

# **COLORADO ANNUAL MONITORING NETWORK PLAN 2007**



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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 Colorado Department of Public Health and Environment – Air Pollution Control Division’s (APCD) 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 first 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. As this is the first year under the new regulations, this document is expected to change and be refined in the upcoming years.

## Overview

In 2006 the APCD operated 129 monitors at 77 locations. In 2007 the Colorado Air Pollution Control Division will operate 115 monitors at 75 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 2006 there were a total of 42 PM<sub>10</sub> monitors at 34 separate locations across the state and 31 PM<sub>2.5</sub> monitors at 21 separate locations. There were 17 meteorological sites. 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 7 of the 77 locations in 2006 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 7 parameters, both of which are in the Denver Metro Area.

Increasing the amount of automated versus manual monitoring will require modifications to the PM<sub>10</sub> and Total Suspended Particulate (TSP) 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 45 PM<sub>10</sub> monitors are continuous “hourly”, while 8 of the 31 PM<sub>2.5</sub> monitors are continuous. This difference reflects the age of the technology more than anything else.

Forty of the 77 current monitoring sites have been in operation for 10 or more years and 23 of these have been in operation for 20 or more years. Nine monitoring sites have been in operation for more than 30 years. These sites are: Denver CAMP (42 years), Greeley-Hospital (40 years), Alamosa Adams State College (37 years), Welby and Arvada (34 years), Pagosa Springs, Lamar Power Plant and Steamboat Springs (32 years). Conversely, 24 of the 75 monitoring sites have begun operation since the start of the year 2000 and one began operation in the year 2006.

## 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 April 2000 Census and the July 2005 Population Estimates by the Colorado State Demography Office. This table also includes the “percent change” in population from 2000 to 2005 and the parameters monitored in each Region and County.

Table 5 through Table 11 list the make and model of each monitor, its 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 hourly, every sixth day, every third day or every day schedule.

**Table 1 APCD Sites in Operation for 2006 - 2007**

<b>County</b>	<b>Site #</b>	<b>Site Name</b>	<b>Address</b>	<b>Started</b>	<b>Ended</b>
Adams (001)	0005	Globeville	5400 Washington St.	11/1989	12/2006
	0006	Commerce City	7101 Birch St.	01/2001	
	2002	Brighton	22 S. 4th St.	10/1988	12/2006
	3001	Welby	3174 E. 78th Ave.	07/1973	
Alamosa (003)	0001	Alamosa	359 Poncha Ave.	01/1970	
	0003		425 4th St.	04/2002	
Arapahoe (005)	0002	Highland Reservoir	8100 S. University Blvd	06/1978	
	0005	Arapahoe Comm. College	6190 S. Santa Fe Drive	12/1998	
Archuleta (007)	0001	Pagosa Springs	Intermediate School	08/1975	
Boulder (013)	0003	Longmont - Municipal	3rd Ave. & Kimbark St.	06/1985	
	0009	Longmont - Main	440 Main St.	11/1989	
	0011	South Boulder Creek	1405½ S. Foothills Hwy	06/1994	
	0012	Boulder Chamber	2440 Pearl St.	12/1994	
	0014	Boulder Scott Carpenter	(to be determined)	??/2007	
	1001	Boulder - CU/Athens	2120 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	
	0022	Denver - LARS	8100 Lowry Blvd.	09/2000	12/2006
	0023	Denver - Swansea	4650 Columbine St.	07/2002	
	0025	Denver - 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	Wright-Inghram Institute	12/1998	
El Paso (041)	0006	Colorado Springs - Glen	1098 Glen Ave.	01/1980	12/2006
	0008	Colo. Spgs. - Meadowlands	3730 Meadowlands Blvd	01/1981	12/2006
	0011	Colorado Springs - RBD	101 Costilla St.	02/1987	
	0015	Colorado Springs - Hwy 24	690 W. Hwy 24	11/1998	
	0013	US Air Force Academy	USAF Rd 640	05/1996	
	0016	Manitou Springs	101 Banks Pl.	04/2004	
Fremont (043)	0003	Canon City - City Hall	128 Main St.	10/2004	
Garfield (045)	0005	Parachute	100 E. 2nd St.	01/1982	

County	Site #	Site Name	Address	Started	Ended
Garfield (045)	0007	Rifle - Henry Building	144 3rd. St.	05/2005	
	0008	New Castle - Library	402 W. Main St.	05/2005	
	0009	Silt - Bell Ranch	512 Owens Dr.	05/2005	
	0010	Silt - Daley Ranch	884 County Road 327	05/2005	
	0011	Silt - Cox Ranch	5933 County Road 233	05/2005	05/2007
Gunnison (051)	0004	Crested Butte	Colorado Hwy 135 & Whiterock Ave.	09/1982	
	0006	Gunnison	221 N. Wisconsin St.	09/2000	12/2006
	0007	Mt Crested Butte	19 Emmons Rd.	07/2005	
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	
	0011	NREL	2229 Old Quarry Rd.	06/1994	
Lake (065)	0001	Leadville	510 Harrison St.	09/1981	12/2006
La Plata (067)	0004	Durango - RCH	1235 Camino del Rio	05/1985	
	0010	Durango - Cutler	177 Cutler Dr.	10/2003	04/2006
	0011	Durango - Grandview	56 Davidson Creek Rd.	07/2004	12/2006
	1001	Durango - Courthouse	1060 2 <sup>nd</sup> Ave.	03/1987	12/2006
Larimer (069)	0009	Fort Collins - CSU	251 Edison St.	12/1998	
	0010	Fort Collins - South	4407 S. College Ave.	11/2002	
	0011	Fort Collins - West	3416 W. LaPorte Ave.	05/2006	
	1004	Fort Collins - Mason	708 S. Mason St.	12/1980	
Mesa (077)	0017	Grand Junction - Powell	650 South Ave.	02/2002	
	0018	Grand Junction	645¼ Pitkin Ave.	01/2004	
	0019	Clifton	(to be determined)	??/2007	
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	County Justice Center	04/1992	
Teller (119)	0001	Cripple Creek	Bennett Ave. & 2 <sup>nd</sup> St.	10/1994	12/2006
	0002	Cripple Creek - Met	Warren Ave. & 2 <sup>nd</sup> St.	01/1998	12/2006
Weld (123)	0006	Greeley - Hospital	1516 Hospital Rd.	04/1967	
	0009	Weld County Tower	3101 35 <sup>th</sup> Ave.	06/2002	
	0010	Greeley - West Annex	905 10 <sup>th</sup> Ave.	12/2003	
	0008	Platteville	1004 Main St.	12/1998	

**Table 2 APCD Site Locations for 2006 – 2007**

<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	39.82574	104.93699	1,561
	3001	Welby	39.83818	104.94983	1,559
Alamosa (003)	0001	Alamosa	37.46972	105.87750	2,307
	0003		37.46943	105.86261	2,299
Arapahoe (005)	0002	Highland Reservoir	39.56792	104.95708	1,778
	0005	Arapahoe Community College	39.60441	105.01952	1,634
Archuleta (007)	0001	Pagosa Springs	37.26806	107.02111	2,168
Boulder (013)	0003	Longmont - Municipal	40.16583	105.10111	1,518
	0009	Longmont - Main	40.16658	105.10240	1,517
	0011	South Boulder Creek	39.95694	105.23833	1,661
	0012	Boulder Chamber	40.02110	105.26335	1,616
	0014	Boulder-Scott Carpenter Pk.	40.01400	105.25595	1,608
	1001	Boulder - CU/Athens	40.01297	105.26718	1,640
Delta (029)	0004	Delta	38.73917	108.07278	1,511
Denver (031)	0002	Denver - CAMP	39.75119	104.98762	1,591
	0013	Denver - NJH	39.37858	104.93996	1,615
	0014	Denver - Carriage	39.75194	105.03083	1,609
	0016	DESCI Building	39.73700	104.96461	1,615
	0017	Denver Visitor Center	37.74036	104.99104	1,593
	0019	Denver Firehouse #6	39.74817	105.00260	1,584
	0021	Auraria Campus Met.	39.74696	105.00361	1,584
	0023	Denver - Swansea	39.77679	104.95627	1,581
	0025	Denver - 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)	0008	Colorado Springs - Meadowlands	38.89806	104.76139	1,850
	0011	Colorado Springs - RBD	38.83139	104.82778	1,830
	0015	Colorado Springs - Hwy 24	39.83089	104.83926	1,820
	0013	US Air Force Academy	39.95833	104.81721	1,970
	0016	Manitou Springs	38.85309	104.90131	1,966
Fremont (043)	0003	Canon City	38.43812	105.24547	1,642
Garfield (045)	0005	Parachute	38.45278	108.04806	1,558
	0007	Rifle - Henry Building	39.53357	107.78216	1,630
	0008	New Castle - Library	39.57354	107.53463	1,703
	0009	Silt - Bell Ranch	39.48776	107.65969	1,787
	0010	Silt –Daley Ranch	39.43089	107.65267	1,945
	0011	Silt - Cox Ranch	39.56795	107.68325	1,692
	1001	Glenwood Springs	39.52944	107.32417	1,782



**Table 2 APCD Site Locations for 2006 – 2007 (Continued)**

<b>County</b>	<b>Site #</b>	<b>Site Name</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Elevation (Meters)</b>
Gunnison (051)	0004	Crested Butte	38.87083	106.98083	2,708
	0007	Mt. Crested Butte	38.90054	106.96555	2,863
Jefferson (059)	0002	Arvada	39.80035	105.10002	1,641
	0005	Welch	39.63878	105.13948	1,738
	0006	Rocky Flats - N	39.91285	105.18855	1,793
	0008	Rocky Flats - SE	39.87692	105.16613	1,716
	0011	NREL	39.74371	105.17798	1,826
La Plata (067)	0004	Durango - RCH	37.30565	107.84801	1,985
Larimer (069)	0009	Fort Collins - CSU	40.57124	105.08012	1,526
	0010	Fort Collins - South	40.52645	105.07719	1,533
	0011	Fort Collins - West	40.59257	105.14110	1,575
	1004	Fort Collins - Mason	40.57747	105.07892	1,517
Mesa (077)	0017	Grand Junction - Powell	39.06363	105.56102	1,395
	0018	Grand Junction	39.06620	108.56166	1,396
	0019	Clifton	39.06268	108.45728	1,412
Pitkin (097)	0006	Aspen - Library	39.19065	106.81806	2,410
Powers (099)	0001	Lamar - Power Plant	38.09139	102.61361	1,118
	0002	Lamar - Municipal	38.07833	102.61528	1,107
	0003	Lamar - Port of Entry	38.11414	102.62779	1,105
Pueblo (101)	0012	Pueblo - Public Works	38.26361	104.61222	1,426
Routt (107)	0003	Steamboat Springs	40.48528	106.83083	2,050
San Miguel (113)	0004	Telluride	37.93750	107.81167	2,694
Summit (117)	0002	Breckenridge	39.48500	106.04667	3,120
Teller (119)	0001	Cripple Creek	38.74444	105.17833	2,869
Weld (123)	0006	Greeley - Hospital	40.41472	104.70611	1,447
	0009	Weld County Tower	40.38637	104.73721	1,475
	0010	Greeley West Annex	40.42346	104.69540	1,419
	0008	Platteville	40.20917	104.82306	1,468

The following abbreviations are used in the next tables:

Orientation refers to the reason why the monitor 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

Parm - Parameter Code

**Scale**

Micro - Microscale

Neigh - Neighborhood Scale

Middle - Middle Scale

Urban - Urban Scale

Regional - Regional Scale

(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 Monitors in Operation for 2007**

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
				PM <sub>2.5</sub> H	06/2003	P.O. Neigh
				Met	06/2003	P.O. Neigh
	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. Neigh
				O <sub>3</sub>	07/1973	P.O. Neigh
				Met	01/1975	P.O. Neigh
				PM <sub>10</sub>	01/1986	SPM Neigh
PM <sub>10</sub> H				07/1990	SPM Micro	
Alamosa (003)	0001	Alamosa	208 Edgemont Blvd.	PM <sub>10</sub>	06/1989	P.O. Region
	0003		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	P.O. Urban
				Met	07/1978	P.O. Neigh
	0005	Arapahoe Community College	6190 S. Santa Fe Drive.	PM <sub>2.5</sub>	03/1999	P.O. Neigh
Archuleta (007) (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
				PM <sub>2.5</sub>	01/1999	P.O. Neigh
	0009	Longmont - Main	440 Main St.	CO	11/1989	P.O. Middle
	0011	South Boulder Creek	1405½ S. Foothills Hwy	O <sub>3</sub>	06/1994	P.O. Urban
	0012	Boulder Chamber of Commerce	2440 Pearl St.	PM <sub>10</sub>	01/1999	P.O. Neigh
				PM <sub>2.5</sub>	01/1999	P.O. Neigh
	0014	Boulder Scott Carpenter Pk	29 <sup>th</sup> St & Arapahoe Ave.	CO	??/2007	??
1001	Boulder - CU/Athens	2120 Athens St.	PM <sub>2.5</sub> H	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	P.O. Micro
				SO <sub>2</sub>	01/1965	P.O. Neigh
				NO <sub>x</sub>	01/1965	P.O. Neigh
				O <sub>3</sub>	06/2005	P.O. Neigh
				Met	01/1985	P.O. Neigh
				PM <sub>10</sub>	01/1986	P.O. Micro
				PM <sub>10</sub> H	01/1988	P.O. Micro
				PM <sub>2.5</sub>	01/1999	P.O. Micro
				PM <sub>2.5</sub> H	08/2000	P.O. Micro
	0013	Denver - NJH	14 <sup>th</sup> Ave. & Albion St.	PM <sub>2.5</sub> H	10/2003	P.O. Middle
	0014	Denver - Carriage	2325 Julian St.	O <sub>3</sub>	06/1982	P.O. Neigh
				Met	01/1983	P.O. Neigh
	0016	DESCI Building (Visibility)	1901 13 <sup>th</sup> Ave.	Viz	01/1990	

?? indicates that the monitor is not yet installed.

**Table 3 APCD Monitors in Operation for 2007 (Continued)**

County	Site #	Site Name	Address	Parm	Started	Scale
Denver (031)	0017	Denver Visitor Center	225 W. Colfax Ave.	PM <sub>10</sub>	12/1992	P.O. 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	P.O. Middle
	0023	Denver – Swansea	4650 Columbine St.	PM <sub>2.5</sub>	07/2002	SPM Neigh
	0025	Denver - Animal Shelter	678 S. Jason St.	TSP	07/2005	P.O. Middle
				Pb	07/2005	P.O. Middle
				PM <sub>10</sub>	07/2005	P.O. Middle
				PM <sub>10</sub> H	08/2005	P.O. Middle
				CO	??/2007	??
				O <sub>3</sub>	??/2007	??
				NO <sub>x</sub>	??/2007	??
				SO <sub>2</sub>	??/2007	??
Met	??/2007	??				
Douglas (035)	0004	Chatfield State Park	11500 N. Roxborough Park Rd.	O <sub>3</sub>	04/2004	P.O. Neigh
				PM <sub>2.5</sub>	07/2005	P.O. Neigh
				PM <sub>2.5</sub> H	05/2004	P.O. Neigh
				Met	04/2004	SPM Neigh
Elbert (039)	0001	Elbert County	Wright-Inghram Institute	PM <sub>2.5</sub>	05/1999	Back Region
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
	0015	Colorado Springs - Hwy 24	690 W. Hwy 24	CO	11/1998	P.O. Micro
				Met	??/2007	??
	0013	US Air Force Academy	USAF Rd 640	O <sub>3</sub>	06/1996	P.O. Urban
Met				06/1966	P.O. Urban	
0016	Manitou Springs	101 Banks Pl.	O <sub>3</sub>	04/2004	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	SPM Neigh
	0008	New Castle - Library	402 W. Main St.	PM <sub>10</sub>	05/2005	SPM Neigh
	0009	Silt - Bell Ranch	512 Owens Dr.	PM <sub>10</sub>	05/2005	SPM Neigh
	0010	Silt - Daley Ranch	884 County Road 327	PM <sub>10</sub>	05/2005	SPM Neigh
	0011	Silt - Cox Ranch	5933 County Road 233	PM <sub>10</sub>	05/2005	SPM Neigh
	1001	Glenwood Springs	109 8 <sup>th</sup> St.	PM <sub>10</sub>	05/2005	SPM Neigh
Gunnison (051)	0004	Crested Butte	Colorado 135 & Whiterock	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	P.O. Neigh

?? indicates that the monitor is not yet installed.

**Table 3 APCD Monitors in Operation for 2007 (Continued)**

County	Site #	Site Name	Address	Parm	Started	Scale
Jefferson (059)	0005	Welch	12400 W. Hwy 285	O <sub>3</sub>	08/1991	P.O. Urban
				Met	10/1991	SPM Neigh
	0006	Rocky Flats - N	16600 W. Hwy 128	O <sub>3</sub>	09/1992	S.P. Neigh
				Met	06/1992	SMP Neigh
0008	Rocky Flats - SE	9901 Indiana St.	Met	06/1992	SPM Neigh	
	0011	NREL	2054 Quaker St.	O <sub>3</sub>	06/1994	P.O. Urban
La Plata (067)	0004	Durango - RCH	1235 Camino del Rio	PM <sub>10</sub>	05/1985	Back Urban
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
	0010	Fort Collins - South	4407 S. College Ave.	CO	11/2002	P.O. Micro
	0011	Fort Collins - West	3416 La Porte Ave.	O <sub>3</sub>	05/2006	P.O. Neigh
	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	P.O. Neigh	
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
				PM <sub>2.5</sub> H	08/2005	P.O. Neigh
	0018	Grand Junction	645¼ Pitkin Ave.	CO	01/2004	P.O. Micro
				PM <sub>10</sub> H	08/2005	P.O. Micro
				Met	01/2004	SPM Neigh
0019	Clifton	32nd Rd & D Rd	PM <sub>10</sub>	??/2007	??	
Pitkin (097)	0006	Aspen - Library	120 Mill St.	PM <sub>10</sub>	05/2003	P.O. Middle
				PM <sub>10</sub> H	05/2002	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	SPM Neigh
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> St.	PM <sub>10</sub>	03/1987	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	County Justice Center	PM <sub>10</sub>	10/1992	P.O. Neigh
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
				PM <sub>2.5</sub> H	10/2003	P.O. Neigh
	0009	Weld County Tower	3101 35 <sup>th</sup> Ave.	O <sub>3</sub>	06/2002	P.O. Neigh
				Met	??/2007	??
	0010	Greeley - West Annex Bldg	905 10 <sup>th</sup> Ave.	CO	12/2003	P.O. Middle
0008	Platteville	1004 Main St.	PM <sub>2.5</sub>	08/1999	P.O. Region	

?? indicates that the monitor is not yet installed.

**Table 4 Monitoring Planned for 2007**

REGIONS	April, 2000 Census	July, 2005 Estimate	Percent Change	CO	SO <sub>2</sub>	NO <sub>x</sub>	O <sub>3</sub>	Met	PM <sub>10</sub> H	PM <sub>2.5</sub> H	TSP	PB	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>COLORADO</b>	<b>4,301,261</b>	<b>4,722,755</b>	<b>9.80</b>	<b>11</b>	<b>3</b>	<b>3</b>	<b>16</b>	<b>17</b>	<b>5</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>31</b>	<b>14</b>
<b>FRONT RANGE</b>	<b>3,511,956</b>	<b>3,866,854</b>	<b>10.11</b>	<b>10</b>	<b>3</b>	<b>3</b>	<b>16</b>	<b>14</b>	<b>3</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>8</b>	<b>13</b>
DNVR-BLDR REGION	2,400,570	2,627,322	9.45	6	3	3	11	11	3	4	1	1	5	4
DENVER PMSA	2,109,282	2,341,442	11.01											
Adams	363,857	405,561	11.46	1	1	1	1	2	1	1			2	1
Arapahoe	487,967	534,252	9.49				1	1						1
Broomfield		45,755												
Denver	554,636	571,848	3.10	3	2	2	3	3	2	2	1	1	3	2
Douglas	175,766	251,418	43.04				1	1		1				
Jefferson	527,056	532,608	1.05				4	4						
BOULDER PMSA/Co	291,288	285,880	-1.86	2			1							
<b>NORTH FRONT RANGE</b>	<b>432,430</b>	<b>500,732</b>	<b>15.79</b>	<b>3</b>			<b>3</b>	<b>2</b>		<b>1</b>			<b>2</b>	<b>3</b>
FORT COLLINS MSA	251,494	271,951	8.13	2			2	1					1	1
GREELEY MSA	180,936	228,781	26.44	1			1	1		1			1	2
COLO. SPRINGS MSA	537,484	587,696	9.34	1			2	2					1	1
El Paso	516,929	565,350	9.37	1			2	2					1	1
Teller	20,555	22,346	8.71											
PUEBLO MSA	141,472	151,104	6.81										1	1
<b>WESTERN SLOPE</b>	<b>459,423</b>	<b>513,332</b>	<b>11.73</b>	<b>1</b>				<b>1</b>	<b>2</b>				<b>21</b>	<b>1</b>
REGION 9	80,071	87,019	8.68										2	
Archuleta	9,898	11,716	18.37										1	
Dolores	1,844	1,846	0.11											
La Plata	43,941	48,019	9.28										1	
Montezuma	23,830	24,862	4.33											
San Juan	558	576	3.23											

**Table 4 Monitoring Planned for 2007 (Continued)**

REGIONS	April, 2000 Census	July, 2005 Estimate	Percent Change	CO	SO <sub>2</sub>	NO <sub>x</sub>	O <sub>3</sub>	Met	PM <sub>10</sub> H	PM <sub>2.5</sub> H	TSP	PB	PM <sub>10</sub>	PM <sub>2.5</sub>
REGION 10	86,348	94,835	9.83										4	
Delta	27,834	30,257	8.71										1	
Gunnison	13,956	14,264	2.21										2	
Hinsdale	790	821	3.92											
Montrose	33,432	37,880	13.30											
Ouray	3,742	4,303	14.99											
San Miguel	6,594	7,310	10.86										1	
REGION 11	198,906	222,739	11.98	1				1	1				10	1
Garfield	43,791	50,673	15.72										7	
Mesa	116,255	130,662	12.39	1				1	1				2	1
Moffat	13,184	13,426	1.84											
Rio Blanco	5,986	6,073	1.45											
Routt	19,690	21,905	11.25										1	
REGION 12	94,098	108,739	15.56						1				2	
Eagle	41,659	49,375	18.52											
Grand	12,442	13,906	11.77											
Jackson	1,577	1,531	-2.92											
Pitkin	14,872	16,420	10.41						1				1	
Summit	23,548	27,507	16.81										1	
<b>CENTRAL MTNS.</b>	<b>125,373</b>	<b>131,813</b>	<b>5.14</b>										<b>3</b>	
CLEAR CREEK. & GILPIN	14,079	14,486	2.89											
Clear Creek	9,322	9,510	2.02											
Gilpin	4,757	4,976	4.60											
PARK COUNTY	14,523	16,595	14.27											
REGION 13	73,702	76,529	3.84										1	
Chaffee	16,242	16,889	3.98											
Custer	3,503	3,964	13.16											
Fremont	46,145	47,727	3.43										1	
Lake	7,812	7,949	1.75											

**Table 4 Monitoring Planned for 2007 (Continued)**

REGIONS	April, 2000 Census	July, 2005 Estimate	Percent Change	CO	SO <sub>2</sub>	NO <sub>x</sub>	O <sub>3</sub>	Met	PM <sub>10</sub> H	PM <sub>2.5</sub> H	TSP	PB	PM <sub>10</sub>	PM <sub>2.5</sub>
REGION 14	23,069	24,203	4.92											
Huerfano	7,862	7,932	0.89											
Las Animas	15,207	16,271	7.00											
<b>SAN LUIS VALLEY</b>	<b>46,190</b>	<b>48,506</b>	<b>5.01</b>										<b>2</b>	
Alamosa	14,966	15,765	5.34										2	
Conejos	8,400	8,586	2.21											
Costilla	3,663	3,628	-0.96											
Mineral	831	946	13.84											
Rio Grande	12,413	13,043	5.08											
Saguache	5,917	6,538	10.50											
<b>EASTERN PLAINS</b>	<b>158,319</b>	<b>162,250</b>	<b>2.48</b>					<b>1</b>					<b>2</b>	<b>1</b>
REGION 1	69,669	72,165	3.58											
Logan	20,504	21,605	5.37											
Morgan	27,171	28,348	4.33											
Phillips	4,480	4,631	3.37											
Sedgwick	2,747	2,667	-2.91											
Washington	4,926	4,936	0.20											
Yuma	9,841	9,978	1.39											
REGION 5	36,201	38,693	6.88											1
Cheyenne	2,231	2,120	-4.98											
Elbert	19,872	22,786	14.66											1
Kit Carson	8,011	7,882	-1.61											
Lincoln	6,087	5,905	-2.99											
REGION 6	52,449	51,392	-2.02					1					2	
Baca	4,517	4,263	-5.62											
Bent	5,998	6,314	5.27											
Crowley	5,518	5,740	4.02											
Kiowa	1,622	1,533	-5.49											
Otero	20,311	19,569	-3.65											
Prowers	14,483	13,973	-3.52					1					2	

**Table 5 APCD Carbon Monoxide Monitors in Operation for 2007**

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
	0014	Boulder - Scott Carpenter	Thermo 48C	?	SLAMS
Denver 031	0002	Denver - CAMP	Thermo 48C	2	SLAMS
	0019	Denver Firehouse #6	Thermo 48C	1	SLAMS
	0025	Denver Animal Shelter	Thermo 48C-TLE	??	NCore
El Paso (041)	0015	Colorado Springs - Hwy 24	Thermo 48C	1	SLAMS
Larimer (069)	0010	Fort Collins - South	Thermo 48C	1	SLAMS
	1004	Fort Collins - Mason	Thermo 48C	1	SLAMS
Mesa (077)	0018	Grand Junction	Thermo 48C	1	SLAMS
Weld (123)	0010	Greeley - West Annex Bldg	Thermo 48C	1	SLAMS

?? indicates that the monitor is not yet installed.

**Table 6 APCD Ozone Monitors in Operation for 2007**

County	Site #	Site Name	Monitor Type	POC	Site Type
Adams (001)	3001	Welby	M.L. 8810	2	SLAMS
Arapahoe (005)	0002	Highland Reservoir	API 400A	1	SLAMS
Boulder (013)	0011	South Boulder Creek	API 400E	1	SLAMS
Denver (031)	0002	Denver - CAMP	API 400A	5	SLAMS
	0014	Denver - Carriage	API 400E	2	SLAMS
	0025	Denver Animal Shelter	API 400E	??	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	M.L. 8810	1	SLAMS
Jefferson (059)	0002	Arvada	API 400E	1	SLAMS
	0005	Welch	M.L. 8810	1	SLAMS
	0006	Rocky Flats - N	API 400E	1	SLAMS
	0011	NREL	M. L 8810	1	SLAMS
Larimer (069)	0011	Fort Collins - West	API 400E	1	SLAMS
	1004	Fort Collins - Mason	API 400E	1	SLAMS
Weld (123)	0009	Weld County Tower	API 400E	1	SLAMS

?? indicates that the monitor is not yet installed.



**Table 7 APCD Sulfur Dioxide/ Nitrogen Oxides Monitors in Operation for 2007**

County	Site #	Site Name	Monitor Type	POC	Site Type
Adams (001)	3001	Welby	SO2 API 100E	2	SLAMS
			NO API 200E	2	SPM
			NO2 API 200E	1	SLAMS
Denver (031)	0002	Denver - CAMP	SO2 API 100E	1	SLAMS
			NO API 200E	1	SPM
			NO2 API 200E	1	SLAMS
		Denver Municipal Animal Shelter	SO2 Ecotech 9850T	??	NCore

?? indicates that the monitor is not yet installed.

**Table 8 APCD Meteorological Monitors in Operation for 2007**

County	Site #	Site Name	Monitor Type	POC	Site Type
Adams (001)	0006	Commerce City	Met - One	1	SPM
	3001	Welby	Met - One	1	SPM
Arapahoe (005)	0002	Highland Reservoir	Met - One	1	SPM
Denver (031)	0002	Denver - CAMP	Met - One	1	SPM
	0014	Denver - Carriage	Met - One	1	SPM
	0021	Auraria Campus Met.	Met - One	1	SPM
	0025	Denver Animal Shelter	Met - One	??	SPM
Douglas (035)	0004	Chatfield State Park	Met - One	1	SPM
El Paso (041)	0015	Colorado Springs Hwy 24	Met - One	1	SPM
Jefferson (059)	0002	Arvada	Met - One	1	SPM
	0005	Welch	Met - One	1	SPM
	0006	Rocky Flats - N	Met - One	1	SPM
	0008	Rocky Flats - SE	Met - One	1	SPM
Larimer (069)	1004	Fort Collins - Mason	Met - One	1	SPM
Mesa (077)	0018	Grand Junction - Powell	Met - One	1	SPM
Powers (099)	0003	Lamar - Port of Entry	Met - One	1	SPM
Weld (123)	0009	Weld County Tower	Met - One	1	SPM

?? indicates that the monitor is not yet installed.

**Table 9 APCD TSP and Lead Monitors in Operation for 2007**

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

**Table 10 APCD PM<sub>10</sub> Monitors in Operation for 2007**

County	Site #	Site Name	Monitor Type	POC	Site Type	Sample
Adams	0006	Commerce City	R&P Partisol 2025	1	SLAMS	1/1
(001)	3001	Welby	SA/GMW-1200	2	SLAMS	1/6
			TEOM-1400ab	3	SLAMS	Hourly
Alamosa (003)	0001	Alamosa	SA/GMW-1200	1	SLAMS	1/1
	0003		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 - 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
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
	0008	New Castle - Library	SA/GMW-1200	1	SLAMS	1/3
	0009	Silt - Bell Ranch	SA/GMW-1200	1	SLAMS	1/3
	0010	Silt - Daley Ranch	SA/GMW-1200	1	SLAMS	1/3
	0011	Silt - Cox Ranch	SA/GMW-1200	1	SLAMS	1/3
	1001	Glenwood Springs	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	R&P Partisol 2025	3	SLAMS	1/3
			R&P Partisol 2000	4	SLAMS	1/6
	0018	Grand Junction	Met-One BAM	1	SLAMS	Hourly
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

**Table 10 APCD PM<sub>10</sub> Monitors in Operation for 2007 (Continued)**

County	Site #	Site Name	Monitor Type	POC	Site Type	Sample
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 2007**

County	Site #	Site Name	Monitor Type	POC	Site Type	Sample
Adams (001)	0006	Commerce City	R&P 2025 Sequential	1	SLAMS	1/3
			R&P 2025 Sequential	2	SLAMS	1/6
			TEOM-1400ab	3	SLAMS	Hourly
			SASS	5	SLAMS	1/3
Arapahoe (005)	0005	Arapahoe Community College	R&P 2025 Sequential	1	SLAMS	1/3
Archuleta (007)	0001	Pagosa Springs	R&P 2000 w/WINS	1	SLAMS	1/6
Boulder (013)	0003	Longmont - Municipal	R&P 2025 Sequential	1	SLAMS	1/3
			TEOM-1400ab	3	SLAMS	Hourly
	0012	Boulder Chamber of Commerce	R&P 2025 Sequential	1	SLAMS	1/3
	1001	Boulder - CU/Athens	TEOM FDMS	3	SLAMS	Hourly
Denver (031)	0002	Denver - CAMP	R&P 2025 Sequential	1	SLAMS	1/1
			R&P 2025 Sequential	2	SLAMS	1/6
			TEOM FDMS	3	SLAMS	Hourly
	0013	Denver - NJH	TEOM FDMS	3	SLAMS	Hourly
	0023	Denver - Swansea	R&P 2025 Sequential	1	SPM	1/1
	0025	Denver Animal Shelter	R&P 2025 Sequential	1	NCore	1/3
			TEOM FDMS	3	NCore	Hourly
Douglas (035)	0004	Chatfield State Park	R&P 2025 Sequential	1	SLAMS	1/3
			TEOM FDMS	3	SLAMS	Hourly
Elbert (039)	0001	Elbert County	R&P 2000 w/VSCC	1	SLAMS	1/3
El Paso (041)	0011	Colorado Springs - RBD	R&P 2025 Sequential	1	SLAMS	1/3
Larimer (069)	0009	Fort Collins - CSU	R&P 2025 Sequential	1	SLAMS	1/3
Mesa (077)	0017	Grand Junction - Powell	R&P 2025 Sequential	1	SLAMS	1/3
			R&P 2025 Sequential	2	SLAMS	1/6
	0018	Grand Junction - Powell	TEOM-1400ab	3	SLAMS	Hourly
Pueblo (101)	0012	Pueblo - Public Works	R&P 2025 Sequential	1	SLAMS	1/3
Weld (123)	0006	Greeley - Hospital	R&P 2025 Sequential	1	SLAMS	1/3
			TEOM-1400ab	3	SLAMS	Hourly
	0008	Platteville	R&P 2025 Sequential	1	SLAMS	1/3
			Met-One	5	SLAMS	1/6

## Carbon Monoxide Monitoring

In 2006 there were 13 monitors in operation. In 2007 the Division will operate 10 monitors. Four monitors have been discontinued they are the Arvada, National Jewish Hospital, Carriage and Colorado Springs I-25 monitors. The reason for this reduction in monitoring is the improvement in measured carbon monoxide levels. The levels have declined from a statewide maximum 1-hour value of 79 ppm in 1968 to a value of 3.9 ppm in 2006. The level of the standard has not been reached since 1999.

### Larimer & Weld Counties

Larimer and Weld counties have a population of 500,732 (July 2005 estimated census), an increase of 12.2 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, 708 S. Mason Street (069 1004)

The population of Fort Collins is 127,686 (July 2005 estimated census). This is an increase of 7.6 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.

### Fort Collins South, 4407 S. College Avenue (069 0010)

The second carbon monoxide monitor in Fort Collins was established in 2002. It is located at 4407 South College Avenue. This site was chosen in conjunction with the City of Fort Collins due to heavy traffic and population growth in the area. The readings at the Fort Collins –South site have been lower than those recorded at the 708 Mason Street monitor.

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

The population of Greeley is 88,249 (July 2005 estimated census). This is an increase of 14.7 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 terminated 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 to 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 2,614,808 (July 2005 estimated census). This is an increase of 8.5 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 78<sup>th</sup> Avenue and Steele Street and in Arvada at 57<sup>th</sup> Avenue and Garrison Street. 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 (013 0009)**

The town of Longmont is a growing, medium sized, Front Range community with a population of 81,678 (July 2005 estimated census). This is an increase of 14.9 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. Although the trend of 8-hour values has shown a decline in the past three years, the hourly values generally exceed those of both Boulder and Greeley. The elevated values are a concern since Longmont is much smaller than both these cities. There is no local meteorological monitoring associated with the carbon monoxide measurements.

## **Boulder, 29<sup>th</sup> Street & Arapahoe Avenue (013 0014)**

The city of Boulder is located about 30 miles to the northwest of Denver. The population estimate of the 2005 census is 94,673. This is an increase of 2.9 percent from the 2000 census. The 2150

28<sup>th</sup> Street site began operation in December 1993 it was terminated in May 2005 when the Division was told that the land was going to be renovated.

The Scott Carpenter Park is located on the eastside of the city of Boulder. The park is located at the southwest corner of 29<sup>th</sup> Street and Arapahoe Avenue. Monitoring was proposed commence at this location in 2007. However, due to new Federal monitoring requirements, it will likely not be installed.

### **Welby, 3174 E. 78<sup>th</sup> Avenue (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 November 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 pollution standard index (PSI).

### **Denver CAMP, 2105 Broadway (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 571,848 according to the 2005 estimate. 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 and since 2001 the second maximum 8-hour concentrations have been less than one-half of the standard.

### **Denver Firehouse #6, 1300 Blake Street (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.

### **Denver Municipal Animal Shelter, 678 S. Jason Street (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 604,291 according to the July 2005 estimate. 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 384,876 according to the July 2005 estimate. This is an increase of 6.3 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 and has not had an exceedance of the 8-hour NAAQS since 1989. The city was redesignated to an attainment area in 1999.

## **Colorado Springs, 690 W. Highway 24 (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 (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 575,929 (July 2005 estimate). This is an increase of 11.2 percent over the 2000 census. However, the population is not evenly distributed among the counties and ranges from Mesa County with 130,662 to Hinsdale County with only 821 according to the July 2005 estimate<sup>1</sup>. 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. However, only Grand Junction has a sufficient population base to require monitoring for carbon monoxide.

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

The Grand Junction 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 CDB 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 1.9 ppm in 2006.

Grand Junction is the largest city on the western slope with a population of 49,422 (July 2005 estimate). This is an increase of 17.7 percent from the 2000 census.

## **Planned Changes in the Carbon Monoxide Monitoring for 2007**

- 1) Possible installation of a site in Boulder at the Scott Carpenter Park.
- 2) Removal of Fort Collins - South site.
- 3) Installation of trace/precursor-level analyzer at the Denver Municipal Animal Shelter

## 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 2006.

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 2006**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Welby	6	6	7	7
Longmont	6	7	6	7
CAMP	6	6	6	7
NJH	6	7	6	7
Carriage	7	6	6	7
Firehouse	7	7	6	7
Glen	7	6	7	7
Highway 24	5	6	6	7
Arvada	7	7	6	7
Ft Collins South	7	6	7	7
Ft. Collins	7	6	6	6
Grand Junction	6	7	6	7
Greeley	7	5	7	7

**Table 13 Accuracy Audits for Carbon Monoxide in 2006**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Welby		1	1	1
Longmont	1		1	
CAMP	1		1	
NJH	1		1	1
Carriage		1	1	1
Firehouse		1		1
Glen		1		1
Highway 24		1		1
Arvada		1	1	1
Ft Collins South	1		1	
Ft. Collins	1		1	
Grand Junction		1		1
Greeley	1		1	



# OZONE

## Ozone Problem Identification

Ozone monitoring in the State by CDPHE is limited to counties along the Front Range of the Rocky Mountains. In addition non-state operated ozone monitors have operated in other locations on the western slope and Front Range. However, only the Front Range monitors have ever recorded exceedances of the 1-hour NAAQS for ozone. Since 1990, there have been seven sites that have exceeded the 1-hour standard. They are: Highlands Reservoir (2003), South Boulder (1993), Denver Carriage (2003), Chatfield Reservoir (1998, 2003), U.S. Air Force Academy (2004), NREL (1995, 2003) and Rocky Mountain National Park (1993).

Although several monitoring sites exceeded the level of the standard one or more times per year, the values recorded during the last three years show that none of the currently operating ozone monitors have recorded a fourth maximum 8-hour average greater than the level of the current standard. Therefore, Denver and the Front Range should remain in attainment for ozone.

## Larimer & Weld Counties

Larimer and Weld counties have a population of 500,732 (July 2005 estimated census), an increase of 12.2 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

Larimer and Weld Counties have a population of 500,732 (July 2005 estimate). This is an increase of 15.8 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 1-hour ozone NAAQS of 0.12 ppm only once since monitoring began in 1981. A review of the data shows that they are unlikely to exceed the level of the new 8-hour NAAQS of 0.08 ppm. 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 but would not have reached the level of the 8-hour standard.

## Fort Collins - West, 3416 W. LaPorte Avenue (069 0011)

The Fort Collins West monitor began operation in May of 2006. The location was established based on modeling and to satisfy permit conditions for a major source in Fort Collins area. The levels recorded for the first season of operation have shown consistently higher concentrations than the 708 Mason Street monitor. For 2006 the 8-hour average, 4<sup>th</sup> maximum was 0.087 ppm. The 4<sup>th</sup> maximum, 8-hour average at the Mason Street monitor was 0.078 ppm for the same period.

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

The population of Fort Collins is 127,686 (July 2005 population estimate). This is an increase of 7.6 percent from the 2000 census and a 0.6 percent increase over the 2004 population estimate. The Fort Collins ozone site has been in operation since 1981 and has recorded only one exceedance of the standard since it began operation. 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 (123 0009)**

The population of Greeley is 88,249 (July 2005 population estimate). This is an increase of 14.7 percent from the 2000 census and a 2.8 percent increase over the 2004 population estimate.

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. Its location along a green belt and beside the communications complex reduces any influence from traffic along 35<sup>th</sup> Avenue.

### **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 2,614,808 (July 2005 estimated census). This is an increase of 8.5 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 78<sup>th</sup> Avenue (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.

### **Highland Reservoir, 8100 S. University Boulevard (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. Operation will continue since the site regularly records levels between 80 and 90 percent of the NAAQS and has a good non-traffic orientation downwind from the Denver CBD.

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

The city of Boulder is located about 30 miles to the northwest of Denver. The Boulder population increased 2.9 percent from the 2000 census to 97,422 in the 2005 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. It has not even recorded the maximum level for the Boulder area. The review of the historic ozone data did not indicate that the South Boulder Creek monitor would exceed the 8-hour standard.

### **Denver, Carriage, 2325 W, Irving Street (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 1-hour NAAQS since 1987 and currently have relatively stable levels well below the 1-hour and 8-hour NAAQS.

### **Denver Municipal Animal Shelter, 678 S. Jason Street (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 (059 0002)**

The city of Arvada is located 15 miles west-northwest of the Denver CBD. It has a population of 103,704 according to the July 2005 population estimate. This is an increase of 1.5 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. Arvada has not had an exceedance of the NAAQS since 1988, but it still records some of the highest levels in the metro area, therefore, it will continue operation.

### **Welch, 12400 W. Highway 285 (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.

Monitoring so far has indicated that some levels at this location are lower than at other locations along the western edge of the Denver metropolitan area. As a result, this site will be reviewed after the 2007 ozone season to determine if it needs to be relocated for maximum concentration in the area.

### **Rocky Flats - N 16600 W. Highway 128 (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. Since that initial ozone study the Rocky Flats -N site has continued to record elevated 1-hour and 8-hour ozone levels.

### **NREL Solar Radiation Research Laboratory, 2229 Old Quarry Road (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. An exceedance of the 1-hour NAAQS was recorded in 1995 and thus there are no plans to change this monitoring location. This site typically records some of the highest 8-hour ozone concentrations in the Denver area.

### **Chatfield Reservoir, 11500 N. Roxborough Park Road (035 0002)**

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. No exceedances of the 1-hour NAAQS have been recorded.

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

This area has a population of 604,291 (July 2005 population estimate). This is an increase of 9.5 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 384,876 (July 2005 population estimate). This is an increase of 7.6 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, USAF Road 640 (041 0013)**

The United States Air Force Academy site was installed as a replacement maximum concentration ozone monitor for the Chestnut Street (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.

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

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. It was established because of concern that the “ozone cloud” was traveling farther up the canyon and the current monitoring network was not adequate. In its three seasons of operation it has not recorded any levels greater than the standard but in 2005 the levels have been as high as 0.082 ppm as an 8-hour average concentration.

**Planned Changes in Ozone Monitoring for 2007-2008**

- 1) Installation of an analyzer at the Denver Municipal Animal Shelter.
- 2) Shut down the analyzer at the Denver CAMP site after the ozone season.
- 3) Possible relocation of the Rocky Flats –N site at the end of the 2007 season due to power issues.

## 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 2006.

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 2006**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Welby	6	6	7	7
Highlands	7	7	7	6
S. Boulder Cr.	6	7	6	7
CAMP	5	7	6	7
Carriage	7	7	6	7
Chatfield	6	7	6	6
Academy	6	6	7	6
Manitou	7	6	7	7
Arvada	7	7	6	7
Welch	7	5	9	7
Rocky Flats N.	6	6	7	7
NREL	6	6	6	7
Ft. Collins West	n/a	1	9	7
Ft. Collins CSU	7	6	7	7
Greeley	7	6	7	7

**Table 15 Accuracy Audits for Ozone in 2006**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Welby		1	1	1
Highlands		1		1
S. Boulder Cr.	1		1	
CAMP	1			
Carriage		1	1	1
Chatfield		1	1	1
Academy		1		1
Manitou	1			1
Arvada		1	1	1
Welch	1		1	
Rocky Flats N.	1		1	
NREL		1		1
Ft. Collins West	n/a	1	1	
Ft. Collins CSU	1		1	
Greeley	1		1	

## **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 78<sup>th</sup> Avenue (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 (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> neighborhood 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.<sup>4</sup> 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, AADT, 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. Thus, the CAMP nitrogen dioxide site is representative of a neighborhood scale area.

### **Planned Changes in Nitrogen Dioxide Monitoring for 2007-2008**

There are no planned changes for nitrogen dioxide monitoring in 2007.

### 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 2006.

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 2006**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
CAMP	6	7	6	7
Welby	6	5	7	7

**Table 17 Accuracy Audits for Oxides of Nitrogen in 2006**

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



## **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 78<sup>th</sup> Avenue (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 (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> neighborhood 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.<sup>4</sup> 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 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 than just its own micro scale area. Thus, the CAMP sulfur dioxide site is representative of a neighborhood scale area.

### **Denver Municipal Animal Shelter, 678 S. Jason Street (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.

### **Planned Changes in Sulfur Dioxide Monitoring for 2007**

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

### 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 2006.

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 2006**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
CAMP	6	7	3	5
Welby	6	5	7	7

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

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

## **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 (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 78<sup>th</sup> Avenue (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 (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 (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 (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 (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 (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 (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 (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 (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 (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 (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. However it will be removed after the 2007 ozone season.

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

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

### **Grand Junction, 645¼ Pitkin Avenue (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, (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 2007**

- 1) Elimination of the Rocky Flats SE site at the end of 2007.
- 2) Installation of sensors at the Greeley – Weld County Tower site.
- 3) Installation of sensors at the Colorado Springs – Highway 24 site.
- 4) Installation of sensors at the Denver Municipal Animal Shelter site.

# PARTICULATE MONITORING

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

The following table shows change in number of PM<sub>10</sub> samples taken between 2005 and 2006.

**Table 20 Gross Filter Counts for PM<sub>10</sub> for 2005 and 2006**

	2005	2006	Total			
Number of filters processed	3064	5373	8437			
Number of gross weight duplicates	610	1077	1687			
Ratio of gross weights to duplicate samples	1:4.98	1:5.02	1:5.00			
Average difference between gross and duplicate samples	0.0001	0.0005				
Standard deviation	0.0004	0.0011				
Maximum	0.0025	0.0348				
Minimum	-0.0022	-0.0021				
	2005 Avg.	2005 Max	2005 Min	2006 Avg.	2006 Max	2006 Min
Days from Sample to Gross Weight	14	74	4	15	133**	-7*
Days from Gross Weight to update on PMT	17	103	1	12	50	1
Days from Sample to update on PMT	32	140*	6	27	148**	2

\*- These values along with another from the same site are under review and are probably a data entry error.

\*\* - This value is affected by problems with the Aspen operator.

### Commerce City 7101 Birch Street (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 Alsop 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.

While there were no wind speed or wind direction measurements taken at the Adams City location, the site is close to the Welby meteorological monitoring site (about 1.7 km to the southeast). Therefore, meteorological information from the Welby site is used to characterize the Adams City and Commerce City sites. Commerce City added a meteorological station in 2003, as required by Chemical Speciation Trends sites. There has not been enough validated data from this site to characterize the wind patterns at this time. Thus, wind data from the Welby site are used here to characterize the winds at the Commerce City site. Generally, prevailing winds blow from the west-southwest, southwest, and the northeast, while secondary directions at this site occur from the north and north-northeast.

The Commerce City PM<sub>2.5</sub> site meets all neighborhood scale criteria as stated in the federal guidelines (40 CFR, Part 58, Appendix D).

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

Welby is 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. 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, 208 Edgemont Boulevard (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 8,488 (July 2005 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, 425 4<sup>th</sup> Street (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 (007 0001)**

Pagosa Springs has a population of 1,640 (July 2005 population estimate). This is an increase of 1.2 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 is located 275 meters (inlet to inlet) to the northeast. The samplers were located near the middle of the first story roof. They were moved closer to the edge of the roof in September 2003, to remain collocated with the PM<sub>10</sub> samplers, which were moved to better capture street emissions. The old location on the Middle school roof may have prevented ambient PM<sub>10</sub> from reaching the sampler due to the roof configuration.

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, 3<sup>rd</sup> Avenue and Kimbark Street (013 0003)**

The town of Longmont is a growing, medium sized, Front Range community with a population of 81,678 (July 2005 estimated census). This is an increase of 14.9 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, 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 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 AADT controlling street easily falls into the neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

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

Delta has a population of 7,659 (July 2005 population estimate). This is an increase of 0.2 percent from the 2000 census. Delta is a small agricultural community midway between Grand Junction and Montrose. There is only one major point source air pollution source of particulate matter in the vicinity, Louisiana Pacific's plywood manufacturing facility. 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. So, Delta sits in a large bowl shaped basin that can effectively trap air pollution especially during persistent temperature inversions.

The location of the Delta County Health Department was chosen because it sits in a large basin with the potential for high PM<sub>10</sub> due to agricultural burning, automobile traffic and the Louisiana Pacific plant. Delta also had an existing PM<sub>10</sub> site and it had been determined to be representative of residential impacts of PM<sub>10</sub>.

#### **Denver CAMP, 2105 Broadway (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> neighborhood 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, AADT, 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 area. Thus, the CAMP PM<sub>10</sub> site is representative of a neighborhood scale area. The given distance and traffic estimate easily falls into the micro scale in accordance with federal guidelines found in the 40 CFR, Part 58, Appendix D.

#### **Denver Visitor Center, 225 W. Colfax Avenue (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 was 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 (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.

### **Colorado Springs, 101 Costilla Street (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. (4267 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>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.

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

Cañon City is located 39 miles west of Pueblo. It has a population of 15,760 (July 2005 population estimate). This is an increase of 2.1 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 current monitor began operation in October 2004.

### **Garfield County Sites**

Garfield County has been subject to a significant amount of natural gas exploration and extraction in recent years. As a result, public concern has been raised in regard to the potentially degraded air quality. This study does not focus on industry-related air quality itself, but rather, characterizes the air quality concerns throughout the county of all types (particulates, and volatiles). The overlying purpose of the study described within this proposal, is to evaluate the air quality characteristics within Garfield County.

This proposed program is a collaborative effort designed to meet the concerns of the Garfield County public, overlap with the Colorado Department of Public Health and the Environment (CDPHE) as well as local industry air quality sampling efforts. It does not replace existing agency or industry programs, but rather provides supplemental information characterizing the county air quality as a whole.

The following seven sites are involved with this study:

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

Parachute has a population of 1,360 (July 2005 population estimate). This is an increase of 1.6 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 annual standard for PM<sub>10</sub> of 50µg/m<sup>3</sup>.



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

Rifle has a population of 8,118 (July 2005 population estimate). This is an increase of 4.6 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.

**New Castle, 402 W. Main Street (045 0008)**

New Castle has a population of 3,148 (July 2005 population estimate). This is an increase of 6.7 percent from the 2000 census. The New Castle monitor began operation in May 2005 as a part of the Garfield County study. The site is located on the roof of the library.

**Silt - Bell Ranch, 512 Owens Drive (045 0009)**

The Bell Ranch site is approximately 4 miles south of the town of Silt. This site and the other sites were established as a part of the study and the locations were chosen by Garfield County with citizen involvement.

**Silt - Daley Ranch, 884 County Road 327 (045 0010)**

The Daley Ranch is approximately 8.5 miles south of the town of Silt. This site and the other sites were established as a part of the study and the locations were chosen by Garfield County with citizen involvement.

**Silt - Cox Ranch, 5933 County Road 233 (045 0011)**

The Cox Ranch is approximately 1 mile northwest of the town of Silt. This site and the other sites were established as a part of the study and the locations were chosen by Garfield County with citizen involvement.

**Glenwood Springs, 109 8<sup>th</sup> Street (045 1001)**

Glenwood Springs has a population of 8,603 (July 2005 population estimate). This is an increase of 1.0 percent from the 2000 census. The Glenwood Springs site began operation in October 1986. The site was terminated in 2001. However it resumed operation as a part of the Garfield study in May of 2005. There are no industrial sources of PM<sub>10</sub> in the area but concern about the heavy traffic from I-70 and local wood burning prompted the State to install a monitor.

The site is located on the Fire Station south of the Colorado River Valley and I-70. The areas to the north, east and south are residential while the west is primarily commercial. This setting makes it representative of a large portion of the city's population exposure from wood burning and traffic emissions.

**Crested Butte, Colorado 135 & Whiterock Avenue (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 1,572 (July 2005 population estimate). This is an increase of 1.9 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 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 (051 0007)**

Mount Crested Butte has a population of 752 (July 2005 population estimate). This is an increase of 1.2 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 (067 0004)**

Durango has a population of 15,878 (July 2005 population estimate). This is an increase of 1.6 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, 251 Edison Street (069 0009)**

The population of Fort Collins is 127,686 (July 2005 estimated census). This is an increase of 7.6 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 (077 0017)**

Grand Junction is the largest city on the western slope, with a population of 49,422 (July 2005 population estimate). This is an increase of 2.3 percent from the 2000 census.

This site monitors both 24-hour and hourly PM<sub>10</sub>. In addition, the Powell location also monitors carbon monoxide, wind speed, wind direction, and temperature.

### **Grand Junction - Pitkin, 645¼ Pitkin Avenue (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.

### **Aspen, 120 Mill Street (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 is classified as nonattainment for PM<sub>10</sub>. 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 6,399 (July 2005 population estimate). This is an increase of 8.2 percent from the 2000 census.

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 micro scale location.

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

Lamar is one of the largest cities on the Eastern Plains with a population of 8,605 (2005 population estimate). This is a decrease of 3.0 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 (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 be designated as a PM<sub>10</sub> nonattainment area. 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 (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 µg/m<sup>3</sup> and both sites regularly record values above 100µg/m<sup>3</sup> as a 24-hour average.

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

The population of Pueblo is 104,169 (July 2005 estimated census). This is an increase of 0.1 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 - 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 neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

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

The population of Steamboat Springs is 10,846 (July 2005 estimated census). This is an increase of 1.0 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 (117 0002)**

The population of Telluride is 2,339 (July 2005 estimated census). This is an increase of 0.2 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 (119 0002)**

Breckenridge is a community with a population of 3,359 (July 2005 population estimate). This is an increase of 39.5 percent from the 2000 census. However, these numbers reflect only the permanent population, not the number of tourists that arrive for skiing. For example according to the Chamber of Commerce, there were an estimated 20,000 people in the town during the Christmas week of 1992. 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 (123 0006)**

The population of Greeley is 88,249 (July 2005 population estimate). This is an increase of 14.7 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 at the first of 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 2007**

- 1) The Cox Ranch site will be removed in May 2007 when the owner sells the property.
- 2) The Lamar Power Plant monitor will be removed in 2007 or 2008 due to conversion of the plant to coal burning.
- 3) Establishing a replacement for the Lamar Power Plant site in 2007 or 2008.

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

### **Commerce City, 7101 Birch Street (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.

### **Arapahoe Community College, 6190 S. Santa Fe Drive (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 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 one story building 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 may not be as high as other Denver locations.

Meteorological data for this area is obtained from the nearest APCD site located in nearby Englewood, about 6.1 km northeast of the ACC site. 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, 3<sup>rd</sup> Avenue and Kimbark Street (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 (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 middle scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D. However, the Division has determined that this middle scale site is representative of many similar middle

scale sites in this area of Boulder due to similar site characteristics. Thus, the Boulder Chamber of Commerce PM<sub>2.5</sub> site is representative of a neighborhood scale area. The site meets all other neighborhood scale criteria.

#### **Boulder – CU, 2120 Athens Street (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 (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> neighborhood 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, AADT, 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. Thus, the CAMP PM<sub>2.5</sub> site is representative of a neighborhood scale area. The given distance and traffic estimate easily falls into the micro scale in accordance with federal guidelines found in the 40 CFR, Part 58, Appendix D.

#### **Denver NJH-E, 14<sup>th</sup> Avenue & Albion Street (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 (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 (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 (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, Wright-Inghram Institute (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, 101 Costilla Street (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.

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

The population of Fort Collins is 127,686 (July 2005 estimated census). This is an increase of 7.6 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 (077 0017)**

The Division operates the weather station at the Powell PM<sub>2.5</sub> sites. Winds in Grand Junction are predominately out of the southeast, east-southeast, and south-southeast, with secondary winds mostly out of the northwest and east.

The PM<sub>2.5</sub> site located at 650 South Avenue. The distance and traffic estimate for the site streets easily fall into the neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D. The site meets all other neighborhood scale criteria.

### **Pueblo - Public Works, 211 S. D Street (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 – 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 neighborhood scale in accordance with federal guidelines found in 40 CFR, Part 58, Appendix D.

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

The population of Greeley is 88,249 (July 2005 estimated census). This is an increase of 14.7 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<sub>2.5</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, Appendix D.

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

The population of Platteville is 2,616 (July 2005 estimated census). This is an increase of 1.6 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<sub>2.5</sub>. These characteristics also make it an ideal location for chemical



speciation sampling, which began at the end of 2001.

The Platteville site is located at 1004 Main Street at the South Valley Middle School, located on the south side of town on Main Street. The school is a one-story building and it has a roof hatch from a locked interior room providing easy access to its large flat roof. There is a 2-story gym attached to the building approximately 28 meters to the Northwest of the monitor. The location of the Platteville monitor 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 2007

- 1) Addition of PM<sub>2.5</sub> TEOM in 2007 for hourly reporting in Colorado Springs.

### 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 2006**

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	1	16	4	4	
Commerce City (collocated)		4					
Welby				4			4
Globeville Clinicare					8		
Chatfield Reservoir		4				4	
Brighton				4			
Alamosa - ASC				16			
Alamosa - Municipal Bldg				16			
Arapahoe Community College		4					
Pagosa Springs. Middle School		4		16			
Longmont		4		4		5	
Boulder Chamber of Commerce		4		4			
Boulder Marine Street						4	
Delta		4		8			
Denver - CAMP	4	4		4	4	4	4
Denver - CAMP (collocated)		4		4			
Denver Municipal Animal Shelter (primary)				4			4
Denver Municipal Animal Shelter (collocated)				4			
Denver - Swansea		4					
Denver Visitor Center				15			
Denver - NJH						4	
Denver - LARS				8			
Elbert		4					
Colorado Springs - Meadowlands		4		8			
Colorado Springs - RBD		4		4	4		
Co. Springs - RBD (collocated)				4			
Canon City				4			
Parachute				7			
Glenwood Springs				8			

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>
New Castle				8			
Rifle				8			
Silt-Bell				8			
Silt - Cox				8			
Silt - Daley				8			
Crested Butte				8			
Mt. Crested Butte		4		16			
Gunnison				8			
Leadville					4		
Durango - Courthouse				8			
Durango - Cutler				1			
Durango River City Hall				8			
Durango - Grandview				8			
Ft. Collins - CSU		4		8			
Grand Junction Powell		4	4			4	
Grand Junction Powell (collocated)		4	4				
Aspen Library				8			
Lamar Power Plant				16			
Lamar Municipal Bldg				16			
Pueblo Public Works		4		8			
Steamboat Springs				16			
Telluride		4		8			
Breckenridge				16			
Cripple Creek				16			
Greeley	4	4		8		4	
Platteville		4					
<b>Total Particulate Audits</b>	<b>12</b>	<b>88</b>	<b>9</b>	<b>379</b>	<b>24</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 2006**

Site	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
<b>TSP</b>				
Denver Municipal Animal Shelter	14	14	14	13
<b>Lead</b>				
Denver Municipal Animal Shelter	14	13	14	13
<b>PM10 High-Volume</b>				
Denver - CAMP	13	15	14	14
Denver Municipal Animal Shelter	11	14	13	14
Colorado Springs - RBD	15	15	15	16
<b>PM10 Low-Volume</b>				
Grand Junction	10	9	14	16
<b>PM2.5 FEM</b>				
Commerce City	15	15	15	18
Denver - CAMP	15	15	15	12
Grand Junction	15	15	14	15
<b>PM2.5 Continuous</b>				
Commerce City	6	5	6	4
Longmont			5	6
Boulder	2		3	5
Denver - CAMP	5	5	6	5
Denver - NJH	3	6	6	8
Chatfield	6	5	5	5
Grand Junction	1	3	3	2
Greeley	1	3	6	4
<b>PM10 Continuous TEOM</b>				
Welby	6	5	5	7
Denver - CAMP	7	5	6	6
Denver Municipal Animal Shelter	6	5	5	7
<b>PM10 Continuous Beta</b>				
Grand Junction	2	1		2

## **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 statewide 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 (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 2007**

There are no planned changes to the TSP/Lead monitoring for 2007.





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**Colorado Department  
of Public Health  
and Environment**