

# **COLORADO ANNUAL MONITORING NETWORK PLAN 2008 - 2009**



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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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# INTRODUCTION

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## PURPOSE OF THE NETWORK PLAN

The purpose of the Network Plan is to provide an overview of the current Air Pollution Control Division's 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 second 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

In 2008 the Colorado Air Pollution Control Division (APCD) plans to operate monitors at 59 locations. In 2007 the Colorado Air Pollution Control Division operated monitors at 77 separate locations. Particulate monitors (TSP, PM<sub>10</sub> and PM<sub>2.5</sub>) are the most abundant and the widespread of monitoring types across the state. In 2008 there are PM<sub>10</sub> monitors at 31 separate locations. In 2008 there are PM<sub>2.5</sub> monitors at 19 separate locations. There are 14 meteorological sites in operation and six additional monitors planned to begin operation in 2008. These sites monitor wind speed, wind direction, resultant speed, resultant direction, standard deviation of horizontal wind direction and temperature. Two meteorological sites also monitor for relative humidity. Only 6 of the 77 locations in 2007 monitored for 3 or more parameters (with meteorological and PM<sub>2.5</sub> measurements counting as only one parameter each). Only 2 locations monitored for more than 6 parameters, both of which are in the Denver Metro Area.

Increasing the amount of automated versus manual monitoring will require modifications to the particulate network since in the current network these are primarily manually operated monitors. The APCD currently operates one TSP monitor and it is used for lead analysis. Only 5 of the 40 PM<sub>10</sub> monitors are continuous "hourly", while 10 of the 31 PM<sub>2.5</sub> monitors are continuous. This difference reflects the age of the technology more than anything else.

Forty two of the 66 current monitoring sites have been in operation for 10 or more years and 21 of these have been in operation for 20 or more years. Ten monitoring sites have been in operation for more than 30 years. These sites are: Denver CAMP (43 years), Greeley-Hospital (41 years), Alamosa Adams State College (38 years), Welby and Arvada (35 years), Pagosa Springs, Lamar Power Plant and Steamboat Springs (33 years). Conversely, 26 of the 66 monitoring sites have begun operation since the start of the year 2000.

## APCD Monitoring Locations

The "APCD Sites in Operation Table 1" and the "APCD Site Location Table 2" show key information that is used through out the remainder of this document. The "County" gives the county name and county number for each monitoring location. The "Site #" refers to the specific site within each county. These two numbers and the "State Code" number, which for Colorado is "08", can be used to identify each site in the state within the Air Quality System operated by the EPA. The "Started" date and the "Ended" date are the dates that the site was established and the date that the site was removed. In Table 3 the dates are for the start of monitoring for each parameter at the site. These dates may or may not be the same.

Table 4 lists the population in Colorado by Census Regions and Counties for the July 2005 and the July 2010 Population Estimates by the Colorado State Demography Office. This table also includes the "percent change" in population from 2000 to 2005/2010 and the parameters monitored in each Region and County.

Table 5 through Table 11 list the make and model of each monitor, its parameter occurrence code (POC), the monitor type usually “SLAMS”, State and Local Air Monitoring Site or SPM, Special Purpose Monitor and the frequency of monitoring. The frequency is shown as “Hourly”, “1/6”, “1/3” or “1/1”. These indicate that the monitor operates on an every sixth day, every third day or every day schedule.

**Table 1 APCD Sites in Operation for 2007 - 2008**

County	Site #	Site Name	Address	Started	Ended
Adams (001)	0006	Commerce City	7101 Birch St.	01/2001	
	3001	Welby	3174 E. 78th Ave.	07/1973	
Alamosa (003)	0001	Alamosa - Adams State College	208 Edgemont Blvd.	01/1970	
	0003	Alamosa - Municipal	425 4th St.	04/2002	
Arapahoe (005)	0002	Highland Reservoir	8100 S. University Blvd	06/1978	
	0005	Arapahoe Community College	6190 S. Santa Fe Drive	12/1998	
	0006	Aurora Reservoir	5800 S. Powhaton Rd.	+	
Archuleta (007)	0001	Pagosa Springs	309 Lewis St.	08/1975	
Boulder (013)	0003	Longmont - Municipal	350 Kimbark St.	06/1985	
	0009	Longmont - Main St.	440 Main St.	11/1989	
	0011	Boulder - Foothills	1405½ S. Foothills Parkway	06/1994	
	0012	Boulder Chamber of Commerce	2440 Pearl St.	12/1994	
	1001	Boulder - CU/Athens	2102 Athens St.	12/1980	
Delta (029)	0004	Delta	560 Dodge St.	08/1993	
Denver (031)	0002	Denver - CAMP	2105 Broadway	01/1965	
	0013	Denver - NJH	14th Ave. & Albion St.	01/1983	
	0014	Denver - Carriage	2325 Irving St.	06/1982	
	0016	DESCI Building	1901 13th Ave.	01/1990	
	0017	Denver Visitor Center	225 W. Colfax Ave.	12/1992	
	0019	Denver Firehouse #6	1300 Blake St.	11/1993	
	0021	Auraria Campus Met.	Auraria Parking Lot R	03/1999	
	0023	Denver - Swansea	4650 Columbine St.	07/2002	
	0025	Denver - Municipal Animal Shelter	678 S. Jason St.	07/2005	
Douglas (035)	0004	Chatfield State Park	11500 N. Roxborough Park Rd.	04/2004	
Elbert (039)	0001	Elbert County	24950 Ben Kelly Rd.	12/1998	
El Paso (041)	0011	Colorado Springs - RBD	101 W. Costilla St.	02/1987	03/2008
	0013	US Air Force Academy	USAFA Rd 640	05/1996	
	0015	Colorado Springs - Hwy 24	690 W. Hwy 24	11/1998	
	0016	Manitou Springs	101 Banks Pl.	04/2004	
	0017	Colorado College	130 W. Cache la Poudre	12/2007	
Fremont (043)	0003	Canon City - City Hall	128 Main St.	10/2004	
Garfield (045)	0005	Parachute	100 E. 2nd St.	01/1982	
	0007	Rifle - Henry Building	144 E. 3rd. St.	05/2005	
	0012	Rifle - Health	195 W. 14 <sup>th</sup> Ave.	+	
Gunnison (051)	0004	Crested Butte	603 6 <sup>th</sup> St.	09/1982	
	0007	Mt. Crested Butte	19 Emmons Rd.	07/2005	

County	Site #	Site Name	Address	Started	Ended
Jefferson (059)	0002	Arvada	9101 W. 57 <sup>th</sup> Ave.	01/1973	
	0005	Welch	12400 W. Hwy 285	08/1991	
	0006	Rocky Flats - N	16600 W. Hwy 128	06/1992	
	0008	Rocky Flats - SE	9901 Indiana St.	06/1992	
Jefferson (059)	0011	NREL	2054 Quaker St.	06/1994	
	0013	Aspen Park	9737 Rhodus St.	+	
LaPlata (067)	0004	Durango - RCH	1235 Camino del Rio	09/1985	
Larimer (069)	0009	Fort Collins - CSU	251 Edison St.	12/1998	
	0010	Fort Collins - South	4407 S. College Ave.	11/2002	06/2007
	0011	Fort Collins - West	3416 W. La Porte Ave.	05/2006	
	0012	Loveland - West	1800 S. CR 31	+	
	1004	Fort Collins - Mason St.	708 S. Mason St.	12/1980	
Mesa (077)	0017	Grand Junction - Powell	650 South Ave.	02/2002	
	0018	Grand Junction - Pitkin	645¼ Pitkin Ave.	01/2004	
	0019	Clifton	Hwy 141 & D Rd.	10/2006	
	0020	Palisade Water Treatment	Rapid Creek Rd.	+	
Montezuma (083)	0006	Cortez	106 W. North St.	+	
Pitkin (097)	0006	Aspen - Library	120 Mill St.	05/2002	
Powers (099)	0001	Lamar Power Plant	100 2 <sup>nd</sup> St.	08/1975	
	0002	Lamar - Municipal	104 Parmenter St.	12/1976	
	0003	Lamar - Port of Entry	7100 US Hwy 50	03/2005	
Pueblo (101)	0012	Pueblo - Public Works	211 S. D St.	07/1998	
Routt (107)	0003	Steamboat Springs	136 6 <sup>th</sup> St.	09/1975	
San Miguel (113)	0004	Telluride	333 W. Colorado Ave.	03/1990	
Summit (117)	0002	Breckenridge	501 N. Park Ave.	04/1992	
Weld (123)	0006	Greeley - Hospital	1516 Hospital Rd.	04/1967	
	0008	Platteville	1004 Main St.	12/1998	
	0009	Greeley - Tower	3101 35 <sup>th</sup> Ave.	06/2002	
	0010	Greeley - West Annex Bldg	905 10 <sup>th</sup> Ave.	12/2003	

**Table 2 APCD Site Locations for 2007 - 2008**

<b>County</b>	<b>Site #</b>	<b>Site Name</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Elevation (Meters)</b>
Adams (001)	0006	Commerce City	39.82575	104.93713	1,564
	3001	Welby	39.83818	104.94984	1,559
Alamosa (003)	0001	Alamosa - ASC	37.46941	105.87903	2,307
	0003	Alamosa - Municipal	37.46948	105.86338	2,298
Arapahoe (005)	0002	Highland Reservoir	39.56797	104.95710	1,731
	0005	Arapahoe Community College	39.60417	105.01953	1,634
	0006	Aurora Reservoir	39.61919	104.67893	1,808
Archuleta (007)	0001	Pagosa Springs	37.26628	107.02102	2,158
Boulder (013)	0003	Longmont - Municipal	40.16448	105.10069	1521
	0009	Longmont - Main	40.16658	105.10240	1,510
	0011	Boulder - Foothills	39.95720	105.23847	1,669
	0012	Boulder Chamber of Commerce	40.02103	105.26326	1,628
	1001	Boulder - CU/Athens	40.00130	105.26718	1,619
Delta (029)	0004	Delta	38.73940	108.07319	1,510
Denver (031)	0002	Denver - CAMP	39.75119	104.98762	1,589
	0013	Denver - NJH	39.37860	104.93998	1,601
	0014	Denver - Carriage	39.75178	105.03065	1,609
	0016	DESCI Building	39.73700	104.96461	1,615
	0017	Denver Visitor Center	37.74027	104.99104	1,594
	0019	Denver Firehouse #6	39.74819	105.00261	1562
	0021	Auraria Campus Met.	39.74696	105.00361	1,584
	0023	Denver - Swansea	39.77679	104.95627	1,581
	0025	Denver - Municipal Animal Shelter	39.70441	104.99808	1,591
Douglas (035)	0004	Chatfield State Park	39.53448	105.07035	1,696
Elbert (039)	0001	Elbert County	39.23194	104.63472	2,137
El Paso (041)	0011	Colorado Springs - RBD	38.83139	104.82778	1,830
	0013	US Air Force Academy	39.95833	104.81721	1,966
	0015	Colorado Springs - Hwy 24	39.83089	104.83925	1,821
	0016	Manitou Springs	38.85310	104.90130	1,946
	0017	Colorado College	38.84799	104.82856	1830
Fremont (043)	0003	Canon City - City Hall	38.43829	105.24504	1,642
Garfield (045)	0005	Parachute	38.45278	108.04806	1,558
	0007	Rifle - Henry Building	39.53357	107.78216	1,630
	0012	Rifle - Health	39.54182	107.78413	1640
Gunnison (051)	0004	Crested Butte	38.86882	106.98090	2,705
	0007	Mt. Crested Butte	38.89864	106.96555	2,863
Jefferson (059)	0002	Arvada	39.80035	105.10002	1,625
	0005	Welch	39.63878	105.13948	1,739
	0006	Rocky Flats - N	39.91285	105.18855	1,794



County	Site #	Site Name	Latitude	Longitude	Elevation (Meters)
Jefferson (059)	0008	Rocky Flats - SE	39.87393	105.16562	1,715
	0011	NREL	39.74371	105.17798	1,826
	0012	Aspen Park	39.54032	105.29651	2467
La Plata (067)	0004	Durango - RCH	37.27691	107.88063	1,985
Larimer (069)	0009	Fort Collins - CSU	40.57125	105.07969	1,526
	0010	Fort Collins - South	40.52639	105.07667	1530
	0011	Fort Collins - West	40.59230	105.14112	1,574
	0012	Loveland - West	40.37447	105.31383	1653
	1004	Fort Collins - Mason	40.57747	105.07892	1,516
Mesa (077)	0017	Grand Junction - Powell	39.06383	108.56121	1,396
	0018	Grand Junction - Pitkin	39.06429	108.56155	1,396
	0019	Clifton	39.06259	108.45729	1,412
	0020	Palisade Water Treatment	39.13057	108.31383	1521
Montezuma (083)	0006	Cortez	37.55000	108.58690	1890
Pitkin (097)	0006	Aspen - Library	39.19083	106.81987	2,410
Powers (099)	0001	Lamar Power Plant	38.08962	102.61361	1,100
	0002	Lamar - Municipal	38.07428	102.61538	1,108
	0003	Lamar - Port of Entry	38.11414	102.62779	1,105
Pueblo (101)	0012	Pueblo - Public Works	38.26292	104.61216	1,420
Routt (107)	0003	Steamboat Springs	40.48520	106.83146	2,047
San Miguel (113)	0004	Telluride	37.93779	107.81216	2,664
Summit (117)	0002	Breckenridge	39.49173	106.04685	2923
Weld (123)	0006	Greeley - Hospital	40.41487	104.70701	1,449
	0008	Platteville	40.20964	104.82385	1,475
	0009	Greeley - Tower	40.38637	104.73721	1,474
	0010	Greeley West Annex Bldg.	40.42344	104.69451	1,414

The following abbreviations are used in the next tables:

Orientation refers to the reason why the monitor was placed in that location.

Scale refers 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
- Parm - Parameter Code

**Scale**

- Micro - Micro-scale
- Neigh - Neighborhood Scale
- Middle - Middle Scale
- Urban - Urban Scale
- Regional - Regional Scale

Other - These are meteorological monitors that do not include either an orientation or a scale.

+ - These monitors are not yet installed.

(PM<sub>10</sub>H and PM<sub>2.5</sub>H - refer to monitors that operate continuously and record their data as hourly samples.)

**Table 3 APCD Parameters Monitored During 2007 - 2008**

County	Site #	Site Name	Address	Parm	Started	Scale			
Adams (001)	0006	Commerce City	7101 Birch St.	PM <sub>10</sub>	01/2001	P.O. Neigh			
				PM <sub>2.5</sub>	01/2001	P.O. Neigh			
				Met	06/2003	Other			
	3001	Welby	3174 E. 78 <sup>th</sup> Ave.	CO	07/1973	P.O. Neigh			
				SO <sub>2</sub>	07/1973	P.O. Neigh			
				NO <sub>x</sub>	07/1976	P.O. Urban			
				O <sub>3</sub>	07/1973	P.O. Neigh			
Met				01/1975	Other				
PM <sub>10</sub>				01/1986	P.O. Neigh				
Alamosa (003)	0001	Alamosa - ASC	208 Edgemont Blvd.	PM <sub>10</sub>	06/1989	P.O. Region			
	0003	Alamosa - Municipal	425 4 <sup>th</sup> St.	PM <sub>10</sub>	04/2002	P.O. Region			
Arapahoe (005)	0002	Highland Reservoir	8100 S. University Blvd.	O <sub>3</sub>	06/1978	H.C. Neigh			
				Met	07/1978	Other			
	0005	Arapahoe Comm. College	6190 S. Santa Fe Dr.	PM <sub>2.5</sub>	03/1999	P.O. Neigh			
	0006	Aurora Reservoir	5800 S. Powhaton Rd	O <sub>3</sub>	+	SPM Urban			
Met				+	Other				
Archuleta (007)	0001	Pagosa Springs	309 Lewis St.	PM <sub>10</sub>	01/1985	P.O. Neigh			
				PM <sub>2.5</sub>	06/2001	P.O. Neigh			
Boulder (013)	0003	Longmont - Municipal	350 Kimbark St.	PM <sub>10</sub>	06/1985	P.O. Neigh			
				PM <sub>2.5</sub>	01/1999	P.O. Neigh			
	0009	Longmont - Main St.	440 Main St.	CO	11/1989	P.O. Middle			
	0011	Boulder - Foothills	1405½ S. Foothills Parkway	O <sub>3</sub>	06/1994	H.C. Urban			
				PM <sub>10</sub>	01/1999	P.O. Neigh			
0012	Boulder Chamber of Commerce	2440 Pearl St.	PM <sub>2.5</sub>	01/1999	P.O. Neigh				
			PM <sub>2.5</sub>	11/2004	P.O. Neigh				
Delta (029)	0004	Delta	560 Dodge St.	PM <sub>10</sub>	08/1993	P.O. Neigh			
Denver (031)	0002	Denver - CAMP	2105 Broadway	CO	02/1965	H.C. Micro			
				SO <sub>2</sub>	01/1965	H.C. Neigh			
				NO <sub>x</sub>	01/1965	H.C. Neigh			
				O <sub>3</sub>	06/2005	P.O. Neigh			
				Met	01/1985	Other			
				PM <sub>10</sub>	01/1986	H.C. Micro			
				PM <sub>2.5</sub>	01/1999	P.O. Micro			
				0013	Denver - NJH	14 <sup>th</sup> Ave. & Albion St.	PM <sub>2.5</sub>	10/2003	P.O. Middle
				0014	Denver - Carriage	2325 Julian St.	O <sub>3</sub>	06/1982	P.O. Neigh
							Met	01/1983	Other
	0016	DESCI Building (Visibility)	1901 13 <sup>th</sup> Ave.	Viz	01/1990	Other			
	0017	Denver Visitor Center	225 W. Colfax Ave.	PM <sub>10</sub>	12/1992	H.C. Middle			
	0019	Denver Firehouse #6	1300 Blake St.	CO	11/1993	P.O. Micro			
	0021	Auraria Campus Met.	Auraria Parking Lot R	Met	03/1999	Other			
	0023	Denver - Swansea	4650 Columbine St.	PM <sub>2.5</sub>	07/2002	P.O. Neigh			
TSP				07/2005	P.O. Middle				
Pb				07/2005	P.O. Middle				
PM <sub>10</sub>				07/2005	P.O. Middle				
CO				+	NCORE				
O <sub>3</sub>				+	NCORE				
NO <sub>x</sub>				+	NCORE				
SO <sub>2</sub>				+	NCORE				
Met				+	NCORE				
PM <sub>2.5</sub>	01/2007	P.O. Neigh							
Douglas (035)	0004	Chatfield State Park	11500 N. Roxborough Pk Rd.	O <sub>3</sub>	05/2004	H.C. Urban			
				PM <sub>2.5</sub>	05/2004	P.O. Neigh			
				Met	04/2004	Other			
Elbert (039)	0001	Elbert County	24950 Ben Kelly Rd.	PM <sub>2.5</sub>	05/1999	Back Region			

County	Site #	Site Name	Address	Parm	Started	Scale
El Paso (041)	0011	Colorado Springs - RBD	101 Costilla St.	PM <sub>10</sub>	03/1987	P.O. Neigh
				PM <sub>2.5</sub>	01/1999	P.O. Neigh
	0013	US Air Force Academy	USAFA Rd 640	O <sub>3</sub>	06/1996	P.O. Urban
	0015	Colorado Springs - Hwy 24	690 W. Hwy 24	CO	11/1998	H.C. Micro
				Met	11/1998	Other
	0016	Manitou Springs	101 Banks Pl.	O <sub>3</sub>	04/2004	P.O. Neigh
0017	Colorado College	130 W. Cache la Poudre	PM <sub>10</sub>	12/2007	P.O. Neigh	
			PM <sub>2.5</sub>	12/2007	P.O. Neigh	
Fremont (043)	0003	Canon City - City Hall	128 Main St.	PM <sub>10</sub>	10/2004	P.O. Middle
Garfield (045)	0005	Parachute	100 E. 2 <sup>nd</sup> St.	PM <sub>10</sub>	05/2000	P.O. Neigh
	0007	Rifle - Henry Building	144 3 <sup>rd</sup> St.	PM <sub>10</sub>	05/2005	P.O. Neigh
				PM <sub>2.5</sub>	+	P.O. Neigh
Met	+	Other				
0012	Rifle - Health	195 W. 14 <sup>th</sup> Ave.	O <sub>3</sub>	+	SPM Neigh	
Gunnison (051)	0004	Crested Butte	603 6 <sup>th</sup> St.	PM <sub>10</sub>	06/1985	P.O. Neigh
	0007	Mt. Crested Butte	19 Emmons Rd.	PM <sub>10</sub>	07/2005	P.O. Neigh
				PM <sub>2.5</sub>	07/2005	P.O. Neigh
Jefferson (059)	0002	Arvada	9101 W. 57 <sup>th</sup> Ave.	O <sub>3</sub>	08/1973	P.O. Neigh
				Met	01/1975	Other
	0005	Welch	12400 W. Hwy 285	O <sub>3</sub>	08/1991	P.O. Urban
				Met	10/1991	Other
	0006	Rocky Flats - N	16600 W. Hwy 128	O <sub>3</sub>	09/1992	H.C. Urban
				Met	06/1992	Other
	0008	Rocky Flats - SE	9901 Indiana St.	Met	06/1992	Other
	0011	NREL	2054 Quaker St.	O <sub>3</sub>	06/1994	H.C. Urban
0013	Aspen Park	9737 Rhodus St.	O <sub>3</sub>	+	SPM Urban	
			Met	+	Other	
La Plata (067)	0004	Durango - RCH	1235 Camino del Rio	PM <sub>10</sub>	05/1985	P.O. Middle
Larimer (069)	0009	Fort Collins - CSU	251 Edison St.	PM <sub>10</sub>	07/1999	P.O. Neigh
				PM <sub>2.5</sub>	07/1999	P.O. Neigh
	0011	Fort Collins - West	3416 La Porte Ave.	O <sub>3</sub>	05/2006	H.C. Urban
	0012	Loveland - West	1800 S. CR 31	O <sub>3</sub>	+	SMP Urban
				Met	+	Other
	1004	Fort Collins - Mason	708 S. Mason St.	CO	12/1980	P.O. Neigh
O <sub>3</sub>				12/1980	P.O. Neigh	
Met				01/1981	Other	
Mesa (077)	0017	Grand Junction - Powell	650 South Ave.	PM <sub>10</sub>	02/2002	P.O. Neigh
				PM <sub>2.5</sub>	11/2002	P.O. Neigh
	0018	Grand Junction - Pitkin	645½ Pitkin Ave.	CO	01/2004	H.C. Micro
				PM <sub>10</sub>	01/2004	P.O. Neigh
	0019	Clifton	Hwy 141 & D Rd.	Met	01/2004	Other
				PM <sub>10</sub>	10/2007	P.O. Neigh
0020	Palisade Water Treatment	Rapid Creek Rd.	O <sub>3</sub>	+	SPM Urban	
			Met	+	Other	
Montezuma (083)	0006	Cortez	106 W. North St.	O <sub>3</sub>	+	SPM Neigh
				PM <sub>2.5</sub>	+	SPM Neigh
Pitkin (097)	0006	Aspen - Library	120 Mill St.	PM <sub>10</sub>	05/2003	P.O. Middle
Powers (099)	0001	Lamar Power Plant	100 2 <sup>nd</sup> St.	PM <sub>10</sub>	06/1985	P.O. Neigh
	0002	Lamar - Municipal	104 Parmenter St.	PM <sub>10</sub>	08/1986	P.O. Neigh
	0003	Lamar - Port of Entry	7100 US Hwy 50	Met	03/2005	Other
Pueblo (101)	0012	Pueblo - Public Works	211 S. D St.	PM <sub>10</sub>	07/1998	P.O. Middle
				PM <sub>2.5</sub>	02/1999	P.O. Neigh
Routt (107)	0003	Steamboat Springs	136 6 <sup>th</sup> Ave.	PM <sub>10</sub>	10/1986	P.O. Neigh
San Miguel (113)	0004	Telluride	333 W. Colorado Ave.	PM <sub>10</sub>	03/1990	P.O. Neigh
Summit (117)	0002	Breckenridge	501 N. Park Ave.	PM <sub>10</sub>	10/1992	P.O. Neigh

County	Site #	Site Name	Address	Parm	Started	Scale
Weld (123)	0006	Greeley – Hospital	1516 Hospital Rd.	PM <sub>10</sub>	10/1986	P.O. Neigh
				PM <sub>2.5</sub>	02/1999	P.O. Neigh
	0008	Platteville	1004 Main St.	PM <sub>2.5</sub>	08/1999	P.O. Region
	0009	Greeley - Tower	3101 35 <sup>th</sup> Ave.	O <sub>3</sub>	06/2002	P.O. Neigh
				Met	+	Other
	0010	Greeley - West Annex Bldg	905 10 <sup>th</sup> Ave.	CO	12/2003	P.O. Middle

Table 4 Population Projections for 2005 - 2010

REGIONS/Counties	Projected Population		Annual Change		CO	SO <sub>2</sub>	NO <sub>x</sub>	NO <sub>y</sub>	O <sub>3</sub>	Met	R.H.	Precip	TSP	Pb	PM10	PM <sub>10</sub> H	PM <sub>2.5</sub>	PM <sub>2.5</sub> H
	July, 2005	July, 2010	00-05	05-10														
<b>COLORADO</b>	4,718,562	5,207,801	1.7%	2.0%	8	2	2		15	14	2		1	1	35	5	21	10
<b>FRONT RANGE</b>	3,862,633	4,250,332	1.8%	1.9%														
DNVR-BLDR REGION	2,623,871	2,845,175	1.6%	1.6%														
DENVER PMSA	2,337,991	2,546,353	2.0%	1.7%														
Adams	402,110	452,411	1.9%	2.4%														
	<b>08-001-0006 Commerce City</b>									1					1		1/C/S	1
	<b>08-001-3001 Welby</b>				1	1	1		1	1					1	1		
Arapahoe	534,252	581,897	1.7%	1.7%														
	<b>08-005-0002 Highland Reservoir</b>								1	1								
	<b>08-005-0005 Arapahoe Community College</b>																1	
	<b>08-005-0006 Aurora Reservoir</b>								+	+								
Broomfield	45,755	51,970	---	2.6%														
Denver	571,848	606,667	0.6%	1.2%														
	<b>08-031-0002 Denver CAMP</b>				1	1	1		1	1					1/C	1	1/C	1
	<b>08-031-0013 Denver NJH</b>																	1
	<b>08-031-0014 Denver Carriage</b>								1	1								
	<b>08-031-0017 Denver Visitor Center</b>														1			
	<b>08-031-0019 Denver Firehouse #6</b>				1													
	<b>08-031-0021 Auraria Met</b>									1	1							
	<b>08-031-0023 Swansea</b>																1	
	<b>08-031-0025 Denver Animal Shelter</b>				+	+	+	+	1	+	+	+	1	1	1/C	1	1	1
Douglas	251,418	303,362	6.8%	3.8%														
	<b>08-035-0004 Chatfield Reservoir</b>								1	1							1	1
Jefferson	532,608	550,046	0.2%	0.6%														
	<b>08-059-0002 Arvada</b>								1	1								
	<b>08-059-0005 Welch</b>								1	1								
	<b>08-059-0006 Rocky Flats - N</b>								1	1								
	<b>08-059-0008 Rocky Flats - SE</b>									1								
	<b>08-059-0011 NREL</b>								1									
	<b>08-059-0013 Aspen Park</b>								+	+								
BOULDER PMSA/Co	285,880	298,822	-0.7%	0.9%														
	<b>08-013-0003 Longmont Municipal</b>														1		1	1

REGIONS/Counties	Projected Population		Annual Change		CO	SO <sub>2</sub>	NO <sub>x</sub>	NO <sub>y</sub>	O <sub>3</sub>	Met	R.H.	Precip	TSP	Pb	PM10	PM <sub>10</sub> H	PM <sub>2.5</sub>	PM <sub>2.5</sub> H	
	July, 2005	July, 2010	00-05	05-10															
BOULDER PMSA/Co	08-013-0009 Longmont - Main				1														
	08-013-0011 Boulder - Foothills								1										
	08-013-0012 Boulder Chamber														1		1		
	08-013-1001 Boulder CU/Athens																		1
NORTH FRONT RANGE	499,962	566,072	2.7%	2.5%															
FORT COLLINS MSA	08-069-0009 Fort Collins - CSU														1		1		
	08-069-0011 Fort Collins - West								1										
	08-069-0012 Loveland - West								+	+									
	08-069-1004 Fort Collins - Mason				1				1	1									
GREELEY MSA	228,011	267,032	4.4%	3.2%															
	08-123-0006 Greeley Hospital														1		1	1	
	08-123-0008 Platteville																1/C		
	08-123-0009 Greeley - Tower								1	+									
COLO. SPRINGS MSA	08-123-0010 Greeley - West Annex				1														
	587,696	674,103	1.6%	2.8%															
	El Paso	565,350	649,217	1.7%	2.8%														
		08-041-0011 Colorado Springs - RDB														1		1	
		08-041-0013 USAFA								1									
		08-041-0015 Colorado Springs - Hwy-24				1													
08-041-0016 Manitou Springs								1											
08-041-0018 Colorado College														1/C		1	1		
Teller	22,346	24,886	1.1%	2.2%															
PUEBLO MSA	151,104	164,982	1.2%	1.8%															
	08-101-0012 Pueblo Public Works														1		1		
WESTERN SLOPE	513,332	589,836	1.9%	2.8%															
REGION 9	87,019	97,620	1.5%	2.3%															
Archuleta	11,716	14,131	3.2%	3.8%															
	08-007-0001 Pagosa Springs														1		1		
Dolores	1,846	2,076	0.0%	2.4%															
La Plata	48,019	53,282	1.5%	2.1%															
	08-067-0004 Durango - RCH														1				
Montezuma	24,862	27,523	0.8%	2.1%															
	08-083-0006 Cortez								+								+		
San Juan	576	608	0.6%	1.1%															
REGION 10	94,835	107,287	1.8%	2.5%															
Delta	30,257	34,200	1.6%	2.5%															

REGIONS/Counties	Projected Population		Annual Change		CO	SO <sub>2</sub>	NO <sub>x</sub>	NO <sub>y</sub>	O <sub>3</sub>	Met	R.H.	Precip	TSP	Pb	PM10	PM <sub>10</sub> H	PM <sub>2.5</sub>	PM <sub>2.5</sub> H
	July, 2005	July, 2010	00-05	05-10														
	<b>08-029-0004 Delta</b>														1			
Gunnison	14,264	15,233	0.4%	1.3%														
	<b>08-051-0004 Crested Butte</b>														1			
	<b>08-051-0007 Mt. Crested Butte</b>														1		1	
Hinsdale	821	918	0.8%	2.3%														
Montrose	37,880	43,875	2.4%	3.0%														
Ouray	4,303	4,781	2.7%	2.1%														
San Miguel	7,310	8,280	1.9%	2.5%														
	<b>08-113-0004 Telluride</b>														1			
REGION 11	222,739	260,304	2.1%	3.2%														
Garfield	50,673	64,097	2.7%	4.8%														
	<b>08-045-0005 Parachute</b>														1			
	<b>08-045-0007 Rifle - Henry Building</b>									+					1		1	
	<b>08-045-0012 Rifle - Health</b>								+									
Mesa	130,662	150,504	2.1%	2.9%														
	<b>08-077-0017 Grand Junction - Powell</b>														1/C		1/C	1
	<b>08-077-0018 Grand Junction - Pitkin</b>				1					1								
	<b>08-077-0019 Cifton</b>														1			
	<b>08-077-0020 Palisade Water Treatment</b>								+	+								
Moffat	13,426	14,424	0.4%	1.4%														
Rio Blanco	6,073	6,651	0.3%	1.8%														
Routt	21,905	24,628	1.7%	2.4%														
	<b>08-107-0003 Steamboat Springs</b>														1			
REGION 12	108,739	124,625	1.8%	2.8%														
Eagle	49,375	58,196	2.6%	3.3%														
Grand	13,906	15,920	1.5%	2.7%														
Jackson	1,531	1,584	-0.6%	0.7%														
Pitkin	16,420	17,427	0.6%	1.2%														
	<b>08-097-0006 Aspen - Library</b>														1	1		
Summit	27,507	31,498	1.3%	2.7%														
	<b>08-117-0002 Breckenridge</b>														1			
<b>CENTRAL MTNS.</b>	131,841	145,235	0.9%	2.0%														
CLR CRK. & GILPIN	14,514	15,737	0.5%	1.6%														
Clear Creek	9,510	10,242	0.3%	1.5%														
Gilpin	5,004	5,495	0.9%	1.9%														
Park County	16,595	19,616	2.5%	3.4%														

REGIONS/Counties	Projected Population		Annual Change		CO	SO <sub>2</sub>	NO <sub>x</sub>	NO <sub>y</sub>	O <sub>3</sub>	Met	R.H.	Precip	TSP	Pb	PM10	PM <sub>10</sub> H	PM <sub>2.5</sub>	PM <sub>2.5</sub> H
	July, 2005	July, 2010	00-05	05-10														
REGION 13	76,529	83,284	0.6%	1.7%														
Chaffee	16,889	17,941	0.7%	1.2%														
Custer	3,964	4,599	2.3%	3.0%														
Fremont	47,727	51,454	0.5%	1.5%														
	<b>08-043-0003 Canyon City - City Hall</b>														1			
Lake	7,949	9,290	0.1%	3.2%														
REGION 14	24,203	26,598	0.9%	1.9%														
Huerfano	7,932	8,771	0.2%	2.0%														
Las Animas	16,271	17,827	1.3%	1.8%														
<b>SAN LUIS VALLEY</b>	48,506	50,608	0.9%	0.9%														
Alamosa	15,765	16,692	0.8%	1.1%														
	<b>08-003-0001 Alamosa - ASC</b>														1			
	<b>08-003-0003 Alamosa - Municipal</b>														1			
Conejos	8,586	8,881	0.4%	0.7%														
Costilla	3,628	3,767	-0.2%	0.8%														
Mineral	946	1,029	2.6%	1.7%														
Rio Grande	13,043	13,263	1.0%	0.3%														
Saguache	6,538	6,976	1.9%	1.3%														
<b>EASTERN PLAINS</b>	162,250	171,790	0.4%	1.1%														
REGION 1	72,165	77,354	0.6%	1.4%														
Logan	21,605	23,327	0.7%	1.5%														
Morgan	28,348	31,241	0.8%	2.0%														
Phillips	4,631	4,745	0.7%	0.5%														
Sedgwick	2,667	2,705	-0.6%	0.3%														
Washington	4,936	4,990	0.1%	0.2%														
Yuma	9,978	10,346	0.2%	0.7%														
REGION 5	38,693	41,884	1.1%	1.6%														
Cheyenne	2,120	2,068	-1.0%	-0.5%														
Elbert	22,786	25,848	2.4%	2.6%														
	<b>08-035-0001 Wright Ingraham Institute</b>																1	
Kit Carson	7,882	8,002	-0.3%	0.3%														
Lincoln	5,905	5,966	-0.9%	0.2%														
REGION 6	51,392	52,552	-0.4%	0.4%														
Baca	4,263	4,128	-1.1%	-0.6%														
Bent	6,314	6,432	1.1%	0.4%														



REGIONS/Counties	Projected Population		Annual Change		CO	SO <sub>2</sub>	NO <sub>x</sub>	NO <sub>y</sub>	O <sub>3</sub>	Met	R.H.	Precip	TSP	Pb	PM10	PM <sub>10</sub> H	PM <sub>2.5</sub>	PM <sub>2.5</sub> H
	July, 2005	July, 2010	00-05	05-10														
Crowley	5,740	6,235	0.8%	1.7%														
Kiowa	1,533	1,501	-1.1%	-0.4%														
Otero	19,569	19,971	-0.7%	0.4%														
Prowers	13,973	14,285	-0.6%	0.4%														
	<b>08-099-0001 Lamar Power Plant</b>														1			
	<b>08-099-0002 Lamar - Municipal</b>														1			
	<b>08-099-0003 Lamar Port of Entry</b>									1								

+ - indicates monitors that will be installed in 2008.

C - Collocated monitors

S - SASS PM<sub>10</sub> monitor



**Table 5 APCD Carbon Monoxide Monitors in Operation for 2008**

County	Site #	Site Name	Monitor Type	POC	Site Type
Adams (001)	3001	Welby	Thermo 48C	1	SLAMS
Boulder (013)	0009	Longmont - Main	Thermo 48C	1	SLAMS
Denver (031)	0002	Denver - CAMP	Thermo 48C	2	SLAMS
	0019	Denver Firehouse #6	Thermo 48C	1	SLAMS
	0025	Denver Municipal Animal Shelter	Thermo 48C-TLE	+	NCORE
El Paso (041)	0015	Colorado Springs - Hwy 24	Thermo 48C	1	SLAMS
Larimer (069)	1004	Fort Collins - Mason	Thermo 48C	1	SLAMS
Mesa (077)	0018	Grand Junction - Pitkin	Thermo 48C	1	SLAMS
Weld (123)	0010	Greeley - West Annex Bldg	Thermo 48C	1	SLAMS

+ indicates that the monitor is to be installed in 2008.

**Table 6 APCD Ozone Monitors in Operation for 2008**

County	Site #	Site Name	Monitor Type	POC	Site Type
Adams (001)	3001	Welby	API 400A	2	SLAMS
Arapahoe (005)	0002	Highland Reservoir	API 400A	1	SLAMS
	0006	Aurora Reservoir	API 400E	+	SLAMS
Boulder (013)	0011	Boulder - Foothills	API 400E	1	SLAMS
Denver (031)	0002	Denver - CAMP	API 400A	5	SLAMS
	0014	Denver - Carriage	API 400E	2	SLAMS
	0025	Denver Municipal Animal Shelter	API 400A	+	NCORE
Douglas (035)	0004	Chatfield State Park	API 400E	1	SLAMS
El Paso (041)	0013	US Air Force Academy	M.L. 8810	1	SLAMS
	0016	Manitou Springs	API 400E	1	SLAMS
Garfield (045)	0012	Rifle- Health	API 400E	+	SLAMS
Jefferson (059)	0002	Arvada	API 400E	1	SLAMS
	0005	Welch	API 400 A	1	SLAMS
	0006	Rocky Flats - N	API 400E	1	SLAMS
	0011	NREL	M.L. 8810	1	SLAMS
	0013	Aspen Park	API 400E	+	SLAMS
Larimer (069)	0011	Fort Collins - West	API 400E	1	SLAMS
	0013	Loveland - West	API 400E	+	SLAMS
	1004	Fort Collins - Mason St.	API 400E	1	SLAMS
Mesa (077)	0020	Palisade – Water Treatment	API 400E	+	SLAMS
Montezuma (083)	0006	Cortez	API 400E	+	SLAMS
Weld (123)	0009	Greeley - Tower	API 400E	1	SLAMS

+ indicates that the monitor is to be installed in 2008.

**Table 7 APCD Sulfur Dioxide/ Nitrogen Oxides Monitors in Operation for 2008**

County	Site #	Site Name	Monitor Type	POC	Site Type
Adams (001)	3001	Welby	SO <sub>2</sub> API 100E	2	SLAMS
			NO API 200E	2	SPM
			NO <sub>2</sub> API 200E	1	SLAMS
Denver (031)	0002	Denver - CAMP	SO <sub>2</sub> API 100E	1	SLAMS
			NO API 200E	1	SPM
			NO <sub>2</sub> API 200E	1	SLAMS
	0025	Denver Municipal Animal Shelter	SO <sub>2</sub> Ecotech 9850T	+	NCORE
			NO <sub>y</sub>	+	NCORE

+ indicates that the monitor is to be installed in 2008.

**Table 8 APCD TSP and Lead Monitors in Operation for 2008**

County	Site #	Site Name	Monitor Type	POC	Site Type	Sample
Denver (031)	0025	Denver Municipal Animal Shelter	TSP	1	NCORE	1/6

**Table 9 APCD Meteorological Monitors in Operation for 2008**

County	Site #	Site Name	Parameter	Monitor Type	POC	Site Type
Adams (001)	0006	Commerce City	WS/WD/Temp*	Met - One	1	SPM
	3001	Welby	WS/WD/Temp*	Met - One	1	SPM
Arapahoe (005)	0002	Highland Reservoir	WS/WD/Temp*	Met - One	1	SPM
	0006	Aurora Reservoir	WS/WD/Temp*	Met-One	+	SPM
Denver (031)	0002	Denver - CAMP	WS/WD/Temp*	Met - One	1	SPM
	0014	Denver - Carriage	WS/WD/Temp*	Met - One	1	SPM
	0021	Auraria Campus Met.	WS/WD/Temp*	Met - One	1	SPM
			Relative Humidity	Rotronic	1	SPM
	0025	Denver Municipal Animal Shelter	WS/WD/Temp*(upper)	Met - One	+	NCore
			Temp (lower)	Met - One	+	NCore
			Relative Humidity	?	+	NCore
			Barometric Pressure	?	+	NCore
Solar Radiation			?	+	NCore	
		Precipitation	?	+	NCore	
Douglas (035)	0004	Chatfield State Park	WS/WD/Temp*	Met - One	1	SPM
Garfield (045)	0007	Rifle - Henry Building	WS/WD/Temp*	Met - One	+	SPM
Jefferson (059)	0002	Arvada	WS/WD/Temp*	Met - One	1	SPM
	0005	Welch	WS/WD/Temp*	Met - One	1	SPM
	0006	Rocky Flats - N	WS/WD/Temp*	Met - One	1	SPM
	0008	Rocky Flats - SE	WS/WD/Temp*	Met - One	1	SPM
	0013	Aspen Park	WS/WD/Temp*	Met - One	+	SPM
Larimer (069)	0012	Loveland - West	WS/WD/Temp*	Met - One	+	SPM
	1004	Fort Collins - Mason	WS/WD/Temp*	Met - One	1	SPM
Mesa (077)	0018	Grand Junction - Pitkin	WS/WD/Temp*	Met - One	1	SPM
			Relative Humidity	Rotronic	1	SPM
	0020	Palisade Water Treatment	WS/WD/Temp*	Met - One	+	SPM
Powers (099)	0003	Lamar - Port of Entry	WS/WD/Temp*	Met - One	1	SPM
Weld (123)	0009	Greeley - Tower	WS/WD/Temp*	Met - One	+	SPM

\* - WS/WD/Temp instrumentation includes scalar wind speed, scalar wind direction, vector wind speed and vector wind direction, standard deviation of horizontal wind direction and temperature.

+ - Indicates that the monitor is to be installed in 2008.

? -These monitor types have yet to be determined.

**Table 10 APCD PM<sub>10</sub> Monitors in Operation for 2008**

County	Site #	Site Name	Monitor Type	POC	Site Type	Sample
Adams (001)	0006	Commerce City	Partisol 2025	1	SLAMS	1/1
	3001	Welby	SA/GMW-1200	2	SLAMS	1/6
			TEOM-1400ab	3	SLAMS	Hourly
Alamosa (003)	0001	Alamosa - Adams State College	SA/GMW-1200	1	SLAMS	1/1
	0003	Alamosa - Municipal	SA/GMW-1200	1	SLAMS	1/1
Archuleta (007)	0001	Pagosa Springs	SA/GMW-1200	3	SLAMS	1/1
Boulder (013)	0003	Longmont - Municipal	SA/GMW-1200	2	SLAMS	1/6
	0012	Boulder Chamber of Commerce	SA/GMW-1200	1	SLAMS	1/6
Delta (029)	0004	Delta	SA/GMW-1200	1	SLAMS	1/3
Denver (031)	0002	Denver - CAMP	SA/GMW-1200	1	SLAMS	1/6
			SA/GMW-1200	2	SLAMS	1/6
			TEOM-1400ab	3	SLAMS	Hourly
	0017	Denver Visitor Center	SA/GMW-1200	1	SLAMS	1/1
	0025	Denver Municipal Animal Shelter	SA/GMW-1200	1	NCore	1/6
			SA/GMW-1200	2	NCore	1/6
			TEOM-1400ab	3	NCore	Hourly
El Paso (041)	0011	Colorado Springs - RBD	SA/GMW-1200	2	SLAMS	1/6
			SA/GMW-1200	3	SLAMS	1/6
	0017	Colorado College	Partisol 2025	1	SLAMS	1/3
			Partisol 2000	2	SLAMS	1/6
Fremont (043)	0003	Canon City - City Hall	SA/GMW-1200	1	SLAMS	1/6
Garfield (045)	0005	Parachute	SA/GMW-1200	1	SLAMS	1/3
	0007	Rifle - Henry Building	SA/GMW-1200	1	SLAMS	1/3
Gunnison (051)	0004	Crested Butte	SA/GMW-1200	2	SLAMS	1/3
	0007	Mt. Crested Butte	SA/GMW-1200	1	SLAMS	1/1
La Plata (067)	0004	Durango - RCH	SA/GMW-1200	1	SLAMS	1/3
Larimer (069)	0009	Fort Collins - CSU	SA/GMW-1200	1	SLAMS	1/3
Mesa (077)	0017	Grand Junction - Powell	Partisol 2025	3	SLAMS	1/3
			Partisol 2000	4	SLAMS	1/6
	0018	Grand Junction - Pitkin	Met-One BAM	1	SLAMS	Hourly
	0019	Clifton	SA/GMW-1200	1	SLAMS	1/3
Pitkin (097)	0006	Aspen - Library	SA/GMW-1200	1	SLAMS	1/3
			TEOM-1400ab	3	SLAMS	Hourly
Powers (099)	0001	Lamar Power Plant	SA/GMW-1200	2	SLAMS	1/1
	0002	Lamar - Municipal	SA/GMW-1200	2	SLAMS	1/1
Pueblo (101)	0012	Pueblo - Public Works	SA/GMW-1200	1	SLAMS	1/3
Routt (107)	0003	Steamboat Springs	SA/GMW-1200	2	SLAMS	1/1
San Miguel (113)	0004	Telluride	SA/GMW-1200	1	SLAMS	1/3
Summit (117)	0002	Breckenridge	SA/GMW-1200	1	SLAMS	1/1
Weld (123)	0006	Greeley - Hospital	SA/GMW-1200	2	SLAMS	1/3

**Table 11 APCD PM<sub>2.5</sub> Monitors in Operation for 2008**

County	Site #	Site Name	Monitor Type	POC	Site Type	Sample
Adams (001)	0006	Commerce City	Partisol 2025 Sequential	1	SLAMS	1/3
			Partisol 2025 Sequential	2	SLAMS	1/6
			TEOM -1400ab	3	SLAMS	Hourly
			SASS	5	SLAMS	1/3
Arapahoe (005)	0005	Arapahoe Community College	Partisol 2025 Sequential	1	SLAMS	1/3
Boulder (013)	0003	Longmont - Municipal	Partisol 2025 Sequential	1	SLAMS	1/3
			TEOM -1400ab	3	SLAMS	Hourly
	0012	Boulder Chamber of Commerce	Partisol 2025 Sequential	1	SLAMS	1/3
	1001	Boulder - CU/Athens	TEOM FDMS	3	SLAMS	Hourly
Denver (031)	0002	Denver - CAMP	Partisol 2025 Sequential	1	SLAMS	1/1
			Partisol 2025 Sequential	2	SLAMS	1/6
			TEOM FDMS	3	SLAMS	Hourly
	0013	Denver - NJH	TEOM FDMS	3	SLAMS	Hourly
	0023	Denver - Swansea	Partisol 2025 Sequential	1	SPM	1/1
	0025	Denver Municipal Animal Shelter	Partisol 2025 Sequential	1	NCore	1/3
TEOM FDMS			3	NCore	Hourly	
Douglas (035)	0004	Chatfield State Park	Partisol 2025 Sequential	1	SLAMS	1/3
			TEOM FDMS	3	SLAMS	Hourly
Elbert (039)	0001	Elbert County	R&P 2000 w/VSCC	1	SLAMS	1/6
El Paso (041)	0011	Colorado Springs - RBD	Partisol 2025 Sequential	1	SLAMS	1/3
			Partisol 2025 Sequential	1	SLAMS	1/3
			TEOM FDMS	3	SPM	Hourly
Larimer (069)	0009	Fort Collins - CSU	Partisol 2025 Sequential	1	SLAMS	1/3
Mesa (077)	0017	Grand Junction - Powell	Partisol 2025 Sequential	1	SPM	1/3
			SASS	5	SLAMS	1/6
			TEOM -1400ab	3	SLAMS	Hourly
Pueblo (101)	0012	Pueblo - Public Works	Partisol 2025 Sequential	1	SLAMS	1/3
Weld (123)	0006	Greeley - Hospital	Partisol 2025 Sequential	1	SLAMS	1/3
			TEOM -1400ab	3	SLAMS	Hourly
	0008	Platteville	Partisol 2025 Sequential	1	SLAMS	1/3
			SASS	5	SPM	1/6

## **CARBON MONOXIDE**

In 2007 there were nine monitors in operation. In 2008 the Division will operate nine monitors. The levels have declined from a statewide maximum 8-hour value of 48.1 ppm in 1973 to a value of 3.2 ppm in 2007. The level of the standard has not been exceeded since 1999. The carbon monoxide monitors currently operated by the APCD are associated with State Implementation Plan requirements.

### **Larimer & Weld Counties**

Larimer and Weld counties have a population of 514,251 (July 2006 population estimates), an increase of 18.9 percent since the 2000 Census. The two major urban centers are Fort Collins in Larimer County and Greeley in Weld County. Larimer County has irrigated farmland in the eastern half while the western half is mountainous. Weld County is predominantly grassland and irrigated farmland. Motor vehicle activity is a major source of pollutants. However, there are several small industries and manufacturing processes located within the two counties. These industries include a brewery, power plants, cement plants, mining, electronics and film manufacturing facilities, and rock quarries.

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

The population of Fort Collins is 129,511 (July 2006 population estimates). This is an increase of 9.1 percent from the 2000 census. Fort Collins does not have the population to require a carbon monoxide monitor under Federal regulation. However, it is one of the largest cities along the Front Range and was declared in nonattainment for carbon monoxide in the mid-1970s after exceeding the 8-hour standard in both 1974 and 1975. The current level of monitoring is in part a function of the resulting carbon monoxide SIP for the area.

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 1-hour carbon monoxide standard of 35 ppm as a 1-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 8-hour standard of 9 ppm, as an 8-hour average, 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.

From 2002 through 2007 the APCD and Larimer County Health Department operated an additional carbon monoxide monitor at 4407 S. College Avenue. This location was selected because to address the concerns that the Mason Street monitor was not representative of the high traffic and rapid growth in the southern part of the city. The levels were generally lower than those recorded at the Mason Street monitor and the S. College Avenue monitor was discontinued at the end of 2007.

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

The population of Greeley is 228,011 (July 2006 population estimates). This is an increase of 17.3 percent from the 2000 census. Greeley does not have the population to require a carbon monoxide monitor under Federal regulation. However, it is one of the larger cities along the Front Range and was declared in nonattainment for carbon monoxide in the late-1970s after exceeding the 8-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 8-hour standard numerous times from 1976 through 1980.

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 Health Department Annex. This location is in the Greeley Central Business District. The levels recorded at this site are comparable but slightly lower than those at the former 811 15<sup>th</sup> Street site but still only about a third of the 8-hour standard.



## **Metropolitan Denver Counties**

This area includes the Front Range Counties of Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Douglas, Gilpin, Jefferson, and Denver. The population of the area is 268,396 (July 2006 population estimates). This is an increase of 8.8 percent from the 2000 census. The Denver metropolitan area consists of all of Denver County, the western half of Adams and Arapahoe counties, most of Boulder and Jefferson counties, the northern portion of Douglas County, and none of Clear Creek and Gilpin counties.

Carbon monoxide monitoring in the area began in 1965 when Denver was selected as one of the cities to take part in the Continuous Air Monitoring Project (CAMP) developed by the U.S. Department of Health Education and Welfare. This first carbon monoxide site was established at the corner of 21<sup>st</sup> Street and Broadway on land designated as a city park. By 1973 other monitoring sites were established at 2095 Julian Street in west Denver, at Colfax Avenue and Colorado Boulevard, at 2005 S. Huron Street, at 3174 E. 78<sup>th</sup> Avenue and in Arvada at 9101 W. 57<sup>th</sup> Avenue. All of these sites recorded exceedances of the 8-hour standard in the early years of operation and most of them recorded exceedances of the 1-hour standard. These exceedances were the reason that the EPA declared the Denver metropolitan area as nonattainment for carbon monoxide in the early 1970s.

Vehicle exhaust was determined to be the largest contributor (roughly 80 percent) to the carbon monoxide problem. As a result, most of the carbon monoxide monitors are located near residential areas with high traffic volumes or in areas downwind of those locations.

## **Longmont, 440 Main Street (08 013 0009)**

The town of Longmont is a growing, medium sized, Front Range community with a population of 82,904 (July 2006 population estimates). This is an increase of 16.6 percent from the 2000 census. Longmont is located between the Denver/Boulder Metro-area and Fort Collins. Longmont is both suburban and rural in nature. There are no major carbon monoxide sources within 12 miles of the monitor.

In January and February of 1988 and again in the winter of 1988/89 the APCD conducted a study at a site near 11<sup>th</sup> Avenue and Main Street, a few blocks north of the downtown area. Because two exceedances of the standard were recorded during the study, the Division felt that a permanent carbon monoxide site should be established closer to the downtown area. These exceedances resulted in Longmont being designated as a carbon monoxide nonattainment area and required a SIP for carbon monoxide be developed showing attainment by December 31, 1995. The Air Quality Control Commission accepted the Longmont SIP on June 16, 1995. In 1999, Longmont was redesignated as an attainment area.

Longmont has contended that its carbon monoxide problems are generally the result of transport from the Denver metropolitan area north to the Longmont area. The review of the time series plots for Longmont, Denver CAMP, Greeley and Boulder show that the carbon monoxide maximum at all four locations generally coincide. In addition these peaks are bimodal at 7 to 9 A.M. and 4 to 6 P.M. at all four locations. This pattern is associated with locally generated emissions from traffic, not transport from another area. The carbon monoxide emissions inventories developed for the SIP show that 78 percent of the carbon monoxide comes from on-road mobile sources. These findings are consistent with the observed distribution of the data.

Carbon monoxide monitoring is expected to continue for the next several years at the current location since the monitoring is a part of the maintenance plan for Longmont.

## **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 carbon monoxide 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.

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 study. Welby has not recorded an exceedance of either the 1-hour or 8-hour carbon monoxide 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).

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

The Denver CAMP site is located in the north-central part of the Denver CBD. Denver is the largest city in Colorado with a population of 580,223 according to the 2006 estimate this is a 6.6 percent increase from the 2000 census. Carbon monoxide monitoring began in February 1965 as a part of the Federal Continuous Air Monitoring Project. It was established as a maximum concentration, population-oriented monitor. The CAMP site measures the exposure of the people who work or reside in the 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 carbon monoxide 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.

Historically the CAMP monitor has recorded some of the highest carbon monoxide levels in the state. It has not recorded an 8-hour concentration over the standard since 1995. The concentrations have continued their steady decline to the point that in 2007 they are now less than one third the level of the standard.

### **Denver Firehouse #6, 1300 Blake Street (08 031 0019)**

The Denver Firehouse #6 is located on the block between Auraria Parkway and Blake Street where they intersect with Speer Boulevard. This is one of the busiest intersections in downtown Denver and computer modeling indicated that it would have high levels of carbon monoxide.

In the winter of 1995 the monitor was converted from a special purpose monitor to a SLAMS monitor. In 1999 the Firehouse monitor recorded the last exceedance of the 8-hour CO standard in the Denver Metro area. The levels have continued their decline and in 2007 the maximum 8-hour concentration was 2.5 ppm.

### **Denver Municipal Animal Shelter, 678 S. Jason Street (08 031 0025)**

The Denver Municipal Animal Shelter (DMAS) was established as a replacement for the Denver Gates particulate monitor that was located at 1050 S. Broadway about one half mile south-southeast and on the other side of the South Platte River and I-25 South. The DMAS location represents the core area of the South Platte drainage in Denver. It has a good mixture of light industrial, residential areas and is strongly affected by the mobile sources along I-25 as well as South Santa Fe Drive. The openness of the area also permits the meteorological data to be representative of the larger core Denver area. Finally the site is on City owned property and will presumably be available for long-term trend analysis. When fully developed the site will be established as the NCore site for the Denver Metropolitan area and will include a trace/precursor-level carbon monoxide analyzer.

### **El Paso, Park & Teller Counties**

This area has a population of 617,864 according to the July 2006 population estimate this is an increase of 11.9 percent from the 2000 census. It is a very popular tourist area with rapid urban growth. The land usage varies from prairie in eastern El Paso County to very mountainous in Teller and Park Counties. Only El Paso County has a large urbanized area, Colorado Springs, with a population of 390,581 according to the July 2006 estimate. This is an increase of 8.2 percent since the 2000 census. The

City of Colorado Springs and El Paso County both operate separate monitoring networks that are not included as a part of this report.

Colorado Springs has not had an exceedance of the 1-hour NAAQS since 1979 when it recorded a maximum 1-hour concentration of 41.5 ppm. The second maximum 1-hour concentration that year was a 30.0 ppm and has not had an exceedance of the 8-hour NAAQS since 1989 when both the 712 S. Tejon Street and the I-25 and Uintah Street monitors recorded a maximum 8-hour concentrations of 10.1 ppm and 13.3 ppm respectively. The city was redesignated to an attainment area for carbon monoxide in 1999.

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

The 690 W. 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) carbon monoxide 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 to monitor maximum concentrations of carbon monoxide 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.

### **Western Counties**

The Western Slope consists of the 21 counties west of the Continental Divide. The population of the area is 521,038 (July 2006 population estimate). This is an increase of 14.6 percent over the 2000 census. However, the population is not evenly distributed among the counties and ranges from Mesa County with 135,468 to Hinsdale County with only 966 according to the July 2006 estimate. Short-term special purpose monitoring for carbon monoxide has been done in Summit County at Vail and near the oil shale projects of Rio Blanco County. Grand Junction is the largest city on the western slope with a population of 51,631 (July 2006 estimate). This is an increase of 22.9 percent from the 2000 census.

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

The Grand Junction-Pitkin monitor began operation in January 2004. This monitor replaced the monitor 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 carbon monoxide concentration values for the city. The carbon monoxide concentrations at the Stocker Stadium site had been declining from an 8-hour maximum in 1991 of 7.8 ppm to a 3.3 ppm in 2003. The Powell monitor has shown a continuing decline in values to a 1.8 ppm in 2007. These levels are approaching the detection limits of the carbon monoxide monitor.

## Quality Assurance Checks for Carbon Monoxide Monitors

The APCD staff performs two types of gaseous analyzer performance audits, assessment audits and accuracy audits. These audits challenge the analyzer with pollutant gases of known concentration within the range of the analyzer. The following table shows the number of these audits conducted on the carbon monoxide analyzers for 2007.

The APCD Quality Assurance staff conducts audits on all of the carbon monoxide instruments at least twice per year. The APCD Field staff conducts precision checks nominally once every two weeks. 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.

**Table 12 Precision Checks for Carbon Monoxide in 2007**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Welby	6	7	7	7
Longmont	7	7	6	7
CAMP	6	7	7	7
Firehouse	6	7	6	7
Highway 24	7	6	7	6
Ft Collins - South	7	6		
Ft. Collins - Mason	7	7	6	7
Grand Junction	7	6	7	6
Greeley - Annex	7	7	6	7

**Table 13 Accuracy Audits for Carbon Monoxide in 2007**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Welby			1	
Longmont	1		2	
CAMP	1		1	
Firehouse		1		1
Highway 24		1		1
Ft Collins - South	1	1		
Ft. Collins - Mason	1		2	
Grand Junction		1		1
Greeley - Annex	1		2	

## Planned Changes in the Carbon Monoxide Monitoring for 2008

Installation of trace/precursor-level analyzer at the Denver Municipal Animal Shelter

## OZONE

On March 12, 2008, the U.S. Environmental Protection Agency released the new level of the National ambient ozone standard. The change in the level was from 0.085 ppm as a 8-hour average to 0.075 ppm. This made a significant change in the number of ozone monitors that exceed 3-year average 8-hour concentration standard. The following locations will exceed the new level: Highland Reservoir, Boulder - Foothills, Chatfield Reservoir, Arvada, Rocky Flats, NREL Solar Radiation Research and Greeley - Tower. The following monitors are listed as marginal as they are close to exceeding the level of the standard but have not exceeded the standard in the past three years: Fort Collins, Denver Carriage, Welch, USAF Academy and Manitou Springs. The only monitors operated by the CDPHE that are not close to to exceeding the level of the new standard are the Denver CAMP and Welby locations.

The non-CDPHE monitor in Colorado that has 3-year average concentrations greater than the new standard is at Rocky Mountain National Park. The ozone monitors operated at Mesa Verde National Park and the Shamrock Mine site located northeast of Bayfield, Colorado are listed as marginal for exceeding the level of the standard.

### **Larimer and Weld Counties**

Larimer and Weld Counties have a population of 514,251 (July 2006 population estimate). This is an increase of 19.9 percent since 2000 census. The two major urban centers are Fort Collins in Larimer County and Greeley in Weld County. Ozone levels at the monitors operated in and around the Greeley and Fort Collins areas have exceeded the level of the former 1-hour ozone NAAQS of 0.12 ppm only once since monitoring began in 1981. However, the site operated by the National Park Service located in Rocky Mountain National Park in Western Larimer County has exceeded the previous 1-hour standard in 1993. However, it has exceeded the 3-year average concentration of the new standard five out of the last six years.

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

The population of Fort Collins is 129,511 (July 2006 population estimate). This is an increase of 79.1 percent from the 2000 census and a 0.6 percent increase over the 2004 population estimate. 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 Fort Collins area. The levels recorded for the first season of operation have shown consistently higher concentrations than the 708 S. Mason Street monitor. For 2007 the 8-hour average, 4<sup>th</sup> maximum was 0.085 ppm. The 4<sup>th</sup> maximum, 8-hour average at the Mason Street monitor was 0.069 ppm for the same period.

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

The Fort Collins ozone site has been in operation since 1981 and has recorded only one exceedance of the former 1-hour standard since it began operation. It has only recorded four concentrations greater than the level of the 8-hour standard and has not ever had a third or fourth maximum concentration at or above the level of the 8-hour standard. Monitoring in this area will likely continue so that changes in the Fort Collins area may be examined, although violations are not expected. At this time there have not been any changes in the area that would require adjustment in the current monitoring level. Due to the size of the community, elevated ozone readings in Fort Collins probably result from second day transport/reactions from the Denver area.

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

The population of Greeley is 90,285 (July 2006 population estimate). This is an increase of 17.3 percent from the 2000 census. The Weld County Tower 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 demolition. The Weld County Tower site has generally recorded levels greater than the old site and would have exceeded the new standard each year since it began operation in 2002.

### **Metropolitan Denver Counties**

This area includes the Front Range Counties of Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Douglas, Gilpin, Jefferson, and Denver. The population of the area is 2,688,396 (July 2006 population estimates). This is an increase of 8.8 percent from the 2000 census. The Denver metropolitan area consists of all of Denver County, the western half of Adams and Arapahoe counties, most of Boulder and Jefferson counties, the northern portion of Douglas County, and none of Clear Creek and Gilpin counties. Only Adams, Arapahoe, Boulder, Douglas, Jefferson and Denver Counties have ozone monitors. The counties of Gilpin and Clear Creek generally lack the appropriate combination of meteorology and geography for ozone formation.

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

The Welby ozone site began operation in July 1973. In the mid-1970s, Welby recorded the highest levels of ozone seen in the State. Since then it has experienced a declining trend of ozone and now records some of the lowest levels in the area. It is unclear if declining levels are due to controls on precursors, increases in nitric oxide levels, high levels of precursors present in the area of the site, or a shift in the path of the ozone “cloud.” Its location in the up and down river drainage path of the Denver air mass that has been “cooking” gives either a warning of the events to come or the results of the day's exposure. 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 monitor has not recorded an exceedance of the old 1-hour standard since 1998. It would not have recorded an exceedance of the new 8-hour standard since 1998. However, the trend in the 3-year average of the 4<sup>th</sup> maximum 8-hour average has been increasing since 2002. The site is still not expected to exceed the new standard in the near future though.

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

The Highlands site began operation in 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 ozone “cloud,” although it may not be in the area of maximum concentrations. The Highlands site would have exceeded the new standard eight of the last ten years.

### **Boulder, 1405½ S. Foothills Parkway (08 013 0011)**

The city of Boulder is located about 30 miles to the northwest of Denver. The Boulder population increased 3.2 percent from the 2000 census to 97,671 in the 2006 population estimate. The Boulder Foothills, South Boulder Creek site was established as a special purpose ozone monitor as a part of the “Summer 1993 Denver Ozone Study.” During that summer a 1-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 and in 1995 to a year-round ozone monitor when the instruments were moved into a new shelter. The South Boulder Creek monitor has not recorded an exceedance of the 1-hour NAAQS since the summer of 1993.

Although the Foothills monitor had not exceeded the previous standard of 0.085 ppm as an 8-hour average. It would have exceeded the new standard of 0.075 ppm as an 8-hour average five of the past six years.

### **Denver - CAMP, 2105 Broadway (08 031 0002)**

The Denver CAMP site is located in the north-central part of the Denver CBD. Ozone monitoring began in 1972 and continued until 1997 when the department removed the monitor. Ozone monitoring was reestablished in 2005.

The CAMP site measures the exposure of the people who work or reside in the 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 carbon monoxide 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.

#### **Denver - Carriage, 2325 W. Irving Street (08 031 0014)**

Carriage is located 2.5 miles west of the CBD. The site represents an ideal neighborhood exposure setting due to its unique location in an old carriage lot in the center of the block surrounded by houses. The Carriage ozone site began operation in 1981. It represents a good neighborhood site for ozone exposure since it is isolated enough to be unaffected by local traffic. Ozone levels at this site have not exceeded the old 1-hour NAAQS since 1987. The Denver Carriage monitor would have exceeded the new standard only once in the past ten years.

#### **Denver Municipal Animal Shelter, 678 S. Jason Street (08 031 0025)**

The Denver Municipal Animal Shelter (DMAS) was established as a replacement for the Denver Gates particulate monitor that was located at 1050 S. Broadway about one half mile south-southeast and on the other side of the South Platte River and I-25 South. The DMAS location represents the core area of the South Platte drainage in Denver. It has a good mixture of light industrial, residential areas and is strongly affected by the mobile sources along I-25 as well as South Santa Fe Drive. The openness of the area also permits the meteorological data to be representative of the larger core Denver area. Finally the site is on City owned property and will presumably be available for long-term trend analysis. When fully developed the site will be established as the NCore site for the Denver Metropolitan area.

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

The city of Arvada is located 15 miles west-northwest of the Denver CBD. It has a population of 104,981 according to the July 2006 population estimate. This is an increase of 2.8 percent from the 2000 census.

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 ozone "cloud." As a result, when conditions are proper for daylong ozone production, this site has received some of the highest levels in the city. In the early and mid 1970s, these wind patterns caused Arvada to have the most violations in the metro area. The Arvada monitor would have exceeded the new standard six of the past ten years and the years that it would not have exceeded the standard it was just below the level of the standard.

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

The Division conducted a short-term ozone study on the grounds of Chatfield High School from June 14, 1989 until September 28, 1989. The Chatfield location was chosen because it sits on a ridge southwest of the Denver CBD. Wind pattern studies showed a potential for elevated ozone levels in the area on mid to late afternoon summer days. There were no exceedances of the NAAQS recorded at the Chatfield 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 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.

The Welch monitor would not have exceeded the new standard in the past ten years. However, since 2002 the trend in values is increasing and in 2007 the 3-year average was just at the level of the standard.

### **Rocky Flats - N, 16600 W. Highway 128 (08 059 0006)**

The Rocky Flats - N site is located north-north east 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 as a part of the first phase of the APCD's monitoring effort around the Rocky Flats Environmental Technology Site.

Ozone monitoring began as a part of the "Summer 1993 Ozone Study". The monitor recorded some of the highest ozone levels of any of the sites during that study. Therefore, it was included as a regular part of the APCD ozone-monitoring network. The Rocky Flats - N monitor would have exceeded the new standard each of the last ten years and thirteen out of the last fifteen years.

### **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 1993 Summer Ozone Study. Based on the elevated concentrations found at this location, it was made a permanent monitoring site in 1994. Since then, this site has recorded the highest ozone levels in the metro area for every year. This site typically records some of the highest 8-hour ozone concentrations in the Denver area. It would have exceeded the new standard each of the past thirteen years it has been in operation.

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

The Chatfield Reservoir location was established as the result of the 1993 Summer Ozone Study. The site is located on the south side of Chatfield Reservoir 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 ozone formation in the Denver metro area. The Chatfield monitor would have exceeded the new standard each of the past four years and the trend of the 3-year averages is increasing.

### **El Paso, Park & Teller Counties**

This area has a population of 617,864 (July 2006 population estimate). This is an increase of 11.9 percent from the 2000 census. It is a very popular tourist area with rapid urban growth. The topography varies from prairie in eastern El Paso County to very mountainous in Teller and Park Counties. Only El Paso County has a large urbanized area, Colorado Springs, with a population of 390,581 (July 2006 population estimate). This is an increase of 8.2 percent since the 2000 census. In addition, the City of Colorado Springs and El Paso County both operate separate monitoring networks that are not included as a part of this report.

The Colorado Springs area has many of the conditions that give the Denver metropolitan area its ozone problem: geography, stagnant summer air, bright sunlight and sufficient precursor chemical production. Ozone monitoring in the area began in 1975 and only one value of 0.125 ppm or greater has ever been reported. The area is classified as attainment for ozone. Monitoring in the Colorado Springs metro area is required due to its population and will be continued for the future.

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



The United States Air Force Academy site was installed as a replacement maximum concentration ozone monitor for the Chestnut Street (08 041 0012) site. Modeling in the Colorado Springs area indicates that high ozone concentrations should generally be found along either the Monument Creek drainage to the north of the Colorado Springs 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.

The Academy monitor did record an exceedance of the old 1-hour standard in 2003 but it would not have recorded any exceedances of the new 8-hour standard. However the trend in values over the past ten years is increasing.

**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 “ozone cloud” was traveling farther up the canyon 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 maintenance area. In its four seasons of operation it has not recorded any levels greater than the new standard. The trend in 8-hour concentrations is increasing.

**Quality Assurance Checks for Ozone Monitors**

The APCD staff performs two types of gaseous analyzer performance audits, assessment audits and accuracy audits. These audits challenge the analyzer with pollutant gases of known concentration within the range of the analyzer. The following table shows the number of these audits conducted on the ozone analyzers for 2007.

The APCD Quality Assurance staff conducts audits on all of the ozone instruments at least twice per year. The APCD Field staff conducts precision checks nominally once every two weeks. 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.

**Table 14 Precision Checks for Ozone in 2007**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Welby	6	6	7	7
Highlands	7	7	6	6
Boulder - Foothills	6	7	6	7
CAMP	6	7	7	7
Carriage	7	7	6	7
Chatfield	6	7	6	7
Air Force Academy	7	6	7	6
Manitou	7	6	7	6
Arvada	6	7	6	7
Welch	6	7	7	7
Rocky Flats - N.	7	7	6	7
NREL	7	6	8	7
Ft. Collins - West	7	6	7	7
Ft. Collins - Mason	7	6	7	7
Greeley - Tower	7	6	7	7

**Table 15 Accuracy Audits for Ozone in 2007**

<b>Site</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>
Welby		1		1
Highlands		1		1
Boulder - Foothills	1		1	
CAMP	1		1	
Carriage		1		1
Chatfield		1		1
Air Force Academy		1		1
Manitou		1		1
Arvada		1		1
Welch	1		1	
Rocky Flats - N.	1		1	
NREL		1		1
Ft. Collins - West	1		1	
Ft. Collins - Mason	1		2	
Greeley - Tower	1		2	

**Planned Changes in Ozone Monitoring for 2008**

- 1) Installation of an analyzer at the Denver Municipal Animal Shelter.
- 2) As the result of the Summer Passive Ozone Study and other analysis the Division will install six new SPM ozone monitors. These will be started no later than June 30, 2008. They will be located in Cortez, Palisade, Rifle, Loveland, Aspen Park and the Aurora Reservoir.
- 3) Temporary shut-down of the Highlands site due to loss of power for demolition and construction nearby.

## NITROGEN DIOXIDE

The Air Pollution Control Division has monitored nitrogen dioxide at eight locations in Colorado. All but two of these locations are no longer operating. Only the CAMP monitor has ever approached the standard of 0.053 ppm. It recorded 0.052 in 1975, 1976 1979 and in 1983. In the past 20 years the levels have been declining and in the past three years the levels have been reduced to nearly one half of the standard.

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

The Welby nitrogen dioxide site began operation in July 1976. Its location in the up and down river drainage path of the Denver air mass that has been “cooking” gives either a warning of the events to come or the results of the day's exposure. 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.

### Denver 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 site represents a location typical of most of the downtown Denver area. The Division has shown that the downtown Denver area and the fringe area surrounding the downtown area is homogeneous and indicates that the CAMP station is representative of a wider area. Thus, the CAMP nitrogen dioxide site is representative of a neighborhood scale area.

### Quality Assurance Checks for Oxides of Nitrogen Monitors

The APCD staff performs two types of gaseous analyzer performance audits, assessment audits and accuracy audits. These audits challenge the analyzer with pollutant gases of known concentration within the range of the analyzer. The following table shows the number of these audits conducted on the oxides of nitrogen analyzers for 2007.

The APCD Quality Assurance staff conducts audits on all of the oxides of nitrogen instruments at least twice per year. The APCD Field staff conducts precision checks nominally once every two weeks. 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.

**Table 16 Precision Checks for Oxides of Nitrogen in 2007**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
CAMP	6	4	3	7
Welby	6	7	8	7

**Table 17 Accuracy Audits for Oxides of Nitrogen in 2007**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
CAMP	1		1	
Welby		1		1

### Planned Changes in Nitrogen Dioxide Monitoring for 2008

Addition of NO<sub>y</sub> analyzer at the Denver Municipal Animal Shelter.

## **SULFUR DIOXIDE**

The Air Pollution Control Division has monitored sulfur dioxide at eight locations in Colorado. All but two of these locations are no longer operating. Sulfur dioxide has never approached the level of any of the sulfur dioxide standards even in the mid-1970's, when the levels were at their highest, they were generally less than one half of the level of the standard. The primary reason for these low levels is that what coal fired industry there is in Colorado uses low sulfur coal for combustion. In 2007 a new trace/precursor-level sulfur dioxide monitor will be established as a part of the NCore monitoring at the Denver Animal Shelter.

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

The Welby sulfur dioxide site began operation in July 1975. Its location in the up and down river drainage path of the Denver air mass that has been "cooking" gives either a warning of the events to come or the results of the day's exposure. 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.

### **Denver 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.

However, this site represents a location typical of most of the downtown Denver area. This area has similar land uses, VMT (vehicle miles traveled), and sulfur dioxide sources. The Division has shown that the downtown Denver area and the fringe area surrounding the downtown area is homogeneous and indicates that the CAMP station is representative of a wider area. Thus, the CAMP sulfur dioxide site is representative of a neighborhood scale area.

### **Denver Municipal Animal Shelter, 678 S. Jason Street (08 031 0025)**

The Denver Municipal Animal Shelter (DMAS) was established as a replacement for the Denver Gates particulate monitor that was located at 1050 S. Broadway about one half mile south-southeast and on the other side of the South Platte River and I-25 South. The DMAS location represents the core area of the South Platte drainage in Denver. It has a good mixture of light industrial, residential areas and is strongly affected by the mobile sources along I-25 as well as South Santa Fe Drive. The openness of the area also permits the data to be representative of the larger core Denver area. Finally the site is on City owned property and will presumably be available for long-term trend analysis. When fully developed the site will be established as the NCore site for the Denver Metropolitan area.

### **Quality Assurance Checks for Sulfur Dioxide Monitors**

The APCD staff performs two types of gaseous analyzer performance audits, assessment audits and accuracy audits. These audits challenge the analyzer with pollutant gases of known concentration within the range of the analyzer. The following table shows the number of these audits conducted on the sulfur dioxide analyzers for 2007.

The APCD Quality Assurance staff conducts audits on all of the sulfur dioxide instruments at least twice per year. The APCD Field staff conducts precision checks nominally once every two weeks. 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.

**Table 18 Precision Checks for Sulfur Dioxide in 2007**

<b>Site</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>
CAMP	6	7	8	7
Welby	6	7	8	7

**Table 19 Accuracy Audits for Sulfur Dioxide in 2006**

<b>Site</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>
CAMP	1		1	
Welby		1		1

**Planned Changes in Sulfur Dioxide Monitoring for 2008**

Installation of a trace/precursor level analyzer at the Denver Municipal Animal Shelter.

## **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. The last measurement that is made 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.

### **Commerce City, 7101 Birch Street (08 001 0006)**

The Commerce City monitor is located on the roof of the Alsup Elementary School. It began operation in November of 2001. The Commerce City site is in a predominantly residential area north of the Denver Central Business District (CBD) near the Platte River valley downstream from the Denver urban air mass.

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

The Welby site began operation in July 1973. The site is located along the bank of the South Platte River downstream from the Denver CBD. Welby is one of the longest continuously operating monitoring sites in the system.

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

The Highlands site began operation in 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 a good orientation downwind from the Denver CBD.

### **Denver 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 winds at the CAMP site are strongly affected by the street canyon effect of the downtown buildings. Meteorological data shows that winds are predominately from the south, south-southwest, north, and north-northwest. However, due to the downtown location of this site, winds are shown to flow from almost all directions at similar frequencies.

### **Denver - Carriage, 2325 Irving Street (08 031 0014)**

The Denver Carriage site is located 2.5 miles west of the CBD. The site represents an ideal neighborhood exposure setting due to its unique location in an old carriage lot in the center of the block surrounded by houses.

### **Auraria Met, Auraria Parking Lot R (08 031 0021)**

The Auraria meteorological monitor is located at the edge of the athletic fields and next to the parking lot for Metropolitan State College/ CU Denver. The monitor is 230 feet away from the Auraria Parkway and 350 feet from Speer Boulevard. It is one of the few locations in the CBD where wind data will be little affected by the street canyon effect of the buildings.

### **Denver Municipal Animal Shelter, 678 S. Jason Street (08 031 0025)**

The Denver Municipal Animal Shelter was established as a replacement for the Denver Gates particulate monitor that was located at 1050 S. Broadway about one half mile south-southeast and on the other side of the South Platte River and I-25 South. The DMAS location represents the core area of the South Platte drainage in Denver. Meteorological monitoring is expected to begin in the summer of 2007.

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

The Chatfield Reservoir location was established as the result of the 1993 Summer Ozone Study. The site is located on the south side of Chatfield Reservoir at the Park offices. This location is away from the influence of trees and other influences.

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

The city of Arvada is located 15 miles west-northwest of the Denver CBD. The Arvada site began operation before 1973. It's location to the northwest of the Denver CBD near the western end of the diurnal midday wind flow of the ozone "cloud" and development in the area make this a good population oriented site.

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

The Welch site is located off State Highway 285 between Kipling Street and C-470. It is approximately 11 miles southwest of the Denver CBD and located between the drainages of Bear Creek and Turkey Creek. It is in position to monitor the southern flow that occurs during the upslope, daytime warming period and the northern flow, which occurs during late afternoon and nighttime when drainage is caused by cooling and settling.

**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 as a part of the first phase of the APCD's monitoring effort around the Rocky Flats Environmental Technology Site. It has continued after the closing of Rocky Flats because it is one of the highest concentration ozone monitors in the state.

**Rocky Flats - SE, 9901 Indiana Street (08 059 0008)**

This site is located along Indiana Street southeast of Rocky Flats. The winds at this location are appreciably different from either the Rocky Flats North site or the Arvada site.

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

The Mason Street site is the only meteorological site operated by the APCD in the Fort Collins area.

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

This location monitors carbon monoxide, wind speed, wind direction, temperature and hourly PM<sub>10</sub>. It is located at the northern edge of a low usage parking lot near the Powell monitor.

**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 monitor was moved to the Port of Entry location in March of 2005.

### **Planned Changes in Meteorological Monitoring for 2008**

- 1) Elimination of the Rocky Flats SE site at the end of 2008.
- 2) Installation of sensors at the Greeley-Weld County Tower site.
- 3) Installation of sensors at the Colorado Springs – Hwy 24 site.
- 4) Installation of sensors at the Denver Municipal Animal Shelter site.
- 5) As the result of the Summer Passive Ozone Study and other analyses the Division will install five new SPM meteorological monitors. These will be started no later than June 30, 2008. They will be located in Palisade, Loveland, Rifle, Aspen Park and the Aurora Reservoir.



# PARTICULATE MONITORING

## PM<sub>10</sub> Monitoring

The following table shows change in number of PM<sub>10</sub> samples taken in 2007.

**Table 20 Gross Filter Counts for PM<sub>10</sub> for 2007**

	2007	
Number of filters processed	5525	
Number of gross weight duplicates	*	
Ratio of gross weights to duplicate samples	*	
Average difference between gross and duplicate samples	*	
Standard deviation	*	
Maximum	*	
Minimum	*	
	2007 Max	2007 Avg.
Days from Sample to Gross Weight	54	16
Days from Gross Weight to update on PMT	124**	18
Days from Sample to update on PMT	152**	34

\*- The laboratory records for these criteria were kept as internal laboratory data until the system audit conducted by the APCD Quality Assurance staff in September 2007. Since that audit the data have been transmitted as a part of the routine data submitted from the laboratory and are stored on the APCD data system. The laboratory records showed that the laboratory was conducting tare and gross weight duplicate re-weights at a random ten percent level. That is supported by the recorded data since September 2007 through April 2008.

\*\* - These data were delayed in shipping from the laboratory and not detected by APCD since it occurred at the end of the Garfield County study.

### Commerce City, 7101 Birch Street (08 001 0006)

The Commerce City site is in a predominantly residential area 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 and a high school. There is a large industrial area to the south, and gravel pits to the west and northwest. This is a good location to capture particulate matter pollution draining down the Platte River Valley from downtown Denver and up slope valley flows from the Greeley area. Adams City/Commerce City has historically shown high PM<sub>10</sub> concentrations as well.

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

Welby is located 8 miles north-northeast of the Denver 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. It is located in the up and down river drainage path of the Denver air mass that has been “cooking” gives either a warning of the events to come or the results of the day's exposure. 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.

### **Alamosa - ASC, 208 Edgemont Boulevard (08 003 0001)**

This Alamosa 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 along this highway but far enough away to reduce impacts on the levels. Meteorological data are not available from the area. The city has a population of 8,490 (July 2006 population estimate). This is an increase of 6.6 percent 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.

### **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.

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

Pagosa Springs has a population of 1,696 (July 2006 population estimate). This is an increase of 6.6 percent from the 2000 census.

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

The Pagosa Springs Middle 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 1980's. However, the PM<sub>10</sub> pollution was cleaned up through the SIP control measures and the area has only exceeded the PM<sub>10</sub> standard once since 1994 and that was a regional blowing dust event in March of 1999.

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.

### **Longmont, 350 Kimbark Street (08 013 0003)**

The town of Longmont is a growing, medium sized, Front Range community with a population of 82,904 (July 2006 population estimates). This is an increase of 16.6 percent from the 2000 census. 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.

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, Appendix D.

### **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 27.4 feet south of a small branch of Boulder Creek, the major creek that runs through Boulder.

The predominant wind direction 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 neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

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

Delta has a population of 7,782 (July 2006 population estimate). This is an increase of 21.6 percent from the 2000 census. Delta is a small agricultural community midway between Grand Junction and Montrose. Louisiana Pacific's plywood manufacturing facility is only major point source of particulate matter in the area. The topography in and around Delta is relatively flat as it sits in the broad flat Uncompaghre River Valley. There are high mesas and mountains surrounding this high valley. 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 is representative of the large basin with the potential for high PM<sub>10</sub> due to agricultural burning, automobile traffic and the Louisiana Pacific plant.

#### **Denver 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.

Meteorological data gathered at the CAMP monitoring station is inconclusive for evaluation of the location as a PM<sub>10</sub> micro-scale site. The winds are strongly affected by the street canyon effect of the downtown buildings. Meteorological data shows that winds are predominately from the south, south-southwest, north, and north-northwest. However, due to the downtown location of this site, winds are shown to flow from almost all directions at similar frequencies. Modeling of the emissions, traffic volume and history show that the CAMP monitor is well situated to be a maximum concentration, micro-scale site. However, this site represents a location typical of most of the downtown Denver area. This area has similar land uses, VMT (vehicle miles traveled), and PM<sub>10</sub> sources. The Division has shown that the downtown Denver area and the fringe area surrounding the downtown area is homogeneous and indicates that the CAMP station is representative of a wider area than just its own micro-scale setting.

#### **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, the maximum value recorded at the site has been 91 µg/m<sup>3</sup> in 1995. In the past ten years, the PM<sub>10</sub> levels at the Denver Visitor site have been increasing. The annual average has increased from 21.0 µg/m<sup>3</sup> in 1997 to 26.9 µg/m<sup>3</sup> in 2006.

#### **Denver Municipal Animal Shelter, 678 S. Jason Street (08 031 0025)**

The Denver Municipal Animal Shelter was established as a replacement for the Denver Gates particulate monitoring site that was located at 1050 S. Broadway about one half mile south-southeast and on the other side of the South Platte River and I-25 South. The DMAS location represents the core area of the South Platte drainage in Denver. It has a good mixture of light industrial, residential areas and is strongly affected by the mobile sources along I-25 as well as South Santa Fe Drive. The openness of the area also permits the meteorological data to be representative of the larger core Denver area. Finally the

site is on City owned property and will presumably be available for long-term trend analysis. When fully developed the site will be established as the NCore or National Core site for the Denver Metropolitan area.

### **Colorado Springs - RBD, 101 Costilla Street (08 041 0011)**

Colorado Springs is characterized as a relatively hilly area. The terrain within a two-mile radius of the site is relatively smooth, but there are hills approximately 600 ft. high located four miles to the west and Pike Peak, which is over 14,000 ft. (4267 m) high. The peak is located about 15 miles due west. The Colorado Springs Airport meteorological station is located about 12 km southeast of the monitor. Wind flows in the RBD area are highly dominated by the topography. It is likely that down draft winds off the mountains to the west flush the air pollution out of this area on a regular basis.

The Costilla Street PM<sub>10</sub> monitoring site is within the Colorado Springs CBD and the area is primarily commercial and residential. However, there is a large power plant (Martin Drake Power plant) about one mile to the southwest. The RBD monitor is the second SLAMS location in the Colorado Springs Area and as such it is a valuable location for PM<sub>10</sub> assessment. The distance and traffic estimate for Cimarron Street and Sawatch Street easily falls into the neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D. This site was closed on March 31, 2008 and replaced with the Colorado College site. The Colorado College site is better suited for the EPA required continuous PM<sub>2.5</sub> monitor.

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

The Colorado College monitor was established after the revised particulate regulations required that Colorado Springs needed a continuous PM<sub>2.5</sub> monitor. The Department 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. These monitors began operation in December of 2007.

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.

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

Cañon City is located 39 miles west of Pueblo. It has a population of 15,934 (July 2006 population estimate). This is an increase of 3.2 percent from the 2000 census. 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 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. The Macon Street site was relocated to the City Hall in October of 2004.

### **Parachute, 100 E. 2<sup>nd</sup> Street (08 045 0005)**

Parachute has a population of 1,486 (July 2006 population estimate). This is an increase of 47.7 percent from the 2000 census. The Parachute PM<sub>10</sub> monitor has been in operation since May of 2000. The annual average has been trending upward but is still just over one half of the former annual standard for PM<sub>10</sub> which was 50µg/m<sup>3</sup>.

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

Rifle has a population of 8,706 (July 2006 population estimate). This is an increase of 28.3 percent from the 2000 census. The first Rifle site began operation 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 as a part of the Garfield County study.

#### **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 with a population of 1,588 (July 2006 population estimate). This is an increase of 3.8 percent from the 2000 census. The monitor is at the east end of town near the highway and in the CBD. 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>. Crested Butte has not recorded an exceedance of the NAAQS since it began monitoring.

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

Mount Crested Butte has a population of 540 (July 2006 population estimate). This is a decrease of 23.6 percent from the 2000 census.

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 1997. A CMB source apportionment from 10 PM<sub>10</sub> filters identified crustal material as the mostly likely source (91 percent) of PM<sub>10</sub>. Carbon, which is most likely from residential woodsmoke, made up 8 percent of the statistically composite sample and secondary species made up the remaining 1 percent. The Mt. Crested Butte site was also selected because it is an area representative of the residential impact of PM<sub>2.5</sub>.

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

Durango has a population of 16,068 (July 2006 population estimate). This is an increase of 15.4 percent from the 2000 census.

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 (1981 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.

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

The population of Fort Collins is 129,511 (July 2006 population estimates). This is an increase of 9.1 percent from the 2000 census. Fort Collins does not have the population to require a particulate monitor under Federal regulation. However, it is one of the largest cities along the Front Range.

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

Grand Junction is the largest city on the western slope, with a population of 51,631 (July 2006 population estimate). This is an increase of 22.9 percent from the 2000 census.

This site monitors 24-hour and hourly PM<sub>10</sub> as well as for 24-hour and hourly PM<sub>2.5</sub> and PM<sub>2.5</sub> Speciation.

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

This location monitors carbon monoxide, wind speed, wind direction, temperature and hourly PM<sub>10</sub>. It is located at the northern edge of a low usage parking lot near the Powell monitor.

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

The Clifton monitor is located in the town of Clifton which is a southeastern suburb of Grand Junction, Colorado. 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 the oil and gas development in the area.

The monitor began operations in October 2007 and operates on an every third day schedule.

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

Aspen is at the upper end of a steep mountain valley. The major difference is that 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 in the valley. The population of Aspen is 6,365 (July 2006 population estimate). This is an increase of 7.6 percent from the 2000 census. 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 41 miles to the northeast.

There have been several particulate monitors in the Aspen area. Only three have not been short-term special studies. The first PM<sub>10</sub> monitor began operation in June 1985. The next, the Sport Stalker, was chosen after an intense effort involving EPA, State, and local agency personnel. The need was to find an acceptable middle or middle scale location.

#### **Lamar Power Plant, 100 2<sup>nd</sup> Street (08 099 0001)**

Lamar is one of the largest cities on the Eastern Plains with a population of 8,502 (2006 population estimate). This is a decrease of 4.1 percent from the 2000 census. Particulate monitoring in Lamar began in August 1975 with the installation of a TSP site at the Lamar power plant at 100 2<sup>nd</sup> Avenue. It operated as a TSP site until August of 1986. The first Lamar PM<sub>10</sub> site began operation in June 1985 at the power plant. In August 1986, the monitoring site was moved to the Municipal Complex (08 099 0002).

On March 19, 1976, the Lamar power plant monitor recorded a TSP of 1,033 µg/m<sup>3</sup>. This is the fourth highest particulate concentration ever reported in Colorado. Lamar has regularly recorded its highest TSP and PM<sub>10</sub> levels in March. Between 1975 and 1986 the power plant monitor reported 25 concentrations greater than the 24-hour TSP NAAQS of 260 µg/m<sup>3</sup>, twelve of these occurred in March, no other month had more than three. Three of the seven exceedances of the 24-hour PM<sub>10</sub> NAAQS have also occurred in March. The primary reason for this relationship is due to the combination of low humidity and high winds that are common during the month of March. Lamar is the only Colorado city east of Denver to have been designated as a PM<sub>10</sub> nonattainment area and is now under an attainment/maintenance plan. In 1992, the Division reinstated the power plant location as well. This was done after a review showed that levels at the power plant were generally higher than those at the City Complex. As a part of the SIP for Lamar, a meteorological site was established in 1992 at the city complex location. Analysis of these data was included as a part of the SIP process.

#### **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 is located on the northern edge of town while the Municipal site is near the center of the town. Both sites have recorded exceedances of the 24-hour standard of 150  $\mu\text{g}/\text{m}^3$  and both sites regularly record values above 100 $\mu\text{g}/\text{m}^3$  as a 24-hour average.

### **Pueblo - Public Works, 211 S. D Street (08 101 0012)**

The population of Pueblo is 104,999 (July 2006 population estimates). This is an increase of 2.8 percent from the 2000 census.

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.

The site is 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. It is also located near Fountain Creek. The distance and traffic estimate for Main Street and surrounding streets easily falls into the middle scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

The Division is in the process of finding a location for the Pueblo monitors since the current building is scheduled for demolition in 2008.

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

The population of Steamboat Springs is 11,083 (July 2006 population estimates). This is an increase of 12.9 percent from the 2000 census. 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.

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

The population of Telluride is 2,345 (July 2006 population estimates). This is an increase of 5.6 percent from the 2000 census

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.

### **Breckenridge - 501 N. Park Avenue (08 119 0002)**

Breckenridge is a community with a population of 3,439 (July 2006 population estimate). This is an increase of 42.8 percent from the 2000 census. However, these numbers reflect only the permanent population, not the number of tourists that arrive for winter or summertime activities. Temporary population increases along with the associated increases in traffic and wood burning caused sufficient

concern that the city of Breckenridge requested that the Division establish PM<sub>10</sub> monitoring in the area. The Breckenridge site began operation in April 1992.

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

The population of Greeley is 90,385 (July 2006 population estimate). This is an increase of 17.3 percent from the 2000 census.

Winds in this area are primarily out of the northwest, with dominant wind speeds less than 3.1 m/s. Secondary winds are from the north, north-northwest, and east-southeast, with the most frequent wind speeds also being less than 3.1 m/s. 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 moved in early 1999, after the town of Greeley purchased the land in 1997.

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.

### **Planned Changes in PM<sub>10</sub> Monitoring for 2008**

- 1) The Lamar Power Plant monitor will be considered for removal and replacement in 2008 due to conversion of the plant to coal burning.
- 2) The Pueblo site will be relocated in 2008 due to the demolition of the current building.



## **PM<sub>2.5</sub> Monitoring**

### **Commerce City, 7101 Birch Street (08 001 0006)**

The Commerce City site is in a predominantly residential area 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 gravel pits to the west and northwest. This is a good location to capture particulate matter pollution draining down the Platte River Valley from downtown Denver and up slope valley flows from the Greeley area. The old Adams City/Commerce City site, which was about 180 meters north of the Alsup Elementary School, recorded high PM<sub>10</sub> concentrations as well.

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

The ACC site is located in south suburban metropolitan Denver. It is located on the south side of the Arapahoe Community College in a distant parking lot. The site is near the bottom of the Platte River Valley along Santa Fe Drive (Hwy. 85) in the city of Littleton. It is also near the city of Englewood. There is a large residential area located to the east across the railroad and Light Rail tracks. The PM<sub>2.5</sub> monitor is located on a mobile shelter in the rarely used South parking lot. Located at 6190 S. Santa Fe Drive, this small trailer is close to the Platte River and the monitor has excellent 360° exposure. Based on the topography and meteorology of the area ACC is in an area where PM<sub>2.5</sub> emissions may collect. This location may capture high concentrations during periods of upslope flow and temperature inversion in the valley. However, since it is further south in a more sparsely populated area than the Broadway-CAMP site, 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.

### **Longmont, 350 Kimbark Street (08 013 0003)**

The town of Longmont, located in Boulder County, is a growing, medium sized, Front Range community. It 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 4,978 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

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>2.5</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 AADT controlling street easily falls into the neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

### **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 (2.13 km) east of the base of the Front Range foothills and about 27.4 feet (8.35 m) south of a small branch of Boulder Creek, the major creek that runs through Boulder.

The predominant wind direction 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 neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D. Thus, the Boulder Chamber of Commerce PM<sub>2.5</sub> site is representative of a neighborhood

scale area and meets all other neighborhood scale criteria.

#### **Boulder - CU/Athens, 2120 Athens Street (08 013 1001)**

The Boulder - CU site is located at the edge of a low usage parking lot to the north and the football practice field to the south. This location provides a good neighborhood representation for particulates.

#### **Denver 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.

Meteorological data gathered at the CAMP monitoring station is inconclusive for evaluation of the location as a PM<sub>2.5</sub> micro-scale site. The winds are strongly affected by the street canyon effect of the downtown buildings. Meteorological data shows that winds are predominately from the south, south-southwest, north, and north-northwest. However, due to the downtown location of this site, winds are shown to flow from almost all directions at similar frequencies. Modeling of the emissions, traffic volume and history show that the CAMP monitor is well situated to be a maximum concentration, micro-scale site. However, this site represents a location typical of most of the downtown Denver area. This area has similar land uses, VMT (vehicle miles traveled), and PM<sub>2.5</sub> sources. The Division has shown that the downtown Denver area and the fringe area surrounding the downtown area is homogeneous and indicates that the CAMP station is representative of a wider area than just its own micro-scale area.

#### **Denver NJH-E, 14<sup>th</sup> Avenue and Albion Street (08 031 0013)**

This site is located three miles east of the Denver CBD, close to one of the busiest intersections in Denver (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 and “temporary” site in the corner of the laboratory building at the corner of Colorado Boulevard and Colfax Avenue.

#### **Denver - Swansea, 4650 Columbine Street (08 031 0023)**

The Swansea Elementary school site was established as a part of the toxicological study associated with the ASARCO Study conducted by the Colorado Department of Public Health and Environment.

#### **Denver Municipal Animal Shelter, 678 S. Jason Street (08 031 0025)**

The Denver Municipal Animal Shelter was established as a replacement for the Denver Gates monitor that was located at 1050 S. Broadway about one half mile south-southeast and on the other side of the South Platte River and I-25 South. The DMAS location represents the core area of the South Platte drainage in Denver. It has a good mixture of light industrial, residential areas and is strongly affected by the mobile sources along I-25 as well as South Santa Fe Drive. The openness of the area also permits the meteorological data to be representative of the larger core Denver area. Finally the site is on City owned property and will presumably be available for long-term trend analysis. When fully developed the site will be established as the NCore site for the Denver Metropolitan area.

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

The Chatfield Reservoir location was established as the result of the 1993 Summer Ozone Study. The site is located on the south side of Chatfield Reservoir at the campground registration building. 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 PM<sub>2.5</sub> particulates in the Denver metro area.

### **Elbert County, 24950 Ben Kelly Road (08 039 0001)**

The Elbert County site is believed to be a good location to measure urban background concentrations of PM<sub>2.5</sub>. Winter winds at Elbert are from the southwest to southeast at 4-5 m/s during the morning hours. During the afternoon hours, brisk winds are generally from the south-southwest to the southeast. This shows that the Denver Metropolitan Area does not influence the winds moving across the monitoring site. A July 1981 analyses of surface streamline was done to study summer wind patterns in this same area. The study shows that in the later morning hours (0800), winds predominately blow from the north and northeast, placing the Denver Metro-Area upwind of the site. Although, during the early morning hours, wind flows off the Cheyenne Ridge and Palmer Lake Divide into the river basins to the north and south, away from the Elbert County monitoring site. By early afternoon (1100) and continuing through later afternoon (1400), up slope flow occurs over nearly the entire region, bringing clean air from the east and northeast to the site. By the evening hours, winds again predominately flow from the mountain region, with these westerly winds again flowing off the Palmer Lake Divide, away from the monitoring site. This would suggest that the Elbert County site is a very clean location for winter months and for early morning, afternoon, and evening hours during the summer months.

The location of this Elbert County site classifies it as an urban background site, in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D. The site meets all guidelines for the urban background site.

### **Colorado Springs - RBD, 101 Costilla Street (08 041 0011)**

Colorado Springs is characterized as a relatively hilly area. The terrain within a two-mile radius of the site is relatively smooth, but there are 600 ft. high hills located four miles to the west and Pike Peak is over 14,000 ft. (4,267 m) high. The peak is located about 15 miles due west. All demographic data and climatological and meteorological summaries are the same as listed above for the Colorado Springs, Meadowland site. For this site, however, the Colorado Springs Airport meteorological station is located about 12 km southeast of the monitor. Wind flows in the RBD area are highly dominated by the topography. It is likely that down draft winds off the mountains to the west flush the air pollution out of this area on a regular basis.

The Costilla Street PM<sub>2.5</sub> monitoring site is within the Colorado Springs CBD and the area is primarily commercial and residential. However, there is a large power plant (Martin Drake Power plant) about one mile to the southwest. The RBD monitor is the second SLAMS location in the Colorado Springs Area and as such it is a valuable location for PM<sub>2.5</sub> assessment. The distance and traffic estimate for Cimarron Street and Sawatch Street easily falls into the neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

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

The Colorado College monitor was established after the revised particulate regulations required that Colorado Springs needed a continuous PM<sub>2.5</sub> monitor. The Department 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. These monitors began operation in December of 2007.

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.

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

The population of Fort Collins is 129,511 (July 2006 population estimates). This is an increase of 9.1 percent from the 2000 census. Fort Collins does not have the population to require a carbon monoxide monitor under Federal regulation. However, it is one of the largest cities along the Front Range.

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

Grand Junction is the largest city on the western slope, with a population of 51,631 (July 2006 population estimate). This is an increase of 22.9 percent from the 2000 census.

This site monitors 24-hour and hourly  $PM_{10}$  as well as for 24-hour and hourly  $PM_{2.5}$  and  $PM_{2.5}$  Speciation.

### **Pueblo - Public Works, 211 S. D Street (08 101 0012)**

Not counting communities that are part of Metropolitan Denver, Pueblo is the third largest city in the state. 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.

The site is located on the roof of the Public Works Building at 211 S. D St., in a relatively flat area found two blocks northeast of the Arkansas River. It is also located near Fountain Creek. The distance and traffic estimate for Main Street and surrounding streets easily falls into the neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

The Division is in the process of finding a location for the Pueblo monitors since the current building is scheduled for demolition in 2008.

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

The population of Greeley is 90,285 (July 2006 population estimates). This is an increase of 17.3 percent from the 2000 census. The current Greeley site has been in operation since 1982.

Winds in this area are primarily out of the northwest; with dominant wind speeds less than 3.1 m/s. Secondary winds are from the north, north-northwest, and east-southeast, with the most frequent wind speeds also being less than 3.1 m/s. The most recent available wind data for this station is for the period December 1986 to November 1987. Predominate 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 moved at the first of 1999, after the town of Greeley purchased the land in 1997.

The Greeley  $PM_{2.5}$  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, Appendix D.

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

The population of Platteville is 2,616 (July 2006 population estimates). This is an increase of 11.8 percent from the 2000 census.

Platteville is located immediately west of Highway 85 along the Platte River valley bottom four 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 PROFS (Prototype Regional Observational Forecasting System) Mesonet network of meteorological monitors from the early 1980's through the mid 1990's 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 burns off. This is due to solar heating. The upslope/downslope Platte River Valley drainage and wind flows between Denver and Greeley, make Platteville a good place to monitor  $PM_{2.5}$ . 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 easily falls into the regional transport scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

**Planned Changes in PM<sub>2.5</sub> Monitoring for 2008**

- 1) Addition of a PM<sub>10/2.5</sub> TEOM in Rifle for hourly reporting.
- 2) Addition of a PM<sub>2.5</sub> monitor in Cortez.
- 3) The Pueblo site will be relocated in 2008 due to the demolition of the current building.

## Total Suspended Particulates and Lead Monitoring

In December 2006 Total Suspended Particulate (TSP) monitoring by the Air Pollution Control Division was reduced from six monitors to a single monitor at the Denver Municipal Animal Shelter. TSP is monitored only as a first step in ambient lead analysis. In the past ten years the maximum quarter lead concentration has generally been less than a tenth of the standard. In addition, Colorado has not recorded an exceedance of the lead standard since the first quarter of 1980.

### Denver Municipal Animal Shelter, 678 S. Jason Street (08 031 0025)

The Denver Municipal Animal Shelter was established as a replacement for the Denver Gates particulate monitor that was located at 1050 S. Broadway about one half mile south-southeast and on the other side of the South Platte River and I-25 South. The DMAS location represents the core area of the South Platte drainage in Denver. It has a good mixture of light industrial, residential areas and is strongly affected by the mobile sources along I-25 as well as South Santa Fe Drive. The openness of the area also permits the meteorological data to be representative of the larger core Denver area. Finally the site is on city owned property and will presumably be available for long-term trend analysis. When fully developed the site will be established as the NCore site for the Denver Metropolitan area.

### Planned Changes in TSP and Lead Monitoring for 2008

There are no planned changes to the TSP/Lead monitoring for 2008.

### Quality Assurance Accuracy Audits for Particulate Monitors

The audit checks performed on the particulate monitors consist of calibrated flow checks.

**Table 21 Accuracy Audits for Particulates in 2007**

Site / Station Name	PM <sub>2.5</sub> PEP	PM <sub>2.5</sub> FRM/FEM	PM <sub>10</sub> Low-Vol	PM <sub>10</sub> High-Vol	TSP	TEOM <sub>(2.5)</sub>	TEOM <sub>(10)</sub>
Commerce City		4	4			4	
Commerce City (collocated)		4					
Welby				4			4
Chatfield Reservoir		4				4	
Alamosa - ASC				16			
Alamosa - Municipal Bldg				16			
Arapahoe Community College	3	4					
Pagosa Springs. Middle School				16			
Longmont - Municipal		4		4		4	
Boulder Chamber of Commerce	4	4		4			
Boulder - CU/Athens						4	
Delta				8			
Denver - CAMP		4		4		4	4
Denver - CAMP (collocated)		4		4			
Denver Municipal Animal Shelter (primary)	3	1		4	4	1	4
Denver Municipal Animal Shelter (collocated)				4	4		
Denver - Swansea		4					
Denver Visitor Center				16			
Denver - NJH						4	
Elbert		4					

Site / Station Name	PM <sub>2.5</sub> PEP	PM <sub>2.5</sub> FRM/FEM	PM <sub>10</sub> Low-Vol	PM <sub>10</sub> High-Vol	TSP	TEOM <sub>(2.5)</sub>	TEOM <sub>(10)</sub>
Colorado Springs - RBD		4		4			
Co. Springs - RBD (collocated)				4			
Colorado College		1	1				
Canon City – City Hall				3			
Parachute				8			
Glenwood Springs				8			
New Castle				8			
Rifle				8			
Silt-Bell				8			
Silt - Cox				4			
Silt - Daley				8			
Crested Butte				8			
Mt. Crested Butte				16			
Durango River City Hall				7			
Ft. Collins - CSU		4		8			
Grand Junction - Powell		4	4			4	
Grand Junction - Powell (collocated)			3				
Clifton				2			
Aspen Library				8			
Lamar Power Plant				16			
Lamar - Municipal				16			
Pueblo Public Works		4		8			
Steamboat Springs				16			
Telluride				8			
Breckenridge				16			
Greeley - Hospital		4		8		4	
Platteville		4					
<b>Total Particulate Audits</b>	<b>10</b>	<b>66</b>	<b>12</b>	<b>300</b>	<b>8</b>	<b>33</b>	<b>12</b>

## Quality Assurance Precision Checks for Particulate Monitors

The precision checks that are made on particulate monitors consist of samplers that operate side-by-side on the same operating schedule. The samples are then compared to ensure that the data are within federal limits.

**Table 22 Precision Checks for Particulates in 2007**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
<b>TSP</b>				
Denver Municipal Animal Shelter	15	15	14	15
<b>LEAD</b>				
Denver Municipal Animal Shelter	15	15	13	15
<b>PM<sub>10</sub> High-Volume</b>				
Denver - CAMP	14	15	14	13
Denver Municipal Animal Shelter	14	15	14	15
Colorado Springs - RBD	15	13	15	15
<b>PM<sub>10</sub> Low-Volume</b>				
Grand Junction - Powell	13	13	12	13
<b>PM<sub>2.5</sub> FEM</b>				
Commerce City	15	15	15	18
Denver - CAMP	16	19	15	15
Grand Junction - Powell	1			
<b>PM<sub>2.5</sub> Continuous</b>				
Commerce City	5	4	7	7
Longmont - Municipal	4	3	5	5
Boulder - CU/Athens	6	3	5	4
Denver - CAMP	6	6	7	4
Denver - NJH	5	6	6	6
Chatfield	4	4	4	4
Grand Junction - Powell	3	3	2	4
Greeley - Hospital	5	6	6	5
<b>PM<sub>10</sub> Continuous TEOM</b>				
Welby	6	6	7	5
Denver - CAMP	6	7	8	8
Denver Municipal Animal Shelter	7	6	8	7
<b>PM<sub>10</sub> Continuous Beta</b>				
Grand Junction - Pitkin	4	3	4	4