# Wyoming Ambient Air Monitoring Annual Network Plan 2012

June 20, 2012

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# 1.0 Introduction

The United Sates Environmental Protection Agency (EPA) through the Code of Federal Regulations (CFR) and the Performance Partnership Agreement requires the State of Wyoming Department of Environmental Quality, Air Quality Division (AQD) to complete the Wyoming Ambient Air Monitoring Annual Network Plan for the State's ambient air monitoring sites. The Wyoming Department of Environmental Quality (WDEQ) strives to protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

## *1.1 The AQD Monitoring History*

Since the 1970's the AQD Monitoring Program has been working actively to evaluate monitoring requirements and use available resources effectively for the State of Wyoming. The Air Quality Resource Management Program serves the Division by looking at monitored data in conjunction with emission inventory trends and planned development to shape the AQD's air quality management policies in the future. Not only does the AQD run the State and Local Air Monitoring Sites (SLAMS) to monitor public health, but also runs or oversees several special purpose monitors (SPM) to track impacts from the many industrial sources that reside in Wyoming. The AQD also helps fund and evaluate data from Air Quality Related Value (AQRV) monitoring within Wyoming, such as visibility and acid deposition.

## *1.2 General Monitoring Goals and Objectives*

The Wyoming AQD has the responsibility to protect, conserve, and enhance the quality of Wyoming's air resource. The AQD helps ensure the ambient air quality in the State of Wyoming is maintained in accordance with the National Ambient Air Quality Standards (NAAQS). To carry out this goal, the AQD operates and maintains a network of ambient air quality monitors and requires industrial pollution sources to conduct source specific ambient air monitoring.

The Wyoming monitoring network, as a whole, is designed to meet the following seven basic ambient air monitoring objectives:

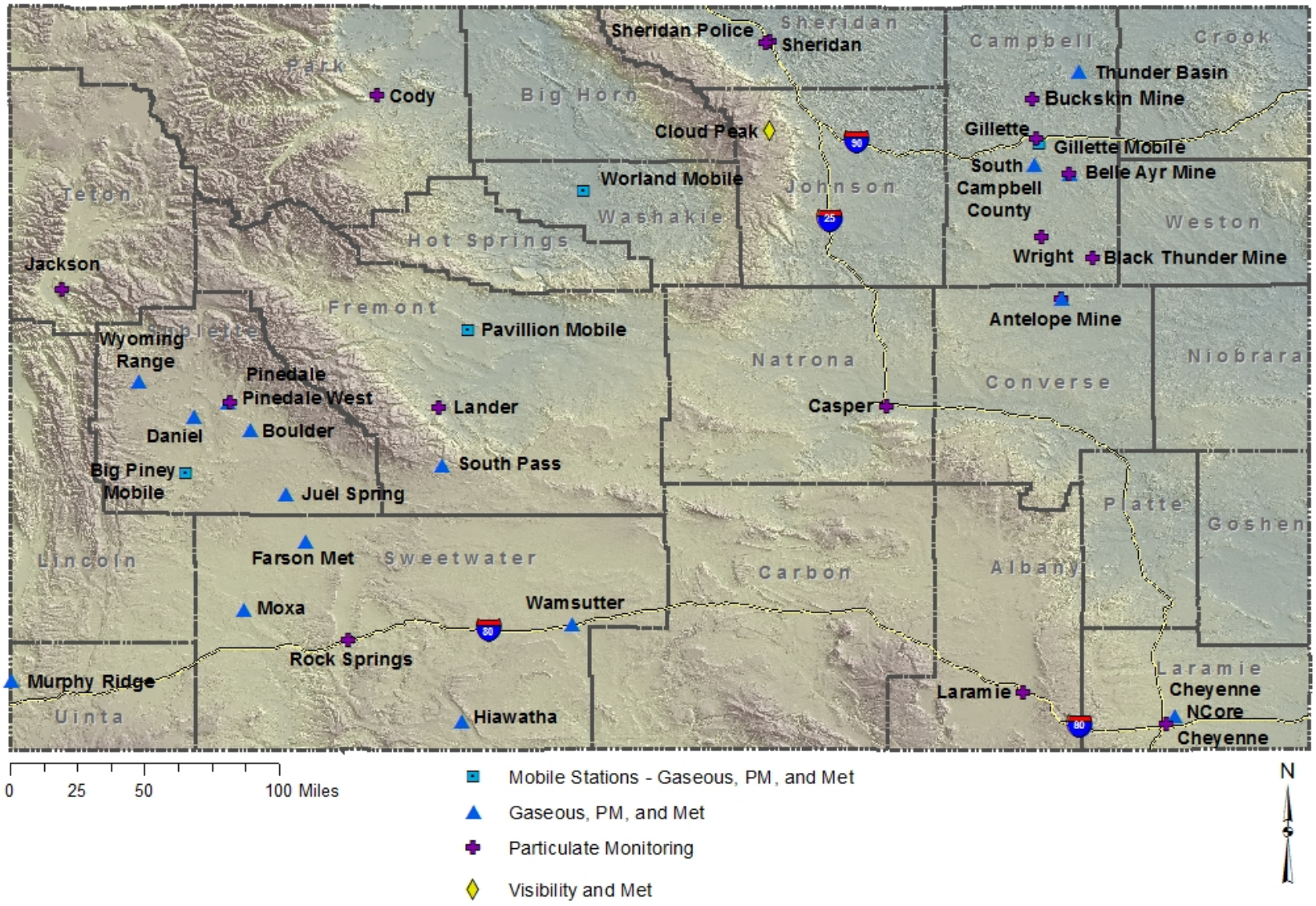
1) Determine representative concentrations in areas of high population density
2) Determine impact on ambient air quality from significant sources
3) Determine general background concentration levels
4) Determine the extent of regional pollutant transport among populated areas and in rural and remote areas
5) Determine welfare-related impacts in support of secondary standards
6) Determine highest concentration expected to occur in the area covered by the network
7) Research pollutant and meteorological behaviors in areas of concern

Not every monitor will meet each one of the objectives, but the complete monitoring network will encompass all seven objectives.

The following map shows the Wyoming monitor locations separated into Particulate Matter, Gaseous, Visibility and Mobile sites.

The table below provides a brief overview of the Wyoming Monitoring Network.

State of Wyoming
Ambient Air Quality Monitors



# Overview of Wyoming Monitors

| Name | County | PARAMETER | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $PM_{10}$ (manual) | $PM_{10}$ (continuous) | $PM_{2.5}$ (manual) | $PM_{2.5}$ (continuous) | $NO_X$ | $O_3$ | $SO_2$ | CO | Camera | Met | Other |
| Laramie | Albany Co | X | | X | | | | | | | | |
| Belle Ayr Mine | Campbell Co | | | | X | X | | | | | X | |
| Black Thunder Mine | Campbell Co | | | | X | | | | | | | |
| Buckskin Mine | Campbell Co | | | | X | | | | | | | |
| Campbell County | Campbell Co | | X | | | X | X | | | X | X | |
| Gillette | Campbell Co | X | | | | | | | | | | |
| Gillette (Mobile # | Campbell Co. | | X | | X | X | X | | | X | X | Methane/NMHC* |
| Thunder Basin | Campbell Co | | | | | X | X | | | X | X | Visibility |
| Wright | Campbell Co | X | | | | | | | | | | |
| Antelope Mine | Converse Co | | | | X | X | | | | | X | |
| Lander | Fremont Co | X | | X | | | | | | | | |
| Pavillion (Mobile # | Fremont Co | | X | | X | X | X | | | X | X | Methane/NMHC* |
| South Pass | Fremont Co | | X | | | X | X | | | X | X | Aerosol |
| Cloud Peak | Johnson Co | | | | | | | | | X | X | Visibility |
| Cheyenne | Laramie Co | X | | X | | | | | | | | |
| Cheyenne NCore | Laramie Co | | | X | X | X | X | Trace | Trace | X | X | NO/NOy, $PM_{10-2.5}$, Speciated $PM_{2.5}$ |
| Casper | Natrona Co | X | | X | | | | | | | | |
| Cody | Park Co | X | | X | | | | | | | | |
| Sheridan - Highland Park/Meadowlark | Sheridan Co | X | | X | | | | | | | | |
| Sheridan - Police Station | Sheridan Co | | X | X | | | | | | | | |
| Big Piney (Mobile # | Sublette Co | | X | | X | X | X | | | X | X | Methane/NMHC* |
| Boulder | Sublette Co | | X | | | X | X | | | X | X | Visibility, $NO_y$ Methane/NMHC* Photolytic $NO_2$ |
| Daniel South | Sublette Co | | X | | | X | X | | | X | X | |
| Farson | Sublette Co | | | | | | | | | | X | |
| Juel Spring | Sublette Co | | | | | X | X | | | X | X | |
| Pinedale | Sublette Co | | | X | X | X | X | | | X | X | |
| Hiawatha | Sweetwater Co | | | | | | X | | | X | X | |
| Moxa | Sweetwater Co | | X | | | X | X | X | | X | X | |
| Rock Springs | Sweetwater Co | X | | X | | | | | | | | |
| Wamsutter | Sweetwater Co | | X | | | X | X | | | X | X | |
| Wyoming Range | Sweetwater Co | | X | | X | X | X | | | X | X | |
| Jackson | Teton Co | X | | X | | | | | | | | |
| Murphy Ridge | Uinta Co | | X | | X | X | X | | | X | X | |

*Non Methane Hydrocarbons

# 2.0 Air Monitoring Plan in 2012

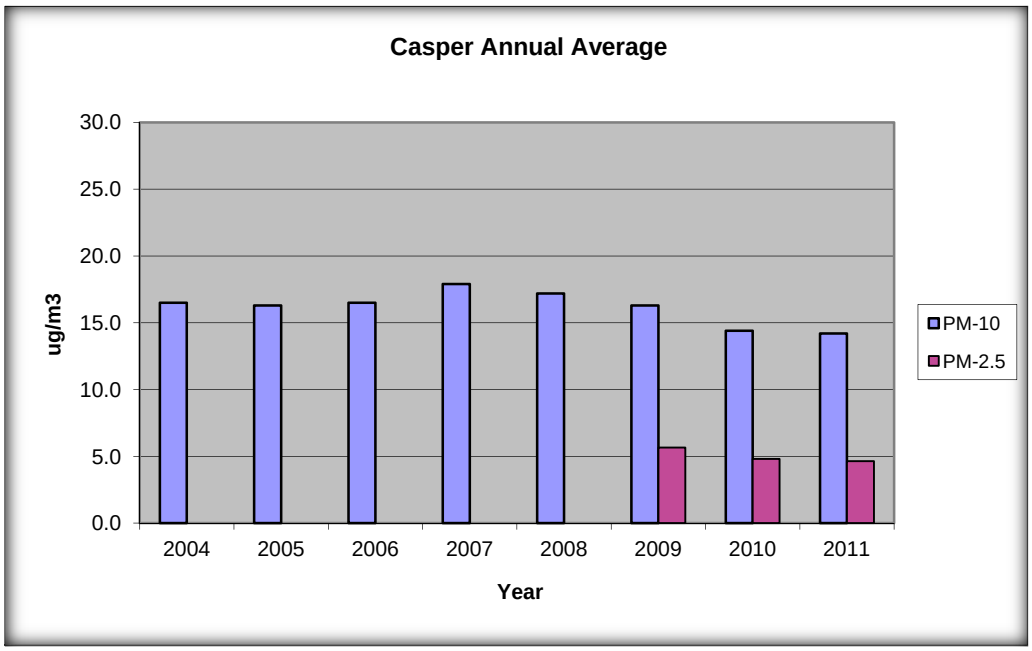
## *2.1 State and Local Air Monitoring Sites (SLAMS)*

The State and Local Air Monitoring Sites (SLAMS) are used for supplying general monitoring data for criteria pollutants and determining compliance with the NAAQS. The SLAMS are relatively stable sites that must meet and follow specific quality assurance, monitoring methodology, sampling objective and siting requirements. The AQD SLAMS sites have been placed in Wyoming's most populous towns with the purpose of determining compliance with NAAQS for the protection of public health. The ten sites specified as Wyoming SLAMS locations are described below:

### 2.1.1 Casper

| Casper Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Casper $PM_{10}$ with collocation | City, County Bldg; Center & C Streets (Casper MSA) | 56-025-0001 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3<br><br>Collocation 1/12 | No planned changes; collocation frequency change (7/1/12) |
| Casper $PM_{2.5}$ | City, County Bldg; Center & C Streets (Casper MSA) | 56-025-0001 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |

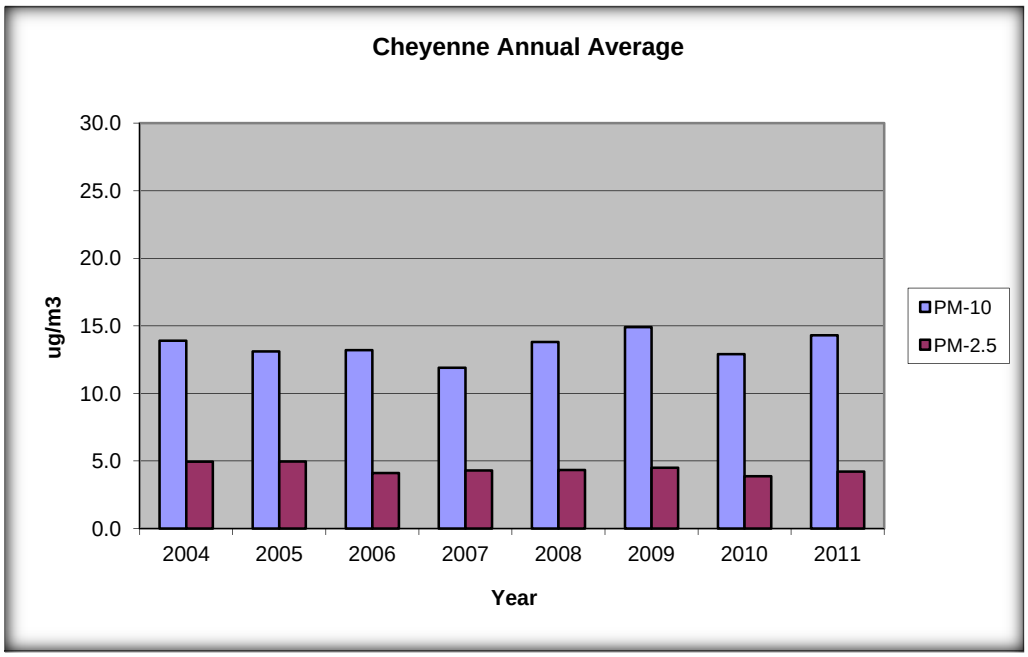
This site is located in downtown Casper, a city of approximately 55,300 people. Casper is the second largest city in Wyoming, located in Natrona County near the center of the State. This site is in the Casper, Wyoming Metropolitan Statistical Area (MSA). $PM_{10}$ sampling began at this site in 1991. A collocated $PM_{10}$ sampler was added in 2001. The Casper monitoring site hi-volume $PM_{10}$ samplers were replaced with low-volume partisols during 2010. The AQD added $PM_{2.5}$ sampling at the Casper site on May 22, 2009. The AQD is interested in monitoring $PM_{2.5}$ concentrations in Casper because it is one of Wyoming's most heavily populated areas.



### 2.1.2 Cheyenne

| Cheyenne Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Cheyenne $PM_{10}$ with collocation | State Office Building 23rd & Central Ave. (Cheyenne MSA) | 56-021-0001 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3<br><br>Collocation 1/12 | No planned changes: collocation frequency change (7/1/12) |
| Cheyenne $PM_{2.5}$ with collocation | State Office Building 23rd & Central Ave. (Cheyenne MSA) | 56-021-0001 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3<br><br>Collocation 1/12 | No planned changes: collocation frequency change (7/1/12) |

The Cheyenne monitoring site is located in downtown Cheyenne on a State of Wyoming building. Cheyenne's population is approximately 59,500 people; it is the capital and largest city in Wyoming. This site is in the Cheyenne, Wyoming MSA. The $PM_{10}$ sampling began at this site in 1991. A collocated $PM_{10}$ sampler was added in 2002. The $PM_{2.5}$ monitors were installed in 1998. A collocated $PM_{2.5}$ sampler was added in March, 2009 to comply with 40 CFR Part 58 requirements for collocation of samplers.

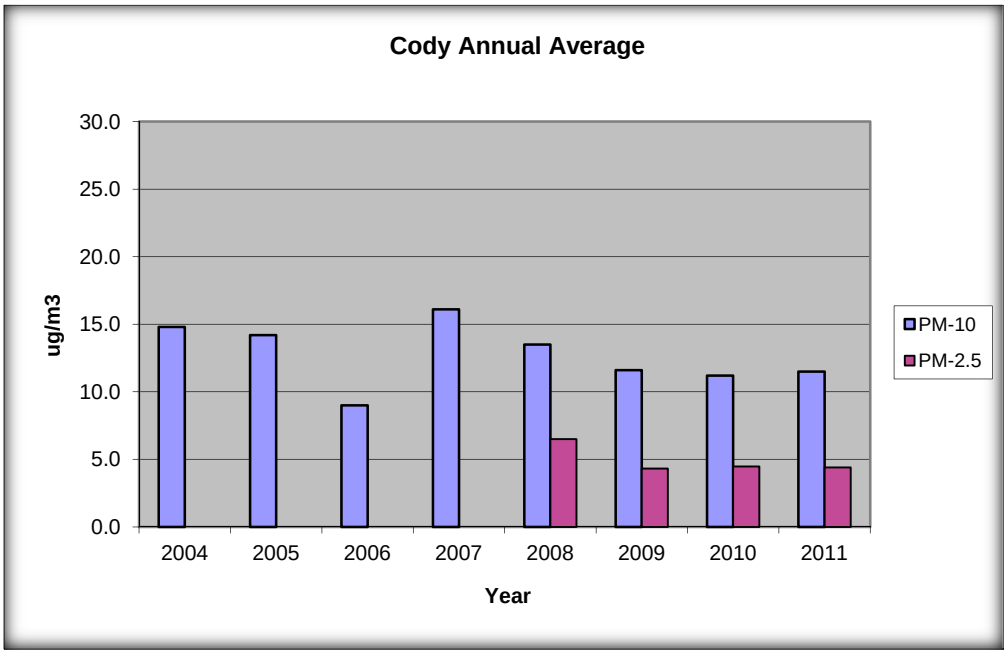

Cheyenne Annual Average
30.0
25.0
20.0
15.0
10.0
5.0
0.0
ug/m3
2004
2005
2006
2007
2008
2009
2010
2011
Year
PM-10
PM-2.5

### 2.1.3 Cody


120
14
291
16

| Cody Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Cody $PM_{10}$ | Cody Jr. High School | 56-029-0001 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |
| Cody $PM_{2.5}$ | Cody Jr. High School | 56-029-0001 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |

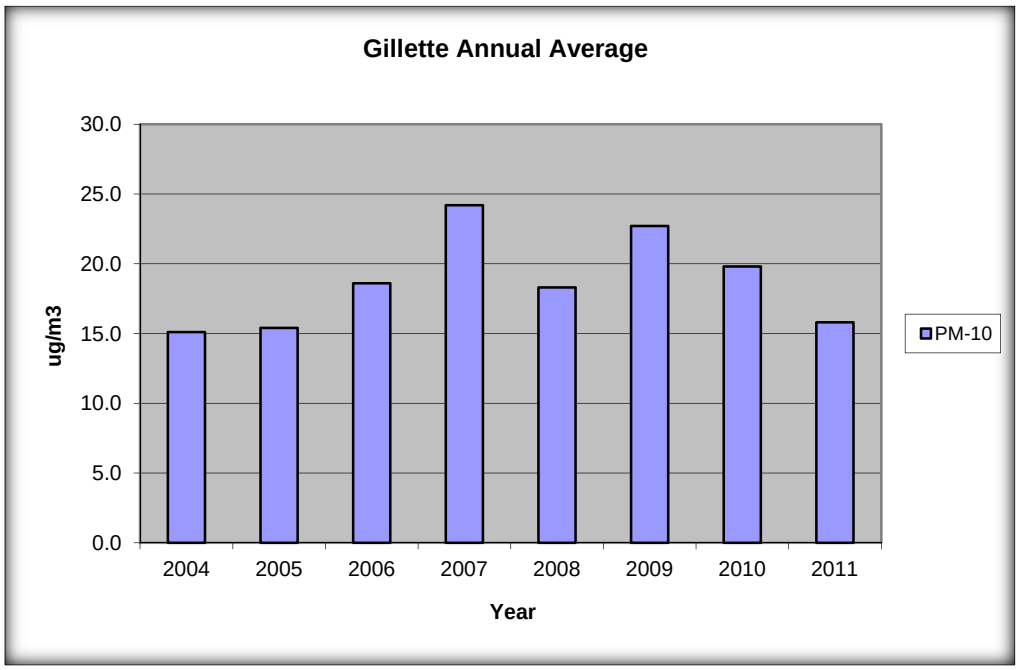
Cody is located in the northwest portion of the State situated in Park County; its population is approximately 9,500. $PM_{10}$ sampling began at this site in 1988. Cody $PM_{2.5}$ monitoring started in June, 2008. The AQD is interested in monitoring $PM_{2.5}$ concentrations in Cody to monitor impacts from wintertime sanding, wood smoke, summertime forest fires, and the nearby lake bed that can be exposed when available water is low. The Cody $PM_{10}$ samplers were upgraded to more reliable low-volume samplers during 2010.



### 2.1.4 Gillette


| Gillette Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Gillette $PM_{10}$ | 1000 West 8th Street | 56-005-1002 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/6 | No planned changes |

Gillette is located in Campbell County Wyoming; its population is approximately 29,100 and is considered a micropolitan statistical area. $PM_{10}$ sampling began at this site in 1991. The Gillette $PM_{10}$ sampler was upgraded to a more reliable low-volume sampler during 2010.

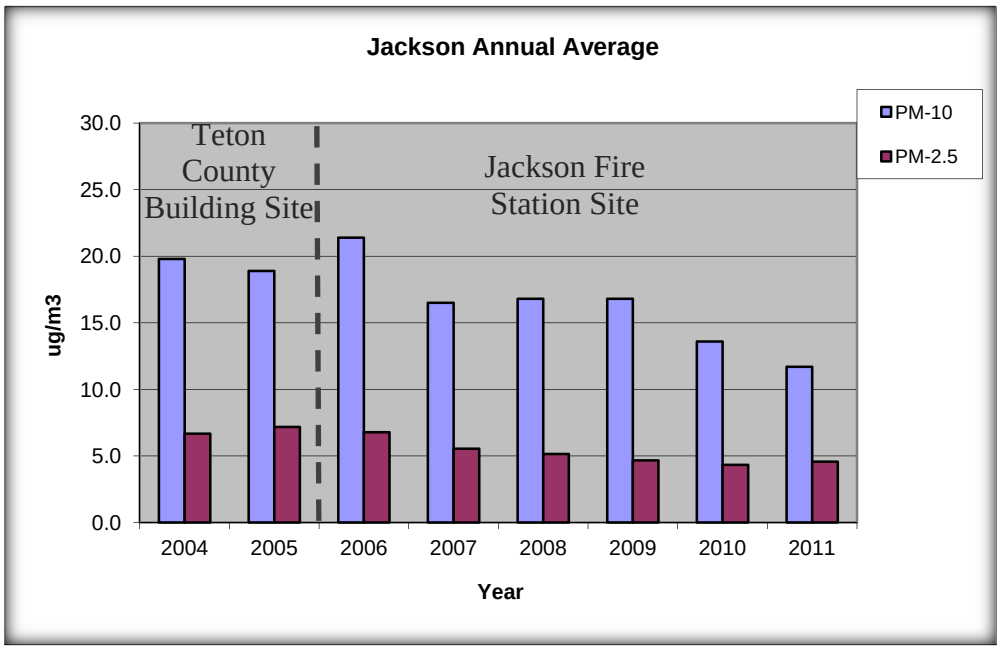

Gillette Annual Average
30.0
25.0
20.0
15.0
10.0
5.0
0.0
ug/m3
2004
2005
2006
2007
2008
2009
2010
2011
Year
PM-10

## 2.1.5 Jackson


26
22

| Jackson Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Jackson $PM_{10}$ | 40 E Pearl Ave. | 56-039-1006 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |
| Jackson $PM_{2.5}$ | 40 E Pearl Ave. | 56-039-1006 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |

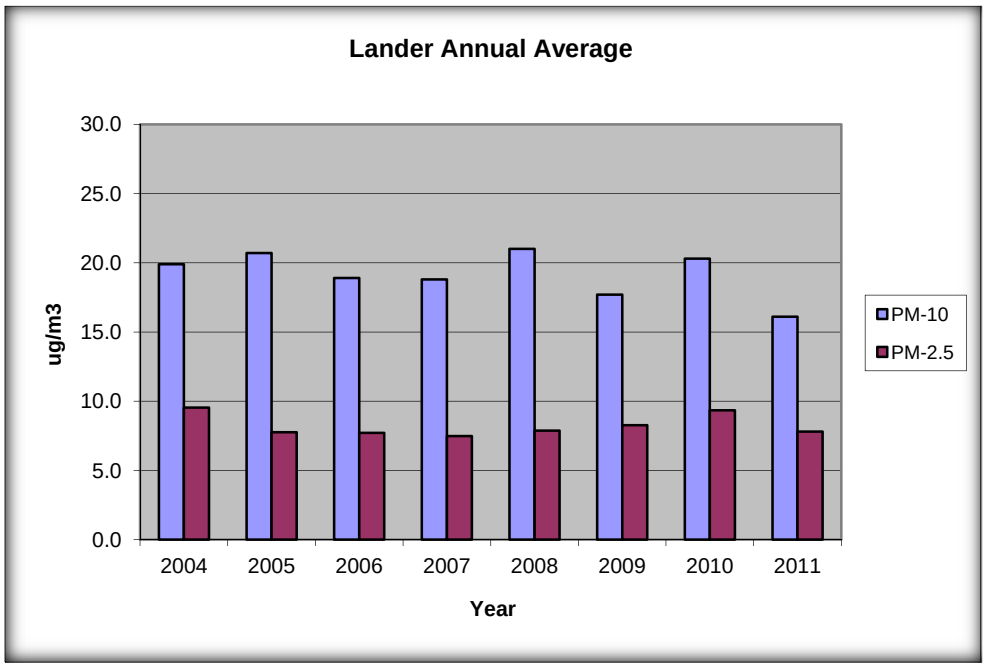
Jackson is located in Teton County in northwest Wyoming. Jackson is considered a micropolitan statistical area with a population of approximately 9,600. $PM_{10}$ and $PM_{2.5}$ sampling began in Jackson in 2001. Sampling at the current location began in 2006.



### 2.1.6 Lander


| Lander Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Lander $PM_{10}$ | 600 Washington | 56-013-1003 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |
| Lander $PM_{2.5}$ | 600 Washington | 56-013-1003 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |

The Lander monitoring site is located at 600 Washington. Lander is located in Fremont County and has a population of approximately 7,500. $PM_{10}$ sampling began at this site in 1989. The $PM_{2.5}$ monitors were installed in 2001.

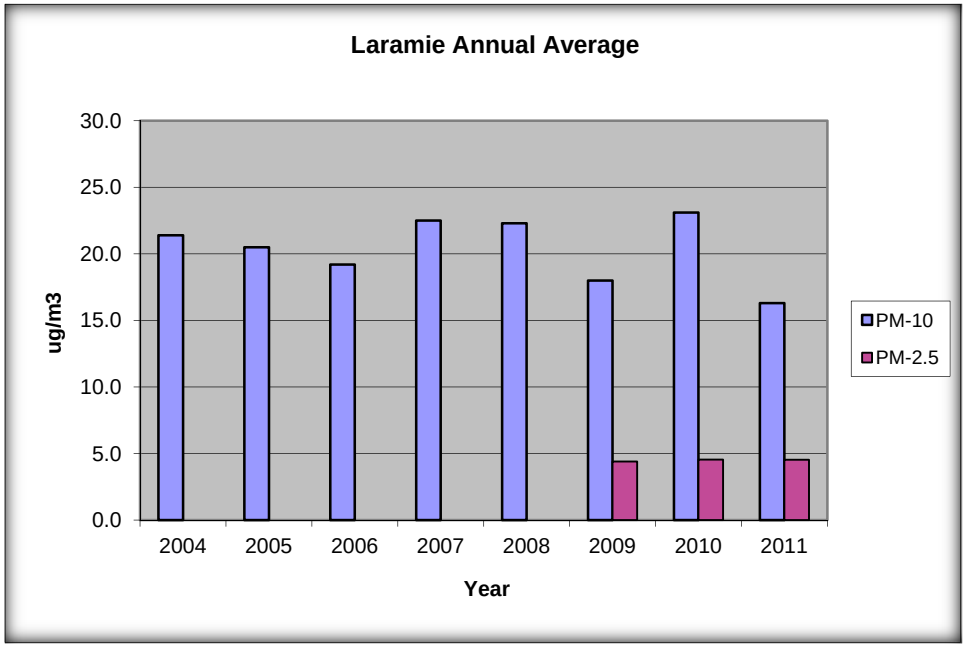

Lander Annual Average
30.0
25.0
20.0
15.0
10.0
5.0
0.0
ug/m3
2004
2005
2006
2007
2008
2009
2010
2011
Year
PM-10
PM-2.5

### 2.1.7 Laramie

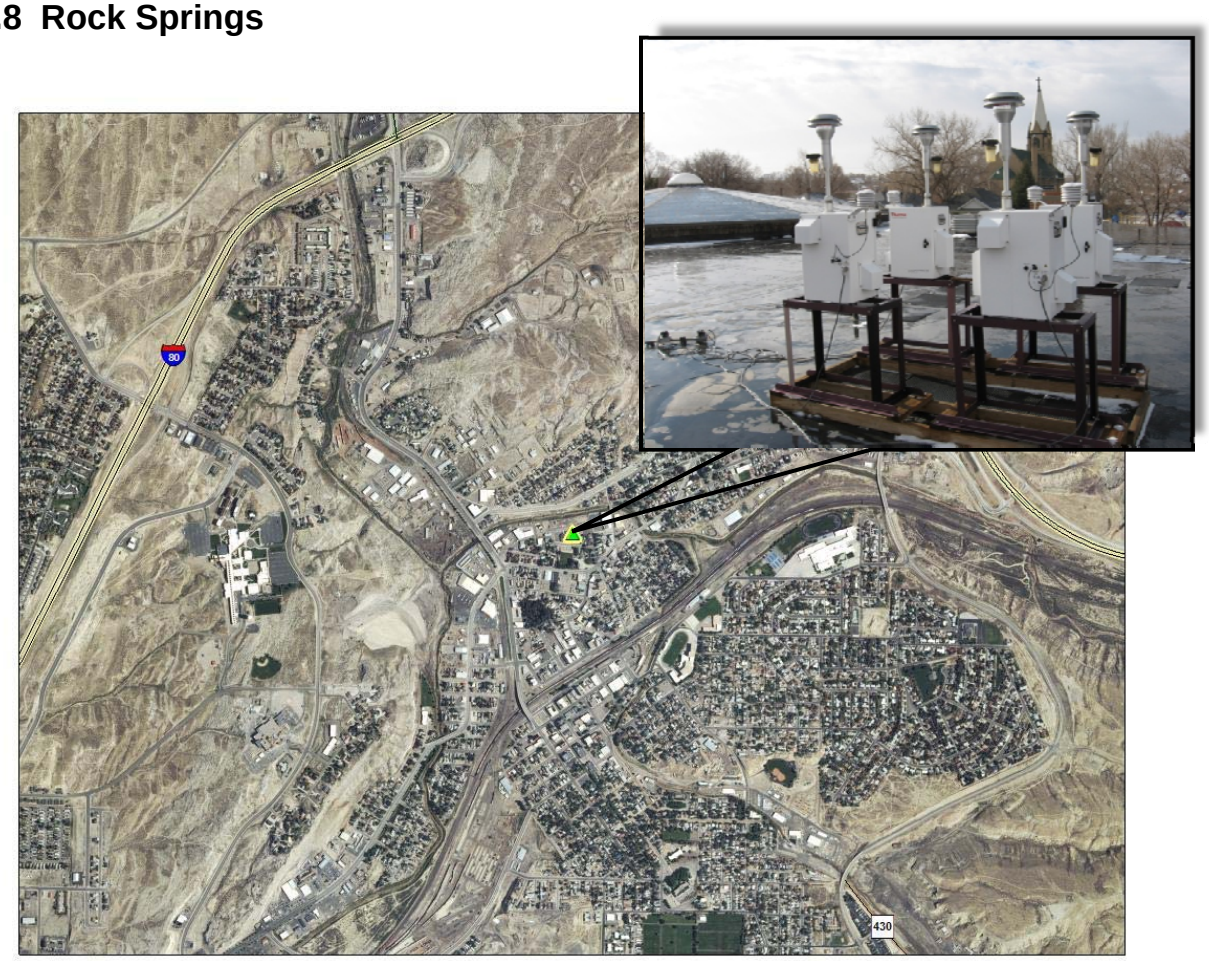

287
130
80

| Laramie Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Laramie $PM_{10}$ | 406 Ivinson | 56-001-0006 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |
| Laramie $PM_{2.5}$ | 406 Ivinson | 56-001-0006 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |

Laramie is located in the southeast portion of Wyoming in Albany County. Laramie has a population of approximately 30,800 and is considered a micropolitan statistical area. $PM_{10}$ sampling began at this site in 1989. The AQD began $PM_{2.5}$ sampling in Laramie on July 12, 2009. The AQD is interested in $PM_{2.5}$ sampling at this location to monitor impacts from wintertime sanding, wood smoke, and summertime forest fires. The AQD upgraded the Laramie site $PM_{10}$ samplers to low-volume samplers during 2010.

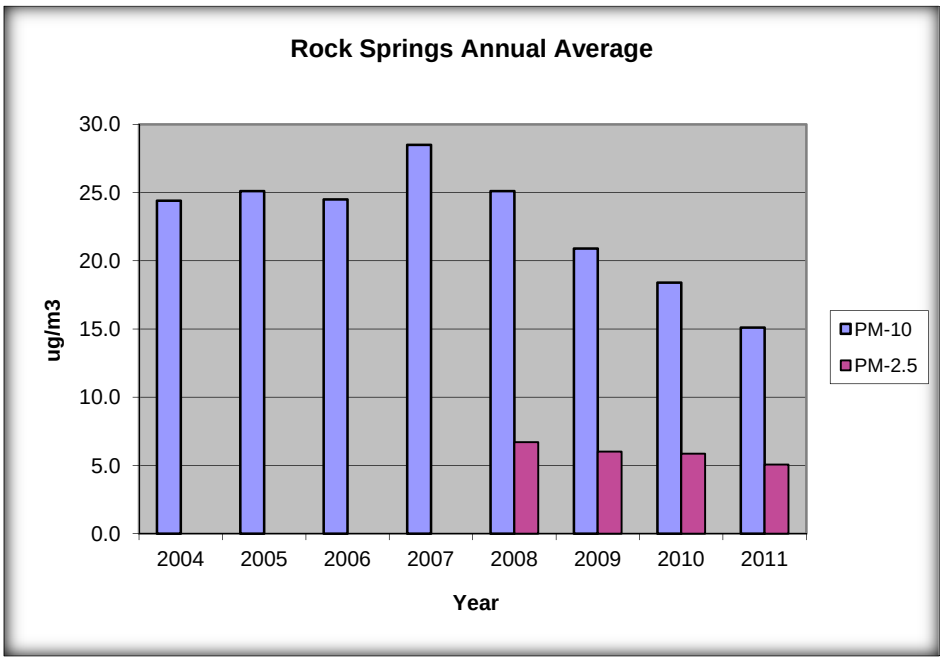


### 2.1.8 Rock Springs




| Rock Springs Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Rock Springs $PM_{10}$ | 625 Ahsay Ave. | 56-037-0007 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |
| Rock Springs $PM_{2.5}$ | 625 Ahsay Ave. | 56-037-0007 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |

Rock Springs is located in Sweetwater County in southwest Wyoming. Rock Springs is a micropolitan statistical area and has a population of approximately 23,000. $PM_{10}$ sampling began at this site in 1989. The AQD added $PM_{2.5}$ monitoring to Rock Springs in March, 2008. The AQD is interested in monitoring $PM_{2.5}$ concentrations in Rock Springs due to the substantial population growth and energy development occurring in the area.

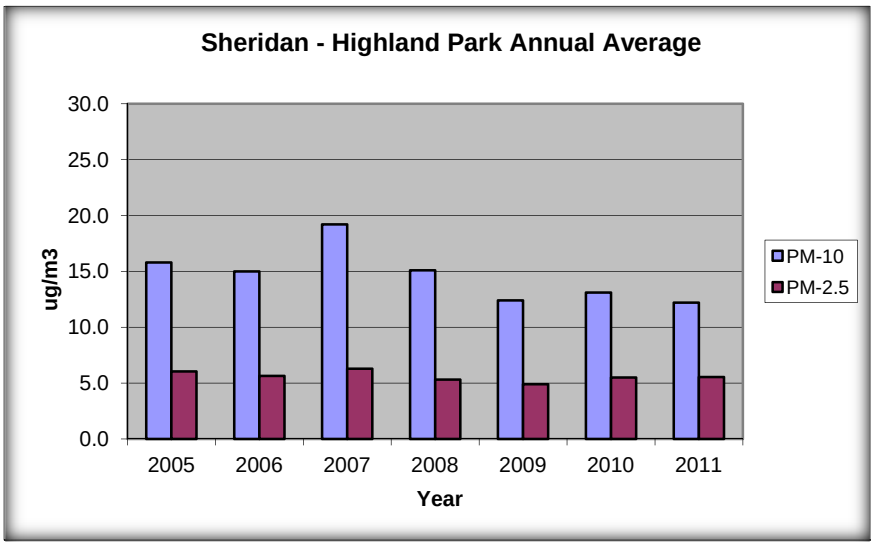



### 2.1.9 Sheridan – (Highland Park / Meadowlark)

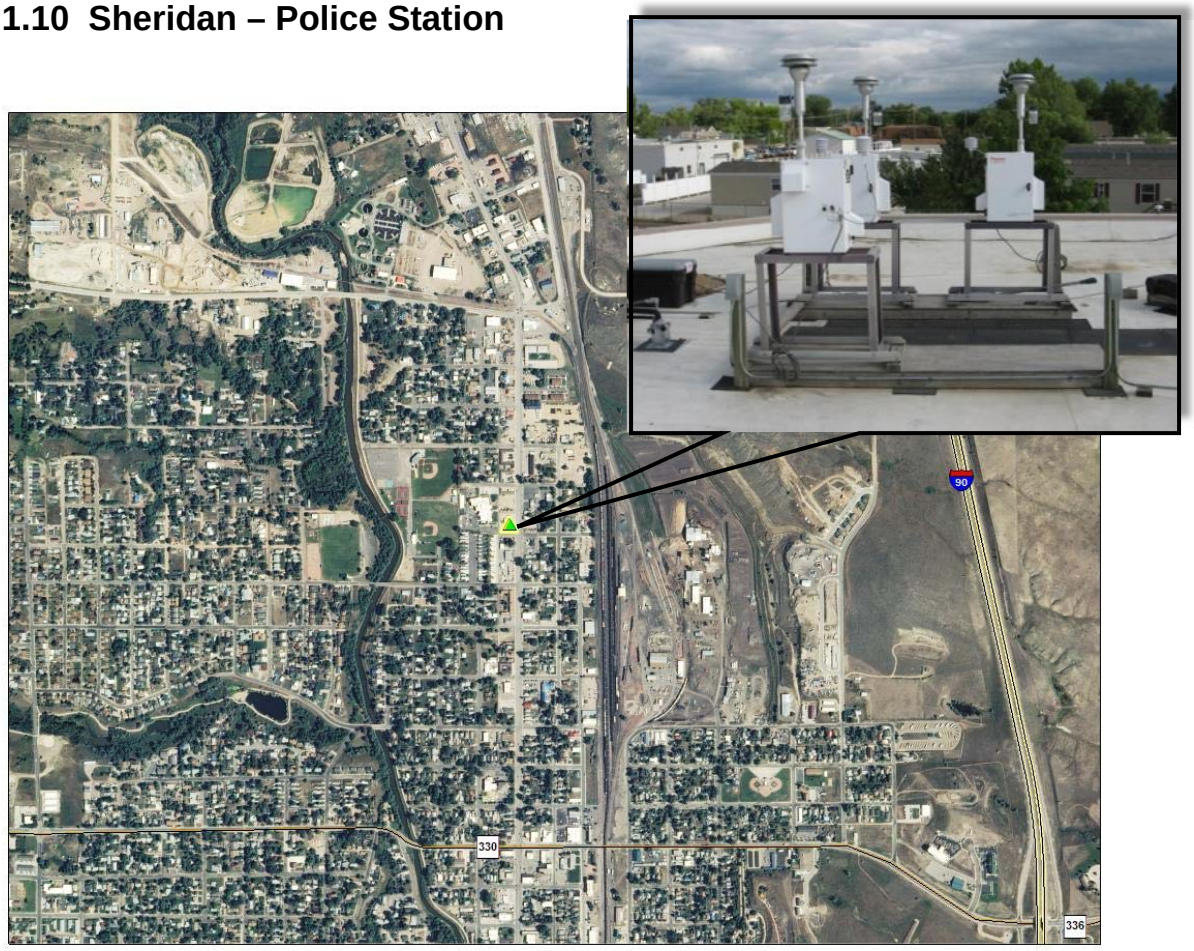
| Sheridan – Highland Park Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Sheridan – Highland Park (Meadowlark) $PM_{10}$ with collocation | Highland Park 1301 Avon<br><br>Meadowlark 1410 DeSmet Ave. | 56-033-0003 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3<br><br>Collocation 1/12 | Name and Location change: collocation frequency change (7/1/12) |
| Sheridan – Highland Park (Meadowlark) $PM_{2.5}$ | Highland Park 1301 Avon<br><br>Meadowlark 1410 DeSmet Ave. | 56-033-0003 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | Name and Location change |

The Sheridan Highland Park Elementary School site (56-033-0003) has to be relocated due to the Sheridan County School District #2 decision to vacate the school in May 2012. The new Sheridan Meadowlark Elementary School site is intended to be the long-term replacement for the Highland Park Elementary site. The Meadowlark Elementary School site is located at 1410 DeSmet Avenue in Sheridan Wyoming (coordinates 44°46.965 N, 106°57.859 W). The Meadowlark Elementary School site is located about 1 ½ miles southeast of the current Highland Park Elementary School. This site represents a neighborhood scale, population oriented station within a $PM_{10}$ non-attainment area. Parameters operating at site include particulate matter < 10 microns (filter), particulate matter <2.5 microns (filter), and particulate matter < 10 microns (filter) collocated on a 1/12 day schedule.

This monitoring location is one of two monitoring stations in the city of Sheridan, a micropolitan statistical area. Sheridan is located in Sheridan County and has a population of approximately 17,400. The City of Sheridan is Wyoming's only non-attainment area for annual $PM_{10}$. From 1998 to 2005 $PM_{10}$ had been monitored at the Sheridan Middle School; from 2005 to 2012 the site was located at the Highland Park School; beginning May 2012 the site will be located at the Meadowlark Elementary School. A collocated $PM_{10}$ monitor was placed at the site, in 2007, to fulfill collocation requirements for the SLAMS network.

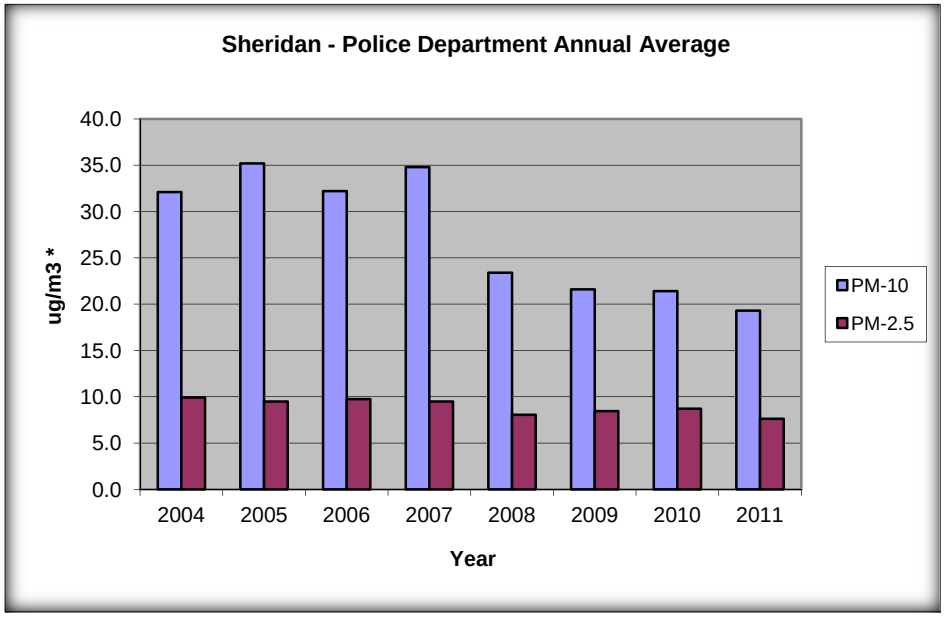



## 2.1.10 Sheridan – Police Station



| Sheridan – Police Station Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Sample Frequency** | **Operational Status** |
| Sheridan – Police Station $PM_{10}$ | 45 West 12th Street | 56-033-0002 | $PM_{10}$ | Continuous TEOM | Neighborhood | Hourly | No planned changes |
| Sheridan – Police Station $PM_{2.5}$ with collocation | 45 West 12th Street | 56-033-0002 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3<br><br>Collocation 1/12 | No planned changes: collocation frequency change (7/1/12) |

The Sheridan – Police Station site is one of the oldest monitoring sites in Wyoming. Sheridan has a population of approximately 17,400 and is considered a micropolitan statistical area. Sheridan is a non-attainment area for annual $PM_{10}$. Filter-based $PM_{10}$ sampling began at this site in 1985. A $PM_{10}$ continuous TEOM sampler replaced the filter-based monitors on October 1, 2007. This allows the AQD to run year-round everyday sampling in Sheridan in an efficient and cost effective manner. Additionally, meteorology instrumentation was added to the Police Station site in 2008 to monitor weather conditions, giving the AQD better information to work with the community to prevent $PM_{10}$ exceedances. $PM_{2.5}$ sampling started in 1998 at this site.




*Note: Vertical scale is larger than other SLAMS graphs.

## *2.2 Special Purpose Monitoring (SPM)*

The Special Purpose Monitoring (SPM) sites are used to support the SLAMS sites and provide special studies and information needed by the State and local agencies to support air program activities. The SPMs can be adjusted to accommodate changing circumstances, needs and priorities. Section 2.2 includes SPM stations operating in Wyoming as of May 2012.

The following SPM sites have a spatial (measurement) scale associated with each parameter at each site used to allow for an understanding of what the ambient air monitor represents in terms of a surrounding, relatively homogeneous parcel of air. These spatial scales are spelled out in 40

CFR Part 58. A scale is assigned to each parameter at the site to indicate what the measurement scale of a particular monitor represents. The monitoring objective and spatial scale are determined when the monitoring station is initiated and may be updated if the monitoring objective changes throughout the life of the monitoring station.

### 2.2.1 Boulder

The Boulder Site is located approximately 5 miles southwest of Boulder, Wyoming and is used to track air quality in an area of natural gas development. The Boulder Station began monitoring in February 2005, and includes gaseous ($NO_x$ and ozone), continuous particulate ($PM_{10}$ TEOM), methane/non-methane hydrocarbons, camera system and meteorological monitoring. The nephelometer for visibility data will be removed from this site on June 30, 2012 due to budget cuts. The Boulder Monitoring Station was also a hub for the AQD's 2007 - 2012 Upper Green Winter Ozone Studies. During the past year the site also housed photolytic $NO_2$, speciated VOC monitoring, $NO_y$ monitoring, speciated $PM_{2.5}$, UV radiometers, and upper air monitoring. Shell Exploration and Production assisted with funding for this site and uses the site, since December 2006, to monitor for ammonia.

| Boulder Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Boulder | 5 mi. SW of Boulder, WY | 56-035-0099 | Ozone | Real Time | Neighborhood/ Urban | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Methane/ NMHC | Real Time | Regional | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous TEOM | Neighborhood | Hourly | No planned changes |

### 2.2.2 Cloud Peak

The Cloud Peak Site began in February 2011 and is located approximately 15 miles west of Buffalo, WY. This site is used to track visibility and meteorology in the area. The Cloud Peak Station includes a camera system and meteorological monitoring. The nephelometer that was located at the site will be removed June 30, 2012 due to budget cuts.

### 2.2.3 Farson

The AQD established a meteorological monitoring site in May 2011 to obtain meteorological data for the purposes of characterizing the general meteorology and air characteristics near Farson, Wyoming. This general area was targeted, in the Southwest Wyoming and 2010 Network Assessment, as a location to help fill a gap in needed meteorological data. The data collected at this site will be used for AERMOD modeling and comparison with other ambient air monitoring data.

### 2.2.4 Hiawatha

The AQD began operation of the Hiawatha monitor in May 2011. This is the AQD's first monitoring station that uses renewable energy as its primary power source. The new solar/wind powered monitoring station is located 35 miles south of Rock Springs, in the Hiawatha Gas Field. This area of industrial oil and gas development was noted in the 2010 Network Assessment as an area that would benefit from ambient quality monitoring. The Hiawatha station includes ozone, camera system, and meteorological monitoring.

| Hiawatha Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Hiawatha | 35 mi. S of Rock Springs, WY | 56-037-0077 | Ozone | Real Time | Regional | Hourly | No planned changes |

### 2.2.5 Juel Spring

The Juel Spring monitoring began in December 2009. This site is located downwind from the Jonah Gas Field, an area of heavy oil and gas development. The Juel Spring Station includes gaseous ($NO_x$ and ozone), camera system and meteorological monitoring. This station is located in conjunction with the Union Cellular Juel Spring Tower site. It is located approximately 15 miles southeast of the old Jonah monitoring site. The results of the AQD's Southwest Wyoming Network Assessment in 2008; concluded that the old

Jonah monitor was no longer meeting its original objective as a downwind monitoring site for the Jonah Gas Field. This area was suggested as a superior location for meeting this downwind objective.

| Juel Spring Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Juel Spring | 20 miles NW of Farson, WY | 56-035-1002 | Ozone | Real Time | Urban | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Urban | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Urban | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Urban | Hourly | No planned changes |

### 2.2.6 Moxa

The Moxa site was installed in May 2010. This site is located approximately 25 miles northwest of Green River. The purpose of this monitoring site is to characterize and monitor meteorology and air quality in an area of heavy energy development. This site includes $NO_x$, $SO_2$, ozone, continuous particulate ($PM_{10}$ TEOM), camera system, and meteorology monitors.

| Moxa Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Moxa | 25 miles NW of Green River | 56-037-0300 | Ozone | Real Time | Urban | Hourly | No planned changes |
| | | | Sulfur Dioxide | Real Time | Urban | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Urban | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Urban | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Urban | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous TEOM | Urban | Hourly | No planned changes |

## 2.2.7 Murphy Ridge

The Murphy Ridge Air Quality Monitoring Station began operations during 2007. The station is located in the Town of Bear River, approximately ten (10) miles north of Evanston on the Wyoming/Utah border. The Murphy Ridge site is located approximately 1 mile from the Murphy Ridge NADP wet deposition site. The purpose of this station is to monitor the air masses coming from Utah and to provide insight on these air masses. This site monitors $NO_x$, ozone, continuous particulate ($PM_{10}$ TEOM), and meteorology. The site is also equipped with a camera. The Murphy Ridge NADP monitor will be removed on June 30, 2012 due to budget cuts.

| Murphy Ridge Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Murphy Ridge | Bear River, WY | 56-041-0101 | Ozone | Real Time | Regional | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Regional | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Regional | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Regional | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous TEOM | Regional | Hourly | No planned changes |

## 2.2.8 Pinedale

Pinedale is located in Sublette County with a population of approximately 2,000 people. There are two (2) monitoring locations in Pinedale the $PM_{2.5}$ sampling started in 2005 at the 101 East Hennick site.

| Pinedale $PM_{2.5}$ Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Pinedale $PM_{2.5}$ | 101 East Hennick | 56-035-0705 | $PM_{2.5}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/3 | No planned changes |

In January 2009, the AQD added a gaseous monitoring site in Pinedale, Wyoming. The need for population based monitoring in this location was noted in the Southwest Wyoming Network Assessment. This station includes ozone, $NO_X$, continuous $PM_{2.5}$ BAM, camera system and meteorology within the town of Pinedale to monitor concentrations in this increasingly populated area. The Pinedale gaseous monitoring location is being considered as a site for collocation of a reference-method $PM_{2.5}$ with a BAM $PM_{2.5}$ monitor. This option is under exploration by the AQD, all collocation decisions are being considered and must meet the needs of the entire monitoring network.

| Pinedale Gaseous Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Pinedale | West side of City Park and Pine Creek | 56-035-0101 | Ozone | Real Time | Urban | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Urban | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Urban | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Urban | Hourly | No planned changes |
| | | | $PM_{2.5}$ | Continuous BAM | Urban | Hourly | No planned changes |

## 2.2.9 South Campbell County

The South Campbell County site began operation in June 2003 and is located approximately 15 miles southwest of Gillette. This site is used to track air quality in an area of heavy coal-bed methane development. This station includes gaseous ($NO_x$ and ozone), continuous particulate ($PM_{10}$ TEOM), camera system and meteorological monitoring.

| South Campbell County Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| South Campbell County | 15 mi. SSW of Gillette | 56-005-0456 | Ozone | Real Time | Urban | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Urban | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Urban | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Urban | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous TEOM | Urban | Hourly | No planned changes |

## 2.2.10 South Daniel

The South Daniel monitor is located approximately five (5) miles south of the town of Daniel in Sublette County and is used to track air quality upwind of an area of extensive natural gas development. The South Daniel Station includes gaseous ($NO_x$ and ozone), continuous particulate ($PM_{10}$ TEOM), camera system and meteorological monitoring. The South Daniel monitor began operation in July 2005.

| South Daniel Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| South Daniel | 5 mi. south of Daniel | 56-035-0100 | Ozone | Real Time | Regional | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Regional | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Regional | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Regional | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous TEOM | Regional | Hourly | No planned changes |

### 2.2.11 South Pass

The South Pass Air Quality Monitoring Station began operation in 2007. The station is located on South Pass at the southern end of the Wind River Range. The purpose of this station is to monitor air quality on the southern end of the range which sees air masses from both the Upper Green River Basin to the northwest and from the southwestern corner of the State. The station has $NO_x$, ozone, continuous particulate ($PM_{10}$ TEOM), meteorology, and a camera. The B and C modules of an IMPROVE-type aerosol monitors along with the nephelometer will be removed due to budget constraints at the end of June 2012.

| South Pass Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| South Pass | South Pass, WY | 56-013-0099 | Ozone | Real Time | Urban | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Urban | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Urban | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Urban | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous TEOM | Urban | Hourly | No planned changes |

## 2.2.12 Thunder Basin

The Thunder Basin Site is located approximately 30 miles northeast of Gillette, Wyoming and is used to track visibility, meteorology, and air quality in the area. The Thunder Basin Station began operating in May 2011 and includes gaseous ($NO_x$ and ozone), camera system and meteorological monitoring. The site nephelometer will be removed on June 30, 2012 due to budget constraints.

| Thunder Basin Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Thunder Basin | 30 mi. NE of Gillette | 56-005-0123 | Ozone | Real Time | Regional | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Regional | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Regional | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Regional | Hourly | No planned changes |

## 2.2.13 Wamsutter

The Wamsutter Station is approximately two (2) miles west of the town of Wamsutter in Sweetwater County and is used to track meteorology and air quality downwind of an area of extensive natural gas development. The Wamsutter Station includes gaseous ($NO_x$ and ozone), continuous particulate ($PM_{10}$ TEOM), camera system and meteorological monitoring. This station began operations on March 13, 2006. In 2011 the AQD added continuous methane/non-methane hydrocarbon monitoring along with periodic canisters to the Wamsutter Station as part of the Three–State Study agreement.

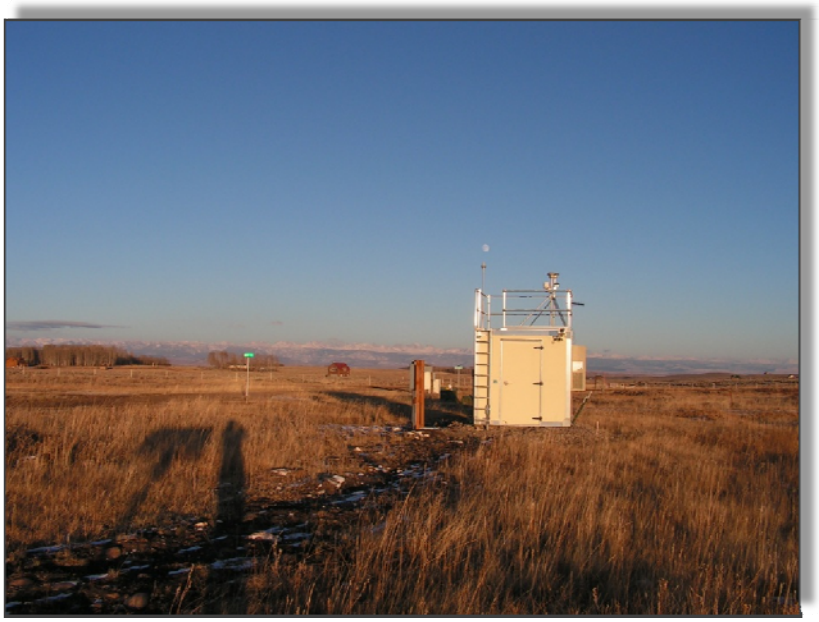
| Wamsutter Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Wamsutter | 2 mi. west of Wamsutter | 56-037-0200 | Ozone | Real Time | Urban | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Urban | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Urban | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Urban | Hourly | No planned changes |
| | | | Methane/ NMHC | Real Time | Urban | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous TEOM | Urban | Hourly | No planned changes |

### 2.2.14 Wright

The Wright monitoring site is located in Campbell County in northern Wyoming. Wright is a community located west of the southern group of the Power River Basin coal mines. The purpose of this monitor is to track population exposure to $PM_{10}$ in a community that is downwind of the coal mines. The AQD upgraded the hi-vol $PM_{10}$ sampler to a low-volume sampler during 2010.

| Wright Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Wright $PM_{10}$ | Adjacent to Wright Junior -Senior High School | 56-005-0099 | $PM_{10}$ | Manual Filter-based Gravimetric (partisol) | Neighborhood | 1/6 | No planned changes |

### 2.2.15 Wyoming Range



The Wyoming Range air quality monitoring station is located in Sublette County approximately 16 miles south of Bondurant and east of the Wyoming Range. Monitoring at this station began in January 2011. This location lends itself to monitoring for transport into the State along with meteorological monitoring filling a need stated in the 2010 Network Assessment. The Wyoming Range station includes gaseous ($NO_x$ and ozone), continuous particulate ($PM_{10}$ BAM and $PM_{2.5}$ BAM), camera system and meteorological monitoring. The primary objective of this station is to monitor transported pollutants entering the Upper Green River Basin from the west.

| Wyoming Range Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Wyoming Range | 16 mi. S of Bondurant, WY | 56-035-0097 | Ozone | Real Time | Regional | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Regional | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Regional | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Regional | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous BAM | Regional | Hourly | No planned changes |
| | | | $PM_{2.5}$ | Continuous BAM | Regional | Hourly | No planned changes |

### 2.2.16 Powder River Basin (PRB) $NO_x$

The Powder River Basin $NO_x$ network began operation in January 2001 through a cooperative agreement between the AQD and the Wyoming Mining Association. The purpose of the network is to monitor regional $NO_2$ concentrations in the Powder River Basin (PRB). The Belle Ayr Monitor is located near the railroad and represents a "maximum concentration" in and around the coal mines. The Antelope monitor is located away from mining activities and is considered to be background. The AQD also collects and uploads data from the Thunder Basin Coal Company's monitor at the Tracy Ranch; this monitoring site is considered downwind of mining activity. The AQD did not list the Tracy Ranch monitor below because the monitor is

funded solely by the Thunder Basin Coal Company. The Antelope monitor has been temporarily mothballed due to power constraints at the current site. During 2012, the AQD will evaluate the options for moving the Antelope background monitor to a location.

| PRB NOx Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Antelope Mine | Converse County | 56-009-0819 | Nitric Oxide | Real Time | Regional | Hourly | Site changes needed |
| | | | Nitrogen Dioxide | Real Time | Regional | Hourly | Site changes needed |
| | | | Oxides of Nitrogen | Real Time | Regional | Hourly | Site changes needed |
| Belle Ayr Mine | Campbell County | 56-005-0892 | Nitric Oxide | Real Time | Micro Scale | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Micro Scale | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Micro Scale | Hourly | No planned changes |

### 2.2.17 Powder River Basin (PRB) $PM_{2.5}$

The Powder River Basin $PM_{2.5}$ Network began official operation in 1999. The purpose of the network is to characterize ambient fine particulate at and around the PRB coal mines. One monitor is located at each "group" of mines (north, middle and south) and one monitor is located away from mining activities to represent background. Due to the age of the instrumentation in the network, the AQD upgraded the instruments to continuous Thermo 1405DF TEOM monitors in 2010.

| PRB $PM_{2.5}$ Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Antelope Mine | Converse County | 56-009-0819 | $PM_{2.5}$ | Continuous TEOM | Regional | Hourly | No planned changes |
| Belle Ayr Mine | Campbell County | 56-005-0892 | $PM_{2.5}$ | Continuous TEOM | Neighborhood | Hourly | No planned changes |
| Black Thunder Mine | Campbell County | 56-005-0891 | $PM_{2.5}$ | Continuous TEOM | Neighborhood | Hourly | No planned changes |
| Buckskin Mine | Campbell County | 56-005-1899 | $PM_{2.5}$ | Continuous TEOM | Neighborhood | Hourly | No planned changes |

## *2.3 Mobile Monitoring Trailers*

Three (3) mobile monitoring trailers have been established and are being operated to help characterize air quality at various locations throughout the State of Wyoming. The mobile monitoring stations are self-contained monitoring shelters that may be moved to different locations in relatively short time frame. The trailers include gaseous monitors ($NO_x$, $O_3$ and methane/non-methane hydrocarbons), continuous $PM_{10}$, continuous $PM_{2.5}$, camera system, and meteorological instrumentation. The mobile monitoring stations may be used to monitor and

characterize events, trends in air quality or areas downwind of industrial development areas. The AQD is planning to locate and operate the mobile monitoring trailers at a site for approximately one (1) year at a time. Initial locations for the three (3) mobile trailers include: Mobile #1 Pavillion, Mobile #2 Big Piney, and Mobile #3 Gillette. The Pavillion mobile monitoring station #1 ended operations on March 31, 2012; more information about the future mobile monitoring trailers locations can be found in Section 5.2 of this Network Plan.

### 2.3.1 Mobile #1 Pavillion

The Pavillion air quality mobile monitoring station began operation in January 2011 and ended on March 31, 2012. The mobile station was located 5.75 miles east of the Town of Pavillion. The site's objective was to monitor a rural residential area that is intermingled with gas development. A digital camera, ozone analyzer, oxides of nitrogen analyzer, methane/NMHC, continuous $PM_{10}$ BAM, $PM_{2.5}$ BAM monitor and meteorology equipment were located at this site.

| Pavillion Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Pavillion | 5.75 mil E of Pavillion, WY | 56-041-0101 | Ozone | Real Time | Regional | Hourly | Operations ended 3/12 |
| | | | Nitric Oxide | Real Time | Regional | Hourly | Operations ended 3/12 |
| | | | Nitrogen Dioxide | Real Time | Regional | Hourly | Operations ended 3/12 |
| | | | Oxides of Nitrogen | Real Time | Regional | Hourly | Operations ended 3/12 |
| | | | Methane/ NMHC | Real Time | Regional | Hourly | Operations ended 3/12 |
| | | | $PM_{10}$ | Continuous BAM | Regional | Hourly | Operations ended 3/12 |
| | | | $PM_{2.5}$ | Continuous BAM | Regional | Hourly | Operations ended 3/12 |

### 2.3.2 Mobile #2 Big Piney

The Big Piney air quality mobile monitoring station began operation in March 2011. The mobile station is located 4 miles south of the Town of Big Piney. A digital camera, ozone analyzer, oxides of nitrogen analyzer, methane/non methane hydrocarbons, continuous $PM_{10}$ beta attenuation monitor (BAM), $PM_{2.5}$ BAM monitor and meteorology equipment are located at this site. As noted in the Network Assessment the objective of this station is to monitor near the Big Piney and LaBarge Gas Fields. The station is scheduled to operate for one more year at this site.

| Big Piney Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Big Piney | 4 mi. South of Big Piney, WY | 56-035-0700 | Ozone | Real Time | Regional | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Regional | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Regional | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Regional | Hourly | No planned changes |
| | | | Methane/ NMHC | Real Time | Regional | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous BAM | Regional | Hourly | No planned changes |
| | | | $PM_{2.5}$ | Continuous BAM | Regional | Hourly | No planned changes |

### 2.3.2 Mobile #3 Gillette

The AQD established a monitoring location, at the Gillette College, to help characterize air quality in Gillette, Wyoming on October 1, 2011. One conclusion of the 2010 Network Assessment was that population-based ozone monitoring was needed in Gillette. The AQD decided that one (1) of the three (3) mobile monitoring trailers would be sited in Gillette for approximately one year. The trailer includes gaseous monitors ($NO_x$, $O_3$ and Methane/Non-Methane Hydrocarbons), continuous $PM_{10}$, continuous $PM_{2.5}$, camera system, and meteorological instrumentation.

| Gillette Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Gillette | Gillette College, Gillette WY | 56-005-0800 | Ozone | Real Time | Regional | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Regional | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Regional | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Regional | Hourly | No planned changes |
| | | | Methane/ NMHC | Real Time | Regional | Hourly | No planned changes |
| | | | $PM_{10}$ | Continuous BAM | Regional | Hourly | No planned changes |
| | | | $PM_{2.5}$ | Continuous BAM | Regional | Hourly | No planned changes |

## 2.4 Cheyenne National Core (NCore) Multi Pollutant Site

| Cheyenne NCore Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| Cheyenne NCore | 6909 Chief Washakie Ave. | 56-021-0100 | Ozone | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Trace Sulfur Dioxide | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Trace Carbon Monoxide | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Nitric Oxide | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Nitrogen Dioxide | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Oxides of Nitrogen | Real Time | Neighborhood | Hourly | No planned changes |
| | | | Total Reactive Nitrogen | Real Time | Neighborhood | Hourly | No planned changes |
| | | | $PM_{10-2.5}$ | Manual Filter-based Gravimetric | Neighborhood | 1/3 | Planning to change to a Met-One BAM system |

| Cheyenne NCore Monitoring Site Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Site Name** | **Location** | **AQS ID** | **Parameter** | **Analysis Method** | **Scale** | **Operating Schedule** | **Operational Status** |
| | | | $PM_{2.5}$ | Manual Filter-based Gravimetric | Neighborhood | 1/3 | Planning to operate for collocation purposes 1/12 day schedule |
| | | | $PM_{2.5}$ | Continuous BAM | Neighborhood | Hourly | No planned changes |
| | | | Speciated $PM_{2.5}$ | Manual Filter-based Gravimetric | Neighborhood | 1/3 | No planned changes |

The Wyoming NCore monitoring site is located in the City of Cheyenne, North Soccer Complex Park. The NCore monitoring site was established during the summer of 2010 and became fully operational January 1, 2011. This site was incorporated as part of the National Core Monitoring Network. The NCore sites will be the basis for developing a representative report card on air quality across the nation, capable of delineating differences among geographic and climatological regions. The monitored data will be used to characterize and monitor trends in air quality, air quality standards' compliance and may be used for national health assessments, model evaluations, and comparison with other ambient air monitoring data.

The AQD has determined a more economical way to monitor $PM_{10-2.5}$ at the Cheyenne NCore monitoring station. The Thermo Partisol 2000-D monitors (filter-based gravimetric) will be replaced with a MetOne BAM Coarse system. One (1) Thermo Partisol 2000-D will be collocated at the site to operate on a 1-in-12 day schedule.

## *2.5 Industrial Monitoring Sites*

Historically, the AQD has required several industrial sources in the State to conduct ambient monitoring for criteria pollutants in and around specific facilities. AQD's largest industrial network is at the Power River Basin coal mines and consists of approximately 50 $PM_{10}$ monitoring locations. The AQD also requires extensive networks of $PM_{10}$ monitoring at the Trona facilities outside of Green River and coal mines in southwest Wyoming. As facilities obtain construction or modification permits from the AQD's New Source Review program, they are often required to monitor for compliance with the ambient air quality standards downwind of their facilities. The monitoring program receives these data on a quarterly basis, and checks for compliance with the NAAQS as well as confirming that the facilities are following appropriate quality assurance measures.

## *2.6 IMPROVE Network*

The purpose of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network is to establish current visibility and aerosol conditions along with characterization of broad regional trends and visibility conditions using monitoring data collected in or near Class I Areas across the United States. Wyoming has five (5) IMPROVE locations which include: Yellowstone National Park, Est. 1988; Bridger Wilderness Area, Est. 1988; North Absaroka Wilderness Area, Est. 2000; Thunder Basin National Grasslands, Est. 2002; and Cloud Peak Wilderness Area, Est. 2002.

# 3.0 Compliance with NAAQS

The primary purpose of the AQD's SLAMS and SPM networks is to evaluate compliance with the NAAQS. The AQD's SLAMS and SPMs employ reference or equivalent method technologies and are run according to SLAMS or PSD quality assurance specifications and therefore may be compared with the NAAQS. The AQD's SLAMS and SPM networks currently operate under project specific quality assurance plans, which are available in the Cheyenne State Office for viewing. The AQD is currently working with U.S. EPA Region 8 staff to develop a general monitoring quality assurance plan that references the specific project plans.

The following tables show 2009 through 2011 data and design values for each SLAMS and SPM monitor. All sites operated by the AQD are in compliance with the NAAQS from 2009-2011, with the exception of the Boulder monitor for ozone.

## *3.1 Particulate Matter ($PM_{10}$)*

In the Wyoming Monitoring Network there are twenty-two (22) sites with $PM_{10}$ monitors. The $PM_{10}$ SLAMS network, consisting of ten sites, has two types of monitors (Thermo Partisol 2000 or Thermo TEOM). The Thermo Partisol 2000 $PM_{10}$ monitors, in the network, have 30% collocation. This fulfills the collocation requirements in 40 CFR 58 Appendix A. The Sheridan Police Department $PM_{10}$ TEOM is not required to have another analyzer collocated for precision purposes according to 40 CFR 58, Appendix A. The AQD network has seven (7) sites that have continuous Thermo TEOM $PM_{10}$ monitors and five (5) sites that have continuous MetOne BAM $PM_{10}$ monitors.

To comply with the 24-hour $PM_{10}$ NAAQS, a monitor must record one or less "exceedance" (24-hour concentration greater than 150 $\mu g/m^3$) per year over a three year period. The design value is the average number of exceedances per year from 2009-2011. A Design Value of zero (0) means the site has recorded no values above 150 $\mu g/m^3$ during that three-year time frame. Wyoming also has an annual ambient air quality standard for $PM_{10}$. Compliance with the annual $PM_{10}$ Wyoming Ambient Air Quality Standards (WAAQS) is determined by the three year average of the annual mean. The three year average of the means must be below 50 $\mu g/m^3$.

| **$PM_{10}$ Compliance with WAAQS of 50 $\mu g/m^3$ Annual Arithmetic Mean ($\mu g/m^3$)** | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Average ('09-'11) | In Compliance |
| SLAMS | | | | | |
| Casper | 16 | 14 | 14 | 11 | Yes |
| Cheyenne | 13 | 14 | 12 | 13 | Yes |
| Cody | 12 | 11 | 12 | 12 | Yes |
| Gillette | 23 | 20* | 16 | 20 | Yes |
| Jackson | 17 | 14 | 12 | 14 | Yes |
| Lander | 18 | 20 | 16 | 18 | Yes |
| Laramie | 18 | 23* | 16 | 19 | Yes |
| Rock Springs | 21 | 18 | 15* | 18 | Yes |
| Sheridan – Highland Park | 12 | 13 | 12 | 12 | Yes |

| | | | | | |
|---|---|---|---|---|---|
| Sheridan – Police Dept. | 22 | 21 | 19 | 21 | Yes |
| **$PM_{10}$ Compliance with WAAQS of 50 µg/$m^3$ Annual Arithmetic Mean (µg/$m^3$)** | | | | | |
| Site Name | 2009 | 2010 | 2011 | Average (‘09-‘11) | In Compliance |
| SPM | | | | | |
| Boulder | 9 | 9 | 9 | 9 | Yes |
| Moxa | N/A | 8.3* | 9 | N/A | N/A |
| Murphy Ridge | 11 | 12* | 10* | 11 | Yes |
| South Campbell County | 12 | 12 | 11 | 12 | Yes |
| South Daniel | 8* | 8* | 8 | 8 | Yes |
| South Pass | 11* | 9 | 8 | 9 | Yes |
| Wamsutter | 15 | 14* | 12 | 14 | Yes |
| Wright | 12* | 12* | 11* | 12 | Yes |
| Wyoming Range | N/A | N/A | 7 | N/A | N/A |
| Mobile Trailers** | | | | | |
| Big Piney | N/A | N/A | 8* | N/A | N/A |
| Gillette | N/A | N/A | 11* | N/A | N/A |
| Pavillion | N/A | N/A | 10* | N/A | N/A |

N/A – data not available

* - site has one or more quarterly reports that did not meet data completeness

** - Mobile Trailers are located in one location for approximately one year

| **$PM_{10}$ Compliance with NAAQS of 150 µg/$m^3$ Highest 24- Hour Average (µg/$m^3$)** | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Design Value (‘09-‘11) | In Compliance |
| SLAMS | | | | | |
| Casper | 93 | 45 | 63 | 0 | Yes |
| Cheyenne | 38 | 41 | 44 | 0 | Yes |
| Cody | 78 | 29 | 46 | 0 | Yes |
| Gillette | 73 | 49* | 45 | 0 | Yes |
| Jackson | 86 | 79 | 40 | 0 | Yes |
| Lander | 49 | 44 | 40 | 0 | Yes |
| Laramie | 60 | 94* | 49 | 0 | Yes |
| Rock Springs | 66 | 68 | 59 | 0 | Yes |
| Sheridan – Highland Park | 27 | 36 | 48 | 0 | Yes |
| Sheridan – Police Dept. | 99 | 70 | 96 | 0 | Yes |
| SPM | | | | | |
| Boulder | 61 | 37 | 33 | 0 | Yes |
| Moxa | N/A | 48* | 43 | N/A | N/A |
| Murphy Ridge | 75 | 103 | 51 | 0 | Yes |
| South Campbell County | 43 | 36 | 41 | 0 | Yes |
| South Daniel | 57* | 45* | 35 | 0 | Yes |

| | | | | | |
|---|---|---|---|---|---|
| South Pass | 82* | 65 | 39 | 0 | Yes |
| **$PM_{10}$ Compliance with NAAQS of 150 µg/m$^3$ Highest 24- Hour Average (µg/m$^3$)** | | | | | |
| Site Name | 2009 | 2010 | 2011 | Design Value ('09-'11) | In Compliance |
| SPM | | | | | |
| Wamsutter | 99 | 56* | 71 | 0 | Yes |
| Wright | 31* | 27* | 52 | 0 | Yes |
| Wyoming Range | N/A | N/A | 67 | N/A | N/A |
| Mobile Trailers** | | | | | |
| Big Piney | N/A | N/A | 27 | N/A | N/A |
| Gillette | N/A | N/A | 22 | N/A | N/A |
| Pavillion | N/A | N/A | 71 | N/A | N/A |

N/A – data not available

* - site has one or more quarterly reports that did not meet data completeness

** - Mobile Trailers are located in one location for approximately one year

## *3.2 Particulate Matter ($PM_{2.5}$)*

There are twenty (20) State run monitoring sites that collect $PM_{2.5}$ data. Within the $PM_{2.5}$ SLAMS network, which includes Thermo Partisol 2000 $PM_{2.5}$ monitors in Casper, Cheyenne, Cody, Jackson, Lander, Laramie, Rock Springs, Sheridan – Highland Park, and Sheridan – Police Department, the AQD has 22.2% of the monitors collocated. This meets the 40 CFR 58 Appendix A requirement for collocation. The PRB $PM_{2.5}$ monitors were replaced with Thermo 1405DF monitors in 2010. The other six (6) stations are running MetOne BAM 1020 monitors with a Very Sharp Cut Cyclone (VSSC) used to monitor $PM_{2.5}$. All the twenty (20) monitors can be compared to the annual $PM_{2.5}$ NAAQS as defined by 40 CFR 58.30. The annual $PM_{2.5}$ standard is attained when the three (3) year average is less than or equal to 15.0 µg/m$^3$. Compliance with the 24-hour $PM_{2.5}$ NAAQS is met when the 3-year average of the 98$^{th}$ percentile concentration is less than or equal to 35 µg/m$^3$.

| $PM_{2.5}$ Compliance with NAAQS of 15.0 µg/m$^3$ Annual Arithmetic Mean (µg/m$^3$) | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Average ('09-'11) | In Compliance |
| SLAMS | | | | | |
| Casper | 4.4* | 4.6 | 4.5 | 4.5 | Yes |
| Cheyenne | 3.9 | 4.2 | 4.4 | 4.2 | Yes |
| Cody | 4.3 | 4.5 | 4.4 | 4.4 | Yes |
| Jackson | 4.7 | 4.3 | 4.6 | 4.5 | Yes |
| Lander | 8.3 | 9.3 | 7.8 | 8.5 | Yes |
| Laramie | 5.7* | 4.8 | 4.6 | 5.0 | Yes |
| Rock Springs | 6.0 | 5.9* | 5.1 | 5.7 | Yes |
| Sheridan – Highland Park | 4.9 | 5.5 | 5.5* | 5.3 | Yes |
| Sheridan – Police Dept. | 8.4 | 8.7 | 7.6 | 8.2 | Yes |
| SPM | | | | | |
| Antelope Mine | 3.5* | 2.8* | 3.6* | 3.3 | Yes |
| Belle Ayr Mine | 5.1 | 3.6* | 5.5* | 4.7 | Yes |
| Black Thunder Mine | 4.1* | 5.1* | 3.1* | 4.1 | Yes |
| Buckskin Mine | 5.6 | 5.3* | 4.9* | 5.3 | Yes |
| Pinedale 2.5 | 5.5* | 6.0 | 5.7 | 5.7 | Yes |
| Pinedale Gaseous | 4.2 | 3.1 | 5.0 | 4.1 | Yes |
| Wyoming Range | N/A | N/A | 3.3 | N/A | N/A |
| NCore | | | | | |
| Cheyenne NCore | N/A | N/A | 3.4 | N/A | N/A |
| Mobile Trailers** | | | | | |
| Big Piney | N/A | N/A | 2.9* | N/A | N/A |
| Gillette | N/A | N/A | 4.5* | N/A | N/A |
| Pavillion | N/A | N/A | 2.8* | N/A | N/A |

N/A – data not available

* - site has one or more quarterly reports that did not meet data completeness

** - Mobile Trailers are located in one location for approximately one year

| $PM_{2.5}$ Compliance with NAAQS of 35 µg/m$^3$ 98% 24- Hour Average (µg/m$^3$) | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Average ('09-'11) | In Compliance |
| SLAMS | | | | | |
| Casper | 8* | 12 | 13 | 11 | Yes |
| Cheyenne | 9 | 9 | 9 | 9 | Yes |
| Cody | 10 | 11 | 12 | 11 | Yes |
| Jackson | 14 | 9 | 12 | 12 | Yes |
| Lander | 35 | 32 | 30 | 32 | Yes |
| Laramie | 14* | 14 | 10 | 13 | Yes |
| Rock Springs | 12 | 13* | 12 | 12 | Yes |
| Sheridan – Highland Park | 10 | 14 | 15* | 13 | Yes |
| Sheridan – Police Dept. | 21 | 27 | 23 | 24 | Yes |
| SPM | | | | | |
| Antelope Mine | 7* | 13* | 11* | 10 | Yes |
| Belle Ayr Mine | 12 | 10* | 20* | 14 | Yes |
| Black Thunder Mine | 10* | 11* | 14* | 12 | Yes |
| Buckskin Mine | 12 | 8* | 16* | 12 | Yes |
| Pinedale 2.5 | 16* | 15 | 21 | 17 | Yes |
| Pinedale Gaseous | 10 | 10 | 11 | 10 | Yes |
| Wyoming Range | N/A | N/A | 8 | N/A | N/A |
| NCore | | | | | |
| Cheyenne NCore | N/A | N/A | 8 | N/A | N/A |
| Mobile Trailers** | | | | | |
| Big Piney | N/A | N/A | 7* | N/A | N/A |
| Gillette | N/A | N/A | 9* | N/A | N/A |
| Pavillion | N/A | N/A | 8* | N/A | N/A |

N/A – data not available

* - site has one or more quarterly reports that did not meet data completeness

** - Mobile Trailers are located in one location for approximately one year

## *3.3 Nitrogen Dioxides ($NO_2$)*

There were eleven (11) State run SPM sites that monitored for $NO_2$ in 2011. The PRB $NO_x$ monitors (Antelope and Belle Ayr Mine sites) were restarted during 2009. Compliance with the annual primary $NO_2$ NAAQS is met when the annual average concentration in the calendar year is less than or equal to 53 ppb. The primary standard 1-hour average concentration is 100 ppb. The maximum 1-hour concentration per year is listed in the second $NO_2$ table below. The $NO_2$ calculated design value is met when the three-year average of the annual 98$^{th}$ percentile of the daily maximum 1-hour average concentration is less than or equal to 100 ppb. This calculated three-year design value is located in the second $NO_2$ table below.

| $NO_2$ Compliance with NAAQS of 53 ppb<br>Annual Arithmetic Mean (ppb) | | | | |
|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | In Compliance |
| Antelope Mine | 1* | 3* | N/A | Yes |
| Belle Ayr Mine | 5* | 7 | 6 | Yes |
| Boulder | 4 | 3 | 2 | Yes |
| Juel Spring | N/A | 1 | 2 | Yes |
| Moxa | N/A | 1* | 2 | Yes |
| Murphy Ridge | 3 | 1 | 2 | Yes |
| Pinedale | 3* | 3 | 3 | Yes |
| South Campbell County | 3 | 3 | 3 | Yes |
| South Daniel | 3 | 0 | 0 | Yes |
| South Pass | 0 | 0 | 1 | Yes |
| Thunder Basin | 2 | 2 | 2 | Yes |
| Wamsutter | 5 | 5 | 4 | Yes |
| Wyoming Range | N/A | N/A | 1 | Yes |
| NCore | | | | |
| Cheyenne NCore | N/A | N/A | 4 | Yes |
| Mobile Trailer** | | | | |
| Big Piney | N/A | N/A | 1* | Yes |
| Gillette | N/A | N/A | 6* | Yes |
| Pavillion | N/A | N/A | 1 | Yes |

N/A – data not available

* - site has one or more quarterly reports that did not meet data completeness

** - Mobile Trailers are located in one location for approximately one year

| $NO_2$ Compliance with NAAQS of 100 ppb<br>Maximum 1-hour average concentration per year and the 3-year 98% 1-hour Design Value (ppb) | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Design Value (‘09-‘11) | In Compliance |
| Antelope Mine | 32* | 34* | N/A | N/A | N/A |
| Belle Ayr Mine | 74* | 70 | 44 | 31 | Yes |
| Boulder | 54 | 66 | 65 | 45 | Yes |
| Juel Spring | N/A | 28 | 19 | N/A | N/A |
| Moxa | N/A | 32* | 31 | N/A | N/A |
| Murphy Ridge | 24 | 61 | 32 | 14 | Yes |
| Pinedale | 34* | 43 | 46 | 30 | Yes |
| South Campbell County | 40 | 35 | 46 | 31 | Yes |
| South Daniel | 13 | 13 | 8 | 7 | Yes |
| South Pass | 9 | 12 | 11 | 5 | Yes |
| Thunder Basin | 14 | 15 | 16 | 11 | Yes |

| $NO_2$ Compliance with NAAQS of 100 ppb<br>Maximum 1-hour average concentration per year and the 3-year 98% 1-hour Design Value (ppb) | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Design Value (‘09-‘11) | In Compliance |
| Wamsutter | 45 | 59 | 57 | 37 | Yes |
| Wyoming Range | N/A | N/A | 8 | N/A | N/A |
| NCore | | | | | |
| Cheyenne NCore | N/A | N/A | 40 | N/A | N/A |
| Mobile Trailers** | | | | | |
| Big Piney | N/A | N/A | 15* | N/A | N/A |
| Gillette | N/A | N/A | 45* | N/A | N/A |
| Pavillion | N/A | N/A | 21 | N/A | N/A |

N/A – data not available

* - site has one or more quarterly reports that did not meet data completeness

** - Mobile Trailers are located in one location for approximately one year

## *3.4 Sulfur Oxides ($SO_2$)*

The Moxa monitoring station began monitoring for $SO_2$ in 2010 and the Cheyenne NCore began monitoring on January 2011, for trace $SO_2$. In past years the State of Wyoming has operated sites that have monitored for this parameter. Most $SO_2$ levels were relatively low and the benefit of monitoring at SPM locations was not justified for a long-term period. For $SO_2$, the AQD has the Wyoming Ambient Air Quality Standards (WAAQS) along with the revised NAAQS for comparison purposes. On an annual basis, the WAAQS $SO_2$ standard is exceeded if the annual mean monitored value is greater than 0.02 ppm. On a 24-hour basis the WAAQS standard is exceeded if a 24-hour concentration exceeds 0.10 ppm more than once per year. On a 3-hour basis, the WAAQS standard is exceeded if the 3-hour concentration is 0.50 ppm more than once in a year. The AQD has not reported any exceedances of the WAAQS 3-hour, 24-hour, or annual $SO_2$ standards in 2011. The table below compares the monitored values with the NAAQS rather than the WAAQS. The level of the national 1-hour ambient air quality standard for $SO_2$ is 75 ppb. The NAAQS 1-hour primary standard is met when the three-year average of the annual ($99^{th}$ percentile) of the daily maximum 1-hour average concentrations is less than or equal to 75 ppb.

| $SO_2$ Compliance with NAAQS of 75 ppb<br>Maximum 1-hour average concentration per year and the 3-year 99% 1-hour average (ppb) | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Design Value (‘09-‘11) | In Compliance |
| Moxa | N/A | 40 | 30 | N/A | N/A |
| NCore | | | | | |
| Cheyenne NCore | N/A | N/A | 19 | N/A | N/A |

## 3.5 Carbon Monoxide (CO)

Starting January 2011, the AQD began trace CO monitoring at the Cheyenne NCore site. In past years the State of Wyoming has operated sites that have monitored for Carbon Monoxide (CO). Most CO levels were relatively low and the benefit of monitoring at SPM locations was not justified for a long-term period. The level for the maximum 8-hour NAAQS for CO is 9 ppm. The national 1-hour ambient air quality standard for CO is 35 ppm.

| **CO Compliance with NAAQS of 35 ppm Maximum 1-hour average concentration for 2011 9 ppm Maximum 8-hour average concentration for 2011 (ppm)** | | | |
|---|---|---|---|
| Site Name | 2011 1-hour value | 2011 8-hour value | In Compliance |
| NCore | | | |
| Cheyenne NCore | 0.36 | 0.2 | Yes |

## 3.6 Ozone ($O_3$)

The AQD operated sixteen (16) $O_3$ monitoring sites in Wyoming during 2011, and all of the sites are SPMs. To comply with the 8-hour ozone NAAQS, the daily maximum 8-hour ozone averages are ranked over a year. The 3 year average of the 4$^{th}$ highest yearly value must be less than or equal to 0.075 ppm. On April 30, 2012, the EPA sent a letter to Governor Mead indicating EPA is designating as nonattainment the Upper Green River Basin, including Sublette and portions of Lincoln and Sweetwater Counties. The area designated nonattainment is classified Marginal. The remainder of the State is designated as unclassifiable/attainment.

| **$O_3$ Compliance with NAAQS of 0.075 ppm 4$^{th}$ Highest 8-Hour Average (ppm)** | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Design Value ('09-'11) | In Compliance |
| Boulder | 0.066 | 0.067 | 0.103 | 0.078 | No |
| Hiawatha | N/A | N/A | 0.063 | N/A | N/A |
| Juel Spring | N/A | 0.064 | 0.076 | N/A | N/A |
| Moxa | N/A | 0.066 | 0.068 | N/A | N/A |
| Murphy Ridge | 0.060 | 0.065 | 0.065 | 0.063 | Yes |
| Pinedale | 0.056 | 0.062 | 0.076 | 0.064 | N/A |
| South Campbell County | 0.060 | 0.061 | 0.062 | 0.061 | Yes |
| South Daniel | 0.062 | 0.063 | 0.075 | 0.066 | Yes |
| South Pass | 0.080 | 0.068 | 0.068 | 0.072 | Yes |
| Thunder Basin | 0.062 | 0.063 | 0.061 | 0.062 | Yes |
| Wamsutter | 0.062 | 0.067 | 0.064 | 0.064 | Yes |
| Wyoming Range | N/A | N/A | 0.072 | N/A | N/A |
| NCore | | | | | |
| Cheyenne NCore | N/A | N/A | 0.067 | N/A | N/A |

| $O_3$ Compliance with NAAQS of 0.075 ppm<br>4th Highest 8-Hour Average (ppm) | | | | | |
|---|---|---|---|---|---|
| Site Name | 2009 | 2010 | 2011 | Design Value ('09-'11) | In Compliance |
| Mobile Trailers ** | | | | | |
| Big Piney | N/A | N/A | 0.064 | N/A | N/A |
| Gillette | N/A | N/A | 0.041 | N/A | N/A |
| Pavillion | N/A | N/A | 0.061 | N/A | N/A |

N/A – data not available

** - Mobile Trailers are located in one location for approximately one year

# 4.0 Special Studies

In addition to the AQD's extensive network of long-term monitoring, the AQD is also conducting several short-term special studies. Primarily these studies and additional monitoring revolve around investigations of industrial source growth within the State.

## *4.1 Upper Green Winter Ozone Study (UGWOS)*

In the winters of 2005 and 2006, primarily in the month of February, the AQD measured 8-hour ozone concentrations greater than 80 ppb at the Daniel South, Jonah and Boulder monitoring stations. Elevated ozone concentrations are uncommon during the winter months; however, they do not appear to be an anomaly because these conditions were recorded in both February 2005 and February 2006. After recording elevated values for two (2) years, the AQD decided to conduct a study of winter ozone formation. The purposes of the study were, originally, to better understand the formation mechanisms and collect data to form a conceptual model of the winter ozone formation. Since 2007 the objectives of the study have been modified to fill gaps in data and conceptual understanding of winter ozone formation with the ultimate intent of developing a working photochemical model for the Upper Green River Basin.

The 2011 monitoring study focused on vertical measurements of meteorology and ozone precursors. The AQD also contracted with various firms to measure nitrous acid (HONO), $NO_y$, speciated particulate, and speciated VOCs. The focus of the 2012 winter monitoring study was ongoing regulatory monitoring supplemented with a monitoring trailer in the Jonah Field and four (4) locations for canister collection and speciated VOC analyses.

Quality Assurance Plans and data from the UGWOS campaigns can be downloaded at http://deq.state.wy.us/aqd/Upper%20Green%20Winter%20Ozone%20Study.asp . Final reports can also be downloaded at the site. During summer 2012, the AQD will be critically evaluating all studies conducted in the Upper Green to determine whether specific aspects of winter ozone formation will still need to be monitored in the future.

## *4.2 VOC Monitoring*

The AQD also committed to performing VOC and/or Hazardous Air Pollutant (HAP) Monitoring in the Southwest Wyoming Operator's Agreement. In 2007 and 2008, the AQD performed

limited VOC monitoring in the Upper Green River Basin during the Upper Green Winter Ozone Study (UGWOS). During UGWOS 2009, more VOC samples were collected and the AQD ran a trial field study of a "continuous" speciated VOC instrument with a pneumatic focusing gas chromatograph (PFGC). During the field test, the AQD learned that this type of instrument was not reliable enough for long term field deployment. For 2010, the AQD tested a continuous methane/non-methane hydrocarbon (NMHC) analyzer at the Boulder station. To compliment this instrument, a series of canisters were pulled to obtain a speciation profile of the NMHC component. The AQD continues to perform continuous methane/non-methane measurements at the Boulder location in addition to pulling periodic canisters. The AQD is also operating a methane/non-methane hydrocarbon analyzer in the Big Piney, Pavillion and Gillette trailers. The AQD also installed a methane/non-methane hydrocarbon analyzer along with a limited number of NMHC canisters at the Wamsutter monitoring station for use in 2012.

## *4.3 Mobile Beta Attenuation Monitor (BAM) Deployment*

The AQD has outfitted a mobile monitoring trailer with continuous BAM $PM_{10}$ and $PM_{2.5}$ monitoring devices for deployment in communities that may be impacted by smoke from wildfire activity or agricultural burning. This portable system will allow the AQD to monitor near real-time $PM_{10}$ and $PM_{2.5}$ concentrations, and meteorological conditions so the AQD can properly inform the public when particulate levels may cause adverse health effects.

### 4.3.1 Worland

The AQD deployed the mobile BAM monitoring station to monitor particulate matter in a residential area of Worland, Wyoming that may be impacted by agricultural activities. Data collection began on October 1, 2011 and is anticipated to continue for one year. The station also collects data on local wind speed, wind direction and temperature and is located south of town, at Newell Sargent Park.

## *4.4 Grand Teton*

The AQD is working cooperatively with the Nation Park Service to fund a portion of the Grand Teton Monitoring Station near the Teton Science School located in Grand Teton National Park. This monitoring station includes ozone, NADP wet deposition, nephelometer, camera system and meteorological instrumentation.

## *4.5 Sundance Meteorology Study*

The AQD has deployed two (2) 3-meter meteorological (met) stations east of Sundance, Wyoming during September 2011. In November, 2009, the Division received comments regarding the potential air quality impacts associated with rock quarries (pits) east of Sundance. After meeting with Crook County Commissioners on May 4, 2010, the AQD suggested setting up two (2) met stations in order to collect met data (wind speed, wind direction, and ambient temp). The AQD plans to run the met stations for at least a one year period to gain a better understanding of the wind patterns in the area.

### 4.6 Three-State Study

During 2010, 2011 and 2012, the AQD has participated in a cooperative activity known as the "Three-State Study". The Wyoming AQD is cooperating with Colorado and Utah State agencies as well as Federal Land Managers and EPA to develop systems which will aid in modeling and predicting impacts from energy development. As part of this study, the Federal Government committed to partially fund one new monitoring station in Southwest Wyoming. This new station is the Hiawatha station; it was installed during spring of 2011, more information about the Hiawatha station can be found in Section 2.2.4 of this document. The AQD also received funding to install a methane/non-methane hydrocarbon analyzer along with speciated canisters at the Wamsutter monitoring station. This monitoring was deployed in 2011 and continues to operate.

## 5.0 Future Air Monitoring Modifications

The State of Wyoming is experiencing rapid energy development, especially in the northeast and southwest quadrants of the State. Energy development is also anticipated to increase in southeast Wyoming. The AQD continues to add new special purpose monitoring sites to monitor for possible impacts from increased development. The AQD tries to anticipate network monitoring requirements before they are needed and is continually updating the future monitoring placement plan for the Monitoring Section. At this time, the AQD is not planning to add or remove any SLAMS locations or monitors in 2012.

### 5.1 Casper

The 2010 Network Assessment included Casper as a population-based area that needed ozone monitoring. The AQD is currently working with possible landowners within the City of Casper to locate a monitoring station consisting of gaseous ($NO_x$ and ozone), camera system and meteorological monitoring.

### 5.2 Mobile #1

The 2012 Network Assessment included Rock Springs as a population-based area that needed ozone monitoring. The AQD will evaluate possible locations for the mobile monitoring station in 2012.

## 6.0 Conclusion

There is an ongoing effort to help ensure the Wyoming Ambient Air Monitoring Network demonstrates adequate coverage across the entire State. As the State's population and industry changes, the AQD works to make sure the monitoring needs in the State of Wyoming are being met. Wyoming mineral price fluctuations and budgeting constraints may play a part in the availability of ambient monitoring activities deployed throughout the State.

Data collected at the AQD monitoring stations though 2011 show that all monitors are attaining NAAQS for $PM_{10}$, $PM_{2.5}$, $NO_2$, $SO_2$, and CO. Currently, all of the AQD monitors, except for Boulder, are attaining the NAAQS for ozone. The Boulder monitor and Upper Green River Basin area ozone issue will be addressed in the non-attainment process.

The AQD continually evaluates data collected at the AQD, industrial and AQRV monitors to determine if changes in policy are needed to continue to manage the air resource in the State of Wyoming.

Any comments pertaining to the Wyoming Ambient Air Monitoring Annual Network Plan should be sent to the following contact:

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# Appendix A

| AQS ID | Site Name | Address | Land Use Type | Location Type | Monitor Type | Meets 40 CFR Part 58 Appendix A, C, D and E Requirements* | Monitor Objective | Longitude | Latitude | Site Start Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 56-025-0001 | Casper | City County Bldg - Center & C Streets | Commercial | Urban And Center City | SLAMS | X | Population Exposure | -106.3256921 | 42.85146789 | 10/15/1998 |
| 56-021-0001 | Cheyenne | State Office Bldg 23rd & Central Avenue | Residential | Urban And Center City | SLAMS | X | Population Exposure | -104.8176611 | 41.13686502 | 1/1/1979 |
| 56-029-0001 | Cody | Cody Jr High School | Residential | Suburban | SLAMS | X | Population Exposure | -109.0685071 | 44.52464211 | 1/1/1975 |
| 56-005-1002 | Gillette | 1000 West 8th St | Commercial | Urban And Center City | SLAMS | X | Population Exposure | -105.516389 | 44.288056 | 1/1/1978 |
| 56-039-1006 | Jackson | 40 E Pearl Ave. | Commercial | Urban And Center City | SLAMS | X | Population Exposure | -109.0685071 | 44.52464211 | 6/8/2007 |
| 56-013-1003 | Lander | 600 Washington | Residential | Suburban | SLAMS | X | Highest Concentration, General/Background | -108.735562 | 42.84222775 | 1/1/1987 |
| 56-001-0006 | Laramie | 406 Ivinson | Commercial | Urban And Center City | SLAMS | X | Population Exposure | -105.591725 | 41.31158614 | 1/1/1968 |
| 56-037-0007 | Rock Springs | 625 Ahsay Ave | Residential | Urban And Center City | SLAMS | X | Population Exposure | -109.220125 | 41.59259168 | 1/1/1983 |
| 56-033-0002 | Sheridan - Police Station | 45 West 12th St | Commercial | Urban And Center City | SLAMS | X | Highest Concentration, Population Exposure | -106.955933 | 44.815142 | 10/5/1983 |
| 56-033-0003 | Sheridan-Highland Park | 1301 Avon | Residential | Urban And Center City | SLAMS | X | Population Exposure | -106.9762423 | 44.80549148 | 7/1/2005 |
| 56-009-0819 | Antelope | Antelope Site 3 | Industrial | Rural | Special Purpose | X | General/Background | -105.386161 | 43.426103 | 9/1/1982 |
| 56-005-0892 | Belle Ayr | Belle Ayr Ba-4,5N,5S | Industrial | Rural | Special Purpose | X | Highest Concentration, Source Oriented | -105.343164 | 44.097074 | 7/9/1991 |
| 56-035-0700 | Big Piney | 4 miles south of Big Piney, Wy | Residential | Rural | Special Purpose | X | Source Oriented, General/Background | -110.0989 | 42.4864 | 3/30/2011 |
| 56-005-0877 | Black Thunder PM2.5 | Black Thunder BTM 26-2 | Industrial | Rural | Special Purpose | X | General/Background | -105.2 | 43.677 | 1/1/1985 |
| 56-035-0099 | Boulder | 5 miles southwest of Boulder, Wy | Desert | Rural | Special Purpose | X | Source Oriented, General/Background | -109.753 | 42.719 | 2/1/2005 |
| 56-005-0899 | Buckskin | Triton Coal Gillette, Wy | Industrial | Rural | Special Purpose | X | General/Background | -105.6 | 44.472 | 4/10/1994 |
| 56-005-0456 | Campbell County | Approx 15 Miles SSW of Gillette, Wy | Desert | Rural | Special Purpose | X | Source Oriented, General/Background | -105.529994 | 44.146964 | 7/15/2003 |

| AQS ID | Site Name | Address | Land Use Type | Location Type | Monitor Type | Meets 40 CFR Part 58 Appendix A, C, D and E Requirements* | Monitor Objective | Longitude | Latitude | Site Start Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 56-021-0100 | Cheyenne – NCore | 6909 Washakie Ave. Cheyenne, Wy | Residential | Suburban | NCore | X | National Core Monitoring Site | -104.77842 | 41.18235 | 1/1/2011 |
| 56-035-0100 | Daniel South | 5 miles south of Daniel, Wy | Desert | Rural | Special Purpose | X | General/Background | -110.0551 | 42.7907 | 7/1/2005 |
| 56-035-1000 | Farson Met | 0.7 miles NW of intersection of HWY 191 & State Route 28 | Desert | Rural | Special Purpose Met | | General Background | -109.4541 | 42.1184 | 4/27/2011 |
| 56-005-0800 | Gillette | Gillette College | Residential | Suburban | Special Purpose | X | Population Exposure | -105.504167 | 44.265833 | 10/1/2011 |
| 56-037-0077 | Hiawatha | Bitter Creek Rd. 43 miles SE of Rock Springs, Wy | Desert | Rural | Special Purpose | X | General Background | -108.6176 | 41.1545 | 3/30/2011 |
| 56-035-1002 | Juel Spring | 20 miles NW of Farson, Wy | Desert | Rural | Special Purpose | X | Source Oriented, General/Background | -109.5604983 | 42.37349916 | 12/11/2009 |
| 56-037-0300 | Moxa | 25 miles NW of Green River, Wy | Desert | Rural | Special Purpose | X | Source Oriented, General/Background | -109.788654 | 41.751009 | 5/27/2010 |
| 56-041-0101 | Murphy Ridge | Near Wyoming Utah Border | Agricultural | Rural | Special Purpose | X | General/Background | -111.0417 | 41.373 | 1/1/2007 |
| 56-013-0900 | Pavillion | West Power Line Road | Industrial | Rural | Special Purpose | X | Source Oriented, General/Background | -108.5789 | 43.2586 | 1/31/2011 |
| 56-035-0705 | Pinedale PM-2.5 | 101 East Hennick | Residential | Suburban | Special Purpose | X | Population Exposure | -109.8601978 | 42.87060057 | 7/1/2005 |
| 56-035-0101 | Pinedale Gaseous | West side of City Park and Pine Creek | Residential | Suburban | Special Purpose | X | Population Exposure | -109.87076 | 42.869824 | 1/1/2009 |
| 56-013-0099 | South Pass | South Pass, Wy | Forest | Rural | Special Purpose | X | General/Background | -108.7200027 | 42.52999916 | 3/12/2007 |
| 56-005-0123 | Thunder Basin | Thunder Basin Grassland Site 30 Mi N-NE of Gillette, Wy | Desert | Rural | Special Purpose | X | General/Background | -105.2903 | 44.6522 | 5/1/2001 |
| 56-037-0200 | Wamsutter | 2 miles west of Wamsutter, Wy | Desert | Rural | Special Purpose | X | Source Oriented, General/Background | -108.0238889 | 41.6775 | 3/1/2006 |
| 56-005-0099 | Wright | Adjacent To Wright Jr-Senior High School | Residential | Rural | Special Purpose | X | General/Background, Population Exposure | -105.490771 | 43.757812 | 11/1/2002 |
| 56-035-0097 | Wyoming Range | Wyoming Range/West Fontenelle Drive | Agricultural | Rural | Special Purpose | X | General/Background | -110.3530 | 42.9800 | 1/1/2011 |

*All SLAMS, NCore, SPM and speciation stations Network Modification Request Forms will be supplied to EPA Region 8 during the Wyoming Systems Audit during 2012.

# Appendix B

## 2011 SLAMS Precision and Accuracy

| | Site AQS I.D. | POC | Site Name | Precision Checks (Number - Type) | Accuracy Audit | | | | Flow Verification | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1st Q | 2nd Q | 3rd Q | 4th Q | 1st Q | 2nd Q | 3rd Q | 4th Q |
| $PM_{10}$ | 56-025-0001 | POC 4 | Casper | 50- Analytical | 1 | 0 | 1 | 0 | 3 | 3 | 2 | 2 |
| | 56-025-0001 | POC 5 | Casper | NA | 1 | 0 | 1 | 0 | 3 | 3 | 2 | 2 |
| | 56-021-0001 | POC 1 | Cheyenne | 56 - Analytical | 1 | 0 | 1 | 0 | 2 | 3 | 1 | 2 |
| | 56-021-0001 | POC 2 | Cheyenne | NA | 1 | 0 | 1 | 0 | 2 | 3 | 1 | 2 |
| | 56-029-0001 | POC 3 | Cody | NA | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-005-1002 | POC 5 | Gillette | NA | 0 | 1 | 0 | 1 | 3 | 3 | 2 | 2 |
| | 56-039-1006 | POC 1 | Jackson | NA | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-013-1003 | POC 3 | Lander | NA | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-001-0006 | POC 5 | Laramie | NA | 1 | 0 | 1 | 0 | 3 | 3 | 1 | 1 |
| | 56-037-0007 | POC 2 | Rock Springs | NA | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-033-0003 | POC 1 | Sheridan Highland Park | 49 - Analytical | 1 | 0 | 1 | 0 | 3 | 3 | 2 | 2 |
| | 56-033-0003 | POC 2 | Sheridan Highland Park | NA | 1 | 0 | 1 | 0 | 3 | 3 | 2 | 2 |
| | Site AQS I.D. | POC | Site Name | Precision Checks (Number - Type) | Accuracy Audit | | | | Flow Verification | | | |
| | | | | | 1st Q | 2nd Q | 3rd Q | 4th Q | 1st Q | 2nd Q | 3rd Q | 4th Q |
| $PM_{2.5}$ | 56-021-0001 | POC 1 | Cheyenne | 51 - Analytical | 1 | 0 | 1 | 0 | 2 | 3 | 1 | 2 |
| | 56-021-0001 | POC 2 | Cheyenne | N/A | 1 | 0 | 1 | 0 | 2 | 3 | 1 | 2 |
| | 56-025-0001 | POC 1 | Casper | N/A | 1 | 0 | 1 | 0 | 3 | 3 | 2 | 2 |
| | 56-039-1006 | POC 1 | Jackson | N/A | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-029-0001 | POC 1 | Cody | N/A | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-013-1003 | POC 1 | Lander | N/A | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-001-0006 | POC 1 | Laramie | N/A | 1 | 0 | 1 | 0 | 3 | 3 | 1 | 1 |
| | 56-035-0705 | POC 1 | Pinedale | N/A | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-037-0007 | POC 1 | Rock Springs | N/A | 0 | 1 | 0 | 1 | 3 | 3 | 3 | 2 |
| | 56-033-0002 | POC 1 | Sheridan Police Dept. | 56 - Analytical | 1 | 0 | 1 | 0 | 3 | 3 | 2 | 2 |
| | 56-033-0002 | POC 2 | Sheridan Police Dept. | N/A | 1 | 0 | 1 | 0 | 3 | 3 | 2 | 2 |
| | 56-033-0003 | POC 1 | Sheridan Highland Park | N/A | 1 | 0 | 1 | 0 | 3 | 3 | 2 | 2 |