



Wyoming Ambient Air Monitoring Annual Network Plan 2010



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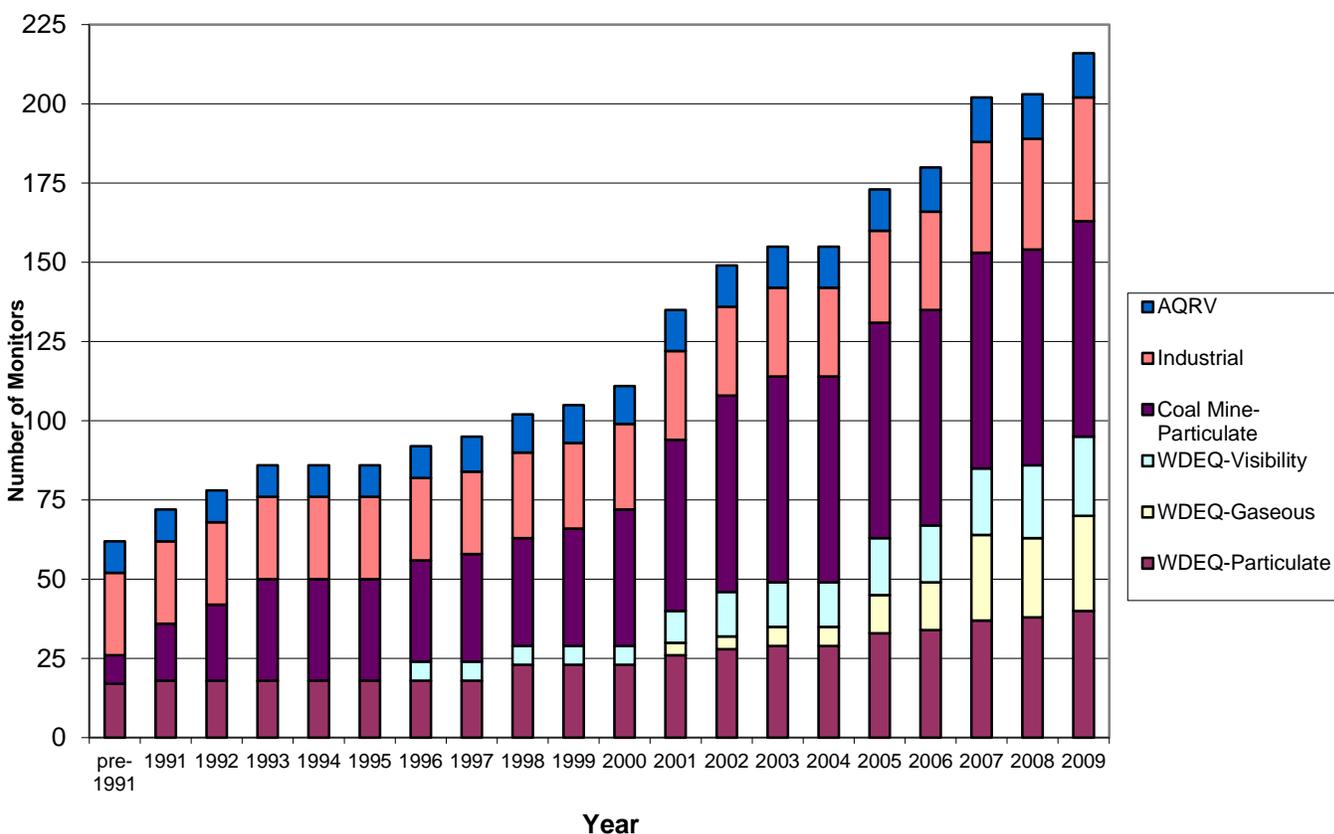
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1.0 Introduction

The United States 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. The following graph shows the number of monitors the AQD runs or oversees by year since 1991.



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.

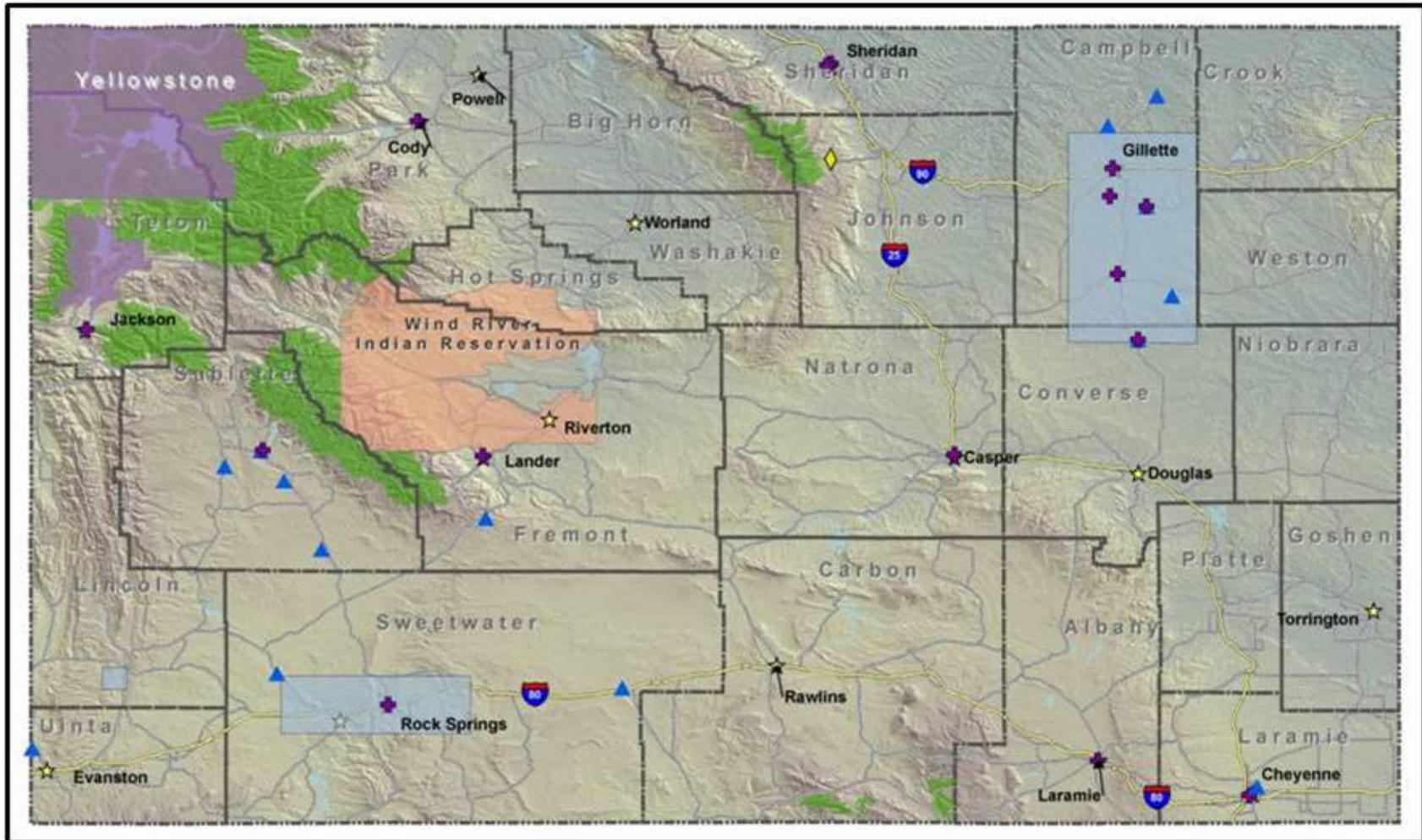
The Wyoming monitoring network, as a whole, is designed to meet the following seven basic ambient air monitoring objectives:

- 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 and Visibility sites. The shaded areas on the map denote large industrial networks in Campbell, Sweetwater, and Lincoln Counties.

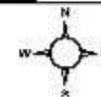
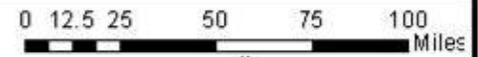
This table provides a brief overview of the Wyoming Monitoring Network.



Air Quality Monitoring Network

Map Produced by
WDEQ
Air Quality Division

- ★ City
- ▲ State-Gaseous
- ✚ State-PM
- ◆ State-Visibility
- Industrial Network
- Wind River Indian Reservation
- Forest Service Class 1
- National Park Service Class 1



1:3,000,000

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								
Thunder Basin	Campbell Co					X	X			X	X	VISIBILITY
Campbell County	Campbell Co		X			X	X			X	X	
Belle Ayr Mine	Campbell Co				X	X					X	
Wright	Campbell Co	X										
Gillette	Campbell Co	X										
Black Thunder Mine	Campbell Co				X							
Buckskin Mine	Campbell Co				X							
Antelope Mine	Converse Co				X	X					X	
Lander	Fremont Co	X		X								
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	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	Sheridan Co	X		X								
Sheridan - Police Station	Sheridan Co		X	X								
Juel Spring	Sublette Co					X	X			X	X	
Boulder	Sublette Co		X			X	X			X	X	VISIBILITY
Daniel South	Sublette Co		X			X	X			X	X	
Pinedale	Sublette Co			X	X	X	X			X	X	
Moxa	Sweetwater Co		X			X	X	X		X	X	
Wamsutter	Sweetwater Co		X			X	X			X	X	
Rock Springs	Sweetwater Co	X		X								
Jackson	Teton Co	X		X								
Murphy Ridge	Uinta Co		X			X	X			X	X	

2.0 Air Monitoring Plan in 2010

2.1 State and Local Air Monitoring Sites (SLAMS)

The 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

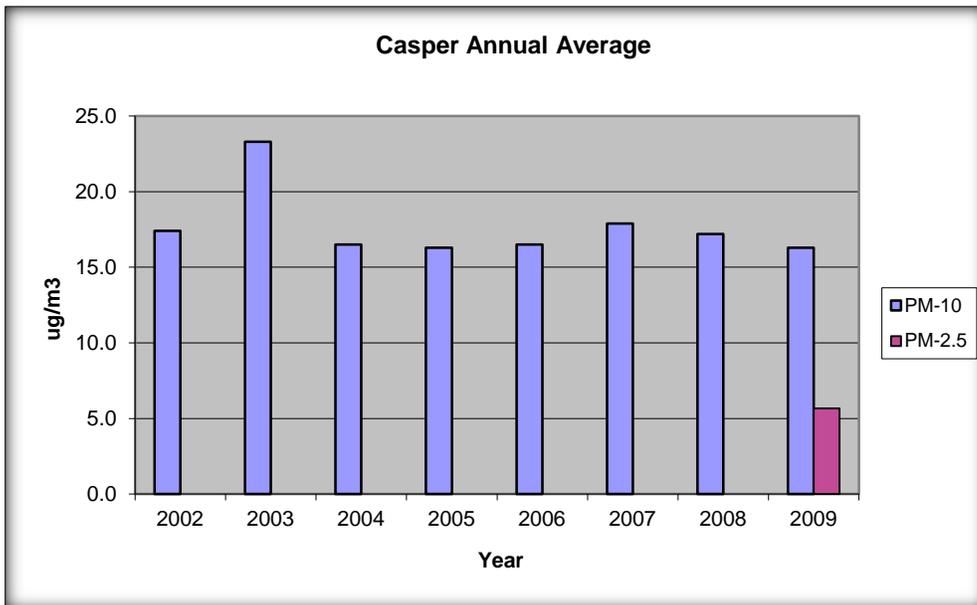


Casper Monitoring Site Specifications

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 (hi-vol)	Neighborhood	1/3	No planned changes

Casper Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Sample Frequency	Operational Status
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). PM₁₀ sampling began at this site in 1991. A collocated PM₁₀ sampler was added in 2001. The Casper monitoring site is the only Hi-Vol PM₁₀ collocated site in the Wyoming monitoring network, but the PM₁₀ samplers will be upgraded to more reliable low-volume samplers during 2010. The AQD added PM_{2.5} sampling at the Casper site on May 22, 2009. We are interested in monitoring PM_{2.5} concentrations in Casper because it is one of Wyoming's most heavily populated areas.



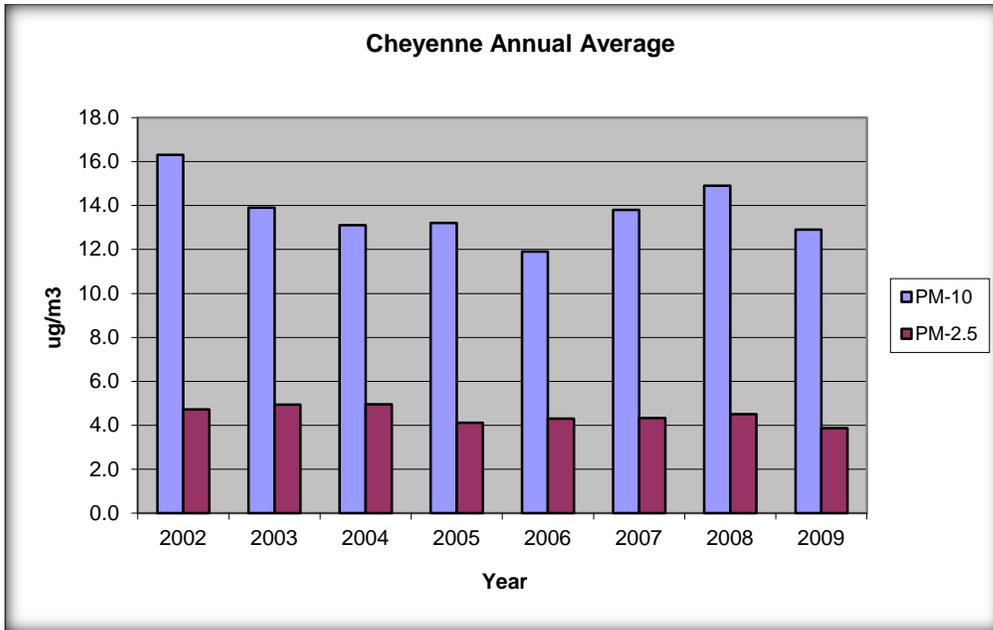
PM_{2.5} NAAQS is 15.0 µg/m³

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 23 rd & Central Ave. (Cheyenne MSA)	56-021-0001	PM ₁₀	Manual Filter-based Gravimetric (partisol)	Neighborhood	1/3	No planned changes
Cheyenne PM _{2.5} with collocation	State Office Building 23 rd & Central Ave. (Cheyenne MSA)	56-021-0001	PM _{2.5}	Manual Filter-based Gravimetric (partisol)	Neighborhood	1/3	No planned changes

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 PM₁₀ sampling began at this site in 1991. A collocated PM₁₀ 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.



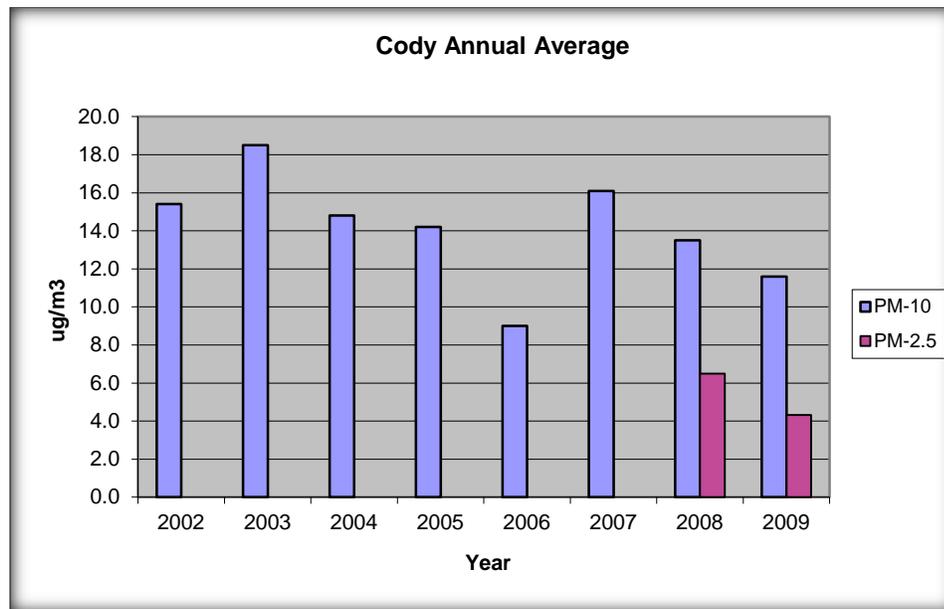
PM_{2.5} NAAQS is 15.0 µg/m³

2.1.3 Cody



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 (hi-vol)	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. PM₁₀ 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 oversee impacts from wintertime sanding, wood smoke, summertime forest fires, and the nearby lake bed that can be exposed when available water is low. While the AQD is not planning major changes to the Cody site, the PM₁₀ samplers will be upgraded to more reliable low-volume samplers during 2010.



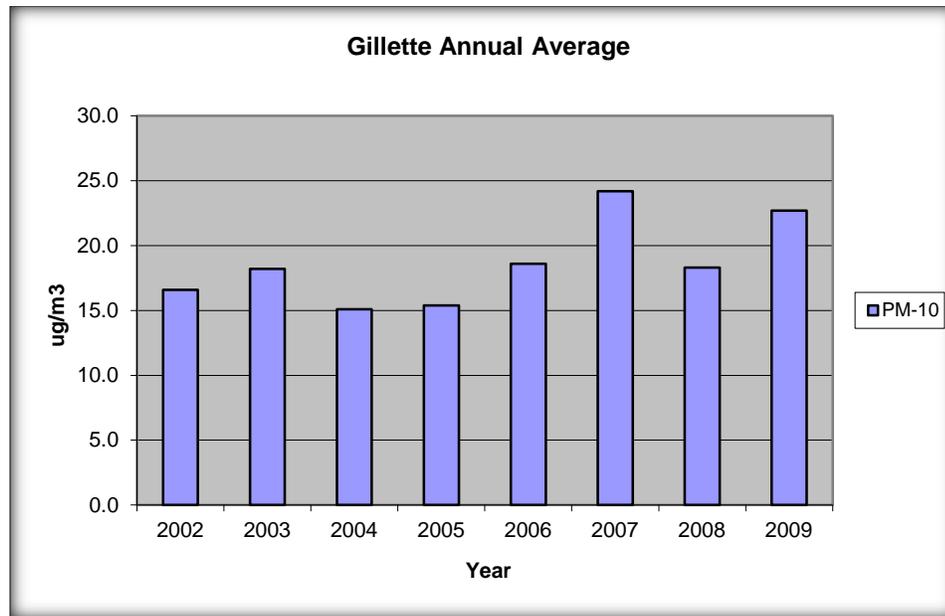
PM_{2.5} NAAQS is 15.0 µg/m³

2.1.4 Gillette

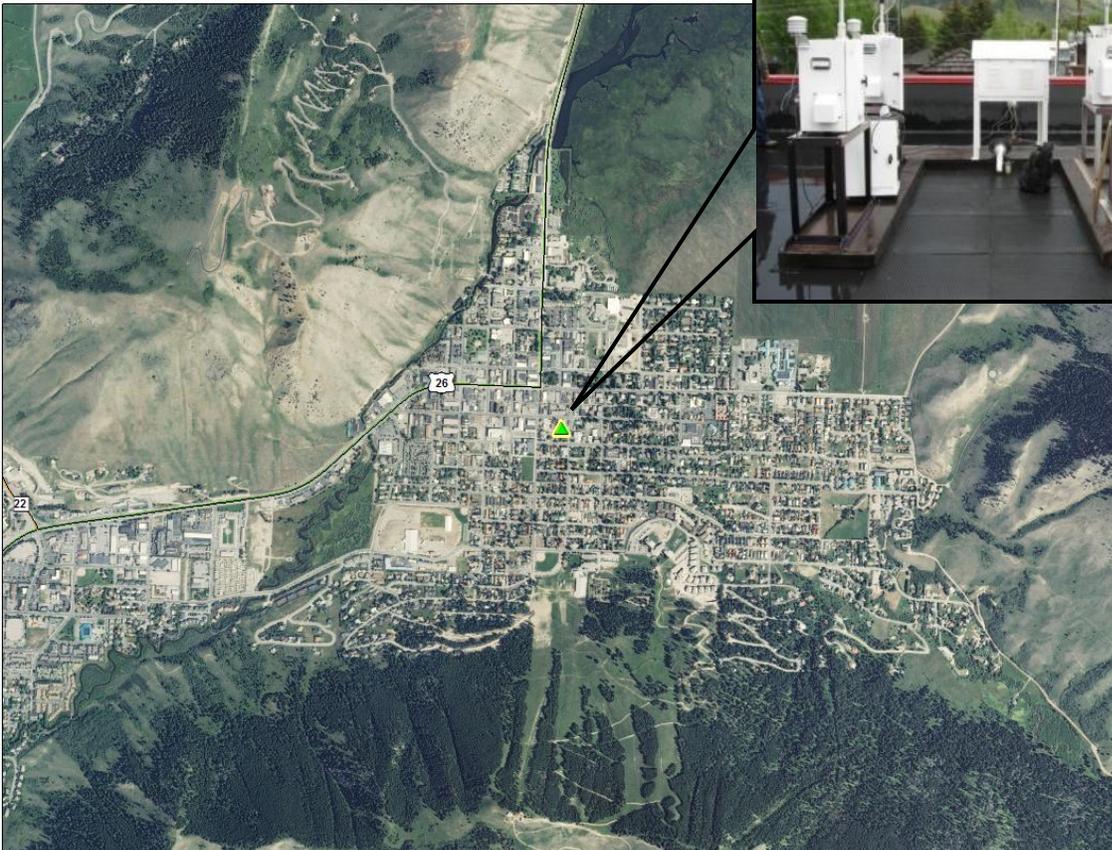


Gillette Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Sample Frequency	Operational Status
Gillette PM ₁₀	1000 West 8 th Street	56-005-1002	PM ₁₀	Manual Filter-based Gravimetric (hi-vol)	Neighborhood	1/6	No planned changes

Gillette is located in Campbell County Wyoming; its population is approximately 29,100 and is considered a micropolitan statistical area. PM₁₀ sampling began at this site in 1991. While the AQD is not planning major changes to the Gillette site, the PM₁₀ sampler will be upgraded to a more reliable low-volume sampler during 2010.

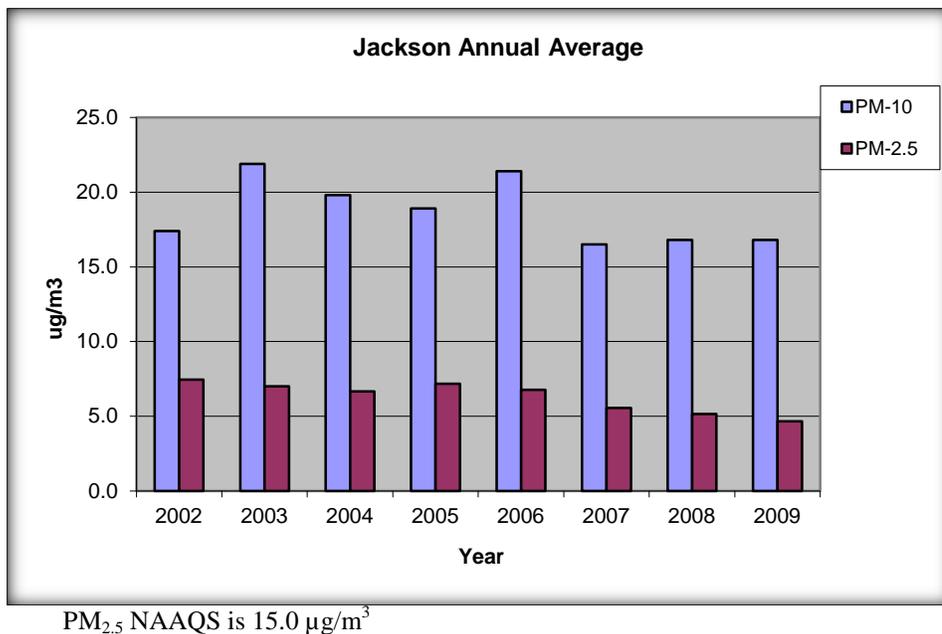


2.1.5 Jackson



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. Jackson PM₁₀ and PM_{2.5} sampling began at this site in 2001.

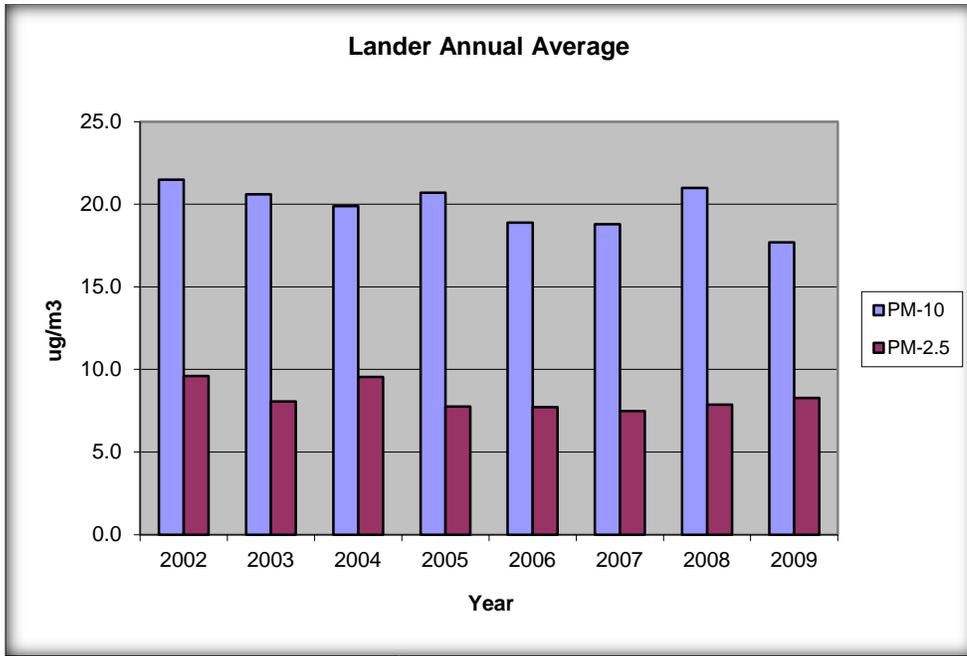


2.1.6 Lander



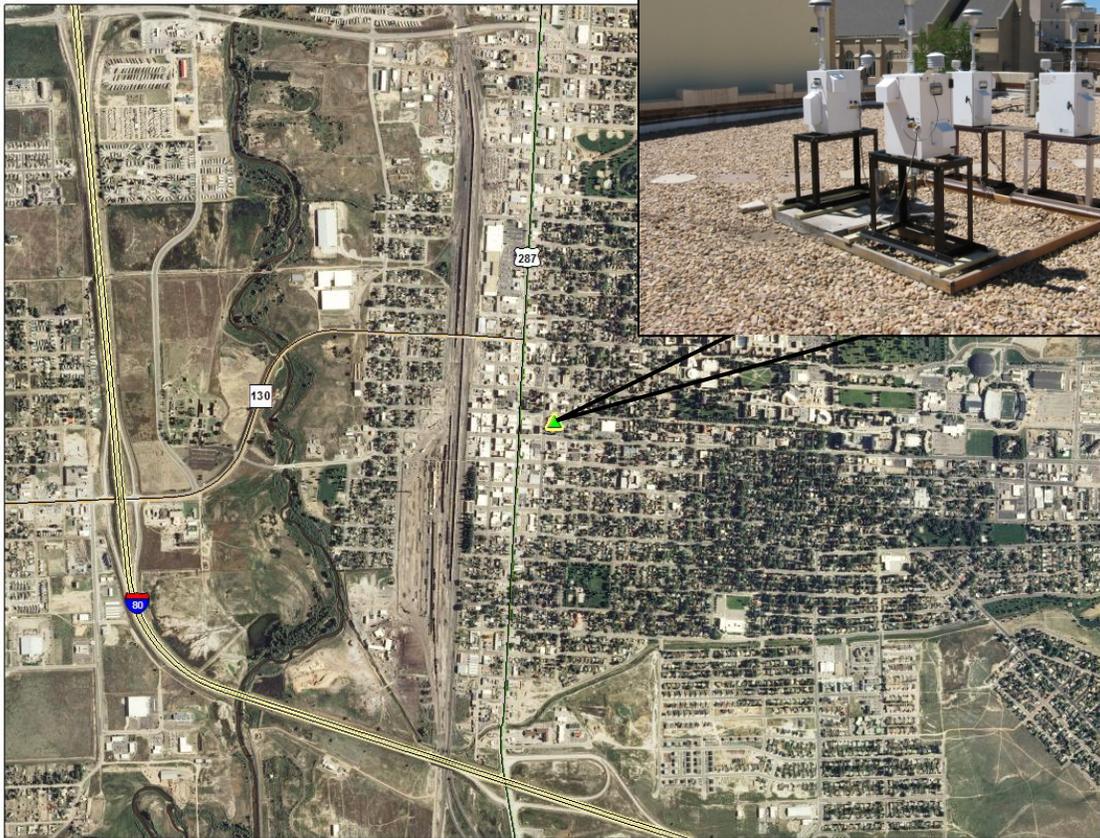
Lander Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Sample Frequency	Operational Status
Lander PM ₁₀	600 Washington	56-013-1003	PM ₁₀	Manual Filter-based Gravimetric (partisol)	Neighborhood	1/3	No planned changes
Lander PM _{2.5}	600 Washington	56-013-1003	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. PM₁₀ sampling began at this site in 1989. The PM_{2.5} monitors were installed in 2001.



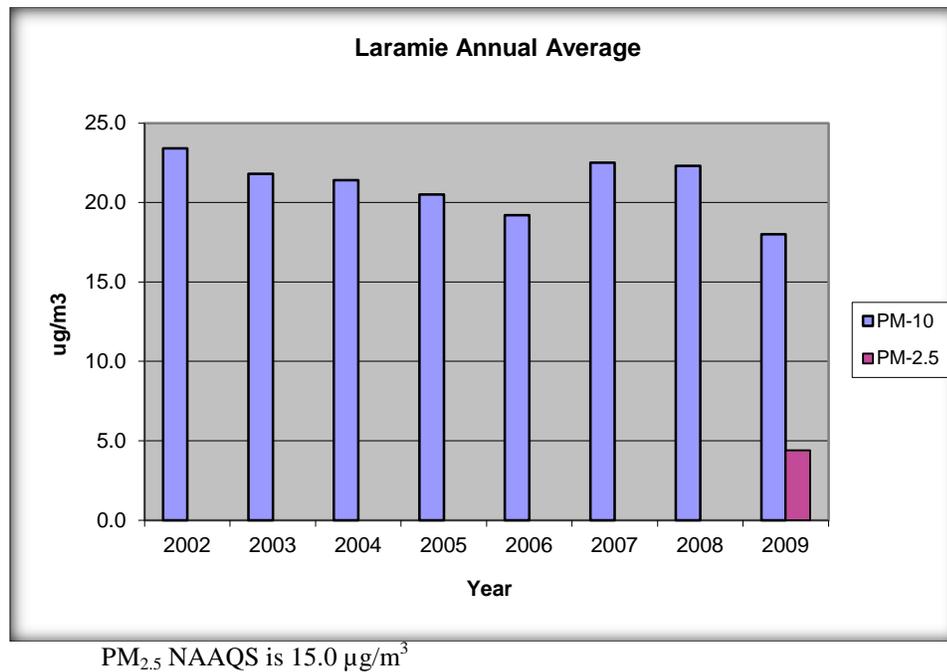
PM_{2.5} NAAQS is 15.0 µg/m³

2.1.7 Laramie



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 (hi-vol)	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. PM₁₀ 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 in order to oversee impacts from wintertime sanding, wood smoke, and summertime forest fires. While the AQD is not planning major changes to the Laramie site, the PM₁₀ samplers will be upgraded to low-volume samplers during 2010.

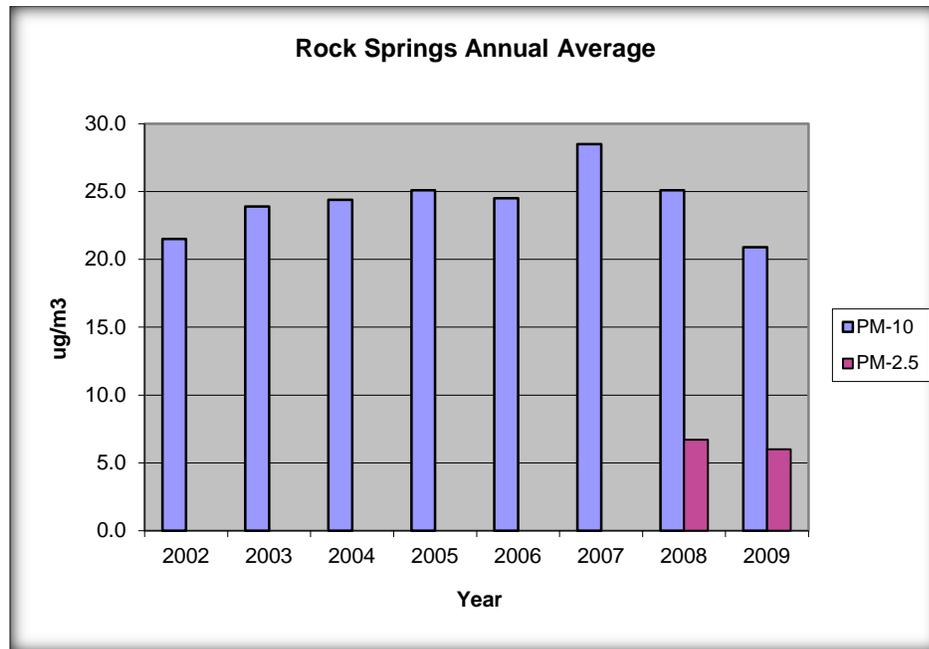


2.1.8 Rock Springs



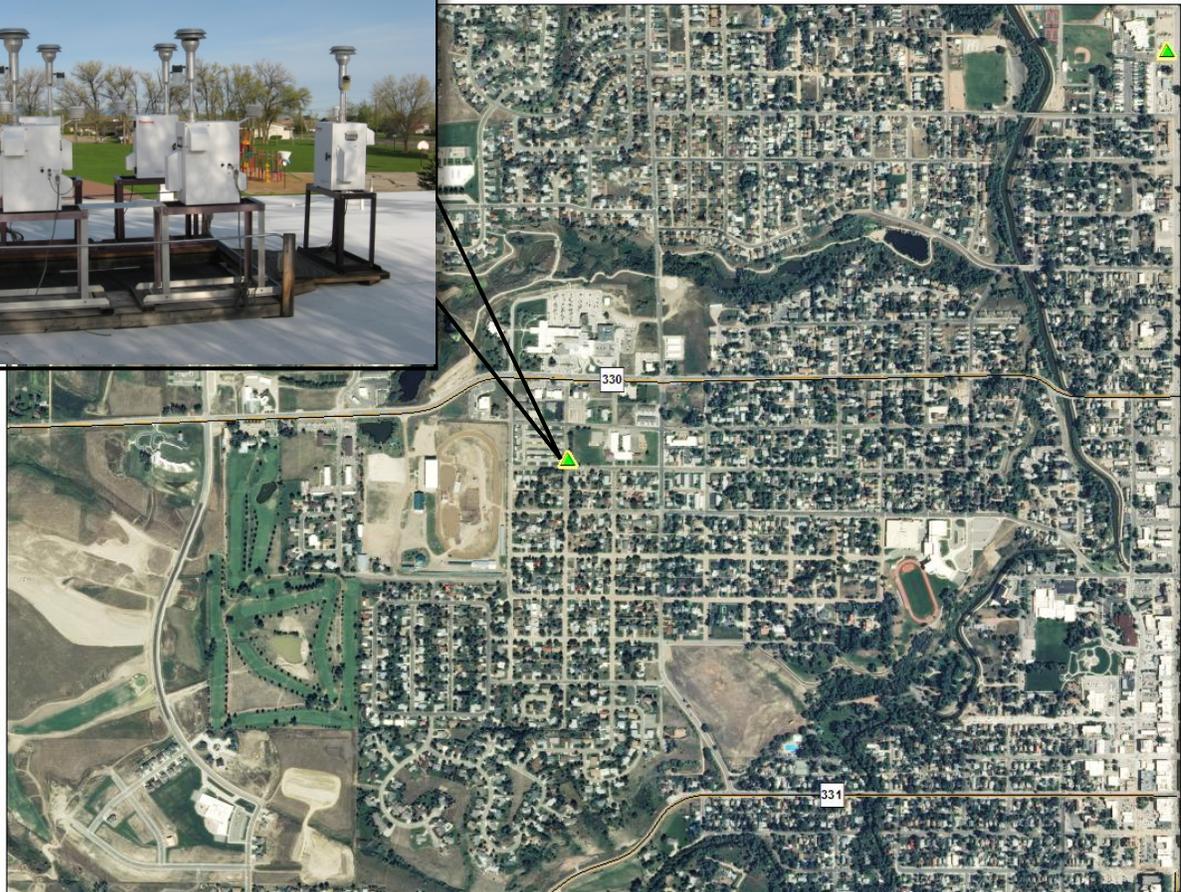
Rock Springs Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Sample Frequency	Operational Status
Rock Springs PM ₁₀	625 Ahsay Ave.	56-037-0007	PM ₁₀	Manual Filter-based Gravimetric (partisol)	Neighborhood	1/3	No planned changes
Rock Springs PM _{2.5}	625 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. PM₁₀ 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.



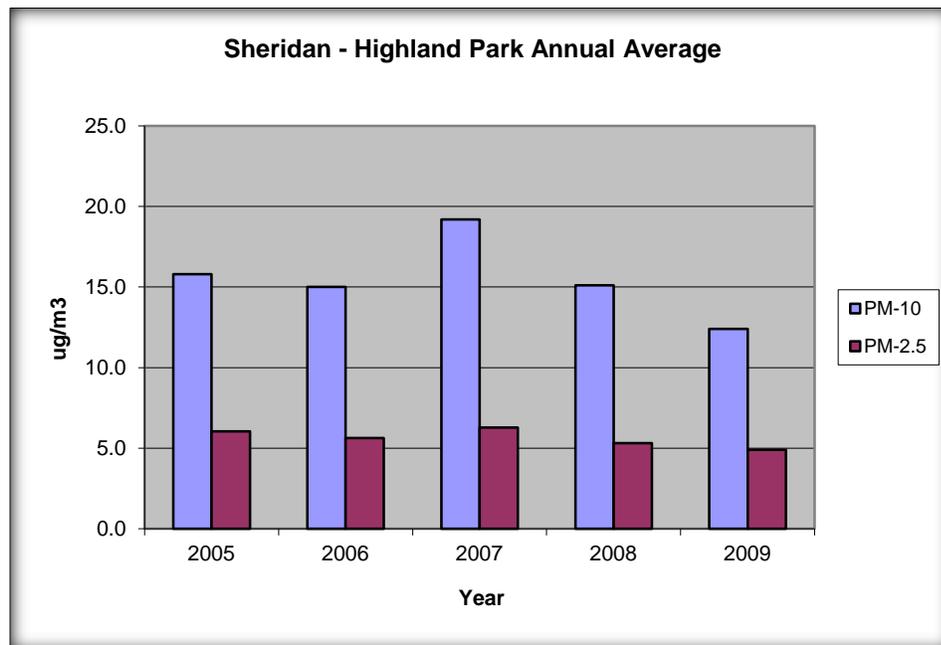
PM_{2.5} NAAQS is 15.0 µg/m³

2.1.9 Sheridan – Highland Park



Sheridan – Highland Park Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Sample Frequency	Operational Status
Sheridan – Highland Park PM ₁₀ with collocation	1301 Avon	56-033-0003	PM ₁₀	Manual Filter-based Gravimetric (partisol)	Neighborhood	1/3	No planned changes
Sheridan – Highland Park PM _{2.5}	1301 Avon	56-033-0003	PM _{2.5}	Manual Filter-based Gravimetric (partisol)	Neighborhood	1/3	No planned changes

Sheridan – Highland Park 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 PM₁₀. In June of 2005, the PM₁₀ and PM_{2.5} sampling was moved from the Sheridan Middle School to the Highland Park School, when the Middle School was torn down. Prior to 2005, PM₁₀ had been monitored at the Middle School since 1998. The Highland Park monitoring location was chosen as being representative of population exposure in a residential neighborhood. A collocated PM₁₀ monitor was placed at the Highland Park Station, in 2007, to fulfill collocation requirements for the SLAMS network.



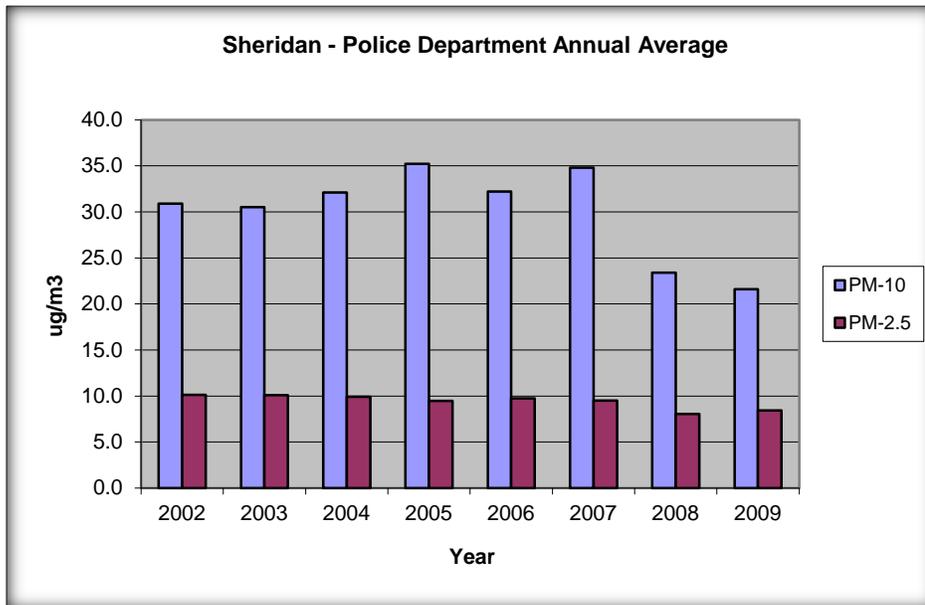
PM_{2.5} NAAQS is 15.0 µg/m³

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 12 th Street	56-033-0002	PM ₁₀	Continuous TEOM	Neighborhood	1/1	No planned changes
Sheridan – Police Station PM _{2.5} with collocation	45 West 12 th Street	56-033-0002	PM _{2.5}	Manual Filter-based Gravimetric (partisol)	Neighborhood	1/3	No planned changes

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 24-hour PM₁₀. Filter-based PM₁₀ sampling began at this site in 1985. A PM₁₀ 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 us better information to work with the community to prevent PM₁₀ exceedances. PM_{2.5} sampling started in 1998 at this site.



PM_{2.5} NAAQS is 15.0 µg/m³

2.2 Special Purpose Monitoring (SPM)

The SPMs 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. The current SPM locations in Wyoming include:

2.2.1 Boulder



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
			PM ₁₀	Continuous TEOM	Neighborhood	1/1	No planned changes

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 includes gaseous (NO_x and ozone), continuous particulate (PM₁₀ TEOM), nephelometer, camera system and meteorological monitoring. The Boulder Monitoring Station was also a hub for the AQD's 2007 - 2010 Upper Green Winter Ozone Studies. During these studies, the site also housed Methane/Non-Methane Hydrocarbon monitoring, Nitrous Acid (HONO) monitoring, VOC monitoring, NO_y monitoring, trace CO and SO₂ monitors, 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.

2.2.2 Cloud Peak



The Cloud Peak Site is located approximately 15 miles west of Buffalo, WY and is used to track visibility and meteorology in the area. The Cloud Peak Station includes a nephelometer, camera system and meteorological monitoring.

2.2.3 Juel Spring



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

The Juel Spring monitor was started on December 11, 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 Network Review in 2008 for Southwest Wyoming; 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.

2.2.4 Moxa



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

Moxa Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Operating Schedule	Operational Status
			Oxides of Nitrogen	Real Time	Urban	Hourly	No planned changes
			PM ₁₀	Continuous TEOM	Urban	1/1	No planned changes

The Moxa site is the newest monitoring station in the Wyoming SPM Network. This monitor was installed May 27, 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, SO₂, ozone, continuous particulate (PM₁₀ TEOM), camera system, and meteorology monitors.

2.2.5 Murphy Ridge



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	1/1	No planned changes

The Murphy Ridge Air Quality Monitoring Station began operations during 2007. The station is located in the Town of Bear River, approximately ten 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 in conjunction with the data collected from the Murphy Ridge NADP monitor. This site monitors NO_x, ozone, continuous particulate (PM₁₀ TEOM), and meteorology. The site is also equipped with a camera. In 2009, SO₂ monitoring was discontinued from the site due to the history of extremely low SO₂ concentrations and ongoing budget constraints.

2.2.6 Pinedale



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

Pinedale is located in Sublette County with a population of approximately 2,000 people. PM_{2.5} sampling started in 2005 at this site.



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	1/1	No planned changes

In January 2009, the AQD added a gaseous monitoring site in Pinedale, Wyoming. This station includes ozone, NO_x, continuous PM_{2.5} (beta-attenuation method (BAM)), camera system and meteorology within the town of Pinedale to monitor concentrations in this increasingly populated area. Please note that since the PM_{2.5} BAM monitor is a new technology for the AQD, we will be operating this monitor under the guidance for “long-term field evaluation” of an FEM or ARM (Chet Wayland memo, 2008). While this monitor meets the 40CFR Part 58 criteria, the AQD does not plan to classify it as a SLAMS monitor when the field evaluation is over.

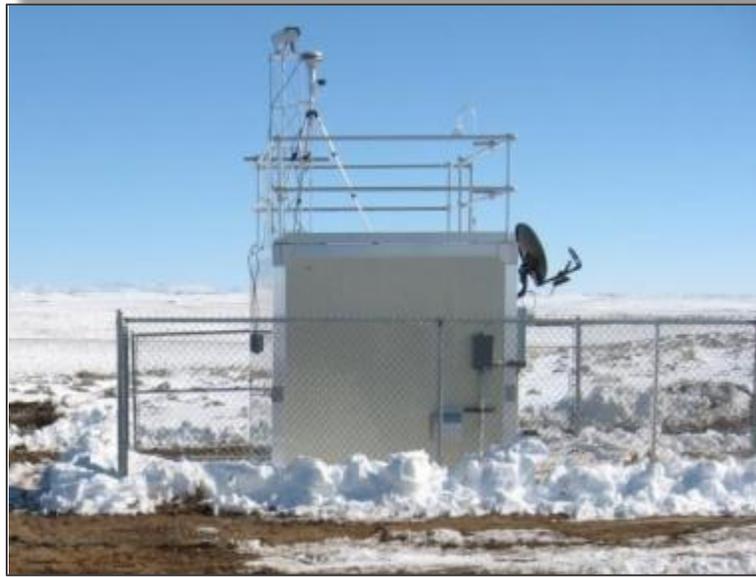
2.2.7 South Campbell County



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	1/1	No planned changes

The South Campbell County site is located approximately 15 miles southwest of Gillette and is used to track air quality in an area of heavy coal-bed methane development. This station includes continuous particulate (PM₁₀ TEOM), gaseous (NO_x and ozone), camera system and meteorological monitoring.

2.2.8 South Daniel



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	1/1	No planned changes

The South Daniel monitor is located 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 (PM₁₀ TEOM), camera system and meteorological monitoring.

2.2.9 South Pass



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	1/1	No planned changes

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 (PM₁₀ TEOM), meteorology, a camera, and the B and C modules of an IMPROVE-type aerosol monitor. The gaseous and aerosol measurements are used in conjunction with NADP data from the South Pass NADP site to examine nitrogen and sulfur in various phases. Additionally the aerosol concentrations of nitrates, sulfates, and carbon can be used to compare with aerosol concentrations collected at the north end of the range and at all IMPROVE-type aerosol samples collected throughout Wyoming.

2.2.10 Thunder Basin



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

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 includes gaseous (NO_x and ozone), nephelometer, camera system and meteorological monitoring.

2.2.11 Wamsutter



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
			Sulfur Dioxide	Real Time	Urban	Hourly	Will be shut down
			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	1/1	No planned changes

The Wamsutter Site is approximately two 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 (PM₁₀ TEOM), camera system and meteorological monitoring. The SO₂ was discontinued on January 1, 2010, due to the redistribution of funding. This station began operations on March 13, 2006.

2.2.12 Wright



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 (hi-vol)	Neighborhood	1/6	No planned changes

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 PM₁₀ in a community that is downwind of the coal mines. The AQD will be upgrading the hi-vol PM₁₀ sampler to a low-volume sampler during 2010.

2.2.13 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 NO₂ concentrations in the Powder River Basin. The Belle Ayr Monitor is located near the rail road 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. Due to lack of funding, the PRB NO_x monitoring network was shut down from March 2007 until April 2009. The Wyoming Mining Association, in cooperation with the AQD, contributed funding to upgrade the stations and resume operation.

PRB NO _x 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	No planned changes
			Nitrogen Dioxide	Real Time	Regional	Hourly	No planned changes
			Oxides of Nitrogen	Real Time	Regional	Hourly	No planned changes
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

2.2.14 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. The AQD temporarily discontinued collection of data from these monitors in September 2007, due to cuts in federal funding for PM_{2.5} monitoring. PRB PM_{2.5} Network operations resumed in June, 2008 with the help of a funding agreement with the Wyoming Mining Association. In 2008, the Buckskin North site was moved due to changes in the Mine’s Lands Necessary to Conduct Mining (LNCM) boundary. Also, in 2008, the Black Thunder monitor was moved due to changes in the Mine plan. Due to the age of the instrumentation in the network, the AQD is planning to upgrade the instruments to continuous 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}	Manual Filter-based Gravimetric	Regional	1/3	No planned changes
Belle Ayr Mine	Campbell County	56-005-0892	PM _{2.5}	Manual Filter-based Gravimetric	Neighborhood	1/3	No planned changes
Black Thunder Mine	Campbell County	56-005-0891	PM _{2.5}	Manual Filter-based Gravimetric	Neighborhood	1/3	No planned changes
Buckskin Mine	Campbell County	56-005-1899	PM _{2.5}	Manual Filter-based Gravimetric	Neighborhood	1/3	No planned changes

2.3 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
			Total Reactive Nitrogen	Real Time	Neighborhood	Hourly	No planned changes
			PM _{10-2.5}	Manual Filter-based Gravimetric	Neighborhood	1/3	No planned changes

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	No planned changes
			PM _{2.5}	Continuous BAM	Neighborhood	1/1	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. Written site approval was granted, for this location, by EPA on October 30, 2009. The NCore monitoring site will be established during the summer of 2010, with data reporting slated to begin on January 1, 2011. This site will be 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.

2.4 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 PM₁₀ monitoring locations. The AQD also requires extensive networks of PM₁₀ 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.

2.5 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 State Offices for viewing. The AQD is currently working with Region 8 staff to develop a general monitoring quality assurance plan that references the specific project plans.

The following tables show 2007 through 2009 data and design values for each SLAMS and SPM monitor. All sites operated by the AQD are in compliance with the NAAQS from 2007-2009, with the exception of the Boulder monitor for ozone.

3.1 Particulate Matter (PM-10)

In the Wyoming Monitoring Network there are nineteen (19) sites with PM₁₀ monitors. The PM₁₀ SLAMS network, consisting of ten sites, has three types of monitors. The Thermo Partisol 2000 PM₁₀ monitors, in the network, have 33% collocation and the R&P Hi-Vol monitors have 25% of the monitors collocated. This fulfills the collocation requirements in 40 CFR 58 Appendix A. The Sheridan Police Department PM₁₀ 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 TEOM PM₁₀ monitors. To comply with the 24-hour PM₁₀ NAAQS, a monitor must record one or less "exceedance" (24-hour concentration greater than 150 µg/m³) per year over a three year period. The design value is the average number of exceedances per year from 2007-2009. Wyoming also has an annual ambient air quality standard for PM₁₀. Compliance with the annual PM₁₀ 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 50µg/m³.

PM₁₀ Compliance with WAAQS of 50 µg/m³ Annual Arithmetic Mean (µg/m³)					
Site Name	2007	2008	2009	Average ('07-'09)	In Compliance
Casper	18	17	16	17	Yes
Cheyenne	14*	15	13	14	Yes
Cody	16*	12	12	13	Yes
Gillette	24*	18	23	22	Yes
Jackson	17*	17	17	17	Yes
Lander	19*	20*	18	19	Yes
Laramie	23	22	18	21	Yes
Rock Springs	29	24	21	25	Yes
Sheridan – Highland Park	19*	15	12	15	Yes
Sheridan – Police Dept.	35	23	22	27	Yes

Boulder	11*	11	9	10	Yes
Jonah	15	17*	N/A	N/A	N/A
Murphy Ridge	12	12	11	12	Yes
South Campbell County	13*	20*	12	15	Yes
South Daniel	11*	8*	8*	9	Yes
South Pass	9*	12	11*	11	Yes
Wamsutter	15	15	15	15	Yes
Wright	21	17	12*	17	Yes

N/A – data not available

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

PM ₁₀ Compliance with NAAQS of 150 µg/m ³ Highest 24- Hour Average (µg/m ³)					
Site Name	2007	2008	2009	Design Value ('07-'09)	In Compliance
Casper	39	46	93	0	Yes
Cheyenne	31	55	38	0	Yes
Cody	55	91	78	0	Yes
Gillette	74	58	73	0	Yes
Jackson	35	93	86	0	Yes
Lander	40	95	49	0	Yes
Laramie	67	73	60	0	Yes
Rock Springs	78	102	66	0	Yes
Sheridan – Highland Park	60	56	27	0	Yes
Sheridan – Police Dept.	168 ^P	103	99	0.67	Yes
Boulder	35	97	61	0	Yes
Jonah	65	127	N/A	N/A	N/A
Murphy Ridge	64	157 ^P	75	0.33	Yes
South Campbell County	53	67	43	0	Yes
South Daniel	44	27	57	0	Yes
South Pass	51	78	82	0	Yes
Wamsutter	227 ^P	76	99	0.33	Yes
Wright	57	56	31	0	Yes

N/A – data not available

P – Exceeds the Primary Standard. The exceedance at Sheridan – Police Dept. occurred on March 27, 2007. The exceedance at Murphy Ridge occurred on April 19, 2008. The AQD has flagged both of these values as high wind events eligible under the Exceptional Events Rule. The AQD is waiting for concurrence from Region 8 on these events.

3.2 Particulate Matter (PM-2.5)

There are ten (10) state run monitoring sites that collect PM_{2.5} data along with the four (4) monitors in the PRB PM_{2.5} network. 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. All fourteen (14) 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 3 year average is less than or equal to 15 µg/m³. Compliance with the 24-hour PM_{2.5} NAAQS is met when the 3-year average of the 98th percentile concentration is less than or equal to 35 µg/m³.

PM_{2.5} Compliance with NAAQS of 15.0 µg/m³ Annual Arithmetic Mean (µg/m³)					
Site Name	2007	2008	2009	Average ('07-'09)	In Compliance
Casper	N/A	N/A	4.4*	N/A	N/A
Cheyenne	4.3	4.5	3.9	4.2	Yes
Cody	N/A	5.7*	4.3	N/A	N/A
Jackson	4.1*	5.2	4.7	4.7	Yes
Lander	7.5*	7.8	8.3	7.9	Yes
Laramie	N/A	N/A	5.7*	N/A	N/A
Pinedale 2.5	5.9*	6.6*	5.5*	6.0	Yes
Pinedale Gaseous	N/A	N/A	4.2	N/A	N/A
Rock Springs	N/A	6.8	6.0	N/A	N/A
Sheridan – Highland Park	6.3	5.3	4.9	5.5	Yes
Sheridan – Police Dept.	9.5	8.0	8.4	8.6	Yes
Antelope Mine	4.5	3.9*	3.5*	4.0	Yes
Belle Ayr Mine	5.9*	6.2*	5.1	5.7	Yes
Black Thunder Mine	6.5*	5.5*	4.1*	5.4	Yes
Buckskin Mine	5.3*	5.5*	5.6	5.5	Yes

N/A – data not available

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

PM_{2.5} Compliance with NAAQS of 35 µg/m³ 98% 24- Hour Average (µg/m³)					
Site Name	2007	2008	2009	Average ('07-'09)	In Compliance
Casper	N/A	N/A	8	N/A	N/A
Cheyenne	9	10	9	9	Yes
Cody	N/A	22 ^F	10	N/A	N/A
Jackson	8	14	14	12	Yes
Lander	26	23	35	27	Yes
Laramie	N/A	N/A	14	N/A	N/A
Pinedale 2.5	13	17 ^F	16	15	Yes
Pinedale Gaseous	N/A	N/A	10	N/A	N/A
Rock Springs	N/A	19	12	N/A	N/A
Sheridan – Highland Park	24	14	10	16	Yes

Site Name	2007	2008	2009	Average ('07-'09)	In Compliance
Sheridan – Police Dept.	27	24	21	24	Yes
Antelope Mine	10	9	7	9	Yes
Belle Ayr Mine	15	16	12	14	Yes
Black Thunder Mine	18	17	10	15	Yes
Buckskin Mine	14	12	12	13	Yes

N/A – data not available

F -- In August 2008, the AQD monitored elevated PM_{2.5} concentrations in Pinedale and Cody due to impacts from wildfires. The AQD has flagged data from August 1, 2008 (Cody) and August 4, 2008 (Pinedale) as natural events under the Exceptional Events Rule. The AQD is waiting for concurrence from Region 8 on these events.

3.3 Nitrogen Dioxides (NO₂)

There were eight (8) state run SPM sites that monitored for NO₂ in 2009. The PRB NO_x monitors (Antelope and Belle Ayr Mine sites) were restarted during 2009. Compliance with the NO₂ NAAQS is determined by the annual average concentration less than or equal to 0.053 ppm.

NO ₂ Compliance with NAAQS of 0.053 ppm Annual Arithmetic Mean (ppm)				
Site Name	2007	2008	2009	In Compliance
Boulder	0.004*	0.003*	0.004	Yes
Murphy Ridge	0.003	0.003	0.003	Yes
Pinedale	N/A	N/A	0.003*	N/A
South Campbell County	0.004	0.003	0.003	Yes
South Daniel	0.003	0.003	0.003	Yes
South Pass	N/A	0.001*		N/A
Thunder Basin	0.002	0.002*	0.002	Yes
Wamsutter	0.007	0.005	0.005	Yes
Antelope Mine	N/A	N/A	0.003*	N/A
Belle Ayr Mine	N/A	N/A	0.006*	N/A

N/A – data not available

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

3.4 Sulfur Oxides

The State of Wyoming operated three (3) special purpose monitoring sites that monitored SO₂. All three (3) SO₂ monitors were closed in 2009; Murphy Ridge on November 30, 2009, South Pass on September 1, 2009, and Wamsutter on December 31, 2009. The AQD choose to close these sites based on the low monitored values at the sites and budget constraints. For SO₂, the AQD has WAAQS that are more stringent than the federal air quality standards. On an annual basis, the WAAQS SO₂ 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 SO₂ standards at the three sites in 2009. The table below compares the monitored values with the NAAQS rather than the more stringent WAAQS.

SO₂ Compliance with NAAQS of 0.030 ppm (annual average) 0.14 ppm (second highest 24-hour average) and 0.5 ppm (second highest 3-hour average)						
Site Name	2009 (annual average)	In Compliance	2009 (2 nd highest 24-hour average)	In Compliance	2009 (2 nd highest 3-hour average)	In Compliance
Murphy Ridge	0.001	Yes	0.001	Yes	0.003	Yes
South Pass	0.001	Yes	0.002	Yes	0.003	Yes
Wamsutter	0.001	Yes	0.002	Yes	0.004	Yes

3.5 Carbon Monoxide

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 the SPM locations was not justified for a long-term period. The Murphy Ridge monitor started in 2007 and was removed in November 2008. The AQD did not report any exceedances of the 8-hour and 1-hour CO standards at Murphy Ridge. Starting in the summer of 2010, the AQD will be conducting Trace CO monitoring at the Cheyenne NCore site.

3.6 Ozone

The AQD operated eight (8) O₃ monitoring sites in Wyoming during 2009, 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 4th highest yearly value must be less than or equal to 0.075 ppm. On March 12, 2009, Wyoming's Governor submitted a recommendation of non-attainment for Sublette and parts of Sweetwater and Lincoln Counties based on non-compliance at the Boulder monitor. On September 16, 2009, the EPA proposed to stay the 2008 standards for the purpose of attainment and non attainment area designations. During the stay, activity will not proceed on the UGRB proposed nonattainment area. EPA proposed to institute an accelerated ozone designation process for the reconsidered standards.

O₃ Compliance with NAAQS of 0.075 ppm 4th Highest 8-Hour Average (ppm)					
Site Name	2007	2008	2009	DV ('07-'09)	In Compliance
Boulder	0.067	0.101	0.074	0.081	No*
Murphy Ridge	0.070	0.064	0.066	0.067	Yes
Pinedale	N/A	N/A	0.060	N/A	N/A
South Campbell County	0.072	0.064	0.065	0.067	Yes
South Daniel	0.066	0.074	0.073	0.071	Yes
South Pass	0.071	0.066	0.086	0.074	Yes

Site Name	2007	2008	2009	DV ('07-'09)	In Compliance
Thunder Basin	0.072	0.074	0.069	0.072	Yes
Wamsutter	0.064	0.064	0.067	0.065	Yes

N/A – data not available

* -- Non-compliance at the Boulder monitor waiting on accelerated ozone designation process and reconsidered standard

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 revolve around continuing investigation into ozone formation and oil & gas source growth in the Upper Green River Basin. The AQD is also setting up a continuous PM_{2.5} monitor for deployment in areas that are experiencing smoke from forest fires.

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 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.

For the 2007 winter months, the AQD contracted with Environ International (subcontractors T&B Systems, Sonoma Technology Inc., and Meteorological Solutions Inc.) to perform a study of ozone formation in the Upper Green River Basin. During the 2007 study, meteorological conditions did not set up as they had in 2005 and 2006 and elevated ozone was not monitored. However, the parameters that were monitored were validated and were used to gain insight into this unique winter formation of ozone in the Upper Green River Basin. Because of the mild winter in 2007, funds were left to perform the study again in 2008. The AQD and its contractors modified the study plan based on available funding and lessons learned during the 2007 study.

During February and March 2008 several days of elevated ozone were monitored. After the winter of 2008, the AQD determined there were still aspects of the winter formation that needed to be recorded and studied. The AQD obtained funding from industry to perform UGWOS (Upper Green Winter Ozone Study) 2009. For 2009, the AQD proposed to add trace gas parameters and NO_y monitoring in addition to increasing the number of mesonet stations in the Upper Green River Basin.

The AQD obtained funding from industry to perform UGWOS 2009. In 2009, the AQD added trace gas parameters and NO_y monitoring in addition to increasing the number of mesonet stations in the Upper Green River Basin. February and March 2009 had fewer days conducive to ozone formation than 2008. Additionally, elevated ozone periods were shorter in duration than

in previous years. In December of 2009, the AQD held a Technical Forum to discuss the Upper Green Winter Ozone Issue. During this forum, special ambient monitoring was discussed extensively and recommendations were formulated for future monitoring efforts. Results and recommendations from the Technical Forum can be found at: <http://deq.state.wy.us/aqd/Ozone%20Technical%20Forum.asp> . For 2010, the AQD proposed to add temporary mesonet ozone and meteorology stations, upper air monitoring with a mini-SODAR and nitrous acid (HONO) monitoring.

Quality Assurance Plans and data from the 2007, 2008, 2009, and 2010 campaigns can be downloaded at <http://deq.state.wy.us/aqd/Upper%20Green%20Winter%20Ozone%20Study.asp> . Final 2007, 2008 and 2009 reports can also be downloaded at the site. During summer 2010, 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 Sublette County Air Toxics Study /Health Risk Assessment

In 2008, citizens of Sublette County requested that a study of air toxics and a risk assessment be performed in Sublette County. During 2009 and first quarter of 2010, the AQD cooperated with the Sublette County Commissioners and the Wyoming Department of Health to conduct air toxics monitoring in the Upper Green River Basin. The study monitored ozone and air toxics in community locations around Sublette County. The study plan and data, when available, can be found at <http://deq.state.wy.us/aqd/Ozone%20Main.asp>. Sublette County has contracted with a consulting firm to perform a risk assessment with the ozone and HAPs data collected during the study period.

4.3 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 long term field deployment. For 2010, the AQD will be testing a continuous methane/non-methane hydrocarbon (NMHC) analyzer at the Boulder station. To compliment this instrument, a series of canisters will be pulled to obtain a speciation profile of the NMHC component.

4.4 University of Wyoming

The AQD has contracted with University of Wyoming Department of Atmospheric Science to further survey ozone in the Upper Green during 2009-2010. The 2009 survey consisted of three parts: a mobile laboratory, passive ozone monitoring campaigns, and an assessment of traffic emissions. The mobile laboratory will monitor for continuous NO-NO₂-NO_x, ozone, methane/non-methane hydrocarbons, and meteorology and spent approximately a month at 5 locations around the Basin. The passive campaign used Ogawa passive samplers placed in

approximately 50 locations around Sublette County to determine spatial ozone variability. Some Ogawa samplers were also be placed on human subjects to determine personal exposure to ozone. UW also conducted traffic counts near the oil and gas fields to help determine traffic emissions associated with oil and gas development. For the 2010 survey, UW will operate a mobile laboratory at the Olson Ranch near Hwy 351 and Paradise Rd. Results of this survey will be posted on the AQD Monitoring page as they become available.

4.5 Network Assessment

During 2010, the AQD performed a network assessment for the entire AQD monitoring network to fulfill part of the 40 CFR Part 58.10 requirements. The purpose of the assessment is to determine efficient and effective placement of gaseous, particulate, and meteorological monitoring stations in the current Wyoming network. Results of the network assessment will be used to guide future monitor placement in Wyoming. The AQD solicited input from the public and other interested stakeholders on the process. The findings of the Network Assessment will be released in conjunction with this Network Plan and can be found on AQD's website along with this document. The findings were as follows:

The Network Assessment was performed in two stages, Southwest Wyoming in 2008 and the remainder of the State in 2010. Results from both the Southwest Wyoming Network Assessment and the assessment of other areas of the State are discussed in this document. The AQD has analyzed the results and several conclusions were reached:

- Currently operating monitoring stations in the Wyoming Monitoring Network are meeting their intended objective(s).
- Currently operating monitoring stations in the Wyoming Monitoring Network are not redundant with each other.
- There is a need for population-based ozone monitoring in Pinedale, Casper, Rock Springs, and Gillette.
- There is a need for population-based monitoring for PM₁₀ in Star Valley.
- Monitoring Stations should be deployed to monitor impacts from the Hiawatha and LaBarge Gas Fields.
- A monitoring station in the Wyoming Range would assist in quantifying transport from the west.
- Meteorological monitoring is needed in Farson and the northern portion of the Wyoming Range.
- The AQD will consider using trace-level gaseous monitors when deploying future stations with NO₂ or SO₂.

Several of these conclusions were generated from the Southwest Wyoming Network Assessment and have already been funded. A population-based monitoring station was deployed in Pinedale in 2009, which monitors for ozone, PM_{2.5}, NO_x, and meteorology. As Section 5 of this document will detail, the AQD has committed to funding the Wyoming Range transport monitoring station, which will monitor for ozone, trace-level NO_x, PM₁₀ and PM_{2.5} and meteorology. The AQD has also committed funding for a meteorological tower in Farson. The Wyoming Range and Farson monitoring stations will be deployed in 2011. The Hiawatha monitoring station has been jointly funded by AQD and EPA as part of the Three-State Study. The Three-State Study is a cooperative monitoring and emission inventory study whose objective

is to assist Wyoming, Colorado, and Utah to model for regional ozone. Due to the lack of power in the Hiawatha project area, this station will operate ozone and meteorology using solar and wind power and will be deployed in 2011.

For those conclusions that do not have permanent funding allocated now, the AQD has purchased a fleet of mobile monitoring stations that could be deployed to these locations on short-term basis (one year) to perform an initial investigation of air quality concentrations.

4.6 Beta Attenuation Monitor (BAM) Deployment

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

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. The AQD continues to add new special purpose monitoring sites to monitor for possible impacts from increased development. The AQD tries to work towards anticipating network monitoring requirements before they are needed and is continually updating the future plan for the Monitoring Section. At this time, the AQD is not planning to add or remove any SLAMS locations or monitors in 2010. Modifications to the PM₁₀ SLAMS network will continue to be made in 2010, which may include the replacement of the older Hi-vol monitors with Partisol low-vol monitors.

5.1 Wyoming Range

The Wyoming Range monitor is targeted to be placed in the late fall of 2010. The AQD is currently working with a contractor to properly site the station and procure equipment for this monitoring location. This site will be located in the northern portion of the Wyoming Range and will be used to help understand transport of ambient air pollutants into Sublette County from the west. Placement of the monitor will be aided by an evaluation of transport “corridors” in Western Wyoming (i.e. corridors where air parcels could enter Wyoming and Sublette County). This evaluation will use existing meteorological data and back trajectory modeling to identify areas where air parcels carrying pollutants may enter Wyoming.

5.2 Mobile Monitoring Trailers

Three (3) mobile monitoring trailers will be established and operated to help characterize air quality at various locations throughout the State of Wyoming. These stations will be self-contained monitoring shelters that may be moved to different locations in relatively short order. The trailers will include gaseous monitors (NO_x, O₃ and Methane/Non-Methane Hydrocarbons), continuous PM₁₀, continuous PM_{2.5}, camera system, and meteorological instrumentation. The mobile monitoring stations may be used to characterize and monitor events and trends in air

quality with or downwind of industrial development areas. Initial locations for the three mobile trailers will be near the town of Pavillion, Campbell County, and Sublette County. Siting for these monitors will take place in Fall of 2010 and early 2011.

5.3 Farson Meteorological Monitoring

The AQD is working to establish and operate a meteorological monitoring site to obtain meteorological data for the purposes of characterizing the general air quality near Farson, Wyoming. This general area was targeted, in the Southwest Wyoming 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.

5.4 Three States Study

During 2010, the AQD will be participating in a cooperative activity known as the “Three State Study”. The Wyoming AQD will be 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 has committed to partially fund one new monitoring station in Southwest Wyoming. The new monitoring station will be added to WyVisNet as it comes online.

5.4 Abandoned Mining Lands Funding

In light of the rapid energy development slated to take place in the next several years throughout Wyoming, the 2009 Legislature appropriated over three million dollars in Abandoned Mining Lands Funds to expand air quality monitoring related to energy development. The AQD has received approval to spend these funds on new monitoring focused on energy development. The Monitoring Section was also allocated a temporary employee for a period of three years to help with the new monitoring projects.

5.5 PAPO Funding

In September 2008, the Pinedale Anticline Supplemental Environmental Impact Statement Record of Decision (PAPA ROD) was signed. In the PAPA ROD, oil and gas operators committed over \$1.5 million dollars to the AQD’s Monitoring Section to help mitigate impacts to air quality from oil and gas development in the PAPA. The funds are to be used to enhance data management and communication to the public, for a new 2-year data analyst position, and to implement monitoring related to emissions from the Pinedale Anticline as determined by the Southwest Wyoming Network Assessment. In 2010, the AQD will use a portion of the funding to investigate near real-time VOC monitoring at the Boulder station. The AQD will also begin to develop the data management system. More information on the PAPA ROD can be found at: http://www.blm.gov/wy/st/en/field_offices/Pinedale/anticline.html

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. At this time, the AQD plans to add monitors in 2010 to determine impacts from energy development and population growth around Wyoming. The AQD is also changing out old equipment at several community monitoring locations to increase the reliability and efficiency of the PM₁₀ monitoring network.

Data collected at the AQD monitoring stations through 2009 show that all monitors are attaining NAAQS for PM₁₀, PM_{2.5}, NO₂, SO₂, and CO. Currently, all of the AQD monitors, except for Boulder, are attaining the NAAQS for ozone. The Boulder area ozone issue will be addressed once the accelerated ozone designation process and reconsidered standards.

The AQD continually evaluates data collected at 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	Monitor Objective	Longitude	Latitude	Site Start Date
56-025-0001	Casper	City County Bldg - Center & C Streets	Commercial	Urban And Center City	SLAMS	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	Population Exposure	-104.8176611	41.13686502	1/1/1979
56-029-0001	Cody	Cody Jr High School	Residential	Suburban	SLAMS	Population Exposure	-109.0685071	44.52464211	1/1/1975
56-005-1002	Gillette	1000 West 8th St	Mobile	Urban And Center City	SLAMS	Population Exposure	-105.516389	44.288056	1/1/1978
56-039-1006	Jackson	40 E Pearl Ave.	Commercial	Urban And Center City	SLAMS	Population Exposure	-109.0685071	44.52464211	6/8/2007
56-013-1003	Lander	600 Washington	Residential	Suburban	SLAMS	Highest Concentration, General/Background	-108.735562	42.84222775	1/1/1987
56-001-0006	Laramie	406 Ivinson	Commercial	Urban And Center City	SLAMS	Population Exposure	-105.591725	41.31158614	1/1/1968
56-037-0007	Rock Springs	625 Ahsay Ave	Residential	Urban And Center City	SLAMS	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	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	Population Exposure	-106.9762423	44.80549148	7/1/2005
56-009-0819	Antelope	Antelope Site 3	Industrial	Rural	Special Purpose	General/Background	-105.386161	43.426103	9/1/1982
56-005-0892	Belle Ayr	Belle Ayr Ba-4,5N,5S	Industrial	Rural	Special Purpose	Highest Concentration, Source Oriented	-105.343164	44.097074	7/9/1991
56-005-0877	Black Thunder PM2.5	Black Thunder BTM 26-2	Industrial	Rural	Special Purpose	General/Background	-105.2	43.677	1/1/1985
56-035-0099	Boulder	5 miles southwest of Boulder, Wy	Desert	Rural	Special Purpose	Source Oriented, General/Background	-109.753	42.719	2/1/2005
56-005-0899	Buckskin	Triton Coal Gillette, Wy	Industrial	Rural	Special Purpose	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	Source Oriented, General/Background	-105.529994	44.146964	7/15/2003
56-021-0100	Cheyenne – NCore	6909 Washakie Ave. Cheyenne, Wy	Residential	Suburban	NCore	National Core Monitoring Site	-104.77842	41.18235	7/1/2010
56-035-0100	Daniel South	5 miles south of Daniel	Desert	Rural	Special Purpose	General/Background	-110.0551	42.7907	7/1/2005

AQS ID	Site Name	Address	Land Use Type	Location Type	Monitor Type	Monitor Objective	Longitude	Latitude	Site Start Date
56-035-1002	Juel Spring	20 miles NW of Farson	Desert	Rural	Special Purpose	Source Oriented, General/Background	-109.5604983	42.37349916	12/11/2009
56-037-0300	Moxa	25 miles NW of Green River	Desert	Rural	Special Purpose	Source Oriented, General/Background	-109.788654	41.751009	5/27/2010
56-041-0101	Murphy Ridge	Near Wyoming Utah Border	Agricultural	Rural	Special Purpose	General/Background	-111.0417	41.373	1/1/2007
56-035-0705	Pinedale PM-2.5	101 East Hennick	Residential	Suburban	Special Purpose	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	Population Exposure	-109.87076	42.869824	1/1/2009
56-013-0099	South Pass	South Pass, Wy	Forest	Rural	Special Purpose	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	General/Background	-105.2903	44.6522	5/1/2001
56-037-0200	Wamsutter	2 miles west of Wamsutter, Wy	Desert	Rural	Special Purpose	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	General/Background, Population Exposure	-105.490771	43.757812	11/1/2002

Appendix B

2009 SLAMS Precision and Accuracy

Parameter	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 1	Casper	21 - Hi-Vol	1	0	1	0	1	1	1	1
	56-021-0001	POC 1	Cheyenne	15 - Partisol	1	0	1	0	3	2	3	3
	56-029-0001	POC 2	Cody	N/A	0	1	0	1	1	1	1	1
	56-005-1002	POC 3	Gillette	N/A	0	1	0	1	1	1	1	1
	56-039-1006	POC 1	Jackson	N/A	0	1	0	1	3	3	3	3
	56-013-1003	POC 3	Lander	N/A	0	0	0	1	3	3	3	3
	56-001-0006	POC 2	Laramie	N/A	1	0	1	0	1	1	1	1
	56-037-0007	POC 2	Rock Springs	N/A	0	1	0	1	3	3	3	3
	56-033-0002	POC 1	Sheridan Police Dept.	N/A	1	0	1	0	3	3	3	3
	56-033-0003	POC 1	Sheridan Highland Park	59 - Partisol	1	0	1	0	3	3	3	3
PM _{2.5}	56-021-0001	POC 1	Cheyenne	31 - Partisol	1	0	1	0	3	2	3	3
	56-025-0001	POC 1	Casper (Opened 2nd Quarter)	N/A		0	1	0		1	3	3
	56-039-1006	POC 1	Jackson	N/A	0	1	0	1	3	3	3	3
	56-029-0001	POC 1	Cody	N/A	0	1	0	1	3	3	3	3
	56-013-1003	POC 1	Lander	N/A	0	1	0	1	3	3	3	3
	56-001-0006	POC 1	Laramie (Opened 3rd Quarter)	N/A			1	0			1	3
	56-037-0007	POC 1	Rock Springs	N/A	0	1	0	1	3	3	3	3
	56-033-0002	POC 1	Sheridan Police Dept.	57 - Partisol	1	0	1	0	3	3	3	3
	56-033-0003	POC 1	Sheridan Highland Park	N/A	1	0	1	0	3	3	3	3
	56-035-0705	POC 1	Pinedale	N/A	0	1	0	1	3	3	3	3

