2023, with proposed exceptional events included.

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

6.9 Recent and Planned Changes in PM Monitoring

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

Birch Street (08-001-0010)

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

Welby (08-001-3001)

- High-volume PM_{10} sampling was discontinued and collocated T640x FEM monitors for PM_{10} and $PM_{2.5}$ were introduced.

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

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

Chatfiled (08-035-0004)

- Filter-based $PM_{2.5}$ monitoring was discontinued on 9/30/2023.

Pueblo - Fountain School (08-101-0015)

- High-volume PM_{10} and Partisol samplers were discontinued on 9/15/2023.
- Installed a new T640x FEM for real-time PM_{10} and $PM_{2.5}$ monitoring.

Steamboat Springs (08-107-0003)

- High-volume PM_{10} sampling was discontinued on 9/29/2023 and a new T640x was installed, reporting real-time FEM PM_{10} measurements.

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

- High-volume PM_{10} sampling was discontinued and T640x FEM monitors for PM_{10} and $PM_{2.5}$ were introduced at both sites.

Alamosa - ASC (08-003-0001)

- Installed a T640x FEM for real-time PM_{10} and $PM_{2.5}$ monitoring on 10/25/2023.

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

- Both locations saw the discontinuation of high-volume PM_{10} sampling in late 2023 and new T640x analyzers were installed.

Arapaho Community College (08-005-0005)

- Low-volume Partisol $PM_{2.5}$ sampling was discontinued and a GRIMM analyzer was introduced, reporting valid data from 4/16/2024.

Longmont (08-013-0003)

- Filter-based instruments, including high-volume PM_{10} and Partisol samplers, were discontinued in early 2024 and replaced with T640x FEM for real-time PM_{10} and $PM_{2.5}$ monitoring.

Planned Changes

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

7

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 $\mu g\ m^{-3}$ averaged over a calendar quarter) since the first quarter of 1980. The 2008 lead standard, which is 0.15 $\mu g\ m^{-3}$ averaged over any three rolling consecutive three-month periods, has not been exceeded using data from 2013 - 2015.

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

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

7.1 Planned Changes in Lead Monitoring

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

8

Meteorological Measurements

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

8.1 Recent and Planned Changes in Meteorological Monitoring

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

9

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 (NO_y), nitrogen dioxide (NO_2), mixing layer height, wind speed, wind direction, relative humidity, temperature, atmospheric pressure, precipitation, total solar radiation, and ultraviolet radiation. All measurements will be collected and reported in hourly averages.

9.1 Recent and Planned Changes in PAMS Monitoring

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

10

Quality Assurance

10.1 Continuous Monitors

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

10.2 Particulate Monitors

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

10.3 Meteorological Monitors

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

11

Summary of Network Changes

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

11.1 Completed and Planned Changes

- **CO Monitoring:**
  - Relocated the CO monitor from Highway 24 to the Colorado College site (08-041-0017) on 1/1/2024.
  - Discontinued CO monitoring at the Welby (08-001-3001) and CAMP (08-031-0002) sites in October 2023, both after over 50 years of operation.
- **O_3 Monitoring:**
  - Discontinued O_3 monitoring at the Platteville Atmospheric Observatory (PAO) site and moved the monitor to the La Salle site (08-123-0015) in February 2024.
  - Will commence O_3 monitoring at new sites in Larimer County (Timnath and Fossil Creek) in summer 2024.
- **NO_2 Monitoring:**
  - Similar relocation from the Platteville Atmospheric Observatory to the La Salle site in February 2024.
  - New monitoring to start in Larimer County (Timnath and Fossil Creek) in summer 2024.
- **SO_2 Monitoring:**
  - Discontinued SO_2 monitoring at Highway 24 when the site was closed on 1/1/2024.
  - Will discontinue SO_2 monitoring at the CAMP site during 2024.
- **PM Monitoring:**
  - Numerous changes across sites, including the installation of T640x monitors and discontinuation of older equipment like high-volume PM_{10} samplers and Partisol samplers throughout 2023 and early 2024.
  - Notable site-specific changes include new equipment at Boulder, Pueblo Fountain School, Steamboat Springs, Lamar, Cañon City, Alamosa, Pagosa Springs, Telluride, Arapaho Community College, and Longmont.
  - Planned changes include updates at Platteville - Middle School, Aspen, Grand Junction - Powell Bldg. and CAMP.
- **Meteorological Monitoring:**

  - Installed a meteorological tower at the Fort Collins West site (08-069-0011) on 7/28/23.
  - Discontinued meteorological monitoring at CAMP and Highway 24.
  - Will commence meteorological monitoring at the new Fossil Creek site in summer 2024.

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

12

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.