

# **COLORADO ANNUAL MONITORING NETWORK PLAN 2014**



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**Colorado Department  
of Public Health  
and Environment**

**Prepared by the Air Pollution Control Division  
Technical Services Program**

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## **I. INTRODUCTION**

The Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division's (APCD) 2014 Ambient Air Monitoring Network Plan is an examination and evaluation of the APCD's network of air pollution monitoring stations. The Network Plan is an annual review of the Division's air monitoring network, as required by Title 40, Code of Federal Regulations, Part 58.10(a) [40 CFR 58.10(a)].<sup>1</sup> It is also a simple accounting of monitoring site changes expected for that year and the following year. It is due on or before July 1 each year.

### **Purpose of Network Plan**

The purpose of the Network Plan is to provide an overview of the APCD's current air quality monitoring network and projected plans for the coming year. This plan shows the general reason for monitoring, the location of the monitor, and finally the type and frequency of measurements taken at each location. This is the seventh year that this review has been released to the general public for comment prior to its submittal to the U. S. Environmental Protection Agency (EPA) for approval. This change was initiated because of a change in Federal Regulations implemented in December 2006.

### **Overview of the Colorado Air Monitoring Network**

The Colorado Air Pollution Control Division currently operates monitors at 58 locations. Since last reported, the Rist Canyon monitoring site was removed, and the I-25 Near Roadway, and Castlewood Canyon sites were added. Additions to the network for that are planned for the coming year include a second near roadway site. These changes are discussed in more detail later in this document.

Particulate monitors, including Particulate Matter 10 microns and smaller (PM<sub>10</sub>) and Particulate Matter 2.5 microns and smaller (PM<sub>2.5</sub>), and ozone monitors are the most abundant and widespread of monitoring types across the state, not considering meteorological monitoring. Currently, there are PM<sub>10</sub> monitors at 30 separate locations, PM<sub>2.5</sub> monitors at 19 separate locations, and ozone monitors at 20 locations. There are 20 meteorological sites in operation. These sites monitor wind speed, wind direction, resultant speed, resultant direction, standard deviation of horizontal wind direction, and temperature. Three meteorological sites, and the visibility site, also monitor for relative humidity.

The APCD currently operates one TSP site at the Centennial Airport used for lead analysis, and submits PM<sub>10</sub> samples from La Casa for lead analysis. Only seven of the 30 PM<sub>10</sub> monitoring sites are continuous, while thirteen of the 19 PM<sub>2.5</sub> monitoring sites also have continuous monitors. Only three continuous PM<sub>2.5</sub> sites (Boulder Athens, NJH, and Rifle) are not collocated with PM<sub>2.5</sub> FRM monitors. This difference reflects the age of the technology, as well as the availability and focus of EPA funding. Increasing the amount of automated versus manual monitoring will require modifications to the particulate network, in the current network these are primarily manually operated monitors.

39 of the 58 currently monitoring sites have been in operation for ten or more years, and 24 of these have been in operation for 20 or more years. Fourteen monitoring sites have been in operation for more than 30 years. Conversely, 19 of the 58 operating sites have been in

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<sup>1</sup> "Annual Monitoring Network Plan and Periodic Network Assessment," 40 Federal Regulations 58.10 (1 July 2011), p. 248.

operation for less than 10 years.

Four of the ozone (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, Lay Peak, and Cortez monitoring sites. ARS keeps the sites in proper working order and performs calibrations, data retrievals, and data validation, while the APCD uploads data to the AQS database and conducts independent audits of the sites for Quality Assurance (QA) purposes.

### **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 best technology available for defining the magnitude and extent of the very visible air pollution problem. Monitoring for gaseous pollutants (carbon monoxide, sulfur dioxide, oxides of nitrogen and ozone) began in 1965 when the Federal Government established the CAMP station in downtown Denver at the intersection of 21<sup>st</sup> Street and Broadway. This was the area that was thought to represent the best probability for detecting maximum levels of most of the suspected pollutants. Instruments were primitive by comparison with those of today, and frequently were out of service.

Under provisions of the original Federal Clean Air Act of 1970, the Administrator of the U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) designed to protect the public's health and welfare. Standards were set for total suspended particulate matter (TSP), carbon monoxide (CO), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>) and sulfur dioxide (SO<sub>2</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 SIP's 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 are made to ensure consistency and compliance with Federal monitoring requirements. Station location, probe siting, sampling methodology, quality assurance practices, and data handling procedures are all maintained throughout any changes made to the network.

### **APCD Monitoring Operations**

The APCD attempts to operate all of its monitors for a full calendar year, beginning operation of new monitors in January and terminating existing monitors in December. Circumstances both in and out of the Division's control make that desired schedule difficult to achieve. 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 permissions for use due to risk management issues.

When modifications to the State and Local Air Monitoring System (SLAMS) network are required, the Division will provide EPA Region 8 with the appropriate modification forms prior

to its implementation for their approval. All currently operating SLAMS monitors have been approved by EPA. With the exception of some vegetation issues (tall trees), sites meet the requirements set forth in 40 CFR 58, Appendices A, C, D, and E.

### **Network Modification Procedures**

The APCD develops changes to its monitoring network in several ways. New monitoring locations have been added as a result of community concerns about air quality, such as the PM<sub>10</sub> monitors in Cripple Creek and Hygiene established in 1998. Other monitors have been established as a result of special studies, such as the O<sub>3</sub> monitoring in Aurora, Rifle, Cortez, Aspen Park, Palisade, and Lay Peak.

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. The most current examples of this are the Auraria meteorological monitoring station and the relocation of the Denver Municipal Animal Shelter (DMAS) site. The Auraria station was removed due to the construction of a tall building in the immediate vicinity of the monitor that obstructed airflow around the monitoring site. The DMAS site was relocated due to a change in use of the 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.

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 changed significantly since the monitor was established, a more suitable location for the monitor is sought. An example of this is the O<sub>3</sub> monitor previously located at the Arvada monitoring site. It was shut down on 1/1/2012, and relocated to the Denver – CAMP location beginning 3/1/2012.

Table 1 lists the locations and monitoring parameters of each site currently in operation, by county, alphabetically. It lists the AQS identification numbers for each site, the site address and coordinates, the start dates, and the site elevations. It further breaks down the monitor type, orientation/scale, and the sampling frequency for each site. The parameter date is the date when valid data were first collected. Due to equipment problems this date can be significantly different than the site installation date, which is the “Started” date.



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

AQS #	Site Name	Address		Started	Elevation (m)	Latitude	Longitude
	Parameter	POC	Started	Orient/Scale	Monitor	Type	Sample
<b>Adams</b>							
08 001 0006	<i>Alsup Elementary School</i>	<i>7101 Birch St.</i>		<i>01/2001</i>	<i>1,565</i>	<i>39.826007</i>	<i>-104.937438</i>
	PM <sub>10</sub>	1	01/2001	P.O. Neigh	Partisol 2025	SLAMS	1 in 1
	PM <sub>2.5</sub>	1	01/2001	P.O. Neigh	Partisol 2025	SLAMS	1 in 3
	PM <sub>2.5</sub> Collocated	2	01/2001	P.O. Neigh	Partisol 2025	SLAMS	1 in 6
	PM <sub>2.5</sub>	3	06/2003	P.O. Neigh	TEOM-1400ab	SPM	Continuous
	PM <sub>2.5</sub> Speciation	5	02/2001	P.O. Neigh	SASS	Trends Spec	1 in 6
	PM <sub>2.5</sub> Carbon	5	02/2007	P.O. Neigh	URG 3000N	Trends Spec	1 in 6
WS/WD/Temp	1	06/2003	Other	Met - One	Other	Continuous	
08 001 3001	<i>Welby</i>	<i>3174 E. 78<sup>th</sup> Ave.</i>		<i>07/1973</i>	<i>1,554</i>	<i>39.838119</i>	<i>-104.94984</i>
	CO	1	07/1973	P.O. Neigh	Thermo 48C	SLAMS	Continuous
	SO <sub>2</sub>	2	07/1973	P.O. Neigh	TAPI 100E	SLAMS	Continuous
	NO	2	01/1976	P.O. Urban	TAPI 200E	Other	Continuous
	NO <sub>2</sub>	1	01/1976	P.O. Urban	TAPI 200E	SLAMS	Continuous
	O <sub>3</sub>	2	07/1973	P.O. Neigh	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	01/1975	Other	Met - One	Other	Continuous
	PM <sub>10</sub>	1	02/1992	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 6
PM <sub>10</sub>	3	06/1990	P.O. Neigh	TEOM-1400ab	SLAMS	Continuous	
<b>Alamosa</b>							
08 003 0001	<i>Alamosa – Adams State College</i>	<i>208 Edgemont Blvd</i>		<i>01/1970</i>	<i>2,302</i>	<i>37.469391</i>	<i>-105.878691</i>
	PM <sub>10</sub>	1	07/1989	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 1
08 003 0003	<i>Alamosa – Municipal Bldg.</i>	<i>425 4<sup>th</sup> St.</i>		<i>04/2002</i>	<i>2,301</i>	<i>37.469584</i>	<i>-105.863175</i>
	PM <sub>10</sub>	1	05/2002	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 1
<b>Arapahoe</b>							
08 005 0002	<i>Highland Reservoir</i>	<i>8100 S. University Blvd</i>		<i>06/1978</i>	<i>1,747</i>	<i>39.567887</i>	<i>-104.957193</i>
	O <sub>3</sub>	1	06/1978	P.O. Neigh	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	07/1978	Other	Met - One	Other	Continuous
08 005 0005	<i>Arapaho Community College (ACC)</i>	<i>6190 S. Santa Fe Dr.</i>		<i>12/1998</i>	<i>1,636</i>	<i>39.604399</i>	<i>-105.019526</i>
	PM <sub>2.5</sub>	1	03/1999	P.O. Neigh	Partisol 2025	SLAMS	1 in 3
08 005 0006	<i>Aurora - East</i>	<i>36001 E. Quincy Ave.</i>		<i>04/2011</i>	<i>1,552</i>	<i>39.63854</i>	<i>-104.56913</i>
	O <sub>3</sub>	1	04/2011	P.O. Region	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	06/2011	Other	Met - One	Other	Continuous
08 005 0007	<i>Centennial Airport</i>	<i>7800 S. Peoria St.</i>		<i>04/2011</i>	<i>1,774</i>	<i>39.572304</i>	<i>-104.84881</i>
	TSP/Pb	1	4/2011	P.O. Neigh	TSP-GMW	SLAMS	1 in 6
<b>Archuleta</b>							
08 007 0001	<i>Pagosa Springs School</i>	<i>309 Lewis St.</i>		<i>08/1975</i>	<i>2,165</i>	<i>37.26842</i>	<i>-107.009659</i>
	PM <sub>10</sub>	3	09/1990	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 1
<b>Boulder</b>							

AQS #	Site Name	Address		Started	Elevation (m)	Latitude	Longitude
	Parameter	POC	Started	Orient/Scale	Monitor	Type	Sample
08 013 0003	Longmont-Municipal Bldg.	350 Kimbark St.		06/1985	1,520	40.164576	-105.100856
	PM <sub>10</sub>	2	09/1985	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 6
	PM <sub>2.5</sub>	1	01/1999	P.O. Neigh	Partisol 2025	SLAMS	1 in 3
	PM <sub>2.5</sub>	3	11/2005	P.O. Neigh	TEOM 1400ab	SPM	Continuous
08 013 0011	South Boulder Creek	1405 ½ S. Foothills Parkway		06/1994	1,669	39.957212	-105.238458
	O <sub>3</sub>	1	06/1994	H.C. Urban	TAPI 400E	SLAMS	Continuous
08 013 0012	Boulder Chamber of Commerce	2440 Pearl St.		12/1994	1,619	40.021097	-105.263382
	PM <sub>10</sub>	1	10/1994	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 6
	PM <sub>2.5</sub>	1	01/1999	P.O. Middle <sup>2</sup>	Partisol 2025	SLAMS	1 in 3
08 013 1001	Boulder – CU – Athens	2102 Athens St.		12/1980	1,622	40.012969	-105.264212
	PM <sub>2.5</sub>	3	02/2004	P.O. Neigh	TEOM FDMS	SPM	Continuous
<b>Delta</b>							
08 029 0004	Delta Health Dept	560 Dodge St.		08/1993	1,511	38.739213	-108.073118
	PM <sub>10</sub>	1	05/1993	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3
<b>Denver</b>							
08 031 0002	CAMP	2105 Broadway		01/1965	1,593	39.751184	-104.987625
	CO	2	01/1971	P.O. Micro	Thermo 48C	SLAMS	Continuous
	SO <sub>2</sub>	1	01/1967	P.O. Neigh	TAPI 100E	SLAMS	Continuous
	O <sub>3</sub>	6	03/2012	P.O. Neigh	TAPI 400E	SLAMS	Continuous
	NO	1	01/1973	Other	TAPI 200E	Other	Continuous
	NO <sub>2</sub>	1	01/1973	P.O. Neigh	TAPI 200E	SLAMS	Continuous
	WS/WD/Temp	1	01/1965	Other	Met - One	Other	Continuous
	PM <sub>10</sub>	1	08/1986	P.O. Micro <sup>2</sup>	SA/GMW-1200	SLAMS	1 in 6
	PM <sub>10</sub> Collocated	2	12/1987	P.O. Micro <sup>2</sup>	SA/GMW-1200	SLAMS	1 in 6
	PM <sub>10</sub>	3	04/2013	P.O. Micro <sup>2</sup>	GRIMM EDM 180	SLAMS	Continuous
	PM <sub>2.5</sub>	1	01/1999	P.O. Micro <sup>2</sup>	Partisol 2025	SLAMS	1 in 1
	PM <sub>2.5</sub> Collocated	2	09/2001	P.O. Micro <sup>2</sup>	Partisol 2025	SLAMS	1 in 6
PM <sub>2.5</sub>	3	04/2013	P.O. Micro <sup>2</sup>	GRIMM EDM 180	SPM	Continuous	
08 031 0013	NJH-E	14 <sup>th</sup> Ave. & Albion St.		01/1983	1,620	39.738578	-104.939925
	PM <sub>2.5</sub>	3	10/2003	P.O. Neigh	TEOM FDMS	SPM	Continuous
08 031 0016	DESCI	1901 E. 13 <sup>th</sup> Ave.		12/1990	1,623	39.735700	-104.958200
	Transmissometer	1	12/1989	Other	Optec LPV-2	SPM	Continuous
	Nephelometer	1	12/2000	Other	Optec NGN-2	SPM	Continuous
	Temp	1	12/1989	Other	Rotronics MP-101A	SPM	Continuous
	Relative Humidity	1	12/1989	Other	Rotronics MP-101A	SPM	Continuous
08 031 0017	Denver Visitor Center	225 W. Colfax		12/1992	1,597	39.740342	-104.991037

<sup>2</sup> The CAMP PM<sub>2.5</sub> site is technically a micro-scale site, but the APCD demonstrated to EPA in 2001 that the CAMP site is representative of a much larger area of similar land use, meteorology, and emissions around downtown Denver, and has therefore been justified to meet the Neighborhood scale criteria for PM<sub>2.5</sub> concentrations. The same is true for the Boulder Chamber of Commerce PM<sub>2.5</sub> site, which is technically a middle scale site.

AQS #	Site Name	Address		Started	Elevation (m)	Latitude	Longitude
	Parameter	POC	Started	Orient/Scale	Monitor	Type	Sample
		PM <sub>10</sub>	1	12/1992	P.O. Middle	SA/GMW-1200	SLAMS
08 031 0026	<i>La Casa</i>		<i>4587 Navajo St.</i>	<i>01/2013</i>	<i>1,594</i>	<i>39.779429</i>	<i>-105.005174</i>
	CO (Trace)	1	01/2012	P.O. Neigh	Thermo 48i-TLE	NCore	Continuous
	SO <sub>2</sub> (Trace)	1	01/2012	P.O. Neigh	TAPI 100EU	NCore	Continuous
	NO <sub>y</sub>	1	01/2012	P.O. Neigh	TAPI 200EU	NCore	Continuous
	O <sub>3</sub>	1	01/2012	Neigh/Urban	TAPI 400E	NCore	Continuous
	WS/WD/Temp	1	01/2012	P.O. Neigh	Met - One	NCore	Continuous
	Relative Humidity	1	01/2012	P.O. Neigh	Met - One	NCore	Continuous
	Temp (Lower)	2	01/2012	P.O. Neigh	Met - One	NCore	Continuous
	PM <sub>10</sub>	1	01/2012	P.O. Neigh	Partisol 2025	SLAMS	1 in 3
	PM <sub>10</sub> Collocated/Pb	2	01/2012	P.O. Neigh	Partisol 2025	SLAMS	1 in 6
	PM <sub>10</sub>	3	01/2012	P.O. Neigh	TEOM-1400ab	SLAMS	Continuous
	PM <sub>2.5</sub>	1	01/2012	P.O. Neigh	Partisol 2025	NCore	1 in 3
	PM <sub>2.5</sub>	3	01/2012	P.O. Neigh	TEOM FDMS	SPM	Continuous
	PM <sub>2.5</sub> Speciation	5	01/2012	P.O. Neigh	SASS	Supplem. Speciation	1 in 3
	PM <sub>2.5</sub> Carbon	5	01/2012	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>06/2013</i>		<i>39.732146</i>	<i>-105.015317</i>
	CO (Trace)	1	06/2013	Near Road	Thermo 48i-TLE	SLAMS	Continuous
	NO <sub>2</sub> (Trace)	1	06/2013	Near Road	TAPI 200EU	NAMS	Continuous
	NO (Trace)	1	06/2013	Near Road	TAPI 200EU	SPM	Continuous
	WS/WD/Temp	1	06/2013	Near Road	Met - One	SPM	Continuous
	PM <sub>10</sub>	3	12/2013	Near Road	GRIMM EDM 180	SLAMS	Continuous
	PM <sub>2.5</sub>	1	01/2014	Near Road	R & P 2025	SLAMS	1 in 3
	PM <sub>2.5</sub>	3	12/2013	Near Road	GRIMM EDM 180	SPM	Continuous
PM <sub>2.5</sub> Carbon	5	10/2013	Near Road	API 633	Supplem. Speciation	Continuous	
<b>Douglas</b>							
08 035 0004	<i>Chatfield State Park</i>		<i>11500 N. Roxborough Pk Rd</i>	<i>04/2004</i>	<i>1,676</i>	<i>39.534488</i>	<i>-105.070358</i>
	O <sub>3</sub>	1	05/2005	H.C. Urban	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	04/2004	Other	Met - One	Other	Continuous
	PM <sub>2.5</sub>	1	07/2005	P.O. Neigh	Partisol 2025	SPM	1 in 3
	PM <sub>2.5</sub>	3	05/2004	P.O. Neigh	TEOM FDMS	SPM	Continuous
08 035 0005	<i>Castlewood Canyon</i>		<i>Castlewood Canyon State Park</i>	<i>11/2013</i>			
	PM <sub>2.5</sub>	1	11/2013	Background	R & P 2000	SLAMS	1 in 6
<b>El Paso</b>							
08 041 0013	<i>U. S. Air Force Academy</i>		<i>USAFA Rd. 640</i>	<i>05/1996</i>	<i>1,971</i>	<i>39.958341</i>	<i>-104.817215</i>
	O <sub>3</sub>	1	06/1996	H.C. Urban	TAPI 400E	SLAMS	Continuous
08 041 0015	<i>Highway 24</i>		<i>690 W. Hwy. 24</i>	<i>11/1998</i>	<i>1,824</i>	<i>39.830895</i>	<i>-104.839243</i>
	CO	1	11/1998	P.O. Micro	Thermo 48i-TLE	SLAMS	Continuous
	SO <sub>2</sub>	1	01/2013	P.O. Micro	TAPI 100T	SLAMS	Continuous

AQS #	Site Name	Address		Started	Elevation (m)	Latitude	Longitude
	Parameter	POC	Started	Orient/Scale	Monitor	Type	Sample
08 041 0016	Manitou Springs	101 Banks Pl.		04/2004	1,955	38.853097	-104.901289
	O <sub>3</sub>	1	04/2004	H.C. Neigh	TAPI 400E	SLAMS	Continuous
08 041 0017	Colorado College	130 W. Cache La Poudre		12/2007	1,832	38.848014	-104.828564
	PM <sub>10</sub>	1	12/2007	P.O. Neigh	Partisol 2000	SLAMS	1 in 6
	PM <sub>2.5</sub>	1	12/2007	P.O. Neigh	Partisol 2025	SLAMS	1 in 3
	PM <sub>2.5</sub>	3	01/2008	P.O. Neigh	TEOM FDMS	SLAMS	Continuous
<b>Fremont</b>							
08 043 0003	Cañon City – City Hall	128 Main St.		10/2004	1,626	38.43829	-105.24504
	PM <sub>10</sub>	1	10/2004	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 6
<b>Garfield</b>							
08 045 0005	Parachute – Elem. School	100 E. 2nd St.		01/1982	1,557	38.453654	-108.053269
	PM <sub>10</sub>	1	05/2000	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3
	WS/WD/Temp	1	03/2011	Other	RM Young /Vaisala	Other	Continuous
08 045 0007	Rifle–Henry Bldg	144 3rd St.		05/2005	1,627	39.531813	-107.782298
	PM <sub>10</sub>	1	05/2005	P.O. Neigh	SA/GMW-1200	SPM	1 in 3
	PM <sub>2.5</sub>	3	09/2008	P.O. Neigh	Thermo 1405 DF	SPM	Continuous
	PM <sub>10</sub>	3	09/2008	P.O. Neigh	Thermo 1405 DF	SPM	Continuous
	PM <sub>10-2.5</sub>	3	09/2008	P.O. Neigh	Thermo 1405 DF	SPM	Continuous
	WS/WD/Temp	1	09/2008	Other	RM Young /Vaisala	Other	Continuous
08 045 0012	Rifle – Health Dept	195 W. 14th Ave.		06/2008	1,629	39.54182	-107.784125
	O <sub>3</sub>	1	06/2008	P.O. Neigh	TAPI 400E	SLAMS	Continuous
08 045 0018	Carbondale	1493 County Road 106		5/2012	1868	39.41224	-107.230413
	PM <sub>10</sub>	1	08/2012	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3
<b>Gunnison</b>							
08 051 0004	Crested Butte	603 6th St.		09/1982	2,714	38.867595	-106.981436
	PM <sub>10</sub>	2	03/1997	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3
	PM <sub>10</sub> Collocated	3	10/2008	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 6
08 051 0007	Mt. Crested Butte - Realty	19 Emmons Rd.		07/2005	2,866	38.900392	-106.966104
	PM <sub>10</sub>	1	07/2005	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 1
<b>Jefferson</b>							
08 059 0002	Arvada	9101 W. 57th Ave.		01/1973	1,640	39.800333	-105.099973
	WS/WD/Temp	1	01/1975	Other	Met - One	Other	Continuous
08 059 0005	Welch	12400 W. Hwy. 285		08/1991	1,742	39.638781	-105.13948
	O <sub>3</sub>	1	08/1991	P.O. Urban	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	11/1991	Other	Met - One	Other	Continuous
08 059 0006	Rocky Flats - N	16600 W. Hwy. 128		06/1992	1,802	39.912799	-105.188587
	O <sub>3</sub>	1	09/1992	H.C. Urban	TAPI 400E	SLAMS	Continuous
	WS/WD/Temp	1	09/1992	Other	Met - One	Other	Continuous
08 059 0011	NREL	2054 Quaker St.		06/1994	1,832	39.743724	-105.177989
	O <sub>3</sub>	1	06/1994	H.C. Urban	TAPI 400E	SLAMS	Continuous
08 059 0013	Aspen Park	26137 Conifer Rd.		04/2011	2,467	39.540321	-105.296512

AQS #	Site Name	Address		Started	Elevation (m)	Latitude	Longitude	
	Parameter	POC	Started	Orient/Scale	Monitor	Type	Sample	
		O <sub>3</sub>	1	04/2011	P.O. Neigh	TAPI 400E	SLAMS	Continuous
		WS/WD/Temp	1	06/2011	Other	Met - One	Other	Continuous
<b>La Plata</b>								
08 067 0004	Durango – River City Hall	1235 Camino del Rio		09/1985	1,988	37.277798	-107.880928	
	PM <sub>10</sub>	1	12/2002	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3	
<b>Larimer</b>								
08 069 0009	Fort Collins – CSU - Edison	251 Edison Dr.		12/1998	1,524	40.571288	-105.079693	
	PM <sub>10</sub>	1	07/1999	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3	
	PM <sub>10</sub>	3	06/2011	P.O. Neigh	Thermo 1405 DF	SPM	Continuous	
	PM <sub>2.5</sub>	1	07/1999	P.O. Neigh	Partisol 2025	SLAMS	1 in 3	
	PM <sub>2.5</sub>	3	06/2011	P.O. Neigh	Thermo 1405 DF	SPM	Continuous	
	PM <sub>10-2.5</sub>	3	06/2011	P.O. Neigh	Thermo 1405 DF	SPM	Continuous	
08 069 0011	Fort Collins - West	3416 La Porte Ave.		05/2006	1,571	40.592543	-105.141122	
	O <sub>3</sub>	1	05/2006	H.C. Urban	TAPI 400E	SLAMS	Continuous	
08 069 1004	Fort Collins - Mason	708 S. Mason St.		12/1980	1,524	40.57747	-105.07892	
	CO	1	12/1980	P.O. Neigh	Thermo 48C	SLAMS	Continuous	
	O <sub>3</sub>	1	12/1980	P.O. Neigh	TAPI 400E	SLAMS	Continuous	
	WS/WD/Temp	1	01/1981	Other	Met - One	Other	Continuous	
<b>Mesa</b>								
08 077 0017	Grand Junction – Powell Bldg	650 South Ave.		02/2002	1,398	39.063798	-108.561173	
	PM <sub>10</sub> & NATTS Toxic Metals	3	01/2005	P.O. Neigh	Partisol 2025	SLAMS	1 in 3	
	PM <sub>10</sub> Collocated & NATTS	4	03/2005	P.O. Neigh	Partisol 2000	SLAMS	1 in 6	
	PM <sub>2.5</sub>	1	11/2002	P.O. Neigh	Partisol 2025	SLAMS	1 in 3	
	PM <sub>10</sub>	3	01/2014	P.O. Neigh	GRIMM EDM 180	SPM	Continuous	
	PM <sub>2.5</sub>	3	01/2014	P.O. Neigh	GRIMM EDM 180	SPM	Continuous	
	PM <sub>10-2.5</sub>	3	01/2014	P.O. Neigh	GRIMM EDM 180	SPM	Continuous	
08 077 0018	Grand Junction - Pitkin	645 1/4 Pitkin Ave.		01/2004	1,398	39.064289	-108.56155	
	CO	1	01/2004	P.O. Micro	Thermo 48C	SLAMS	Continuous	
	WS/WD/Temp	1	01/2004	Other	Met - One	Other	Continuous	
	Relative Humidity	1	01/2004	Other	Rotronic	Other	Continuous	
08 077 0019	Clifton - Sanitation	Hwy. 141 & D Rd.		10/2006	1,413	39.062514	-108.457382	
	PM <sub>10</sub>	1	10/2007	P.O. Neigh	SA/GMW -1200	SLAMS	1 in 3	
08 077 0020	Palisade Water Treatment	Rapid Creek Rd.		05/2008	1,512	39.130575	-108.313853	
	O <sub>3</sub>	1	04/2008	P.O. Urban	TAPI 400E	SLAMS	Continuous	
	WS/WD/Temp	1	04/2008	Other	RM Young	Other	Continuous	
<b>Moffat</b>								
08 081 0002	Lay Peak	Moffat CR 17		08/2011	1,961	40.506890	-107.891000	
	O <sub>3</sub>	1	08/2011	P.O. Region	TAPI 400E	SLAMS	Continuous	

AQS #	Site Name	Address		Started	Elevation (m)	Latitude	Longitude	
	Parameter	POC	Started	Orient/Scale	Monitor	Type	Sample	
		WS/WD/Temp	1	08/2011	P.O Region	Met – One	Other	Continuous
		Relative Humidity	1	08/2011	P.O Region	Met - One	Other	Continuous
<b>Montezuma</b>								
08 083 0006	Cortez – Health Dept	106 W. North St.		06/2006	1,890	37.350054	-108.592337	
	O <sub>3</sub>	1	06/2008	P.O. Urban	TAPI 400E	SLAMS	Continuous	
	PM <sub>2.5</sub>	1	06/2008	P.O Region	Partisol 2000	SPM	1 in 6	
<b>Pitkin</b>								
08 097 0006	Aspen - Library	120 Mill St.		05/2002	2,408	39.19104	-106.818864	
	PM <sub>10</sub>	1	05/2002	P.O. Neigh	SA/GWM 1200	SLAMS	1 in 3	
<b>Prowers</b>								
08 099 0002	Lamar Municipal	104 E. Parmenter St.		12/1976	1,107	38.084688	-102.618641	
	PM <sub>10</sub>	2	03/1987	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 1	
08 099 0003	Lamar Port of Entry	7100 US Hwy. 50		03/2005	1,108	38.113792	-102.626181	
	WS/WD/Temp	1	03/2005	Other	Met - One	Other	Continuous	
<b>Pueblo</b>								
08 101 0015	Pueblo – Fountain School	925 N. Glendale Ave.		06/2011	1,433	38.276099	-104.597613	
	PM <sub>10</sub>	1	04/2011	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3	
	PM <sub>2.5</sub>	1	04/2011	P.O. Neigh	Partisol 2025	SLAMS	1 in 3	
<b>Routt</b>								
08 107 0003	Steamboat Springs	136 6th St.		09/1975	2,054	40.485201	-106.831625	
	PM <sub>10</sub>	2	03/1987	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 1	
<b>San Miguel</b>								
08 113 0004	Telluride	333 W. Colorado Ave.		03/1990	2,684	37.937872	-107.813061	
	PM <sub>10</sub>	1	03/1990	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3	
<b>Weld</b>								
08 123 0006	Greeley-Hospital	1516 Hospital Rd.		04/1967	1,441	40.414877	-104.70693	
	PM <sub>10</sub>	2	03/1987	P.O. Neigh	SA/GMW-1200	SLAMS	1 in 3	
	PM <sub>2.5</sub>	1	02/1999	P.O. Neigh	Partisol 2025	SLAMS	1 in 3	
	PM <sub>2.5</sub>	3	02/1999	P.O. Neigh	TEOM – 1400ab	SPM	Continuous	
08 123 0008	Platteville Middle School	1004 Main St.		12/1998	1,469	40.209387	-104.82405	
	PM <sub>2.5</sub>	1	08/1999	P.O. Region	Partisol 2025	SLAMS	1 in 3	
	PM <sub>2.5</sub> Speciation	5	08/1999	P.O. Region	SASS	Spec Trends	1 in 6	
	PM <sub>2.5</sub> Carbon	5	04/2011	P.O. Neigh	URG 3000N	Spec Trends	1 in 6	
08 123 0009	Greeley –County Tower	3101 35th Ave.		06/2002	1,484	40.386368	-104.73744	
	O <sub>3</sub>	1	06/2002	H.C. Neigh	TAPI 400E	SLAMS	Continuous	
	WS/WD/Temp	1	02/2012	Other	Met - One	Other	Continuous	
08 123 0010	Greeley – West Annex	905 10th Ave.		12/2003	1,421	40.423432	-104.69479	
	CO	1	12/2003	P.O. Neigh	Thermo 48C	SLAMS	Continuous	

The following abbreviations were used in Table 1, with orientation (Orient) referring to the reason why the monitor was placed in that location, 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 Projects Monitor
- H.C. - Highest Concentration
- POC - Parameter Occurrence Code

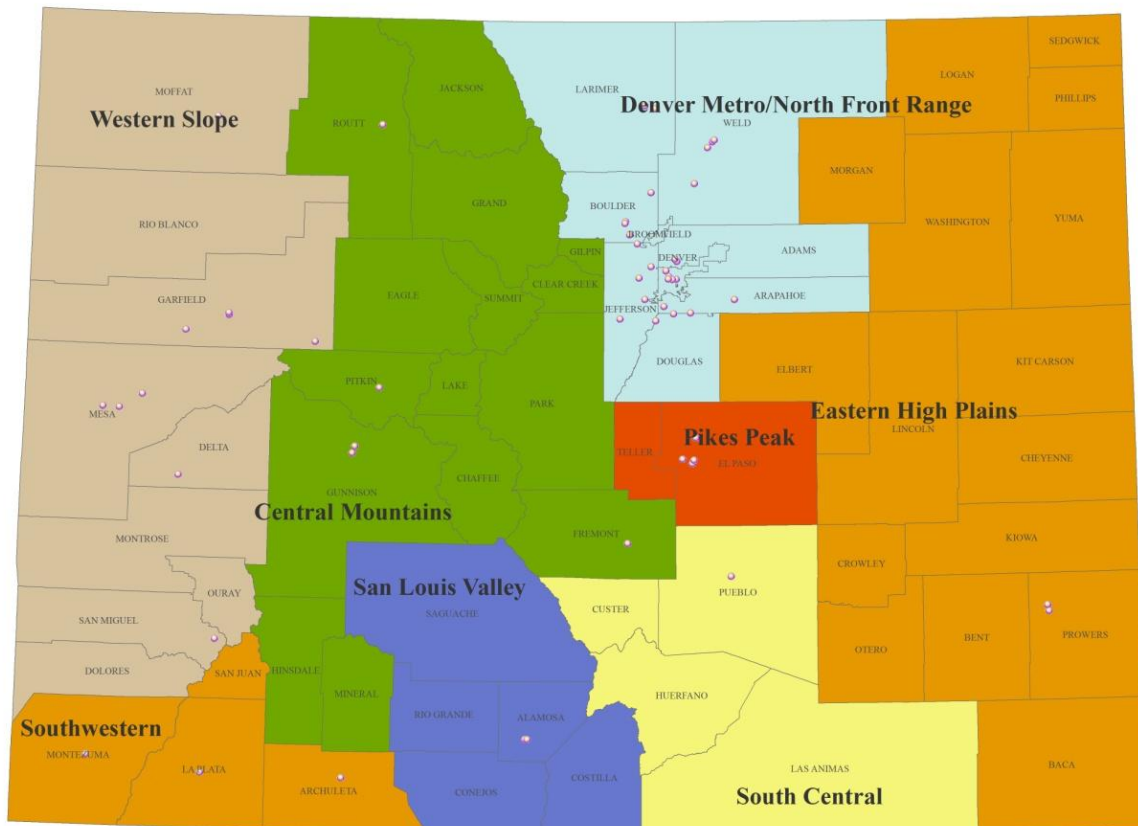
**Scale (Area Represented)<sup>3</sup>**

- 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)

Also included in the above table are listings as “Other” which are meteorological monitors that do not include either orientation or scale. A “+” in the Start column indicates that the monitor has not yet been installed.

**Description of Monitoring Areas 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 shows the approximate boundaries of these areas.



**Figure 1. Monitoring Regions in Colorado**

<sup>3</sup> “Appendix D to Part 58 – Network Design Criteria for Ambient Air Quality Monitoring,” 40 Federal Register 58 (1 July 2011), pp. 290-292.

## **Central Mountains Region**

The Central Mountains Region consists of 15 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. Leadville, Steamboat Springs, Cañon City, Salida, Buena Vista and Aspen represent the larger communities. The population of this region is about 256,800, according to U.S. Census Bureau estimates. Skiing, tourism, ranching, mining, and correctional facilities are the primary industries. 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 is with particulate pollution from wood burning and road sanding. Currently, there are no gaseous and five particulate monitoring sites operated by the APCD in the Central Mountains region.

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

The Denver-Metro/North Front Range Region includes Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Larimer and Weld counties. It includes the largest population area of the state, with 2.8 million people living in the seven-county Denver-metro area and another half-million living in the northern Colorado area of Larimer and Weld counties. This area includes Rocky Mountain National Park and several wilderness areas.

Since 2002, the region complies with all National Ambient Air Quality Standards, except for ozone. The area has been exceeding the EPA's most recent 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 for the more stringent ozone standard adopted by EPA in 2008.

In the past, the Denver-metropolitan area violated health-based air quality standards for carbon monoxide and fine particles. In response, the Regional Air Quality Council, the Colorado Air Quality Control Commission and the Air Pollution Control Division developed, adopted and implemented air quality improvement plans to reduce each of the 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.

Currently, there are 28 gaseous pollutant monitors at 16 sites and 28 particulate monitors at 17 sites in the Northern Front Range Region. There are six CO, 14 O<sub>3</sub>, four NO<sub>2</sub>, one NO<sub>y</sub>, and three SO<sub>2</sub> monitoring sites. There are 13 PM<sub>10</sub>, 14 PM<sub>2.5</sub>, and one TSP/Pb monitoring sites. There are two air toxics monitoring sites, one located at CAMP, and one at Platteville.

## **Eastern High Plains Region**

The Eastern High Plains region encompasses the counties on the plains of eastern Colorado. The area is semiarid and often windy. The area's population is approximately 157,000 according to U.S. Census Bureau estimates. Its major urban 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. All of the area complies with federal air quality standards.



Historically, there have been a number of communities 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 and early 1990s after a review showed that the concentrations were well below the standard and trending downward.

For the Eastern High Plains Region there is currently one PM<sub>10</sub> monitoring site in Lamar and no gaseous pollutant monitoring sites in the area. A replacement site for the Elbert background site was installed in Douglas County, which is in the Northern Front Range region.

### **Pikes Peak Region**

The Pikes Peak Region includes El Paso and Teller counties. The area has a population of approximately 626,200 according to U.S. Census Bureau estimates. Eastern El Paso County is rural prairie, while the western part of the region is mountainous. All of the area complies with federal air quality standards.

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, both military installations. Aerospace and technology are also large employers in the area.

Currently, there are four gaseous pollutants monitored at three sites and one particulate monitoring site in the Pikes Peak Region. There is one CO, one SO<sub>2</sub>, and two O<sub>3</sub> monitoring sites, as well as two PM<sub>10</sub> and two PM<sub>2.5</sub> monitoring sites in the region.

### **San Luis Valley Region**

Colorado's San Luis Valley Region is in the south central portion of Colorado and includes 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 71 miles wide and 122 miles long, extending south into New Mexico. The average elevation is 7,500 feet. Principal towns include Alamosa, Monte Vista and Del Norte. The population is about 45,100 according to U.S. Census Bureau estimates. 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.

The air quality planning region consists of Saguache, Rio Grande, Alamosa, Conejos and Costilla counties. All of the area complies with federal air quality standards.

Currently, there are no gaseous and two particulate monitoring sites in the area. There are two PM<sub>10</sub> monitoring sites.

### **South Central Region**

The South Central Region is comprised of Pueblo, Huerfano, Las Animas and Custer counties. Its population is approximately 184,800 according to U.S. Census Bureau estimates. Urban 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.

Currently, there are no gaseous pollutant monitoring sites and one particulate monitoring site in the South Central Region. There is one PM<sub>10</sub> and one PM<sub>2.5</sub> monitoring site in the region.

### Southwest Region

The Southwestern Region includes the Four Corners area counties of Montezuma, La Plata, Archuleta and San Juan. The population of this region is about 89,800, according to U.S. Census Bureau estimates. 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 dominant industries. Though the oil and gas industry is growing in this area, all of the area complies with federal air quality standards.

Currently there is one gaseous and three particulate monitoring stations in the region. There is one O<sub>3</sub>, two PM<sub>10</sub> monitors, and one PM<sub>2.5</sub> monitor.

### 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 about 309,700, according to U.S. Census Bureau estimates. 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 complies with federal air quality standards.

Currently, there are four gaseous pollutant monitoring sites and seven particulate monitoring sites in the Western Slope region. There are one CO, and three O<sub>3</sub> monitoring sites. There are five PM<sub>10</sub>, and two PM<sub>2.5</sub> monitoring sites.

### State-wide Population Statistics

Table 2 is a listing of the projected population statistics by county. The counties have been grouped into Planning and Management Regions (per Colorado Executive Orders of November 1972, 1973 and 1986, and October 1998), Metropolitan Statistical Areas (per the US Office of Management and Budget, June 30, 1993), and Sub-state Regions. The Sub-state Regional grouping typically varies from data user to data user. For the purposes of this assessment, the groupings used were as similar to the State's monitoring regions as possible.

**Table 2. Population Statistics and Monitors by County and Metropolitan Statistical Area**

REGIONS/COUNTIES	Actual Population	Projected Population		Avg. Annual % Change	
	July 2010	July 2015	July 2020	2010 -15	2010 -20
<b><i>COLORADO</i></b>	<b><i>5,029,196</i></b>	<b><i>5,474,968</i></b>	<b><i>5,999,989</i></b>	<b><i>1.8%</i></b>	<b><i>1.9%</i></b>
<b><i>FRONT RANGE</i></b>	<b><i>4,141,359</i></b>	<b><i>4,488,360</i></b>	<b><i>4,892,326</i></b>	<b><i>1.7%</i></b>	<b><i>1.8%</i></b>

REGIONS/Counties	Actual Population	Projected Population		Avg. Annual % Change	
	July 2010	July 2015	July 2020	2010 -15	2010 -20
<b>DNVR-BLDR Region</b>	<b>2,784,228</b>	<b>3,004,415</b>	<b>3,252,481</b>	<b>1.6%</b>	<b>1.7%</b>
<b>DENVER PMSA</b>	<b>2,489,661</b>	<b>2,691,747</b>	<b>2,920,374</b>	<b>1.6%</b>	<b>1.7%</b>
Adams	441,603	491,263	544,258	2.2%	2.3%
Arapahoe	572,003	619,762	673,230	1.7%	1.8%
Broomfield	55,889	63,926	71,211	2.9%	2.7%
Denver	600,158	645,364	686,613	1.5%	1.4%
Douglas	285,465	322,985	373,308	2.6%	3.1%
Jefferson	534,543	548,447	571,753	0.5%	0.7%
<b>BOULDER PMSA/Co</b>	<b>294,567</b>	<b>312,668</b>	<b>332,107</b>	<b>1.2%</b>	<b>1.3%</b>
<i>N. FRONT RANGE</i>	<i>552,455</i>	<i>610,993</i>	<i>691,615</i>	<i>2.1%</i>	<i>2.5%</i>
<b>FORT COLLINS MSA</b>	<b>299,630</b>	<b>325,776</b>	<b>360,274</b>	<b>1.7%</b>	<b>2.0%</b>
<b>GREELEY MSA</b>	<b>252,825</b>	<b>285,216</b>	<b>331,341</b>	<b>2.6%</b>	<b>3.1%</b>
<i>S. FRONT RANGE</i>	<i>804,676</i>	<i>872,952</i>	<i>948,230</i>	<i>1.7%</i>	<i>1.8%</i>
<b>COLO. SPRINGS MSA</b>	<b>645,613</b>	<b>702,925</b>	<b>763,003</b>	<b>1.8%</b>	<b>1.8%</b>
El Paso	622,263	677,353	734,862	1.8%	1.8%
Teller	23,350	25,572	28,142	1.9%	2.1%
<b>PUEBLO MSA</b>	<b>159,063</b>	<b>170,027</b>	<b>185,227</b>	<b>1.4%</b>	<b>1.6%</b>
<i>WESTERN SLOPE</i>	<i>552,564</i>	<i>622,228</i>	<i>704,243</i>	<i>2.5%</i>	<i>2.7%</i>
<b>REGION 9</b>	<b>91,716</b>	<b>103,916</b>	<b>118,231</b>	<b>2.7%</b>	<b>2.9%</b>
Archuleta	12,084	14,348	17,127	3.7%	4.2%
Dolores	2,064	2,247	2,436	1.8%	1.8%
La Plata	51,334	58,404	66,714	2.8%	3.0%
Montezuma	25,535	28,160	31,171	2.1%	2.2%
San Juan	699	758	784	1.7%	1.2%
<b>REGION 10</b>	<b>105,333</b>	<b>114,699</b>	<b>131,150</b>	<b>1.8%</b>	<b>2.5%</b>
Delta	30,952	35,724	41,311	3.1%	3.3%
Gunnison	15,324	16,457	17,895	1.5%	1.7%
Hinsdale	843	928	1,027	2.0%	2.2%
Montrose	41,276	47,541	54,718	3.0%	3.3%
Ouray	4,436	5,220	5,832	3.5%	3.1%
San Miguel	7,359	8,829	10,367	4.0%	4.1%
<b>REGION 11</b>	<b>247,082</b>	<b>271,207</b>	<b>301,602</b>	<b>2.0%</b>	<b>2.2%</b>
Garfield	56,389	65,124	76,939	3.1%	3.6%
Mesa	146,723	157,878	171,581	1.5%	1.7%
Moffat	13,795	14,672	15,464	1.3%	1.2%
Rio Blanco	6,666	7,827	9,056	3.5%	3.6%
Routt	23,509	25,706	28,563	1.9%	2.1%
<b>REGION 12</b>	<b>113,576</b>	<b>132,406</b>	<b>153,260</b>	<b>3.3%</b>	<b>3.5%</b>

REGIONS/Counties	Actual Population	Projected Population		Avg. Annual % Change	
	July 2010	July 2015	July 2020	2010 -15	2010 -20
Eagle	52,197	61,846	71,076	3.7%	3.6%
Grand	14,843	16,989	20,090	2.9%	3.5%
Jackson	1,394	1,507	1,598	1.6%	1.5%
Pitkin	17,148	19,394	21,929	2.6%	2.8%
Summit	27,994	32,670	38,568	3.3%	3.8%
<b>CENTRAL MTNS.</b>	<b>129,151</b>	<b>143,418</b>	<b>160,566</b>	<b>2.2%</b>	<b>2.4%</b>
<b>CLR CRK. &amp; GILPIN</b>	<b>14,529</b>	<b>15,729</b>	<b>17,228</b>	<b>1.7%</b>	<b>1.9%</b>
Clear Creek	9,088	9,757	10,710	1.5%	1.8%
Gilpin	5,441	5,972	6,519	2.0%	2.0%
<b>PARK COUNTY</b>	<b>16,206</b>	<b>19,614</b>	<b>23,816</b>	<b>4.2%</b>	<b>4.7%</b>
<b>REGION 13</b>	<b>76,198</b>	<b>83,733</b>	<b>92,777</b>	<b>2.0%</b>	<b>2.2%</b>
Chaffee	17,809	19,862	23,052	2.3%	2.9%
Custer	4,255	4,991	5,866	3.5%	3.8%
Fremont	46,824	50,456	54,217	1.6%	1.6%
Lake	7,310	8,424	9,642	3.0%	3.2%
<b>REGION 14</b>	<b>22,218</b>	<b>24,343</b>	<b>26,744</b>	<b>1.9%</b>	<b>2.0%</b>
Huerfano	6,711	6,996	7,527	0.8%	1.2%
Las Animas	15,507	19,346	19,217	5.0%	2.4%
<b>SAN LUIS VALLEY</b>	<b>46,027</b>	<b>49,107</b>	<b>52,843</b>	<b>1.3%</b>	<b>1.5%</b>
Alamosa	15,445	16,505	17,860	1.4%	1.6%
Conejos	8,256	8,773	9,253	1.3%	1.2%
Costilla	3,524	3,726	3,871	1.1%	1.0%
Mineral	712	804	870	2.6%	2.2%
Rio Grande	11,982	12,812	13,887	1.4%	1.6%
Saguache	6,108	6,487	7,101	1.2%	1.6%
<b>EASTERN PLAINS</b>	<b>160,095</b>	<b>171,854</b>	<b>190,011</b>	<b>1.5%</b>	<b>1.9%</b>
<b>REGION 1</b>	<b>72,546</b>	<b>76,169</b>	<b>81,358</b>	<b>1.0%</b>	<b>1.2%</b>
Logan	22,709	23,873	25,734	1.0%	1.3%
Morgan	28,159	29,772	32,209	1.1%	1.4%
Phillips	4,442	4,540	4,670	0.4%	0.5%
Sedgwick	2,379	2,542	2,689	1.4%	1.3%
Washington	4,814	4,948	5,054	0.6%	0.5%
Yuma	10,043	10,494	11,001	0.9%	1.0%
<b>REGION 5</b>	<b>38,659</b>	<b>44,636</b>	<b>55,341</b>	<b>3.1%</b>	<b>4.3%</b>
Cheyenne	1,836	1,940	2,082	1.1%	1.3%
Elbert	23,086	28,266	38,173	4.5%	6.5%
Kit Carson	8,270	8,643	8,893	0.9%	0.8%
Lincoln	5,467	5,787	6,193	1.2%	1.3%
<b>REGION 6</b>	<b>48,890</b>	<b>51,049</b>	<b>53,312</b>	<b>0.9%</b>	<b>0.9%</b>

REGIONS/Counties	Actual Population	Projected Population		Avg. Annual % Change	
	July 2010	July 2015	July 2020	2010 -15	2010 -20
Baca	3,788	3,822	3,893	0.2%	0.3%
Bent	6,499	6,657	6,832	0.5%	0.5%
Crowley	5,823	6,234	6,643	1.4%	1.4%
Kiowa	1,398	1,458	1,509	0.9%	0.8%
Otero	18,831	19,813	20,802	1.0%	1.0%
Prowers	12,551	13,065	13,633	0.8%	0.9%

## II. Carbon Monoxide (CO)

In 2014, the APCD will operate eight CO monitors. Currently, the NAAQS for CO is a primary standard, 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 2.7 ppm in 2012. 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 CFR requirements. 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 one CO monitor to be collocated with the near-roadway NO<sub>2</sub> monitoring requirements. EPA is also specifying that monitors required in CBSAs of 2.5 million or more persons are to be operational by January 1, 2015, and that monitors required in CBSAs of one million or more persons are required to be operational by January 1, 2017. A monitor was located at the near roadway NO<sub>2</sub> site to satisfy these requirements.

### Denver Metro/Northern Front Range Region

The three major urban centers in the Northern Front Range Region include Fort Collins and Greeley in Laramie and Weld counties respectively, and the greater Denver Metro area. Motor vehicle activity is a major source of CO. However, there are several small industries and manufacturing processes that may contribute to CO levels. These industries include breweries, power plants, cement plants, mining, electronics and film manufacturing facilities, and rock quarries. Weld County is also an area of significant oil and gas development.

Table 3 lists the maximum eight-hour and one-hour concentrations recorded in 2013 for the Northern Front Range region while, Table 4 lists the same values for monitoring stations in the Denver Metro area.

**Table 3. Maximum CO Concentrations in Northern Front Range**

Site ID	Site Name	Eight-Hour Max (ppm)	One-Hour Max (ppm)
08 069 1004	Fort Collins-Mason	1.7	2.9
08 123 0010	Greeley-West Annex	1.7	3.3

**Table 4. Maximum CO Concentrations in Denver Area**

Site ID	Site Name	Eight-Hour Max (ppm)	One-Hour Max (ppm)
08 001 3001	Welby	2.1	2.9
08 031 0002	CAMP	4.4	5.8
08 031 0026	La Casa	2.6	3.8

Site ID	Site Name	Eight-Hour Max (ppm)	One-Hour Max (ppm)
08 031 0027	I-25 Denver	2.5	3.0

It should be noted here that the I-25-Denver, and La Casa monitors are trace level monitors, while the others are not. The monitor located at the Welby site is a Regional Administrator Required Monitor.

### **Pikes Peak Region**

The Pikes Peak Region is a very popular tourist area with rapid urban growth. In 2013 the CO analyzer was upgraded from a 48c to a 48i TLE analyzer. The TLE indicates the new analyzer is capable of trace-level CO detection, which increases the resolution of concentrations detected by an order of magnitude. The TLE is a more accurate analyzer. In 2013, the highest eight-hour CO concentration recorded at the Colorado Springs-Hwy 24 monitor was 1.8 ppm with a maximum one-hour concentration of 3.3 ppm.

The CO monitor in this area is:

08 041 0015 Colorado Springs – Hwy. 24, 690 W. Highway 24

### **Western Slope Region**

Population in the Western Slope region is not evenly distributed among the counties and ranges from 146,723 people in Mesa County to 2,064 in San Miguel County, according to the April 2010 census data. Grand Junction is the largest city on the western slope with a population of 58,566 (April 2010). This is due in large part to the transient oil/gas working population associated with the boom in drilling in this area.

In 2013, the highest eight-hour CO concentration recorded at the Grand Junction – Pitkin monitor was 0.9 ppm with a one-hour maximum concentration of 1.5 ppm.

The CO monitor in this area is:

08 077 0018 Grand Junction - Pitkin, 645 ¼ Pitkin Ave.

### **Planned Changes in CO Monitoring**

In 2014 there are no planned changes to the CO network.

## **III. Ozone (O<sub>3</sub>)**

On March 12, 2008, the U.S. Environmental Protection Agency 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 violate the standard.

The EPA is currently set to propose a new primary O<sub>3</sub> standard in 2014, to be final in 2015. The APCD operates seven sites out of 20 that have three-year design values (2011 – 2013) in excess of the current eight-hour O<sub>3</sub> NAAQS standard of 0.075 ppm, up from three sites last year.

EPA's monitoring requirements for O<sub>3</sub> include placing certain numbers 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 Primary Metropolitan Statistical Area (PMSA). This PMSA includes the counties of Adams, Arapahoe, Broomfield, Denver, Douglas, and Jefferson. There are seven different MSAs in Colorado. The table below lists EPA's O<sub>3</sub> monitoring requirements. Each MSA is discussed further in the following subsections.

**Table 5. EPAs Minimum Ozone Monitoring Requirements**

<b>MSA population<sup>1,2</sup></b>	<b>Most recent 3-year design value concentrations <math>\geq</math> 85% of any O<sub>3</sub> NAAQS<sup>3</sup></b>	<b>Most recent 3-year design value concentrations <math>&lt;</math> 85% of any O<sub>3</sub> NAAQS<sup>3,4</sup></b>
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000 <sup>5</sup>	1	0

<sup>1</sup>Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

<sup>2</sup>Population based on latest available census figures.

<sup>3</sup>The ozone (O<sub>3</sub>) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

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

<sup>5</sup>Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

In addition to the above mentioned O<sub>3</sub> monitoring requirements, EPA rules also state that there must be at least one monitoring site per MSA that monitors for the highest concentrations. There are six MSA areas in Colorado. They are the Denver, Boulder, Fort Collins, Greeley, Colorado Springs, and Pueblo MSAs.

### **Denver Metro/Northern Front Range**

Motor vehicle activity is a major precursor source of O<sub>3</sub>. However, there are several small industries and manufacturing processes that also contribute to those levels. These industries include a brewery, power plants, cement plants, mining, electronics and film manufacturing facilities, and rock quarries. Weld County is also an area of significant oil and gas development.

In the Northern Front Range, the first and fourth maximum eight-hour concentrations recorded in 2013 for each O<sub>3</sub> monitoring site in Larimer and Weld Counties are listed in the table below. Also listed are the three-year design values (2011-2013) for each site with enough data available to calculate them. There are two MSAs located in Larimer and Weld counties. These are the Fort Collins-Loveland MSA, and the Greeley PMSA. According to the 2010 Census data their populations are 299,630, and 252,825, respectively. Per EPA monitoring requirements, these MSAs fall in the 50,000 to 350,000 population range and each area requires at least one highest concentration O<sub>3</sub> monitor. These requirements are satisfied by the monitors listed below. The monitor located at the Fort Collins – West site is a highest concentration monitor for the Fort Collins-Loveland MSA, and the Greeley – Tower monitor serves the same purpose for the Greeley MSA. Design values that are bold and italicized exceed the NAAQS.

**Table 6. Maximum O<sub>3</sub> Concentrations in Northern Front Range Region**

Site ID	Site Name	1 <sup>st</sup> eight-hour Max (ppm)	4 <sup>th</sup> eight-hour Max (ppm)	2011 - 2013 Design Value (ppm)
08 069 0011	Fort Collins – West	0.091	0.082	<b><i>0.080</i></b>
08 069 1004	Fort Collins – Mason	0.083	0.074	0.072
08 123 0009	Greeley – Tower	0.080	0.073	<b><i>0.076</i></b>

In the Denver Metro area, only Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson counties have O<sub>3</sub> monitors. There are 11 monitors currently in operation in this area. The first and fourth maximum eight-hour concentrations recorded in 2013 for each O<sub>3</sub> monitoring site in the metropolitan Denver area are listed in the table below. Also listed are the three-year design values (2011-2013) for each site with enough data available to calculate them. The CAMP and La Casa O<sub>3</sub> sites were established in 2012, so there is insufficient data to report their design values at this time.

There are two MSAs located in the Metropolitan Denver area. These are the Boulder-Longmont PMSA, and the Denver PMSA. According to the 2010 Census data their populations are 294,567, and 2,489,661, respectively. Per EPA monitoring requirements, the Boulder-Longmont PMSA falls in the 50,000 to 350,000 population range, and the Denver PMSA falls in the 350,000 to 4,000,000 range. The Boulder-Longmont PMSA therefore requires at least one monitor, which is satisfied by the monitor at South Boulder Creek. By EPA rules, the Denver PMSA requires at least two monitors. This requirement is satisfied by the remaining ten monitors that are placed throughout the Denver PMSA. The monitors located at Chatfield, Rocky Flats – North, and NREL are all highest concentration monitors for the Denver PMSA. The monitor located at the Welby site is a Regional Administrator Required Monitor.

**Table 7. Maximum O<sub>3</sub> Concentrations in the Denver Metro Area**

Site ID	Site Name	1 <sup>st</sup> Eight-hour Max (ppm)	4 <sup>th</sup> Eight-hour Max (ppm)	2011-2013 Design Value (ppm)
08 001 3001	Welby	0.082	0.077	<b><i>0.076</i></b>
08 005 0002	Highland Reservoir	0.085	0.079	<b><i>0.079</i></b>
08 005 0006	Aurora – East	0.081	0.073	0.074
08 013 0011	South Boulder Creek	0.086	0.079	<b><i>0.077</i></b>
08 031 0002	CAMP	0.074	0.067	-----
08 031 0026	La Casa	0.080	0.071	-----
08 035 0004	Chatfield State Park	0.086	0.083	<b><i>0.083</i></b>
08 059 0005	Welch	0.084	0.080	<b><i>0.078</i></b>
08 059 0006	Rocky Flats – N	0.093	0.085	<b><i>0.083</i></b>
08 059 0011	NREL	0.090	0.084	<b><i>0.082</i></b>
08 059 0013	Aspen Park	0.080	0.077	<b><i>0.075</i></b>

Eight of the eleven monitors are equal to or greater than the level of the 8-hour NAAQS standard for ozone. Their values are bolded and italicized to highlight them. Of the three remaining sites, two do not have enough data to calculate the design value, and the third is within 0.001 ppm of reaching the standard limit.



## Pikes Peak Region

The first and fourth maximum eight-hour concentrations recorded in 2013 for each O<sub>3</sub> monitoring site in the Pikes Peak Region are listed in the table below. Also listed are the three year design values (2011-2013) for each site with enough data available to calculate them.

There is one MSA located in the Pikes Peak Region, the Colorado Springs MSA. According to the 2010 Census data the population is 645,613. 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 is satisfied by the monitors at the Air Force Academy and Manitou Springs.

**Table 8. Maximum O<sub>3</sub> Concentrations in Pikes Peak Region**

Site ID	Site Name	1 <sup>st</sup> Eight-hour Max (ppm)	4 <sup>th</sup> Eight-hour Max (ppm)	2011-2013 Design Value (ppm)
08 041 0013	U.S. Air Force Academy	0.082	0.074	0.074
08 041 0016	Manitou Springs	0.078	0.072	0.074

## Western Slope Region

The first and fourth maximum eight-hour concentrations recorded in 2013 for each O<sub>3</sub> monitoring site in the Western Slope Region are listed in the table below. Also listed are the three year design values (2011-2013) for each site with enough data available to calculate them. None of these sites recorded ozone concentrations that exceeded the 8-hour ozone standard. The Lay Peak site was established in August of 2011, so there is insufficient data to calculate the design value at this time.

There is one MSA located on the Western Slope. It is the Grand Junction MSA, which includes all of Mesa County. Per EPA monitoring requirements, this MSA falls in the 50,000 to 350,000 population range, and requires one O<sub>3</sub> monitor. The monitor at the Palisade Water Treatment Plant satisfies this requirement, as well as the highest concentration monitor requirement.

**Table 9. Maximum O<sub>3</sub> Concentrations in the Western Slope Region**

Site ID	Site Name	1 <sup>st</sup> Eight-hour Max (ppm)	4 <sup>th</sup> Eight-hour Max (ppm)	2011-2013 Design Value (ppm)
08 045 0012	Rifle – Health	0.065	0.062	0.065
08 077 0020	Palisade Water Treatment	0.068	0.066	0.067

## Southwest Region

There is a single O<sub>3</sub> monitor in the Southwest Region in Cortez. The first and fourth eight-hour maximum concentration in 2013 were 0.065 and 0.064 ppm respectively, and the 2011-2013 design value is 0.068.

The O<sub>3</sub> monitor in Cortez is:

08 083 0006 – Cortez 106 W. North Street

## **Planned Changes in O<sub>3</sub> Monitoring**

Planned changes for the 2014-2015 plan year include the review of sites in the Front Range for possible enhancement, and the possible installation of a new site in the Pueblo MSA, pending reviews of industry monitoring data. In addition, the CDPHE is looking into the relocation of the Highland Reservoir site due to construction and the Aspen Park and South Boulder Creek sites as they no longer meet siting criteria due to the presence of large trees that cannot be removed.

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

The APCD has monitored NO<sub>2</sub> at eight locations in Colorado in the past, two of which are still in operation. The Denver CAMP monitor exceeded the NO<sub>2</sub> standard in 1977 though the Welby monitor has never exceeded the standard of 53 ppb as an annual average. Nonetheless, concentrations have shown a gradual decline in the past 20 years, and the last decade trend has been nearly flat.

In January 2010, the EPA set a new primary 1-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 NCore La Casa site in January 2013. 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 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 the 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. In addition to the near roadway monitoring, there must be one monitoring station in each CBSA with a population of 1 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 and Welby sites satisfy this requirement.

## **Denver Metro/Northern Front Range Counties**

The In 2013, the annual NO<sub>2</sub> concentration at the Welby site was 16.93 ppb. For 2011 through 2013 the one-hour standard design value is 62 ppb, which is well below the 100 ppb NAAQS. The same value for the CAMP site is 71 ppb. The 2013 annual average at CAMP was 24.40 ppb, which is also well below the standard. The 2013 annual average at the La Casa site was 21.86 ppb. The 2013 annual average at the I-25-Denver site was 25.34 ppb, but only covers the June through December 2013 time period. A 3-year design value cannot be calculated for the I-25 or La Casa sites as there is insufficient data to do so.

The The NO<sub>2</sub>/NO<sub>y</sub> monitors in this area are:

08 001 3001 Welby, 3174 E. 78<sup>th</sup> Avenue  
08 031 0002 CAMP, 2105 Broadway  
08 031 0026 La Casa, 4545 Navajo Street  
08 031 0027 I-25, 917 Yuma Street

The CAMP monitor serves as an area-wide monitor, while the I-25 site houses the near-roadway monitor. The Welby monitor is a Regional Administration Required Monitor. The monitor at the La Casa site serves as the NCore monitor.

### **Planned Changes in NO<sub>2</sub>/NO<sub>y</sub> Monitoring**

The only change planned is the addition of a second near roadway monitoring site in 2015. Per 40 CFR Part 58, Revision to Ambient Nitrogen Dioxide Monitoring Requirements, Final Rule,

“On February 9, 2010, the EPA promulgated minimum monitoring requirements for the NO<sub>2</sub> monitoring network in support of the revised NO<sub>2</sub> NAAQS (75 FR 6474). The NO<sub>2</sub> NAAQS was revised to include a 1-hour standard with a 98<sup>th</sup> percentile form averaged over three years and a level of 100 ppb, reflecting the maximum allowable NO<sub>2</sub> concentration anywhere in an area, while retaining the annual standard of 53 ppb.

As part of the NAAQS rulemaking, the EPA promulgated revisions to requirements for minimum numbers of ambient NO<sub>2</sub> monitors that included new monitoring near major roads in larger urban areas. In addition, those monitoring revisions included requirements to characterize NO<sub>2</sub> concentrations representative of wider spatial scales in larger urban areas (area-wide monitors), and monitors intended to characterize NO<sub>2</sub> exposures of susceptible and vulnerable populations.

...The first tier of the ambient NO<sub>2</sub> monitoring network requires near-road monitoring. There must be one microscale near-road NO<sub>2</sub> monitoring station in each CBSA with a population of 500,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road.”

Near-roadway stations are also to be designed with a CO monitor, and have the capacity to expand the monitoring suite. The first near roadway monitor is sited at 971 Yuma Street in Denver, on the Colorado Department of Transportation right-of-way island between Yuma St. and I-25.

### **V. Sulfur Dioxide (SO<sub>2</sub>)**

The Air Pollution Control Division has monitored SO<sub>2</sub> at eight locations in Colorado in the past. Currently, there are four monitoring locations in operation. A new one-hour primary standard was finalized in June 2011. To attain that standard, the three-year average of the 99<sup>th</sup> percentile of the daily maximum one-hour average at each monitor within an area must not exceed 75 ppb. The secondary NAAQS is a three-hour average not to exceed 500 ppb more than once per year. SO<sub>2</sub> had never approached the level of any of the standards until an SO<sub>2</sub> analyzer was added at Highway 24 in Colorado Springs, which has exceeded the standard in 2013. An exceedance of the standard is a single occurrence of a concentration above the specified NAAQS concentration and does not take into account the three-year averaging period necessary to determine a violation of the standard. Because the Highway 24 station has less than a year of data for SO<sub>2</sub>, there is insufficient data to indicate that a violation of the standard exists.

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 MSA according to the EPA's monitoring rules for SO<sub>2</sub>.

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 needs.

### Metropolitan Denver Counties

The mean calculated by the one-hour standard design value for the La Casa site does not satisfy summary criteria. The concentration values are listed in ppb in accordance with the EPA's data reporting rules for this pollutant. It should be noted here that the values listed for the La Casa site are only shown for comparative purposes, and are not of sufficient validity for a comparison to the standard, as the data do not span the entirety of 2013. The monitor located at the Welby site is a Regional Administrator Required Monitor.

**Table 10. Maximum SO<sub>2</sub> Concentrations for the Denver Metro Region**

Site ID	Site Name	2013 99 <sup>th</sup> %-ile 1-Hour Daily Maximum Concentration (ppb)	2011 – 2013 Design Value (ppb) <sup>4</sup>
08 001 3001	Welby	30	29
08 031 0002	CAMP	38	37
08 031 0026	La Casa	36*	--

\* = Data set does not meet completeness criteria

### Pikes Peak Region

In January of 2013 an SO<sub>2</sub> monitor was added to the Highway 24 monitoring station in Colorado Springs. The 99<sup>th</sup> percentile value of the one-hour daily maximum concentration for 2013 was 58 ppb. The three year average design value cannot be calculated as there are not three years worth of data available yet.

The SO<sub>2</sub> monitor in this area is:

08 041 0015, Highway 24, 690 W. Highway 24

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

In 2014, there are no planned changes to the SO<sub>2</sub> monitoring network. However, the I-25/Cimarron exit and nearby area in Colorado Springs is planned for future roadway reconstruction, which will require relocation of the Highway 24 site.

## VI. PM<sub>10</sub>

In 2013, the APCD operated 33 PM<sub>10</sub> monitors at 30 different locations. 27 of these sites use high volume instruments, six sites use low volume instruments, seven sites have continuous

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<sup>4</sup>The one-hour SO<sub>2</sub> design value is calculated by taking the three year average of the 99<sup>th</sup> percentile of the daily maximum one-hour averages.

monitors collocated with FRM monitors, three of which have continuous dichot particulate monitors, which also monitor PM<sub>2.5</sub> and PM<sub>10</sub>. There are two sites with collocated high volume samplers (CAMP and Crested Butte), and one site with a collocated low volume sampler (Grand Junction - Powell). The PM<sub>10</sub> NAAQS is a 24-hour average of 150 µg/m<sup>3</sup> not to be exceeded more than an average of 1.0 times in a three year period. This average is also based on the monitoring frequency and the percent of valid data collected at a site.<sup>5</sup>

### Denver Metro/Northern Front Range Counties

Motor vehicle activity is a source of particulate matter. Several industries and manufacturing processes also contribute to particulate levels. These industries include breweries, power plants, cement plants, mining, electronics, film manufacturing facilities, and rock quarries. There are also a variety of agricultural sources of PM<sub>10</sub> including feed lots, grazing, tilling, and other agricultural activities. This region is also an area of significant oil and gas development.

Neither the monitor at the Fort Collins – CSU site nor the Greeley monitor had any PM<sub>10</sub> exceedances in 2013. The maximum concentrations recorded were 98 µg/m<sup>3</sup> at Fort Collins – CSU, and 50 µg/m<sup>3</sup> at Greeley.

The PM<sub>10</sub> monitoring sites in this area are:

- 08 069 0009 Fort Collins-CSU, 251 Edison Drive
- 08 123 0006 Greeley-Hospital, 1516 Hospital Road

There were no PM<sub>10</sub> exceedances by any of the monitors in the Denver Metro area. The table below lists the maximum concentrations recorded at each of the sites in 2013. Site ID numbers that include an asterisk (\*) indicate a low volume sampler, while no asterisk indicates high volume samplers.

**Table 11. Maximum PM<sub>10</sub> Concentrations for the Denver Metro Area**

Site ID	Site Name	Max. 24-Hour Concentration (µg/m <sup>3</sup> )
08 001 0006*	Commerce City	144
08 001 3001	Welby	88
08 013 0003	Longmont-Municipal	47
08 013 0012	Boulder Chamber Bldg.	72
08 031 0002	CAMP	90
08 031 0017	Denver Visitor Center	73
08 031 0026*	La Casa	81

### Eastern High Plains Region

The sources of PM<sub>10</sub> in the eastern plains are mainly agricultural with some mobile sources near cities and towns. Agricultural sources of PM<sub>10</sub> include feed lots, grazing, tilling, and other dry land agricultural activities. There is also a coal fired power plant in Lamar and a flour mill that contribute to PM<sub>10</sub> in Lamar.

<sup>5</sup>“Appendix K to Part 50 – Interpretation of the National Ambient Air Quality Standards for Particulate Matter,” 40 Federal Regulations 50 (1 July 2011), pp. 80-83.

There were seven PM<sub>10</sub> exceedances at the Lamar Municipal site in 2013. The highest concentration recorded at this site was 1,220 µg/m<sup>3</sup>.

The PM<sub>10</sub> monitoring site in this area is:

08 099 0002 Lamar Municipal, 104 E. Parmenter Street

### **Pikes Peak Region**

There were no exceedances of the PM<sub>10</sub> NAAQS in this region. The highest concentration recorded at the Colorado College site was 73 µg/m<sup>3</sup>. This monitor is a low-volume sampler.

The PM<sub>10</sub> monitoring site in this area is:

08 041 0017 Colorado College, 130 West Cache la Poudre

### **San Luis Valley Region**

There were seven exceedances in this region in 2013, four at Alamosa – Adams State College, and three at Alamosa Municipal. The maximum concentration at Alamosa – Adams State College was 237 µg/m<sup>3</sup> and the maximum concentration at Alamosa Municipal was 246 µg/m<sup>3</sup>. Both monitors are high volume samplers. The high values seen at these sites are under consideration as exceptional events by the department, and are most likely due to strong wind gusts.

The PM<sub>10</sub> monitoring sites in this area are:

08 003 0001 Alamosa-Adams State College, 208 Edgemont Boulevard

08 003 0003 Alamosa-Municipal, 425 4<sup>th</sup> Street

### **South Central Region**

There were no exceedances in this region in 2013. The maximum concentration found at Pueblo – Fountain School was 64 µg/m<sup>3</sup>.

The PM<sub>10</sub> monitoring site in this area is:

08 101 0015 Pueblo – Fountain School, 925 North Glendale Avenue

### **Central Mountain Region**

There was one PM<sub>10</sub> exceedance in the Central Mountain region at the Mount Crested Butte site. The table below lists the maximum concentrations recorded at each of the sites in 2013.

**Table 12. Maximum PM<sub>10</sub> Concentrations for Mountain Counties**

<b>Site ID</b>	<b>Site Name</b>	<b>Max. 24-Hour Concentration (µg/m<sup>3</sup>)</b>
08 043 0003	Cañon City – City Hall	109
08 051 0004	Crested Butte	140
08 051 0007	Mount Crested Butte	187
08 097 0006	Aspen – Library	65
08 107 0003	Steamboat Springs	82

### **Southwestern Region**

There were four exceedances of the PM<sub>10</sub> standard in 2013 in this area, one in Durango, and

three in Pagosa Springs. The maximum concentration at Pagosa Springs was 295  $\mu\text{g}/\text{m}^3$ , and the maximum concentration at Durango – River City Hall was 419  $\mu\text{g}/\text{m}^3$ .

The PM<sub>10</sub> monitoring sites in this area are:

08 007 0001 Pagosa Springs, 309 Lewis Street  
 08 067 0004 Durango – River City Hall, 1235 Camino Del Rio

### Western Slope Region

There was one PM<sub>10</sub> exceedance in the Western Slope region in 2013. It was at the Telluride site. The table below lists the maximum concentrations recorded at the monitoring sites in this area. Site ID numbers that include a star (\*) indicate a low volume sampler, while no star indicates high volume samplers. Sources of PM<sub>10</sub> in the Western region include motor vehicle activity, industries and manufacturing processes, which include lumber processing, mining, gravel pits, and rock quarries. There are also a variety of agricultural sources of PM<sub>10</sub> including feed lots, grazing, tilling, and other dry land agricultural activities.

**Table 13. Maximum PM<sub>10</sub> Concentrations in Western Slope Counties**

Site ID	Site Name	Max. 24-Hour Concentration ( $\mu\text{g}/\text{m}^3$ )
08 029 0004	Delta	64
08 045 0005	Parachute	29
08 045 0007	Rifle – Henry Building	46
08 045 0018	Carbondale	45
08 077 0017*	Grand Junction – Powell	55
08 077 0019	Clifton	109
08 113 0004	Telluride	265

### Planned Changes in PM<sub>10</sub> Monitoring

There are no planned changes to the PM<sub>10</sub> monitoring network. In the near future, CDPHE will apply for waivers for the Alamosa – Adams State College, and Mt. Crested Butte particulate sites, as they no longer meet siting criteria due to large trees or buildings near the monitors.

### VII. PM<sub>2.5</sub>

PM<sub>2.5</sub> concentration values are reported in four different groups of readings by the APCD. Data from instruments sampling according to the Federal Reference Method (FRM) are reported with the 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. There are 17 FRM instruments at 15 sites, of the 15 sites eight are collocated with a continuous instrument and two are collocated with an FRM; one site (Rifle) has continuous PM<sub>2.5</sub> but no FRM. Speciation samples are taken at three sites, all collocated with an FRM.

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

## Denver Metro/Northern Front Range Region

Motor vehicle activity is a source of particulate matter. There are also several small industries and manufacturing processes that may contribute to particulate levels. These industries include breweries, power plants, cement plants, mining, electronics and film manufacturing facilities and rock quarries. Weld County is also an area of significant oil and gas development.

The PM<sub>2.5</sub> sites listed below with manual method FRM sites in the APCD network as of December 31, 2011, are suitable for comparisons to the annual PM<sub>2.5</sub> NAAQS.

There were no PM<sub>2.5</sub> exceedances in 2013 in the Larimer and Weld County area. The table below lists the maximum PM<sub>2.5</sub> concentrations recorded at each of the sites in Larimer and Weld Counties, as well as the weighted annual average values. The monitoring data listed below are all from FRM monitors. The annual average value for all three sites does not meet EPA statistical summary criteria because of insufficient data, however alternative approaches to calculating a design value are provided in 40 CFR Part 50, Appendix N.

**Table 14. Maximum PM<sub>2.5</sub> Concentrations in Northern Front Range Counties**

Site ID	Site Name	Max. 24-Hour Concentration (µg/m <sup>3</sup> )	Annual Average Value (µg/m <sup>3</sup> )
08 069 0009	Fort Collins – CSU	27.8	6.8
08 123 0006	Greeley – Hospital	28.2	7.2
08 123 0008	Platteville	26.0	7.1

There were no exceedances of the PM<sub>2.5</sub> standard in the Denver Metro area in 2013. The table below lists the maximum PM<sub>2.5</sub> concentrations recorded in 2013 for each site in the Denver Metro area. All the monitoring data listed in the table are from FRM monitors. The annual average value for all these sites does not meet EPA statistical summary criteria because of insufficient data, however alternative approaches to calculating a design value are provided in 40 CFR Part 50, Appendix N.

**Table 15. Maximum PM<sub>2.5</sub> Concentrations in the Denver Metro Area**

Site ID	Site Name	Max. 24-Hour Concentration (µg/m <sup>3</sup> )	Annual Average Value (µg/m <sup>3</sup> )
08 001 0006	Commerce City	31.2	8.0
08 005 0005	Arapahoe Community College	31.8	6.8
08 013 0003	Longmont – Municipal	23.6	7.1
08 013 0012	Boulder Chamber of Commerce	24.9	6.0
08 031 0002	CAMP	28.5	7.5
08 031 0026	La Casa	28.3	7.3
08 035 0004	Chatfield Reservoir	27.8	5.6
08 035 0005	Castlewood Canyon State Park	13.6*	5.3*

\* = Data set does not meet completeness criteria

The following sites are micro-scale sites and are EPA approved. Based on ongoing data collection and analysis CAMP can be shown to be analogous with sites ranging from Commerce City to La Casa, and highly correlated with sites within the Platte Valley from Greeley and Platteville in the north to Chatfield in the south, and is approved as neighborhood scale.



08 031 0002-1 Denver CAMP, 2105 Broadway  
08 031 0026-1 La Casa, 4587 Navajo Street  
08 035 0004-1 Chatfield Reservoir, 11500 N. Roxborough Park Road

The Boulder Chamber of Commerce building site is considered a middle scale site, but it has been approved by the EPA as representative of a neighborhood scale site. The Division performed a land use and gridded emissions inventory analysis to demonstrate to EPA that the area surrounding the Boulder Chamber of Commerce building has many contiguous middle scale sites with similar emissions densities, meteorology and land uses.

### **Pikes Peak Region**

There were no exceedances of the PM<sub>2.5</sub> standard in 2013 in the Pikes Peak Region. The maximum 24-hour concentration at the Colorado College site was 21.0 µg/m<sup>3</sup>, and the annual average was 6.0 µg/m<sup>3</sup>, though the average does not satisfy EPA statistical summary criteria because of insufficient data.

The PM<sub>2.5</sub> monitoring site in this area is:

08 041 0017 Colorado College, 130 West Cache la Poudre

### **South Central Region**

There were no exceedances of the PM<sub>2.5</sub> NAAQS standard in the South Central region in 2013. The maximum concentration at the Pueblo – Fountain School was 30.9 µg/m<sup>3</sup> and the annual average was 6.5 µg/m<sup>3</sup> though the average does not satisfy summary criteria.

The PM<sub>2.5</sub> monitoring site in this area is:

08 101 0015 Pueblo – Fountain School, 925 North Glendale Avenue

### **Southwest Region**

There were no exceedances of the PM<sub>2.5</sub> standard in the Southwest region in 2013. The maximum 24-hour concentration at Cortez was 32.5 µg/m<sup>3</sup>, and the annual average was 6.1 µg/m<sup>3</sup>.

The PM<sub>2.5</sub> monitoring site in this area is:

08 083 0006 Cortez, 106 West North Street

### **Western Slope Region**

There were no PM<sub>2.5</sub> exceedances recorded in the Western Slope region. The maximum 24-hour concentration at Powell 42.2 µg/m<sup>3</sup>, and the annual average was 8.8 µg/m<sup>3</sup>, though the average did not satisfy summary criteria.

The PM<sub>2.5</sub> monitoring site in this area is:

08 077 0017 Grand Junction – Powell, 650 South Avenue

### **PM<sub>2.5</sub>, TEOM, and BAM Continuous Monitors not intended for NAAQS Comparison**

All Federal Reference Method (FRM) monitors in the Colorado PM<sub>2.5</sub> network are compared to the NAAQS. The FRM monitors are all filter based 24-hour composite samples. The Division also employs a variety of continuous particulate monitors for forecasting and advising

the public of air quality alerts.

The APCD does not collect or report PM<sub>2.5</sub> FEM data.

These monitors are used to gather near real-time data that are mainly used to inform and alert the public when concentrations are elevated and for short term forecasting of air pollution by the Division. The TEOM 1400ab with 8500 FDMS and the TEOM 1405-DF are federally equivalent monitors, however frequent monitor problems and Division concerns regarding equivalency designation have led the Division not to use these monitors for regulatory purposes. The following sites have continuous PM<sub>2.5</sub> monitors that are not intended for comparison with the NAAQS:

08 001 0006-3 Commerce City, 7101 Birch Street  
08 013 0003-3 Longmont-Municipal, 350 Kimbark Street  
08 013 1001-3 Boulder CU/Athens, 2102 Athens St.  
08 031 0002-3 CAMP, 2105 Broadway  
08 031 0013-3 NJH-E, 14<sup>th</sup> Avenue and Albion Street  
08 031 0026-3 La Casa, 4587 Navajo Street  
08 035 0004-3 Chatfield Reservoir, 11500 N. Roxborough Park Road  
08 041 0017-3 Colorado College, 130 W. Cache la Poudre  
08 045 0007-3 Rifle – Henry Building, 144 3<sup>rd</sup> Street  
08 069 0009-3 Fort Collins-CSU, 251 Edison Drive  
08 077 0017-3 Grand Junction-Powell, 650 South Avenue  
08 123 0006-3 Greeley-Hospital, 1516 Hospital Road

### **Community Monitoring Zones**

Community monitoring zones are an additional method of defining an area for comparison with the PM<sub>2.5</sub> NAAQS where data from two or more monitoring sites are averaged together for comparison with the standard. Currently, the APCD does not have any areas where this technique is used.

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<sub>2.5</sub> 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<sub>2.5</sub> NAAQS.” The CMZ is an optional technique that averages the PM<sub>2.5</sub> 24-hour concentrations from two or more monitors located in the same community.

If the PM<sub>2.5</sub> 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 web site. A public comment period will be open for thirty days prior to the APCD selecting a new site.

## **Planned Changes in PM<sub>2.5</sub> Monitoring**

A possible relocation of the Boulder CU/Athens TEOM site due to new construction near the site is being investigated.

## **VIII. TSP/Pb**

In December 2006 Total Suspended Particulate (TSP) monitoring by the APCD was reduced from six monitoring sites to a single site at DMAS. In 2012 when DMAS was moved to La Casa, TSP sampling for lead was discontinued at the Division's NCore site and PM<sub>10</sub> sampling for lead began. Because this is an NCore site, no waiver is required for using PM<sub>10</sub> sampling in lieu of TSP sampling for lead concentrations. In the past three years the maximum quarterly lead concentration has generally been less than a tenth of the current standard. In addition, Colorado has not recorded an exceedance of the previous lead standard (1.5 µg/m<sup>3</sup> averaged over a calendar quarter) since the first quarter of 1980. The new lead standard, which is 0.15 µg/m<sup>3</sup> averaged over any three rolling consecutive three-month periods, has not been exceeded using data from 2011 - 2013. The new lead standard became effective on December 15, 2008.

With the revision of the standard in mind, the APCD reviewed its stationary sources database for all point sources that emit lead in Colorado. There were 32 lead sources identified in a database retrieval conducted in November, 2008. None of the sources emit greater than one ton(s) per year (TPY) of total lead, which includes elemental lead and all lead compounds. Thus, no new lead monitors are required at any point source facility in Colorado.

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 EPA, Centennial Airport had the second highest lead emissions of any airport in the country at 1.18 TPY using data from the 2005 National Emissions Inventory (NEI). Since this emissions estimate exceeded the threshold for lead, the Division has 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. Subsequently, EPA has updated the lead emissions inventory for airports using 2008 NEI data. They found that Centennial Airport has dropped to the sixth highest lead emissions of any airport in the country at 1.08 TPY. The decrease in general aviation activity is likely due to the economic recession.

Also, the EPA has lowered the lead emissions threshold from 1.0 TPY to 0.5 TPY. Colorado still has no lead point sources greater than 0.5 TPY. However, the APCD may need to monitor lead at three additional airports, including Pueblo Memorial (0.55 TPY, ranked 47<sup>th</sup>), Greeley-Weld County (0.54 TPY, ranked 51<sup>st</sup>), and Rocky Mountain Metropolitan Airport in Jefferson County (0.51 TPY, ranked 59<sup>th</sup>). This new monitoring is on hold pending an airport lead study being conducted by EPA.

## **Denver Metro/Front Range Region**

There are various industries and manufacturing processes located in the area, but only a very few emit significant amounts of lead into the air.

There were no exceedances of the lead NAAQS in 2013. The maximum TSP value recorded by the Centennial TSP monitor was 52 µg/m<sup>3</sup>. The maximum lead value recorded by the Centennial lead monitor was 0.091 µg/m<sup>3</sup>. The maximum lead value at La Casa was 0.011

µg/m<sup>3</sup>.

The TSP/PM<sub>10</sub>/Lead monitoring sites in this area include:

08 005 0007 Centennial Airport, near 7800 S. Peoria Street  
08 031 0026 La Casa, 4587 Navajo Street

### **Planned Changes in TSP and Lead Monitoring**

There are plans to shut down the Centennial Airport lead site at the end of 2014.

## **IX. METEOROLOGICAL MEASUREMENTS**

Meteorological measurements taken by the APCD consist of Wind Speed, Wind Direction, Temperature, and Humidity. The wind speed and direction measurements are made as both scalar and vector averages. A final parameter that is recorded at the meteorological sites is the standard deviation of horizontal wind direction. This is a calculation, not a direct measurement, of the variation of wind direction over time.

The meteorological monitoring sites are:

08 001 0006 Commerce City, 7101 Birch Street  
08 001 3001 Welby, 3174 E. 78<sup>th</sup> Avenue  
08 005 0002 Highland Reservoir, 8100 S. University Boulevard  
08 005 0006 Aurora-East, 36001 Quincy Avenue  
08 031 0002 Denver-CAMP, 2105 Broadway  
08 031 0026 La Casa, 4587 Navajo Street  
08 031 0027 I-25, 913 Yuma Street  
08 035 0004 Chatfield State Park, 11500 N. Roxborough Park Road  
08 045 0005 Parachute – Elem. School, 100 E. 2<sup>nd</sup> Street  
08 045 0012 Rifle Health Dept., 195 W. 14<sup>th</sup> Street  
08 059 0002 Arvada, 9101 W. 57<sup>th</sup> Avenue  
08 059 0005 Welch, 12400 W. Hwy 285  
08 059 0006 Rocky Flats-N, 16600 W. Hwy 128  
08 059 0013 Aspen Park, 26137 Conifer Road  
08 069 1004 Fort Collins-Mason, 708 S. Mason Street  
08 077 0018 Grand Junction-Pitkin, 645 ¼ Pitkin Avenue  
08 077 0020 Palisade Water Treatment, Hwy 141 and D Road  
08 081 0002 Lay Peak, 17820 County Road 17  
08 099 0003 Lamar Port of Entry, 7100 US Hwy 50  
08 123 0009 Greeley – Weld County Tower, 3101 35<sup>th</sup> Avenue

### **Planned Changes in Meteorological Monitoring**

Meteorological sensors will be installed at the Highway 24 site in Colorado Springs, and a relative humidity sensor will be installed at the CAMP site. The Highland Reservoir site is temporarily closed due to construction activities in the area, and will likely be permanently closed.

## **X. QUALITY ASSURANCE**

### **Continuous Monitors**

The APCD staff performs three types of gaseous analyzer performance checks: quality

control checks, accuracy audits, and calibrations. These audits/calibrations challenge the analyzer with pollutant gases of known concentration within the range of the analyzer. The APCD Quality Assurance staff conducts accuracy audits on all of the instruments at least twice per year. The APCD field 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). A complete description of the procedures and the results are available from the APCD.

### **Particulate Monitors**

The audit checks performed on the particulate monitors consist of calibrated flow checks. The precision checks that are made on particulate monitors consist of collocated samplers that operate side-by-side and collect a sample from both samplers once every sixth day. EPA requires a minimum of 15% of the FRM network to be collocated. In 2013 Colorado maintained 15 FRM monitoring sites, four of which have collocated instruments (CAMP, Commerce City, La Casa, and Grand Junction). 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 FRM sampler next to the Division's PM<sub>2.5</sub> sampler (between 1 – 4 m apart). Once each calendar quarter a collocated sample from 25 % of the network is sent to an independent laboratory (the EPA's Region X Lab) to compare results and check for bias. All of the samples are then compared to ensure that the data are within federal limits and meet pre-established data quality objectives.

Once each calendar quarter a collocated sample is sent to the EPA Region 9 lab as part of the lead performance evaluation program (Pb-PEP), which checks the national network for bias. The samples are then compared to ensure that the data are within federal limits and meet pre-established data quality objectives.

### **Meteorological Monitors**

Annual calibrations and audit checks are performed on the 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.

## **XI. SUMMARY OF NETWORK CHANGES**

In 2013, several network changes occurred, and in 2014 several more changes are planned. This section summarizes the completed and planned changes below.

### **Completed Changes**

The following changes to CDPHE's monitoring network occurred during 2013.

- The Rist Canyon site was closed in June of 2013. See Appendix C.
- The Highlands Reservoir site was shut down October 1, 2013. See Appendix D.
- The I-25 near-roadway site was started in June of 2013. See Appendix B.
- Particulate sampling began in Castlewood Canyon in November 2013.

### **Planned Changes**

The following changes to CDPHE's monitoring network are planned for 2013-2014.

- A second near-roadway NO<sub>2</sub> monitor, as well as a trace level CO monitor will be installed by January 1, 2015. See initial site documentation in Appendix F.
- The possible installation of a new ozone site in the Pueblo area will be investigated.
- The possible relocation of the Highland Reservoir site due to re-construction of the water facility.
- A new location for South Boulder Creek will be investigated since vegetation in the area is changing siting criteria conditions.
- A new location for Aspen Park will be investigated since vegetation in the area is changing siting criteria conditions.
- Waivers will be applied for siting criteria exceptions for Welby (Appendix H), and CAMP (Appendix G).
- Boulder CU/Athens TEOM site will be considered for removal.
- Lead sampling at Centennial Airport will be considered for removal at the end of 2014.
- Meteorological sensors will be installed at the Hwy. 24 site
- Relative Humidity sensor will be installed at CAMP

## **XII. APPENDIX A, C, D, E REQUIRMENTS 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, SPMs, 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 gaseous and particulate analyzer are performed on a quarterly basis. 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. The results of the precision tests are periodically uploaded to the AQS database, and can be viewed there. The other results are kept "in-house" at the CDPHE, and are available on request.

Appendix C specifies the criteria pollutant monitoring methods (manual methods or automated analyzers) which must be used in SLAMS, and NCore stations that are a subset of SLAMS. All monitors used in the CDPHE's monitoring network are EPA approved FRM or FEM methods. The monitor types and sampling frequencies are listed in Table 1, as well as in the station summaries found in Appendix A.

Appendix D specifies the network design criteria for ambient air quality monitoring. It covers the monitoring objectives and spatial scales, the general monitoring requirements, the design criteria for NCore sites, pollutant specific design criteria for SLAMS sites, and the design criteria for Photochemical Assessment Monitoring Stations (PAMS). These requirements are addressed in Table 1 and the individual pollutant sections.

Appendix E 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 annually. These evaluations include measurements of the probe heights and locations, as well as residence time determinations for each gaseous analytical instrument. The results of these site evaluations are available upon request.

## Appendix A - Monitoring Site Descriptions

This appendix includes site information for all sites containing continuous gaseous monitors, meteorological monitors, or particulate monitors. The data is presented first in a tabular format, and is then followed by site descriptions. It is in the order of AQS ID number.

**Table 16. Monitoring Site Locations and Instruments**

<i>AQS #</i>	<i>Site Name</i>	<i>CO</i>	<i>O<sub>3</sub></i>	<i>NO</i>	<i>NO<sub>2</sub>/NO<sub>y</sub></i>	<i>SO<sub>2</sub></i>	<i>PM<sub>10</sub></i>	<i>PM<sub>2.5</sub></i>	<i>TSP/Pb</i>	<i>Met</i>	<i>App. A,C,D,E Reqs. Met?</i>
08 001 0006	Alsop Elementary School - Commerce City						X	X		X	YES
08 001 3001	Welby	X	X	X	X	X	X			X	NO - trees
08 003 0001	Alamosa – Adams State Coll.						X				NO - trees
08 003 0003	Alamosa – Municipal Bldg.						X				YES
08 005 0002	Highland Reservoir		X							X	YES
08 005 0005	Arapahoe Comm. Coll.							X			YES
08 005 0006	Aurora – East		X							X	NO - RT
08 005 0007	Centennial Airport								X		YES
08 007 0001	Pagosa Springs School						X				YES
08 013 0003	Longmont-Municipal Bldg.						X	X			YES
08 013 0011	South Boulder Creek		X								NO - trees
08 013 0012	Boulder Chamber of Commerce						X	X			YES
08 013 1001	Boulder – CU - Athens							X			YES
08 029 0004	Delta Health Dept						X				YES
08 031 0002	Denver – CAMP	X	X	X	X	X	X	X		X	NO – tress RT(SO <sub>2</sub> )
08 031 0013	Denver - NJH-E							X			YES
08 031 0016	DESCI										YES
08 031 0017	Denver Visitor Center						X				YES
08 031 0026	La Casa	X	X	X	X	X	X	X	X	X	YES
08 031 0027	I-25 Near Road	X		X	X		X	X		X	YES
08 035 0004	Chatfield State Park		X					X		X	NO - RT
08 035 0005	Castlewood Canyon						X	X			YES
08 041 0013	U. S. Air Force Academy		X								YES
08 041 0015	Colorado Springs Hwy. 24	X				X					YES
08 041 0016	Manitou Springs		X								YES
08 041 0017	Colorado College						X	X			YES
08 043 0003	Cañon City – City Hall						X				YES
08 045 0005	Parachute – Elem. School						X			X	YES
08 045 0007	Rifle – Henry Bldg						X	X		X	YES
08 045 0012	Rifle – Health Dept		X								YES
08 045 0018	Carbondale						X				YES
08 051 0004	Crested Butte						X				YES
08 051 0007	Mt. Crested Butte - Realty						X				YES



<i>AQS #</i>	<i>Site Name</i>	<i>CO</i>	<i>O<sub>3</sub></i>	<i>NO</i>	<i>NO<sub>2</sub>/NO<sub>y</sub></i>	<i>SO<sub>2</sub></i>	<i>PM<sub>10</sub></i>	<i>PM<sub>2.5</sub></i>	<i>TSP/Pb</i>	<i>Met</i>	<i>App. A,C,D,E Reqs. Met?</i>
08 059 0002	Arvada									X	YES
08 059 0005	Welch		X							X	YES
08 059 0006	Rocky Flats - N		X							X	YES
08 059 0011	NREL		X								YES
08 059 0013	Aspen Park		X							X	NO - trees
08 067 0004	Durango-River City Hall						X				YES
08 069 0009	Fort Collins – CSU - Edison						X	X			NO - trees
08 069 0011	Fort Collins - West		X								YES
08 069 1004	Fort Collins - Mason	X	X							X	YES
08 077 0017	Grand Junction – Powell Bldg						X	X			YES
08 077 0018	Grand Junction - Pitkin	X								X	YES
08 077 0019	Clifton - Sanitation						X				YES
08 077 0020	Palisade Water Treatment		X							X	YES
08 081 0002	Lay Peak		X							X	YES
08 083 0006	Cortez – Health Dept		X					X			YES
08 097 0006	Aspen - Library						X				YES
08 099 0002	Lamar Municipal						X				YES
08 099 0003	Lamar Port of Entry									X	YES
08 101 0015	Pueblo - Fountain School						X	X			YES
08 107 0003	Steamboat Springs						X				YES
08 113 0004	Telluride						X				YES
08 123 0006	Greeley-Hospital						X	X			YES
08 123 0008	Platteville Middle School							X			YES
08 123 0009	Greeley – County Tower		X							X	YES
08 123 0010	Greeley – West Annex	X									YES

**Alsup Elementary School - Commerce City, 7101 Birch Street (08 001 0006):**

The Alsup Elementary School - 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 two schools in addition to the Alsup Elementary School in the immediate vicinity, 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.

PM<sub>10</sub> monitoring began in January 2001 and continues today. PM<sub>2.5</sub> monitoring began in January 2001 and continues today. There are a collocated set of monitors, along with a continuous monitor, a trends speciation monitor, and a PM<sub>2.5</sub> carbon monitor all in operation.

Meteorological monitoring began in June of 2003.

**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.

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. The continuous monitor began operation in June, while the high volume monitor began operation in July.

Meteorological monitoring began in January of 1975.

**Alamosa – Adams State College, 208 Edgemont Boulevard (08 003 0001):**

The Alamosa – Adams State College site is located on the science building of Adams State College in a principally residential area. The only significant traffic is on US 160 through the center of town. The site is adjacent to this highway but far enough away to reduce direct impacts on the PM<sub>10</sub> levels. Meteorological data are not available from the area. The city has a population of 8,780 (2010 Census data). This is an increase of 10.3% from the 2000 census. The major particulate source is wind-blown dust. This site began operation in 1973 as a TSP monitor and was changed to a PM<sub>10</sub> monitor in June 1990. This is a population oriented neighborhood scale SLAMS monitor that is on a daily sampling schedule.

**Alamosa - Municipal, 425 4<sup>th</sup> Street (08 003 0003):**

The Alamosa 425 4<sup>th</sup> Street was started in May 2002. The site was established closer to the center of the city to be more representative of the population exposure in the area. This is a population oriented neighborhood scale SLAMS monitor that is on a daily sample schedule.

**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. Currently, the site is not

operational due to further construction in the area, and is being considered for permanent shut down.

**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<sup>0</sup> 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 an aid in the determination of the easternmost 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 projects monitor (SPM) for a regional scale, and became a SLAMS monitor in 2013.

**Centennial Airport, 7800 S. Peoria Street (08 005 0007):**

The Centennial Airport site was established in April of 2011 in response to the improved lead standards from the EPA. The lead concentrations found in this monitor are well below the improved standards. As such, the site is being considered for permanent closure.

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

The Pagosa Springs School 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.

**South Boulder Creek, 1405½ S. Foothills Parkway (08 013 0011):**

The city of Boulder is located about 30 miles to the northwest of Denver. The Boulder Foothills, South Boulder Creek site was established as a special-purpose O<sub>3</sub> monitor as a part of the "summer 1993 Denver O<sub>3</sub> Study." During that summer a one-hour level of 0.128 ppm was recorded on July 2, 1993. In 1994, the monitor was converted from an SPM to a seasonal SLAMS monitor. In 1995 it was converted to a year-round O<sub>3</sub> monitoring site when the instruments were moved into a new shelter.

This is a highest concentration oriented urban scale SLAMS monitor.

**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 Division'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 – 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 began operation in November 2004, and may be removed in 2013 due to construction of a new covered air-filled dome covering the practice fields that obstructs air flow. The dome is erected each fall, and remains inflated until early spring. It is removed

during the summer months.

**Delta, 560 Dodge Street (08 029 0004):**

Delta is a small agricultural community midway between Grand Junction and Montrose. The topography in and around Delta is relatively flat as it sits in the broad Uncompaghre River Valley surrounded by high mesas and mountains. Delta sits in a large bowl shaped basin that can effectively trap air pollution, especially during persistent temperature inversions.

The Delta County Health Department site was chosen because it is a one story building near the downtown area. The site began operation in August 1993, and is representative of the large basin with the potential for high PM<sub>10</sub> due to agricultural burning, automobile traffic, and the former Louisiana Pacific wafer board plant. This is a population oriented neighborhood scale SLAMS monitor on a 1 in 3 day sample schedule.

**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.

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 continuous and an FEM monitor, and was furthered by the addition of a collocated FEM monitor in 2001.

Meteorological monitoring began at this site in January of 1965.

**NJH-E, 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 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 (Figure 15). 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.

**Denver Visitor Center, 225 W. Colfax Avenue (08 031 0017):**

The Denver Visitor Center site is located near the corner of Colfax Avenue and Tremont Street. It began operation on December 28, 1992. In 1993, this site along with the Denver CAMP and Gates monitors recorded the first exceedances of the 24-hour PM<sub>10</sub> standard in the Denver metropolitan area since 1987. The Visitor Center recorded a PM<sub>10</sub> level of 161 µg/m<sup>3</sup> on January 14, 1993. Since then, high values have been observed but have been below the NAAQS of 150 µg/m<sup>3</sup>. In the past ten years, the 24-hour maximum levels have trended downward. This is a population oriented middle scale SLAMS monitor operating on a daily sample schedule.

**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 La Casa 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. 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 high volume samplers, and a Lo-Vol PM<sub>10</sub> on the shelter roof. These concurrent PM<sub>10</sub> measurements will be compared prior to removing the Hi-Vol PM<sub>10</sub> monitors. The Lo-vol PM<sub>10</sub> concentrations are more useful as they can be used 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 monitor, a continuous TEOM/FDMS FEM instrument, a supplemental PM<sub>2.5</sub> speciation monitor, and a carbon speciation monitor.

PM<sub>10</sub>/lead (Pb-TSP) monitoring began in January 2013. Lead sampling at La Casa is accomplished via PM<sub>10</sub> filter sample collection and sampling for TSP, as practiced at DMAS, was discontinued.

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

The I-25 site is an EPA required near roadway NO<sub>2</sub> monitoring site. It was established in June 2013. Trace level CO, particulates, and meteorological parameters are also monitored here.

**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 FEM monitor in 2005.

Meteorological monitoring began in April of 2004.

**Castlewood Canyon, Castlewood Canyon State Park (08 035 0005):**

The Castlewood Canyon site was added as a replacement background concentration site for particulate monitoring. This site replaces the previous background site located in Elbert County. The site monitors for PM<sub>10</sub> and PM<sub>2.5</sub>.

**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 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.

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

Manitou Springs is a 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 needed a continuous PM<sub>2.5</sub> monitor. The Division 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 a 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.

The nearest representative meteorological site is located at the Colorado Springs Airport. 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, two on the SLAMS network (PM<sub>10</sub> and PM<sub>2.5</sub>) and one that is a special projects monitor (PM<sub>2.5</sub> continuous).

**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 City Hall 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.

**Parachute – Elementary School, 100 E. 2<sup>nd</sup> Street (08 045 0005):**

The Parachute site began operation in May 2000 with the installation of a PM<sub>10</sub> monitor at the high school. This is a population oriented neighborhood scale SLAMS monitor on a 1 in 3 day sample schedule.

**Rifle - Henry Building, 144 3<sup>rd</sup> Street (08 045 0007):**

The first Rifle site began monitoring for particulates in June 1985 and ended operation in May 1986. The next site began operation in December 1987 and continued until 2001. The levels at that site, with the exception of the March 31, 1999 high wind event, were always less than one half of both the annual and the 24-hour standards. The current location on the Henry Building began operation in May of 2005 with the installation of a PM<sub>10</sub> monitor as a part of the Garfield County study. There are now two population oriented neighborhood scale special project PM<sub>10</sub> monitoring sites: one on a 1 in 3 day sample schedule, and one that is continuous. There is also a continuous monitor measuring PM<sub>2.5</sub> and PM<sub>10</sub>, and meteorological monitors.

**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 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 with a neighborhood scale.

**Carbondale, 1493 County Road 106 (08 045 0018):**

Carbondale is in the fairly narrow Roaring Fork valley between Aspen and Glenwood Springs. The Carbondale site is located just south of the confluence of the Crystal and Roaring Fork rivers and was established to monitor PM<sub>10</sub> in January of 2013. This is a population oriented neighborhood scale special project monitoring site.

**Crested Butte, 603 6<sup>th</sup> Street (08 051 0004):**



The Crested Butte PM<sub>10</sub> site began operation in June 1985. Crested Butte is a high mountain ski town. The monitor is at the east end of town near the highway and in the central business district. Any wood burning from the residential area to the west directly affects this location. The physical setting of the town, near the end of a steep mountain valley, makes wood burning, street sanding, and wintertime inversions a major concern. The town is attempting to regulate the number of wood burning appliances, since this is a major source of wintertime PM<sub>10</sub>.

There are two population oriented neighborhood scale monitors here, one in the SLAMS network (1 in 3 day sample schedule) and one that is a continuous monitor.

**Mt. Crested Butte Realty, 19 Emmons Road (08 051 0007):**

Mount Crested Butte is located at an elevation of 8,940 feet (2,725 m) at the base of the Crested Butte Mountain Resort ski area. Mount Crested Butte is a unique location for high particulate matter concentrations because it is located on the side of a mountain (Crested Butte 12,162 ft. or 3,707 m), not in a bowl, valley, or other topographic feature that would normally trap air pollutants. There is not a representative meteorological station in or near Mt. Crested Butte.

The location for the Mt. Crested Butte site was selected because it had an existing PM<sub>10</sub> site that had several high PM<sub>10</sub> concentrations including five exceedances of the 24-hour standard in 1997 and one in 1998. Mt. Crested Butte also exceeded the PM<sub>10</sub> annual average standard in 2011. A CMB source apportionment from 10 PM<sub>10</sub> filters identified crustal material as the mostly likely source (91%) of PM<sub>10</sub>. Carbon, which is most likely from residential wood smoke, made up 8% of the statistically composite sample and secondary species made up the remaining one percent. The Mt. Crested Butte site was also selected because it is an area representative of the residential impact of PM<sub>10</sub>. This is a population oriented neighborhood scale SLAMS monitor on a daily sample schedule.

**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 Division 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 - N, 16600 W. Highway 128 (08 059 0006):**

The Rocky Flats - N site is located north-northeast of the plant on the south side of Colorado Highway 128, approximately 1¼ miles to the west of Indiana Street. The site began operation in June 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.

**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, 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. This is a highest concentration oriented urban scale SLAMS monitor.

**Aspen Park, 26137 Conifer Road (08 059 0013):**

The Aspen Park site began operation in May 2009. It is intended to verify/refute model predictions of above normal O<sub>3</sub> levels. In addition, passive O<sub>3</sub> monitors used in the area in a 2007 study indicated the possibility of higher O<sub>3</sub> levels. The monitor is located in an urban setting at a Park and Ride facility off of Highway 285, at an elevation of just over 8,100 feet. Because the site is nearly 3,000 feet higher than the average metro area elevation, it should see O<sub>3</sub> levels that are larger than those seen in the metro area, as O<sub>3</sub> concentrations increase with increasing elevation. Whether or not the increased concentrations will be a health concern will be determined with the data gathered from this monitor. This is a SLAMS neighborhood scale monitor.

**Durango - River City Hall, 1235 Camino del Rio (08 067 0004):**

Durango is the second largest city on the western slope. The town is situated in the Animas River Valley in southwestern Colorado. Its elevation is approximately 6,500 feet (1,981 meters) above mean sea level. The Animas valley through Durango is steep and narrow. Even though little meteorological information is available for the area, the microclimate of Colorado mountain communities is characterized by cold air subsidence, or drainage flows during the evening and early morning hours and up valley flows during afternoon and early evening hours when solar heating is highest. Temperature inversions that trap air pollutants near the surface are common during night and early morning hours. This is a population oriented neighborhood scale SLAMS monitor that samples continuously.

**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. There are two population oriented neighborhood scale SLAMS monitors, a PM<sub>10</sub> and a PM<sub>2.5</sub>, that sample on a 1 in 3 day sample schedule. There is also continuous monitor measuring PM<sub>10</sub> and PM<sub>2.5</sub>.

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

The Fort Collins-West 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. 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.

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 in the broad valley of the Colorado River. The monitors are on county owned buildings in the south side of the city. The 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. This site monitors for 24-hour and hourly PM<sub>10</sub> as well as for 24-hour and hourly PM<sub>2.5</sub>.

**Grand Junction - Pitkin, 645<sup>1</sup>/<sub>4</sub> Pitkin Avenue (08 077 0018):**

The Grand Junction-Pitkin CO monitor began operation in January 2004. This monitor replaced the site at the Stocker Stadium. The Stocker Stadium location had become less than ideal with the growth of the trees surrounding the park and the Division felt that a location nearer to the CBD would provide a better representation of CO concentration values for the city. The CO concentrations at the Stocker Stadium site had been declining from an eight-hour maximum in 1991 of 7.8 ppm to 3.3 ppm in 2003. It is a population oriented, micro-scale SLAMS monitor.

Meteorological monitors were installed in 2004, and include wind speed, wind direction, temperature and relative humidity sensors.

**Clifton, Hwy 141 & D Road (08 077 0019):**

The Clifton PM<sub>10</sub> monitor is located in the town of Clifton which is a southeastern suburb of Grand Junction. The monitor is in a low usage parking lot operated by the sanitation district. It is one half mile north of the Colorado River. The site was established at the request of the Mesa County Health Department to address concerns of oil and gas related industries in the area.

The population oriented neighborhood scale SLAMS monitor began operations in October 2007, and operates on an every third day schedule.

**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. Monitoring commenced in May 2008. This is an urban scale special purpose monitor.

**Lay Peak, (08 081 0002):**

The Lay Peak site was established in support of the 3-State Pilot Study program. It began operations in August of 2011. The site monitors for O<sub>3</sub> and meteorological parameters, including relative humidity. The purpose for this site and other Three State Study sites is for the development of monitoring data sets in geographic areas that have no monitoring data to support modeling efforts in NEPA assessments and in determinations of NAAQS compliance. The Lay Peak site is located approximately 18 miles west of the town of Craig and 2 miles south of Highway 40 on County Road 17. The site sits on the north flank of Lay Peak and is approximately 200 ft above the valley floor. The surrounding terrain is high desert, dominated by sagebrush, pinion pines, and riparian vegetation. The site is in open terrain with a 360-degree exposure. There are no significant sources nearby, however, the oil and gas development potential is high for lands to the north and east of the site, and development of these resources is expected to increase in the future. It is a regional site.

**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. Currently, there are O<sub>3</sub> and PM<sub>2.5</sub> monitors in operation at this site.

The O<sub>3</sub> site 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. Monitoring commenced in May 2008. This is an urban scale SLAMS monitor.

**Aspen - Library, 120 Mill Street (08 097 0006):**

Aspen is at the upper end of a steep mountain valley. Aspen does not have an interstate 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.

The population oriented neighborhood scale SLAMS 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. This is a population oriented neighborhood scale SLAMS

monitor on a daily sample schedule.

**Lamar Port of Entry, 7100 US Highway 50, (08 099 0003):**

The particulate monitors in Lamar have recorded some of the highest readings in the state. These readings are primarily associated with east winds in excess of 20 mph. The Division first established a meteorological monitor in Lamar at the Municipal Building but this location was too protected and the meteorological monitor was moved to the Port of Entry location in March of 2005.

**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 ft to 4,814 ft (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 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 and the town 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 the 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> monitor is on the roof of a hospital office building at 1516 Hospital Road. 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. This is a population oriented neighborhood scale SLAMS monitor on a 1 in 3 day sample schedule.

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.

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 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.

Meteorological monitoring began in February of 2012.

**Greeley West Annex Bldg, 905 10<sup>th</sup> Avenue (08 123 0010):**

Greeley does not have the population to require a CO monitor under Federal regulation. However, it is one of the larger cities along the Front Range and was declared in nonattainment for CO in the late-1970s after exceeding the eight-hour standard in 1976 and 1977. The first Greeley monitor operated from December 1976 to December 1980. It was located at 15<sup>th</sup> Street and 16<sup>th</sup> Avenue and exceeded the eight-hour standard numerous times from 1976 through 1980. The monitor is a population oriented neighborhood scale SLAMS monitor.

The 811 15<sup>th</sup> Street location began operation in November 1981 and was discontinued in 2002. The current monitor is located in the Weld County West Annex building, and began operations in December 2003. This location is in the Greeley CBD. The levels recorded at this site are comparable but slightly lower than those at the former 811 15<sup>th</sup> Street site, about a quarter of the eight-hour standard.

## Appendix B- I-25 Near Roadway Site Modification Documents

EPA REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM (VERSION 2, 4/1/04)						
DATE: 5/13/2014		CITY: DENVER			STATE: CO	
AQS SITE ID: 08 031 0027			SITE NAME: I-25 DENVER			
PROPOSED MODIFICATION/REASON WHY: This is a required near road site for NO2, with CO and particulates monitoring.						
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	
NO2	Near Road	X				TAPI T200UP
CO	Near Road	X				TECO 48-TLE
PM2.5	Near Road	X				RP 2025
PM10	Near Road	X				GRIMM EDM 180
PM2.5	Near Road	X				GRIMM EDM 180
PM1	Near Road	X				GRIMM EDM 180
PM - CARBON	Near Road	X				API 633
PROPOSED SAMPLING START / REMOVAL DATE OR DATE STARTED / REMOVED: JUNE 2013						
ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:						
LOCATION (LAT./LONG. OR UTM# S): UTM ZONE 13 UTM EASTING 498689 UTM NORTHING 4398032						
SITE ELEVATION (M. MSL):				PROBE HEIGHT (M. AGL): 5.0 M		
DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS	
29 M	SE				NO OBSTACLES	
12 M	N					
18 M	N					
25 M	N					
UNRESTRICTED AIR FLOW: >270 DEG. >180 DEG. <CRITERIA _____ DEG.						
DISTANCE TO FLUES/INCINERATORS (M) NOT APPLICABLE						
DISTANCE TO INTERSECTIONS (M):			DISTANCE FROM SUPPORTING STRUCTURES (M): VERT. _____ HORIZ. _____			
DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
185 M	W. 11 <sup>TH</sup> AVE.	NORTH				Local street
8 M	YUMA STREET	EAST				Local street
63 M	W. MULBERRY PL.	SOUTH				Local street
9 M	I-25	WEST	249,000	2011	INTERSTATE	MAJOR HWY
DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)		DIRECTION TO AREA SOURCES	COMMENTS	
0.34 miles	NNW				ZUNI POWER PLANT	
CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except noted with submittal.						
Printed Name: <u>Gregory Harshfield</u> Signature: <u>[Signature]</u>						



FOR EPA USE ONLY:	Received Date: _____	Followup Actions: _____	Approval Status
Given: _____	Email Response Date: _____	Letter Response Date: _____	

<b>FOR METEOROLOGICAL PARAMETERS ONLY:</b>			
MONITORING PURPOSE/OBJECTIVES: CHARACTERIZE METEOROLOGY AT NEAR ROAD NO2 SITE			
PROPOSED MONITORING SCHEDULE/DURATION: LONG-TERM NEAR ROAD SITE			
PROPOSED START / REMOVAL DATE OR DATE STARTED / REMOVED: JUNE 2013			
DATA ACQUISITION SYSTEM: AGILAIRE			
PRIMARY	PARAMETERS:	APPLICABLE √ those that apply	SENSOR HT (M)
BACKUP	WIND SPEED/DIRECTION	X	10
EQUIPMENT MANUFACTURER/MODEL: Met One	SOLAR RADIATION		
	RELATIVE HUMIDITY	X	7
WILL THE DATA BE USED FOR MODELING? <u>YES</u> NO	PRESSURE		
IS SITE REQUIRED FOR SIP?    YES <u>NO</u>	SIGMA THETA	X	10
UNRESTRICTED AIRFLOW? <u>YES</u> NO	PRECIPITATION		
DISTANCE TO TREE DRIPLINE (M): 15 m. Tree is below tower height.	TEMPERATURE	X	7
NEARBY TERRAIN:    SMOOTH <u>ROLLING</u> ROUGH	OTHER (DESCRIBE)		
TOPOGRAPHIC FEATURES (E.G HILLS, MOUNTAINS, VALLEYS, RIDGES, BODIES OF WATER): ALONG HIGHWAY THAT FOLLOWS PLATTE RIVER VALLEY.			
COMMENTS: MET TOWER IS HIGHER THAN TREES.			

<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>
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## Appendix C- Rist Canyon Site Modification Documents

# STATE OF COLORADO

John W. Hickenlooper, Governor  
Christopher E. Urbina, MD, MPH  
Executive Director and Chief Medical Officer

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

4300 Cherry Creek Dr. S.      Laboratory Services Division  
Denver, Colorado 80246-1530      8100 Lowry Blvd.  
Phone (303) 692-2000      Denver, Colorado 80230-6928  
Located in Glendale, Colorado      (303) 692-3090  
<http://www.cdphe.state.co.us>



Colorado Department  
of Public Health  
and Environment

Date: February 20, 2013

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 network site modification request form for the proposed decommissioning of the Rist Canyon site (ozone and meteorology). Site common name, AQS ID and proposed actions are as follows:

- Rist Canyon AQS ID: 08-069-0012  
Removal - Ozone SPM Monitor  
Removal - Meteorological Special Purpose Monitors

This letter, the enclosed Comparison of Top Ranked Daily 8-Hour Average Maximum Values (Attachment 1), the enclosed network modification form (Attachment 2), and site assessment form (Attachment 3) was made available for a 30 day public comment period from 1/16/2013 to 2/16/2013. The Air Pollution Control Division did not receive any comments related to this network modification request.

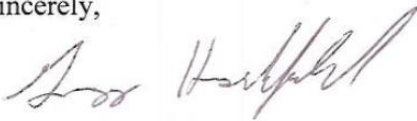
### **Rist Canyon - AQS ID: 08-069-0012**

The proposed last sample to be collected from the Rist Canyon ozone monitor and meteorological sensors is to be based upon EPA's concurrence of this network modification request. The Rist Canyon site was established in 2009 in support of an EPA recommendation to verify a modeling hot spot in the foothills to the west of Fort Collins. This hot spot was originally presented in the 2010 Ozone Projections for the 2010 Base Case and 2010 Sensitivity Tests and 2010 Ozone Source Apportionment Modeling for the Denver 8-hour Ozone State Implementation Plan document. The APCD proposes to shut down the Rist Canyon ozone monitor and meteorological sensors for the following reasons:

- The monitored concentrations observed at the Rist Canyon site do not appear to validate the modeled hot spot. Attachment 1 shows a comparison of the top ranked daily 8-hour average maximum values for sites located in the Fort Collins area. The APCD believes the 3.5 year data set is sufficient to adequately demonstrate attainment of the site's objectives. The Rist Canyon site has a calculated design value 7 ppb lower than the Fort Collins West site and 2 ppb higher than the Fort Collins CSU site. A comparison of values shows the Rist Canyon site to be redundant with the Fort Collins sites. The closure of this monitor is in accordance with EPA's effort to disinvest in redundant sites so that resources can be reallocated to further expand the existing network as needed.
- Even though the site has been in operation in excess of three years, the analyzer is still currently classified as a Special Purpose Monitor. Continued monitoring at the Rist Canyon site would require a conversion of the site's monitoring type designation, from a Special Purpose Monitoring Station (SPM) to a State and Local Air Monitoring Station (SLAMS). This conversion would imply a longer term commitment to continue monitoring at this location. The APCD believes long term monitoring at this site is not in the best interest of the air monitoring network. The monitoring resources spent on the Rist Canyon site are better spent expanding the air monitoring network elsewhere.
- The site marginally fails to meet siting criteria for ozone and meteorology. A tree located 15 meters west of the ozone probe is 18 meters above the probe; thus making it by definition an obstacle. A tree located to the southwest of the meteorological tower is also by definition an obstacle to the meteorological measurements. The location of the analyzer within the Rist Canyon Fire Station requires the use of long sample lines. The long sample line results in sample retention times in excess of 20 sec. The conversion to thick walled sample lines (smaller internal diameter) has decreased sample retention times; however, sample retention times remain marginal.

Enclosed is the associated Ambient Air Monitoring Network Modification Request Form and a copy of the Rist Canyon Site Assessment Form. If you have any questions or need further information, you can reach me at (303) 692-3232.

Sincerely,



Gregory Harshfield  
Continuous Monitoring and Data Systems Support Supervisor

cc: Gordon Pierce

Enclosures:

- Attachment 1: Northern Front Range - Comparison of Top Ranked Daily 8-Hour Avg. Maximum Values
- Attachment 2: Rist Canyon - Ambient Air Monitoring Network Modification Form
- Attachment 3: Rist Canyon - Site Assessment Form

## Attachment 1

Front Range - Comparison of Top Ranked Daily 8-Hour Avg. Maximum Values

### Northern Front Range - Annual Comparison of Top Ranked Daily 8-Hour Average Maximum Values

2009 - Daily 8 Hour Average Max			2010 - Daily 8 Hour Average Max			2011 - Daily 8 Hour Average Max			2012 - Daily 8 Hour Average Max		
Rank	Rist Canyon	ppm	Rank	Rist Canyon	ppm	Rank	Rist Canyon	ppm	Rank	Rist Canyon	ppm
1	21-AUG-2009	0.071	1	14-APR-2010	0.074	1	25-Jul-2011	0.080	1	9-Aug-2012	0.077
2	19-JUN-2009	0.069	2	16-JUN-2010	0.072	2	15-Jun-2011	0.075	2	6-Apr-2012	0.076
3	22-JUN-2009	0.069	3	24-JUN-2010	0.071	3	10-May-2011	0.073	3	15-May-2012	0.072
4	11-AUG-2009	0.069	4	13-AUG-2010	0.071	4	24-Jun-2011	0.073	4	26-Mar-2012	0.071
5	13-AUG-2009	0.067	5	13-APR-2010	0.071	5	09-Aug-2011	0.073	5	9-Sep-2012	0.071
6	04-AUG-2009	0.066	6	23-JUN-2010	0.070	6	29-Jul-2011	0.072	6	8-Jun-2012	0.069
7	17-JUN-2009	0.064	7	29-JUN-2010	0.070	7	24-Jul-2011	0.071	7	28-Apr-2012	0.068
8	08-JUL-2009	0.064	8	28-JUN-2010	0.069	8	22-Jun-2011	0.070	8	28-May-2012	0.068
		4th Max:			4th Max:			4th Max:			4th Max:
		3 Year Avg:			3 Year Avg:			3 Year Avg:			3 Year Avg:
		n/a			n/a			0.071			0.071
Rank	Fort Collins West	ppm	Rank	Fort Collins West	ppm	Rank	Fort Collins West	ppm	Rank	Fort Collins West	ppm
1	22-AUG-2009	0.082	1	24-JUN-2010	0.077	1	25-Jul-2011	0.086	1	22-Jun-2012	0.093
2	11-AUG-2009	0.074	2	14-APR-2010	0.075	2	24-Jun-2011	0.081	2	13-Jul-2012	0.086
3	13-MAY-2009	0.073	3	01-JUL-2010	0.075	3	15-Jun-2011	0.080	3	9-Aug-2012	0.086
4	08-JUL-2009	0.073	4	03-AUG-2010	0.075	4	19-Jul-2011	0.080	4	31-Aug-2012	0.08
5	19-JUN-2009	0.072	5	16-JUN-2010	0.074	5	28-Jun-2011	0.079	5	9-Sep-2012	0.079
6	04-AUG-2009	0.071	6	28-JUN-2010	0.074	6	09-Aug-2011	0.079	6	17-Jun-2012	0.077
7	12-AUG-2009	0.071	7	04-JUN-2010	0.073	7	31-Jul-2011	0.078	7	26-Jul-2012	0.077
8	15-JUL-2009	0.070	8	13-AUG-2010	0.073	8	10-May-2011	0.076	8	15-May-2012	0.076
		4th Max:			4th Max:			4th Max:			4th Max:
		3 Year Avg:			3 Year Avg:			3 Year Avg:			3 Year Avg:
		n/a			n/a			0.080			0.080
Rank	Fort Collins CSU	ppm	Rank	Fort Collins CSU	ppm	Rank	Fort Collins CSU	ppm	Rank	Fort Collins CSU	ppm
1	22-AUG-2009	0.074	1	13-APR-2010	0.068	1	24-Jun-2011	0.071	1	22-Jun-2012	0.094
2	13-MAY-2009	0.069	2	04-JUN-2010	0.067	2	25-Jul-2011	0.070	2	13-Jul-2012	0.08
3	19-JUN-2009	0.063	3	14-APR-2010	0.066	3	19-Jul-2011	0.069	3	20-Jul-2012	0.075
4	11-AUG-2009	0.063	4	01-JUL-2010	0.066	4	15-Jun-2011	0.068	4	14-Jul-2012	0.074
5	25-JUN-2009	0.062	5	24-JUN-2010	0.065	5	17-Jul-2011	0.067	5	19-Jul-2012	0.074
6	08-JUL-2009	0.061	6	03-AUG-2010	0.065	6	31-Jul-2011	0.067	6	4-Jul-2012	0.073
7	04-AUG-2009	0.061	7	23-JUN-2010	0.064	7	09-Aug-2011	0.066	7	11-Jul-2012	0.073
8	17-JUN-2009	0.060	8	28-JUN-2010	0.064	8	10-May-2011	0.065	8	6-Apr-2012	0.072
		4th Max:			4th Max:			4th Max:			4th Max:
		3 Year Avg:			3 Year Avg:			3 Year Avg:			3 Year Avg:
		n/a			n/a			0.068			0.074
		n/a			n/a			0.065			0.069

## Attachment 2

Rist Canyon - Ambient Air Monitoring Network Modification Form

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

(VERSION 2, 4/1/04)

DATE: 1/9/2013

CITY: Larimer County - Foothills area west of Fort Collins

STATE: CO

AQS SITE ID: 08-069-0012

SITE NAME: Rist Canyon

PROPOSED MODIFICATION/REASON WHY: Site results are very similar to the Fort Collins - West location. Meteorological tower does not meet siting criteria due to nearby trees. According to EPA siting criteria, one nearby tree, to the west, is an obstruction to the ozone probe. Siting of the ozone monitor within the fire station requires an unusually long inlet line that has not always met the requirement that sample residence time be less than 30 seconds.

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		x		API 400 E
Meteorological Tower	SPM					Met One Wind speed, wind direction, temp.

PROPOSED SAMPLING START / REMOVAL DATE OR DATE STARTED / REMOVED: Proposed removal March 1, 2013

**ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS: Ozone and Meteorology**

LOCATION (LAT./LONG. OR UTM' S): Latitude 40.64191 Longitude -105.27525 WGS 84

SITE ELEVATION (M. MSL): 2057 Meters

PROBE HEIGHT (M. AGL): 3.6 Meters

DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS
Tree 1052 - 15 Meters	NW	15 Meters	NW	14.4 Meters	Tree 1052 to NW is on a hill, which
					Makes it more of an obstruction.

UNRESTRICTED AIR FLOW: >270 DEG. >180 DEG. <CRITERIA\_\_270\_\_\_\_\_DEG.

DISTANCE TO FLUES/INCINERATORS (M): None

DISTANCE TO INTERSECTIONS (M): No intersections nearby

DISTANCE FROM SUPPORTING STRUCTURES (M):  
VERT. \_\_1.2\_\_ HORIZ. \_\_2.1\_\_ Probe comes out of building side

DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
		NORTH				
17 Meters	Rist Canyon Road	EAST			Local Highway	
		SOUTH				
		WEST				

DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS
No nearby point sources.				
Forested foothills area.				

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

Printed Name: \_\_\_\_\_ 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 wind speed, temperature, and wind direction at ozone site.

PROPOSED MONITORING SCHEDULE/DURATION: Proposed shut down on March 1, 2013.

PROPOSED START / REMOVAL DATE Proposed shut down on March 1, 2013.  
 OR DATE STARTED / REMOVED:

DATA ACQUISITION SYSTEM: Air Vision

PRIMARY	Air Vision	PARAMETERS:	APPLICABLE √ those that apply	SENSOR HT (M)
BACKUP		WIND SPEED/DIRECTION	X	10 Meters
EQUIPMENT MANUFACTURER/MODEL: Met One 010/020 Wind Speed Also temperature probe		SOLAR RADIATION		
		RELATIVE HUMIDITY		
WILL THE DATA BE USED FOR MODELING?	YES NO	PRESSURE		
IS SITE REQUIRED FOR SIP?	YES <u>NO</u>	SIGMA THETA	X	10 Meters
UNRESTRICTED AIRFLOW?	YES <u>NO</u> <i>Obstructions to NW and SE</i>	PRECIPITATION		
DISTANCE TO TREE DRIPLINE (M): A number of trees are obstructions - see attachment.		TEMPERATURE	X	6 Meters
NEARBY TERRAIN: SMOOTH ROLLING <u>ROUGH</u>		OTHER (DESCRIBE)		

TOPOGRAPHIC FEATURES (E.G HILLS, MOUNTAINS, VALLEYS, RIDGES, BODIES OF WATER): In valley in foothills area of the Rocky Mountains, to the west of the city of Fort Collins, CO.

COMMENTS:



## Attachment 3

### Rist Canyon – Site Assessment Form

AQS Number	80690012
SITENO	1246
AQCR	2
SUBREGION	A
COMPANY	STATE OF COLORADO
PROJECT	MONITORING
SITENAME	11835 RIST CANYON ROAD
STREETADDRESS	11835 Rist Canyon Road
CITY	Larimer County
STATE	CO
UTMZONE	13
UTMNORTH	4499055
UTMEAST	476731
VERTICAL_MEASURE	6750

LATITUDE/LONGITUDE DATUM	WGS84
LONGITUDE (Dec Degrees)	-105.2752
LATITUDE (Dec Degrees)	40.6419
SUBREPORT MET TOWERS TABLE - Short Page	

AQS Number	80690012	Tower Observer	Nancy Chick	
		Tower Observation Date	8/31/2012	
Is there a Tower At this Site?	Yes	Tower Latitude	40.64211 Decimal Degrees, WGS 84	
		Tower Longitude	-105.27513	
Is Wind Speed Measured?	Yes	Wind Speed Measurement Height	10	Meters
Is Wind Direction Measured?	Yes	Wind Direction Measurement Height	10	Meters
Is Temperature Measured?	Yes			
Is Delta Temperature Measured?	No	Temperature 1 Height	6	Meters
		Temperature 2 Height		Meters
		Temperature 3 Height		Meters
Is Sigma Theta Recorded?	Yes			
Is Relative Humidity Measured?	No	Relative Humidity Measurement Height		Meters
Does Tower Meet Siting Criteria?	No			
Tower Comments	Tall Trees to West are an obstruction.			

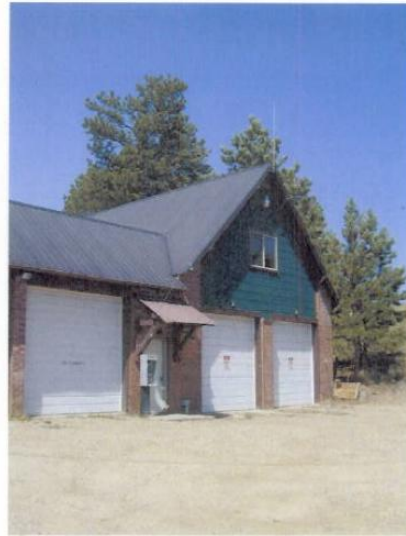
SUBREPORT SITE PICTURES

AQS Number	Site Pictures Date	Site Pictures Taken By	Site Picture Comments
80690012	8/31/2012	Nancy Chick	The tents are temporary - for a revegetation project.

View 1



View 2



View 3



Ground Cover View



North View



Northeast View



East View



Southeast View



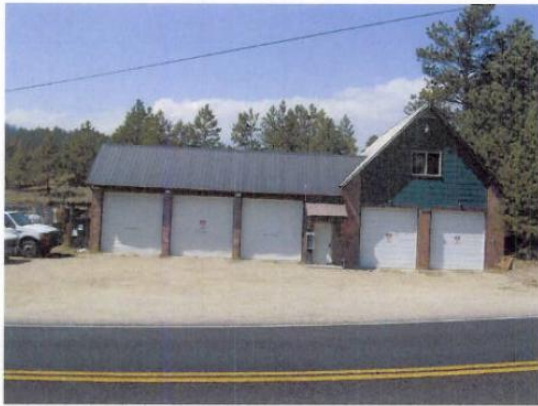
South View



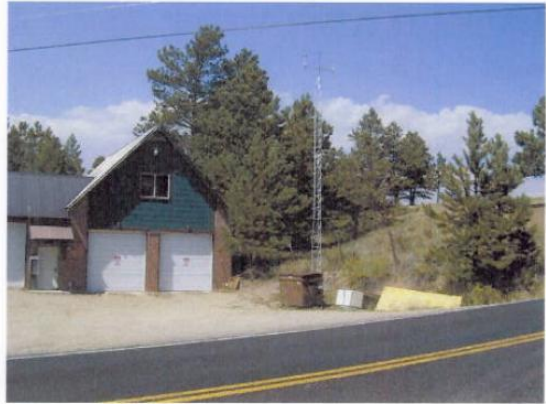
Southwest View



West View



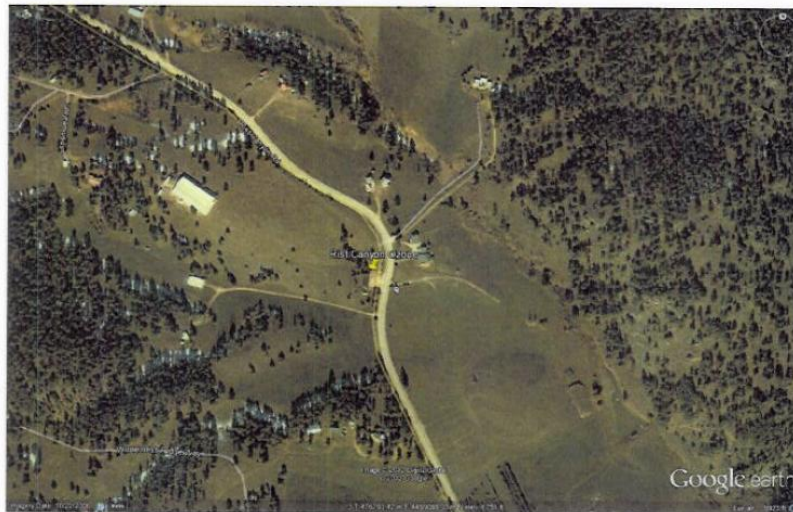
Northwest View



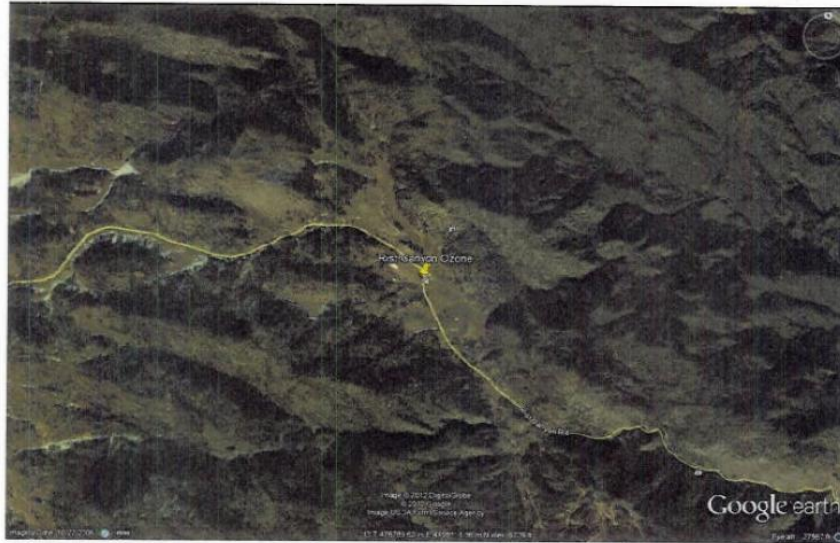
AQS Number	Site Diagram Date	Site Diagram Observer	Site Diagram Comments
------------	-------------------	-----------------------	-----------------------

80690012	8/31/2012	Nancy Chick	
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Site Diagram 1



Site Diagram 2



SUBREPORT SITE\_STREET\_INFORMATION

## SITE STREET INFORMATION

AQS Number	Tangent Street Number	Street Name	Road Type	Traffic Count	Year of Traffic Count	Direction From Site to Street	Source of Traffic Count
80690012	54	Rist Canyon Road	LOCAL ST OR HY			E	

SUBREPORT - TREE INDIVIDUAL

## TREES - INDIVIDUAL

Tree Identification Number	AQS Number	Tree Latitude	Tree Longitude	Tree Species	Is Tree an Evergreen?	Tree Comments
1050	80690012	40.64212	-105.27502	PINE	Yes	NE TREE NEAR ROAD.
1051	80690012	40.64236	-105.27501	PINE	Yes	North Tree on Hill. GPS reading taken on road, east of tree. (Tree is on fenced private property).
1052	80690012	40.64212	-105.27539	PINE	Yes	Tallest tree to NW.



1053	80690012	40.64182	-105.27508	PINE	Yes	Tallest tree to SSE - Double trunk at base.
------	----------	----------	------------	------	-----	---

Site AQS Number	80690012	
Parameter (Pollutant)	44201	Parameter Codes:
POC	1	CO 42101 O3 44201 NO2 42602 SO2 42401
Evaluation Date (YYYYMMDD)	20120831	PM10 STP 81102 PM2.5
Evaluation Observer	Nancy Chick	Lead In TSP at STP 12128
Probe Height (m above ground)	3.6	CO 3 +/- 1/2 Meters Microscale CO 3 - 15 Meters Middle and Neighborhood Scale O3, SO2, NO2 3 - 15 Meters PM10, PM2.5, Lead 2-7 Meters Microscale 2-15
Probe Horizontal Distance (m)	2.1	O3, NO2, SO2 - > 1 meter from supporting structure
Probe Vertical Distance (m)	1.2	O3, NO2, SO2 - > 1 meter from supporting structure
Probe Material	TEFLON	O3, NO2 - Teflon or Pyrex Glass
Probe Building Side	YES	N, NE, etc, or NONE
Probe In a Dusty Area?	No	SO2 - Away from dirty,dusty areas PM10, PM2.5 - Area should be paved or have vegetative ground cover
Residence Time for Pollutant	36	O3, NO2 - Less than 20 seconds
Unrestricted Air Flow (Degrees)	270	CO, O3, SO2, NO2 - Must be 270, or 180 if on side of a building. O3 - Must Include predominant wind dir. SO2 - Wind during peak season must be included in 270 arc. PM10, PM2.5 - At least 270, including predominant wind direction. Lead - At least 270, except for street canyon sites.
Furnace Or Incinerator Flues Nearby?	No	SO2 - No flues or other minor SO2 sources should be nearby PM10, PM2.5, Lead - Recommended Non
Does Site Meet Siting Criteria?	<input type="checkbox"/>	Check Box if Site Meets All EPA Siting Requirements for this Parameter
Pollutant Comments	Trees to NW and SE of probe can block wind. Siting criteria for residence time are not met.	Record any unusual characteristics of site, conditions that do not conform to requirements, etc.

Subreport - Monitor Tangent Roads Linked to Site Roads Table V2

AQS NUMBER	PARAMETER	POC	TANGENT STREET NUMBER	STREET NAME	Rist Canyon Road	ROAD DISTANCE COMMENTS
80690012	44201	1	54			
	DIRECTION FROM SITE TO STREET	DISTANCE FROM MONITOR PROBE TO TANGENT ROAD	ROAD TYPE	TRAFFIC COUNT (VEHICLES PER DAY)	YEAR OF TRAFFIC COUNT	SOURCE OF TRAFFIC COUNT
	E	17	LOCAL ST OR HY			

SUBREPORT - Monitor Obstruction Table - Portrait Version

AQS NUMBER	PARAMETER	POC	IS THIS AN ACTUAL OBSTRUCTION TO BE REPORTED TO AOS ?	Yes	OBSTRUCTION COMMENTS	Height of tree includes hill.
80690012	44201	1				
Obstruction Number	PROBE OBSTRUCTION TYPE	DIRECTION FROM MONITOR PROBE TO OBSTRUCTION	DISTANCE FROM MONITOR TO PROBE OBSTRUCTION (Meters)	HEIGHT OF POTENTIAL PROBE OBSTRUCTION (Meters)	OBSTRUCTION OBSERVATION DATE	OBSERVER
1052	TREE	NW	15	18	8/31/2012	Nancy Chick

AQS NUMBER	PARAMETER	POC	IS THIS AN ACTUAL OBSTRUCTION TO BE REPORTED TO AOS ?	Yes	OBSTRUCTION COMMENTS	Probe mounted on side of this building.
80690012	44201	1				
Obstruction Number	PROBE OBSTRUCTION TYPE	DIRECTION FROM MONITOR PROBE TO OBSTRUCTION	DISTANCE FROM MONITOR TO PROBE OBSTRUCTION (Meters)	HEIGHT OF POTENTIAL PROBE OBSTRUCTION (Meters)	OBSTRUCTION OBSERVATION DATE	OBSERVER
5013	BUILDING	W	2.1	8.3	8/31/2012	Nancy Chick

SUBREPORT - TREE HISTORY- Grouped by AQS

AQS Number 80690012

Pollutant - AQS Code 44201

Site Tree and Object Height Calculation Sheet

Parameter Codes:

CO 42101 O3 442

PM10 STP

81102

Lead In TSP at STP 12128

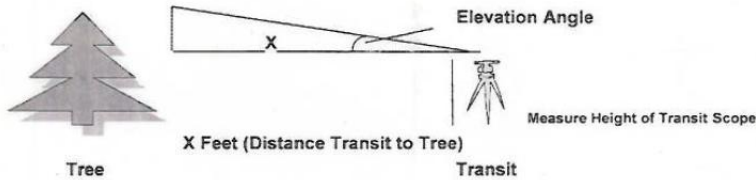
080690012 - 20120831 - Tree Height.jpg

Site Evaluation - Tree and Object Height Calculations

Date: 20120831 Observer: Nancy Chick  
 Transit Used: Mass DPW 374

AQS Site Number 080690012 Rist Canyon

Fill out this form to measure and calculate the height for individual trees near the site.  
 Tree Height Calculation



Formula:  
 Tangent (Elevation Angle) = Height of Tree / X Feet. Therefore,

$$[(\text{Tangent of Elevation Angle}) * (\text{X Distance in Feet})] + \text{Height of Transit (Feet)} = \text{Height of Tree (Feet)}$$

Convert Feet to Meters: Feet \* 0.3048

Convert Inches to Feet: inches/12


Tree Identification Number	Elevation Angle to Top of Tree (Degrees)	Distance to Tree Base (Feet)	Height of Transit (in/feet)	Height of Tree (Feet)	Height of Tree (Meters)
NW Tree	26.7°	108 FT	66.5 in / 5.5 FT	59.8	18 include hill
Building Gate	18.3°	66 FT	5.5	27.3	8.3
Tower W5	24.2°	60 FT	5.5	32.5 FT	9.9 use 10
Tower Temp	11.9°	60 FT	5.5	18 FT	5.5 use 6
North Tree	15.6°	139 FT	5.5	44.3	13.5 include hill
NE Tree	14.9°	61.5	5.5	21.8	6.7

Moderate release


No release needed


No release

Move Transit to best place SSE Tree 19.2° 90 FT 65.8 in / 5.5 FT 36.8 11.2 Meters

Tree Identification Number	AQS Number	Parameter	Direction from Probe to Tree	Distance from Probe to Tree (Meters)	Tree Height (Meters)	Is the Tree an Obstruction ?	Tree History Comments
1050	80690012	44201	NE	17	6.7	No	
Tree Photo 1		Tree Photo 2		Tree Photo 3		Tree Photo 4	Tree Photo 5
							

Tree Identification Number	AQS Number	Parameter	Direction from Probe to Tree	Distance from Probe to Tree (Meters)	Tree Height (Meters)	Is the Tree an Obstruction ?	Tree History Comments
1051	80690012	44201	N	37	13.5	No	Height includes hill.
Tree Photo 1		Tree Photo 2		Tree Photo 3		Tree Photo 4	Tree Photo 5
							

Tree Identification Number	AQS Number	Parameter	Direction from Probe to Tree	Distance from Probe to Tree (Meters)	Tree Height (Meters)	Is the Tree an Obstruction ?	Tree History Comments
1052	80690012	44201	NW	15	18	Yes	Height includes hill.
Tree Photo 1	Tree Photo 2	Tree Photo 3	Tree Photo 4	Tree Photo 5			
							

Tree Identification Number	AQS Number	Parameter	Direction from Probe to Tree	Distance from Probe to Tree (Meters)	Tree Height (Meters)	Is the Tree an Obstruction ?	Tree History Comments
1053	80690012	44201	SSE	24	11.2	No	
Tree Photo 1	Tree Photo 2	Tree Photo 3	Tree Photo 4	Tree Photo 5			
							

## Appendix D - Highlands Site Modification Documents

# STATE OF COLORADO

John W. Hickenlooper, Governor  
Larry Wolk, MD, MSPH  
Executive Director and Chief Medical Officer

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

4300 Cherry Creek Dr. S. Laboratory Services Division  
Denver, Colorado 80246-1530 8100 Lowry Blvd.  
Phone (303) 692-2000 Denver, Colorado 80230-6928  
Located in Glendale, Colorado (303) 692-3090

[www.colorado.gov/cdphe](http://www.colorado.gov/cdphe)



Colorado Department  
of Public Health  
and Environment

September 27, 2013

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 network site modification request form for the discontinuation of the Highland ozone and meteorology monitoring site, AQS ID: 08-005-0002. The Highland site will be shutdown beginning 10/1/2013. The land owner is disconnecting power from the shelter to support a construction project that is estimated to be completed 7/1/2015. Two underground water tanks will be demolished and new underground water tanks will be constructed. The site will remain without power throughout the construction period. The APCD is currently looking into relocating the site to a more suitable location; however, a lack of suitable siting locations may require the site be mothballed for two years.

This letter and Network Modification form was not made available for public comment due to the uncertain nature of the closure. Public comments will be solicited if the site is relocated and/or during the development cycle of APCD's 2014 Network Plan. Enclosed is the associated Ambient Air Monitoring Network Modification Request Form (see Attachment 1). If you have any questions or need further information, you can reach me at (303) 692-3232.

Sincerely,

Gregory Harshfield  
Scientist/Supervisor  
Continuous Monitoring and Data Systems Support

cc: Gordon Pierce

Enclosures:

Attachment 1: Highland Ambient Air Monitoring Network Modification Form

**Attachment 1: Highland Ambient Air Monitoring Network Modification Form**

EPA REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM (VERSION 2, 4/1/04)						
DATE: 10/1/13		CITY: 8100 S. University Blvd., Centennial			STATE: Colorado	
AQS SITE ID: 08-005-0002			SITE NAME: Highland			
<p>PROPOSED MODIFICATION/REASON WHY (Site Shutdown)</p> <p>The Highland site will be shutdown beginning 10/1/2013. The land owner is disconnecting power from the shelter to support a construction project that is estimated to be completed 7/1/2015. Two underground water tanks will be demolished and new underground water tanks will be constructed. The site will remain without power throughout the construction period. The APCD is currently looking into relocating the site to a more suitable location; however, a lack of suitable siting locations may require the site be mothballed for two years.</p>						
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	
O3 & Met	SLAMS			X		API 400E (O3) Met-One WD, WS, RD, RS, Sigma, Temp
<p>PROPOSED SAMPLING START / REMOVAL DATE OR DATE STARTED / REMOVED:</p> <p>Ozone and Meteorological parameters will be discontinued on 10/1/2013.</p>						
ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:						
LOCATION (LAT./LONG. OR UTM' S): 39° 34' 04.07" N, 104° 57' 24.28" W						
SITE ELEVATION (M. MSL): 5725				PROBE HEIGHT (M. AGL): ~3m		
DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS	
10 M	NE				Tree not an obstacle.	
UNRESTRICTED AIR FLOW: >270 DEG. >180 DEG. <CRITERIA_____DEG.						
DISTANCE TO FLUES/INCINERATORS (M): Backup generator @ 25 m to the NW						
DISTANCE TO INTERSECTIONS (M): 350 m			DISTANCE FROM SUPPORTING STRUCTURES (M): VERT._____HORIZ._____			
DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS

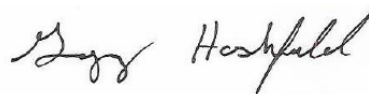


120 m	E. Otero Pl.	NORTH	<200	2009	Residential	No data available (estimate)
140 m	S. Fillmore Cir.	EAST	<200	2009	Residential	No data available (estimate)
185 m	East Countyline Road	SOUTH	19,553	2009	Single Carriageway (4 lanes)	
305 m	S. University	WEST	28,900	2009	Single Carriageway (4 lanes)	
DISTANCE 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: Gregory Harshfield

Signature: \_\_\_\_\_



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

## Appendix E- La Casa Site Modification Documents

EPA REGION 8 AMBIENT AIR MONITORING NETWORK MODIFICATION REQUEST FORM (VERSION 2, 4/1/04)						
DATE: 05/05/2014		CITY: Denver			STATE: CO	
AQS SITE ID: 08 031 0026			SITE NAME: La Casa			
PROPOSED MODIFICATION/REASON WHY: File update for new equipment that was added.						
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	
CO	NCore			X		TECO 48i TLE
SO2	NCore			X		TAPI 400E
O3	NCore			X		TAPI 100E
NO/NOy	NCore			X		TAPI 200EU
PM10	NCore			X		RP 2025
PM10-Collocated/Pb	NCore			X		RP 2025
PM10	NCore			X		TEOM 1400ab
PM2.5	NCore			X		RP 2025
PM2.5	NCore			X		TEOM FDMS
PM2.5 SPECIATION	NCore			X		SASS
PM2.5 Carbon	NCore			X		URG 3000N
PROPOSED SAMPLING START / REMOVAL DATE OR DATE STARTED / REMOVED: 01/01/2013						
ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:						
LOCATION (LAT./LONG. OR UTM 'S): 39.77949, -105.00518						
SITE ELEVATION (M. MSL): 1598 m				PROBE HEIGHT (M. AGL): 9.6 m (NOy), 5.0 m (CO, O3, SO2)		
DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS	
42 m	E				Not an obstacle.	
53 m	SE				Not an obstacle.	
50 m	SSE				Not an obstacle.	
UNRESTRICTED AIR FLOW: >270 DEG. >180 DEG. <CRITERIA _____ DEG.						
DISTANCE TO FLUES/INCINERATORS (M): Not applicable.						
DISTANCE TO INTERSECTIONS (M):			DISTANCE FROM SUPPORTING STRUCTURES (M): VERT. _____ HORIZ. _____			
DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
1,331 m	I-25	EAST	193,699	2010	INTERSTATE	MAJOR HWY.
396 m	I-70	NORTH	131,488	2010	INTERSTATE	MAJOR HWY.
321 m	W. 44 <sup>th</sup> Ave.	SOUTH				Local Street, no traffic data available
98 m	Pecos Street	WEST	14,097	2011	LOCAL STREET	LOCAL STREET
DISTANCE TO NEAREST POINT SOURCES (MILES)		DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)		DIRECTION TO AREA SOURCES	COMMENTS

N/A				
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>Gregory Harshfield</u> Signature: <u><i>Gregory Harshfield</i></u>				
FOR EPA USE ONLY: Received Date: _____ Follow-up Actions: _____ Approval Status				
Given: _____ Email Response Date: _____ Letter Response Date: _____				

<b>FOR METEOROLOGICAL PARAMETERS ONLY:</b>			
MONITORING PURPOSE/OBJECTIVES: CHARACTERIZE METEOROLOGICAL PARAMETERS AT N CORE SITE			
PROPOSED MONITORING SCHEDULE/DURATION: LONG TERM			
PROPOSED START / REMOVAL DATE OR DATE STARTED / REMOVED: 06/01/2013			
DATA ACQUISITION SYSTEM: Agilaire			
PRIMARY	PARAMETERS:	APPLICABLE √ those that apply	SENSOR HT (M)
BACKUP	WIND SPEED/DIRECTION	X	10 M
EQUIPMENT MANUFACTURER/MODEL: Met One	SOLAR RADIATION		
	RELATIVE HUMIDITY		
WILL THE DATA BE USED FOR MODELING? <u>YES</u> NO	PRESSURE		
IS SITE REQUIRED FOR SIP? YES <u>NO</u>	SIGMA THETA	X	8 M
UNRESTRICTED AIRFLOW? <u>YES</u> NO	PRECIPITATION		
DISTANCE TO TREE DRIPLINE (M): 42 M	TEMPERATURE	X	8 M
NEARBY TERRAIN: <u>SMOOTH</u> ROLLING ROUGH	DELTA TEMPERATURE	X	8 M, 4 M
TOPOGRAPHIC FEATURES (E.G HILLS, MOUNTAINS, VALLEYS, RIDGES, BODIES OF WATER): N/A			
COMMENTS:			

<b>FORM KEY:</b> <b>PAGE 1:</b>  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
---

**Appendix F- Second Near Roadway Site Location Documentation**

**Monitoring Plan**

***Colorado Department of Public Health and Environment  
Near-Roadway NO<sub>2</sub> Monitoring Site #2  
Denver, Colorado***

**Near-Roadway Monitoring Plan**

Prepared for:

***United States Environmental Protection Agency  
Region 8 – Air Permitting, Monitoring and Modeling Unit  
1595 Wynkoop Street  
Mail Code 8P-AR  
Denver, Colorado 80202***

Prepared by:

***Colorado Department of Public Health and Environment  
Air Pollution Control Division  
4300 Cherry Creek Drive South  
Denver CO, 80246***

## 1. Introduction

In February 2010, new minimum monitoring requirements for the nitrogen dioxide (NO<sub>2</sub>) monitoring network were promulgated (75 FR 6474) in support of a revised National Ambient Air Quality Standard (NAAQS) for NO<sub>2</sub>. The NO<sub>2</sub> NAAQS was revised to include a 1-hour standard with a 98<sup>th</sup> percentile form and a level of 100 ppb, reflecting the maximum allowable NO<sub>2</sub> concentration anywhere in an area, while retaining the annual standard of 53 ppb. In this rule, the U.S. Environmental Protection Agency (USEPA) required changes to the monitoring network that will focus monitoring resources to capture short-term NO<sub>2</sub> concentrations, and to assess NO<sub>2</sub> concentrations for vulnerable and susceptible populations. In the new monitoring requirements, state and local air monitoring agencies are required to install near-road NO<sub>2</sub> monitoring stations at locations where peak hourly NO<sub>2</sub> concentrations are expected to occur within the near-road environment in larger urban areas. State and local air agencies are required to consider traffic volumes, fleet mix, roadway design, traffic congestion patterns, local terrain or topography, and meteorology in determining where a required near-road NO<sub>2</sub> monitor should be placed, while meeting all siting criteria set forth in 40CFR Part 58.

Depending upon population and traffic count data, state and local ambient air monitoring agencies may be required to install up to two near roadway sites in select core based statistical areas (CBSA). If multiple sites are required, the USEPA has decided to do a phased deployment of near-road sites due to the magnitude of resources required to implement a large national near-road network in accordance with the rule. State and local ambient air monitoring agencies are required to submit plans for the first near-road NO<sub>2</sub> monitoring station in their annual monitoring network plans due July 1, 2012, with the near-road NO<sub>2</sub> monitoring site implemented and operational by January 1, 2014. If subsequent near-roadway sites are required, second tier monitors shall be reflected in the State's Annual Monitoring Network Plan that is to be submitted by July 1, 2014 with the monitor operational by January 1, 2015. Third tier monitors shall be reflected in the State's Annual Monitoring Network Plan that is to be submitted by July 1, 2016 with the monitor operational by January 1, 2017. Planning and implementation deadlines for second and third tier near-road monitoring sites have been revised from the original NO<sub>2</sub> rule via a rulemaking on March 14, 2013 (78 FR 16184).

The Denver-Aurora-Boulder area has been identified for the installation and operation of two near-road NO<sub>2</sub> monitoring sites. An explanation of how the minimum near-road monitoring requirements were determined for the Denver-Boulder CBSA is given in Section 2. The Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD) installed the first near-roadway site on the east side of I-25 by the NB 8<sup>th</sup> Ave. on-ramp, located at 971 Yuma St., and became fully operational on June 1, 2013. This site monitors for NO<sub>2</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub> and meteorological parameters. U.S. EPA requirements call for a second near-roadway site for NO<sub>2</sub> to be installed by 1/1/2015. It is EPA's preference that the second near-roadway NO<sub>2</sub> site to be materially different than the first site, either in traffic mix, area, roadway or terrain. While not required, PM<sub>10</sub> and PM<sub>2.5</sub> data will also be collected at the second near-roadway site.

## 2. Site Requirements

Title 40 of the United States Code of Federal Regulations Part 58 Appendix D Section 4.3.2 specifies that there must be one microscale near-road NO<sub>2</sub> monitoring station in each CBSA with a population of 500,000 or more. An additional near-road NO<sub>2</sub> monitoring station is required if the CBSA population is 2,500,000 or more, or if any CBSA with a population of 500,000 or more and has one or more road segments with 250,000 or greater annual average daily traffic (AADT).

According to the 2010 Census, the CBSAs in Colorado with populations in excess of 500,000 are:

CBSA Name	Population	Max AADT Segment	Number of Sites
Denver-Aurora-Broomfield	2,552,1995	249,000	2
Colorado Springs	626,227	130,000	1

Note: AADT values are determined by Colorado DOT 2011 data.

Pursuant to USEPA's Revision to the Ambient Nitrogen Dioxide Monitoring Requirements, the Denver-Aurora-Broomfield CBSA has been identified to receive Tier 2 funding (FY 2014) for the establishment and implementation of a second near-road NO<sub>2</sub> monitoring station in the Denver-Aurora-Broomfield CBSA. The CDPHE/APCD will be responsible for the installation of this station. This Near-Roadway NO<sub>2</sub> Monitoring Plan will be included in the Division's Annual Network Monitoring Plan in accordance with Appendix D and is to be submitted to the USEPA by June 30, 2014. It is CDPHE's intent to have this monitoring station installed and operational by January 1, 2015.

## 3. Technical Approach

The CDPHE will identify and install the near-road NO<sub>2</sub> monitoring station in accordance with Title 40 Part 58 of the Code of Federal Regulations. Additionally, the "Near-Road NO<sub>2</sub> Monitoring Technical Assistance Document" (TAD) (*Near-road NO<sub>2</sub> Monitoring Technical Assistance Document*, EPA-454/B-12-002, June 2012) will also be used to determine the best and most feasible site location for the station and used as a guide for parameters to be monitored. The Near-Road TAD was developed by EPA to provide recommendations and criteria for locating and installing near-roadway NO<sub>2</sub> sites. The reasoning behind near-roadway NO<sub>2</sub> monitoring is as follows, "it has been established that the combination of higher urban population densities with increased vehicle miles traveled (VMT), which correspond to on-road mobile source emissions, can result in an increased potential for exposure and associated risks to human health and welfare."

Per the Technical Assistance Document (TAD), there are four process steps to examine when locating a near-road NO<sub>2</sub> site:

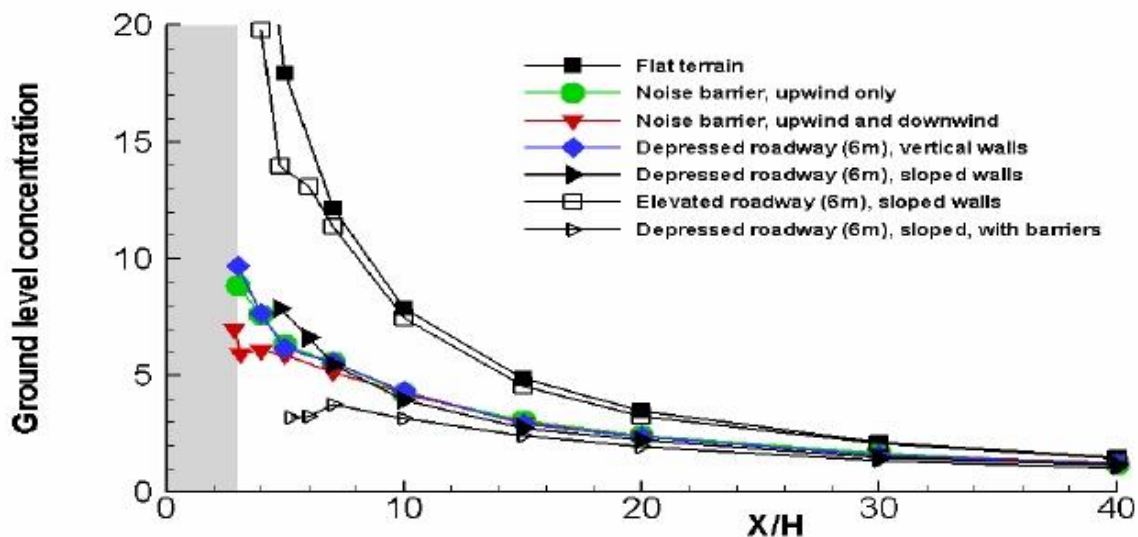
1. Obtain and Assess AADT, Fleet Mix, and Congestion Data
2. Consider Physical Site Characteristics
3. Review Siting Criteria
4. Prepare Candidate Site Comparison Matrix

#### 4. Potential Monitoring Station Locations

Using Colorado Department of Transportation (CDOT) traffic count data, a ranked list of sites has been developed. Based on both annual average daily traffic (AADT) counts and “fleet equivalent” calculations (where heavy duty vehicles are assumed to have 10 times the emissions of a light duty vehicle), the current near-road site is in the road segment that was ranked as first. It should be noted that the TAD and CDOT data are looking at traffic on road segments, not combined intersections. Table 1 lists the top road segments for both the AADT and the fleet equivalent- annual average daily traffic counts (FE-ADDT).

For physical characteristics, the location needs to be suitable for placing a shelter near the road and needs to have good exposure for meteorology. The roadway design and roadside structures also play a factor (see figure below). In general, a roadway design that has the site at-grade or where the road is slightly elevated with sloping walls is optimal. Depressed roadways or roadways on bridges tend to show lower concentrations. Noise barriers also tend to show lower concentrations. The current near-road site is located at grade, with no sound barrier walls. The surrounding terrain is relatively flat. Additionally, safety is paramount to the site location. The selected site must be safely sited for both the traveling public on the roadway and the personnel operating the monitoring site. The site must be accessible to station operators in a safe and legal manner, and not pose safety hazards to driver, pedestrians, or nearby residence.

By definition in regulations, near-road is within 50 meters. In the TAD, EPA has recommended that sites/sampling inlets should be within 20 meters of the roadway whenever possible. The below figure shows ground level concentrations, in a near-road environment, as a function of distance from the nearest lane of travel. This figure shows that ground level concentrations significantly drop as the distance from the road way increases, with the most significant concentration decreases occurring within the first 15-20 meters.



[F-4]

Of importance is the identification of potential sites that are materially different than the first site, either in traffic mix, roadway, area, economics or terrain than the existing near-road site. Potential road segments surrounding the existing near-road site have been removed from consideration as “locations of interest”. Sections of I-70 east of I-25 to I-225 have been removed from consideration because of future CDOT development plans. Figures 1, 2 and 3 contain maps of three sections of I-25 in the Denver-Aurora-Broomfield CBSA that show the top FE-AADT road segments on I-25. These road segments have been preliminarily surveyed for potential sites in accordance with guidance given in the TAD. Potential site locations are displayed within these maps. All potential sites in these road segments have been prioritized according to criteria set forth in the TAD.

As seen in Figures 1 and 3, two areas of interest have been identified and are under consideration. The first area is south of the Denver Technology Center between E. Orchard and Dry Creek, and the second area contain road segments just immediately north and south of the I-25/I-70 mousetrap. Both of these areas have viable locations and would provide unique characteristics that would enhance Colorado’s air monitoring network. However, more serious consideration is currently being given to the road segments immediately to the north and south of the I-25/I-70 mousetrap due to environmental justice concerns and increased heavy-duty traffic. The Globeville/Swansea/Elyria neighborhoods to the east of I-25 between 38<sup>th</sup> Ave. and 52<sup>nd</sup> Ave. is an environmental justice area, whose local officials and neighborhood groups are actively looking to increase air quality monitoring in their neighborhood. Final site selection is expected to occur in late spring or early summer 2014.

## **5. Parameters to be monitored**

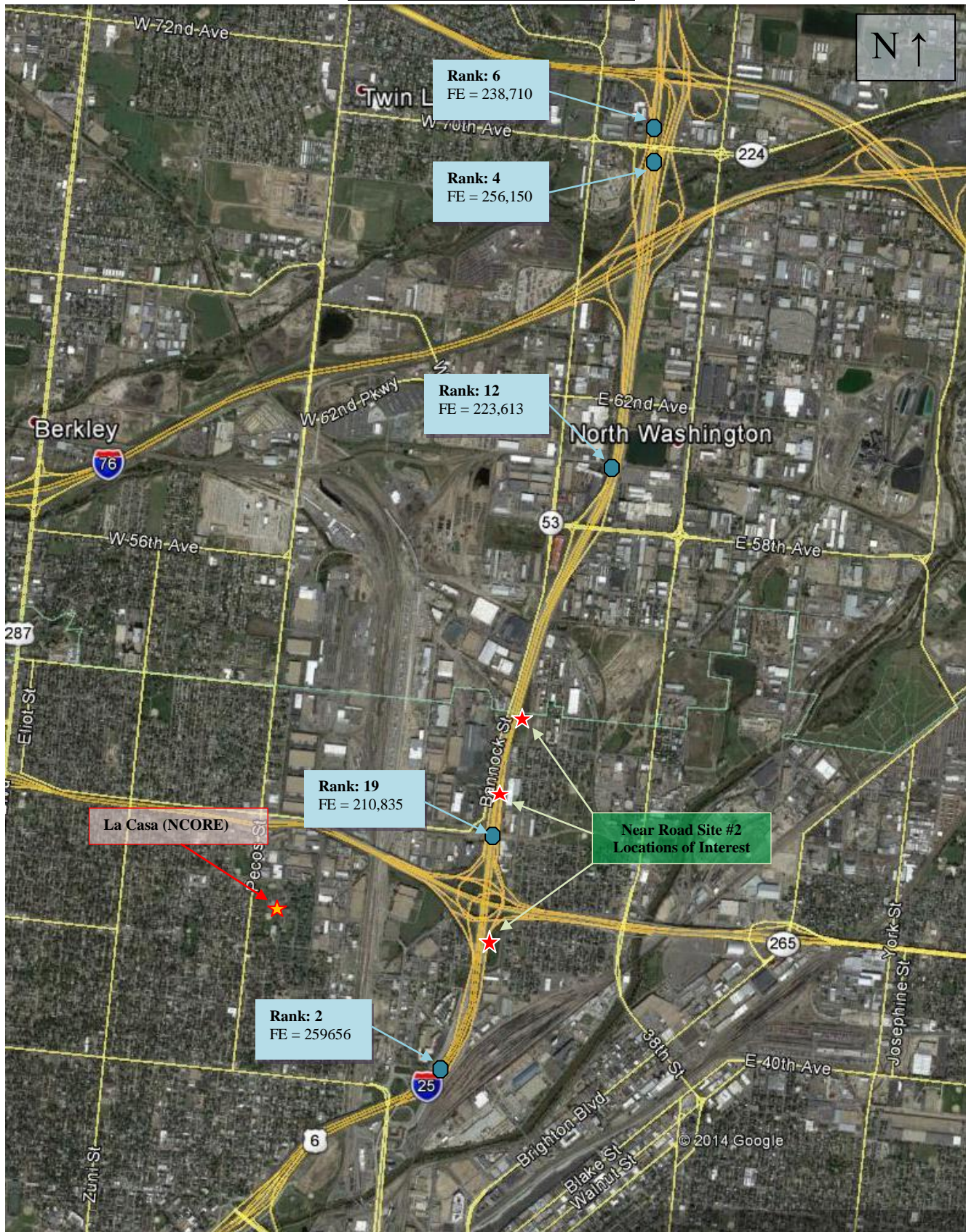
The TAD discusses a number of pollutants of interest in the near-road environment due to their direct emission by on-road mobile sources, or the formation from or interaction with on-road mobile source emissions. Table 16-1 in the TAD lists the Clean Air Science Advisory Committee (CASAC) Ambient Air Monitoring and Methods Subcommittee’s (AAMMS) recommended priorities for the parameters to be monitored at a near-road environment. Table 2 lists these parameters and Colorado’s intentions for monitoring.



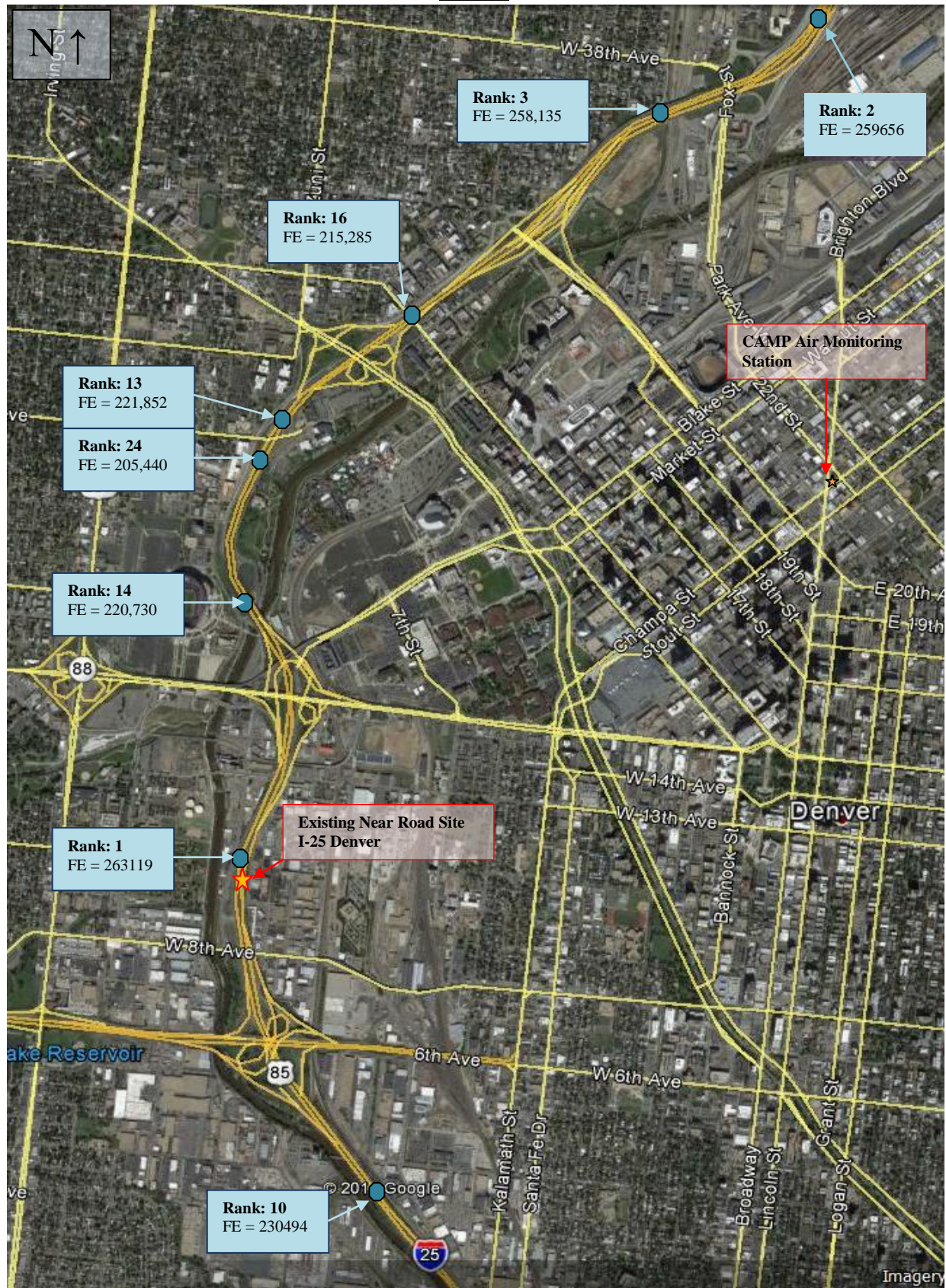
**Table 1 – Highest Traffic Road Segments Ranked by Fleet Equivalent (FE) Annual Average Daily Traffic**

Segment Description	AADT	AADT Rank	Percent Truck	Heavy Duty Vol	Heavy Rank	Fleet Equiv AADT.	FE Rank	County
I-25, 8th Ave. to Colfax Ave.	249000	1	6.3	1568.7	12	263118.3	1	Denver Co
I-25, 38th Ave. to I-70	240000	2	9.1	2184.0	4	259656.0	2	Denver Co
I-25, 20th St. to 38th Ave.	238000	3	9.4	2237.2	2	258134.8	3	Denver Co
I-25, I-76 to SH-224 (70th Ave.)	235000	5	10.0	2350.0	1	256150.0	4	Adams Co
I-25, Orchard Rd. to Belleview Ave.	236000	4	5.1	1203.6	37	246832.4	5	Arapahoe Co
I-25, SH-224 (70th Ave.) to US-36	219000	10	10.0	2190.0	3	238710.0	6	Adams Co
I-25, Arapahoe Rd. to Orchard Rd.	222000	8	6.1	1354.2	21	234187.8	7	Arapahoe Co
I-25, Belleview Ave. to I-225	223000	6	5.0	1115.0	45	233035.0	8	Denver Co
I-25, I-225 to Hampden Ave.	223000	7	5.0	1115.0	46	233035.0	9	Denver Co
I-25, Alameda Ave. to 6th Ave.	220000	9	5.3	1166.0	40	230494.0	10	Denver Co
I-25, 6th Ave. to 8th Ave.	214000	11	6.4	1369.6	20	226326.4	11	Denver Co
I-25, 58th Ave. to I-76	206000	15	9.5	1957.0	6	223613.0	12	Adams Co
I-25, 23rd Ave. to Speer Blvd.	208000	14	7.4	1539.2	14	221852.8	13	Denver Co
I-25, Colfax Ave. to Walnut St./Mile High	208000	13	6.8	1414.4	18	220729.6	14	Denver Co
I-25, Santa Fe Dr. to Alameda Ave.	208000	12	5.7	1185.6	38	218670.4	15	Denver Co
I-25, Speer Blvd. to 20th St.	198000	20	9.7	1920.6	7	215285.4	16	Denver Co
I-25, Dry Creek Rd. to Arapahoe Rd.	203000	17	6.6	1339.8	24	215058.2	17	Arapahoe Co
I-25, Hampden Ave. to Yale Ave.	204000	16	4.7	958.8	62	212629.2	18	Denver Co
I-25, I-70 to 58th Ave.	192000	23	10.9	2092.8	5	210835.2	19	Denver Co
I-25, County Line Rd. to Dry Creek Rd.	198000	19	7.1	1405.8	19	210652.2	20	Arapahoe Co
I-25, Franklin St. to Downing St.	199000	18	6.4	1273.6	28	210462.4	21	Denver Co
I-25, Colorado Blvd. to University Blvd.	196000	22	6.5	1274.0	27	207466.0	22	Denver Co
I-25, Yale Ave. to Evans Ave.	197000	21	5.0	985.0	59	205865.0	23	Denver Co
I-25, Walnut St./Mile High to 23rd Ave.	191000	24	8.4	1604.4	9	205439.6	24	Denver Co
1-70, Central Park to Havana	191000	25	8.4	1604.4	10	205439.6	25	Denver Co

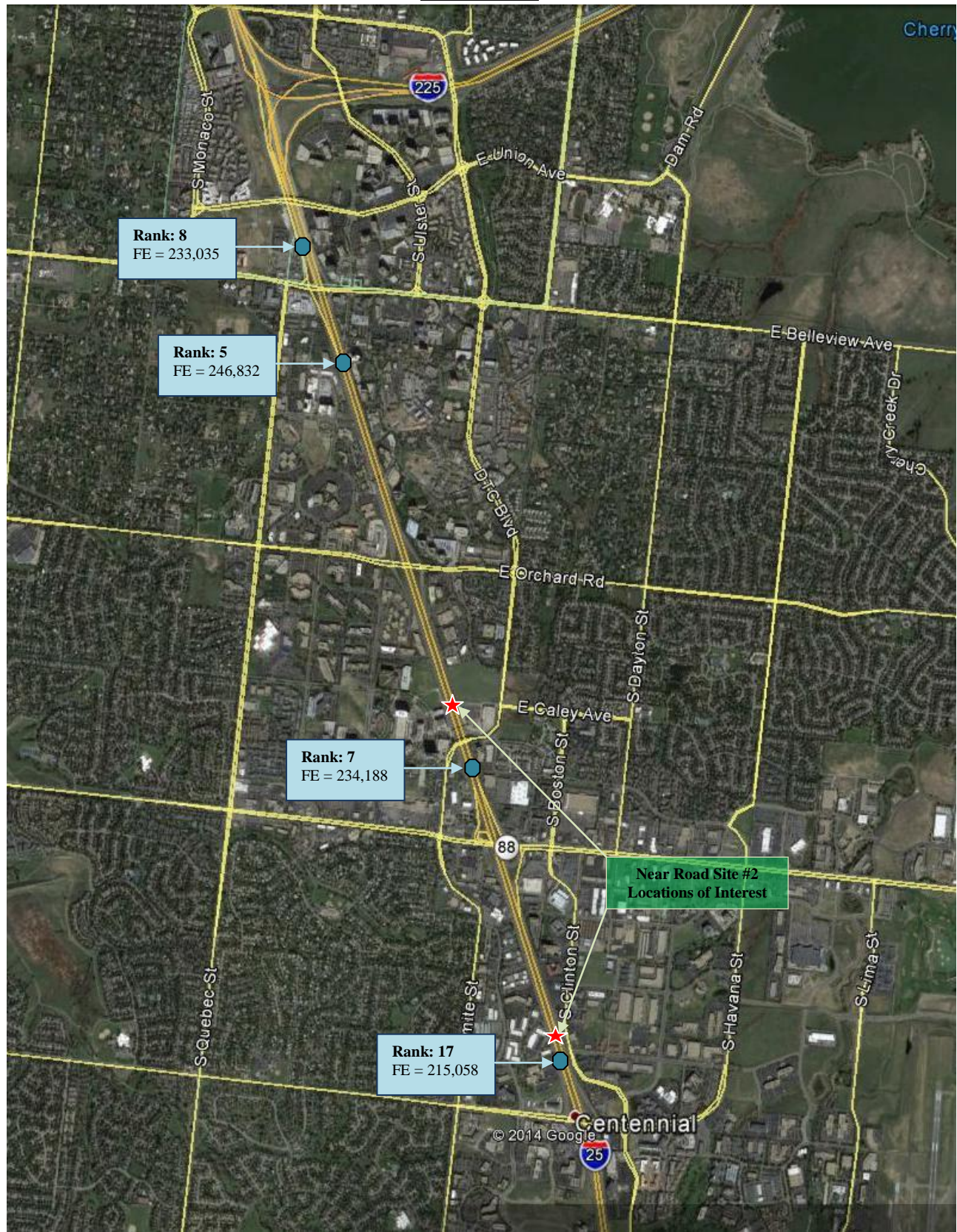
**Figure 1 - CDOT 2011 Traffic Count Segments - Fleet Equivalent  
Commerce City / North Denver**



**Figure 2 - CDOT 2011 Traffic Count Segments - Fleet Equivalent**  
**Denver**



**Figure 3 - CDOT 2011 Traffic Count Segments - Fleet Equivalent**  
**South Metro**



**Table 2 – CASAC AAMM’s Monitoring Priorities**

Priority	Parameter	Colorado’s Plan
<b>Tier 1</b>		
	NO & NO <sub>2</sub>	Include
	CO	
	Black Carbon	
	Wind Speed / Direction / Temp	Include
<b>Tier 2</b>		
	Ozone	
	Air Toxics	
	Ultrafine Particle Dist.	
	Traffic Count	
<b>Tier 3</b>		
	PM <sub>2.5</sub> - Continuous	Include
	PM <sub>2.5-10</sub> - Continuous	Include
	CO <sub>2</sub>	
	OC/EC	
<b>Tier 4</b>		
	RH	Include
	Precipitation, SR, & BP	

Below is a detailed list of the proposed capital equipment purchases. Depending upon the actual competitive bid costs of equipment, monies saved may be use to purchase lower tier equipment as identified in Table 2.

- An 8’ wide x 18’ long temperature controlled monitoring shelter is required to house the equipment needed for the site and to allow for future expansion of monitoring parameters.
- A Federal Equivalent Reference Method (FRM) or Federal Equivalent Method (FEM) NO<sub>2</sub> monitor is required to collect hourly NO<sub>2</sub> data for comparison with the NAAQS. A photolytic catalyst type analyzer, a molybdenum catalyst type analyzer, or cavity attenuated phase shift type analyzer will be used.
- GRIMM ultra fine particle monitor will be installed to collect particulate size and mass data to better understand the emissions in a near-road environment.

- A multi-gas calibrator will be installed to blend span and precision level gases for nightly quality control checks of the NO<sub>2</sub> analyzer.
- A high efficiency zero air source will be installed to provide a diluent gas to the multi-gas calibrator. The multi-gas calibrator will in turn provide a reference zero and blended span and precision checks to the analyzers.
- A data logger will be installed to provide on-site logging and consolidation of monitoring data. Data collected at the site by the data logger will be polled by CDPHE central polling system.

## **6. Colorado's Data Monitoring System**

The CDPHE uses Agilaire's AirVision software for central data polling and processing. The polling servers and data storage servers are currently located at CDPHE main offices. Colorado utilizes Environmental Systems Corporation (ESC) and Agilaire data loggers to collect and store data at monitoring stations. The central data system polls data loggers in the field at designated time intervals via phone, wireless or DSL modems. The central data system stores the data, allows for data validation, produces on demand tabular and graphical reports, and generates AQS compatible data sets. All data collection and validation is done in accordance with 40CFR Part 58. The CDPHE will purchase and install the necessary equipment and supplies to install and operate Colorado's near-road site and ensure it's compatibly with all data processing systems and other monitoring sites across the state.

## **7. Quality Assurance**

Unless otherwise required the CDPHE will address quality assurance and equipment operation within the CDPHE's existing Quality Assurance Project Plans (QAPPs) and Standard Operating Procedures (SOPs). Where necessary the CDPHE will draft, review and release new SOPs for any equipment not currently addressed by CDPHE SOPs.

## **8. Site Development and Timeline**

Beginning May 2013, the CDPHE began evaluating CDOT traffic count data to identify potential road segments for Colorado's second near-road NO<sub>2</sub> monitoring station. Initial discussions and meetings have focused on preliminary road segment investigations and possible siting limitations. Based upon findings from these initial meetings, preliminary field survey work was conducted and several potential sites have been identified (Figure 1 and 3). The CDPHE is beginning to work with CDOT to determine the feasibility for site development and permitting. Throughout calendar year 2014, CDPHE will finalize and permit Colorado's second near-roadway NO<sub>2</sub> monitoring location through the appropriate land manager; complete the Near-Roadway NO<sub>2</sub> Monitoring Plan as part of the Annual Network Plan; procure equipment and supplies; and install and make operable the site. Table 3 gives a proposed timeline for site development activities.

**Table 3 – Near Road Site Development Timeline**

<b>Activity</b>	<b>Milestone</b>	<b>Time Period or Completion Date</b>
Gather traffic data	Develop list of potential road segments	June – Early September 2013
Start Dialog with CDOT – Review TAD	Develop an understanding of project requirements and criteria	July – August 2013
CDPHE and CDOT site survey	Identify potential sites	September 2013
Develop and submit Work Plan and Budget to EPA	Apply for EPA funding	February 2014
Identify list of preferred sites	Identify viable sites	April 2014
Draft Monitoring Plan	Start development of Monitoring Plan	April 2014
Finalize Near-Road Monitoring Plan	Submit for public comment	May 2014
Identify preferred site	Highest priority site determined	June 2014
Submit Annual Network Plan to EPA	Submit plan	June 30, 2014
Develop intent to apply of Special Use Permit proposal (CDOT)	Determine feasibility of site with CDOT	July 2014
Develop application for Special Use Permit (CDOT)	Apply for Special Use Permit	July 2014
Draft Memorandum of Understanding (MOU)	Start development of MOU between CDPHE and CDOT/Others	July 2014
Draft and submit Region 8 Network Modification Form	Gain EPA concurrence	July 2014
Begin requisition process for shelter	Develop and post shelter bid request	July 2014
Submit MOU for signature	Signed MOU between CDPHE and CDOT	August 2014
Begin requisition process for equipment.	Post equipment bid request and place equipment orders	August 2014
Develop site infrastructure	Site prepared to accept shelter	August – September 2014
Install Shelter	Shelter installed	September – November 2014
Receive and acceptance test equipment	Equipment operational in workshop	September – November 2014
Install monitoring equipment at site	Equipment set up at site	November 2014
Site test equipment	Site determined operational	December 2014
Begin data collection	Site operational	January 1, 2015

## Appendix G – CAMP Waiver Application Letter

# STATE OF COLORADO

John W. Hickenlooper, Governor  
Larry Wolk, MD, MSPH  
Executive Director and Chief Medical Officer

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

4300 Cherry Creek Dr. S.  
Denver, Colorado 80246-1530  
Phone (303) 692-2000  
Located in Glendale, Colorado  
[www.colorado.gov/cdphe](http://www.colorado.gov/cdphe)



Colorado Department  
of Public Health  
and Environment

May 20, 2014

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

Dear Mr. Payton:

The Colorado Department of Public Health and Environment's (CDPHE) Air Pollution Control Division (APCD) is submitting a waiver request for the ozone, sulfur dioxide, and nitrogen dioxide parameters at the CAMP (08-031-0002) air monitoring site that fail to meet the > 10 meter threshold from the drip line of trees criteria. Siting criteria set forth in the CFR Title 40, Part 58, Appendix E, Section 5 states: "To reduce this possible interference/obstruction, the probe, inlet, or at least 90 percent of the monitoring path must be at least 10 meters or further from the drip line of trees."

A waiver process has been established in CFR Title 40, Part 58, Appendix E, Section 10 to allow air monitoring agencies to request a waiver from the local Environmental Protection Agency (EPA) Regional Administrator to waive one or more siting criteria for some monitoring sites providing that the local air monitoring agency can adequately demonstrate the need for monitoring at that location. For existing sites, at least one of the below criteria must be met:

- 1) "10.1.1 The site can be demonstrated to be as representative of the monitoring area as it would be if the siting criteria were being met."
- 2) "10.1.2 The monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints."

Under normal circumstances, sites that do not meet siting criteria due to obstacles or obstructions will be relocated. However, due to the importance of some sites for their long term trend record or the extremely unique site location, extra consideration is given to retaining the site through the waiver process. CAMP is one of these sites.

The site is located at 2105 Broadway St. in downtown Denver and began monitoring for carbon monoxide in 1965 as part of the Federal Continuous Air Monitoring Project. It has been in operation since that date, with the exception of down time associated with building maintenance and the construction of buildings. The CAMP station is Colorado's longest operating air quality monitoring site. The site was initially established as a



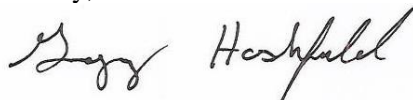
maximum concentration, population –oriented monitor. The site measures the exposure of the people who work or reside in Denver’s Central Business District. Its location in a high traffic street canyon causes this site to record some of the highest CO and NO<sub>2</sub> pollution episodes in the metro area.

Currently, CAMP’s ozone, sulfur dioxide, and nitrogen dioxide parameters marginally do not meet the siting criteria for distance to the drip line of trees. As seen in the Attachment 1, the continuous gaseous probes are located between 7 and 10 meters from the large tree south of the site. The yellow line on the below figure represents 10 meters in length. The line originates from the center of the building, where the ozone, sulfur dioxide, and nitrogen dioxide probes are located, and extends south to the tree. Further analysis shows the tree blocks 15% of the monitoring path, which is 5% greater than the 10% criterion. While these exceedences are considered relatively minor, the continued growth of the tree in subsequent years will only provide an increasing infringement on siting criteria. Attachment 2 contains pictures of the site and tree.

The CAMP site is a permanent building that resides on property owned and managed by Denver Parks and Recreation. The CDPHE does not have authority over ground keeping activities, and the removal of an old growth tree on Denver Parks and Recreation property is not an option. The relocation of analyzer probes are not an option due to the location of instrument racks, power and roof access ports. The sampling density of probes and inlets on the CAMP rooftop is very high and the relocation of one probe will most likely cause siting issues with other existing probes or inlets. The extension of sample lines through the existing access ports is not possible due to residence time requirements. Currently, all parameters at the CAMP site have design values less than the National Ambient Air Quality Standards, and is not considered to be a driver in determining attainment within the Denver metro area. The CDPHE places a very high value on the continued operation of the CAMP site, and feels that data collected at the site for the long term trending of air pollution in Denver’s Central Business District is in the best interest of Colorado’s air monitoring network.

This waiver request letter is included in an appendix within CDPHE’s 2014 Network Plan. A 30 day public comments period has been solicited as part of the development cycle of CDPHE’s 2014 Network Plan. CDPHE requests EPA’s concurrence of this waiver. If you have any questions or need further information, you can reach me at (303) 692-3232.

Sincerely,



Gregory Harshfield  
Scientist/Supervisor  
Continuous Monitoring and Data Systems Support

cc: Gordon Pierce

Attachment 1 – Aerial Image of the CAMP Site



Attachment 2 – Photos of Tree  
Looking Southeast



Looking North



## Appendix H – Welby Waiver Application Letter

# STATE OF COLORADO

John W. Hickenlooper, Governor  
Larry Wolk, MD, MSPH  
Executive Director and Chief Medical Officer

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

4300 Cherry Creek Dr. S.  
Denver, Colorado 80246-1530  
Phone (303) 692-2000  
Located in Glendale, Colorado  
[www.colorado.gov/cdphe](http://www.colorado.gov/cdphe)



Colorado Department  
of Public Health  
and Environment

May 20, 2014

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

Dear Mr. Payton:

The Colorado Department of Public Health and Environment's (CDPHE) Air Pollution Control Division (APCD) is submitting a waiver request for the carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, and PM<sub>10</sub> (FRM and continuous) parameters at the Welby (08-001-3001) air monitoring site that fail to meet the spacing from obstruction criteria set forth in the CFR Title 40, Part 58, Appendix E, Section 4. This section states: "The distance from the obstacle to the probe, inlet, or monitoring path must be at least twice the height that the obstacle protrudes above the probe, inlet, or monitoring path." Additionally, the carbon monoxide, ozone, sulfur dioxide, and nitrogen dioxide parameters are nearing the > 10 meter threshold from the drip line of trees criterion set forth in CFR Title 40, Part 58, Appendix E, Section 5. This section states: "To reduce this possible interference/obstruction, the probe, inlet, or at least 90 percent of the monitoring path must be at least 10 meters or further from the drip line of trees."

A waiver process has been established in CFR Title 40, Part 58, Appendix E, Section 10 to allow air monitoring agencies to request a waiver from the local Environmental Protection Agency (EPA) Regional Administrator to waive one or more siting criteria for some monitoring sites providing that the local air monitoring agency can adequately demonstrate the need for monitoring at that location. For existing sites, at least one of the below criteria must be met.

- 3) "10.1.1 The site can be demonstrated to be as representative of the monitoring area as it would be if the siting criteria were being met."
- 4) "10.1.2 The monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints."

Under normal circumstances, sites that do not meet siting criteria due to obstacles or obstructions will be relocated. However, due to the importance of some sites for their long term trend record or the extremely unique site location, extra consideration is given to retaining the site through the waiver process. Welby is one of these sites.

The Welby site is located at 3174 E. 78th Ave., Thornton, and is located 8 miles north-northeast of the Denver Central Business District (CBD) on the bank of the South Platte River. The site is ideally located to measure nighttime drainage of the air mass from the Denver metropolitan area and the thermally driven, daytime upriver

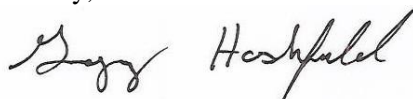
flows. Carbon monoxide monitoring began in 1973 and continued through the spring of 1980. Monitoring was stopped from the spring of 1980 until October 1986 when it began again as a special purpose monitoring site, and has been subsequently redesignated as a SLAMS site. The site was established and sited with a monitoring objective of determining neighborhood and urban scale population exposure in the north Denver area with a special emphasis on the transport of pollution into and out of the Denver metro area along the South Platte River. Additionally, Welby is unique in that it was selected in 2012 to represent communities where susceptible and vulnerable populations are located. The requirement for this type of site was promulgated in the 2010 nitrogen dioxide National Ambient Air Quality Standards (NAAQS) rule, which requires the Regional Administrator, under their discretionary authority, to work with States to identify, and install if necessary, an additional 40 nitrogen dioxide monitoring sites across the nation in communities where susceptible and vulnerable populations are exposed to nitrogen dioxide concentrations that have the potential to exceed the NAAQS, CFR Title 40, Part 58, Appendix D, Section 4.3.4.

Currently, Welby's carbon dioxide, ozone, sulfur dioxide, nitrogen dioxide and PM<sub>10</sub> (FRM and continuous) parameters do not meet the siting criteria for obstacles associated with trees southeast of the site. Attachment 1 shows an aerial image of the Welby site, with the yellow lines representing 10 meters in length for scale. All gaseous probes are located between 10 and 13 meters from the dripline of the trees. However, the aerial image is a little misleading because of the angle at which the photo was taken and because of the trees' shadows, the image makes it appear the trees are closer than their actual measured values. Attachment 2 shows actual photos of the Welby site. Further analysis shows the trees block approximately 25% of the monitoring path, which is 15% greater than the 10% criterion for ozone, sulfur dioxide, nitrogen dioxide probes and right at the 270 degree unrestricted airflow for the predominated wind direction (drainage air flows) criteria for particulate samplers. While these exceedences are still relatively minor, the continued growth of the tree in subsequent years will only provide an increasing infringement on siting criteria.

The Welby site resides on property owned and managed by the Adams County Parks and Community Resources Department. The site is located on a narrow strip of land between a bike path and the South Platte River right on the southern edge of Adams County's Steele Street Park. When the site was first established, the trees along the river bank were small and at a height well below the roof of the shelter. The trees are becoming a concern after several decades of growth. The CDPHE does not have authority over ground keeping activities, and the removal of trees on Adams County park property is not an option. The probes and sample inlets are configured such that they are as far as physically possible from trees while still maintaining the distance between inlet criteria, and keeping residence times within acceptable limits. Relocation of the shelter close by is not currently an option due to the close proximity of park infrastructure and trees. The CDPHE places a very high value on the continued operation of the Welby site, and feels that data collected at the site for long term trending and for the modeling of the transport of pollution in and out of the Denver metro area along the South Platte drainage is in the best interest of Colorado's air monitoring network.

This waiver request letter is included in an appendix within CDPHE's 2014 Network Plan. A 30 day public comments period has been solicited as part of the development cycle of CDPHE's 2014 Network Plan. CDPHE requests EPA's concurrence of this waiver. If you have any questions or need further information, you can reach me at (303) 692-3232.

Sincerely,



Gregory Harshfield  
Scientist/Supervisor  
Continuous Monitoring and Data Systems Support

cc: Gordon Pierce

Attachment 1 – Aerial Image of the Welby Site



Attachment 2 – Photos of Trees  
Looking East



Looking South



## Appendix I – Comments and Responses

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### Fwd: City and County of Denver - Comments on 2014 Annual Network Plan

1 message

---

**Comments - CDPHE, APCD** <cdphe.commentsapcd@state.co.us>  
To: Gregory Harshfield - CDPHE <gregory.harshfield@state.co.us>

Tue, Jun 24, 2014 at 12:16 PM

Bob True  
Planner/Information Specialist  
Colorado Department of Public Health and Environment  
Air Pollution Control Division  
4300 Cherry Creek Drive South  
Denver, CO 80246-1530  
303-692-3108 | [robert.true@state.co.us](mailto:robert.true@state.co.us)

[www.colorado.gov/cdphe/apcd](http://www.colorado.gov/cdphe/apcd)

——— Forwarded message ———

From: **Thomas, Gregg W. - Environmental Health** <[Gregg.Thomas@denvergov.org](mailto:Gregg.Thomas@denvergov.org)>  
Date: Mon, Jun 23, 2014 at 1:56 PM  
Subject: City and County of Denver - Comments on 2014 Annual Network Plan  
To: "cdphe.commentsapcd@state.co.us" <[cdphe.commentsapcd@state.co.us](mailto:cdphe.commentsapcd@state.co.us)>

To whom it may concern, thank you for the opportunity to comment on the 2014 Annual Network Plan. These comments are submitted on behalf of City and County of Denver Department of Environmental Health (DEH).

The comments all pertain to the proposed second near road monitoring site in Denver,

1. Of the candidate sites identified for the second near road monitor, DEH prefers site locations east of I-25 between 49<sup>th</sup> and 52<sup>nd</sup> Aves. These locations are all within 10-50 m of the highway, meeting EPA's criteria. DEH preference would be from north (52<sup>nd</sup> Ave) to south (49<sup>th</sup> Ave),

- a. 52<sup>nd</sup> Ave site is north of the merge lane from westbound I-70, where 49<sup>th</sup> Ave is not.
- b. Prevailing winds in that area often put the highway immediately upwind of the monitor, which is preferred for a near road monitor.
- c. This site ranks high for heavy duty traffic; higher than the existing monitoring site.
- d. Afternoon wind shifts (180 degrees), especially in the summer, occasionally means that the monitor is upwind of the highway. With relatively little local traffic to the east, this could produce some interesting diurnal contrasts.
- e. In addition, a few large stationary sources are located both east and west of the highway in this area. This could present some interesting diurnal and day of week contrasts.

<https://mail.google.com/mail/u/0/?ui=2&ik=1514fdc48b&view=pt&search=inbox&th=146cf17fee068169&siml=146cf17fee068169>

1/2



2. The potential site south of I-70 and east of I-25, while being a high traffic site, is not much different from the existing near road site. Understanding the prevailing meteorology, it is rare that a monitor in this location would pick up impacts from both highways.

a. Overnight and morning prevailing winds (out of the SSW) follow the South Platte River drainage. This fetch is similar to the existing I-25 site.

b. Afternoon winds back NE-ly which means I-25 is then downwind of the monitoring site, and while I-70 is now upwind under these conditions, the distance from the highway is close to 500 feet; too far to see much of a near road signature.

3. DEH does not favor a location near the junction of I-25 and I-225. Air pollution in this area is almost entirely driven by mobile sources, and it is very similar to the existing near road site,

4. If costs permit, deploying an aethalometer at the second location would be of great use due to the proximity to higher diesel truck traffic and the high time resolution available. DEH is currently in possession of an aethalometer that was used during the 2005-06 community based air toxics monitoring study. It is on loan from EPA Region 8 and could be deployed.

a. However, DEH would like to deploy that monitor for use in updated baseline sampling in the Swansea neighborhood (2015-2016) in advance of the I-70 East expansion. Aethalometer costs add 15-20K for the instrumentation.

Once again, thank you for the opportunity to comment.

**Gregg W Thomas | Manager of Air, Water, and Climate Section**

Denver Department of Environmental Health

Environmental Quality Division  
200 W 14th Ave, Dept 310 Denver, CO 80204

720.865.5413 Phone | 303.748.1138 Cell  
[gregg.thomas@denvergov.org](mailto:gregg.thomas@denvergov.org)

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# STATE OF COLORADO

John W. Hickenlooper, Governor  
Larry Wolk, MD, MSPH  
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Colorado Department  
of Public Health  
and Environment

July 1, 2014

Gregg Thomas  
Denver Department of Environmental Health  
Environmental Quality Division  
200 W. 14<sup>th</sup> Ave., Dept. 310  
Denver, CO 80204

SUBJECT: Response to public comment – 2014 Network Monitoring Plan

Thank you for the comments you provided for the Colorado Department of Public Health, Air Pollution Control Division's (Division) 2014 Network Monitoring Plan. As required by 40 CFR 58.10, the Division is required to submit an annual network monitoring plan to the Environmental Protection Agency Regional Administrator by July 1<sup>st</sup>. This plan is to be made available for public comment for 30 days prior to acceptance by the Regional Administrator. The Division's 2014 Network Monitoring Plan was made available for public comment from May 23, 2014 thru June 23, 2014. The Division received three comments all pertaining to the proposed locations for Colorado's second near-roadway nitrogen dioxide (NO<sub>2</sub>) site.

Included in the 2014 Network Monitoring Plan is the Monitoring Plan for the Colorado Department of Public Health and Environment Near-Roadway NO<sub>2</sub> Monitoring Site #2. Within this plan four site locations were proposed, two along I-25 in the Denver Technological Center area, and two along I-25 near the I-70 interchange (mousetrap). All comments received voiced favor for locating the site in or near the mousetrap. Based upon these comments, the Division will focus its efforts at securing a site location near the mousetrap. Comments varied as to a preferred location within or around the location of the mousetrap. Comments were received in support of both the northern and southern locations near the mousetrap. Locations within the mousetrap are not being considered due to the difficulty of meeting federal siting criteria for meteorological and gaseous monitoring, as well as the difficulty of accounting for all the roadway sections. With all things being equal, the southern location has a greater fleet-equivalent annual average daily traffic count relative to the northern location, though the northern site has a higher heavy duty percentage and more favorable wind directions. However, the infrastructure and Federal Highway Administration requirements at the southern site appear to be much more extensive and may be limiting in practical application. The Division intends to further investigate the feasibility of both mousetrap sites and will make the site selection determination based upon a thorough assessment of findings and resources available.

Comments regarding the inclusion particulate monitoring near the mousetrap and along freeway corridors near the Elyria, Swansea and Globeville neighborhoods were also received. These neighborhoods have a number of schools in relatively close proximity to freeway corridors. Both of the mousetrap sites (northern and southern) are close to schools that are near I-25. The Division is planning to include a continuous particulate analyzer for both PM<sub>10</sub> and PM<sub>2.5</sub> at this near-roadway NO<sub>2</sub> site, as well as meteorological parameters.

Sincerely,

Gordon Pierce, Program Manager  
Technical Services Program  
Air Pollution Control Division



November 6, 2013

Martha Rudolph  
Director, Environmental Programs  
Colorado Department of Public Health and Environment  
4300 Cherry Creek Drive South  
Denver, CO 80246-1530

William C. Allison V  
Director, Air Pollution Control Division  
Colorado Department of Public Health and Environment  
4300 Cherry Creek Drive South  
Denver, CO 80246-1530

**RE: Colorado Air Monitoring Plan for PM<sub>2.5</sub> and NO<sub>2</sub>**

Dear Ms. Rudolph and Mr. Allison,

We are writing on behalf of the communities who live, work, play, and send their children to attend school near the intersection of I-70 and I-25 (“the mousetrap”) in response to a message from Will Allison regarding the potential location of highway-oriented air monitors for fine particulate matter (PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>).<sup>1</sup> Close proximity to the two major highways has resulted in environmental, social, economic, and physical deterioration of the surrounding neighborhoods of Elyria, Swansea and Globeville. These communities also face higher incidence and severity of adverse health risks resulting from increased exposure to harmful air pollutants.

The current air monitoring network in Denver fails to adequately measure population exposures to elevated concentrations of NO<sub>2</sub> and PM<sub>2.5</sub> in communities adjacent to I-70 and I-25 in the vicinity of the mousetrap. The monitoring site selected for the first highway-oriented NO<sub>2</sub> monitor near I-25 and 8<sup>th</sup> Avenue has significantly less vehicle traffic than the combined annual average daily traffic (AADT) from both I-25 and I-70 at the mousetrap. EPA’s near highway monitoring criteria and the statutory requirement that all geographic areas of the state attain the National Ambient Air Quality Standards (NAAQS) require that air agencies site monitors to ensure that all communities located adjacent to highways will be protected by attainment of the NAAQS. The current NO<sub>2</sub> monitor location near I-25 and 8<sup>th</sup> Avenue is not representative of the higher traffic, highway emissions and community exposures occurring at the mousetrap. Our groups respectfully request CDPHE place an air monitoring station at the mousetrap to fulfill the

requirements of the Clean Air Act.

Communities near the mousetrap are severely impacted by air quality

The neighborhood of Globeville is bisected by I-70 and I-25. More than 80 percent of the nearly 4,000 residents are of Hispanic origin.<sup>ii</sup> The Globeville neighborhood poverty rate is over 23 percent, well above the Denver and national averages. There are two schools in Globeville – Garden Place Elementary School and Laradon Hall, a private institution that provides services to children and adults with developmental disabilities.<sup>iii</sup>

The Elyria and Swansea neighborhoods are also bisected by I-70 near the mousetrap. Elyria and Swansea have a population just over 6,000, with more than 80 percent being Latino. Nearly 28 percent of residents live in poverty.<sup>iv</sup> Swansea Elementary School serves both neighborhoods and is one of two elementary schools in Denver that is within 500 feet of a major freeway, the distance at which health effects are most acute.<sup>v</sup>

These neighborhoods are also within the Children’s Corridor, a geographic area so strongly associated with high numbers of at-risk children that it is the center of a campaign by the Piton Foundation to make the neighborhoods more visible and actionable to the community.<sup>vi</sup>

The 2013 Health Disparities Report, conducted by CDPHE, looked at the race/ethnicity of individuals who live within 500 feet of I-70 on the section that runs east from the mousetrap through these neighborhoods. The Department selected the section of I-70 “because it’s one of the most heavily traveled highways in the state with up to 139,000 vehicles per day, almost seven times the 20,000 vehicle threshold determined to be dangerous.” The study found that 79 percent of individuals living within 500 feet of this section of I-70 are Hispanic/Latino, compared with only 21 percent statewide.<sup>vii</sup>

These three neighborhoods suffer from some of the worst air in the state. More than half a million pounds of toxics were released into the air in Globeville, Swansea, and Elyria in 2012, according to EPA’s Toxics Release Inventory – more than any other zip code in Colorado, and more than 20 percent of the state’s total toxic air releases.<sup>viii</sup> Denver County as a whole suffers from some of the worst diesel particulate pollution in the entire nation – ranking 9<sup>th</sup> out of the 3,109 counties nationwide. The lifetime cancer risk from diesel soot in Denver exceeds the risk of all other air toxics tracked by EPA. Diesel soot is a major component of PM<sub>2.5</sub> near highways, and is a major source of the health risks linked to breathing fine particles. The average lifetime diesel soot cancer risk for a resident of Denver County is 1 in 1,938, which is *516 times greater* than the EPA’s acceptable cancer level of 1 in a million.<sup>ix</sup> Much of this diesel pollution is likely concentrated at the mousetrap, where Colorado’s two largest highways intersect.

State Monitoring Plan Required Under the Clean Air Act

State or local agencies are required under 40 CFR Section 58 to submit an annual monitoring network plan for “the establishment and maintenance of an air quality surveillance system that consists of a network of [State or Local Air Monitoring Systems (“SLAMS”)].”<sup>x</sup> The monitoring plan is required to include “a statement of purposes for each monitor and evidence that siting and operation of each monitor meets the requirements stated in appendices A, C, D, and E.”<sup>xi</sup> Appendix D addresses criteria for assembling monitoring networks. Appendix E addresses specific criteria for the location of monitoring sites.

Appendix D of Part 58 details “monitoring objectives and general criteria to be applied in establishing the required SLAMS ambient air quality monitoring stations and for choosing general locations for additional monitoring sites.”<sup>xii</sup> The three criteria for monitoring networks are: “(a) Provide air pollution data to the general public in a timely manner... (b) Support compliance with ambient air quality standards and emissions strategy development... (c) Support for air pollution research studies...”<sup>xiii</sup> “Monitoring sites must be capable of informing managers about many things including the peak air pollution levels, typical levels in populated areas, air pollution transported into and outside of a city or region, and air pollution levels near specific sources.”<sup>xiv</sup>

Of particular concern to the communities located in the vicinity of the mousetrap are the requirements that the monitoring plan include—

- (a) Sites located to determine the highest concentrations expected to occur in the area covered by the network;
- (b) Sites located to measure typical concentrations in areas of high population density;
- (c) Sites located to determine the impact of significant sources or source categories on air quality.<sup>xv</sup>

The facts that 1) the mousetrap includes the highest concentration of vehicle traffic in the state, and therefore the greatest emissions of mobile source related pollutants, and 2) that these neighborhoods are also in close proximity to a large, multi-unit coal-fired power plant<sup>vi</sup>, two oil refineries, the Purina Mill and other large industrial sources of emissions, strongly suggests that the mousetrap is likely the location with “the highest concentrations expected to occur in the [Denver CBSA] covered by the network.” The fact that CDPHE measures the highest PM concentrations in the Denver PM maintenance area at the Commerce City monitor, which is sited as a regional scale monitor not near a major highway, confirms that this north metro area is exposed to the worst PM levels linked to stationary sources. When additional concentrations attributable to mobile source emissions are added at the mousetrap, total exposures to PM<sub>2.5</sub> must be highest at the mousetrap location. For this reason, EPA’s network criteria require that a monitor be located to ensure attainment in these mousetrap communities.

#### Near highway monitors are needed to better characterize community exposures

Studies have shown that people who live, work, or attend school near major highways have an increased incidence and severity of health problems including reduced lung

function and impaired development in children, asthma, cardiovascular disease, low birth weight, and pre-term newborns, and premature death.<sup>xvii</sup>

Historically, air quality monitors were placed in areas away from highways because they were intended to measure air pollution across entire regions to determine compliance with state and federal air standards. As a result, many current monitoring stations significantly underestimate the harmful exposures in neighborhoods near highways.

In the 2011 update to the NAAQS for NO<sub>2</sub>, EPA recognized that highway-associated exposures account for a majority of ambient exposures to peak NO<sub>2</sub> concentrations. In particular, the EPA recognized that the combination of increased mobile source emissions and increased urban population densities lead to increased potential for exposure and associated risks.<sup>xviii</sup> And in the 2012 proposal to update the PM NAAQS for fine particles less than 2.5 micrometers in diameter, EPA states its belief “that there are gradients in near-roadway PM<sub>2.5</sub> that are most likely to be associated with heavily travelled roads, particularly those with significant heavy-duty diesel activity...”<sup>xix</sup>

To supplement the long-standing requirement of Part 58 that States include monitoring sites at locations to measure the expected highest concentrations in an area, the EPA added requirements for near-road monitors in urban areas near heavily trafficked highways to “better understand the potential health impacts of these exposures.”<sup>xx</sup> The Agency further explained that “a number of key monitoring objectives will be supported, including collection of NAAQS comparable data in the near-road environment, support for long-term health studies investigating adverse effects on people, providing a better understanding of pollutant gradients impacting neighborhoods that parallel major roads, availability of data to validate performance of models simulating near-road dispersion, characterization of areas with potentially elevated concentrations and/or poor air quality...”<sup>xxi</sup> and others.

Federal near roadway monitoring rules, beginning in January 2014, require states to add new monitors within 50 meters of major highways to measure NO<sub>2</sub>, PM<sub>2.5</sub> and carbon monoxide (CO). To achieve the health protection objectives of the Clean Air Act, these monitors must be placed at sites with the expected highest highway emissions and therefore the highest exposures to highway emissions. Only then will the data collected be able to fulfill the important monitoring objectives laid out by EPA above, and ensure that air quality will attain the NAAQS in all communities exposed to the elevated pollution levels associated with highway emissions.

#### Denver near highway air monitors required under the Clean Air Act

In February 2010, EPA strengthened the NAAQS for NO<sub>2</sub>. As part of the revisions, EPA requires microscale near-road NO<sub>2</sub> monitors in urban areas near heavily trafficked highways where peak 1-hour NO<sub>2</sub> concentrations are expected to occur. With a Core Based Statistical Area (CBSA) population of 2,500,000 or more persons, Denver is required to have two near-road NO<sub>2</sub> monitors. The rule requires the first monitor to be operational by January 1, 2014 and the second monitor to be reflected in the state Annual

Monitoring Network Plan submitted July 1, 2014, with the monitor operational by January 1, 2015.<sup>xxii</sup>

EPA also issued a decision in 2011, as part of the NAAQS for carbon monoxide, to require one CO monitor to be collocated with one NO<sub>2</sub> near road monitor. Based on its CBSA, Denver is required to have its near road CO monitor operational by January 1, 2015 at either of the required NO<sub>2</sub> stations.<sup>xxiii</sup>

In December 2012, EPA strengthened the NAAQS for PM<sub>2.5</sub>, requiring near highway monitors at one location in each urban area with a population of 1 million or more. The PM<sub>2.5</sub> monitors will be collocated at near-road monitoring sites also measuring NO<sub>2</sub> and CO. Denver is required to have a PM monitoring station operational by January 1, 2015.<sup>xxiv</sup>

#### Near highway NO<sub>2</sub> monitoring criteria apply to PM<sub>2.5</sub> monitor siting

In the final PM NAAQS rule, EPA requires one near-road PM<sub>2.5</sub> monitor to be collocated at a planned near-road NO<sub>2</sub> station.<sup>xxv</sup> EPA explains that “the NO<sub>2</sub> network design considers multiple factors that are also relevant for PM<sub>2.5</sub> concentrations (i.e., average annual daily traffic, fleet mix, roadway design, congestion patterns, terrain, and meteorology) and significant thought and review has already gone into its design, including pilot studies at five locations, and the development of a technical assistance document in conjunction with the affected monitoring agencies and the CASAC AAMMS (Russell and Samet, 2010b) to support deployment.”<sup>xxvi</sup>

Therefore, the design criteria in 40 CFR Section 58, Appendix D, ¶ 4.3, “Requirement for Near-road NO<sub>2</sub> Monitors,” also apply to near highway PM<sub>2.5</sub> monitors.

4.3.2(a)(1) The near-road NO<sub>2</sub> monitoring stations shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments, considering fleet mix, roadway design, congestion patterns, terrain, and meteorology, *where maximum hourly NO<sub>2</sub> concentrations are expected to occur* and siting criteria can be met in accordance with appendix E of this part. Where a State or local air monitoring agency identifies multiple acceptable candidate sites where maximum hourly NO<sub>2</sub> concentrations are expected to occur, the monitoring agency shall *consider the potential for population exposure in the criteria utilized to select the final site location*. Where one CBSA is required to have two near-road NO<sub>2</sub> monitoring stations, the sites shall be differentiated from each other by one or more of the following factors: fleet mix; congestion patterns; terrain; geographic area within the CBSA; or different route, interstate, or freeway designation. [Emphasis added.]

Moreover, in the final PM NAAQS rule EPA stated that, “To the extent that air agencies are still determining the optimum location for their multi-pollutant near-road monitoring

stations, *EPA encourages consideration of sites that best reflect measurement of maximum concentrations associated with exposure of people living in areas that parallel major roads*, to maximize the value of the data for use later in health studies.<sup>xxvii</sup>

[Emphasis added.]

In both of these provisions, EPA reiterates the importance of selecting sites *where maximum hourly concentrations are expected to occur*. And EPA specifically states that these criteria apply to the siting of both NO<sub>2</sub> and PM<sub>2.5</sub> monitors.

#### CDPHE should place second NO<sub>2</sub> monitor and PM monitor at the mousetrap

Based on the criteria outlined above, CDPHE is required to choose a near road NO<sub>2</sub> and PM monitoring site that prioritizes AADT, hourly concentrations and population exposure. It is clear that the mousetrap is the appropriate location to place Denver's second NO<sub>2</sub> monitor and the near road PM monitor.

CDPHE recently placed a near-highway monitoring site near I-25 and 8<sup>th</sup> Avenue, about 15 meters from I-25. CDPHE stated that the site is predominantly for NO<sub>2</sub>, but will soon begin collecting both PM<sub>2.5</sub> and PM<sub>10</sub> data.<sup>xxviii</sup> CDPHE also stated that it used EPA's Technical Assistance Document for near-road monitoring and the chosen road segment ranked the highest based on a weighted annual average traffic volume. According to CDPHE, highway segments on I-25 near the mousetrap ranked just below, and road segments along I-70 were quite a bit lower.<sup>xxix</sup> However, CDPHE did not look at the cumulative AADT at the mousetrap.

The AADT along I-25 at 8<sup>th</sup> Avenue is only 249,000, as reported on the spreadsheet provided by Mr. Allison, whereas at the mousetrap the total trips passing through the interchange are 326,000, more than 30 percent more traffic. Traffic counts reported by CDOT for 2012 show AADT at the mousetrap as (truck share shown in parenthesis):<sup>xxx</sup>

I-25 south of interchange: 243,000 (9.1%)

I-25 north of interchange: 198,000 (10.9%)

I-70 west of interchange: 150,000 (9.1%)

I-70 east of interchange: 140,000 (9.3%)

Especially important is the fact that the share of AADT represented by truck trips at the mousetrap is much higher than at the current NO<sub>2</sub> monitoring site. CDOT's data show that approximately 40 percent more truck trips use the I-25 segments north and south of the mousetrap than at 8<sup>th</sup> Avenue.

Together, the higher AADT and the greater number of truck trips show that the mousetrap is the location in the Denver CBSA where mobile source emissions are the highest. Concentrations of NO<sub>2</sub> and PM<sub>2.5</sub> measured at the current monitor location will not be representative of concentrations occurring within the neighborhoods adjacent to the mousetrap. To satisfy the requirements of EPA's Appendix D that near-highway monitors be located *where maximum hourly NO<sub>2</sub> concentrations are expected to occur*,



and to ensure that attainment is being demonstrated throughout the entire geographic area of the State, as required by CAA section 107(a), the second NO<sub>2</sub> monitor and the PM<sub>2.5</sub> monitor must be located at the mousetrap.

The air quality data provided by Mr. Allison from the monitor located at the Swansea Elementary School does not justify a different result. Mr. Allison stated that there was a monitor on the roof of the Swansea Elementary School from 2005-2012 but it was removed because it “did not show concentrations materially different than our downtown monitor (called CAMP and located at 2105 Broadway).”<sup>xxx1</sup> However, the Swansea School is located nearly 2 miles east of the mousetrap at a location where CDOT shows only 140,000 trips per day. AADT at the school is 186,000 less than at the mousetrap. These concentration data suggest that measurements at the mousetrap, within the 50-meter zone required by EPA, will be significantly higher than at the Swansea school site. The fact that the Swansea site was as high as at the CAMP station even though AADT is much lower than at the mousetrap demonstrates why a monitor must be located at the mousetrap to meet EPA’s criteria for the monitoring network and to protect residents in the nearby neighborhoods, including those who attend the Swansea School.

CDOT currently operates a secure met station with access to power at the mousetrap, which would make it relatively easy and cost-effective for CDPHE to install air monitors at this location as well.

Should CDPHE choose not to site the second NO<sub>2</sub> monitor at the mousetrap, we request that the Department still place a PM monitor at the mousetrap as authorized by EPA: “While only a single near-road PM<sub>2.5</sub> monitor is required within each of the CBSAs, agencies may elect to add additional PM<sub>2.5</sub> monitoring sites in near-road environments.”<sup>xxx2</sup>

#### Proximity to stationary sources is not a reason for rejecting mousetrap site

Mr. Allison stated in a meeting with community representatives on September 30 that the mousetrap location had been rejected for citing the first NO<sub>2</sub> monitor because of the possibility that the impact of emissions from the highways could be confounded by emissions from the Cherokee Power Plant and other local stationary sources, and that responsibility for NAAQS violations could not be clearly attributed to mobile versus industrial sources. However, EPA clearly states in the final PM NAAQS rule that “continuous PM<sub>2.5</sub> FEMs, which provide mass concentration data on an hourly basis, are better suited to accomplish the goals of near-road monitoring as they will complement the time resolution of the other air quality measurements and traffic data collected at the same sites. In this regard, particular PM<sub>2.5</sub> FEMs are better suited for near-road monitoring than FRMs.”<sup>xxx3</sup>

At the mousetrap, such hourly data can be combined with wind direction data from the met station to clearly distinguish the contribution from stationary sources from the concentrations contributed by highway emissions.

CDPHE should act quickly to submit a revised monitoring plan

CDPHE is required to submit to EPA a revised monitoring plan that includes the new highway-oriented monitoring stations no later than July 1, 2014. However, we urge the Department to act more quickly to get a PM<sub>2.5</sub> monitor in place at the mousetrap. The sooner data is collected from this site, the sooner the community can be assured that air quality is attaining national health standards, or that remedial action might be necessary to protect the residents and children attending the schools in close proximity to the mousetrap.

Thank you for considering our concerns and recommendations.  
If you have any questions, please do not hesitate to contact Vickie Patton at (303) 447-7215 or [vpatton@edf.org](mailto:vpatton@edf.org).

Respectfully submitted,

**Birdseed Art Collective**  
Carla Padilla

**Environmental Defense Fund**  
Robert Yuhnke  
Vickie Patton, General Counsel  
Hilary Sinnamon, Consultant to Environmental Defense Fund  
[vpatton@edf.org](mailto:vpatton@edf.org)

**Focus Points Family Resource Center**  
Steven Moss, Executive Director

**Garden Place Elementary**  
Rebecca Salomon, Principal

**Globeville Civic Association #1**  
Dave Oletski

**Globeville Civic Association #2**  
Armando Payan

**Globeville, Elyria-Swansea LiveWell**  
Rachel Cleaves, Coordinator  
[Rachel.cleaves@ucdenver.edu](mailto:Rachel.cleaves@ucdenver.edu)

**Street Kidz**  
Nancy Gomez, Associate Director

**Unite North Metro Denver**  
Thaddeus Tecza, Representative  
[Thaddeus.tecza@colorado.edu](mailto:Thaddeus.tecza@colorado.edu)

**University of Denver Sturm College of Law, Environmental Law Clinic**  
Michael Harris, Assistant Professor & Director  
[mharris@law.du.edu](mailto:mharris@law.du.edu)

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<sup>i</sup> Email from Will Allison, CDPHE, to Thad Tecza dated October 4, 2013.

<sup>ii</sup> Denver Department of Planning & Community Development, "Globeville Assessment," January 2008, Page 18-20.

<sup>iii</sup> Globeville Assessment, page 53.

<sup>iv</sup> Piton Foundation website, Elyria Swansea Neighborhood Summary, available at [http://www.piton.org/?fuseaction=CommunityFacts.Summary&Neighborhood\\_ID=885](http://www.piton.org/?fuseaction=CommunityFacts.Summary&Neighborhood_ID=885) (last accessed on October 14, 2013).

<sup>v</sup> CDPHE, Health Disparities Report (2013). Available online at: [http://www.colorado.gov/cs/Satellite?c=Document\\_C&childpagename=CDPHE-Main%2FDocument\\_C%2FCBONAddLinkView&cid=1251647411145&page.name=CBONWrap](http://www.colorado.gov/cs/Satellite?c=Document_C&childpagename=CDPHE-Main%2FDocument_C%2FCBONAddLinkView&cid=1251647411145&page.name=CBONWrap) (last accessed October 30, 2013).

<sup>vi</sup> Piton Foundation website at: [www.denverchildrenscorridor.org](http://www.denverchildrenscorridor.org) (last accessed October 30, 2013).

<sup>vii</sup> CDPHE, Health Disparities Report (2013).

<sup>viii</sup> EPA's TRI website at: <http://www2.epa.gov/toxics-release-inventory-tri-program> using zip code 80216.

<sup>ix</sup> Clean Air Task Force website, Diesel Soot Health Impacts: Where You Live, Denver County. Available at: <http://www.catf.us/diesel/dieselhealth/county.php?c=08031&site=0> (last accessed October 14, 2013).

<sup>x</sup> 40 C.F.R. 58.10(a)(1).

<sup>xi</sup> 40 C.F.R. 58.10(a)(1).

<sup>xii</sup> 40 C.F.R. 58, App. D(1).

<sup>xiii</sup> 40 C.F.R. 58, App. D(1.1).

<sup>xiv</sup> 40 C.F.R. 58, App. D(1.1.1).

<sup>xv</sup> 40 C.F.R. 58, App. D(1.1.1).

<sup>xvi</sup> We recognize and strongly support the transition underway at the Cherokee coal-fired power plant, and urge the full and swift phase out of coal combustion at that facility.

<sup>xvii</sup> EPA, Near Roadway Research website, available at: <http://www.epa.gov/nrmrl/appcd/nearroadway/index.html> (last accessed October 14, 2013).

<sup>xviii</sup> EPA, *Implementation of a National Near-Road NO<sub>2</sub> Monitoring Network*, 2011. [http://cfpub.epa.gov/si/si\\_public\\_file\\_download.cfm?p\\_download\\_id=505642](http://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=505642)

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<sup>xix</sup> 77 Fed. Reg. at 39009 (June 29, 2012).

<sup>xx</sup> *Id.*

<sup>xxi</sup> *Id.*

<sup>xxii</sup> 78 Fed. Reg. at 16,184 (March 14, 2013), *Revisions to Ambient Nitrogen Dioxide Monitoring Requirements*, Final Rule. <http://www.epa.gov/airquality/nitrogenoxides/pdfs/20130307fr.pdf>

<sup>xxiii</sup> EPA, *Fact Sheet: National Ambient Air Quality Standards for Carbon Monoxide*, 2011.

<http://www.epa.gov/airquality/carbonmonoxide/pdfs/COFactSheetAugust12v4.pdf>

<sup>xxiv</sup> EPA, *EPA's Revised Air Quality Standards for Particulate Pollution: Monitoring, Designations and Permitting Requirements*, 2012.

<http://www.epa.gov/airquality/particlepollution/2012/decfsimp.pdf>

<sup>xxv</sup> EPA can use its discretion in approving a deviation from the PM<sub>2.5</sub> monitoring requirements as already exists in the network design criteria. Such deviations are to be approved by the Regional Administrator as described in section 4.7.1 of Appendix D to part 58.

<sup>xxvi</sup> 78 Fed. Reg. at 3238 (January 15, 2013).

<sup>xxvii</sup> 78 Fed. Reg. at 3238 (January 15, 2013).

<sup>xxviii</sup> Email from Will Allison, CDPHE, to Thad Tecza dated October 4, 2013.

<sup>xxix</sup> *Id.*

<sup>xxx</sup> Colorado Department of Transportation, Traffic Data Explorer, 2013. Available online at:

<http://dtdapps.coloradodot.info/Otis/TrafficData> (last accessed October 30, 2013).

<sup>xxxi</sup> Email from Will Allison, CDPHE, to Thad Tecza dated October 4, 2013.

<sup>xxxii</sup> 78 Fed. Reg. at 3238.

<sup>xxxiii</sup> 78 Fed. Reg. at 3238.

# STATE OF COLORADO

John W. Hickenlooper, Governor  
Larry Wolk, MD, MSPH  
Executive Director and Chief Medical Officer

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

4300 Cherry Creek Dr. S.  
Denver, Colorado 80246-1530  
Phone (303) 692-2000  
Located in Glendale, Colorado

[www.colorado.gov/cdphe](http://www.colorado.gov/cdphe)



Colorado Department  
of Public Health  
and Environment

July 1, 2014

Vickie Patton  
Environmental Defense Fund  
2060 Broadway, Suite 300  
Boulder, CO 80302

SUBJECT: Response to public comment – 2014 Network Monitoring Plan

Thank you for the comments you provided for the Colorado Department of Public Health, Air Pollution Control Division's (Division) 2014 Network Monitoring Plan. As required by 40 CFR 58.10, the Division is required to submit an annual network monitoring plan to the Environmental Protection Agency Regional Administrator by July 1<sup>st</sup>. This plan is to be made available for public comment for 30 days prior to acceptance by the Regional Administrator. The Division's 2014 Network Monitoring Plan was made available for public comment from May 23, 2014 thru June 23, 2014. The Division received three comments all pertaining to the proposed locations for Colorado's second near-roadway nitrogen dioxide (NO<sub>2</sub>) site.

Included in the 2014 Network Monitoring Plan is the Monitoring Plan for the Colorado Department of Public Health and Environment Near-Roadway NO<sub>2</sub> Monitoring Site #2. Within this plan four site locations were proposed, two along I-25 in the Denver Technological Center area, and two along I-25 near the I-70 interchange (mousetrap). All comments received voiced favor for locating the site in or near the mousetrap. Based upon these comments, the Division will focus its efforts at securing a site location near the mousetrap. Comments varied as to a preferred location within or around the location of the mousetrap. Comments were received in support of both the northern and southern locations near the mousetrap. Locations within the mousetrap are not being considered due to the difficulty of meeting federal siting criteria for meteorological and gaseous monitoring, as well as the difficulty of accounting for all the roadway sections. With all things being equal, the southern location has a greater fleet-equivalent annual average daily traffic count relative to the northern location, though the northern site has a higher heavy duty percentage and more favorable wind directions. However, the infrastructure and Federal Highway Administration requirements at the southern site appear to be much more extensive and may be limiting in practical application. The Division intends to further investigate the feasibility of both mousetrap sites and will make the site selection determination based upon a thorough assessment of findings and resources available.

Comments regarding the inclusion particulate monitoring near the mousetrap and along freeway corridors near the Elyria, Swansea and Globeville neighborhoods were also received. These neighborhoods have a number of schools in relatively close proximity to freeway corridors. Both of the mousetrap sites (northern and southern) are close to schools that are near I-25. The Division is planning to include a continuous particulate analyzer for both PM<sub>10</sub> and PM<sub>2.5</sub> at this near-roadway NO<sub>2</sub> site, as well as meteorological parameters.

Sincerely,

Gordon Pierce, Program Manager  
Technical Services Program  
Air Pollution Control Division

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## Fwd: Colorado Air Monitoring Network Plan

1 message

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**Comments - CDPHE, APCD** <cdphe.commentsapcd@state.co.us>  
To: Gregory Harshfield - CDPHE <gregory.harshfield@state.co.us>

Thu, Jun 26, 2014 at 8:08 AM

fyi

----- Forwarded message -----

From: **Miguel, Nola J - City Council Operations** <Nola.Miguel@denvergov.org>  
Date: Wed, Jun 25, 2014 at 5:12 PM  
Subject: Colorado Air Monitoring Network Plan  
To: "CDPHE,CommentsAPCD@state.co.us" <CDPHE,CommentsAPCD@state.co.us>  
Cc: "Montero, Judy H. - City Council District #9" <Judy.Montero@denvergov.org>

Colorado Department of Public Health and Environment

4300 Cherry Creek Drive South

Denver, CO 80246-1530

6/23/2014

Dear Colorado Department of Public Health and Environment,

I am writing in regards to the **Colorado Air Monitoring Network Plan 2014** in support of the *Near Roadway Air Quality Monitor* site being located at one of the 2 sites identified near the "mousetrap" at I-25/ and I-70 intersection. This area is of particular concern to me because the neighborhoods near both I-25 and I-70 are exposed to some of the most polluted air in Colorado. Because of this, I continue to support having the 2<sup>nd</sup> near highway monitoring site be at the Mousetrap.

Residents of my district living near the Mousetrap and the children at Garden Place Elementary need to be assured they are protected from violations of the national air quality standards. Monitors located in less polluted portions of the metro area will not ensure that residents in this district are protected. I believe that the Tech Center site presented as another option would not address the same types of urgent concerns around health that my residents have expressed to me.

My expectation is that the complexity of pollution for residents in this area becomes better understood and residents feel safe and healthy in their neighborhood. Having a monitor there could help determine if there are areas of concern, and/or relieve anxiety, and lead to improved quality of life for residents in Globeville. The Health Impact Assessment (HIA) done for Globeville Elyria and Swansea neighborhood planning, by Denver Environmental Health, recommends to "minimize stressful environmental impacts on residents" to help with mental wellbeing in the neighborhood. The HIA also directly recommends "...additional monitoring with a goal of

<https://mail.google.com/mail/u/0/?ui=2&ik=1514fdc48b&view=pt&search=inbox&th=146d881b8eb1e755&siml=146d881b8eb1e755>

1/2

quantifying near-highway pollution separately from the I-70 project". I feel it is important that these recommendations are taken into account for the Health of residents in Globeville and adjacent neighborhoods.

If you decide not to have the second highway monitoring station near the Mousetrap, please advise how CDPHE and the City of Denver could provide the resources to fund a monitor at that location as part of the monitoring plan you will be submitting to EPA.

Thank you,

Councilwoman Judy H. Montero  
City and County of Denver, District 9

**Nola Miguel, MSW | Council Aide**

Office of Denver City Councilwoman Judy Montero, District 9  
720-337-7709 | [3457 Ringsby Court, Suite 215](#)  
[nola.miguel@denvergov.org](mailto:nola.miguel@denvergov.org) | Dial 3-1-1 for City Services

*\*This email is considered an "open record" under the Colorado Open Records Act and must be made available to any person requesting it unless it clearly requests confidentiality. Please indicate whether or not you want your communication to be confidential.*

*Please Note--I am currently working part time and am in the office on Mondays and Wednesdays.*

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Colorado Department  
of Public Health  
and Environment

July 1, 2014

Councilwoman Judy Montero  
City and County of Denver, District 9  
3457 Ringsby Court, Suite 215  
Denver, CO 80216

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Sincerely,

Gordon Pierce, Program Manager  
Technical Services Program  
Air Pollution Control Division