



Wyoming Ambient Air Monitoring Annual Network Plan 2009



TABLE OF CONTENTS

1.0	Introduction.....	1
1.1	AQD Monitoring History	1
1.2	General Monitoring Goals and Objectives.....	2
2.0	Air Monitoring Plan in 2009.....	5
2.1	State and Local Air Monitoring Sites (SLAMS).....	5
2.1.1	Casper	5
2.1.2	Cheyenne.....	6
2.1.2	Cody.....	7
2.1.4	Gillette.....	8
2.1.5	Jackson.....	9
2.1.6	Lander	10
2.1.7	Laramie	11
2.1.8	Rock Springs.....	12
2.1.9	Sheridan – Highland Park	14
2.1.10	Sheridan – Police Station.....	15
2.2	Special Purpose Monitoring (SPM)	16
2.2.1	Arvada.....	17
2.2.2	Boulder.....	17
2.2.3	Cloud Peak	18
2.2.4	Jonah	18
2.2.5	Murphy Ridge	19
2.2.6	Pinedale.....	20
2.2.7	South Campbell County	22
2.2.8	South Daniel.....	23
2.2.9	South Pass	24
2.2.9	Thunder Basin.....	25
2.2.11	Wamsutter	26
2.2.12	Wright	27
2.2.13	Powder River Basin (PRB) NO _x	27
2.2.14	PRB PM _{2.5}	28
2.3	Industrial Monitoring Sites.....	28
2.4	IMPROVE Network.....	29
2.5	National Core (NCore) Multi Pollutant Site	29
3.0	Compliance with NAAQS	29
3.1	Particulate Matter (PM-10)	30
3.2	Particulate Matter (PM-2.5)	31
3.3	Nitrogen Dioxides (NO ₂)	33
3.4	Sulfur Oxides.....	33
3.5	Carbon Monoxide.....	34
3.6	Ozone	34
4.0	Special Studies	34
4.1	Upper Green Winter Ozone Study (UGWOS).....	35
4.2	Sublette County Air Toxics Study /Health Risk Assessment	35
4.3	VOC Monitoring	36
4.4	University of Wyoming.....	36
4.5	Network Assessment	36
4.6	BAM Deployment.....	36
5.0	Future Air Monitoring Modifications	37
5.1	Casper and Laramie PM _{2.5}	37

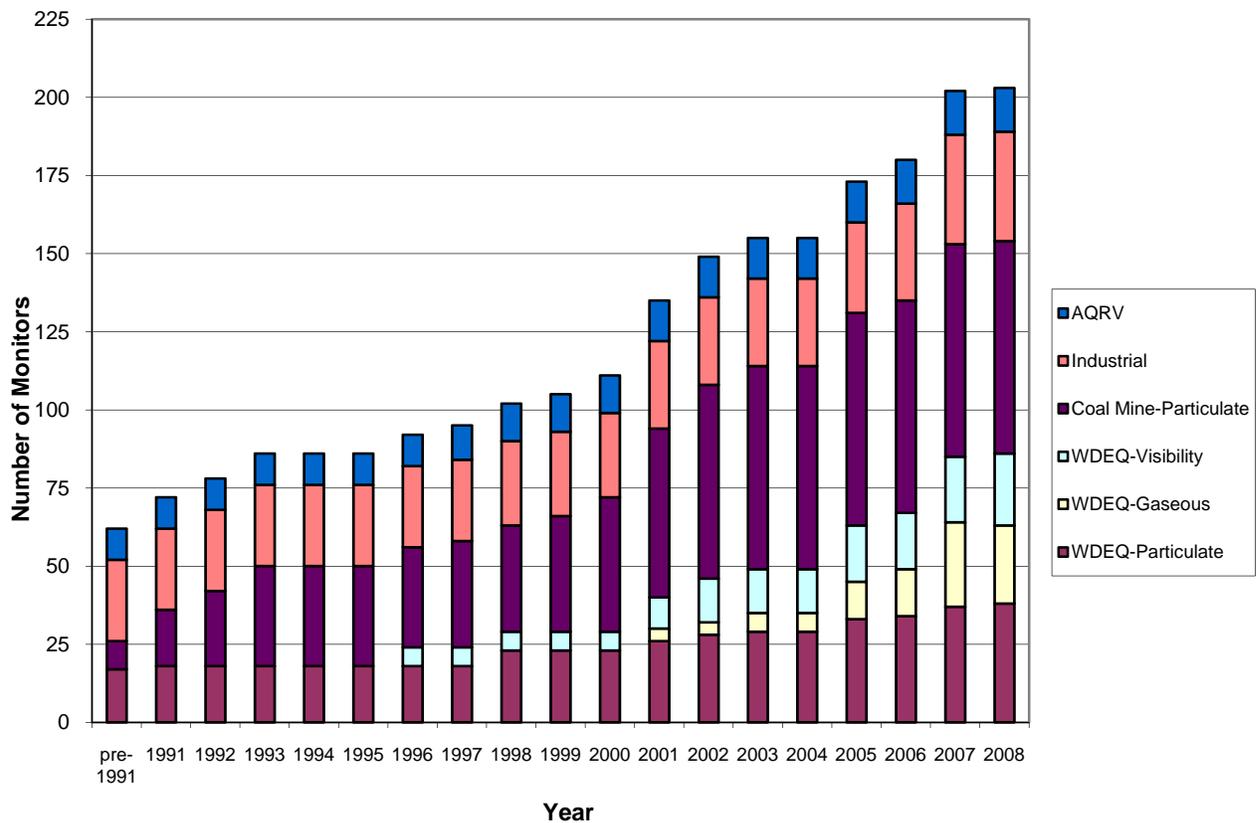
5.2	Wyoming Range.....	37
5.3	Jonah Monitor Move	37
5.4	Abandoned Mining Lands Funding.....	37
5.5	PAPO Funding	38
6.0	Conclusion	38
	Appendix A.....	39
	Appendix B.....	41
	Appendix C (NCore).....	42

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 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 AQD's air quality management policies in the future. Not only does AQD run the State and Local Air Monitoring Sites (SLAMS) to monitor public health, but also runs or oversees several special purpose monitors to track impacts from the many industrial sources that reside in Wyoming. 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 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. 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, AQD operates and maintains a network of ambient air quality monitors and requires industrial pollution sources to conduct source specific ambient air monitoring.

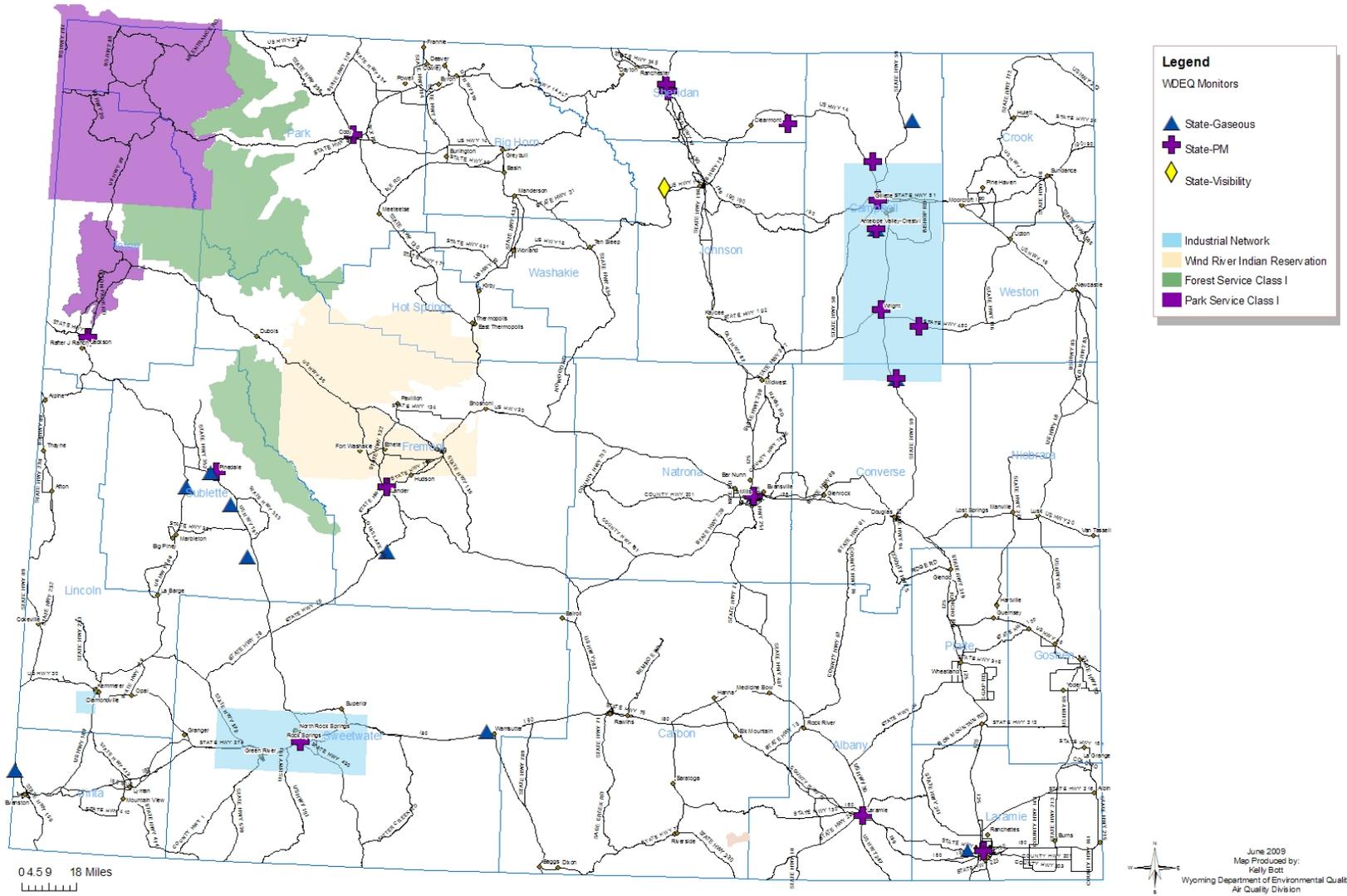
The Wyoming monitoring network, as a whole, is designed to meet the following six basic ambient air monitoring objectives:

1. Determine the highest concentrations expected to occur in the area covered by the network;
2. Determine representative concentrations in areas of high population density;
3. Determine the impact on ambient pollution levels of significant sources or source categories;
4. Determine general background concentration levels;
5. Determine the extent of regional pollutant transport among populated areas, and in support of secondary standards; and
6. Determine the welfare-related impacts in more rural and remote areas (such as visibility impairment and effects on vegetation).

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



Overview of Wyoming Monitors

Name	County	PARAMETER									
		PM10 (manual)	PM10 TEOM	PM2.5	NOx	O3	SO2	CO	Camera	Met	Other
Laramie	Albany Co	X									
Thunder Basin	Campbell Co				X	X			X	X	VISIBILITY
Campbell County	Campbell Co	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	X	AEROSOL
Cloud Peak	Johnson Co								X	X	VISIBILITY
Cheyenne	Laramie Co	X		X							
Casper	Natrona Co	X									
Cody	Park Co	X		X							
Sheridan - Highland Park	Sheridan Co	X		X							
Sheridan - Police Station	Sheridan Co		X	X							
Arvada	Sheridan Co	X									
Jonah	Sublette Co		X		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	
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	X	X	

2.0 Air Monitoring Plan in 2009

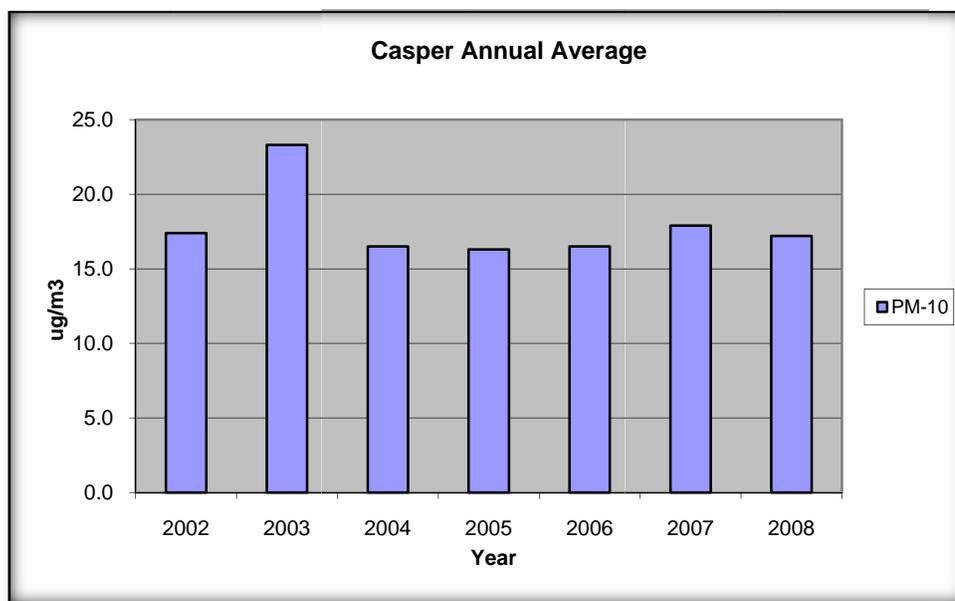
2.1 State and Local Air Monitoring Sites (SLAMS)

SLAMS are used for supplying general monitoring data for criteria pollutants and determining compliance with the NAAQS. SLAMS are relatively stable sites that must meet and follow specific quality assurance, monitoring methodology, sampling objective and siting requirements. 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	Gravimetric	Neighborhood	1/3	No planned changes

This site is located in downtown Casper, a city of approximately 51,700 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. AQD plans to add PM_{2.5} sampling at the Casper site sometime in the 2009 calendar year. We are interested in monitoring PM_{2.5} concentrations in Casper because it is one of Wyoming's most heavily populated areas.



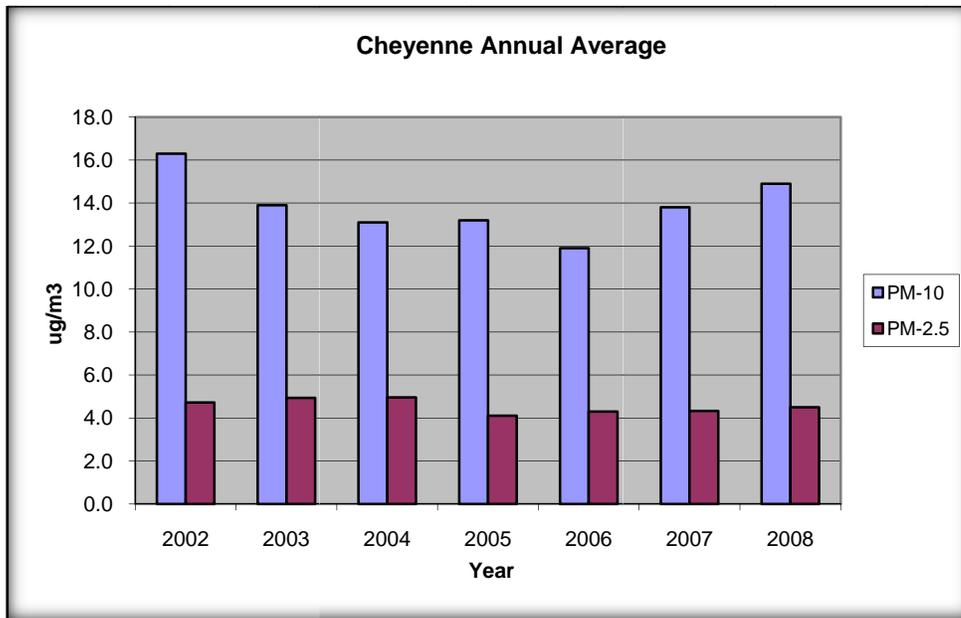
PM₁₀ NAAQS is 50 µg/m³

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	Gravimetric	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}	Gravimetric	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 55,700 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. As part of a network-wide upgrade effort, the Hi-Vol PM₁₀ monitors at this site were exchanged for Partisol PM₁₀ monitors in late 2007. A collocated PM_{2.5} sampler was added in March, 2009 to comply with 40 CFR Part 58 requirements for collocation of samplers.

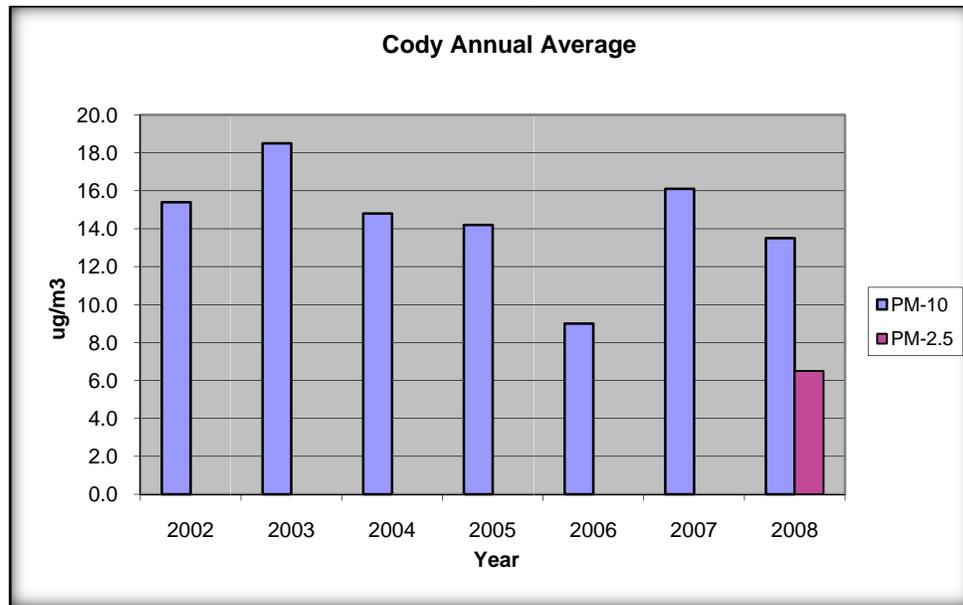


PM₁₀ NAAQS is 50 µg/m³
 PM_{2.5} NAAQS is 15.0 µg/m³

2.1.2 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	Gravimetric	Neighborhood	1/3	No planned changes
Cody PM _{2.5}	Cody Jr. High School	56-029-0001	PM _{2.5}	Gravimetric	Neighborhood	1/3	No planned changes

Cody is located in the northwest portion of the state situated in Park County; its population is approximately 9,200. PM₁₀ sampling began at this site in 1988. AQD changed the sample frequency for PM₁₀ from 1-in-6 days to 1-in-3 days. Additionally, Cody PM_{2.5} monitoring started in June, 2008. 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.



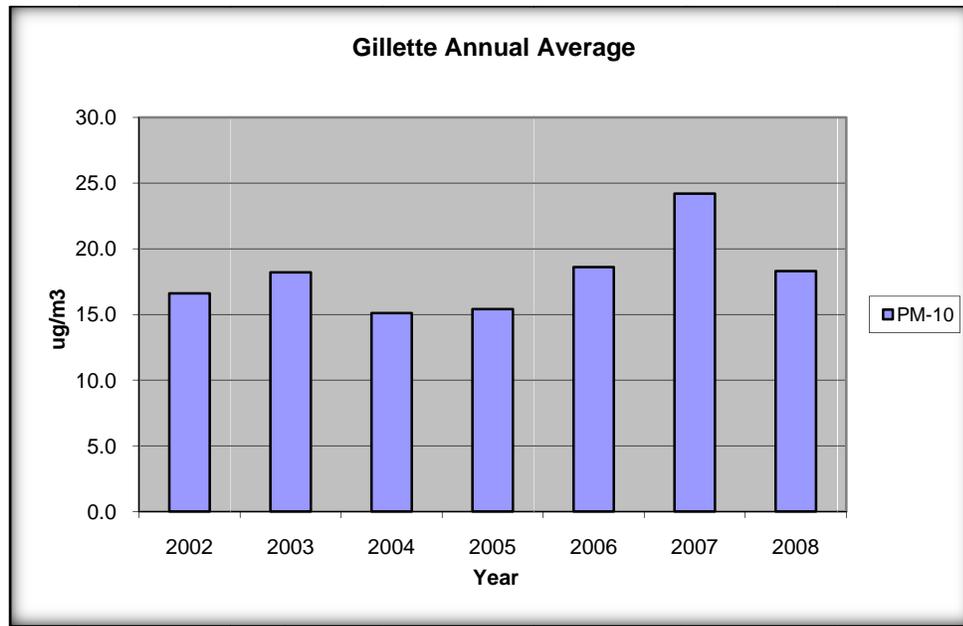
PM₁₀ NAAQS is 50 µg/m³
 PM_{2.5} NAAQS is 15.0 µg/m³

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	Gravimetric	Neighborhood	1/6	No planned changes

Gillette is located in Campbell County Wyoming; its population is approximately 22,700 and is considered a micropolitan statistical area. PM₁₀ sampling began at this site in 1991.



PM₁₀ NAAQS is 50 µg/m³

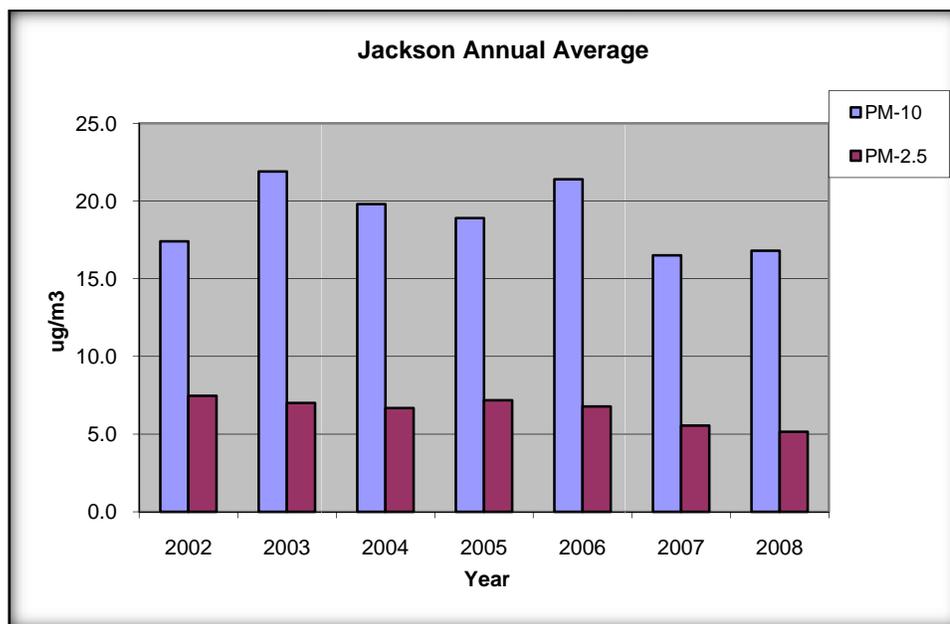
2.1.5 Jackson



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	Gravimetric	Neighborhood	1/3	No planned changes
Jackson PM _{2.5}	40 E Pearl Ave.	56-039-1006	PM _{2.5}	Gravimetric	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 9,000. Jackson PM₁₀ sampling began at this

site in 2001. The PM_{2.5} monitors were also installed in 2001. In June 2007, the monitors were moved from the County Building, on South Willow, to the Fire Station (40 E. Pearl Ave) due to obstructions from trees and complaints from local residents about noise. As part of a network wide effort, the Hi-Vol PM₁₀ monitors at this site were exchanged for Partisol PM₁₀ monitors in September 2007.

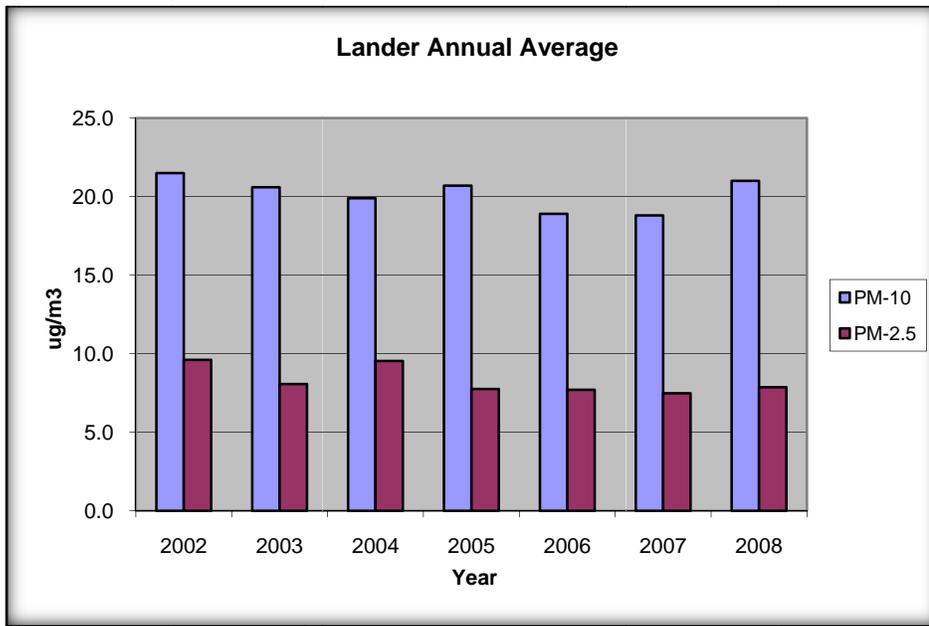


PM₁₀ NAAQS is 50 µg/m³
 PM_{2.5} NAAQS is 15.0 µg/m³

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	Gravimetric	Neighborhood	1/3	No planned changes
Lander PM _{2.5}	600 Washington	56-013-1003	PM _{2.5}	Gravimetric	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 6,900. PM₁₀ sampling began at this site in 1989. The PM_{2.5} monitors were installed in 2001. As part of a network wide effort, the Hi-Vol PM₁₀ monitors at this site were exchanged for Partisol PM₁₀ monitors in late 2007.



PM₁₀ NAAQS is 50 µg/m³
 PM_{2.5} NAAQS is 15.0 µg/m³

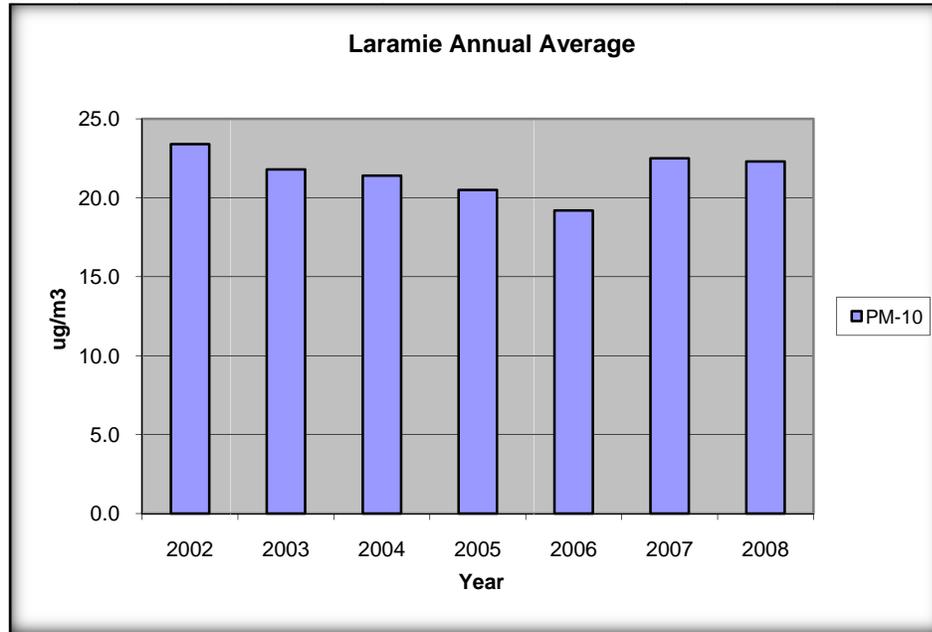
2.1.7 Laramie



Laramie Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Sample Frequency	Operational Status
Laramie PM ₁₀	406 Iverson	56-001-0006	PM ₁₀	Gravimetric	Neighborhood	1/3	No planned changes

Laramie is located in the southeast portion of Wyoming in Albany County. Laramie has a population of approximately 26,000 and is considered a micropolitan statistical area. PM₁₀ sampling began at this site in 1989. AQD plans to add PM_{2.5} sampling to Laramie in order to

oversee impacts from wintertime sanding, wood smoke, and summertime forest fires. AQD expects to begin PM_{2.5} sampling in Laramie in July, 2009.



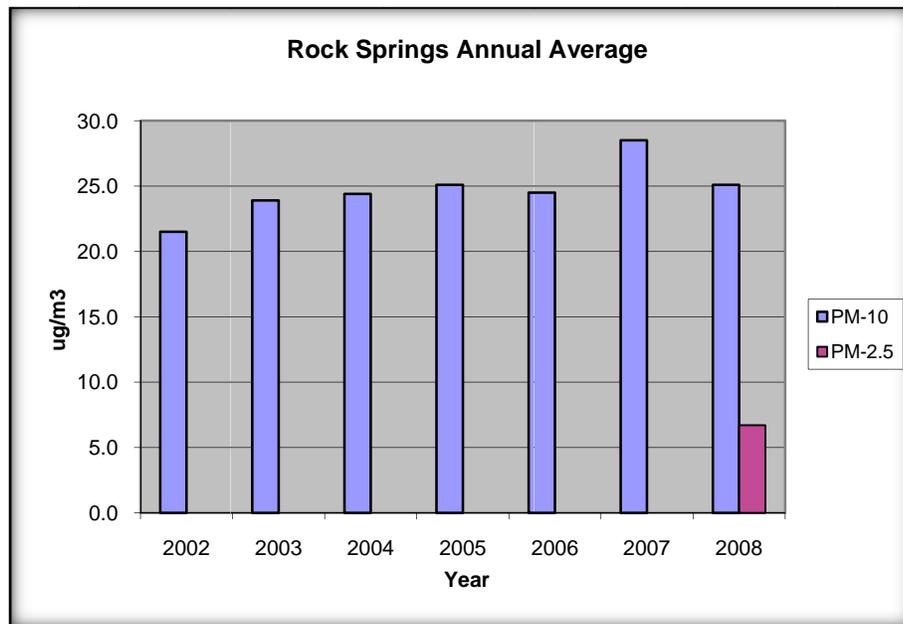
PM₁₀ NAAQS is 50 $\mu\text{g}/\text{m}^3$

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	Gravimetric	Neighborhood	1/3	No planned changes
Rock Springs PM _{2.5}	625 Ahsay Ave.	56-037-0007	PM _{2.5}	Gravimetric	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 18,700. PM₁₀ sampling began at this site in 1989. As part of a network wide effort, the Hi-Vol PM₁₀ monitors at this site were exchanged for Partisol PM₁₀ monitors in late 2007. Additionally, AQD added PM_{2.5} monitoring to Rock Springs in March, 2008. 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.



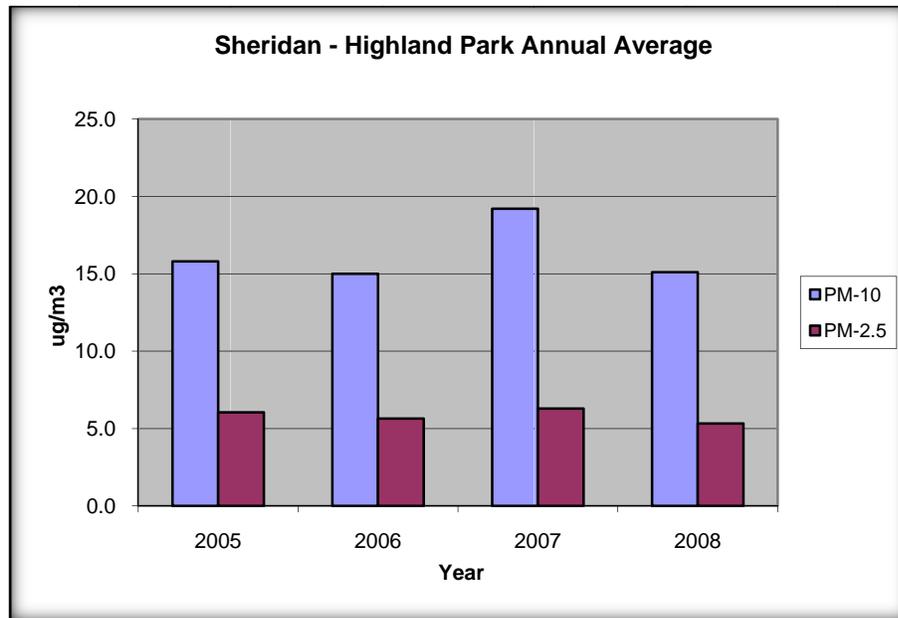
PM₁₀ NAAQS is 50 µg/m³
 PM_{2.5} NAAQS is 15.0 µg/m³

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	Gravimetric	Neighborhood	1/3	No planned changes
Sheridan – Highland Park PM _{2.5}	1301 Avon	56-033-0003	PM _{2.5}	Gravimetric	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 16,300. 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. As part of a network-wide effort, the Hi-Vol PM₁₀ monitors at this site were exchanged for Partisol PM₁₀ monitors in late 2007. A collocated PM₁₀ monitor was placed at the Highland Park Station, in 2007, to fulfill collocation requirements for the SLAMS network.



PM₁₀ NAAQS is 50 µg/m³
 PM_{2.5} NAAQS is 15.0 µg/m³

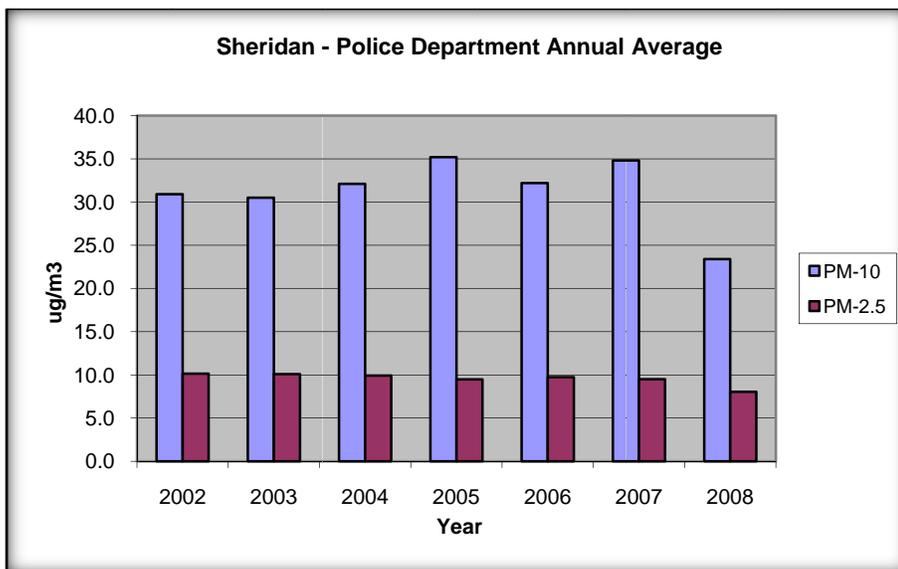
2.1.10 Sheridan – Police Station



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	Gravimetric	Neighborhood	1/1	No planned changes

Sheridan – Police Station Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Sample Frequency	Operational Status
Sheridan – Police Station PM _{2.5} with collocation	45 West 12 th Street	56-033-0002	PM _{2.5}	Gravimetric	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 16,300 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 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.



PM₁₀ NAAQS is 50 µg/m³
 PM_{2.5} NAAQS is 15.0 µg/m³

2.2 Special Purpose Monitoring (SPM)

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 twelve SPM locations in Wyoming include:

2.2.1 Arvada

Arvada Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Operating Schedule	Operational Status
Arvada	Adjacent to Arvada Elementary School	56-033-0099	PM ₁₀	Gravimetric	Neighborhood	1/6	Monitor to be removed

Arvada is located in Sheridan County in northern Wyoming. This monitoring location was chosen for an SPM because it is the largest community in an area of extensive coal bed methane development. Unfortunately, the site has not been running since May of 2007 because AQD was not able to find an operator for the site. Due to current budget restraints, AQD will no longer continue the operation of this site.

2.2.2 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	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	Gravimetric	Urban	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 AQD's 2007, 2008, and 2009 Upper Green Winter Ozone Studies. During these studies, the site also housed VOC monitoring, NO_y monitoring, trace CO and SO₂ monitors, and UV radiometers. Shell Exploration and Production assisted with funding for this site and uses the site, since December 2006, to monitor for ammonia.

2.2.3 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, transmissometer, camera system and meteorological monitoring.

2.2.4 Jonah

Jonah Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Operating Schedule	Operational Status
Jonah	Jonah Field – Encana field office	56-035-0098	Ozone	Real Time	Urban	Hourly	Shut down, may move site
			Nitric Oxide	Real Time	Urban	Hourly	Shut down, may move site

Jonah Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Analysis Method	Scale	Operating Schedule	Operational Status
			Nitrogen Dioxide	Real Time	Urban	Hourly	Shut down, may move site
			Oxides of Nitrogen	Real Time	Urban	Hourly	Shut down, may move site
			PM ₁₀	Gravimetric	Urban	1/1	Shut down, may move site

The Jonah monitor is located in the Jonah Field, at the EnCana field office, an area of heavy oil and gas development. The Jonah Station includes gaseous (NO_x and ozone), continuous particulate (PM₁₀ TEOM), camera system and meteorological monitoring. As development has continued in the Jonah Field, AQD has determined that monitoring for ozone at this site has decreased value due to heavy NO titration. The results of AQD's Network Review in 2008 for Southwest Wyoming; concluded that the Jonah monitor was no longer meeting its original objective as a downwind monitoring site for the Jonah Gas Field. Equipment at the site was shut down in April 2008 after the 2008 Upper Green Winter Ozone Study. AQD worked for the rest of 2008 to find a suitable site downwind of the Jonah Gas Field. Because all line power from Jonah to Farson is privately owned, AQD worked to negotiate a lease and power use that can fit into AQD's current budget constraints. AQD is currently negotiating with BLM and Union Cellular to place the Jonah equipment at the Juell Springs Cellular Tower site, approximately 15 miles southeast of the old Jonah monitoring site. AQD also recognizes that monitoring inside the Jonah Field is valuable to understanding winter ozone formation and developing a model for winter ozone and plans to continue to do so in future winter campaigns.

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	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
			Carbon Monoxide	Real Time	Urban	Hourly	Removed in November 2008
			PM ₁₀	Gravimetric	Urban	1/1	No planned changes

The Murphy Ridge Air Quality Monitoring Station began operating 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), SO₂, CO, and meteorology. In November, 2008, the CO monitor was removed from Murphy Ridge due to budget cuts. The site is also equipped with a camera.

2.2.6 Pinedale



Pinedale 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}	Gravimetric	Regional	1/3	No planned changes

Pinedale is located in Sublette County with a population of approximately 1,800 people. PM_{2.5} sampling started in 2005 at this site. In November, 2008, one monitor malfunctioned and was not fully repaired until May of 2009. Therefore, the data from November 13, 2008 thru May 7, 2009, operated on the 1/6 schedule instead of the 1/3 schedule.



Pinedale 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}	BAM	Urban	1/1	No planned changes

In January 2009, AQD added a gaseous monitoring site in Pinedale, Wyoming. This station includes ozone, NO_x, continuous PM_{2.5} (BAM), and meteorology within the town of Pinedale to monitor concentrations in this increasingly populated area.

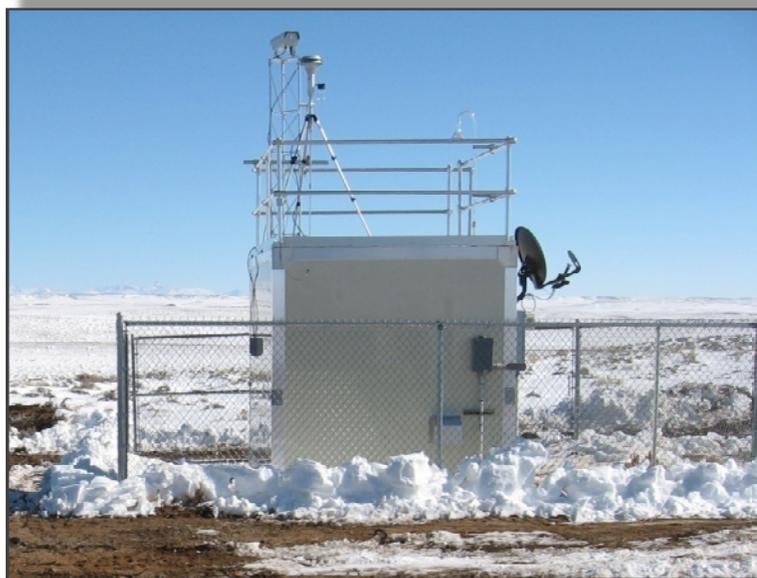
2.2.7 South Campbell County



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	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	Gravimetric	Regional	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. The Campbell County Hi-Vol PM₁₀ monitors failed in June, 2008, AQD then purchased a TEOM for the replacement PM₁₀ monitor. The TEOM was installed and began operations November 5, 2008. This station includes continuous particulate (PM₁₀ TEOM), gaseous (NO_x and ozone), 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	Gravimetric	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
			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	Gravimetric	Urban	1/1	No planned changes

The South Pass Air Quality Monitoring Station also 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, SO₂, 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.

2.2.9 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, transmissometer, 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	Regional	Hourly	No planned changes
			Sulfur Dioxide	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	Gravimetric	Regional	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, SO₂, and ozone), continuous particulate (PM₁₀ TEOM), and meteorological monitoring. 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	Gravimetric	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 Powder 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.

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 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. 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. 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 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. AQD temporarily discontinued collection of data from these monitors in September 2007, due to cuts in federal funding for PM_{2.5} monitoring. Network operations resumed in June, 2008 with the help of a funding agreement with the Wyoming Mining Association. The Black Thunder Mine and Buckskin Mine monitoring locations were moved in 2008 due to changes with the facility mine plans.

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}	Gravimetric	Regional	1/3	No planned changes
Belle Ayr Mine	Campbell County	56-005-0892	PM _{2.5}	Gravimetric	Neighborhood	1/3	No planned changes
Black Thunder Mine	Campbell County	56-005-0877	PM _{2.5}	Gravimetric	Neighborhood	1/3	No planned changes
Black Thunder Mine Collocated			PM _{2.5}	Gravimetric	Neighborhood	1/6	No planned changes
Buckskin Mine	Campbell County	56-005-0899	PM _{2.5}	Gravimetric	Neighborhood	1/3	No planned changes

2.3 Industrial Monitoring Sites

Historically, 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. 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 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 NAAQS as well as confirming that the facilities are following appropriate quality assurance measures.

2.4 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.

2.5 National Core (NCORE) Multi Pollutant Site

The Wyoming Department of Environmental Quality, Air Quality Division's NCore monitoring site will be located in the North Cheyenne Soccer Complex. This location is near a suburban neighborhood of north Cheyenne and meets the urban spatial scale criteria. Verbal approval to establish this location as the Wyoming NCore site was given by EPA OAQPS and EPA Region VIII on February 5, 2009. Written approval was granted by Region VIII on June 15, 2009. The NCore monitoring site will be established by January 1, 2011, and will collect data for trace level sulfur dioxide (SO₂), total reactive nitrogen (NO_y), trace carbon monoxide (CO), ozone (O₃), PM_{10-2.5}, PM_{2.5}, and PM_{2.5} speciation. Detailed information concerning the Wyoming NCore monitoring site is located in Appendix C of this document.

3.0 Compliance with NAAQS

The primary purpose of the AQD's SLAMS and SPM networks is to evaluate compliance with NAAQS. 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 NAAQS. AQD's SLAMS and SPM networks currently operate under project specific quality assurance plans, which are available in the State Offices for viewing. 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 2006 through 2008 data and design values for each SLAMS and SPM monitor. All sites operated by AQD are in compliance with NAAQS from 2006-2008, 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 two 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. AQD also 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 2006-2008. 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.

In 2008, AQD recorded one exceedance at the Murphy Ridge monitoring site. The exceedance at Murphy Ridge occurred on April 19, 2008 with a concentration of 157 µg/m³. This exceedance was attributed to high winds and blown dust from Utah dust storms. AQD has flagged this value as a high wind event that is eligible under the Exceptional Events Rule. AQD is waiting for concurrence from Region 8 on this event.

PM₁₀ Compliance with WAAQS of 50 µg/m³ Annual Arithmetic Mean (µg/m³)					
Site Name	2006	2007	2008	Average ('06-'08)	In Compliance
Casper	20	18	17	18	Yes
Cheyenne	13	14*	15	14	Yes
Cody	9	16*	12	12	Yes
Gillette	19	24*	18	20	Yes
Jackson - Fire	21*	17*	17	18	Yes
Lander	19*	19*	20*	19	Yes
Laramie	19	23	22	21	Yes
Rock Springs	24	29	24	26	Yes
Sheridan – Highland Park	16*	19*	15	17	Yes
Sheridan – Police Dept.	31	35	23	30	Yes
Arvada	16*	14*	N/A	N/A	N/A
Boulder	10	11*	11	10	Yes
Jonah	16*	15	17*	16	Yes
Murphy Ridge	N/A	12	12	N/A	N/A
South Campbell County	19*	13*	20*	17	Yes
South Daniel	8*	11*	8*	9	Yes
South Pass	N/A	9*	12	N/A	N/A
Wamsutter	15	15	15	15	Yes
Wright	14	21	17	17	Yes

N/A – data not available

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

PM₁₀ Compliance with NAAQS of 150 µg/m³ Highest 24- Hour Average (µg/m³)					
Site Name	2006	2007	2008	Design Value (‘06-‘08)	In Compliance
Casper	44	39	46	0	Yes
Cheyenne	42	31	55	0	Yes
Cody	24	55	91	0	Yes
Gillette	65	74	58	0	Yes
Jackson – Fire	80	35	93	0	Yes
Lander	49	40	95	0	Yes
Laramie	57	67	73	0	Yes
Rock Springs	67	78	102	0	Yes
Sheridan – Highland Park	43	60	56	0	Yes
Sheridan – Police Dept.	140	168 ^P	103	0.67	Yes
Arvada	51	40	N/A	N/A	N/A
Boulder	32	35	97	0	Yes
Jonah	87	65	127	0	Yes
Murphy Ridge	N/A	64	157 ^P	N/A	N/A
South Campbell County	136	53	67	0	Yes
South Daniel	30	44	27	0	Yes
South Pass	N/A	51	78	N/A	N/A
Wamsutter	73	227 ^P	76	0.67	Yes
Wright	57	57	56	0	Yes

N/A – data not available

P – Exceeds the Primary Standard

3.2 Particulate Matter (PM-2.5)

There are eight (8) 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 Cheyenne, Cody, Jackson, Lander, Rock Springs, Sheridan – Highland Park, and Sheridan – Police Department, AQD has 28.6% of the monitors collocated. This meets the 40 CFR 58 Appendix A requirement for collocation. All twelve (12) 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. In August 2008, AQD monitored elevated PM_{2.5} concentrations in Pinedale and Cody due to impacts from wildfires. The fires were located near each one of these towns. AQD has flagged data from August 1, 2008 (Cody) and August 4, 2008 (Pinedale) as natural events under the Exceptional Events Rule. AQD has placed these natural event packets out for public comment. The packets will be submitted to EPA Region VIII by July 2009.

PM_{2.5} Compliance with NAAQS of 15.0 µg/m³ Annual Arithmetic Mean (µg/m³)					
Site Name	2006	2007	2008	Average ('06-'08)	In Compliance
Cheyenne	4.3	4.3	4.5	4.4	Yes
Cody	N/A	N/A	5.7*	N/A	N/A
Jackson	6.8	4.1*	5.2	5.4	Yes
Lander	7.7	7.5*	7.8	7.7	Yes
Pinedale	7.1	5.9*	6.6*	6.5	Yes
Rock Springs	N/A	N/A	6.8	N/A	N/A
Sheridan – Highland Park	5.7	6.3	5.3	5.8	Yes
Sheridan – Police Dept.	9.8	9.5	8.0	9.1	Yes
Antelope Mine	3.9	4.5	3.9*	4.1	Yes
Belle Ayr Mine	5.5*	5.9*	6.2*	5.9	Yes
Black Thunder Mine	6.3*	6.5*	5.5*	6.1	Yes
Buckskin Mine	5.2	5.3*	5.5*	5.3	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	2006	2007	2008	Average ('06-'08)	In Compliance
Cheyenne	13	9	10	11	Yes
Cody	N/A	N/A	22	N/A	N/A
Jackson	20	8	14	14	Yes
Lander	23	26	23	24	Yes
Pinedale	17	13	17	16	Yes
Rock Springs	N/A	N/A	19	N/A	N/A
Sheridan – Highland Park	13	24	14	17	Yes
Sheridan – Police Dept.	24	27	24	25	Yes
Antelope Mine	12	10	9	10	Yes
Belle Ayr Mine	16	15	16	16	Yes
Black Thunder Mine	22	18	17	19	Yes
Buckskin Mine	12	14	12	13	Yes

N/A – data not available

3.3 Nitrogen Dioxides (NO₂)

There are eight (8) state run sites that monitored for NO₂ in 2008. The PRB NO_x network consists of two monitors; these monitors were not running in 2008. AQD is currently working to reestablish these monitors, they will be reporting for the 2nd Quarter of 2009. Compliance with the NO₂ NAAQS is determined by the annual average concentration less than or equal to 0.053 ppm.

NO₂ Compliance with NAAQS of 0.053 ppm Annual Arithmetic Mean (ppm)				
Site Name	2006	2007	2008	In Compliance
Boulder	0.004	0.004*	0.003*	Yes
Jonah	0.010	0.012	0.017*	Yes
Murphy Ridge	N/A	0.003	0.003	Yes
South Campbell County	0.003	0.004	0.003	Yes
South Daniel	0.003	0.003	0.003	Yes
South Pass	N/A	N/A	0.001*	Yes
Thunder Basin	0.002	0.002	0.002*	Yes
Wamsutter	0.007	0.007	0.005	Yes
Antelope Mine	0.004*	N/A	N/A	N/A
Belle Ayr Mine	0.009	N/A	N/A	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 in 2008. There are no SO₂ SLAMS sites in Wyoming. For SO₂, 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. AQD has not reported any exceedances of the WAAQS 3-hour, 24-hour, or annual SO₂ standards at the three sites in 2008. 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	2008 (annual average)	In Compliance	2008 (2 nd highest 24-hour average)	In Compliance	2008 (2 nd highest 3-hour average)	In Compliance
Murphy Ridge	0.001	Yes	0.003	Yes	0.003	Yes
South Pass	0.001	Yes	0.002	Yes	0.006	Yes
Wamsutter	0.001	Yes	0.002	Yes	0.006	Yes

3.5 Carbon Monoxide

The State of Wyoming operates the Murphy Ridge site that monitors for CO. This monitor started in 2007 and will be removed in November 2008. AQD has not reported any exceedances of the 8-hour and 1-hour CO standards at Murphy Ridge.

CO Compliance with NAAQS of 9 ppm (highest 8-hour average) And 35 ppm (highest 1-hour average)				
Site Name	2008 (8-hour average)	In Compliance	2008 (1-hour average)	In Compliance
Murphy Ridge	0.7	Yes	0.9	Yes

3.6 Ozone

AQD operated seven (7) O₃ monitoring sites in Wyoming in 2008, 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. Wyoming's Governor has submitted a recommendation of non-attainment for Sublette and parts of Sweetwater and Lincoln Counties based on non-compliance at the Boulder monitor. The Governor's recommendation and supporting materials can be found at <http://deq.state.wy.us/Sublettecountyozone.htm>.

O ₃ Compliance with NAAQS of 0.075 ppm 4 th Highest 8-Hour Average (ppm)					
Site Name	2006	2007	2008	DV ('06-'08)	In Compliance
Boulder	0.072	0.067	0.101	0.080	No*
Jonah	0.069	0.068	0.082	0.073	Yes
Murphy Ridge	N/A	0.070	0.064	N/A	N/A
South Campbell County	0.065	0.072	0.064	0.067	Yes
South Daniel	0.074	0.066	0.074	0.071	Yes
South Pass	N/A	0.071	0.066	N/A	N/A
Thunder Basin	0.072	0.072	0.074	0.073	Yes
Wamsutter	0.067	0.064	0.064	0.065	Yes

N/A – data not available

* Wyoming's Governor has submitted a recommendation of non-attainment for Sublette and parts of Sweetwater and Lincoln Counties based on non-compliance at the Boulder monitor

4.0 Special Studies

In addition to AQD's extensive network of long-term monitoring, 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. AQD is in the process of completing the Network Assessment that is due to EPA in 2010. 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, 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, 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, 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. 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, AQD determined there were still aspects of the winter formation that needed to be recorded and studied. AQD obtained funding from industry to perform UGWOS (Upper Green Winter Ozone Study) 2009. For 2009, 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.

Quality Assurance Plans and data from the 2007, 2008 and 2009 campaigns can be downloaded at <http://deq.state.wy.us/aqd/Monitoring%20Data.asp>. Final 2007 and 2008 reports can also be downloaded at the site. During summer 2009, 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 hazardous air pollutants (HAPs) and a risk assessment be performed in Sublette County. During 2009, AQD will be cooperating with the Sublette County Commissioners and the Wyoming Department of Health to conduct air toxics monitoring in the Upper Green River Basin. The study aims to monitor ozone and HAPs in community locations around Sublette County. The study plan and data, when available, can be found at <http://deq.state.wy.us/Sublettecountyozone.htm>. After data collection, Sublette County is expected to contract with a consulting firm to perform a risk assessment with the ozone and HAPs data collected during the study period.

4.3 VOC Monitoring

AQD also committed to performing VOC and/or Hazardous Air Pollutant (HAP) Monitoring in the Southwest Wyoming Operator's Agreement. In 2007 and 2008, 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. Additionally, in 2009 AQD will be studying continuous VOC monitoring at the Boulder Station in an effort to purchase equipment that will collect continuous VOC samples long term at the Boulder Station. UGWOS Results of this monitoring can be downloaded at AQD's monitoring website: <http://deq.state.wy.us/aqd/Monitoring%20Data.asp>

4.4 University of Wyoming

AQD has contracted with University of Wyoming Department of Atmospheric Science to further survey ozone in the Upper Green during 2009. The survey consists 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. The passive campaigns will use Ogawa passive samplers placed in approximately 50 locations around Sublette County to determine spatial ozone variability. Some Ogawa samplers will also be placed on human subjects to determine personal exposure to ozone. UW will also conduct some traffic counts near the oil and gas fields to help determine traffic emissions associated with oil and gas development. Results of this survey will be posted on the AQD Monitoring page as they become available.

4.5 Network Assessment

During 2009 and 2010, AQD will perform 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. AQD will also solicit the help of an External Advisory Committee which will consist of public participants, federal land managers, EPA, environmental organizations and industry to help evaluate assessment methods and the results.

AQD has already partially completed this activity for Southwest Wyoming. Results of that Network Assessment can be found at <http://deq.state.wy.us/aqd/Monitoring%20Data.asp>. AQD will assimilate the results of this assessment with the rest of the State to determine future monitoring needs in Wyoming.

4.6 BAM Deployment

In 2009, AQD plans to outfit a portable continuous PM_{2.5} monitoring device for deployment in communities that may be impacted by smoke from wildfire activity. This portable system will allow AQD to monitor near real-time PM_{2.5} concentrations so AQD can properly inform the public when particulate levels may cause adverse health effects.

5.0 Future Air Monitoring Modifications

At this time, AQD is not planning to add or remove any SLAMS monitors in 2009. Modifications to the PM₁₀ SLAMS network will continue to be made in 2009. AQD is replacing the older Hi-vol monitors with Partisol low-vol monitors. AQD and Region 8 have agreed on the locations discussed in Section 2.1.

5.1 Casper and Laramie PM_{2.5}

AQD is planning to add PM_{2.5} to the PM₁₀ monitoring sites at Casper and Laramie in 2009, however these monitors will be considered SPMs. AQD has also added another collocated PM_{2.5} monitor in Cheyenne to meet network collocation requirements for this type of Partisol monitor.

5.2 Wyoming Range

The State of Wyoming is experiencing rapid energy development, especially in the northeast and southwest quadrants of the State. AQD continues to add new special purpose monitoring sites to monitor for possible impacts from increased development. In 2006, AQD signed an agreement with six natural gas producers that operate in the Pinedale Anticline and Jonah Natural Gas Fields to share costs for six monitoring stations in southwest Wyoming (known as the “Southwest Wyoming Operators Agreement”). As of December 2007, five (Boulder, Jonah, Daniel South, South Pass and Murphy Ridge) of the six sites are operational. The remaining station (Wyoming Range) is targeted to be placed in 2009 or early 2010.

5.3 Jonah Monitor Move

The Jonah monitor is located in the Jonah Field, near the EnCana field office, an area of heavy oil and gas development. As development has continued in the Jonah Field, AQD has determined that monitoring for ozone at this site has decreased value due to heavy NO titration. AQD’s Network Review in 2008 for Southwest Wyoming concluded that the Jonah monitor was no longer meeting its original objective as a downwind monitoring site for the Jonah Gas Field. Equipment at the site was shut down in April 2008 after the 2008 Upper Green Winter Ozone Study. AQD worked for the rest of 2008 to find a suitable site downwind of the Jonah Gas Field. Because all line power from Jonah to Farson is privately owned, AQD worked to negotiate a lease and power use that can fit into AQD’s current budget constraints. AQD is currently negotiating with BLM and Union Cellular to place the Jonah equipment at the Juell Springs Cellular Tower site, approximately 15 miles southeast of the old Jonah monitoring site. AQD is hopeful that an agreement can be reached with Union Cellular and the Jonah monitor will be relocated in late summer 2009.

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. However, due to the current revenue shortfall AQD does not have approval to spend these funds yet. If AQD gets approval to spend these funds, new monitoring will be focused on energy development in the

northeast and southwest quadrants of the State. The Monitoring Section was also allocated a temporary employee for a period of three years (pending budget approval) 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 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 2009, AQD will use a portion of the funding to investigate near real-time speciated VOC monitoring at the Boulder station. 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, AQD works to make sure the monitoring needs in the State of Wyoming are being met. At this time, AQD plans to add monitors in 2009 to determine impacts from energy development and population growth around Wyoming. 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 AQD monitoring stations through 2008 show that all monitors are attaining NAAQS for PM₁₀, PM_{2.5}, NO₂, SO₂, and CO. Currently, all AQD monitors, except for Boulder, are attaining the NAAQS for ozone. Wyoming's Governor has submitted a recommendation of non-attainment for Sublette and parts of Sweetwater and Lincoln Counties based on non-compliance at the Boulder monitor. 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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Monitoring Section Supervisor
Wyoming Air Quality Division
122 West 25th Street, 2-E
Cheyenne, WY 82002
(307) 777-8684
ckesla@wyo.gov

Appendix A

AQD 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	-106.3	42.851	1/1/1967
56-021-0001	Cheyenne	State Office Bldg 23rd & Central Avenue	Residential	Urban And Center City	SLAMS	Population Exposure	-104.8	41.14	1/1/1979
56-029-0001	Cody	Cody Jr High School	Residential	Suburban	SLAMS	Population Exposure	-109.1	44.533	1/1/1975
56-005-1002	Gillette	1000 West 8th St	Mobile	Urban And Center City	SLAMS	Population Exposure	-105.5	44.288	1/1/1978
56-039-0006	Jackson	40 E Pearl Ave.	Commercial	Urban And Center City	SLAMS	Population Exposure	-110.8	43.478	6/8/2007
56-013-1003	Lander	600 Washington	Residential	Suburban	SLAMS	Highest Concentration, General/Background	-108.7	42.841	1/1/1987
56-001-0006	Laramie	406 Iverson	Commercial	Urban And Center City	SLAMS	Populations Exposure	-105.6	41.312	1/1/1968
56-037-0007	Rock Springs	625 Ahsay Ave	Residential	Urban And Center City	SLAMS	Population Exposure	-109.2	41.592	1/1/1983
56-033-0002	Sheridan - Police Station	45 West 12th St	Commercial	Urban And Center City	SLAMS	Highest Concentration, Population Exposure	-107	44.833	10/5/1983
56-033-0003	Sheridan-Highland Park	1301 Avon	Residential	Urban And Center City	SLAMS	Population Exposure	-107	44.806	7/1/2005
56-009-0819	Antelope	Antelope Site 3	Industrial	Rural	Special Purpose	General/Background	-105.4	43.427	9/1/1982
56-033-0099	Arvada	Adjacent to Arvada Elem. School	Residential	Rural	Special Purpose	General/Background	-106.1	44.654	11/1/2002
56-005-0892	Belle Ayr	Belle Ayr Ba-4,5N,5S	Industrial	Rural	Special Purpose	Highest Concentration, Source Oriented	-105.3	44.099	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

AQD ID	Site Name	Address	Land Use Type	Location Type	Monitor Type	Monitor Objective	Longitude	Latitude	Site Start Date
56-035-0099	Boulder	5 miles southwest of Boulder, Wy	Desert	Rural	Special Purpose	Source Oriented, General/Background	-109.8	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	-105.5	44.147	7/15/2003
56-035-0100	Daniel South	5 miles south of Daniel	Desert	Rural	Special Purpose	General/Background	-110.1	42.791	7/1/2005
56-035-0098	Jonah	Approx 40 Miles NW of Farson, Wy	Industrial	Rural	Special Purpose	Source Oriented	-109.7	42.429	11/5/2004
56-041-0101	Murphy Ridge	Near Wyoming Utah Border	Agricultural	Rural	Special Purpose	General/Background	-111.0	41.373	1/1/2007
56-035-0705	Pinedale	101 East Hennick	Residential	Suburban	Special Purpose	Population Exposure	-109.7	42.429	7/1/2005
56-035-0101	Pinedale	West side of City Park and Pine Creek	Residential	Suburban	Special Purpose	Population Exposure	-109.9	42.870	1/1/2009
56-013-0099	South Pass	South Pass, Wy	Forest	Rural	Special Purpose	General/Background	-108.4	42.315	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	-105.3	44.672	5/1/2001
56-037-0200	Wamsutter	2 miles west of Wamsutter, Wy	Desert	Rural	Special Purpose	Source Oriented, General/Background	-108	41.678	3/1/2006
56-005-0099	Wright	Adjacent To Wright Jr-Senior High School	Residential	Rural	Special Purpose	General/Background, Population Exposure	-105.5	43.758	11/1/2002

Appendix B

2008 SLAMS Precision and Accuracy

Parameter	AQS ID	POC	Site Name	Precision Checks	Accuracy Audit				Flow Verification*			
					1 st Q	2 nd Q	3 rd Q	4 th Q	1 st Q	2 nd Q	3 rd Q	4 th Q
PM ₁₀	56-025-0001	1	Casper	16- Hi-Vol	1	0	0	1	2	1	1	1
	56-021-0001	1	Cheyenne	49- Partisol	1	0	0	1	3	3	3	2
	56-029-0001	2	Cody	N/A	1	0	0	1	1	1	1	1
	56-005-1002	3	Gillette	N/A	1	1	0	1	1	1	1	1
	56-039-1006	1	Jackson	N/A	1	1	0	1	1	3	3	3
	56-013-1003	3	Lander	N/A	1	1	0	1	1	3	3	4
	56-001-0006	2	Laramie	N/A	1	0	0	1	2	2	3	1
	56-037-0007	2	Rock Springs	N/A	1	1	0	1	2	3	3	3
	56-033-0002	1	Sheridan - PD	26- Teom	1	1	0	1	3	2	1	0
56-033-0003	1	Sheridan- HP	60- Partisol	1	1	0	1	3	3	2	0	

Parameter	AQS ID	POC	Site Name	Precision Checks	Accuracy Audit				Flow Verification*			
					1 st Q	2 nd Q	3 rd Q	4 th Q	1 st Q	2 nd Q	3 rd Q	4 th Q
PM _{2.5}	56-021-0001	1	Cheyenne	N/A	1	0	0	1	3	3	3	2
	56-039-1006	1	Jackson	N/A	1	1	0	1	1	3	3	3
	56-029-0001	2	Cody	N/A	1	0	0	1	0	1	1	3
	56-013-1003	1	Lander	N/A	1	1	0	1	1	3	3	4
	56-037-0007	1	Rock Springs	N/A	1	1	0	1	2	3	3	3
	56-033-0002	2	Sheridan - PD	55-Partisol	1	1	0	1	3	2	1	0
	56-033-0003	1	Sheridan- HP	N/A	1	1	0	1	3	3	2	0

* This data may not all be available in AQS, AQD is in the process of uploading this data into the EPA-AQS database. If needed, AQD can be contacted for this information.

Appendix C

Wyoming National Core (NCore) Monitoring Site

The Wyoming Department of Environmental Quality, Air Quality Division's NCore monitoring site will be located in the North Cheyenne Soccer Complex. This location is near a suburban neighborhood of north Cheyenne and meets the urban spatial scale criteria. Verbal approval to establish this location as the Wyoming NCore site was given by EPA OAQPS and EPA Region VIII on February 5, 2009. Written approval was granted by Region VIII on June 15, 2009. The NCore monitoring site will be established by January 1, 2011, and will collect data for trace level sulfur dioxide (SO₂), total reactive nitrogen (NO/NO_y), trace carbon monoxide (CO), ozone (O₃), PM_{10-2.5} mass, PM_{2.5}, and PM_{2.5} speciation.

Site Description:

Site Name: Cheyenne –
Soccer Field

AQS ID: 56-021-0100

Location: North Cheyenne
Soccer Complex

City: Cheyenne

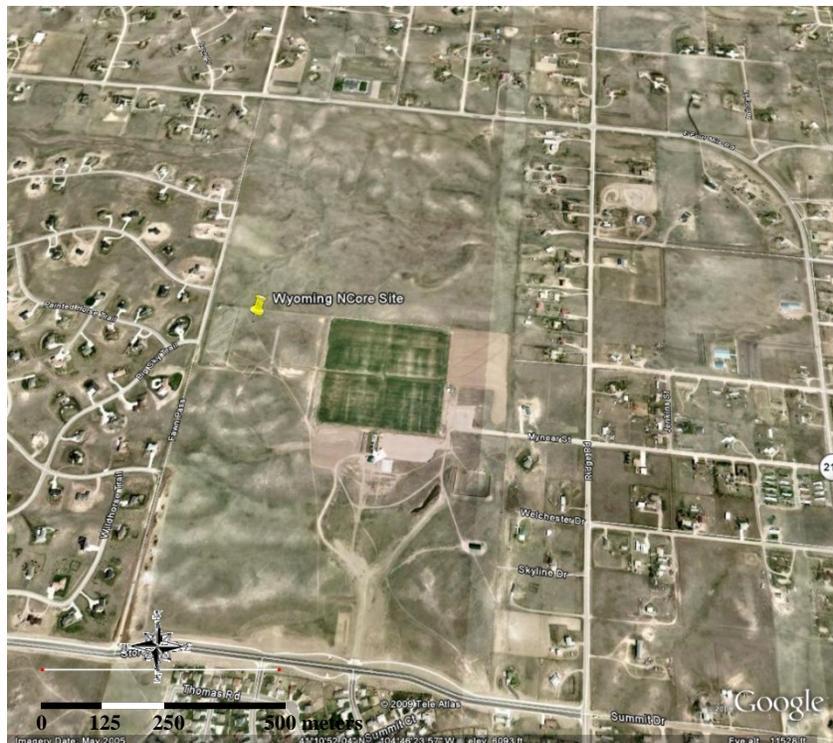
CBSA: Laramie County,
Cheyenne MSA

GPS Coordinates:

41.182350,
-104.778420

Site Elevation: 1859 m

Starting Date: January 1,
2011



Area of Representativeness:

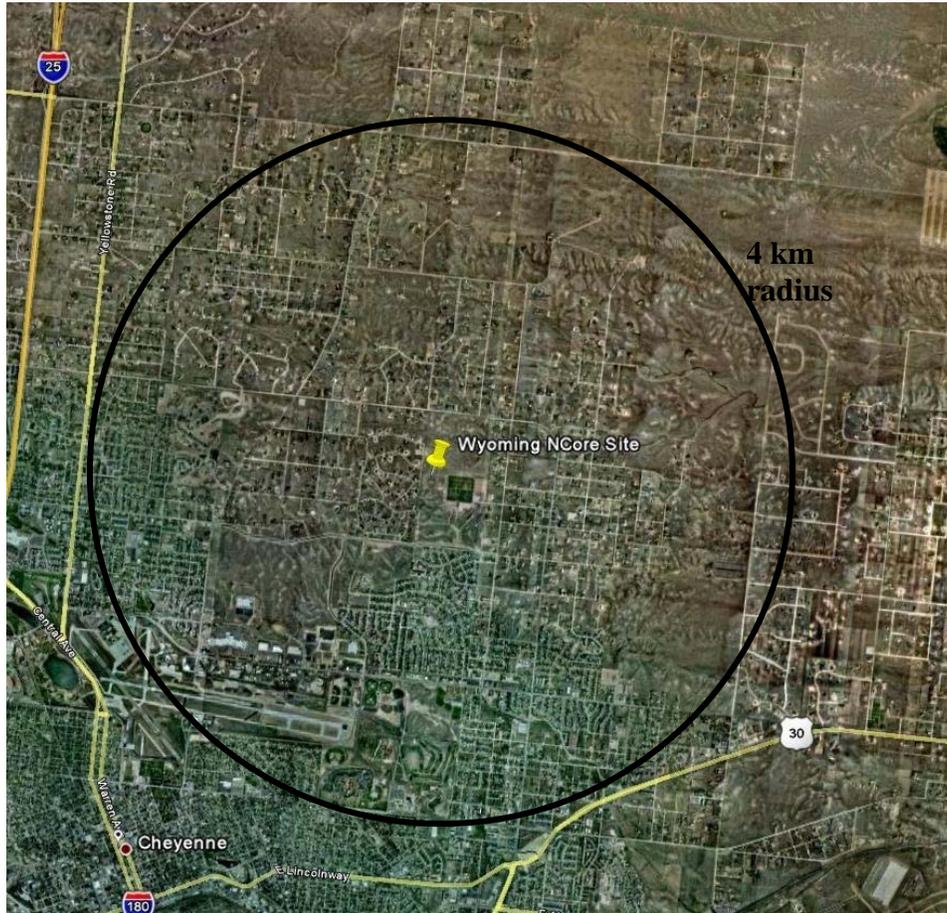
40 CFR Part 58 Appendix D provides design criteria for the NCore ambient air monitoring stations. The monitoring objective for the NCore site is to produce data that represents a fairly large area and therefore the spatial scale of the site is important. The spatial scale defines the physical dimensions of the air parcel nearest to the monitoring site throughout which actual pollution concentrations are reasonably similar. Spatial scale is determined by the characteristics of the area surrounding the air monitoring site. In the case of urban NCore the spatial scales to be used are neighborhood and urban. The following table shows the parameter, specific monitor and the area of representativeness for each pollutant at the Cheyenne – Soccer Field NCore site.

Wyoming NCore				
Parameter	Monitor	Designation	Spatial Scale	Sample Frequency
SO ₂	API 100EU	NCore	Neighborhood	Continuous
CO	API 300EU	NCore	Neighborhood	Continuous
O ₃	API 400EU	NCore	Neighborhood/Urban	Continuous
NO/NO _y	Unknown *	NCore		Continuous
PM _{10-2.5}	Thermo Partisol 2000-D Dichotomous or Thermo Partisol 2000 PM _{10-2.5} Sampler Pair *	NCore	Neighborhood	1/3
PM _{2.5}	Thermo Partisol 2000-D Dichotomous or Thermo Partisol 2000 PM _{2.5} *	NCore	Neighborhood/Urban	1/3
PM _{2.5}	Met One BAM-1020 *	NCore	Neighborhood/Urban	Continuous
PM _{2.5} Speciated	IMPROVE Type II PM _{2.5} module A – D systems *	NCore	Neighborhood/Urban	1/6
WS/WD	Not purchased	NCore	Neighborhood/Urban	Continuous
Solar Radiation	Not purchased	NCore	Neighborhood/Urban	Continuous
Rel. Humidity	Not purchased	NCore	Neighborhood/Urban	Continuous
Barometric Pressure	Not purchased	NCore	Neighborhood/Urban	Continuous
Sigma Theta	Not purchased	NCore	Neighborhood/Urban	Continuous
Precipitation	Not purchased	NCore	Neighborhood/Urban	Continuous
Temperature	Not purchased	NCore	Neighborhood/Urban	Continuous

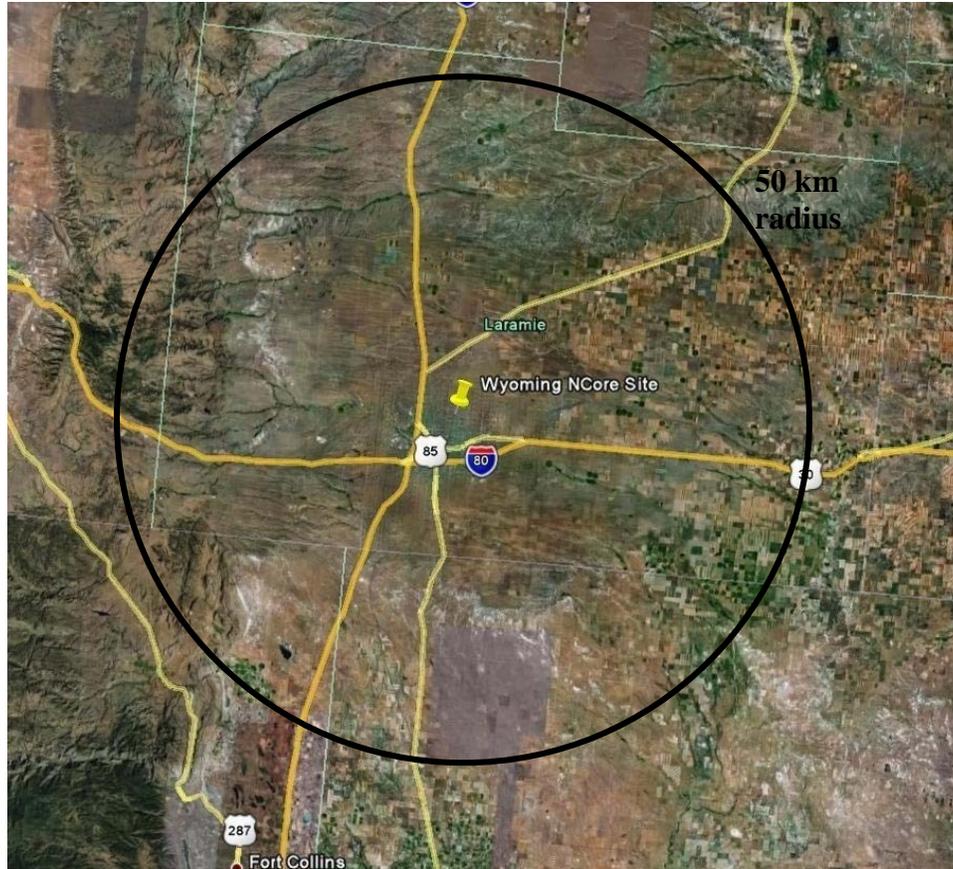
* Anticipated equipment, not yet purchased

AQD has not purchased the NO/NO_y, PM_{10-2.5}, PM_{2.5} (continuous and filter based), PM_{2.5} speciation, and meteorological equipment for the NCore monitoring station. The above table shows the anticipated equipment that may be purchased and used at the NCore station. AQD is waiting on a Federal Reference Method or Federal Equivalent Method (FRM/FEM) designation before purchasing the NO/NO_y monitor. The filter-based 1-in-3 day Thermo Partisol 2000-D Dichotomous monitor or Thermo Partisol 2000 PM_{2.5} monitor will be used to calculate both 24-hour average and annual average for NAAQS compliance.

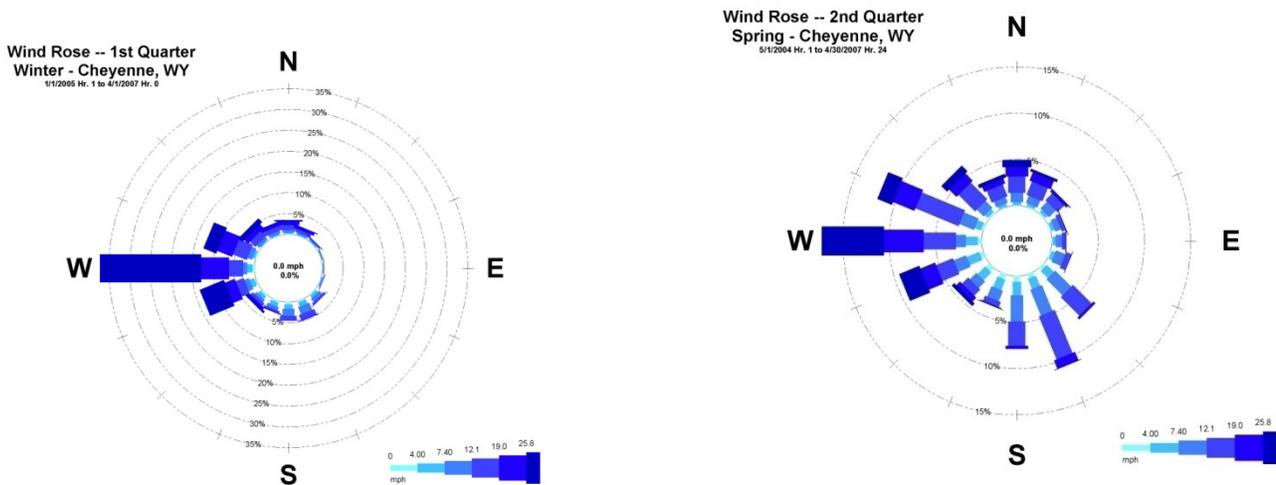
The neighborhood scale, shown below, is set to represent an area up to a 4 km radius from the location. For some parameters, like SO_2 , CO, and $\text{PM}_{10-2.5}$, this is the largest spatial scale option. This scale includes a large portion of the City of Cheyenne. As can be seen from the view below, the proposed NCore site is located north of the main portion of Cheyenne in a suburban residential area.



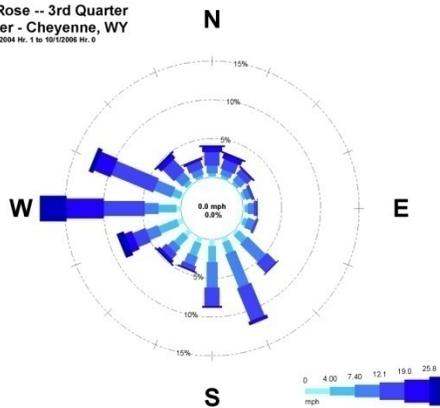
The urban scale is 4 km up to 50 km, this scale encompasses the entire City of Cheyenne along with a great portion of Laramie County.



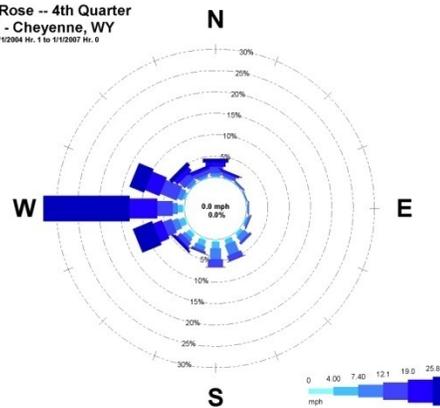
Wind speed and wind direction measurements have been collected from the Cheyenne Airport. The following wind roses show the airport data compiled from hourly averages for the years 2004 – 2007. The wind roses show that for a majority of the year winds out of the west dominate. During the spring and summer months the city of Cheyenne has more variable winds.



Wind Rose -- 3rd Quarter
Summer - Cheyenne, WY
7/1/2004 Hr. 1 to 10/31/2006 Hr. 0



Wind Rose -- 4th Quarter
Fall - Cheyenne, WY
10/1/2004 Hr. 1 to 1/31/2007 Hr. 0



Quality Assurance:

A specific Quality Assurance Project Plan (QAPP) will be developed and implemented prior to the use of the air quality monitors and station operation. All quality assurance and quality control procedures will be implemented in accordance with 40 CFR 58, Appendix A.

Stakeholders:

The Wyoming NCore monitoring station is being supported by two local entities. AQD has a lease with the City of Cheyenne for the placement of the NCore site in the North Cheyenne Soccer Complex. The original lease agreement is for four years with annual options to renew indefinitely. According to the Cheyenne Parks and Recreation Department the future land use for the area near the NCore site appears to be similar to the current use. In many years to come, if the city does decide to develop the area near the station, the vegetation could transform from natural prairie grasses to manicured lawn for playing fields. Another local stakeholder is Frontier Refinery, located in Cheyenne, which has a permit condition to provide an annual stipend directed toward the continual operation of the NCore station.

NCore Siting Criteria:

Appendix E to 40 CFR Part 58 – *Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring* contains specific location criteria for NCore siting. The following information is what WDEQ is anticipating for the site set up and installation.

1. Horizontal and Vertical Probe Placement:

The gaseous instruments will be placed in an 8'w X 12'1 X 8'h temperature controlled air monitoring shelter located in the open area of the North Cheyenne Soccer Complex. The sample probe inlets will be approximately 3 meters above ground. A 10 meter tipping tower will be installed on the side of the shelter to accommodate the 10 meter above ground sampling inlet height needed for NO_y.

The manual particulate monitors will be placed either on the shelter roof or an elevated wooden platform near the shelter. The height of the particulate sample inlets will be approximately 2 - 3 meters above ground.

A tipping 10 meter meteorological tower will be placed approximately 50 feet from the shelter and will house all of the meteorological equipment and monitors.

2. Spacing from Minor Sources:

Lowes Emergency Generator: 1.9 miles southwest of site
 National Weather Center Emergency Generator: 2.4 miles southwest of site
 Frontier Refinery: 4 miles south of site

3. Spacing from Obstructions:

There are no obstructions in the area. This site is located in an area of open prairie grassland.

4. Spacing from Trees:

The closest tree line is approximately 40 meters to the north and includes small evergreen trees that are approximately 2-3 meters in height.

5. Spacing from Roadways:

Tables E-1, E-2, and Figure E-1 of 40 CFR Part 58 Appendix E list the minimum distances from roadways a monitoring probe needs to be based on the average daily traffic (ADT) counts. The following table summarizes the findings and includes the minimum separation distance from roadways for each pollutant. The ADT counts were obtained from the 2008 Plan Cheyenne Metropolitan Planning Organization's website. The NCore site location meets the minimum distance requirement for all pollutants.

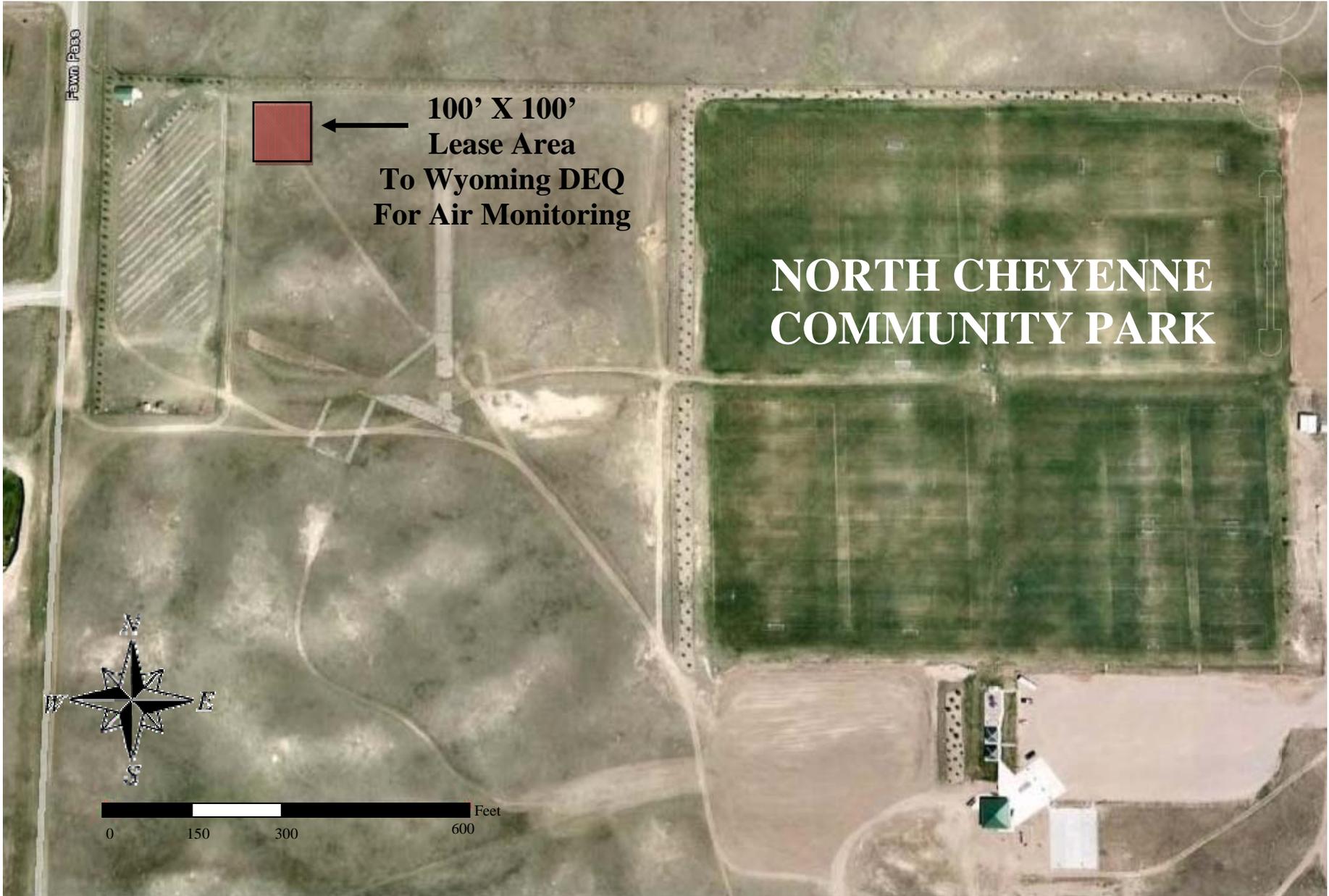
Roadway	ADT	Distance from site (meters)	Direction from site	Minimum Distance Required (meters)			
				Ozone Table E-1	NO/NO _y Table E-1	CO Table E-2	PM Figure E-1
Four Mile Road	3156	760	North	10	10	10	70
Ridge Road	1880	885	East	10	10	10	70
Storey Blvd.	6653	807	South	10	10	10	70
Fawn Pass	<200 (estimated)	115	West	10	10	10	70

Site Details:

AQD plans to hire a contractor to help set up the NCore station and supply necessary training on equipment and quality assurance procedures in 2009 and 2010. This will help ensure that the AQD staff operating the NCore station will be fully versed in the processes and procedures of operating and maintaining such an air quality monitoring station.

AQD has procured the 8 X 12 X 8 temperature controlled shelter, API trace CO monitor, API trace SO₂ monitor, API O₃ monitor, API calibrating system, and API zero air generator. The additional equipment needed to complete the NCore station will be purchased in 2009 and 2010.

The aerial photo below shows the 100' X 100' area that WDEQ has leased from the City of Cheyenne in the North Cheyenne Soccer Complex. This area will be fenced and the air monitoring shelter, all necessary equipment, and meteorological tower will be located within the fence.



Site Photos

