South Dakota Ambient Air Monitoring Annual Network Plan 2011

South Dakota Department of Environment and Natural Resources
Air Quality Program

Table of Contents

List of Tables

Table **Page**

List of Figures

Executive Summary

The department develops an annual ambient air monitoring network plan which is a review of the ambient air monitoring network each year as required by Title 40 of the Code of Federal Regulation (CFR), Part 58. The review finds the state's ambient air quality concentrations are demonstrating attainment with EPA's National Ambient Air Quality Standards (NAAQS). Modifications to the state's ambient air monitoring network are being proposed to adjust the sampling sites to meet the changing needs of the state.

The annual plan is published in the department's air quality website to provide public review and comments so adjustments can be made to meet the needs of the general public before the annual plan is finalized. The annual plan includes the following major sections:

1. Ambient air monitoring goals, plans and needs are in Sections 3.0 through 5.0, respectively;

2. Evaluation of collected data compared to the NAAQS is in Section 6.0;

3. Determination of air pollution trends are in Sections 7.0 and 8.0; and

4. Proposed modifications to the ambient air monitoring network to meet the changing trends, national requirements, and state needs are in Section 9.0.

The department will continue to evaluate the following areas for the need to modify the ambient air monitoring network:

1. With the change in deicing operations in Rapid City, the department will continue to evaluate the need for other air monitoring sites in the city if problems with dust indicate a need; and

2. As monitoring rules are finalized by EPA there may be a need for modifications to the $PM_{2.5}$ and ozone testing site locations.

The department is planning the following site modifications in 2011 and 2012:

1. Manual method $PM_{2.5}$ monitors and a Met One BAM 1020 continuous $PM_{2.5}$ monitor are operated at the UC #2 Site. At the end of 2011, three years of air monitoring data will be collected with both methods. Running both methods duplicates the sampling effort so the manual method will be discontinued at the end of 2011;

2. A Met One BAM 1020 continuous monitor will be installed at the Watertown Utility Site replacing the RAAS $PM_{2.5}$ manual method monitors. The Watertown Utility Site was selected for this upgrade because it is one of the highest concentration sites in the state for $PM_{2.5}$ and has a shelter;

3. DENR plans to continue to replace the RAAS $PM_{2.5}$ manual method monitors with Partisol 2000 $PM_{2.5}$ manual method monitors. The RAAS $PM_{2.5}$ manual method monitors have been discontinued by the manufacturer and replacement parts will no longer be available after 2011. The Aberdeen and Brookings sites will be replaced by the start of 2012;

4. The air toxic monitor at UC #1 will complete the collection of three years of data by the end of 2011. The air toxic monitor will be discontinued at the end of 2011 because no further testing is necessary until the Hyperion Energy Center begins to operate; and

5. No ambient air monitoring sites are planned to be closed in 2011 or 2012.

1.0 INTRODUCTION

The United States Environmental Protection Agency (EPA) through Title 40 of the Code of Federal Regulation (CFR) and the Performance Partnership Agreement requires the South Dakota Department of Environment and Natural Resources (department) to complete an annual ambient air monitoring network plan. EPA's requirements for the annual plan are listed in 40 CFR § 58.10. The annual plan will cover a review of the ambient air monitoring sites and determine if the network is meeting the monitoring objectives in 40 CFR Part 58, Appendixes A, C, D, and E. The annual plan will identify needed modifications to the network such as the termination or relocation of a monitor, termination of an existing station, addition of new parameters, or the establishment of new stations.

The department is required to public notice the annual ambient air monitoring network plan for 30 days prior to submitting the plan to EPA. The department will comply with this requirement by posting this document on the department's Air Quality Program website at the following location for 30 days:

http://denr.sd.gov/des/aq/airprogr.aspx

All comments received by the department during this 30 day period will be addressed by the department and the appropriate changes will be incorporated in the plan. If a substantial change is made to the plan because of a comment, another 30 day public comment period will be completed. The final annual plan will be submitted to EPA for review including all public comments and the department's responses to the comments.

2.0 AMBIENT AIR MONITORING NETWORK HISTORY

In 1972, South Dakota developed and EPA approved a State Implementation Plan (SIP) which included the establishment and operation of an ambient air monitoring network for the state. In 1980, South Dakota submitted a revision to its SIP to upgrade the program by establishing a network of state and local air monitoring stations (SLAMS) and special purpose monitoring (SPM) stations.

In 1985, the state set up the first samplers to test for levels of particulate matter 10 microns in diameter or less (PM_{10}) in anticipation of EPA adopting a PM_{10} National Ambient Air Quality Standards (NAAQS). In 1987, the total suspended particulate (TSP) standard was replaced with the new PM_{10} standard. South Dakota submitted a revised ambient air monitoring network plan to include sampling sites for the new PM_{10} standard and shutdown the TSP monitoring network in 1987.

A new standard was added by EPA for particulate matter 2.5 microns in diameter or less ($PM_{2.5}$) in 1997. South Dakota submitted a revised ambient air monitoring network plan to include sampling sites for the new $PM_{2.5}$ standard. In 1999, $PM_{2.5}$ samplers were added to the ambient air monitoring network to determine compliance with the new standard.

In 1997, a new standard was also set for ozone that lowered the concentration level and moved from a one hour to an eight hour average standard. Due to the standard change and concern with the modeling results by the Ozone Transport Assessment Group, the state started an ozone monitoring network which by 2006 included sites in Sioux Falls, Rapid City, and Wind Cave National Park. South Dakota submitted an attainment designation to EPA on April 15, 2003, designating each county as attaining the new ozone standard.

In 2006, EPA revised the $PM_{2.5}$ standard significantly by reducing the 24-hour standard from 65 to 35 micrograms per cubic meter. South Dakota submitted an attainment designation to EPA on December 11, 2007, designating each county as attaining the new $PM_{2.5}$ standard.

In 2007, EPA revised the ozone standard and reduced the standard from 0.08 to 0.075 parts per million. South Dakota is attaining the new standard and submitted a proposed attainment designation package for all counties in the state to EPA on March 6, 2009. The new presidential administration in 2009, asked EPA to stay the implementation of the new ozone standard and re-evaluate the standard. A new revised standard was proposed and EPA's final decision on the standard is anticipated to be published in 2011.

The nitrogen dioxide (NO_2) standard was reviewed and a new one-hour standard was set by EPA in 2009. The annual standard was retained without any change in concentration level. The department began monitoring for nitrogen dioxide in 2003 and currently operates nitrogen dioxide monitors in Sioux Falls, Union County, Badlands, and Rapid City.

EPA also made changes to the air monitoring requirements for lead in 2009. The final rule did not require lead monitoring at the National Core site and all sources in South Dakota have emission levels less than 0.5 ton per year. Therefore, testing for lead is not required at this time.

The sulfur dioxide (SO_2) standard was reviewed and the 24-hour and annual standards were replaced by a new 1-hour standard set by EPA in 2010. The department began monitoring for sulfur dioxide in 2002 and currently operates sulfur dioxide monitors in Sioux Falls, Union County, Badlands, and Rapid City.

Data collected from the ambient air monitoring network is entered into the federal database called the Air Quality System (AQS). Individuals interested in reviewing the air quality data can go to the EPA website at the following address:

http://www.epa.gov/airexplorer/index.htm

3.0 AIR MONITORING GOALS

The department's Air Quality Program was established with the primary goal of protecting the health, welfare and property of South Dakotans from the detrimental effects of air pollution. The Clean Air Act of 1970 and subsequent amendments define air quality standards for various air pollutants necessary to protect the public from injurious pollution concentrations. Air pollution concentrations that exceed these established standards can cause "a public health hazard, nuisance, annoyance or damage buildings, property, animals, plants, forests, crops, exposed metals or otherwise interfere with the enjoyment of life or property."

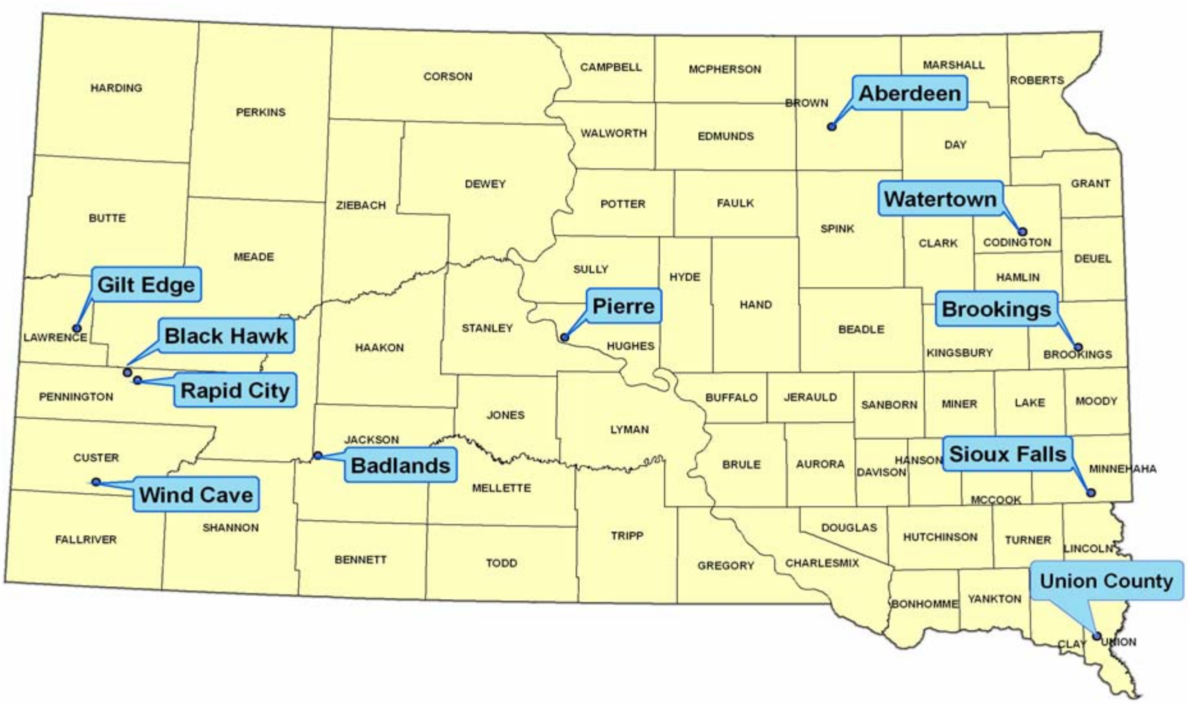
In order to attain and maintain the NAAQS, the department developed regulations that restrict air pollution from sources, establishes these restrictions in an air quality permit, requires periodic inspections to ensure compliance, and maintains an ambient air monitoring network to provide air quality information and monitor the success of the Air Quality Program.

4.0 AIR MONITORING PLAN

In calendar year 2010, the ambient air monitoring network included 16 ambient air monitoring sites. Figure 4-1 shows a map of the general locations and cities with ambient air monitoring sites at the beginning of 2010. The following types of ambient air monitors and monitoring sites are operated in South Dakota:

- State and local air monitoring stations (SLAMS);
- Special purpose monitors (SPM);
- Air toxic monitors;
- Prevention of Significant Deterioration (PSD) monitors;
- Interagency Monitoring of Protected Visual Environments (IMPROVE) sites;
- Environmental radiation ambient monitoring systems; and
- National Core (NCore) multi pollutant sites.

Figure 4-1 –South Dakota Air Monitoring Sites



Ambient air monitoring site files are maintained in the department's Pierre office for the SLAMS and SPM sites. The ambient air monitoring site files are available for public review during normal working hours from 8:00 AM to 5:00 PM each workday. The monitoring site files contain at a minimum the following information for each site:

1. AQS site identification form;
2. Sampling location;
3. Sampling and analysis method;
4. Operating schedule;
5. Monitoring objective and spatial scale;
6. Beginning date of operation; and
7. Site maps.

4.1 State and Local Air Monitoring Stations (SLAMS)

A State and Local Air Monitoring Station consists of an air monitor selected by the state or local air programs to determine compliance with the NAAQS. At the beginning of 2010, thirteen of the networks sites had a SLAMS monitor for at least one air pollutant parameter. The sites in the network collected PM_{10} data at twelve sites, $PM_{2.5}$ data at eleven sites, sulfur dioxide and nitrogen dioxide at five sites, and ozone at six sites throughout South Dakota.

4.2 Special Purpose Monitoring (SPM)

A SPM monitor is a generic term for all monitors used for special studies. The data is reported to EPA, the equipment is EPA or non-EPA designated monitoring methods, and the monitoring data is used for special circumstances or needs. Five of the ambient air monitoring network sites operated some kind of SPM monitor in 2010. The parameters tested by the SPM monitors in South Dakota include:

1. Weather stations at the Black Hawk, SD School, and UC #1 sites;
2. Air toxic monitors at the SD School and UC #1 sites;
3. PM_{coarse} monitor, NOy analyzer, and $PM_{2.5}$ speciation monitors at the SD School Site;
4. RC National Guard Site has a SPM monitor to help define the extent of the PM_{10} high concentration area in western Rapid City; and
5. Radiation monitors operated at the Pierre and RC National Guard sites.

4.3 Air Toxics Monitoring Sites

As part of a national research project, air monitors testing for pollutants classified as air toxics are being operated at the SD School Site in Sioux Falls and at the UC #1 Site in Union County. Testing for air toxic parameters began in Sioux Falls at the Hilltop Site in 2000 and continued at the SD School Site in 2008. The SD School Site is located near the South Dakota School for the Deaf and the Terry Redlin Elementary grade school. The goal is to determine current concentration levels in South Dakota's largest city.

In 2002, a second air toxics site was established in Custer. This location was established because EPA's modeling estimates of air toxic emissions showed that Custer County had the potential for some parameters to be the highest readings in the state. The city of Custer is the largest city in

Custer County. In March 2008, five years of sampling data was completed at this site and concentration levels did not indicate trends that would require continuation of the site.

The Custer Site was closed in December 2008 and the equipment was moved to the UC #1 Site. The UC #1 Site is operated as part of three sites in Union County to determine background concentrations in anticipation of construction of the proposed oil refinery at the Hyperion Energy Center.

At the end of 2011, air toxic sampling will include three years of testing at the UC #1 Site. No further testing is planned until the Hyperion Energy Center begins to operate so the parameter will be removed from the site.

The air toxic data is reported to the AQS database by the EPA contractor so it can be compared with other national sites and provide baseline levels for South Dakota and used in health studies. Currently, the data collected between 2000 and 2010 have been added by the EPA contractor into the AQS and the National Air Toxic Assessment database. If an individual is interested in reviewing the data they may register with EPA at:

http://www.epa.gov/ttn/atw/natamain/

4.4 Prevention of Significant Deterioration (PSD) Monitoring Sites

In 2010, no Prevention of Significant Deterioration monitoring project were started or completed.

4.5 IMPROVE Network

Two Interagency Monitoring of Protected Visual Environments (IMPROVE) sites are being operated by the National Parks Service in South Dakota. The site locations are at the Badlands and Wind Cave National Park. Data results for parameters collected by the National Park Service can be requested from the individual national parks at:

http://vista.cira.colostate.edu/views/Web/Data/DataWizard.aspx.

4.6 Environmental Radiation Ambient Monitoring System (ERAMS)

The ERAMS sites in Pierre and Rapid City are being operated as a part of the national network of sampling sites. The Pierre Site has been operated since the early 1980s. The state has a limited role in operating the monitor. The state collects the samples, takes preliminary readings of radioactivity levels, and ships the samples to the EPA office of Radiation and Indoor Air. The type of sample collected is airborne particulates and measurements taken are gross beta radiation levels.

In 2009, EPA requested a second site in the state to be located in the Rapid City area. The new ERAMS monitor was installed at the RC National Guard Site on May 7, 2009. The site is operated by DENR's Rapid City Regional Office in conjunction with the Rapid City National Guard.

The general objectives of the sampling sites are to provide a means of estimating ambient levels of radioactive pollutants in our environment, to follow trends in environmental radioactivity levels, and to assess the impact of fallout and other intrusions of radioactive materials. Specifically, the ERAMS monitor was designed to:

1. Provide a direct assessment of the population's intake of radioactive pollutants due to fallout;
2. Provide data for developing a set of dose computational models for specific sources and a national dose computational model to aggregate all sources and determine total population dose;
3. Monitor pathways for significant population exposure from routine, accidental, and terrorist releases of radioactivity from major sources;
4. Provide data for indicating additional sampling needs or other actions required to ensure public health and environmental quality in the event of a major release of radioactivity to the environment; and
5. Serve as a reference for data comparison with other localized and limited monitoring programs.

The radiation data collected at this site may be reviewed at:

http://oaspub.epa.gov/enviro/erams_query.simple_query

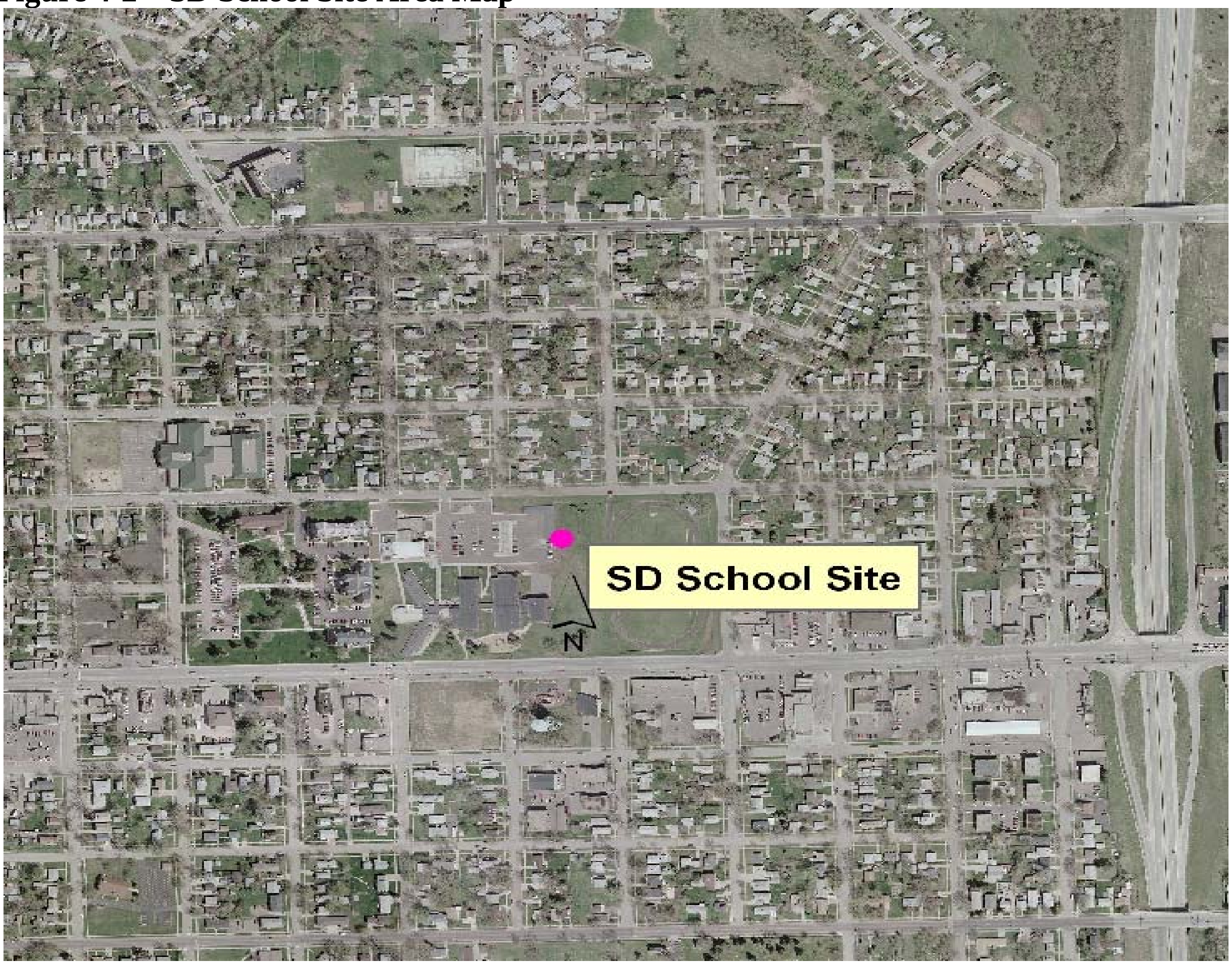
4.7 National Core Multi-Pollutant Site

The National Core (NCore) multi-pollutant monitoring site will provide data on several pollutants at lower detection levels and replaces the National Air Monitoring Station (NAMS) sites that have existed for several years. Each state's ambient air monitoring network is required to have at least one NCore site. At the beginning of 2011, all required parameters were operating at the SD School Site. The NCore site addresses the following monitoring objectives:

1. Timely reporting of data to the public through AIRNow, air quality forecasting, and other public reporting mechanisms;
2. Support development of emission strategies through air quality model evaluation and other observational methods
3. Accountability of emission strategy progress through tracking long-term trends of criteria and non-criteria pollutants and their precursors;
4. Support long-term health assessments that contribute to ongoing reviews of the NAAQS;
5. Compliance through establishing nonattainment/attainment areas by comparison with the NAAQS; and
6. Support multiple disciplines of scientific research, including; public health, atmospheric and ecological.

The NCore site in South Dakota is located on the School for the Deaf campus in Sioux Falls, which is identified as the SD School Site (46-099-0008). This site meets the location requirements to be in an urban population residential area. Sioux Falls was selected as the NCore site for South Dakota because it is the largest city in the state and is one of the state's fastest growing communities. See Figure 4-2 for an aerial view of the city around the SD School Site.

Figure 4-2 – SD School Site Area Map



The NCore site collects data for trace level sulfur dioxide (SO_2), trace level nitrogen oxides (NOx), all reactive oxides of nitrogen (NOy), carbon monoxide (CO), ozone (O_3), $PM_{2.5}$ continuous and filter based manual monitors, PM_{coarse} mass, $PM_{2.5}$ speciated, PM_{10}, PM_{coarse} speciation and meteorological parameters of wind speed, wind direction, relative humidity, and ambient temperature.

5.0 AMBIENT AIR MONITORING NEEDS

5.1 Monitoring State's Large Population Centers

South Dakota's industrial base and population centers are typical of many of the northern plains states. The largest industry in the state is agriculture. Most of the other industries are located in several localized areas. The industries in these locations are typically small (less than 50 employees) and generally do not produce large quantities of air pollutants. Most are considered service oriented businesses or light industrial. The only heavy industrial facilities are the Big Stone Power Plant in Grant County and the quarry area in Rapid City.

The population distribution of the state follows the general industrial distribution. Most of the state's population of 754,844, in the 2000 Census, lives on either the eastern or western third of South Dakota. The two largest cities in South Dakota are Sioux Falls and Rapid City located in southeastern and western South Dakota, respectively. The remaining population is primarily spread across the eastern third of the state with the remaining portion of the state sparsely populated. See Table 5-1 for a list of the ten largest cities and Table 5-2 for a list of the 10 largest counties in the state.

Table 5-1 – 10 Largest Cities in South Dakota

Ranking	City Name	Counties	Population
1	Sioux Falls	Minnehaha/Lincoln	153,888
2	Rapid City	Pennington /Meade	67,956
3	Aberdeen	Brown	26,091
4	Watertown	Codington	21,482
5	Brookings	Brookings	18,504
6	Mitchell	Davison	15,254
7	Yankton	Yankton	14,454
8	Pierre	Hughes	13,646
9	Huron	Beadle	12,592
10	Vermillion	Clay	10,571

Table 5-2 – 10 Most Populated Counties in South Dakota

Ranking	Counties	Population
1	Minnehaha	169,468
2	Pennington	100,948
3	Lincoln	44,828
4	Brown	36,531
5	Brookings	31,965
6	Codington	27,277
7	Meade	25,434
8	Lawrence	24,097
9	Yankton	22,438
10	Davison	19,504

Given South Dakota's population distribution, most of the air monitoring efforts of the state have in the past been concentrated in the areas of high population. Within these areas of high population, monitoring sites are chosen that will determine areas of high pollution concentration, determine if the NAAQS are being met, identify and attempt to quantify pollutant concentrations emitted by industries, and identify sources that have the potential to release large amounts of pollutants. Air monitoring sites are currently being operated in or near the five largest cities and seven largest counties in the state.

5.2 Real Time Data

Air monitoring goals have shifted to the collection of data using continuous air monitoring samplers and providing the data as quickly as possible for the public to use. Continuous samplers provide more data at lower operational cost, which is necessary as EPA continuous to expand ambient air monitoring programs for the same amount of money or less. In many cases the continuous emission monitoring can be accessed by telephone and uploaded to a website for public use. The public can then use this data to determine if they need to take extra precautions when doing outdoor activities. The real time information is used to monitor PM_{10} and $PM_{2.5}$ concentrations when high wind dust alerts are forecasted in Rapid City and is provided to the public on South Dakota's website at:

http://denr.sd.gov/des/aq/aarealtime.aspx

In 2011, data uploaded from the $PM_{2.5}$ monitor and ozone analyzer at Wind Cave, Badlands, and SD School sites were reporting hourly data to EPA's AirNow website at:

http://www.airnow.gov/

This data along with other monitoring sites around the nation provides the public and EPA with near real time data to show current air pollution levels and forecast levels for long range transport. The goal for the future is to add other locations in the state to this website and to the department's website.

5.3 Class I Areas

With the development of coal bed methane production in Wyoming and Montana and the potential for new coal fired power plants in and out of the state, there is a growing need for data in rural and small cities. In addition, South Dakota must develop a plan to implement the regional haze regulations required by the federal Clean Air Act. The implementation of these regulations will put more importance on air pollution levels in the state's two class I areas of Badlands and Wind Cave National Parks.

Ambient air monitors were placed in these areas in order to determine background levels and the impact of long range transport of air pollutants like particulate matter, ozone, sulfur dioxide, and nitrogen dioxide. In addition, continuous data is needed for modeling purposes to help in determining air quality permit requirements. The National Park sites collect data from IMPROVE monitors for PM_{10}, $PM_{2.5}$, and chemical analysis of the collected particulates. The department collects PM_{10}, $PM_{2.5}$, sulfur dioxide, nitrogen dioxide, and ozone data at the Badlands and Wind Cave sites.

5.4 Ozone Monitoring

EPA is planning to make a final decision on revising the ozone standard in 2011. The final concentration level could have a major impact to South Dakota and a large part of the nation if the level selected is in the low end of the proposed range near 0.060 parts per million (ppm).

Ozone levels in the nation are being impacted by long range transport from within the nation and internationally. In some cases, states are observing rural ozone levels higher than ozone levels in large cities. This is a serious problem for states in the eastern half of the nation in meeting the ozone standard and beginning to be a problem in the western half of the nation. Colorado, Wyoming and Utah are having issues with high ozone levels in their rural areas. It will be important to maintain ozone monitoring in the western part of South Dakota to determine if long range transport of air pollution affects ozone concentration in rural and urban areas.

Past national modeling efforts show there is potential for having ozone concentrations near the standard in the east and southeastern parts of the state. Monitoring sites were added in 2008 in Union and Brookings counties to more accurately determine if the population is being exposed to high ozone levels. The eastern third of the state now has three ozone monitoring sites.

5.5 $PM_{2.5}$ Monitoring

In 2006, EPA significantly lowered the 24-hour $PM_{2.5}$ standard from 65 micrograms per cubic meter (ug/m^3) to 35 ug/m^3. EPA is planning to propose changes in the $PM_{2.5}$ standard in 2011 which may lower the standard even further. Therefore, sampling for $PM_{2.5}$ levels will continue to be a priority in the state.

5.6 Metropolitan Statistical Areas

40 CFR Part 58, Appendix D, contains information used to design an ambient air monitoring network and lists three basic objectives in designing an ambient air monitoring network. The three basic objects are listed below:

1. Provide air pollution data to the general public in a timely manner. The department accomplishes this objective by providing Near Real Time data on the department's website at:

   http://denr.sd.gov/des/aq/aarealtime.aspx

   The data includes hourly data from cities like Sioux Falls and Rapid City sites. It also includes other cities like Black Hawk and Watertown sites and rural areas like Union County, Badlands and Wind Cave sites. Specifically in the Rapid City area, High Wind Dust Alerts are called when meteorological conditions are forecasted that could cause high PM_{10} concentrations. This information along with a report graphing hourly concentrations recorded during the alert is also provided to the public through the department's website;

2. Support compliance with ambient air quality standards and emissions strategy development. The department accomplishes this objective by locating the sites throughout the state to assess the permit control measures and pollution emission impacts on the state. For example, the Rapid City air monitoring sites specifically evaluate the permit control measures and the special measures taken to reduce fugitive dust levels; and

3. Support for air pollution research studies. The department supports research by loading the air quality data into EPA's AQS database site and by supporting local studies when requested by the state's colleges.

EPA identified in Appendix D the air monitoring requirements for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. The number of required air monitoring sites for ozone and particulate matter is based on the state's Metropolitan Statistical Areas (e.g., determined by the population of the MSA and each pollutant's design value in the MSA). Each design value is specific to the pollutant and form of the standard. To determine the number of monitoring sites, the design value is calculated based on the pollutant concentration and the applicable form of the standard in 40 CFR Part 50, divided by the applicable pollutant's standard in 40 CFR Part 50, and the results multiplied by 100. The percentage is compared to the values in Appendix D to determine the minimum number of monitoring sites.

If there is no ambient air monitoring data for the MSA, only the minimum number of sites listed in Appendix D is required to be operated. If there is a minimum of three years of air quality data for the MSA, a design value is calculated. If the MSA has a design value greater than 85% of the standards for ozone and $PM_{2.5}$ and 80% of the standard for PM_{10} the required number of sampling sites continues to increase as the population increases. If the highest concentration site in a MSA has a design value less than 80% for PM_{10} and 85% of the standard for other pollution parameters the required number of sites may be one or even zero depending on the design value and population of the MSA.

There is one additional ambient air monitoring requirement in Appendix D for an ozone network. If a MSA is required to have one or more ozone monitor, at least one of the ozone monitoring sites is required to be located at the expected high concentration area for the MSA.

Table 5-3 shows the population, design values and the minimum site requirements for the Sioux Falls, Rapid City, and Sioux City MSAs in the state using data through the 2010 sampling year.

Table 5-3 – 40 CFR Part 58, Appendix D Requirements for MSA

2010 MSA Population	Counties	Site	AQS ID	Maximum Design Values	> NAAQS Criteria (Yes or No)	Minimum Sites Required
Sioux Falls MSA						
123,975	Minnehaha, Lincoln, McCook, and Turner	SF KELO	46-099-0006	PM_{10} 24-hr = 30%	No	0
		SD School	46-099-0008	PM_{10} 24-hr = 38%		
		SF KELO	46-099-0006	$PM_{2.5}$ 24-hr = 72%	No	0
		SD School	46-099-0008	$PM_{2.5}$ 24-hr = 60%		
		SF KELO	46-099-0006	$PM_{2.5}$ Annual = 61%	No	0
		SD School	46-099-0008	$PM_{2.5}$ Annual = 60%		
		SF KELO	46-099-0006	No ozone 8-hr design value	No	0
		SD School	46-099-0008	Ozone 8-hr = 84%		
Rapid City MSA						
59,607	Pennington and Meade	RC National Guard	46-103-0013	PM_{10} 24-hr = 49%	No	0
		RC Credit Union	46-103-0020	PM_{10} 24-hr = 77%		
		Black Hawk	46-093-0001	PM_{10} 24-hr = 22%		
		RC Library	46-103-1001	PM_{10} 24-hr = 35%		
		RC National Guard	46-103-0013	No $PM_{2.5}$ 24-hr design value	No	0
		RC Credit Union	46-103-0020	$PM_{2.5}$ 24-hr = 48%		
		Black Hawk	46-093-0001	No $PM_{2.5}$ 24-hr design value		
		RC Library	46-103-1001	$PM_{2.5}$ 24-hr = 47%		
		RC National Guard	46-103-0013	No $PM_{2.5}$ annual design value	No	0
		RC Credit Union	46-103-0020	$PM_{2.5}$ Annual = 47%		

2010 MSA Population	Counties	Site	AQS ID	Maximum Design Values	> NAAQS Criteria (Yes or No)	Minimum Sites Required
		Black Hawk	46-093-0001	No $PM_{2.5}$ annual design value		
		RC Library	46-103-1001	$PM_{2.5}$ Annual = 43%		
		RC National Guard	46-103-0013	No ozone 8-hr design value	No	0
		RC Credit Union	46-103-0020	No ozone 8-hr design value		
		Black Hawk	46-093-0001	Ozone 8-hr = 77%		
		RC Library	46-103-1001	No ozone 8-hr design value		
Sioux City MSA						
Union (SD),	14,399	UC #1	46-129-0001	PM_{10} 24-hr = 49%	No	0
Dixon-Dakota (NE), and	27,006	UC #2	46-129-0002	PM_{10} 24-hr = 44%		
Woodbury (IA)	102,172	UC #1	46-129-0001	$PM_{2.5}$ 24-hr = 70%	No	0
Total	**143,577**	UC #2	46-129-0002	$PM_{2.5}$ 24-hr = 72%		
		UC #1	46-129-0001	$PM_{2.5}$ Annual = 57%	No	0
		UC #2	46-129-0002	$PM_{2.5}$ Annual = 60%		
		UC #3	46-129-0003	No ozone 8-hr design value	No	0

The department operates the following additional types of monitors to meet the specific network requirements in 40 CFR Part 58, Appendix D:

1. $PM_{2.5}$ speciation monitor in Sioux Falls at the SD School Site; the largest urban area in the state;
2. $PM_{2.5}$ background and transport monitors at the Badlands and Wind Cave sites; and
3. NCore site located in the city of Sioux Falls at the SD School Site.

Another requirement in Appendix D is providing for a Photochemical Assessment Monitoring Stations (PAMS) which is required in areas classified as serious, severe, or extreme nonattainment for ozone. South Dakota is not required to have a PAMS site.

There is no Appendix D required population air monitoring sites for carbon monoxide. The only required carbon monoxide air monitoring site is at the National Core Site. Carbon monoxide air monitoring started at the SD School Site in 2011.

There are population monitoring requirements for nitrogen dioxide but the core based statistical area (CBSA) must have a population level of 500,000 or greater. There are no population based monitoring sites required for South Dakota because of the small size of the population centers in the state.

Sulfur dioxide has a population based monitoring requirement for a CBSA. The monitoring requirement is based on a calculation using the total amount of sulfur dioxide, in tons, emitted within the counties in the CBSA area and the population within the CBSA counties. The calculation is called the population weighted emissions index for the CBSA. Union County is part of the Sioux City CBSA and is the only area in South Dakota with a population weighted emissions index that has a value high enough to require a monitoring site. The EPA rules require the monitoring site to be located in the parent CBSA or Sioux City area in this case. No population weighted emissions index required sulfur dioxide monitoring sites are required in South Dakota.

The minimum requirements for lead are based on the lead air emissions from a source and airport. In this case, there are no required monitoring sites in South Dakota.

5.7 Future Monitoring

There is currently minimal monitoring being completed in other parts of the state that have small, but expanding populations and industries. These areas include the northeastern and the northern Black Hills portions of the state. These areas will continue to be evaluated to determine whether additional monitoring efforts need to be concentrated in those areas.

PM_{10}, $PM_{2.5}$, sulfur dioxide, and nitrogen dioxide, and ozone will be the focus of the ambient air monitoring network as levels of these pollutants have the greatest potential to have concentrations close to the standard as EPA continues to lower the NAAQS for these pollutants.

6.0 COMPLIANCE WITH NAAQS

This section provides a comparison of the collected data to the NAAQS. The comparison will determine if an area is attaining the standard. In addition, the comparison will assist in determining if more monitoring stations for certain parameters is needed in an area or an area no longer needs to monitor for a certain parameter or parameters.

6.1 Particulate Matter (PM_{10})

The PM_{10} NAAQS is based on a 24-hour average concentration. The maximum 24-hour average concentration allowed is 150 micrograms per cubic meter (ug/m^3). Attainment with the 24-hour standard is demonstrated when there is less than or equal to one expected exceedance per year averaged over three years. A 24-hour average concentration of 154.4 ug/m^3 is the highest level that still attains the 24-hour standard for PM_{10}.

In 2010, the statewide PM_{10} monitoring network included 13 monitoring locations. Six of the sites recorded data using manual monitors providing 24-hour sample concentrations. Seven of the sites have continuous samplers providing 1-hour concentrations. The main distribution of the PM_{10} air monitoring sites is located in South Dakota's two largest cities: 1) Rapid City (three sites); and 2) Sioux Falls (two sites). Two sites are operated in central Union County for preconstruction, construction and post construction of the Hyperion Energy Center. Other locations with one site include the Badlands, Wind Cave, Aberdeen, Watertown, Black Hawk, and Brookings.

Table 6-1 contains a list of the expected exceedance rate, 2nd highest 24-hour PM_{10} concentrations, three year average of 2nd highest 24-hour (design value), and attainment status for the PM_{10} ambient air monitors throughout the state for calendar year 2008 to 2010. Since the 24-hour standard allows for one expected exceedance per year, the 2nd highest maximum 24-hour concentration, helps determine how close a site is to exceeding the 24-hour standard. Using a 3-year average value (design value) reduces the impact from an unusually high concentration in one year and is a better comparison of the actual pollution levels.

Table 6-1 – Statewide PM_{10} 24-Hour Concentrations

Site	Expected Exceedance Rate	Yearly 2nd Maximum 24-hour	2010 Design Value	Attainment?	Percent Standard
RC Library	0	2008 – 48 ug/m^3 2009 – 44 ug/m^3 2010 – 61 ug/m^3	51 ug/m^3	Yes	34%
RC National Guard	0	2008 – 84 ug/m^3 2009 – 65 ug/m^3 2010 – 73 ug/m^3	74 ug/m^3	Yes	49%
RC Credit Union	0	2008 – 124 ug/m^3 2009 – 124 ug/m^3 2010 – 97 ug/m^3	115 ug/m^3	Yes	77%
Black Hawk	0	2008 – 36 ug/m^3 2009 – 34 ug/m^3 2010 – 29 ug/m^3	33 ug/m^3	Yes	22%
Badlands	0	2008 – 56 ug/m^3 2009 – 32 ug/m^3 2010 – 31 ug/m^3	40 ug/m^3	Yes	27%
SF KELO	0	2008 – 46 ug/m^3 2009 – 40 ug/m^3 2010 – 49 ug/m^3	45 ug/m^3	Yes	30%
SD School	0	2008 – 59 ug/m^3 2009 – 51 ug/m^3 2010 – 60 ug/m^3	57 ug/m^3	Yes	38%

Site	Expected Exceedance Rate	Yearly 2nd Maximum 24-hour	2010 Design Value	Attainment?	Percent Standard
Brookings	1.0	2008 – 120 ug/m^3 2009 – 58 ug/m^3 2010 – 81 ug/m^3	86 ug/m^3	Yes	57%
Aberdeen	0	2008 – 70 ug/m^3 2009 – 53 ug/m^3 2010 – 46 ug/m^3	56 ug/m^3	Yes	37%
Watertown	0.33	2008 – 91 ug/m^3 2009 – 80 ug/m^3 2010 – 125 ug/m^3	99 ug/m^3	Yes	66%
Wind Cave	0.33	2008 – 47 ug/m^3 2009 – 141 ug/m^3 2010 – 67 ug/m^3	85 ug/m^3	Yes	53%
UC #1	0	2008 – 2009 – 79 ug/m^3 2010 – 66 ug/m^3	73 ug/m^3	[1]	
UC #2	0	2008 – 2009 – 49 ug/m^3 2010 – 82 ug/m^3	66 ug/m^3	[1]	

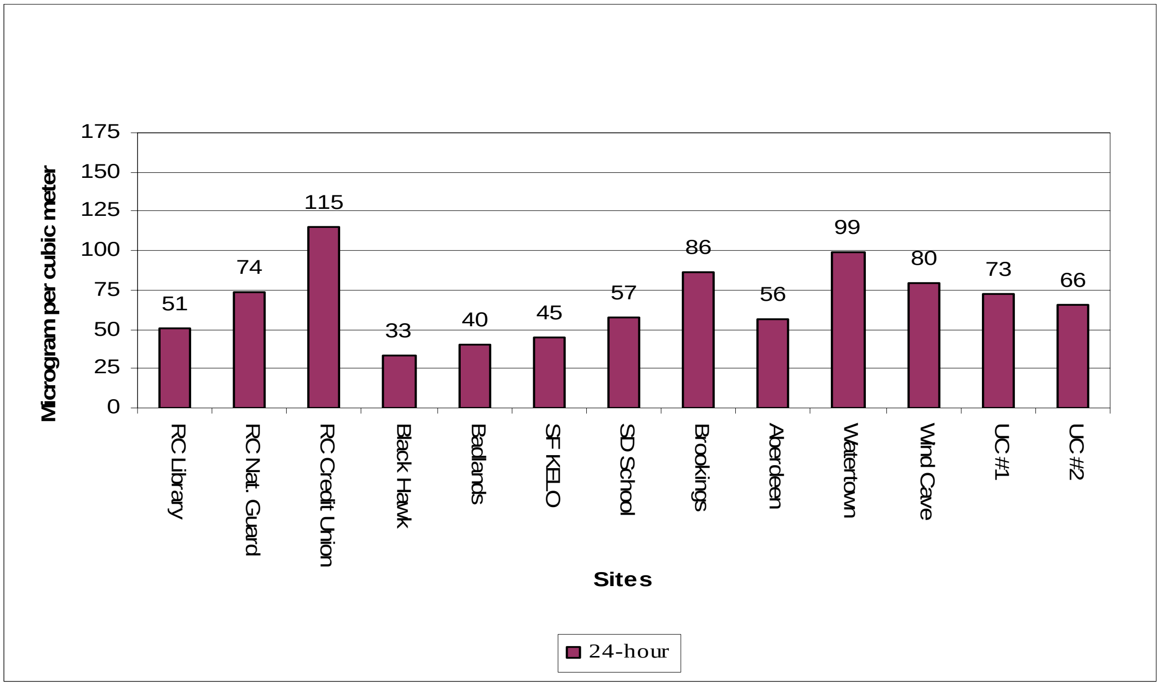
[1] – Site with less than three years of air monitoring data. The department is unable to compare the results to the PM_{10} 24-hour standard until three years of data is obtained.

Figure 6-1 shows a graph of the design value for each PM_{10} site and is based on the data in Table 6-1. The design value is the calculated average of the yearly 2nd maximum 24-hour average from the most resent consecutive 3-years of data.

Sites with a PM_{10} design value 80% or greater than the NAAQS have a potential to have a 24-hour sample exceed the PM_{10} standard. RC Credit Union Site has the highest PM_{10} design value in the state at 77% of the standard. The Watertown Site has the next highest design value at 66% of the standard. All the site design values for PM_{10} concentration are all less than 80% of the 24-hour standard as calculated using the data between 2008 and 2010.

The expected exceedance rates for the 24-hour standard are calculated using the last 3-years of data. In 2008, two of the ambient air monitoring sites each had one 24-hour concentration greater than the PM_{10} standard. The first occurred at the Watertown Site with a 24-hour concentration of 156 ug/m^3. Construction dirt was piled near the site and high winds eroded and blew the dirt to the monitor. This issue was addressed by the city of Watertown and no 24-hour concentrations greater than the PM_{10} standard have been recorded since or are expected from this site.

Figure 6-1 – 2010 PM_{10} Design Values Statewide [1]



[1] – UC #1 and #2 have less than three years of air monitoring data. The department is unable to compare the results to the PM_{10} 24-hour standard until three years of data is obtained.

The second occurrence of a 24-hour concentration greater than the PM_{10} standard in 2008 was recorded at the Brookings Site. New water, storm water, wastewater pipelines, and other utilities were being installed for several city blocks near the monitoring site. High winds caused the dirt to suspend and the 24-hour average concentration was 203 ug/m^3. This is only the second time a 24-hour concentration collected at the Brookings Site was greater than the PM_{10} standard since the site was set up in 1989.

Both sample concentration days in 2008 were affected by exceptional events and were entered into EPA's database with a state flag. Both the Watertown and Brookings sites currently have calculated expected exceedance rates greater than zero. If no exceedances occur in 2011 at either site both will have an expected exceedance rate of zero.

In 2009, only one site recorded a concentration greater than the PM_{10} standard. The Wind Cave Site had a concentration of 337 ug/m^3. This high concentration was caused by a federal national park prescribed fire and was flagged in EPA's database as an exceptional event.

During 2010, none of the sites had concentrations that exceeded the 24-hour PM_{10} standard.

Currently, all the sites in South Dakota are attaining the PM_{10} 24-hour standard. Concurrence from EPA will not be requested on the state's exceptional event flags unless the sampling days will have an impact on the attainment status of the monitoring site.

6.2 Particulate Matter ($PM_{2.5}$)

The $PM_{2.5}$ NAAQS consists of a 24-hour and annual standard. The 24-hour standard is 35 ug/m^3. Attainment of the 24-hour standard is achieved when the maximum 24-hour average concentration, based on the annual 98th percentile averaged over three years (24-hour average design value), is less than or equal to 35 ug/m^3. The $PM_{2.5}$ annual standard is 15 ug/m^3. Attainment is demonstrated when the maximum annual arithmetic mean averaged over three consecutive years (annual design value) is equal to or less than 15 ug/m^3.

Spatial averaging of more than one site's annual average is an option when having multiple sites within an area with similar topography and meteorological conditions. The department elected not to do spatial averaging in any of the sampling areas in South Dakota to determine compliance with the annual $PM_{2.5}$ standard.

In 2010, there were eleven $PM_{2.5}$ SLAMS sites operated in the state. Federal Reference Method manual monitors were operated at five of the $PM_{2.5}$ sites. Met One BAM continuous $PM_{2.5}$ monitors with Federal Equivalent Method designation were operated at six of the sites. Four sites: 1) Wind Cave; 2) UC #2; 3) SD School; and 4) RC Credit Union all had both methods. The remaining two sites at Badlands and UC #1 sites have only the Met One BAM continuous $PM_{2.5}$ monitor

6.2.1 $PM_{2.5}$ 24-Hour Standard

Table 6-2 shows the yearly 24-hour 98th percentile for calendar years 2008 to 2010 used in the calculation of the 24-hour design value for $PM_{2.5}$ in 2010, the 24-hour design value, and designation status of each site. In 2010, the highest 24-hour 98th percentile concentration was 29.2 ug/m^3 or 83% of the standard was recorded at the UC #2 Site in Union County on a continuous Met One BAM $PM_{2.5}$ monitor. The site with the second highest 24-hour 98th percentile concentration was at the SD School Site in Sioux Falls at 27.9 ug/m^3 also collected on the Met One BAM $PM_{2.5}$ monitor.

Table *6-2* – Statewide $PM_{2.5}$ 24-Hour Concentrations

Site	Yearly 98th Percentile	2010 24-hour Design Value	Attainment Status
RC Library	2008 – 15.2 ug/m^3 2009 – 13.1 ug/m^3 2010 – 20.7 ug/m^3	16.3 ug/m^3	Yes
RC Credit Union	2008 – 18.7 ug/m^3 2009 – 14.3 ug/m^3 2010 – 14.0 ug/m^3	16.8 ug/m^3	Yes
Badlands	2008 – 12.8 ug/m^3 2009 – 10.4 ug/m^3 2010 – 13.6 ug/m^3	12.3 ug/m^3	Yes
SD KELO	2008 – 26.0 ug/m^3 2009 – 22.2 ug/m^3 2010 – 27.8 ug/m^3	25.3 ug/m^3	Yes

Site	Yearly 98th Percentile	2010 24-hour Design Value	Attainment Status
SD School	2008 – 20.2 ug/m^3 2009 – 21.9 ug/m^3 2010 – 27.9 ug/m^3	21.1 ug/m^3	Yes
Brookings	2008 – 18.9 ug/m^3 2009 – 25.7 ug/m^3 2010 – 25.7 ug/m^3	23.4 ug/m^3	Yes
Fire Station #1	2008 – 16.3 ug/m^3 2009 – 23.0 ug/m^3 2010 – 26.2 ug/m^3	21.8 ug/m^3	Yes
Watertown	2008 – 28.4 ug/m^3 2009 – 23.1 ug/m^3 2010 – 23.9 ug/m^3	25.1 ug/m^3	Yes
Wind Cave	2008 – 10.8 ug/m^3 2009 – 9.6 ug/m^3 2010 – 12.4 ug/m^3	10.9 ug/m^3	Yes
UC #1	2008 2009 – 21.3 ug/m^3 2010 – 27.8 ug/m^3	24.6 ug/m^3	[1]
UC # 2	2008 2009 – 23.3 ug/m^3 2010 – 29.2 ug/m^3	25.1 ug/m^3	[1]

[1] – Site with less than three years of air monitoring data. The department is unable to compare the results to the $PM_{2.5}$ 24-hour standard until three years of data is obtained.

When using the 98th percentile, one or two 24-hour $PM_{2.5}$ concentrations greater than the standard at a continuous monitoring site will not affect the 24-hour design value or the area attainment status because the 98th percentile may be the 7th or 8th highest reading for the year. But these concentrations may affect the annual design value and need to be considered when evaluating the data results for each year. A conception theory on what caused the high concentrations can be formed and further developed in future years. In some cases if local sources are causing the problem early actions can be taken to reduce concentration levels and further protect public health from high levels of $PM_{2.5}$.

During 2010, two events recorded 24-hour $PM_{2.5}$ concentrations greater than 35 ug/m^{3}at different monitoring sites. The first event occurred from October 20 to October 23 when a federal prescribed fire burned the area near the Wind Cave Site. This is the second time in two years that a prescribed fire caused high $PM_{2.5}$ concentrations. Concentrations during the first day of the event were 115.0 ug/m^3 on the continuous monitor and 111.8 ug/m^3 on the manual monitor. On the second day of the fire, the $PM_{2.5}$ concentration was 54.5 ug/m^3 on the continuous monitor. On the following days concentrations were below the standard and continued to move lower until the fire burned out. Both days over the standard were flagged as exceptional events due to a federal prescribed fire.

The department will request EPA's concurrence flag for these days if they will have a significant impact on the attainment status of this site. This event is not expected to re-occur because the departement will be working with the federal land managers on a Smoke Management Plan as part of the Regional Haze Program to minimize the impacts of federal prescribed fires in South Dakota.

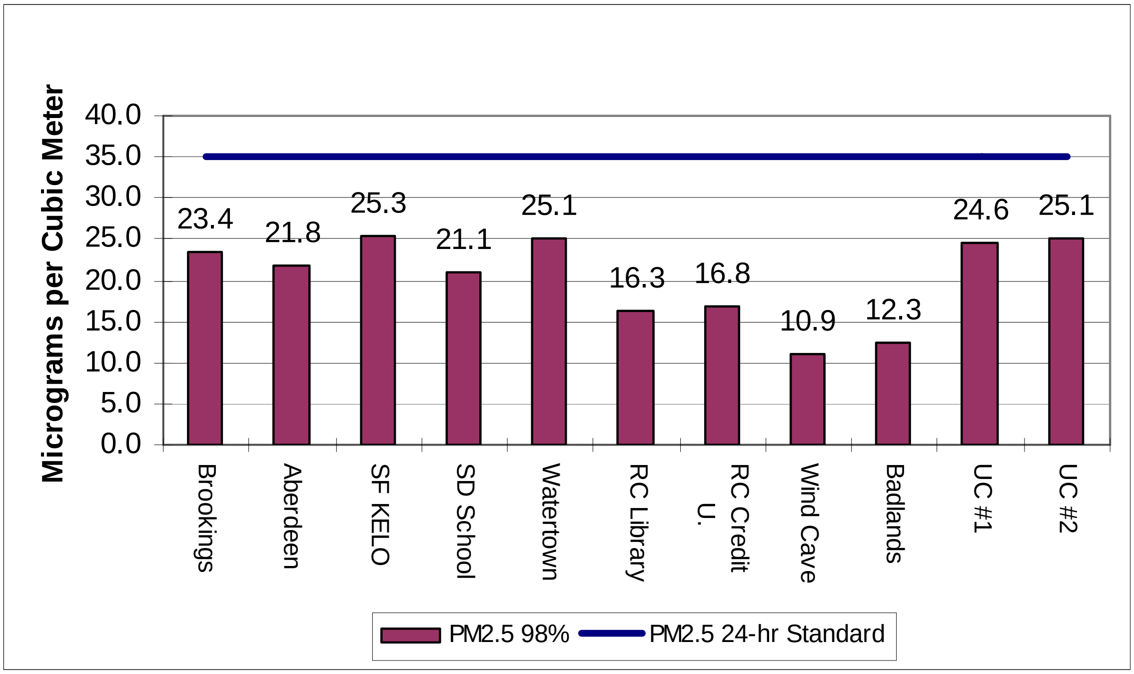
The second event with $PM_{2.5}$ concentrations greater than the standard in 2010, occurred from February 5 and 6 on the eastern edge of the state. An alert notice was issued by Minnesota and Iowa because meteorological conditions were expected to increase pollution levels and transport $PM_{2.5}$ air pollution into the region. The Minnesota alert notice indicated the high concentration levels were an artifact from long range transport of $PM_{2.5}$ air pollution to the east and southeast. The weather during this period of time included light winds and fog with snow on the ground which further reduces the dispersion of $PM_{2.5}$ pollutants and allowed local sources to add to the concentration levels during the event.

On February 5 all three continuous $PM_{2.5}$ monitor sites on the southeastern corner of the state had concentrations over the standard. UC #1 had the highest concentration at 46.1 ug/m^3 followed close by SD School and UC #2 in the low 40 ug/m^3. On February 6 only UC #1 had a concentration just slightly over the standard at 36.2 ug/m^3. SD School and UC #2 had concentrations just under the standard. The other sites in the eastern half of the state are on an every third day schedule and did not have samples for these days.

In 2009, there was a similar event in eastern South Dakota which affected all six sites. The conception theory on what caused the high concentrations is long range transport of $PM_{2.5}$ pollution from high population centers east and southeast of Minnesota and Iowa with increases in levels because of meteorological conditions that do not allow dispersion of the pollutants.

Figure 6-2 contains a graph of the 24-hour design values for each site. The highest design value was recorded at the SF KELO Site in Sioux Falls with a concentration of 25.3 ug/m^3 or 72% of the standard. The Watertown and UC #2 sites followed closely with a concentration of 25.1 ug/m^3 with only 0.2 ug/m^3 separating the two sites from the SF KELO Site. As expected, the background locations at the Badlands and Wind Cave sites had the lowest 24-hour design values for $PM_{2.5}$ concentrations at 12.3 ug/m^3 and 10.9 ug/m^3, respectively. All sites are attaining the 24-hour $PM_{2.5}$ standard.

Figure 6-2 – 2010 $PM_{2.5}$ Statewide 24-Hour design values [1]



[1] – UC #1 and #2 have less than three years of air monitoring data. The department is unable to compare the results to the $PM_{2.5}$ 24-hour standard until three years of data is obtained.

6.2.2 $PM_{2.5}$ Annual Standard

Table 6-3 contains a list of the annual design values for each of the $PM_{2.5}$ sites using the data from 2008 to 2010 in the state. The highest annual concentration in 2010 was recorded at the SD School Site at 9.7 ug/m^3. The second highest sites were UC #1 and UC #2 sites both in Union County at 9.6 ug/m^3. The Badlands Site had the lowest annual average at 3.9 ug/m^3 in 2010, slightly less than in 2009.

Table 6-3 – Statewide $PM_{2.5}$ Annual Concentrations

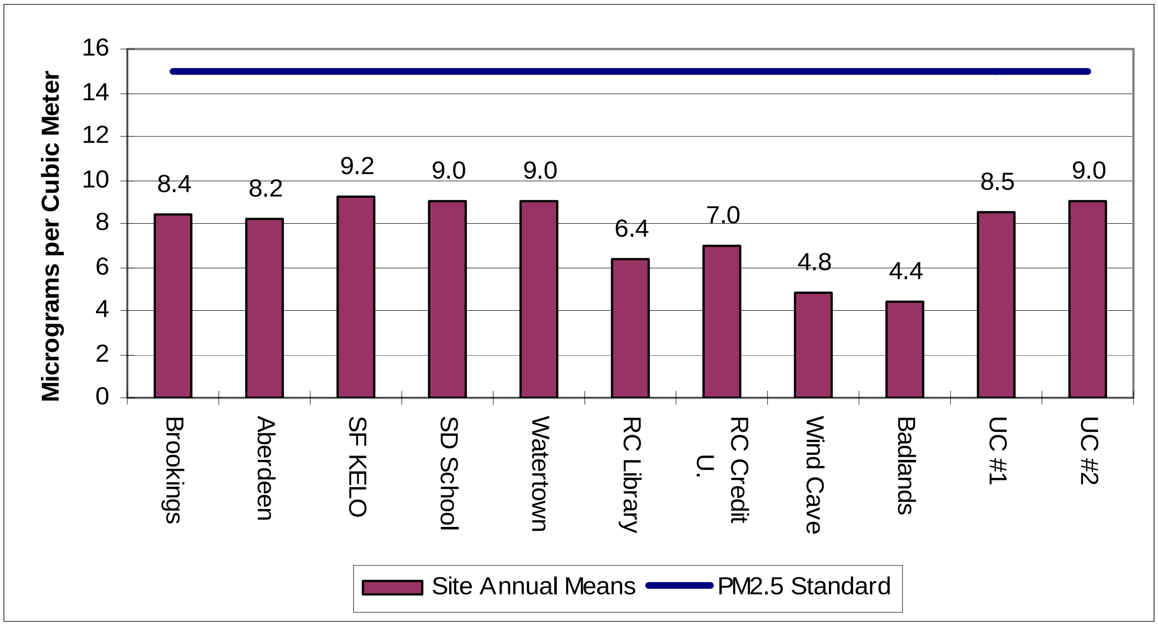
Site	Annual Averages	2010 Annual Design Values	Attainment Status
RC Library	2008 – 6.7 ug/m^3 2009 – 5.9 ug/m^3 2010 – 6.6 ug/m^3	6.4 ug/m^3	Yes
RC Credit Union	2008 – 7.7 ug/m^3 2009 – 6.7 ug/m^3 2010 – 6.6 ug/m^3	7.0 ug/m^3	Yes
Badlands	2008 – 5.2 ug/m^3 2009 – 4.0 ug/m^3 2010 – 3.9 ug/m^3	4.4 ug/m^3	Yes
SF KELO	2008 – 9.4 ug/m^3 2009 – 9.1 ug/m^3 2010 – 9.2 ug/m^3	9.2 ug/m^3	Yes
SD School	2008 – 9.0 ug/m^3		

Site	Annual Averages	2010 Annual Design Values	Attainment Status
	2009 – 9.0 ug/m^3 2010 – 9.7 ug/m^3	9.0 ug/m^3	Yes
Brookings	2008 – 8.0 ug/m^3 2009 – 8.6 ug/m^3 2010 – 8.6 ug/m^3	8.4 ug/m^3	Yes
Aberdeen	2008 – 7.7 ug/m^3 2009 – 8.1 ug/m^3 2010 – 8.7 ug/m^3	8.2 ug/m^3	Yes
Watertown	2008 – 9.7 ug/m^3 2009 – 8.5 ug/m^3 2010 – 8.9 ug/m^3	9.0 ug/m^3	Yes
Wind Cave	2008 – 4.9 ug/m^3 2009 – 4.7 ug/m^3 2010 – 4.7 ug/m^3	4.8 ug/m^3	Yes
UC #1	2008 2009 – 7.4 ug/m^3 2010 – 9.6 ug/m^3	8.5 ug/m^3	[1]
UC #2	2008 2009 – 8.4 ug/m^3 2010 – 9.6 ug/m^3	9.0 ug/m^3	[1]

[1] – Site with less than three years of air monitoring data. The department is unable to compare the results to the $PM_{2.5}$ annual standard until three years of data is obtained.

Figure 6-3 contains a graph of the $PM_{2.5}$ annual concentrations for each site in the state. None of sites in the network had a 2010 design value that exceeded the annual $PM_{2.5}$ standard. The 2010 annual design value concentration for each site followed about the same pattern as the 24-hour levels. The highest annual concentrations were collected in the eastern third of the state. The highest annual design value concentration was recorded at the SF KELO Site with a level of 9.2 ug/m^3 which is 61% of the annual standard. The lowest $PM_{2.5}$ annual design value was recorded at the Badlands Site with a concentration of 4.4 ug/m^3.

Figure 6-3 – 2010 $PM_{2.5}$ Statewide Annual Design Values [1]



[1] – UC #1 and #2 have less than three years of air monitoring data. The department is unable to compare the results to the $PM_{2.5}$ annual design value until three years of data is obtained.

6.3 Lead

During the early 1980's, the department conducted lead sampling. The levels detected were well below the NAAQS levels at that time. After passage of the 1990 Clean Air Act Amendments, there were concerns with the way EPA had instructed states in determining if those areas were in attainment of the lead standard. For this reason, a monitoring site was established in April 1992, at the Jaehn's Site in Rapid City to determine compliance with the standard. This site was downwind of GCC Dacotah, which is a cement plant that burns coal and has the potential to emit lead. The results of the analyzed data from the second quarter of 1992 through the first quarter of 1994 showed lead levels well below the NAAQS. Due to the low concentrations of lead in Rapid City, the sampling site was terminated at the end of the first quarter in 1994.

EPA changed the lead NAAQS on October 15, 2008. The change significantly lowers the lead standard from 1.5 ug/m^3 to 0.15 ug/m^3 based on the annual maximum three month rolling average. Attainment of the lead NAAQS is achieved if the annual maximum three month rolling average, averaged over a three year period, is less than or equal to 0.15 ug/m^3.

In 2010, EPA completed a rule change that requires source type testing in addition to network testing if a source has emissions of 0.5 tons or greater per year. The rule originally required lead testing at the NCore Site. The final rule required lead testing at NCore Site only if the site is located in city with a 500,000 and greater population. None of the facilities in the South Dakota emissions inventory have lead emissions at or greater than 0.5 tons per year so no source related testing is required at this time. The NCore site is located in Sioux Falls and the city has a population under 500,000 so no testing is required. Currently, there are no lead sampling sites planned for South Dakota because of the low potential for concentrations of lead pollution.

The lead sampling in the past indicates that South Dakota is attaining the new lead standard.

6.4 Ozone

In 1999, the first ozone monitor was setup in South Dakota and was located at the Sioux Falls Hilltop Site. In 2000, a second ozone monitor was added at the Robbinsdale Site in Rapid City. In 2005, the Rapid City ozone monitor was moved to the RC Credit Union Site because of the planned move of the Robbinsdale sampling shelter to the Wind Cave Site. Also in 2003, the National Parks Service added an ozone monitor to the Badlands Site. It is located in a shelter next to the IMPROVE monitors near the park visitor center/headquarters. In 2005, a fourth ozone site was added at the Wind Cave Site. The Wind Cave Site was added to determine if a large increase in oil and gas mining in Colorado, Wyoming and Montana would cause impacts on the Wind Cave National Park, which is a Class 1 area.

Air dispersion modeling results completed by the department showed that the RC Credit Union Site does not meet location requirements in 40 CFR Part 58 because it is located in the middle of the one microgram impact area for nitrogen dioxide from industrial sources in Rapid City. For this reason the ozone analyzer was moved from the RC Credit Union Site to the Black Hawk Site in 2007.

Beginning in 2008, the Hilltop Site had to be moved and a new location was found at the School for the Deaf campus. The move to a new location was required because the city of Sioux Falls had to revert the Hilltop property back to the original owner when the water tower system was replaced ending the agreement to use the property. Also in 2008, a site was added north of Brookings at the Research Farm.

In 2008, EPA adopted a new ozone standard at 0.075 parts per million. The form of the standard remained as the fourth highest, daily 8-hour average, averaged over three years (ozone design value). In 2009, the EPA administration stopped the implementation of the standard and decided to complete another review of the ozone standard. EPA proposed a different revised standard and has indicated it will make a final decision on the standard in 2011. The 2010 design value concentration in parts per million for each of the sites can be seen in Table 6-4 and Figure 6-4.

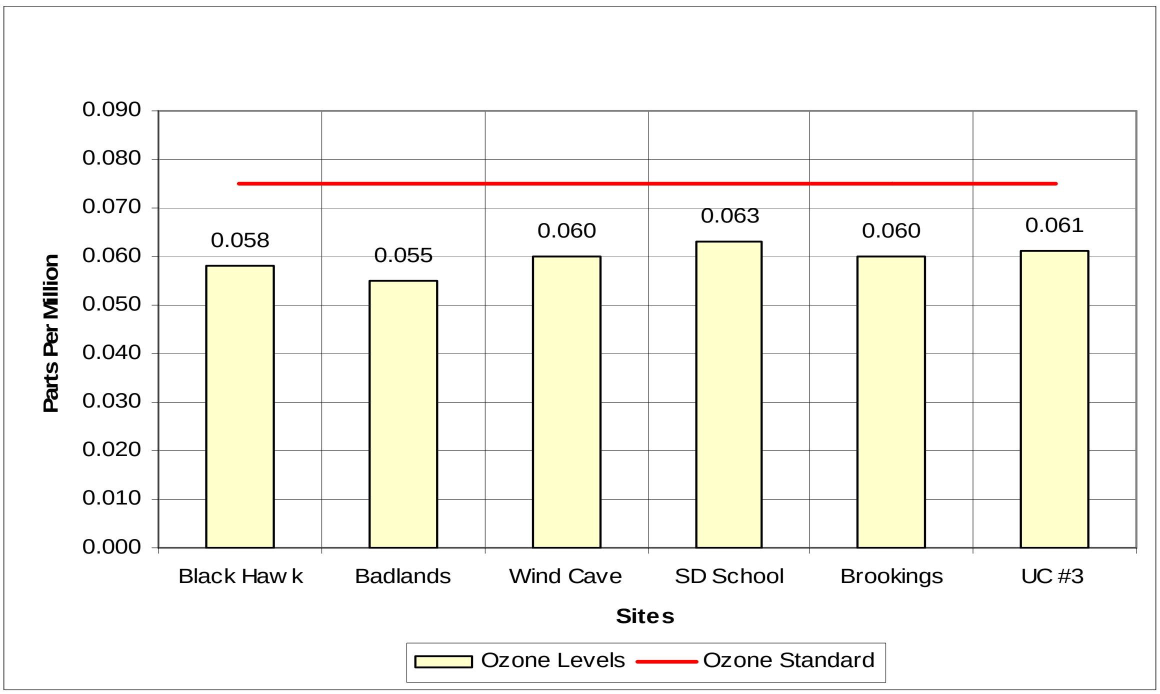
Table 6-4 – Statewide Ozone 4th highest Concentrations

Site	4th Highest Concentration	3-year Average	Attainment Status
SD School	2008 – 0.061 ppm 2009 – 0.062 ppm 2010 – 0.064 ppm	0.063 ppm	Yes
Research Farm	2008 – 0.059 ppm 2009 – 0.057 ppm 2010 – 0.064 ppm	0.060 ppm	Yes
Black Hawk	2008 – 0.060 ppm 2009 – 0.057 ppm 2010 – 0.057 ppm	0.058 ppm	Yes

Site	4th Highest Concentration	3-year Average	Attainment Status
Badlands	2008 – 0.053 ppm 2009 – 0.054 ppm 2010 – 0.058 ppm	0.055 ppm	Yes
Wind Cave	2008 – 0.059 ppm 2009 – 0.061 ppm 2010 – 0.059 ppm	0.060 ppm	Yes
UC #3	2008 2009 – 0.060 ppm 2010 – 0.062 ppm	0.061 ppm	[1]

[1] – Site with less than three years of air monitoring data. The department is unable to compare the results to the $PM_{2.5}$ annual standard until three years of data is obtained.

Figure 6-4 – 2010 Ozone Design Values Statewide [1]



[1] – Site with less than three years of air monitoring data. DENR is unable to compare the results to the ozone standard until three years of data is obtained.

In 2010, the SD School Site had the highest 3-year average ozone concentrations in the state at 0.063 ppm, which is 84% of the 2008 revised ozone standard. The SD School Site replaced the Wind Cave Site as the state's highest concentration site for the first time since testing began at the Wind Cave Site in 2005. The second highest location is UC #3 Site at 0.061 ppm. Since 2008, both the Wind Cave and Badlands sites are reporting significantly lower ozone design value concentrations.

Currently all ozone sites are less than 85% of the standard at the end of 2010. The data collected in the past three years demonstrates that South Dakota is attaining the national ozone standard. Ozone concentrations are near the same concentration level statewide. Because EPA plans to lower the ozone standard this parameter may need more sampling locations to determine the state's compliance with the standard in future years.

6.5 Sulfur Dioxide

Five sulfur dioxide ambient air monitoring sites were operated in 2010. The analyzers were located at SD School, Badlands, Wind Cave, UC #1, and UC #2 sites. EPA made a major change to the sulfur dioxide standard in 2009 replacing the 24-hour and annual primary standard with a new 1-hour standard. The 1-hour sulfur dioxide standard concentration is 75 parts per billion (ppb) based on the three year average of the yearly 99th percentile level (1-hour design value). The 3-hour secondary standard for sulfur dioxide was maintained without change.

6.5.1 Sulfur Dioxide 1-Hour Standard

Table 6-5 contains the yearly 99th percentile concentration, the 1-hour design value, and the attainment status for each site. The site sulfur dioxide design value concentrations are based on sulfur dioxide data collected in 2008 to 2010. The highest 99th percentile 1-hour level in 2010 was recorded at the UC #1 Site at 11.5 ppb. The Badlands Site had the second highest 1-hour concentration at 9.0 ppb. The SD School Site had a significant decrease in sulfur dioxide concentrations over the last three years moving from 27 to 5 ppb. One possible cause for lower concentrations at SD School Site could be the reduction in sulfur levels in vehicle fuels.

Table 6-5 – 2010 Statewide Sulfur Dioxide 1-hour Design Values

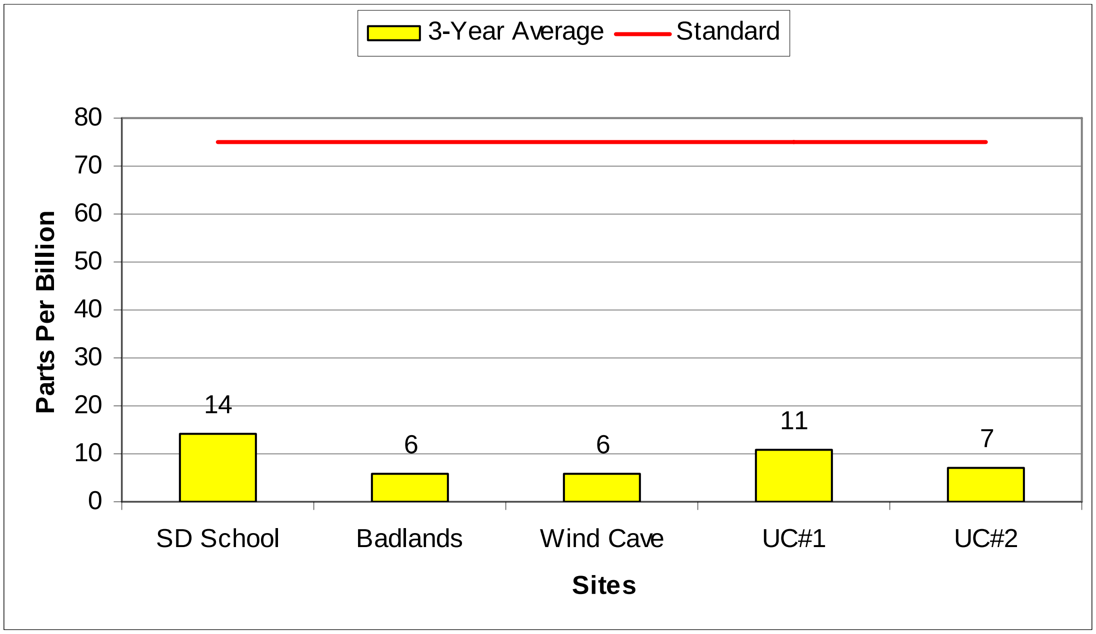
Site	99th Percentile Concentration	3-year Average	Attainment Status
SD School	2008 – 27.0 ppb 2009 – 10.0 ppb 2010 – 5.0 ppb	14 ppb	Yes
Wind Cave	2008 – 3.0 ppb 2009 – 10.0 ppb 2010 – 5.0 ppb	6 ppb	Yes
Badlands	2008 – 5.0 ppb 2009 – 5.0 ppb 2010 – 9.0 ppb	6 ppb	Yes
UC #1	2008 2009 – 9.6 ppb 2010 – 11.5 ppb	11 ppb	[1]
UC #2	2008 2009 – 6.0 ppb 2010 – 8.6 ppb	7 ppb	[1]

[1] – Site with less than three years of air monitoring data. The department is unable to compare the results to the sulfur dioxide 1-hour standard until three years of data is obtained.

Figure 6-5 shows the three year average of the yearly 99th percentile 1-hour concentration for each of the sites in the network for 2010. All five of the sites recorded concentrations well under the 1-hour standard. The highest 1-hour design value concentration was recorded at the SD

School Site with a maximum concentration of 14 ppb which is 19% of the standard. The second highest was recorded at the UC #1 Site with a concentration of 11 ppb which is 15% of the standard.

Figure 6-5 – 2010 Sulfur Dioxide 1-Hour Concentrations [1]



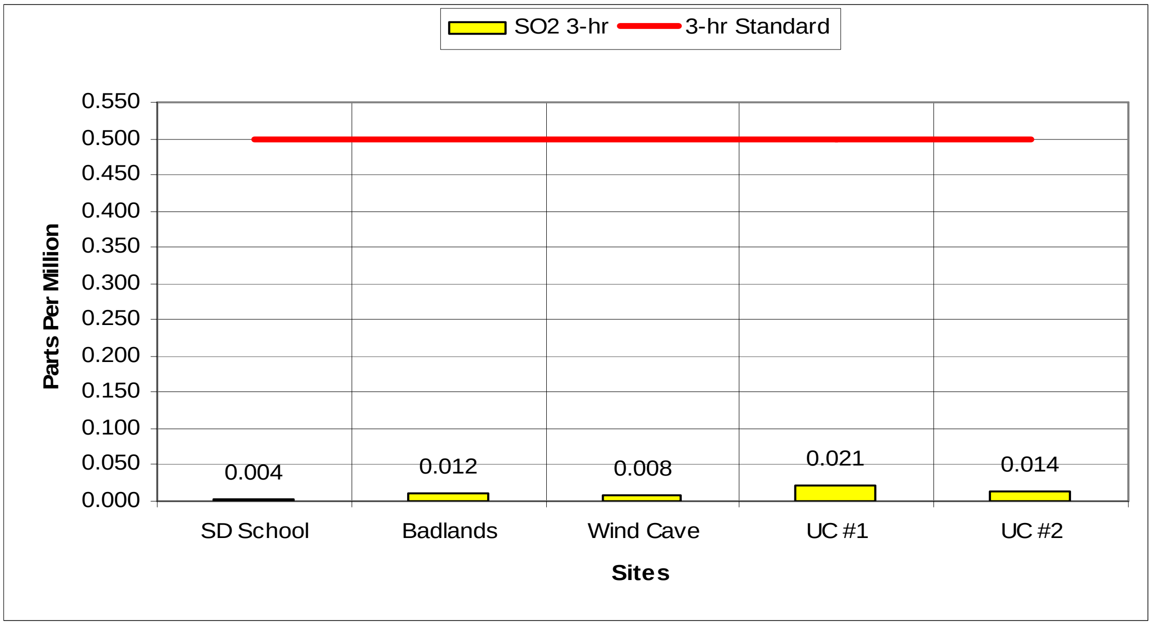
[1] – UC #1 and #2 have less than three years of air monitoring data. DENR is unable to compare the results to the 1-hour sulfur dioxide standard until three years of data is obtained.

The data collected in the past three years demonstrates that South Dakota is attaining the new 1-hour sulfur dioxide standard.

6.5.2 Sulfur Dioxide 3-Hour Secondary Standard

The secondary sulfur dioxide standard is based on a 3-hour average concentration of 0.500 ppm, not to be exceeded more than once per year. The graph in Figure 6-6 shows the second maximum 3-hour concentrations for all five sites in the network in 2010. The 3-hour sulfur dioxide concentrations for all of the sites are very low. The UC #1 Site recorded the highest 3-hour average in 2010 with a concentration of 0.021 ppm at 4% of the 3-hour standard. UC #2 had the second highest 3-hour concentration at 0.014 ppm at 3% of the standard.

Figure 6-6 – 2010 Sulfur Dioxide 3-hour Concentrations [1]



[1] – UC #1 and #2 have less than three years of air monitoring data. DENR is unable to compare the results to the 3-hour secondary standard for sulfur dioxide until three years of data is obtained.

The data collected in the past three years demonstrates that South Dakota is attaining the 3-hour secondary standard for sulfur dioxide.

6.6 Nitrogen Dioxide

Beginning in 2010 the standard for nitrogen dioxide was revised by adding a 1-hour standard of 100 ppb and keeping the annual arithmetic mean standard of 53 ppb. Attainment is demonstrated when the 3-year average of 98^{th} percentile daily maximum 1-hour concentration is less than or equal to 100 ppb (1-hour design value) and the annual arithmetic mean is less than or equal to 53 ppb (annual design value).

There were five nitrogen dioxide ambient air monitoring sites operated in 2010. The locations were at the SD School, Badlands, Wind Cave, UC #1, and UC #2 sites.

6.6.1 Nitrogen Dioxide 1-Hour Standard

Table 6-6 contains the 1-hour 98^{th} percentile concentration for each of the last three years, 1-hour design value concentrations, and the attainment status for each site. The SD School Site had the highest yearly 98^{th} percentile 1-hour concentration at 48 ppb in 2010. The second highest 1-hour was recorded at the UC #1 Site at 22 ppb.

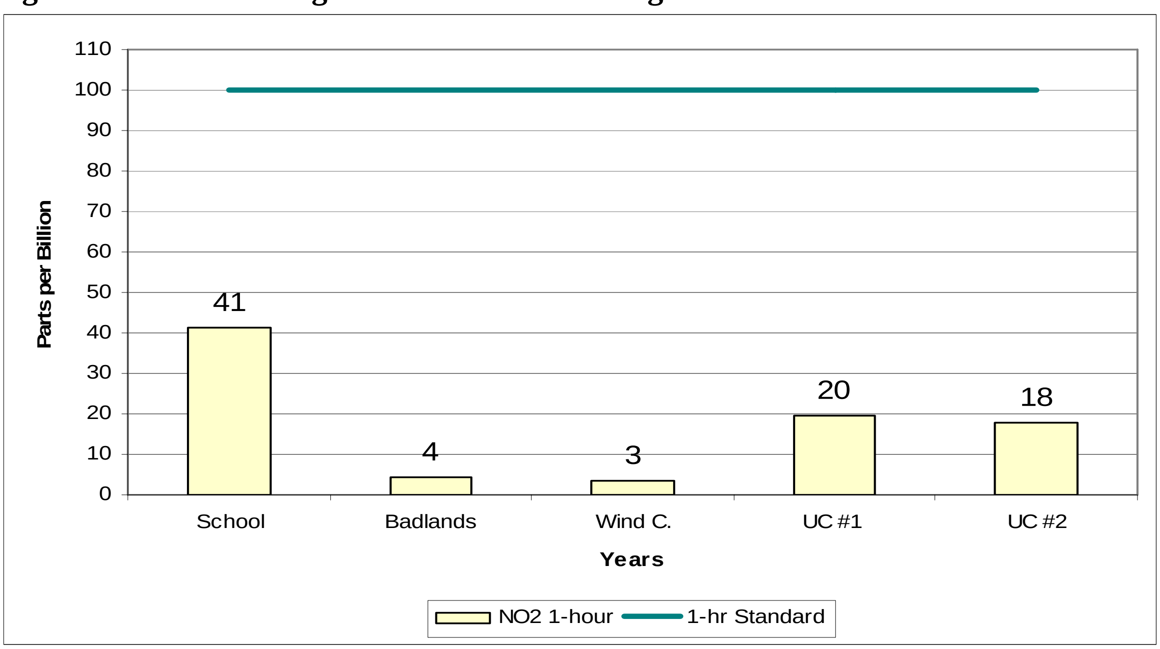
Table 6-6 – Nitrogen Dioxide 1-hour 98th Percentile Concentrations

Site	98th Percentile Concentration	3-year Average	Attainment Status
SD School	2008 – 38 ppb 2009 – 38 ppb 2010 – 48 ppb	41 ppb	Yes
Badlands	2008 – 4 ppb 2009 – 4 ppb 2010 – 5 ppb	4 ppb	Yes
Wind Cave	2008 – 3 ppb 2009 – 3 ppb 2010 – 4 ppb	3 ppb	Yes
UC #1	2008 2009 – 17 ppb 2010 – 22 ppb	20 ppb	[1]
UC #2	2008 2009 – 16 ppb 2010 – 20 ppb	18 ppb	[1]

[1] – Site with less than three years of air monitoring data. The department is unable to compare the results to the nitrogen dioxide 1-hour standard until three years of data is obtained.

Figure 6-7 shows the nitrogen dioxide 1-hour design values for each site. The SD School Site recorded the highest 1-hour nitrogen dioxide average of 48 ppb at 48% of the standard. Most of the hourly concentrations collected at the five sites are at the detection level of the analyzers. In general the rural areas have concentrations near the detection level. Rural areas impacted by a large source of nitrogen dioxide emissions like at UC #1 and UC #2 record higher concentrations than background sites but the levels are still well under the standard.

Figure 6-7 – 2010 Nitrogen Dioxide 1-hour Design Values [1]



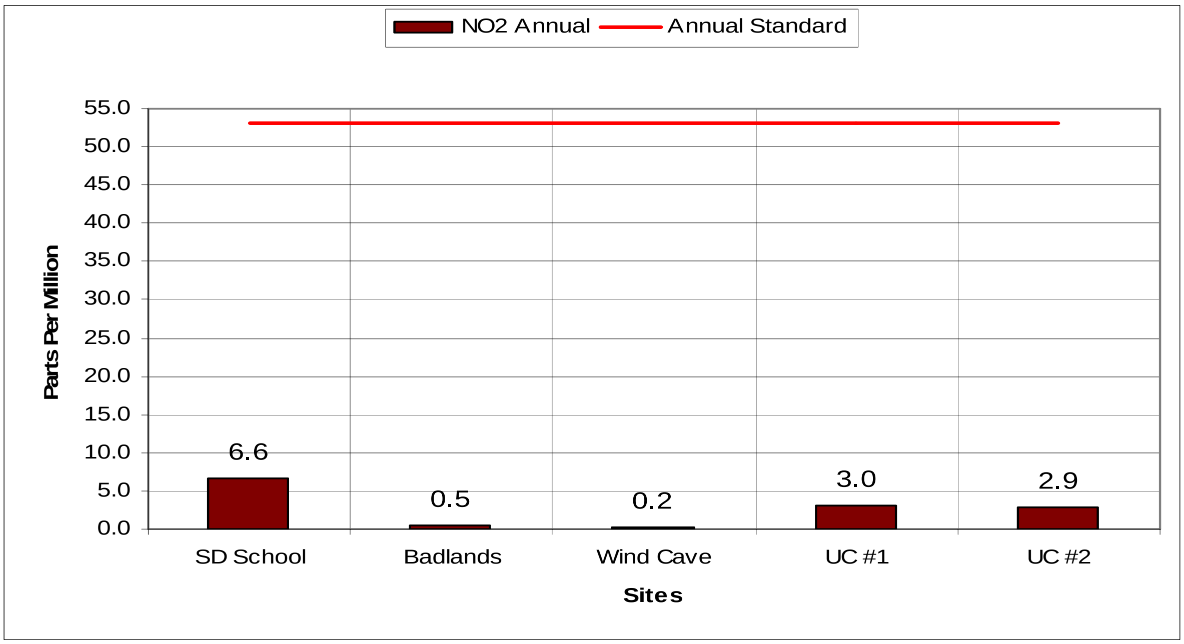
[1] UC #1 and #2 have less than three years of air monitoring data. DENR is unable to compare the results to the 1-hour nitrogen dioxide standard until three years of data is obtained.

All sites had concentrations under the 1-hour nitrogen dioxide standard and are attaining the standard using data from 2008 to 2010.

6.6.2 Nitrogen Dioxide Annual Standard

Figure 6-8 shows the annual average for the five sites operated in 2010. The highest nitrogen dioxide annual average was recorded at the SD School Site at 6.6 ppb at 22% of the standard. The Badlands and Wind Cave sites remained at about same level near the detection concentration level and UC #1 and UC #2 were up slightly from last year.

Figure 6-8 – 2010 Nitrogen Dioxide Annual Concentration



In 2010, all five sites attained the annual standard for nitrogen dioxide.

6.7 Carbon Monoxide

The carbon monoxide standard is based on two primary standards in the form of a one-hour and 8-hour average concentrations. The department began the operation of the first carbon monoxide analyzer in January of 2010 at UC #1 Site in Union County. A second analyzer was added to the SD School Site as required by the National Core sampling requirements and began testing at the start of 2011.

The one-hour standard is 35.0 ppm and is not to be exceeded more than once per year. The highest 1-hour concentration of carbon monoxide recorded at the UC #1 Site was 0.960 ppm in 2010. The other standard is an 8-hour average concentration of 9.0 ppm, not to be exceeded more than once per year. The highest 8-hour average recorded at the UC #1 Site was 0.276 ppm in 2010.

The carbon monoxide concentrations are very low at UC #1 and this area is attaining the NAAQS. The data at UC #1 represents background levels of carbon monoxide collected in a rural area in eastern South Dakota. It is anticipated by DENR that carbon monoxide levels at UC #1 represent one of the higher concentration locations for a rural area given the traffic counts on Interstate 29 near the sampling site. Other rural areas with less traffic emissions could have even lower concentrations.

7.0 AIR MONITORING SITE EVALUATION AND TRENDS

This section will discuss the goals of each air monitoring site in the network and trends for each pollutant. Through this evaluation a determination is made if site goals are being met and if each testing parameter is needed at the site. This section also has site specific information tables including AQS ID #, location, operation, data use, sampling schedule, monitoring objectives, spatial scale, and sampling and analytical methods required as part of the annual plan requirements in 40 CFR Part 58.

7.1 Rapid City Area

The Rapid City area had a total of three monitoring sites collecting data in 2010. The high concentration site for PM_{10} was located at the RC Credit Union Site and a continuous PM_{10} monitor was used to determine compliance with the NAAQS standards. The RC Library and RC National Guard sites have manual Andersen PM_{10} monitors collecting 24-hour data using a filter based gravimetric sampling method.

In cooperation with the City, County, and industry, the department is implementing a Natural Events Action Plan for the Rapid City area. Part of this plan is to alert the public of the potential of high dust levels caused by high winds and to advise the public of precautions to take during the high wind events. Under this plan high wind dust alerts are called when the following forecast conditions occur:

- Hourly wind speeds exceed 20 miles per hour;
- Peak wind gusts are greater than 40 miles per hour; and
- Five consecutive days of 0.02 inches or less of precipitation each day excluding dry snow.

During 2010, a total of seven high wind dust alerts were called for the Rapid City area. None of the days exceeded the PM_{10} 24-hour standard. The highest 24-hour average concentration recorded during an alert was 45.4 ug/m^3. This demonstrates the implementation of the Natural Events Action Plan for the Rapid City area is working to maintain PM_{10} concentrations below the NAAQS during high wind events.

The Rapid City area had a total of two monitoring sites collecting data for $PM_{2.5}$ in 2010. The RC Library and RC Credit Union sites have manual Andersen $PM_{2.5}$ monitors collecting 24-hour data using a filter based gravimetric sampling method. In addition, a continuous Met One BAM $PM_{2.5}$ monitor was operated on the RC Credit Union Site.

In the fall of 2008, a surface water quality problem was found when Rapid Valley began using Rapid Creek for a drinking water source. Testing indicated high levels of chlorides during snow melt events caused the drinking water to smell and the water treatment plant had to stop producing drinking water until chloride levels dropped. Testing indicated liquid deicer used on the streets during snow and ice events was causing the problem. The city of Rapid City began a process of reducing the use of liquid deicer and increasing the use of river sand in the eastern and south eastern parts of Rapid City to help reduce chloride levels in Rapid Creek. DENR is working with Rapid City to determine which streets can be changed from chemical deicer to sand so air quality is not affected.

One dust complaint was received by the Rapid City Area Air Quality Program during the winter of 2010/2011. The complaint indicated general dusty conditions in the southeast part of the city. A follow-up by DENR indicated general dusty conditions in most of Rapid City caused by the drying out of sanding material and dirt track out in early spring. PM_{10} concentration were higher during this period but only one day had a level greater than 100 ug/m^3 and that day was less than the PM_{10} standard.

7.1.1 RC Library Site

The RC Library Site is located on the library building in Rapid City. The site was established in 1972, and it is the oldest sampling site in South Dakota still operating. The site is geographically located in the downtown area of the city east of the hogback and in the Rapid Creek river valley. The site purpose is to evaluate population exposure, fugitive dust controls, the success of the street sanding and sweeping methods employed by the city of Rapid City and general concentration levels in the eastern part of the city. Figure 7-1 shows a picture of the RC Library Site.

Figure 7-1 – RC Library Site

PM_{10} sampling began at the site in 1985. $PM_{2.5}$ monitors were added to the site in 1999. An attainment designation for $PM_{2.5}$ was completed for the Rapid City area in 2004. An attainment designation for PM_{10} was completed and approved by EPA for the Rapid City area in 2006. Table 7-1 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Table 7-1 – RC Library Site Specifics

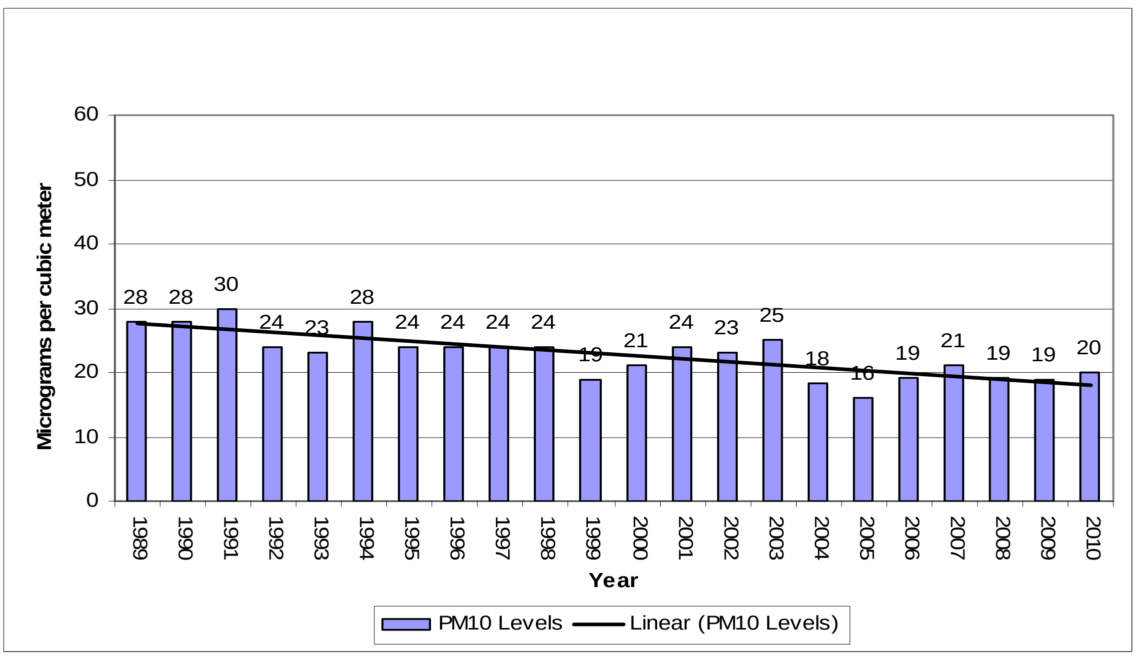
Parameter	Information
Site Name	RC Library
AQS ID Number	46-103-1001
Street Address	6th and Quincy, Rapid City, South Dakota
Geographic Coordinates	UTM Zone 13, NAD 83, E 641,837.99, N 4,882,111.77
MSA	Rapid City
PM_{10}	**(Manual)**
Sampler Type	Federal Reference Method RFPS-1287-063
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS),
$PM_{2.5}$	**(Manual)**

Parameter	Information
Sampler Type	Federal Equivalent Method EQPM-0804-153
Operating Schedule	Every 3rd Day, co-located every 6th day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 $PM_{2.5}$ w/Cyclone
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

7.1.1.1 RC Library PM_{10} Data

Annual average PM_{10} concentrations for the RC Library Site are shown in Figure 7-2. The PM_{10} concentrations show a gradual decline from a high of 30 ug/m^3 in 1991, to a low of 16 ug/m^3 in 2005. The largest reduction in annual concentrations came when changes were implemented by the city on the street sanding and sweeping operations in the early 1990s. In the last five years, annual concentrations have leveled off and are almost steady with a 1 or 2 ug/m^3 change. The plan is to continue the PM_{10} monitoring because this is the only site east of the hogback in Rapid City and the site will provide a check on PM_{10} levels being maintained as the City of Rapid City adjusts its sanding techniques in eastern Rapid City.

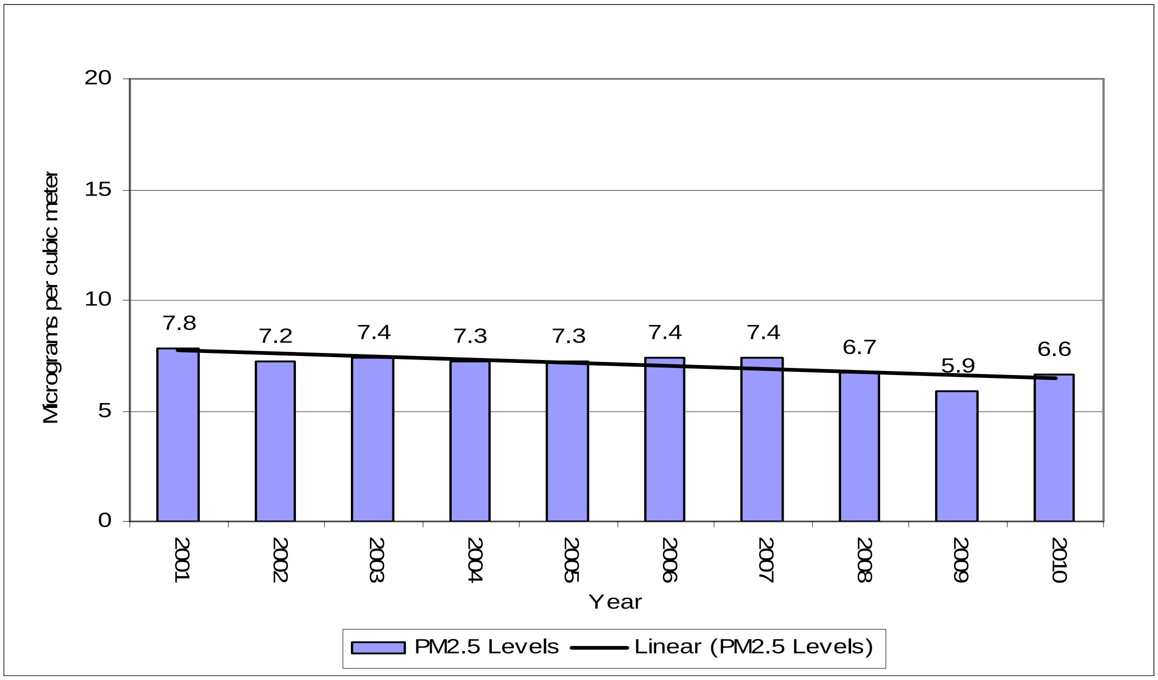
Figure 7-2 – RC Library PM_{10} Annual Averages



7.1.1.2 RC Library $PM_{2.5}$ Data

The graph in Figure 7-3 shows the $PM_{2.5}$ annual average for each sampling year since 2001. The annual average concentrations vary in difference by 1.9 micrograms per cubic from the highest to lowest annual average. The highest was 7.8 ug/m^3 in 2001 and the lowest was 5.9 ug/m^3 recorded in 2009. The trends indicate a slightly declining $PM_{2.5}$ concentration level for the past ten years even though in 2010 there was a slight increase in $PM_{2.5}$ concentrations. Plans are to continue testing for $PM_{2.5}$ at this site.

Figure 7-3 – RC Library $PM_{2.5}$ Annual Averages



7.1.2 RC National Guard Site

The RC National Guard Site is located on the roof of the armory at the Camp Rapid facility in western Rapid City (see Figure 7-4). The site was established at this location in 1992, with PM_{10} the only sampling parameter because a large portion of the particulate matter emissions near this site consists of crustal material. Because the site is located only a few blocks from the high concentration location at the RC Credit Union Site, the site is designated as a SPM site for PM_{10}. The goal of the site is to determine the size of the area being impacted by fugitive dust sources in the quarry area in western Rapid City.

In the spring of 2009 a radiation monitor was added to the site as part of the national ERAMS network of sites. The monitor is a SPM site that provides a warning system to detect levels of radiation from accidental releases or military activities of radiation.

Figure 7-4 – RC National Guard Site

The sampling objectives for the PM_{10} parameter is to measure population exposure and high concentration from source impacts from the quarry area north of the monitoring site. In addition, this monitoring site along with the RC Credit Union Site, define the high PM_{10} concentration area in western Rapid City. Table 7-2 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

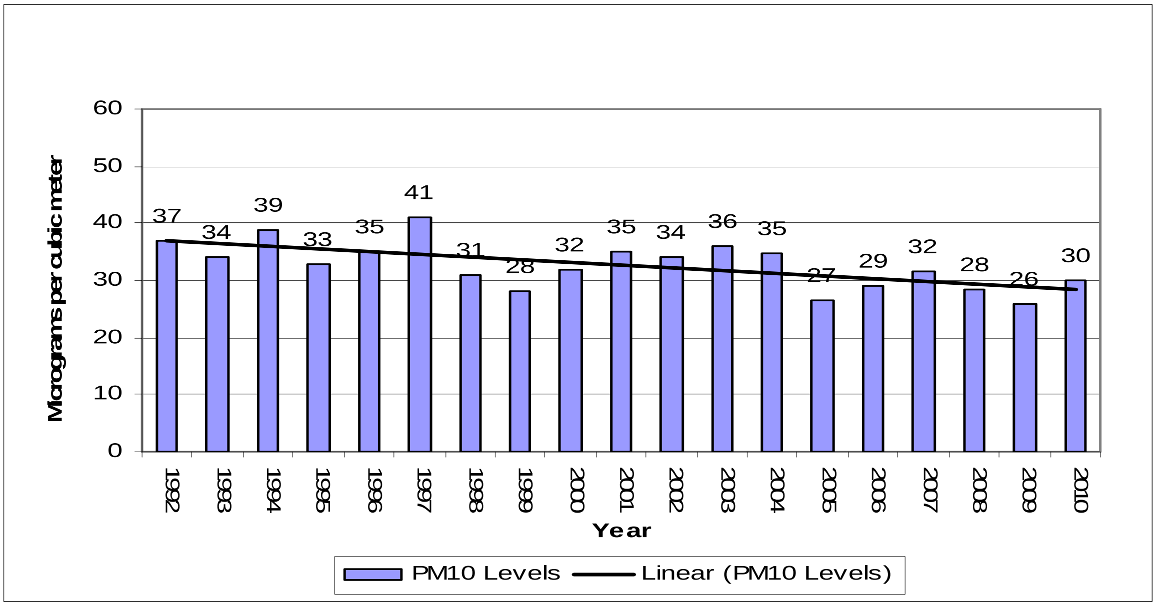
Table 7-2 – RC National Guard Site Specifics

Parameter	Information
Site Name	RC National Guard
AQS ID Number	46-103-0013
Street Address	Camp Rapid Armory West Main Street
Geographic Coordinates	UTM Zone 13, NAD 83, E 638,543.08, N 4,882,373.72
MSA	Rapid City
PM_{10}	(Manual)
Sampler Type	Federal Reference Method RFPS-1287-063
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SPMS (No comparison to the NAAQS),

7.1.2.1 RC National Guard PM_{10} Data

The RC National Guard Site is the second oldest monitoring site in Rapid City and is a special purpose monitoring site sampling for PM_{10}. The graph in Figure 7-5 shows the annual means for the site since 1992. The annual means vary from a high of 41 ug/m^3 in 1997 to a low of 26 ug/m^3 in 2009. The trends for the annual mean concentrations continue to decline; but do cycle up and down from year to year. The annual average concentration in 2009 is the lowest recorded at this site.

Figure 7-5 – RC National Guard PM_{10} Annual Averages



The RC National Guard Site's PM_{10} concentrations continue to be well below the levels recorded at the RC Credit Union Site. The RC Credit Union Site is only four city blocks from the RC National Guard Site. Therefore, the RC National Guard Site PM_{10} testing will continue to be evaluated for closure.

7.1.3 RC Credit Union Site

The RC Credit Union Site is located on a lot next to the new Fire Station #3 building. The RC Credit Union Site replaced the Fire Station #3 Site in October 2003, as the high PM_{10} concentration location for the western part of Rapid City. The RC Credit Union Site is located just south of the quarry area and is centrally located in relation to the quarry facilities. Figure 7-6 contains a picture of the monitoring site looking in a north direction towards the quarry area. The goal of this site is to determine if the Rapid City area is attaining the PM_{10} standard and population exposure.

Figure 7-6 – RC Credit Union Site

Continuous Thermo BETA PM_{10} continuous, $PM_{2.5}$ Met One BAM and $PM_{2.5}$ RAAS 100 manual monitors were operated at this site in 2010. The BETA PM_{10} monitor provides hourly concentrations on an every day sampling schedule. The hourly readings from the continuous PM_{10} monitor are used to assist in the calling of high wind dust alerts for Rapid City and to compare concentrations to the PM_{10} NAAQS.

Manual $PM_{2.5}$ federal reference method monitors are operated at this site on a schedule of every third day to assess the concentrations levels to the $PM_{2.5}$ NAAQS. A continuous Met One BAM $PM_{2.5}$ monitor is used to supply hourly data for investigation of high concentrations recorded on the manual $PM_{2.5}$ monitors. Table 7-3 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Table 7-3 – RC Credit Union Site Specifics

Parameter	Information
Site Name	RC Credit Union
AQS ID Number	46-103-0020
Street Address	106 Kinney Ave.
Geographic Coordinates	UTM Zone 13, NAD 83, E 638,199.75, N 4,882,811.92
MSA	Rapid City
PM_{10}	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-1102-150

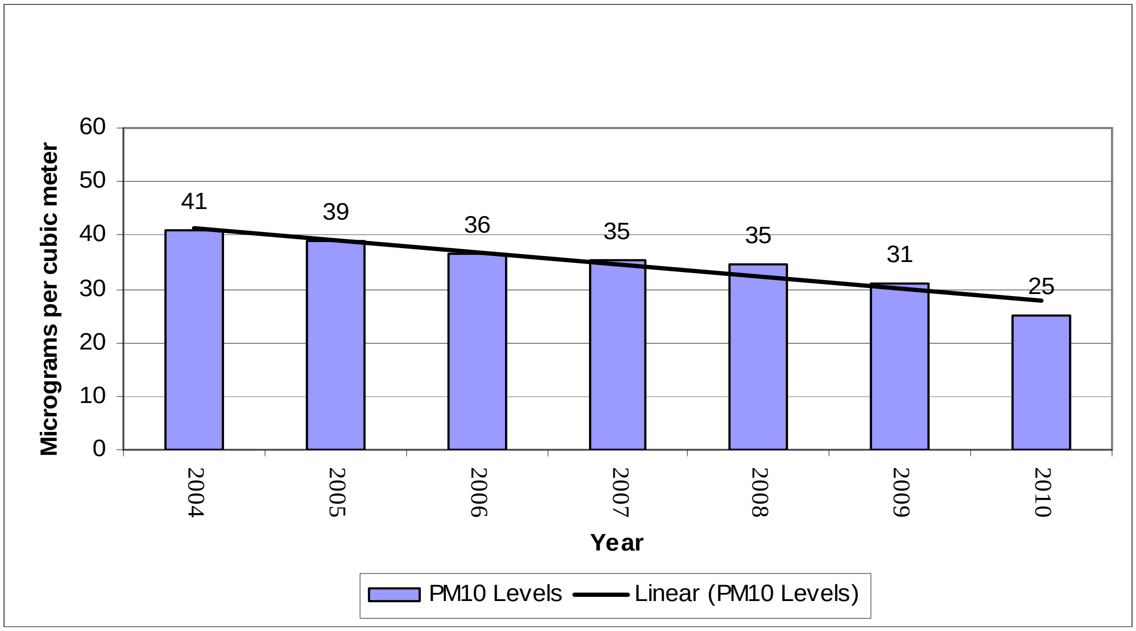
Parameter	Information
Operating Schedule	Every Day/co-located FEM to FRM every 12th day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Methods	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-Time Data
$PM_{2.5}$	**(Manual)**
Sampler Type	Federal Equivalent Method EQPS-0804-153
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 $PM_{2.5}$ w/cyclone
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
$PM_{2.5}$	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-0308-170
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Met One BAM-1020
Analysis Methods	Beta Attenuation
Data Use	Real-time Data and SPM

7.1.3.1 RC Credit Union PM_{10} Data

The RC Credit Union Site began operation in October of 2003. Only three months of data was collected in 2003, so 2004 is the first complete sampling year. Figure 7-7 shows a graph of the annual average PM_{10} concentration.

The PM_{10} annual average concentration show a declining level each year since 2004. In 2010, average concentration levels decrease to the lowest level recorded at this site since 2004. Over the six year period, annual concentrations changed significantly by 16.0 ug/m^3. Testing for PM_{10} concentrations is a priority for this site and the parameter will be continued.

Figure 7-7 – RC Credit Union PM_{10} Annual Averages



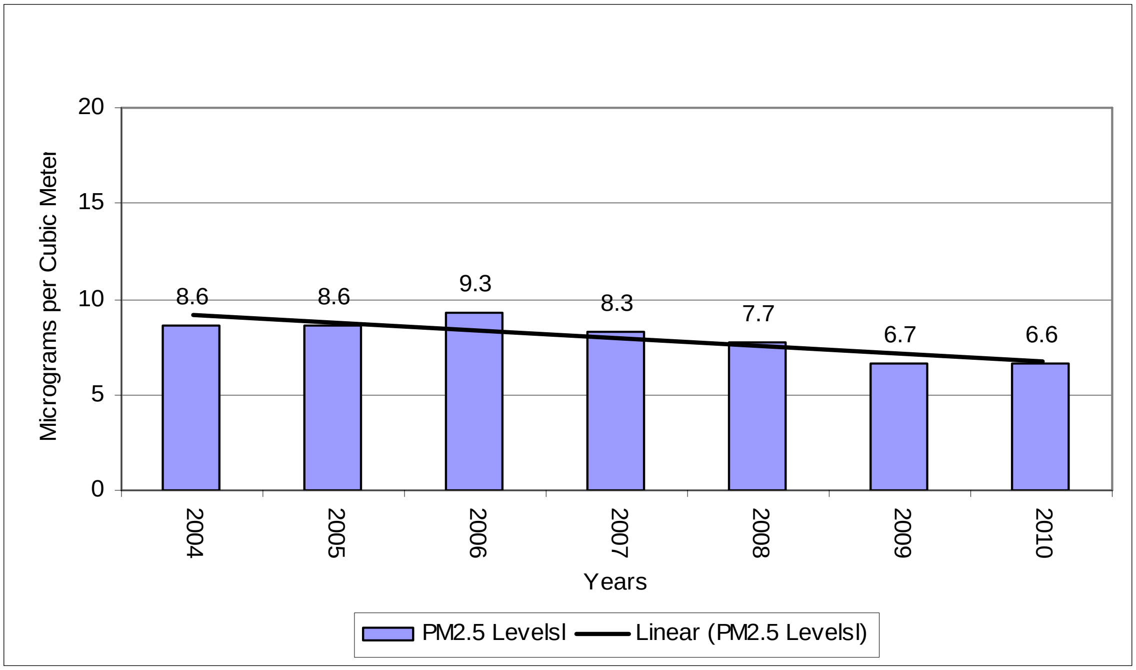
7.1.3.2 RC Credit Union $PM_{2.5}$ Data

The testing for $PM_{2.5}$ parameter using the manual method began at this site in October 2003 and completed the first full year of testing in 2004. The RC Credit Union Site records the highest $PM_{2.5}$ concentrations in the Rapid City area for both 24-hour and annual concentrations.

Figure 7-8 shows the annual average for each sampling year since 2004.The annual average concentrations have remained relatively constant over the first four years. But in the last three years $PM_{2.5}$ annual concentrations have declined to the lowest level since the site began operation with a concentration of 6.6 ug/m^3 for the annual average. The highest annual average for $PM_{2.5}$ at this site was 9.3 ug/m^3 in 2006. Over the seven year period, annual concentrations changed by 2.7 ug/m^3.

In 2009, a continuous method $PM_{2.5}$ monitor was operated at the site as a special purpose monitor. At the end of 2010, the continuous monitor which is a Federal Equivalent Method will become a SLAMS monitor. DENR will need to designate one method as the primary monitor or remove one of the methods from the site.

Figure 7-8 – RC Credit Union $PM_{2.5}$ Annual Averages



After two years of testing the continuous and manual methods had about the same two year average 98th percentile 24-hour concentration level with the continuous method having a slightly higher concentration at 16.8 ug/m^3 versus 16.2 ug/m^3 for the manual method. The manual method had a slightly higher annual average at 7.0 ug/m^3 versus 5.7 ug/m^3 for the continuous method. DENR will be close and move the manual $PM_{2.5}$ monitors from the site based on the air monitoring needs in other locations in the state, the RC Credit Union Site's low $PM_{2.5}$ concentrations for both the 24-hour and annual standards, and comparable concentrations between the manual and continuous method.

The parameter of $PM_{2.5}$ will be continued at this site using the continuous monitor to determine compliance with the NAAQS and to determine any change in concentration levels.

7.2 Black Hawk Site

Black Hawk is a small town located just north of Rapid City in Meade County north of the quarry area. Black Hawk is not an incorporated city but is a growing subdivision and is part of the Rapid City MSA. The goal of the Black Hawk Site is to determine urban background concentrations for PM_{10} coming into the Rapid City area from the north and determine compliance with the ozone NAAQS in the Rapid City MSA.

The Black Hawk Site was setup in the fall of 2000. The site is located on a small hill east of the Black Hawk Elementary School. PM_{10} and $PM_{2.5}$ monitors were located on a sampling shelter until October 2003 when the sampling shelter was moved to the RC Credit Union Site. The monitors were then located on scaffolding within a fenced area until the fall of 2006 when a shelter was added back to the site.

At the end of 2004 the $PM_{2.5}$ monitors were removed because concentrations were the lowest in the area and the potential for concentrations over the NAAQS were very low. In 2007, the ozone analyzer was moved from RC Credit Union Site to the Black Hawk Site to operate the ozone parameter outside of the modeled one microgram nitrogen dioxide influence area from air quality sources in western Rapid City. See Figure 7-9 for a current picture of the site looking to the northwest.

Figure 7-9 – Black Hawk Site

The land use around the site is mainly residential with a few service type businesses. There are no obstructions around the monitoring site. The limestone quarry industries are located to the south and southeast of the Black Hawk Site and are expanding to ore bodies located closer to this site. The first of the new limestone quarries are currently operating about one mile south of the site.

The site's spatial scale is neighborhood for PM_{10} and ozone sampling. The objectives of the PM_{10} sampling are high concentration, population, and source impact. The objectives of the ozone sampling are high concentration and population. The goals are being met and the site will be continued with sampling for both ozone and PM_{10} parameters.

Table 7-4 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

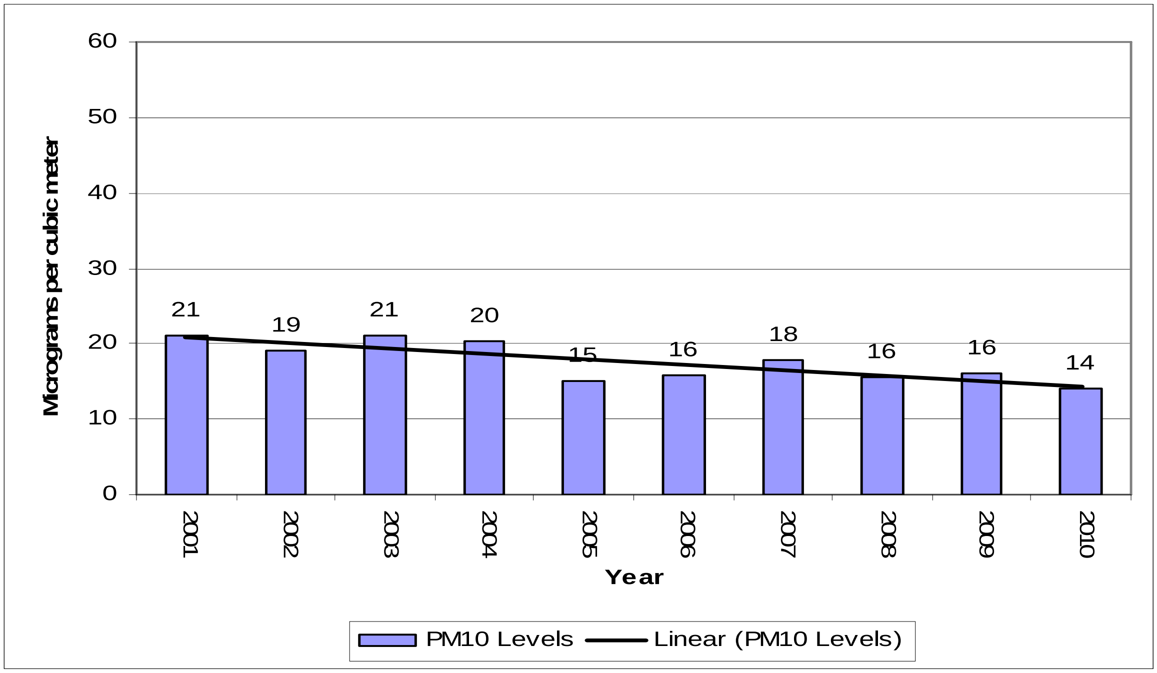
Table 7-4 – Black Hawk Site Specifics

Parameter	Information
Site Name	Black Hawk Elementary
AQS ID Number	46-093-0001
Street Address	7108 Seeaire Street
Geographic Coordinates	UTM Zone 13, NAD 83, E 634,683.07 N 4,890,309.65
MSA	Rapid City
PM_{10}	**(Manual)**
Sampler Type	Federal Reference Method RFPS-1287-063
Operating Schedule	Every Third Day
Scale Representation	Neighborhood
Monitoring Objective	Population, Urban Background
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
Ozone	**(Continuous)**
Sampler Type	Federal Equivalent Method EQOA-0880-147
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Instrumental Thermo 49i
Analysis Methods	Ultraviolet
Data Use	SLAMS (Comparison to the NAAQS) and Real-time Data

7.2.1 Black Hawk PM_{10} Data

Figure 7-10 contains a graph showing the PM_{10} annual averages for the Black Hawk Site. The first four years of PM_{10} concentration levels remained about the same. In 2005, the annual average dropped significantly by approximately 4 ug/m^3 from the 2004 level. The highest annual average was 21 ug/m^3 recorded in both 2001 and 2003. The lowest level of 14 ug/m^3 was recorded in 2010. In 2010, the PM_{10} concentrations dropped 2 ug/m^3 from the concentration in 2009. The overall trend shows a decrease in concentrations over the ten year period.

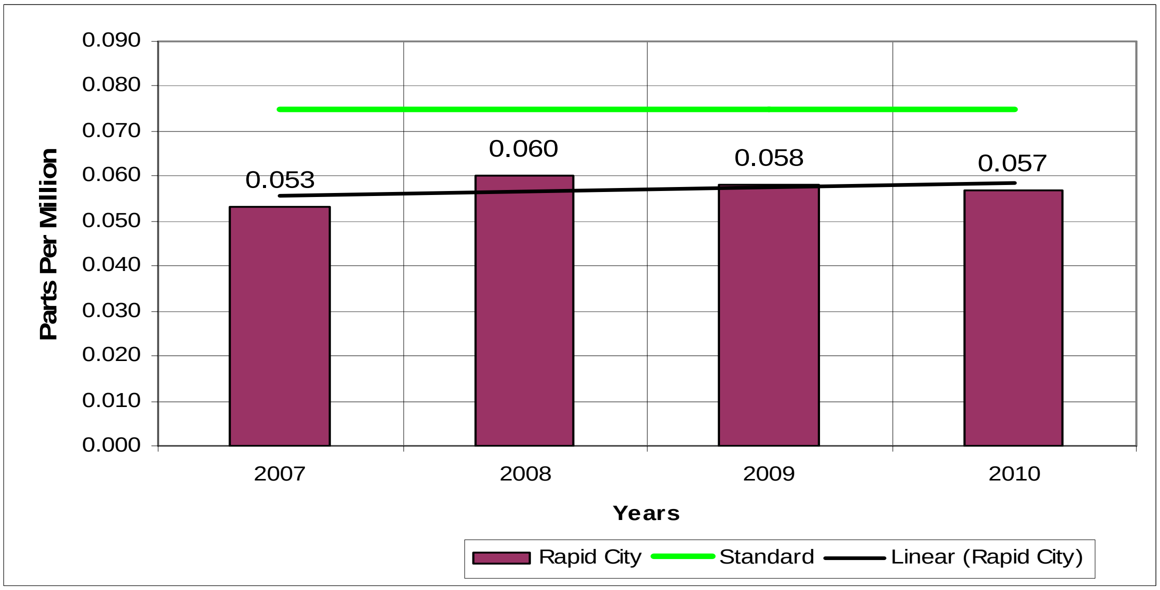
Figure 7-10 – Black Hawk PM_{10} Annual Averages



7.2.2 Black Hawk Ozone Data

The 2010 sampling year is the fourth ozone season at the Black Hawk Site (see Figure 7-11). It is difficult to determine a trend with only four years of data. Concentrations were the lowest ozone levels recorded in the state during the first year of testing (2007). In the second year of testing (2008), the site recorded the second highest ozone level in the state. In 2009 and 2010, the ozone levels are slightly less than the 2008 ozone levels and appear to have flattened out.

Figure 7-11 – Black Hawk Ozone Yearly 4th Highest 8-hour Averages



The testing results show the area is attaining the ozone standard.

7.3 Badlands Site

The Badlands is one of two Class I areas in South Dakota designated for visibility protection under the Clean Air Act. The Badlands area is a large national park that attracts more than two million visitors each year. The Badlands area is a dry semi-desert area with short prairie grass and beautiful sandstone cliff vistas.

The Badlands Site was established in 2000, with manual monitors for PM_{10} and $PM_{2.5}$. The site is located next to the IMPROVE site which also included an ozone analyzer operated by the National Park Service. The site is in the southeast part of the park near the visitor center. Figure 7-12 shows a current picture of the Badlands Site.

Figure 7-12 – Badlands Site

In October of 2004, the number of pollutant parameters was increased by adding continuous monitors for PM_{10}, $PM_{2.5}$, sulfur dioxide, and nitrogen dioxide. The changes increased the amount of data collected and provide additional information on transport of air pollution. At the end of 2007, the department took over the operation of the ozone monitor at this site upon a request made by the National Park Service.

The IMPROVE data is used to determine what type of sources are impacting the visibility of the national parks in South Dakota. The goal of having a SLAMS site next to the IMPROVE site is to determine how the data compares between the two different sampling methods, to determine air pollution background levels, and to see if pollution trends show long range transport of air pollution into the state. Table 7-5 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Table 7-5 – Badlands Site Specifics

Parameter	Information
Site Name	Badlands
AQS ID Number	46-071-0001
Street Address	25216 Ben Reifel Road, Interior, South Dakota 57750
Geographic Coordinates	UTM Zone 14, NAD 83, E 263,173.81 N 4,847,799.95
MSA	None
PM_{10}	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-1102-150
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Method	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
$PM_{2.5}$	**(Continuous)**
Sampler Type	Federal Equivalent Method RFPS-0308-170
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Met One BAM-1020 w/$PM_{2.5}$ VSCC
Analysis Method	Beta Attenuation
Data Use	Real-time Data and SPMS
SO_2	**(Continuous)**
Sampler Type	Federal Equivalent Method EQSA-0486-060
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Methods	Pulsed Fluorescent
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
NO_2	**(Continuous)**
Sampler Type	Federal Reference Method RFNA-1289-074
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Method	Chemiluminescence
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Ozone	**(Continuous)**

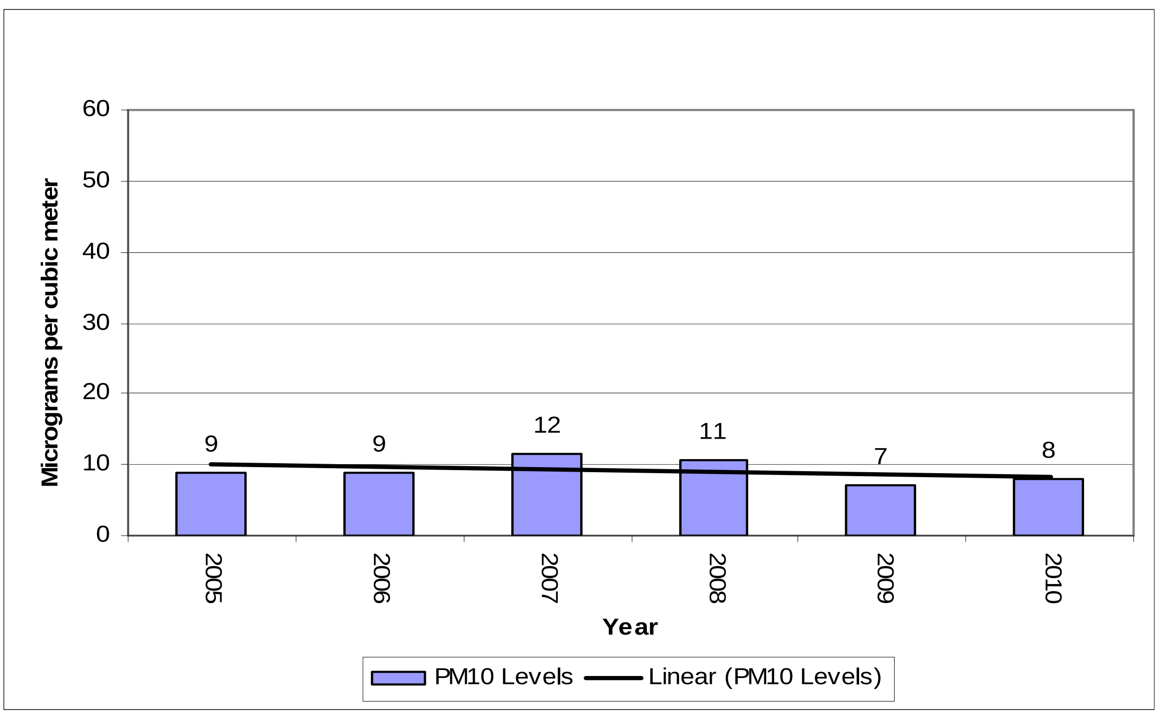
Parameter	Information
Sampler Type	Federal Equivalent Method EQOA-0880-047
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Method	Ultraviolet
Data Use	SLAMS (Comparison to the NAAQS) and Real-time Data

7.3.1 Badlands PM_{10} Data

PM_{10} data has been collected at this site since 2000. The PM_{10} manual monitor was operated on an every sixth day schedule through 2004. Beginning in 2005, a continuous Thermo Beta Gauge PM_{10} monitor replaced the manual monitors.

Figure 7-13 contains a graph of the annual averages for the Badlands Site. The annual average concentration over the last six years varied slightly overall but trends show a slight decrease in concentration. The highest annual average concentration of 12 ug/m^3 was recorded in 2007. The lowest annual average concentration of 7 ug/m^3 was recorded in 2009. The PM_{10} concentrations recorded at this site are some of the lowest levels in the state and are considered background for the western half of the state. This parameter is meeting the goals for testing at this site and will be continued.

Figure 7-13 – Badlands PM_{10} Annual Averages

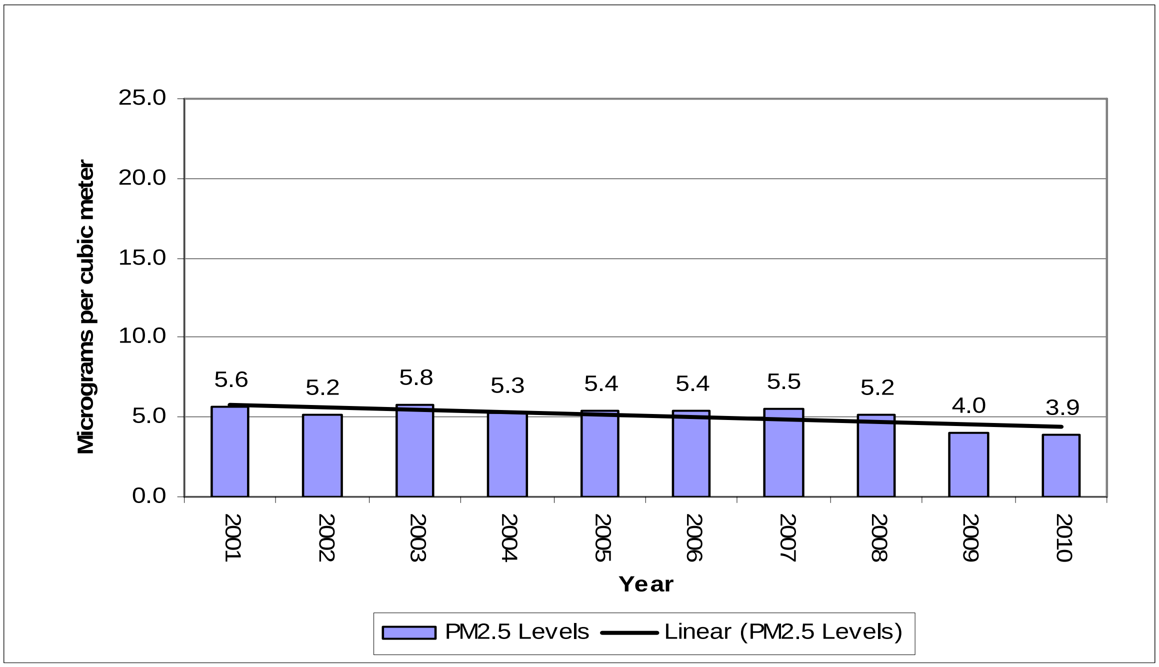


7.3.2 Badlands $PM_{2.5}$ Data

The $PM_{2.5}$ monitors run on an every third day schedule from 2001 to 2008. With the completion of the 2003 year, the site had three years of $PM_{2.5}$ data and the department was able to make a comparison of the concentration levels to the 24-hour and annual standards. The area was designated as attaining the standard. Beginning in 2009, the Met One BAM-1020 FEM replaced the manual RAAS 100 and the sampling schedule went to every day providing hourly average and 24-hour average concentrations.

The annual averages for the Badlands Site show a concentration range with a high of 5.8 ug/m^3 in 2003 and a low of 3.9 ug/m^3 in 2010. The trend for the annual average was steady during the first eight year testing but has declined slightly in the last two years by 1.3 ug/m^3. $PM_{2.5}$ concentrations at this site are the lowest in the state and represent background levels for western South Dakota. Figure 7-14 contains a graph of the annual averages. This parameter is meeting the goals for testing at this site and will be continued.

Figure 7-14 – Badlands $PM_{2.5}$ Annual Averages

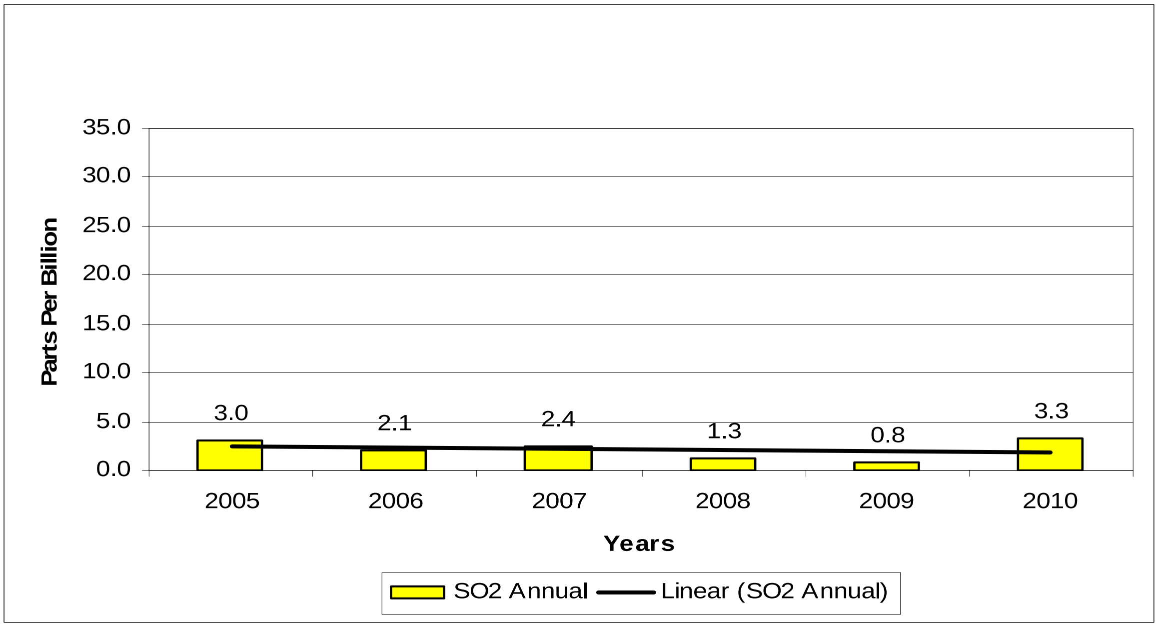


7.3.3 Badlands Sulfur Dioxide Data

The first year of testing at the Badlands Site for sulfur dioxide occurred in 2005. As expected, concentrations for sulfur dioxide are very low and represent background levels. Concentrations are at or near the detection limit for the analyzers at 0.1 ppb for the annual average levels for sulfur dioxide.

In 2010, the annual average increased slightly from 2009 from 0.8 ppb to 3.3 ppb of sulfur dioxide. See Figure 7-15 to view a graph of the annual average concentrations for sulfur dioxide. The linear trends line shows a steady to slight decrease in concentrations but levels are very low and indicate minimal concentrations of sulfur dioxide. This parameter is meeting the goals for testing at this site and will be continued.

Figure 7-15 – Badlands Sulfur Dioxide Annual Averages



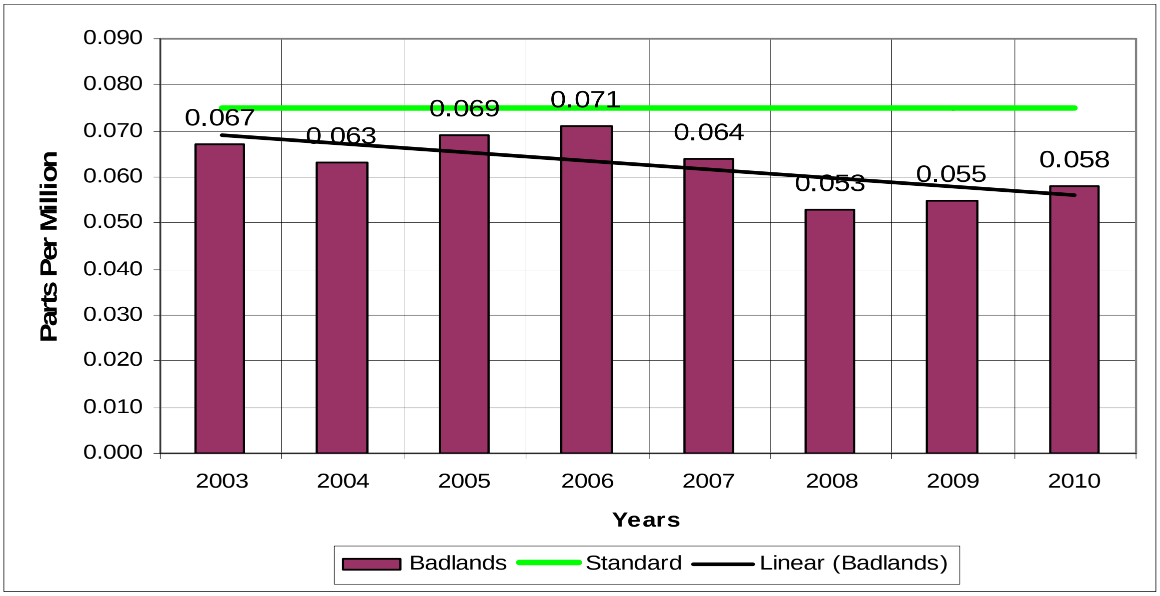
7.3.4 Badlands Ozone Data

The first year of testing at the Badlands Site for ozone with the equipment being operated by the National Park Service was 2003. DENR completed quarterly audits of the ozone analyzer so data could be compared to the NAAQS. At the beginning of 2008 sampling year, DENR took over the operation of the ozone analyzer.

Concentrations of ozone at this site have varied over the seven years of testing. The yearly 4th highest 8-hour average ranged from a high of 0.071 in 2006 to a low of 0.053 in 2008. This trend is similar to most of the sites in the state with the last three years having lower ozone levels. See Figure 7-16 to view a graph of the yearly 4th highest 8-hour average. The linear trends line shows a declining concentration level mainly due to the last three years of testing.

Concentrations of ozone at this site were one of the highest concentrations in the state. Levels have decreased significantly in the last three years with concentrations now at one of the lowest in the state. This parameter will continue to be a priority at this location because of past concentration levels and the testing is meeting the needs to continue the sampling effort.

Figure 7-16 – Badlands Ozone Yearly 4th Highest 8-hour Averages

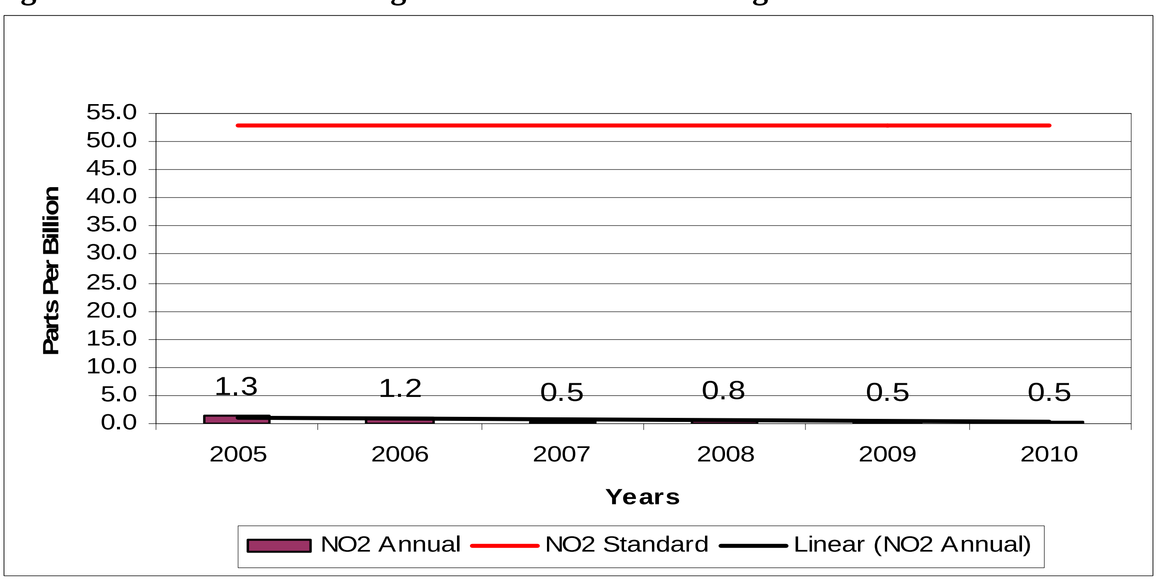


7.3.5 Badlands Nitrogen Dioxide Data

The first year of testing at the Badlands Site for nitrogen dioxide occurred in 2005. As expected, concentrations for nitrogen dioxide are very low and represent background levels. Many hourly concentrations are at the detection limit of the analyzer at 1.0 ppb. The calculated annual average levels for all six years are close to the detection level for nitrogen dioxide.

See Figure 7-17 to view a graph of the annual average concentrations. The linear trends line shows a slightly declining concentration level. This parameter will continue to be a priority at this location and the testing is meeting the needs to continue the sampling effort.

Figure 7-17 – Badlands Nitrogen Dioxide Annual Averages



7.4 Wind Cave Site

The Wind Cave National Park is one of two class I areas in South Dakota designated for visibility protection under the Clean Air Act. The Wind Cave area is a large national park located in the southern Black Hills of South Dakota. The Wind Cave Site was established in 2005, with manual monitors for $PM_{2.5}$ and continuous monitors for $PM_{2.5}$, PM_{10}, sulfur dioxide, nitrogen dioxide, and ozone. The monitoring equipment is located in a sampling shelter next to the IMPROVE site operated by the National Park Service. The site is located a short distance west of the visitor center. Figure 7-18 shows a current picture of the Wind Cave Site.

Figure 7-18 – Wind Cave Site

The IMPROVE data will be used to determine what type of sources are impacting the visibility of the national parks in South Dakota. The purpose of having a SLAMS site next to the IMPROVE site is to determine how the data compares between the two different sampling methods, to determine air pollution background levels, and to see if pollution trends show long range transport of air pollution from outside of the state. Table 7-6 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Table 7-6 – Wind Cave Site Specifics

Parameter	Information
Site Name	Wind Cave
AQS ID Number	46-033-0132
Street Address	290 Elk Mountain Camp Road, Hot Springs, South Dakota

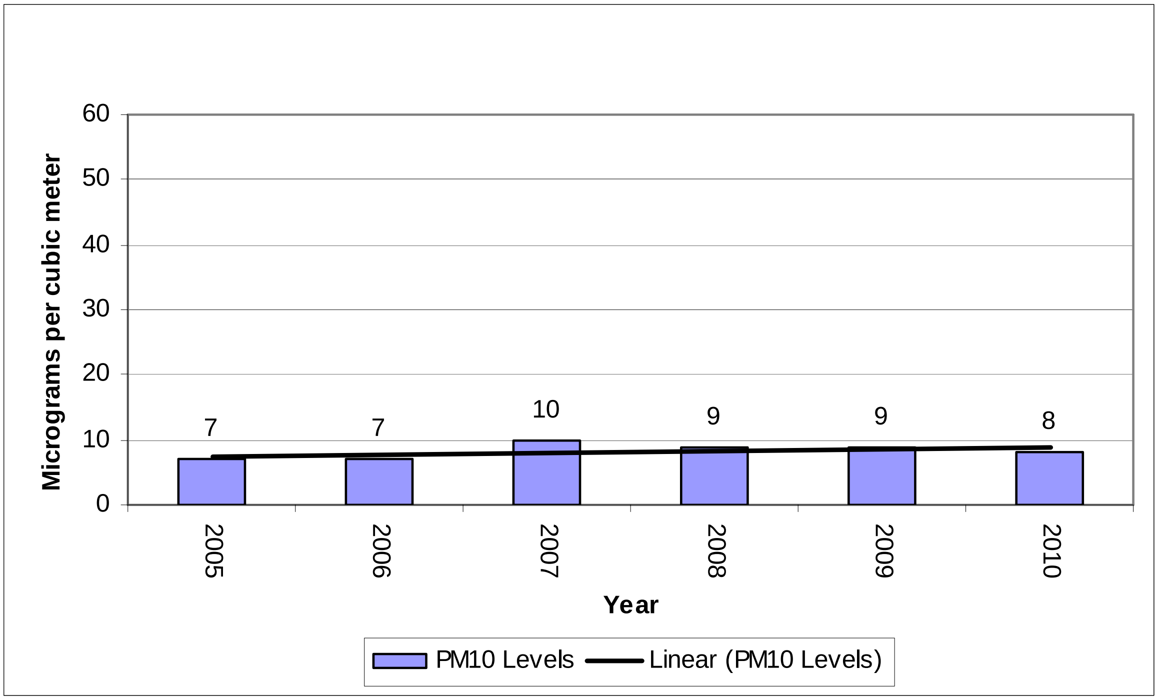
Parameter	Information
Geographic Coordinates	UTM Zone 13, NAD 83, E 622,471.56 N 4,823,856.93
MSA	None
PM_{10}	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-1102-150
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Method	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
$PM_{2.5}$	**(Manual)**
Sampler Type	Federal Equivalent Method EQPM-0804-153
Operating Schedule	Every Third Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Andersen RAAS2.5-100 $PM_{2.5}$ SAM w/WINS
Analysis Method	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
$PM_{2.5}$	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-0308-170
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Met One BAM-1020 FEM
Analysis Method	Beta Attenuation
Data Use	Real-time Data and SPMS
SO_2	**(Continuous)**
Sampler Type	Federal Equivalent Method EQSA-0486-060
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Methods	Pulsed Fluorescent
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
NO_2	**(Continuous)**
Sampler Type	Federal Reference Method RFNA-1289-074
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Method	Chemiluminescence
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Ozone	**(Continuous)**
Sampler Type	Federal Equivalent Method EQOA-0880-047

Parameter	Information
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Method	Ultra Violet
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data

7.4.1 Wind Cave PM_{10} Data

The PM_{10} concentrations at this site are one of the lowest in the state and are similar in concentrations as the Badlands Site. The Wind Cave Site is the most remote site in the state and a site that has no influence from industry and agriculture activities near the location. Figure 7-19 contains a graph showing the annual average PM_{10} concentrations. The 2010, PM_{10} concentrations remained about the same as in 2009. The trend line indicates a slight increase in concentration levels over the six years of testing. The concentrations ranged from 7 to 10 ug/m^3 and are very low representing background levels. This parameter is meeting the goals of background, visibility protection, long range transport, and will be continued.

Figure 7-19 – Wind Cave PM_{10} Annual Averages

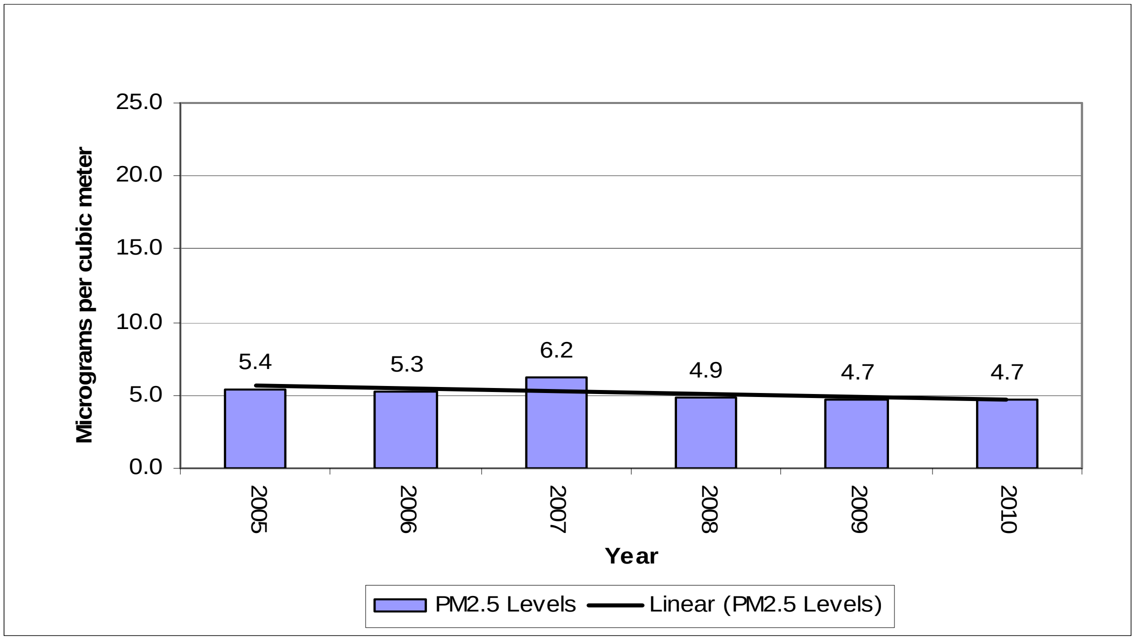


7.4.2 Wind Cave PM 2.5 Data

The $PM_{2.5}$ concentrations are similar to the levels recorded at the Badlands Site and are some of the lowest in the state. Figure 7-20 contains a graph showing the annual average $PM_{2.5}$ concentration levels. The linear trend line indicates a slight decrease in concentration level during the six years of testing. The $PM_{2.5}$ annual average concentration range from 6.2 ug/m^3 in

2007 to 4.7 ug/m^3 in 2009 and 2010. This parameter is meeting the goals of background, visibility protection, and long range transport and will be continued.

Figure 7-20 – Wind Cave $PM_{2.5}$ Annual Averages



7.4.3 Wind Cave Sulfur Dioxide Data

The annual sulfur dioxide averages for Wind Cave are very low and are at the detection level for the sulfur dioxide analyzer. The graph in Figure 7-21 shows the annual concentration levels for the last six years. The linear trends line shows a steady sulfur dioxide concentration level but levels are too low over the six years of testing to provide any indication of actual trends. This parameter is meeting the goals of background, visibility protection, and long range transport. Because the concentrations of sulfur dioxide at the Badlands and Wind Cave sites are very close, the sulfur dioxide analyzer at Wind Cave was moved to the RC Credit Union Site in Rapid City at the start of 2011.

7.4.4 Wind Cave Nitrogen Dioxide Data

The annual nitrogen dioxide averages are very low and are at the detection level for the analyzer similar to sulfur dioxide levels. The graph in Figure 7-22 shows the annual average concentration levels for the Wind Cave Site. The linear trend line shows a steady concentration level but with recorded levels at the detection level for the method trends are difficult to determine. This parameter is meeting the goals of background, visibility protection, and long range transport. This analyzer was also moved to the RC Credit Union Site in Rapid City at the beginning of 2011 because the nitrogen dioxide concentrations at the Badlands and Wind Cave sites are very close.

Figure 7-21 – Wind Cave Sulfur Dioxide Annual Averages

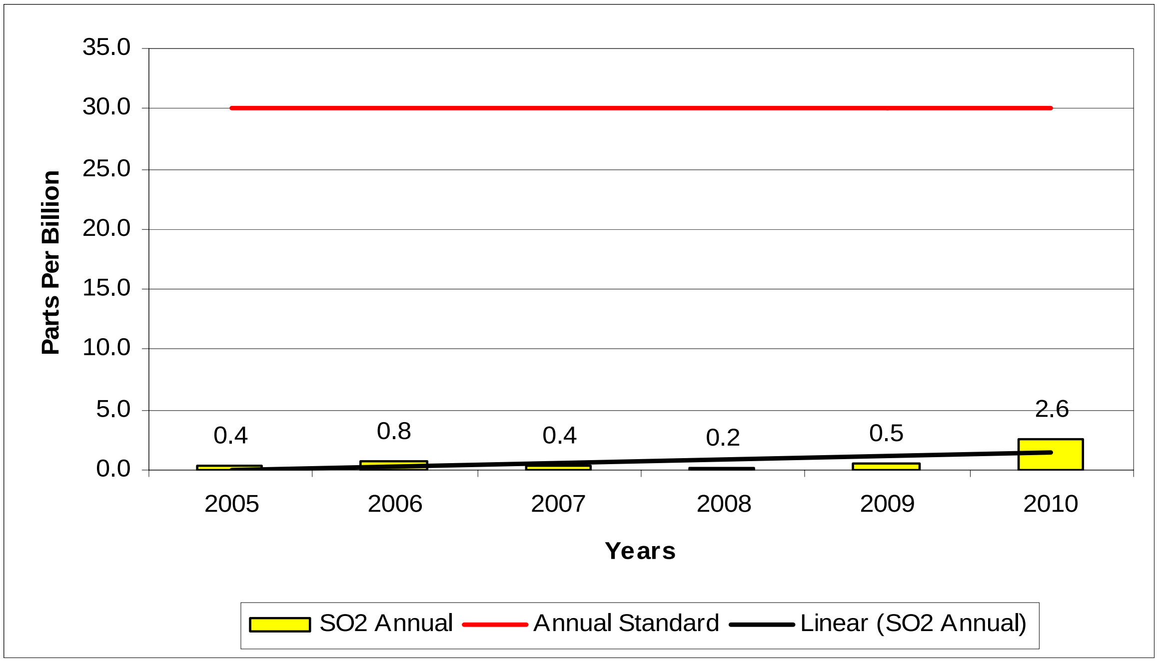
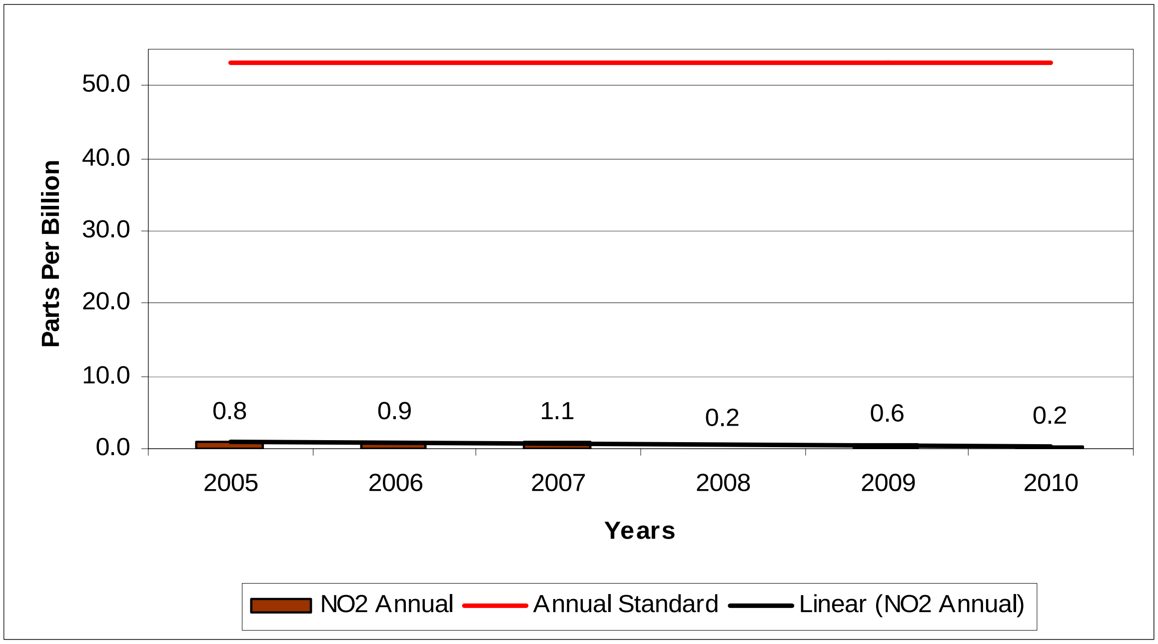


Figure 7-22 – Wind Cave NO_2 Annual Averages

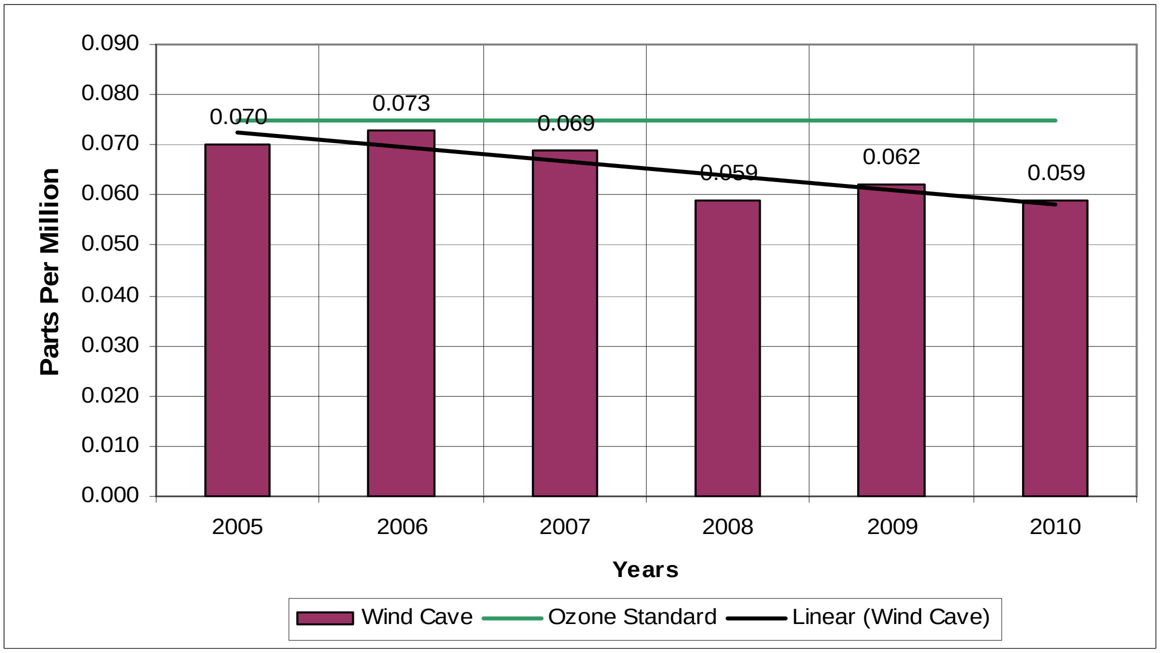


7.4.5 Wind Cave Ozone Data

Figure 7-23 contains a graph of the ozone 8-hour concentrations for the Wind Cave Site since 2005. The Wind Cave Site has the highest reported yearly 4th highest 8-hour ozone level in the state at 0.073 parts per million recorded in 2006. Now this site has a 3-year average that is one of the lowest in the state. The yearly 4th highest 8-hour average ranged from a high of 0.073 in

2006 to a low of 0.059 in 2008 and 2010. This trend is similar to the Badlands Site with the last three years having significantly lower ozone levels. The linear trends line shows a declining concentration level due to the last three years of testing. Testing for ozone is meeting the needs of the monitoring network by detecting transport pollution levels for this area of the state. Therefore, this parameter will be continued.

Figure 7-23 – Wind Cave Ozone Yearly 4th Highest 8-hour Averages



7.5 Sioux Falls Area

In 2010, two sampling sites were operated in the Sioux Falls area: 1) SF KELO and 2) SD School sites. The criteria pollutant parameters tested at these sites include PM_{10}, $PM_{2.5}$, ozone, sulfur dioxide, and nitrogen dioxide. In addition, special purpose monitoring for continuous $PM_{2.5}$, speciation $PM_{2.5}$ and air toxics are also operated in the city. Air monitoring data shows the Sioux Falls area is attaining all of the NAAQS set by EPA.

The city continues to grow and now includes residential areas in two counties: 1) Minnehaha and 2) Lincoln. Sioux Falls is the largest city in the state with a 2010 Census population of 169,468 for Minnehaha County and 44,828 in Lincoln County. The industrial base is mainly service oriented businesses with some heavy industry.

7.4.1 SF KELO Site

The SF KELO Site was established in 1991, as a replacement for the City Hall Site. The site is located in the downtown, central part of the city and at 20 years of operation is the oldest site still operating in Sioux Falls. The SF KELO Site is a SLAMS site for both PM_{10} and $PM_{2.5}$. The sampling frequency for $PM_{2.5}$ monitoring is every third day and the PM_{10} monitor was changed to every sixth day at the beginning of 2009. Sampling objectives for these monitoring parameters are population and high concentration. The sampling scale is neighborhood for both PM_{10} and $PM_{2.5}$. Figure 7-24 shows a current picture of the monitoring site.

Figure 7-24 – SF KELO Site

In 2002, a $PM_{2.5}$ speciation monitor was added to the site to determine the chemical make up of the $PM_{2.5}$ pollution. The sampler was located at this site because the $PM_{2.5}$ concentrations are some of the highest in the state and because the city of Sioux Falls is the largest population center in the state. The $PM_{2.5}$ speciation monitor was moved from this site to the SD School Site at the beginning of 2009.

During an oversight review completed by EPA in 2001, it was noted that a tree planted to the west of the sampling site had grown and would require that the sampling platform be moved about 10 feet east. The monitors were moved so the tree would not be an obstruction of the 360-degree arch around the monitor. In 2010, the distance between the monitors and the tree is sufficient so the tree is not an obstruction to the site. The height of the tree will be assessed each year to be sure the distance of the monitors from the tree meets the location requirements in 40 CFR Part 58. Table 7-7 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Table 7-7 - SF KELO Site Specifics

Parameter	Information
Site Name	SF KELO
AQS ID Number	46-099-0006
Street Address	500 South Phillips, Sioux Falls, SD

Parameter	Information
Geographic Coordinates	UTM Zone 14, NAD 83, E 683,678.21 N 4,823,550.80
MSA	Sioux Falls
PM_{10}	**(Manual)**
Sampler Type	Federal Reference Method RFPS-1287-063
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
$PM_{2.5}$	**(Manual)**
Sampler Type	Federal Equivalent Method EQPM-0202-143
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Partisol 2000 $PM_{2.5}$ w/VSCC
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

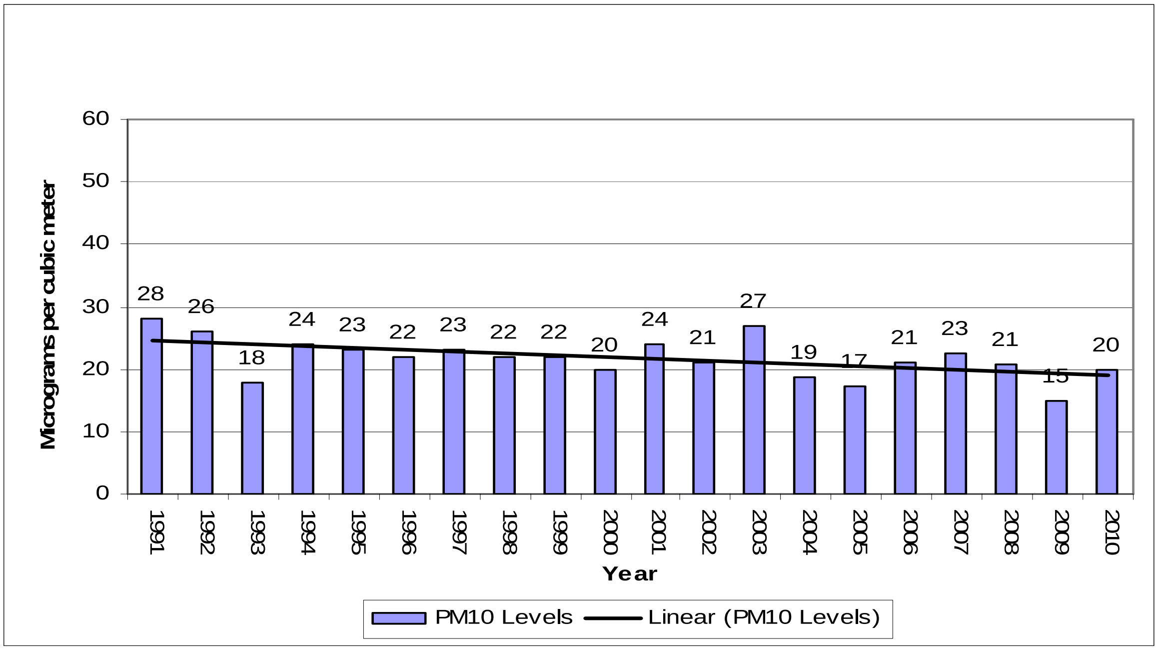
7.4.1.1 SF KELO PM_{10} Data

The annual averages for the SF KELO Site range from a high of 28 ug/m^3 in 1991 to a low of 15 ug/m^3 in 2009. Annual average concentrations vary moving back and forth through the high and low range over the 20 years of sampling. In 2010, the annual average increased slightly. Figure 7-25 contains a graph of the annual averages since the site was setup in 1991. The overall PM_{10} annual trend line shows a declining concentration level.

During the 20 years of testing, PM_{10} concentrations have always remained low for both the 24-hour and annual levels at SF KELO Site. The 20 year annual average is 22 ug/m^3 and is well below any level of concern.

A comparison of PM_{10} concentrations at the SF KELO and SD School sites was completed during the 5-year Assessment completed in 2010. The goal was to determine if both sites are needed to test for this parameter. The results indicated PM_{10} concentrations were always lower at the SF KELO Site then at the SD School Site. Both sites have low concentrations and the data indicated that testing was needed only at the SD School Site. At the end of 2010, testing for PM_{10} was completed and the equipment was removed from the SF KELO Site.

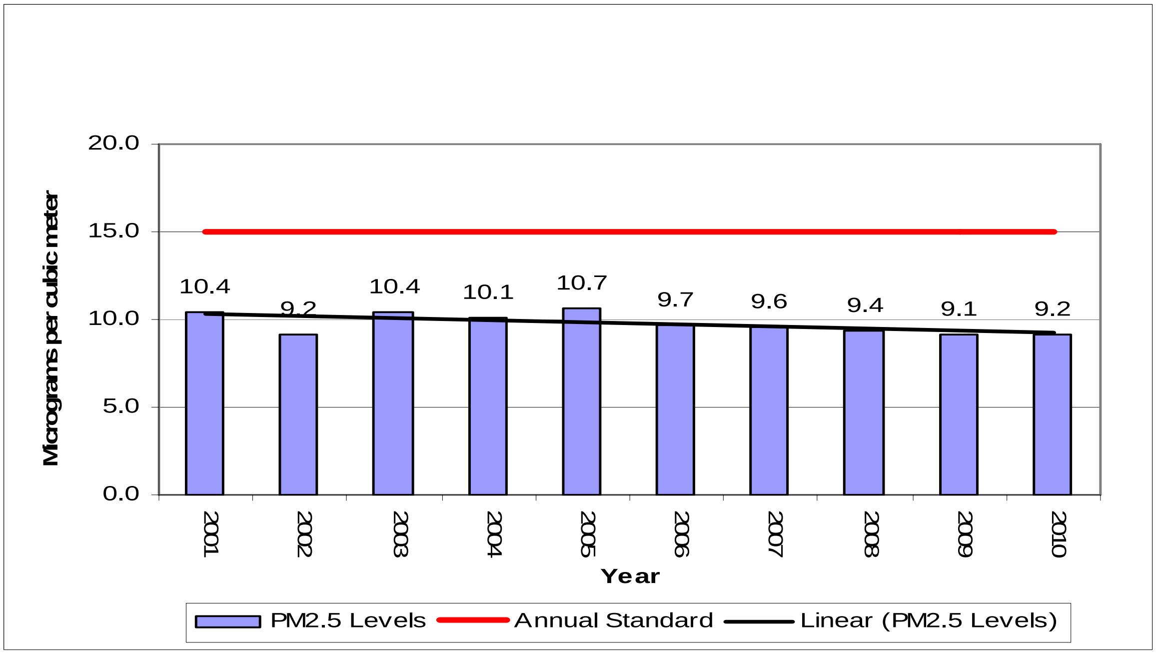
Figure 7-25 – SF KELO PM_{10} Annual Averages



7.4.1.2 SF KELO $PM_{2.5}$ Data

Sampling for $PM_{2.5}$ concentrations began in 2001. Annual averages for the SF KELO Site have a range from a high of 10.7 ug/m^3 in 2003 and 2005 to a low of 9.1 ug/m^3 in 2009. Figure 7-26 contains a graph of the annual averages for the SF KELO Site.

Figure 7-26 – SF KELO $PM_{2.5}$ Annual Averages



Concentrations for $PM_{2.5}$ at SF KELO Site showed a slight decline but the levels for the last three years of testing have remained almost the same. Annual averages show some variation from year to year, but the trend line shows a slight decrease in concentration. In 2010, the annual average concentration increased slightly form 2009 but the change was very small.

The SF KELO Site is one the highest $PM_{2.5}$ sites in the state for 24-hour hour and annual concentrations. Some years it has the highest 24-hour or annual level. In 2010, $PM_{2.5}$ concentrations were the fourth highest site but all four sites were very close in levels. This parameter is meeting the goals of population and high concentration testing. This site continues to be an important site because of the historical concentration levels and testing will be continued.

7.4.2 SD School Site

The SD School Site replaced the SF Hilltop Site on January 1, 2008. The site is the National Core site for the state. Operating sampling parameters at the SD School Site include PM_{10}, $PM_{2.5}$, ozone, sulfur dioxide, nitrogen dioxide, meteorology, $PM_{2.5}$ speciation and air toxics in 2010. At the beginning of 2011 the parameters of carbon monoxide, NOy, and PMcoarse were added to this site. The setup of sampling equipment for PMcoarse will include results for PM_{10} and $PM_{2.5}$ without adding any additional monitors to the site. This is a very busy monitoring site collecting 140,465 data points per year all loaded to the EPA national database. Figure 7-27 shows a current picture of the SD School Site.

Figure 7-27 – SD School Site

The SD School Site is located on the east central part of the city. The site is about 1.2 miles southeast of the main industrial area in Sioux Falls. The area around the site is mainly residential. Interstate 229 which is a major commuting road runs north and south about three city blocks east of the monitoring site. Table 7-8 contains details on the monitoring site specific to the requirements in 40 CFR Part 58. In addition to the parameters listed in Table 7-8, an air toxic and $PM_{2.5}$ speciation monitor is operated at this site on an every 6th day sampling schedule.

Table 7-8 – SD School Site Specifics

Parameter	Information
Site Name	SD School
AQS ID Number	46-099-0008
Street Address	2009 East 8th Street, Sioux Falls, SD
Geographic Coordinates	UTM Zone 14, NAD 83, E 687,288.70 N 4,822,930.29
MSA	Sioux Falls
PM_{10}	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-0798-122
Operating Schedule	Every Daily/Hourly
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Met One BAM-1020
Analysis Methods	beta attenuation
Data Use	SLAMS (Comparison to the NAAQS)
$PM_{2.5}$	**(Manual)**
Sampler Type	Federal Reference Method RFPS-0202-143
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Partisol 2000 w/VSCC
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
$PM_{2.5}$	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-0308-170
Operating Schedule	Every Daily/Hourly
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Met One BAM-1020
Analysis Methods	beta attenuation
Data Use	SLAMS (Comparison to the NAAQS)
Ozone	**(Continuous)**
Sampler Type	Federal Equivalent Method EQOA-0880-047
Operating Schedule	Hourly
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Instrumental Thermo 49C
Analysis Methods	Ultraviolet

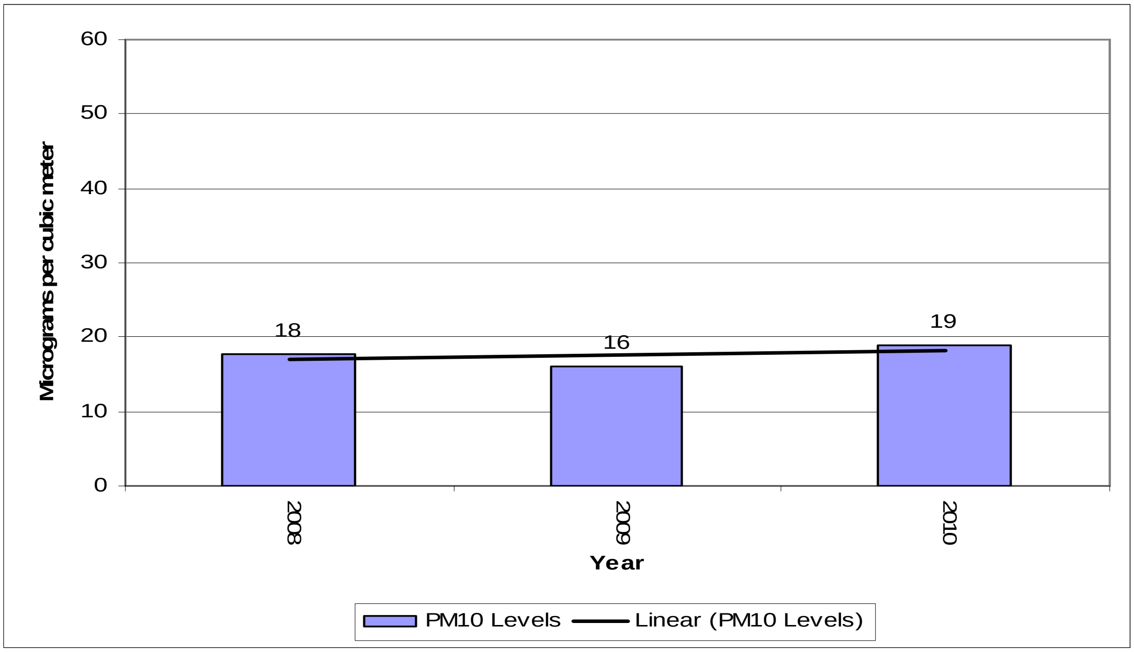
Parameter	Information
Data Use	SLAMS (Comparison to the NAAQS), Real-time Data
NO_2	**(Continuous)**
Sampler Type	Federal Reference Method RFNA-1289-074
Operating Schedule	Hourly
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Automated Analyzer Thermo 42c
Analysis Methods	Ultraviolet Fluorescence
Data Use	SLAMS (Comparison to the NAAQS), Real-time Data
SO_2	**(Continuous)**
Sampler Type	Federal Equivalent Method EQSA-0486-060
Operating Schedule	Hourly
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Instrumental Thermo 43i TL
Analysis Methods	Pulsed Fluorescence
Data Use	SLAMS (Comparison to the NAAQS), Real-time Data

The 2010 sampling year is the third year at this location. Comparison for the parameter data can now be made using only the SD School Site data.

7.4.2.1 SD School PM_{10} Data

Figure 7-28 shows a graph of the annual averages since 2008. The annual averages at the SD School Site range from a high of 19 ug/m^3 in 2010 to a low of 16 ug/m^3 in 2009. In 2010, PM_{10} concentrations were slightly higher than the previous two years. This parameter is meeting the goals of high concentration and population and will be continued.

Figure 7-28 – SD School PM_{10} Annual Averages

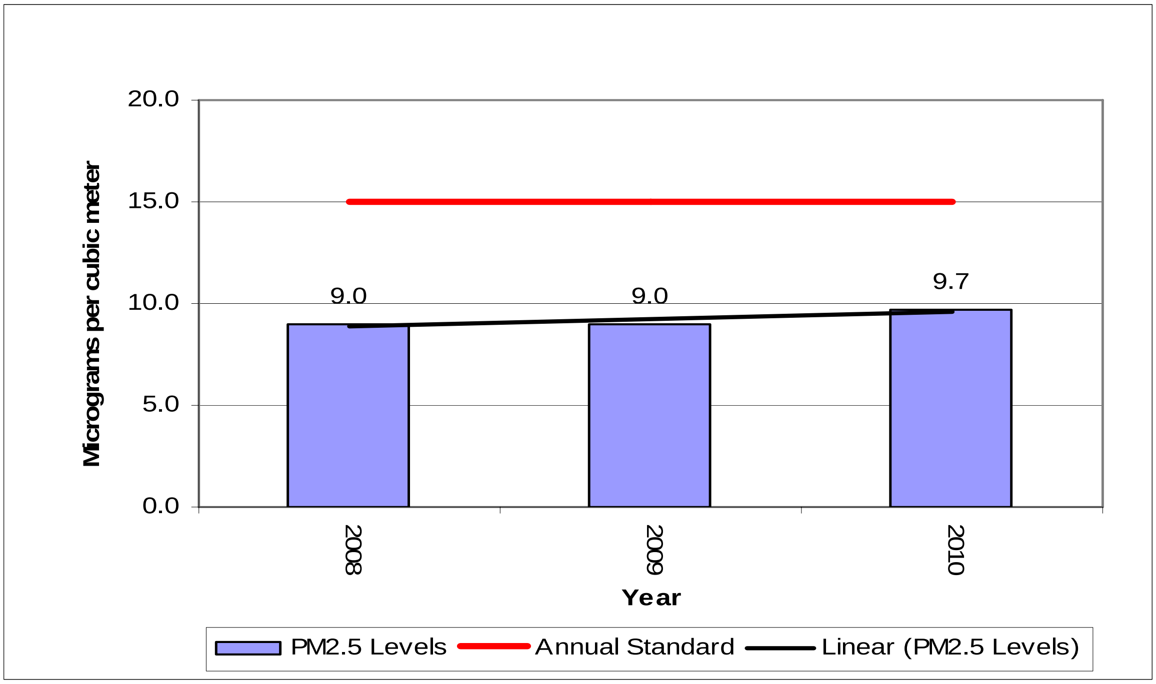


7.4.2.2 SD School $PM_{2.5}$ Data

$PM_{2.5}$ data has been collected at this site since 2008. Annual averages for the SD School Site range from a low of 9.0 ug/m^3 in 2008 to a high of 9.7 ug/m^3 in 2010. The 2010 sampling year recorded a slightly higher concentration as was recorded in 2008 and 2009. Figure 7-29 contains a graph of the annual averages.

Concentrations of $PM_{2.5}$ are some of the highest in the state at this site. This parameter will remain a priority because concentrations are 65% of the annual standard. Testing for this parameter is meeting the goals of high concentration and population and will be continued.

Figure 7-29 – SD School $PM_{2.5}$ Annual Averages

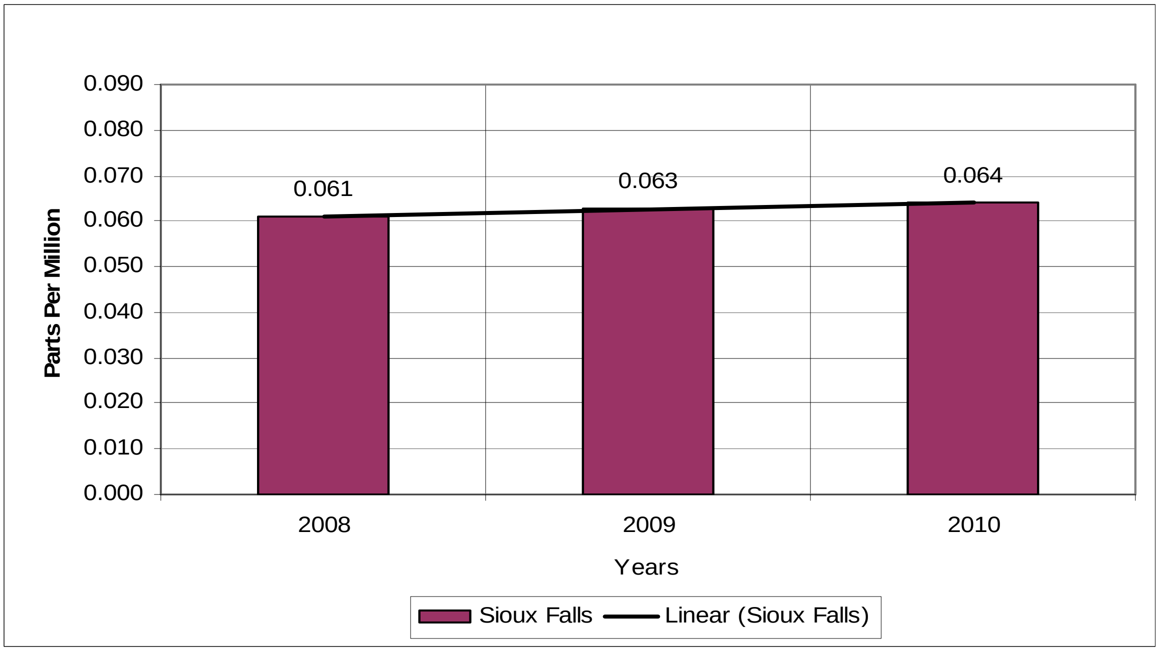


7.4.2.3 SD School Ozone Data

The ozone analyzer runs on a continuous sampling schedule providing hourly concentrations to the data logger. The official yearly ozone season for South Dakota runs from June 1 to September 30. Past sampling experience shows that some of the high ozone readings can occur outside of the official ozone season. The department operates the monitor year around instead of just during the ozone season.

Sampling began for ozone at this site in 2008. The highest annual 4th highest 8-hour ozone concentration was recorded in 2010 at 0.064 ppm. The lowest annual 4th highest 8-hour ozone concentration was recorded at 0.061 ppm in 2008. Figure 7-30 contains a graph of each year's 4th highest ozone concentration level. This parameter is meeting the goals of high concentration and population testing and will be continued.

Figure 7-30 – SD School Ozone Yearly 4th Highest 8-Hour Averages



7.4.2.4 SD School Sulfur Dioxide Data

Testing for sulfur dioxide started in 2008 at this site. A continuous analyzer is operated providing hourly concentration levels. The sulfur dioxide levels remain low at or just above the detection level of 1 ppb for this type of analyzer. The type of analyzer was changed to a trace level sulfur dioxide analyzer in 2011. The detection level of this analyzer is 0.1 ppb.

In 2010, there was a slight decrease in sulfur dioxide. In general no trend can be determined because of the low sulfur dioxide levels. This parameter is meeting the goals of high concentration and population and will be continued. Figure 7-31 contains a graph of the sulfur dioxide annual average for each sampling year.

7.4.2.5 SD School Nitrogen Dioxide Data

The SD School Site began testing for nitrogen dioxide in 2008. The nitrogen dioxide analyzer provides hourly concentration levels. The SD School Site records the highest nitrogen dioxide in the state. There is only 0.6 ppb difference in annual concentration levels from 2008 to 2010. The highest level was recorded in 2008 and 2010 at 6.6 ppb. The lowest level of 5.6 ppb was recorded in 2009. Testing for this parameter is meeting the goals of high concentration and population and will be continued. See Figure 7-32 for more information on the nitrogen dioxide levels collected at this site.

Figure 7-31 – SD School Sulfur Dioxide Annual Averages

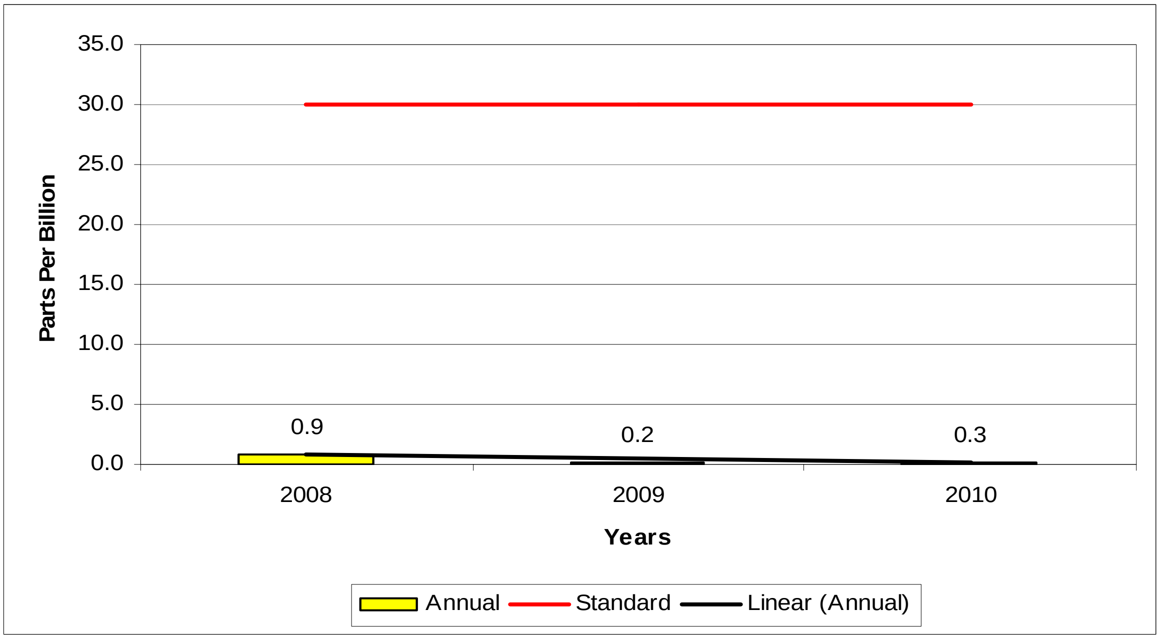
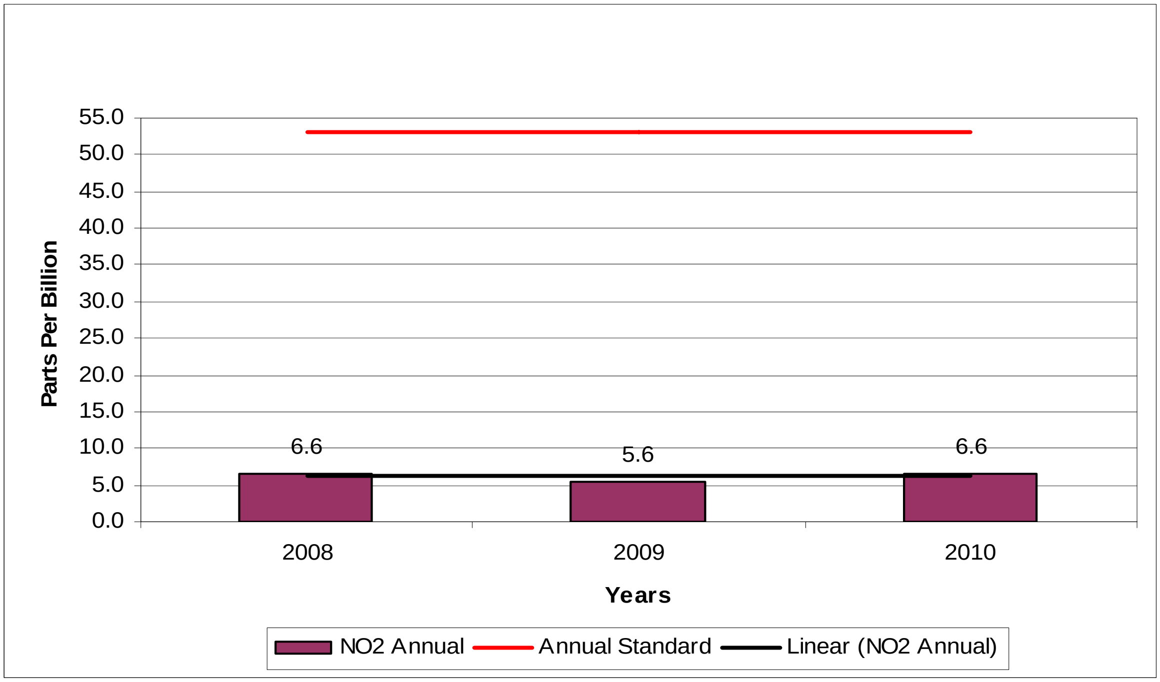


Figure 7-32 – SD School Nitrogen Dioxide Annual Averages



7.5 Aberdeen Area

In 2010, one sampling site was operated in the city of Aberdeen at the Fire Station #1 Site. The Fire Station #1 Site was established in 2000 as part of the implementation of the $PM_{2.5}$ air monitoring network. The parameters tested at the site include PM_{10} and $PM_{2.5}$. The monitoring site is located in the center of the city on top of the fire station roof just east of the main downtown business area. The area around the site has service type businesses, county and city offices, and residential area to the east. See Figure 7-33 for a picture of the monitoring site.

Figure 7-33 – Aberdeen's Fire Station #1 Site

In 2009, Fire Station #1 was renovated and a small addition was added to the south side of the building. The addition required no changes at the site so the location requirements in 40 CFR Part 58 are still met. Table 7-9 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Table 7-9 – Fire Station #1 Site Specifics

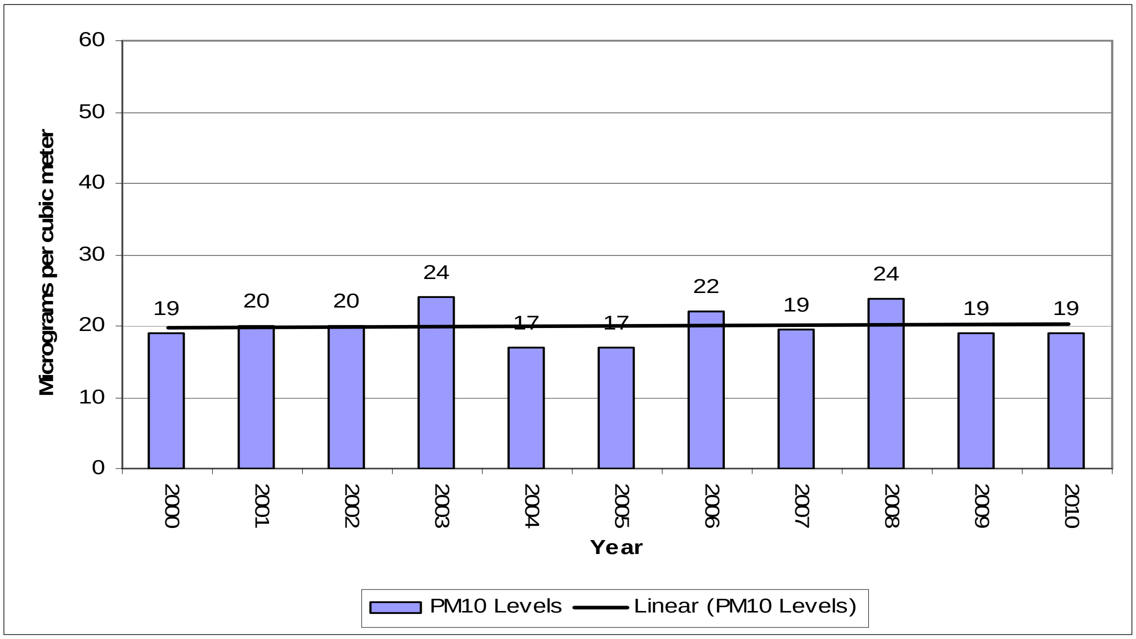
Parameter	Information
Site Name	Fire Station #1
AQS ID Number	46-013-0003
Street Address	111 2nd Ave SE, Aberdeen, SD
Geographic Coordinates	UTM Zone 14, NAD 83, E 540,216.92 N 5,034,545.94
MSA	None
PM_{10}	**(Manual)**
Sampler Type	Federal Reference Method RFPS-1287-063
Operating Schedule	Every 6th Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS),

Parameter	Information
$PM_{2.5}$	**(Manual)**
Sampler Type	Federal Equivalent Method EQPM-0804-153
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 $PM_{2.5}$ w/cyclone
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

7.5.1 Fire Station #1 PM_{10} Data

In 2009 the sampling schedule for PM_{10} changed from every third day to every 6th day because concentrations at the site continue to be low and the chance of recording a concentration over the current standard are very low. Figure 7-34 contains a graph of the annual averages since the site was setup in 2000.

Figure 7-34 – Fire Station #1 PM_{10} Annual Averages



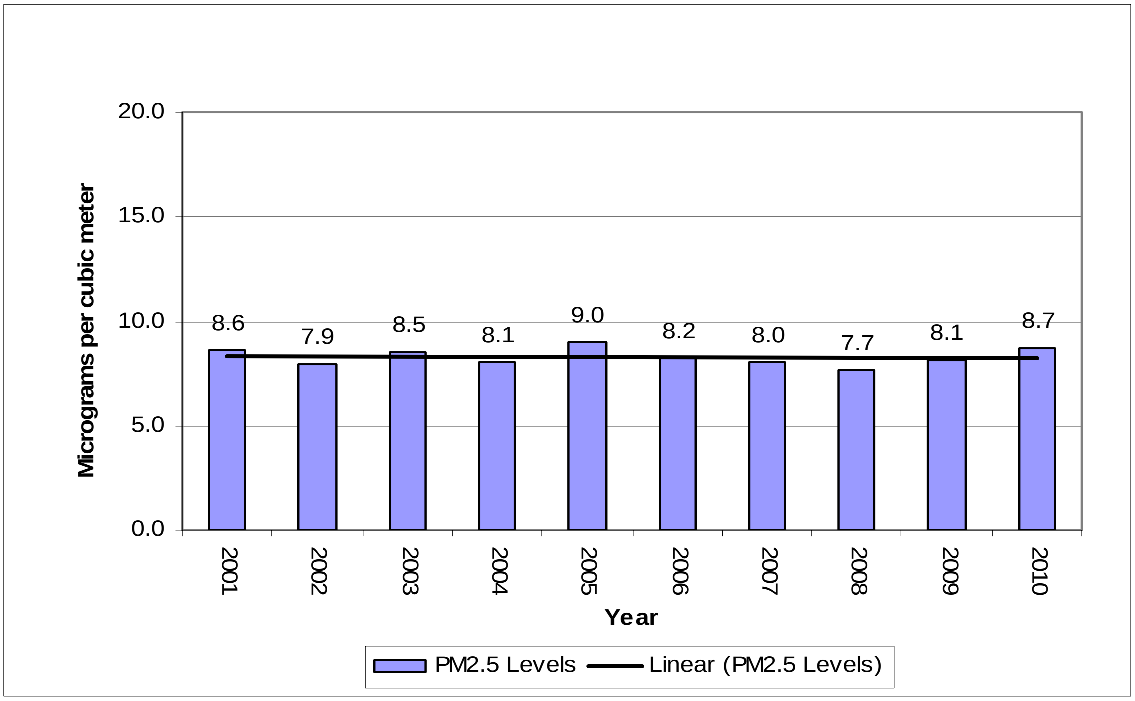
The annual average concentrations change from year to year but the trends line indicates levels are steady over the eleven years of testing. The annual averages range from a low of 17 ug/m^3 in 2004 and 2005 to a high concentration level of 24 ug/m^3 recorded in 2003 and 2008. In 2010, annual average concentration was the same as in 2009. The testing for this parameter is meeting the goals of high concentration and population and will be continued.

7.5.2 Fire Station #1 $PM_{2.5}$ Data

Sampling began for $PM_{2.5}$ at this site in 2001. The $PM_{2.5}$ monitors run on an every third day sampling schedule. Annual averages for the Fire Station #1 Site in Aberdeen have concentrations that range from 7.7 ug/m^3 in 2008 to 9.0 ug/m^3 in 2005. The 2010 annual average concentration was slightly higher then was recorded in 2009 by 0.6 ug/m^3.

The trend line shows that annual averages have stayed steady over the last ten years. The testing for this parameter is meeting the goals of high concentration and population and will be continued. Figure 7-35 contains a graph of the annual average concentrations.

Figure 7-35 – Fire Station #1 $PM_{2.5}$ Annual Averages



7.6 Brookings Area

In 2010 two air monitoring sites were operated in the Brookings area. The oldest site is located at the City Hall building in the center of the city. Testing at this site includes PM_{10} and $PM_{2.5}$ parameters. The Research Farm Site was setup in 2008 and is located at the Soil Conservation Farm northwest of the city of Brookings. Testing at this site includes ozone and meteorological data.

7.6.1 City Hall Site

The City Hall Site was established in 1989 and sampled for levels of PM_{10}. The site is the result of a cooperative effort between the department and the city of Brookings. The area to the west of the site is residential and the areas north, east, and south have service oriented businesses and light industry. Brookings is a growing community with a population of 22,056 and has a growing industrial base. In 1999, $PM_{2.5}$ monitors were added to the site. The sampling frequency for PM_{10} is every sixth day and $PM_{2.5}$ is every third day. Figure 7-36 shows a current picture of the monitoring site. Table 7-11 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Figure 7-36 – City Hall Site

Table 7-10 – City Hall Site Specifics

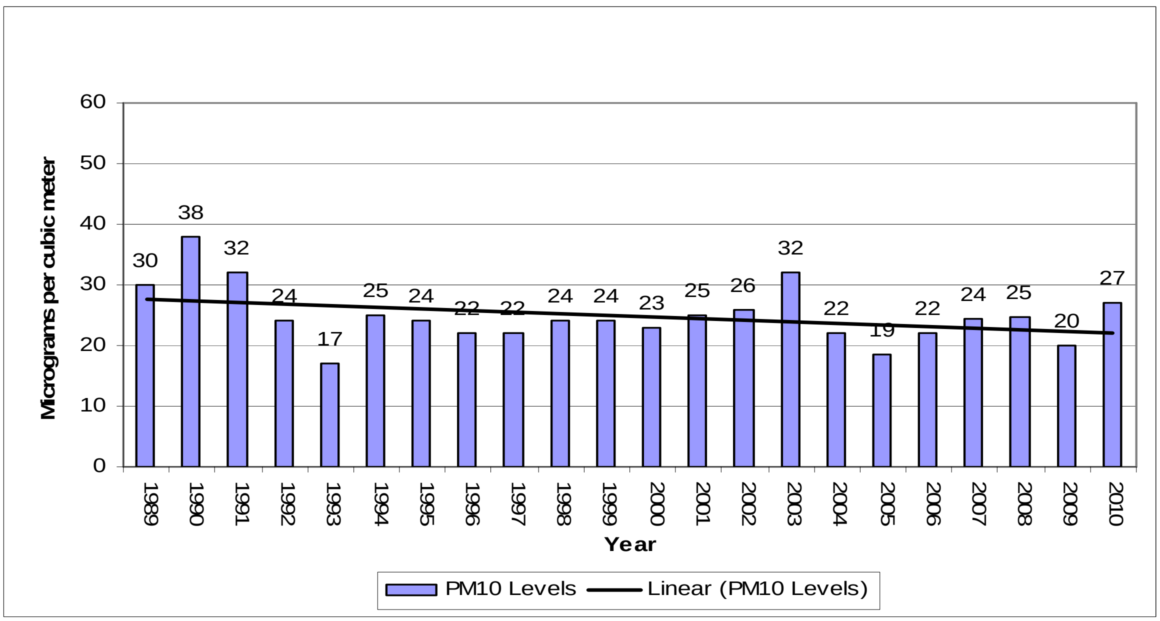
Parameter	Information
Site Name	City Hall
AQS ID Number	46-011-0002
Street Address	311 3rd Avenue, Brookings, SD
Geographic Coordinates	UTM Zone 14, NAD 83, E 675,410.76 N 4,908,468.06
MSA	None
PM_{10}	**(Manual)**
Sampler Type	Federal Reference Method RFPS-1287-063
Operating Schedule	Every 6th Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS),
$PM_{2.5}$	**(Manual)**
Sampler Type	Federal Equivalent Method EQPM-0804-153
Operating Schedule	Every 3rd Day

Parameter	Information
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 $PM_{2.5}$ w/WINS
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

7.6.1.1 City Hall PM_{10} Data

PM_{10} sampling began at this site in 1989. The annual averages range from a high of 38 ug/m^3 in 1990 to a low of 17 ug/m^3 in 1993. The trend line shows concentration levels declining over the 22 years the site has been operating. In 2010, PM_{10} concentrations were up from the previous year but still under the highest level recorded in 1990. Testing for this parameter is meeting the goals of high concentration and population and will be continued. In Figure 7-37, there is a graph of the yearly annual averages since the site was setup in 1989.

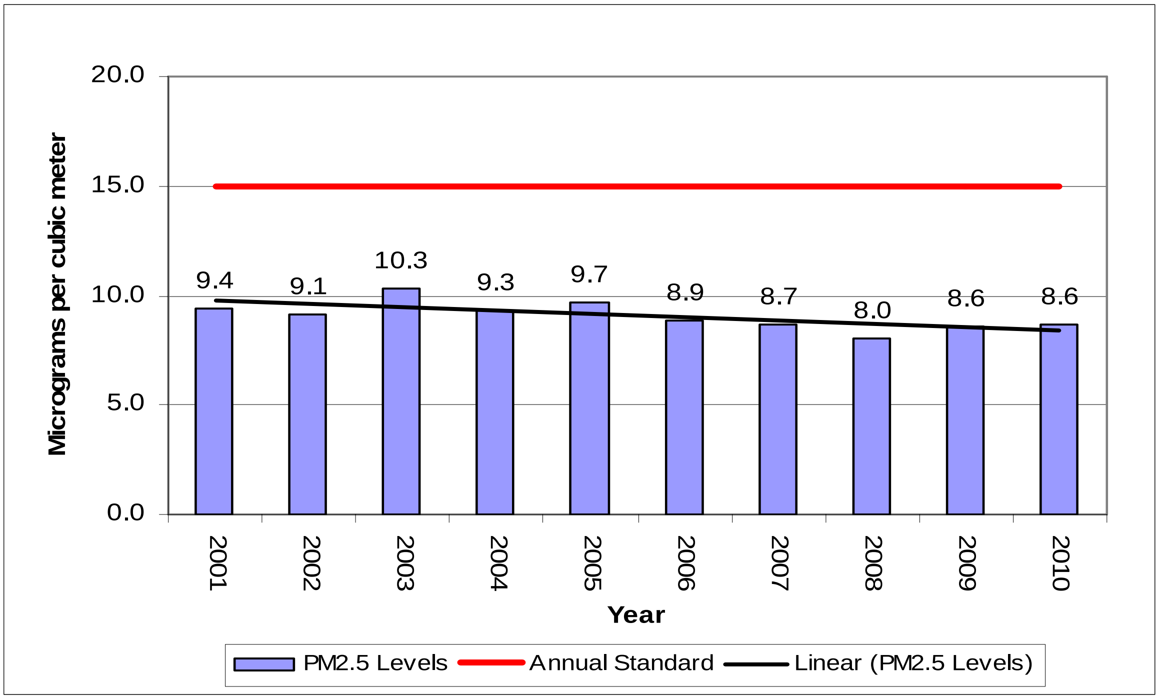
Figure 7-37 – City Hall Site PM_{10} Annual Averages



7.6.1.2 City Hall $PM_{2.5}$ Data

The $PM_{2.5}$ monitors run on an every third day schedule since the site was setup in 1999. Annual averages for the City Hall Site range from a high of 9.7 ug/m^3 in 2003 and 2005 to a low of 8.0 ug/m^3 in 2008. The trends for the ten years of testing show a slight decrease in $PM_{2.5}$ levels overall. In 2010, $PM_{2.5}$ concentrations were at the same concentration level as recorded in 2009. Testing for this parameter is meeting the goals of high concentration and population and will be continued. Figure 7-38 contains a graph of the annual average concentrations.

Figure 7-38 – City Hall Site $PM_{2.5}$ Annual Averages



7.6.2 Research Farm Site

The Research Farm Site was set up in cooperation with the 3M Company in Brookings and Valero Renewable Fuels Company near the city of Aurora which provided the equipment for the site. The sampling is a requirement of the Prevention of Significant Deterioration permits for both facilities. DENR is operating the site and provided data to the facilities. The 3M Company has completed their air monitoring report using the data for 2008. Valero Renewable Fuels Company decided not to complete the facility upgrade under its Prevention of Significant Deterioration permit and no longer needs data from the Research Farm Site. Ozone data collected between 2008 and 2010 was added as a SLAMS site to the National Database in 2010.

The site location is outside of the nitrogen dioxide one microgram area modeled for the facilities in the Brookings area. The site collects data for ozone and meteorological parameters. The goals of the monitoring site were the evaluation of impacts to the ozone concentrations from modification at the 3M Company and Valero Renewable Fuels Company and to date the goals have been met. New goals have been added to collect ozone data downwind of a small city and for comparison to the NAAQS. The completion of the 2010 sampling year provides the first three year average comparison of the ozone data to the NAAQS. Figure 7-39 shows a current picture of the monitoring site. Table 7-11 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Figure 7-39 – Research Farm Site

Table 7-11 – Research Farm Site Specifics

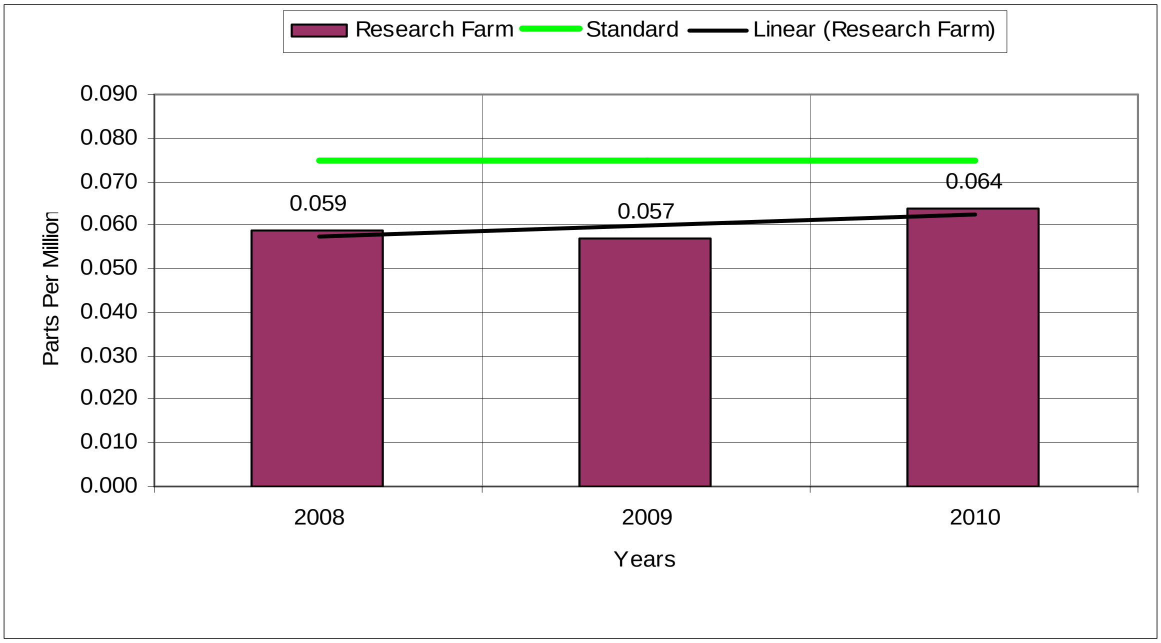
Parameter	Information
Site Name	Research Farm
AQS ID Number	46-011-0003
Street Address	3714 Western Ave.
Geographic Coordinates	UTM Zone 14, NAD 83, E 674766.316 N 4912930.911
MSA	None
Ozone	**(Continuous)**
Sampler Type	Federal Equivalent Method EQOA-0880-047
Operating Schedule	Every 3rd Day
Scale Representation	Regional
Monitoring Objective	High Concentration, Population, and Background
Sampling Method	Thermo 49i
Analysis Methods	ultraviolet
Data Use	PSD (Comparison to the NAAQS),

7.6.2.1 Research Farm Site Ozone Data

The 2010 sampling year is the third ozone season of testing. The goal is to collect at least three years of data before any changes are made to the site. In 2010, the Research Farm Site had a yearly fourth highest 8-hour average that was under the standard of 0.075 ppm. The current ozone data indicates an increasing level. The ozone sampling sites along the eastern edge of state have all had a slight increase in ozone levels the last three years. This is in contrast to the west river sites that have decreasing ozone concentrations and they went from the highest concentration sites to now the lowest after the last three years.

The testing for this parameter is meeting the goals of a SLAMS location and will be continues because as one the three sites recording the highest concentrations in the state it is meeting the goal of high concentration and population. The graph in Figure 7-40 shows the yearly 4th highest ozone concentration level for the last three years.

Figure 7-40 – Research Farm Site Ozone Yearly 4th Highest 8-Hour Averages



7.7 Watertown Area

In 2010, one sampling site was operated in the city of Watertown and is identified as the Watertown Site. Watertown is the fourth largest city in South Dakota with a population of 21,482. The city has an increasing growth rate and industrial base. The industrial base is a mixture of service-oriented business and light industry. One other air monitoring site was operated in Watertown starting in 1974 and closed 1987. No other air monitoring data has been operated in the city. Figure 7-41 shows a picture of the monitoring site.

The Watertown Site was established in 2003 as part of the implementation of the $PM_{2.5}$ network. The parameters tested at the site include PM_{10} on a sampling frequency of every day and $PM_{2.5}$ at a sampling frequency of every third day. The monitoring site is located in the western third of the city just east of an industrial park area. The site is located on the roof of a monitoring shelter. The area around the site has service type businesses and light industry to the west and south. Residential areas are located to the north and east of the site. There have been no significant changes noted in buildings or trees around the site during this review. Table 7-12 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Figure 7-41 – Watertown Site

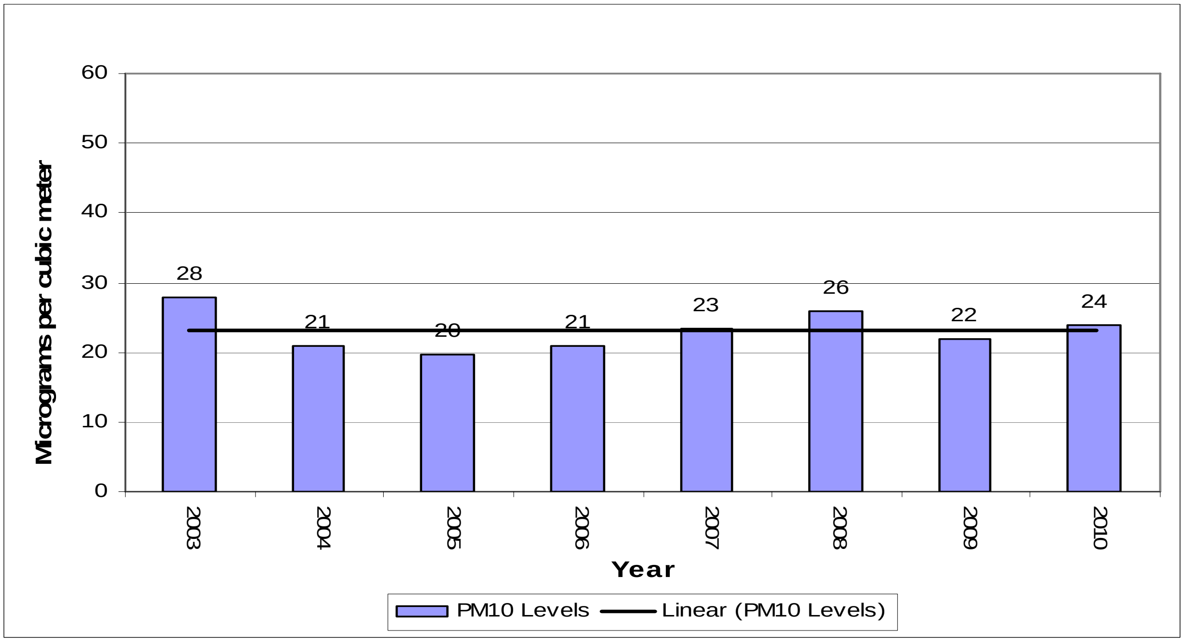
Table 7-12 – Watertown Site Specifics

Parameter	Information
Site Name	Watertown
AQS ID Number	46-029-0002
Street Address	801 4th Ave. SW, Watertown, SD
Geographic Coordinates	UTM Zone 14, NAD 83, E 647,740.74 N 4,973,300.25
MSA	None
PM_{10}	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-1102-150
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Methods	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-Time Data
$PM_{2.5}$	**(Manual)**
Sampler Type	Federal Equivalent Method EQPM-0804-153
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 $PM_{2.5}$ w/cyclone
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

7.7.1 Watertown PM_{10} Data

The PM_{10} monitor operated on an every third sampling schedule until 2006 when a continuous PM_{10} monitor replaced the manual monitors and an everyday sampling schedule began. The highest recorded annual average for PM_{10} concentrations was 28 ug/m^3 recorded in the first sampling year of 2003. The lowest annual average concentration of 20 ug/m^3 was recorded on the manual monitor in 2005. In 2010, concentrations were up slightly from the previous year at 24 ug/m^3. The annual average indicates concentration levels are steady during the eight years of testing. Testing for this parameter is meeting the goals of high concentration and population and will be continued. Figure 7-42 contains a graph of the annual averages.

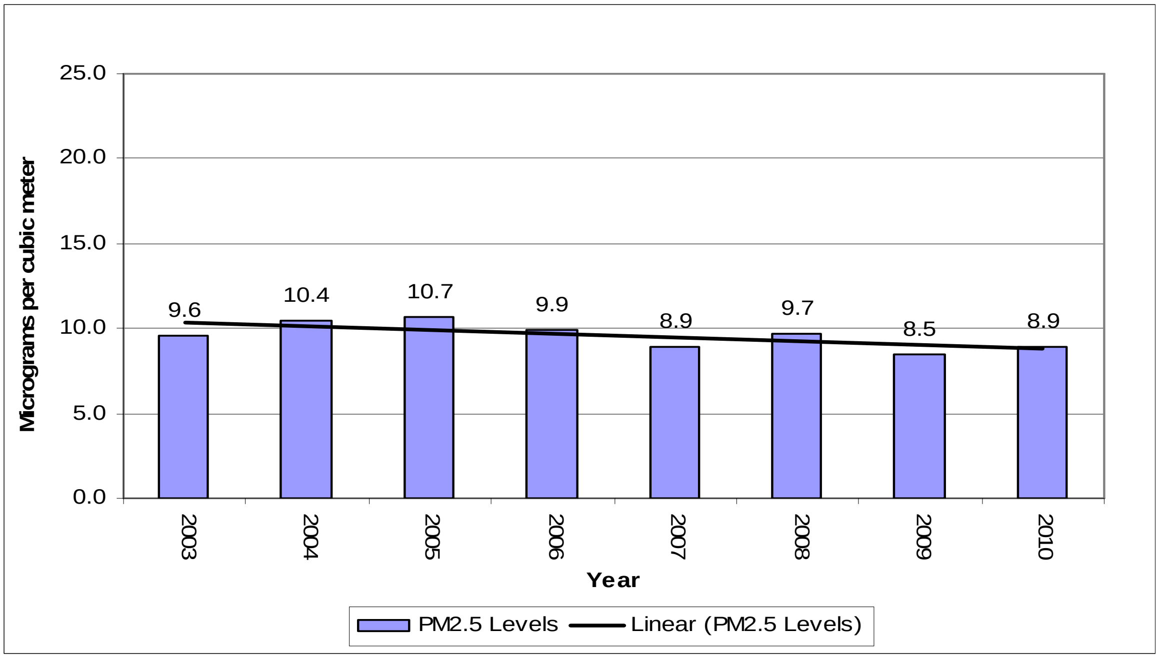
Figure 7-42 – Watertown PM_{10} Annual Averages



7.7.2 Watertown $PM_{2.5}$ Data

The $PM_{2.5}$ monitors run on an every third day schedule since the $PM_{2.5}$ monitors were setup in 2003. Annual averages for the Watertown Site range from a high of 10.7 ug/m^3 in 2005 to a low of 8.5 ug/m^3 in 2009. The 2010 annual average was slightly higher from the previous year. The annual average shows a slight decrease in $PM_{2.5}$ concentration levels over the eight years of testing. Testing for this parameter is meeting the goals of high concentration and population and will be continued. Figure 7-43 contains a graph showing the annual average concentration for each year of testing.

Figure 7-43 – Watertown $PM_{2.5}$ Annual Averages



7.8 Union County Area

At the beginning of 2009, three new monitoring sites were set up in Union County. No ambient air quality testing has ever been completed in this county. All three sites are located north of Elk Point. The new sites will determine air pollution levels near the location of the proposed Hyperion Energy Center prior to construction, during construction, and post construction. In addition the data will be compared to the NAAQS. The Hyperion Energy Center when constructed would be home to an oil refinery and electrical power plant. Because the sites are collecting preconstruction or background data the parameters will be compared between UC #1 and UC #2 sites.

7.8.1 UC #1 Site

UC #1 Site is located about 3 miles south of the proposed Hyperion Energy Center. Sampling began on or near January 1, 2009 for all but carbon monoxide. Problems with the new carbon monoxide analyzer were encountered and needed to be worked out. By the beginning of 2010, the carbon monoxide data was meeting the quality assurance measures. The goals of the site are background and comparison to the NAAQS. Figure 7-44 provides a picture of the monitoring site looking to the southeast.

Figure 7-44 – UC #1 Site

Table 7-13 contains details on the monitoring site specific to the requirements in 40 CFR Part 58. In addition to the parameters listed in Table 7-13 an air toxic monitor is also operated on an every 6^{th} day sampling schedule.

Table 7-13 – UC #1 Site Specifics

Parameter	Information
Site Name	UC #1
AQS ID Number	46-127-0001
Street Address	31988 457^{th} Ave.
Geographic Coordinates	Lat. + 42.751518 Long. – 96.707208
MSA	Sioux City, IA-NE-SD
PM_{10}	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-1102-150
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Method	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS)

Parameter	Information
$PM_{2.5}$	**(Continuous)**
Sampler Type	Federal Equivalent Method RFPS-0598-0119
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Met One BAM-1020 w/$PM_{2.5}$ VSCC
Analysis Method	Beta Attenuation
Data Use	Real-time Data and SPMS
SO_2	**(Continuous)**
Sampler Type	Federal Equivalent Method EQSA-0486-060
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental 43i Trace Level Thermo
Analysis Methods	Pulsed Fluorescent
Data Use	SLAMS (Comparison to the NAAQS)
NO_2	**(Continuous)**
Sampler Type	Federal Reference Method RFNA-1289-074
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental 42i Thermo/Fisher
Analysis Method	Chemiluminescence
Data Use	SLAMS (Comparison to the NAAQS)
CO	**(Continuous)**
Sampler Type	Federal Equivalent Method EQOA-0880-047
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental API 300EU Trace Level
Analysis Method	Ultraviolet
Data Use	SLAMS (Comparison to the NAAQS)

7.8.2 UC #2 Site

UC#2 Site is located about 1 ½ miles north northwest of the proposed Hyperion Energy Center. Table 7-14 contains details on the monitoring site specific to the requirements in 40 CFR Part 58. Figure 7-45 contains a picture of the monitoring site looking west.

Figure 7-45 – UC #2 Site

Table 7-14 – UC #2 Site Specifics

Parameter	Information
Site Name	UC #2
AQS ID Number	46-127-0002
Street Address	31307 473 Ave.
Geographic Coordinates	Lat. + 42.850975 Log. – 96.747325
MSA	Sioux City, IA-NE-SD
PM_{10}	**(Continuous)**
Sampler Type	Federal Equivalent Method EQPM-1102-150
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Method	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No change planned for 2010
$PM_{2.5}$	**(Continuous)**
Sampler Type	Federal Equivalent Method RFPS-0598-0119
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport

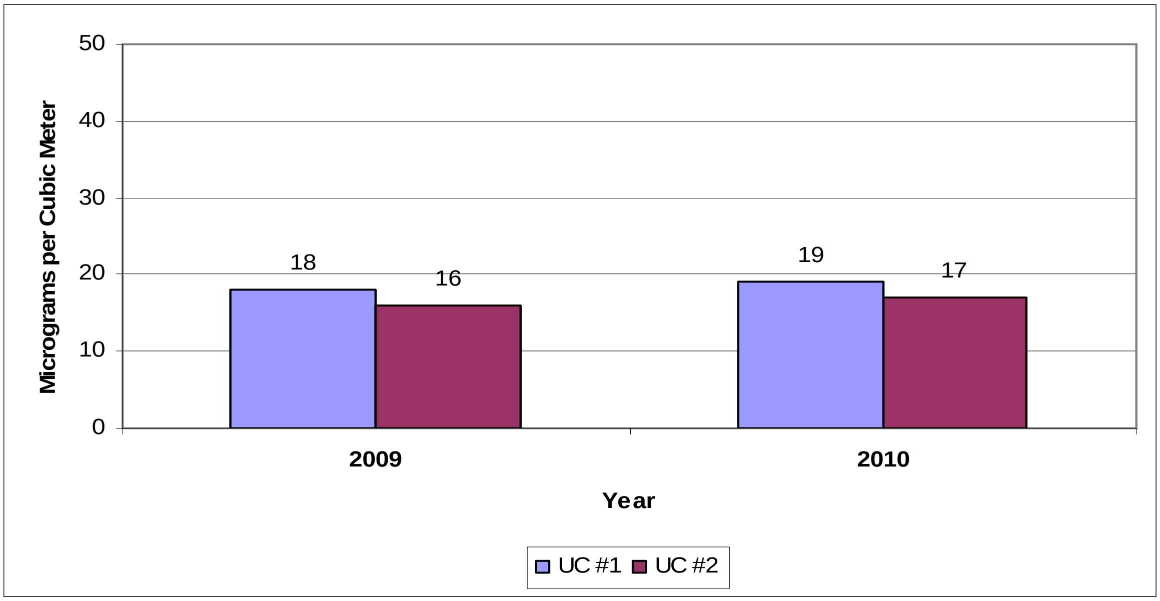
Parameter	Information
Sampling Method	Met One BAM-1020 w/$PM_{2.5}$ VSCC
Analysis Method	Beta Attenuation
Data Use	Real-time Data and SPMS
SO_2	**(Continuous)**
Sampler Type	Federal Equivalent Method EQSA-0486-060
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental 43i Trace Level Thermo/Fisher
Analysis Methods	Pulsed Fluorescent
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
NO_2	**(Continuous)**
Sampler Type	Federal Reference Method RFNA-1289-074
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental 42i Thermo
Analysis Method	Chemiluminescence
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
$PM_{2.5}$	**(Manual)**
Sampler Type	Federal Equivalent Method EQPM-0804-153
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 $PM_{2.5}$ w/cyclone
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

7.8.3 UC #1 and UC #2 PM_{10} Data

The average concentrations of PM_{10} in Union County represent concentration levels similar to other sites in eastern South Dakota. The annual average concentrations in eastern part of the state range between 22 to 15 ug/m^3. The Union County sites annual averages ranked in the middle to the lower end of this range. See the annual averages for the two sites in Union County in Figure 7-46.

PM_{10} point source emissions have localized impacts due to the size and weight of the particles. Therefore, low annual averages close to the same concentration level at both sites would be expected in a rural area with only fugitive dust sources. Because of differences in localized fugitive dust sources such as tilling of agricultural fields, gravel roads, and associated wind speed and direction during the activities can have a larger effect on differences in 24-hour concentration levels between the two sites.

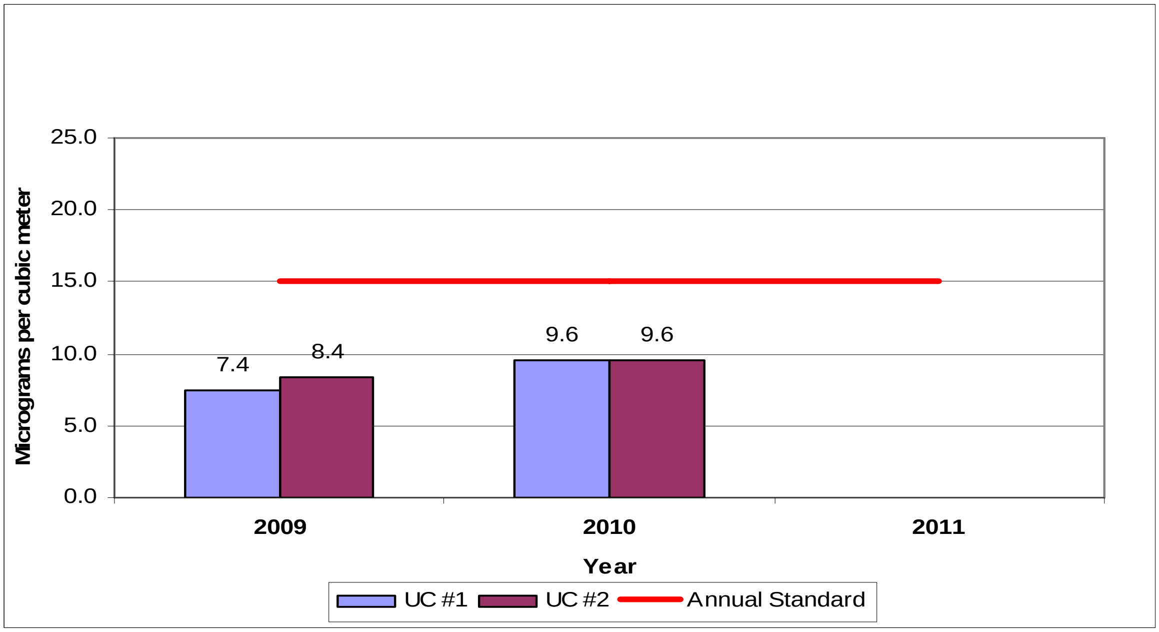
Figure 7-46 – Union County Annual PM_{10} Concentrations



7.8.4 UC #1 and UC #2 $PM_{2.5}$ Data

The annual average concentrations for $PM_{2.5}$ at the two sites would be expected to be close to the same level. In this case the annual averages were compared between both continuous monitors. See Figure 7-47 to view a graph of the annual averages.

Figure 7-47 – Union County Annual $PM_{2.5}$ Concentrations



A difference of 1 ug/m^3 was shown in 2009. In 2010, both sites had the same annual average concentration of $PM_{2.5}$. When comparing the activities around the two sites the differences include a highway running just north of UC #2 and a small group of homes and business near this site. UC #1 has only one home near the site. Therefore, there may be some concentration difference between the two sites. In 2010, it appears the differences did not affect the annual average levels.

At UC #2 both a manual method and a continuous method monitor are run. One notable item is the difference in the annual averages in 2009, between the manual and continuous method at UC #2 was only 0.3 ug/m^3. The difference in annual averages between both methods in 2010 was only 0.1 ug/m^3. So the difference was not method related and appears to be associated with higher traffic counts or more combustion sources near UC #2 in 2009.

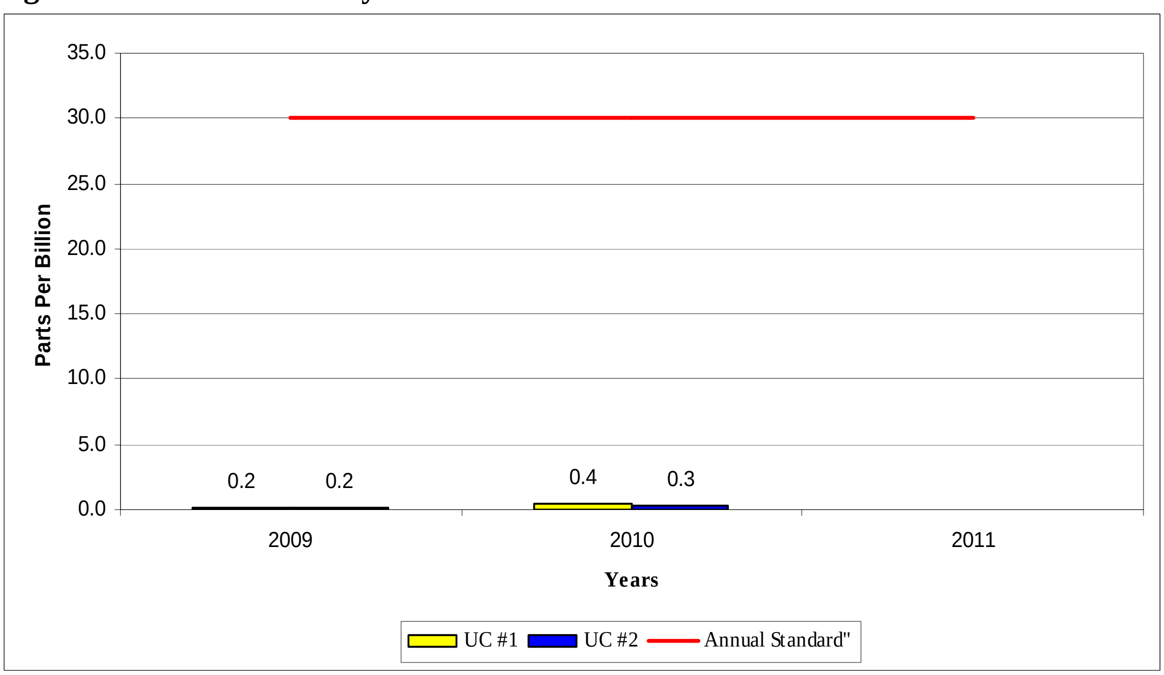
Annual average concentrations in the eastern part of the state range from 9.1 to 7.4 ug/m^3. UC #1 appears to best represent the current background $PM_{2.5}$ concentrations as it has the lowest annual average and has the least chance of having higher readings due to localized sources. A better comparison can be made when three years of data has been completed for both sites.

7.8.5 UC #1 and UC #2 Sulfur Dioxide Data

Concentrations of sulfur dioxide follow the same trend as other sites in the state with low annual average concentrations that are near the detection level (0.1 ppb) for the analyzer method being used to collect the data. Trace level sulfur dioxide analyzers are operated at both sites beginning in 2009.

Differences in concentration levels are noted between the two sites when comparing the 1-hour and 3-hour averages but the annual average levels are very close. See Figure 7-48 for a graph showing the annual averages for both sites in 2009 and 2010.

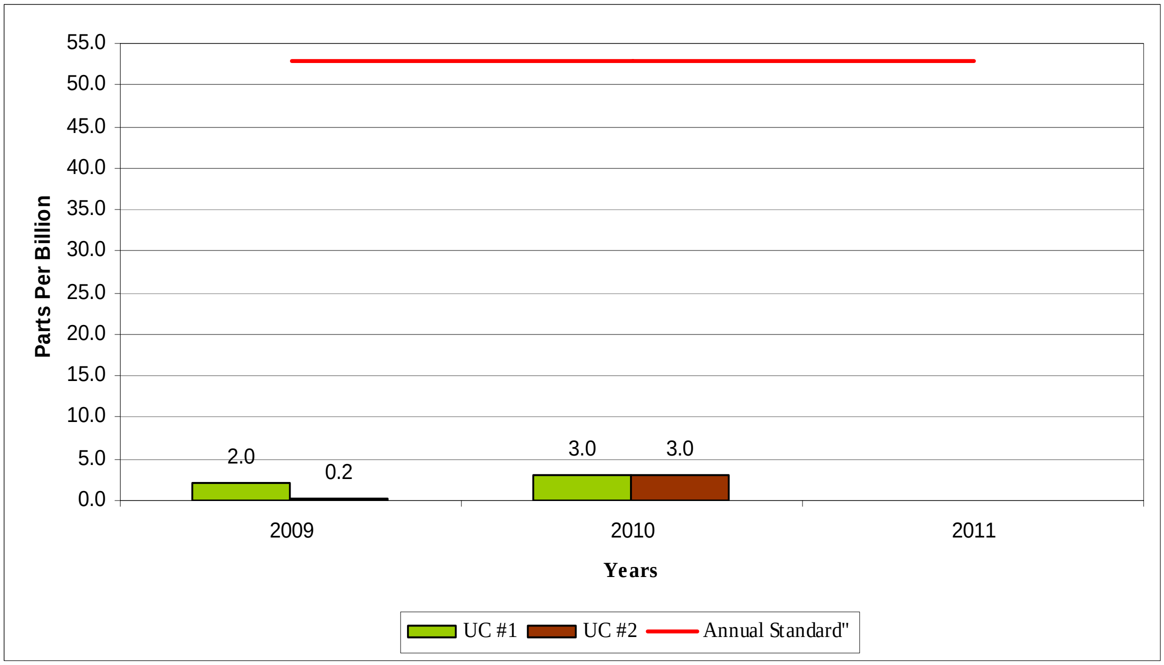
Figure 7-48 – Union County Sulfur Dioxide Concentrations



7.8.6 UC #1 and UC #2 Nitrogen Dioxide Data

Concentrations of nitrogen dioxide follow the same trends as other rural sites in the state like the Badlands and Wind Cave sites. Annual average concentrations are very low near the detection level for the analyzer method being used to collect the data. Just as the sulfur dioxide parameter, the nitrogen dioxide parameter differences are noted when comparing a 1-hour average but the annual averages are very close in concentration. Figure 7-49 shows a graph of the annual average concentration for both sites in 2009 and 2010.

Figure 7-49 – Union County Nitrogen Dioxide Concentrations



7.8.7 UC #3 Site

UC #3 Site is located about 3 ½ miles north and 2 miles west of the proposed Hyperion Energy Center. Figure 7-50 contains a picture of the monitoring site looking northeast.

Figure 7-50 – UC #3 Site

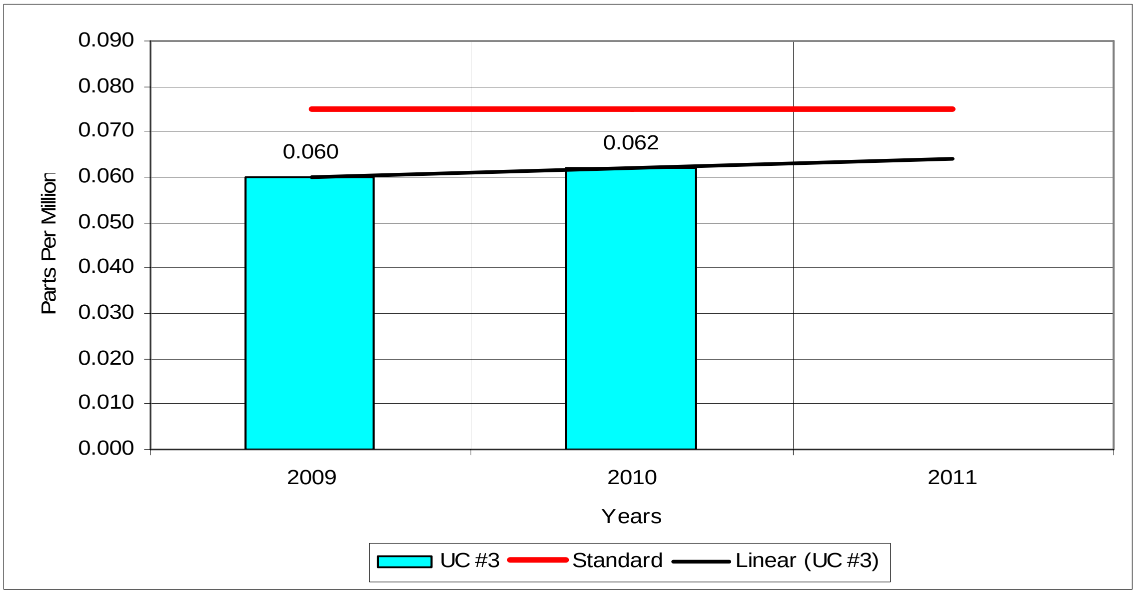
Table 7-15 contains details on the monitoring site specific to the requirements in 40 CFR Part 58.

Table 7-15 – UC #3 Site Specifics

Parameter	Information
Site Name	UC #3
AQS ID Number	46-127-0003
Street Address	31102 47th Ave.
Geographic Coordinates	Lat. + 42.880212 Long. – 96.785339
MSA	Sioux City, IA-NE-SD
Ozone	**(Continuous)**
Sampler Type	Federal Equivalent Method EQOA-0880-047
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Thermo 49i
Analysis Method	Ultraviolet
Data Use	PSD and (Comparison to the NAAQS),

The ozone 8-hour average for the UC #3 Site recorded a concentration that was similar to levels recorded at the other two sites in the eastern part of the state in 2010. As expected the SD School Site in Sioux Falls recorded the highest concentration at 0.064 ppm and the lowest 0.057 ppm was recorded at the Research Farm Site in rural Brookings County. See Figure 7-51 for a graph of the ozone concentrations at the UC #3 Site.

Figure 7-51 – Union County Ozone Concentrations



8.0 SPECIAL AIR QUALITY MONITORING

8.1 Urban Air Toxics Monitoring Program

South Dakota has two stations that collect samples as part of the Urban Air Toxics Monitoring Program (UATMP). These stations collect 24-hour air samples on an every 6th day schedule.

One monitor is located at the SD School Site in Sioux Falls and is identified by the federal contractor as SSSD. Sioux Falls is the largest city in the state. This site was selected because it represents population exposure to chemical and particulate emissions from the industrial parts of the city. The predominant wind direction is northwest for most of the year with southeast winds during the summer months. The monitor was originally located about 1.2 miles southeast of the existing site (SFSD) and was relocated to its existing site in 2008. The previous monitor was setup in March of 2000, sampling for hydrocarbons, halogenated hydrocarbons, and polar compounds. In 2002, carbonyls sampling was added.

The other monitor is located at the UC #1 Site in Union County and is identified by the federal contractor as UCSD. The monitoring project objectives are to gather data to determine current pollution levels before construction of the project begins, collect data during plant construction, and determine levels during the operation of the facility. Sampling began at the beginning of January 2009.

Table 8-1 shows a comparison of the two sites for the five pollutants the department is sampling for at the two sites. The table shows which site had the higher concentration (parts per billion carbon (ppbc)) in 2010, the overall trend for each site, and possible sources emitting the air toxic pollutant.

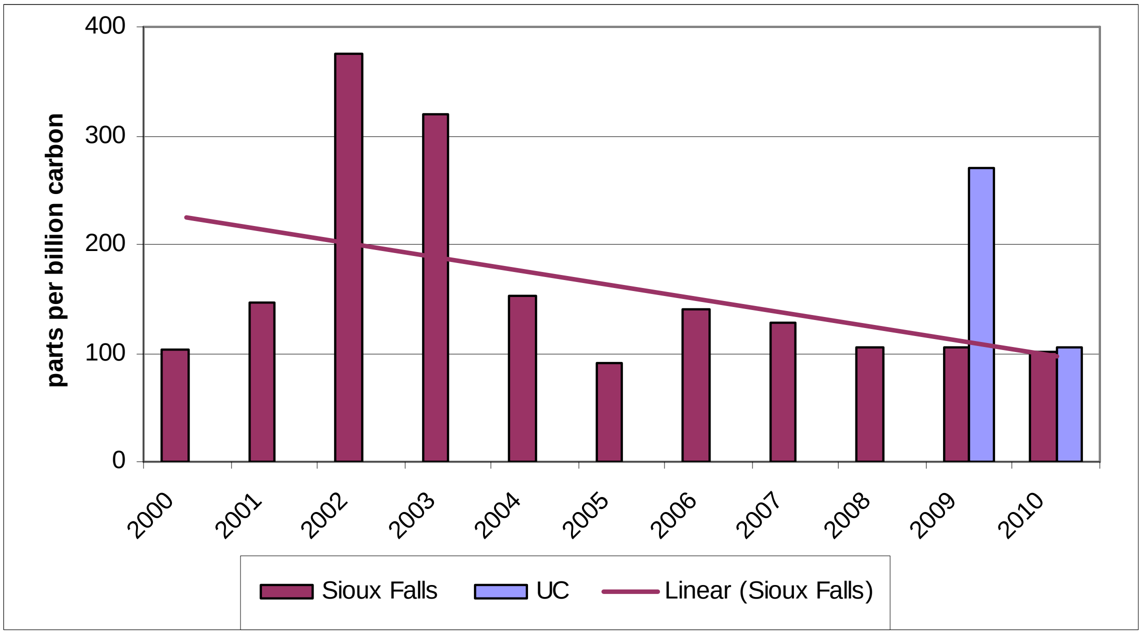
Table 8-1 – Air Toxic Sampling Results for 2010

Air Toxic Pollutant	Site	Site with Higher Concentrations (ppbc)	Trend	Possible Sources
1,3-Butadiene	UC #1		Decrease	Motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke
1,3-Butadiene	SD School	X	Decrease	
Formaldehyde	UC #1	X	Decrease	Power plants, manufacturing facilities, incinerators, and automobile exhaust emissions
Formaldehyde	SD School		Decrease	
Acetaldehyde	UC #1		Decrease	An intermediate product of higher plant respiration and is formed as a product of incomplete wood combustion in fireplaces and wood stoves, coffee roasting, burning of tobacco, vehicle exhaust fumes, and coal refining and waste processing.
Acetaldehyde	SD School	X	Decrease	
Acrolein	UC #1		Decrease	Formed from the breakdown of certain pollutants found in outdoor air, from burning tobacco, or from burning gasoline.
Acrolein	SD School	X	Increase	
Benzene	UC #1		Decrease	Burning coal and oil, motor vehicle exhaust, and evaporation from gasoline service stations and industrial solvents
Benzene	SD School	X	Decrease	

In 2010, Sioux Falls experienced higher concentrations of 1,3-Butadiene, Acetaldehyde, Acrolein and Benzene and Union County experienced higher concentrations of Formaldehyde. The trend for these pollutants appears to be decreasing, except for Acrolein in Sioux Falls is increasing.

The option of testing for total non-methane organic compounds (NMOC) parameter was also included in the sampling since 2000. NMOC compounds are of particular interest because of their role in ozone formation. The trend line would indicate some ozone forming pollutants are decreasing in levels. The average total NMOC values are shown in Figure 8-1.

Figure 8-1 – Average Total NMOC [1]



[1] – Note that the 2008-2010 values in Sioux Falls are from the SSSD site and the previous values were from the SFSD site.

8.2 $PM_{2.5}$ Speciation Monitoring Program

The chemical speciation network will quantify mass concentrations and significant $PM_{2.5}$ constituents which include trace elements, sulfate, nitrate, sodium, potassium, ammonium, and carbon. This series of analytes is very similar to those measured within the Interagency Monitoring of Protected Visual Environments (IMPROVE) program.

Physical and chemical speciation data are anticipated to provide valuable information for:

- Assessing trends in mass component concentrations and related emissions, including specific source categories.
- Characterizing annual and seasonal spatial variation of aerosols.
- Determining the effectiveness of implementation control strategies.
- Helping to implement the $PM_{2.5}$ standard by using speciated data as input to air quality modeling analyses.
- Aiding the interpretation of health studies by linking effects to PM2.5 constituents.
- Understanding the effects of atmospheric constituents on visibility impairment and regional haze.

South Dakota has one site that collects samples as part of the Speciation Network. This site collects 24-hour air samples on a 6-day schedule in 2010. Beginning in 2011, the sampling frequency increased to every third day schedule. The site is the SD School Site in Sioux Falls. The speciation monitor was moved from the SF KELO Site to the SD School Site at the beginning of 2009. The SD School Site is located on the east central part of the city and is the National Core Site for South Dakota. The site is about 1.2 miles southeast of the main industrial area in Sioux Falls.

The area around the site is mainly residential. Interstate 229 which is a major commuting road runs north and south about three city blocks east of the monitoring site. The predominant wind direction is northwest for most of the year with southeast winds during the summer months. Carbon samples were taken by the Met One SASS monitor. In September 2009, the Improve URG 3000N sampler was set up to do the carbon sampling.

Figure 8-2 shows a comparison of the $PM_{2.5}$ concentrations between the speciation monitor, the manual monitor, and the continuous monitor located at this site. The speciation monitor in most cases has lower annual average concentrations then the continuous and manual monitors. The speciation monitor is not an approved EPA reference or equivalent method so data can not be used to compare to the NAAQS.

Figure 8-2 – Average $PM_{2.5}$ Concentration

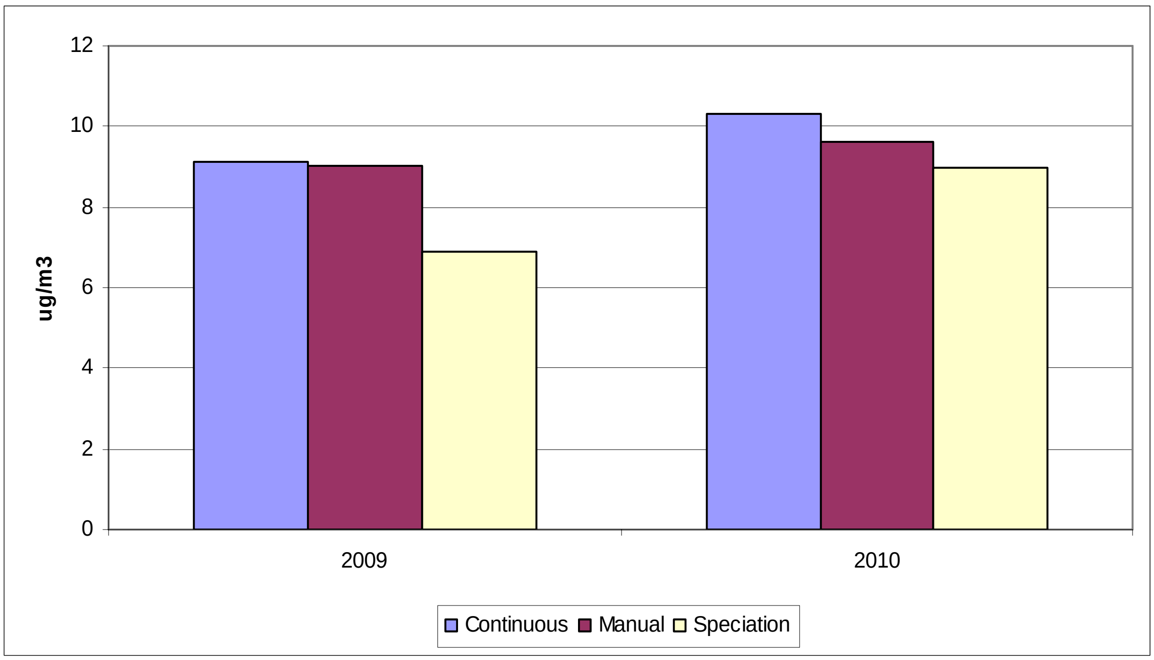


Figure 8-3 shows the average total organic carbon and elemental carbon concentrations for the URG. Concentrations of carbon are low. The organic carbon concentrations on the average were higher in 2010 then in 2009. The average contribution of elemental carbon to the overall concentration decreased slightly between the two years.

Figure 8-3 – Average Carbon Concentrations

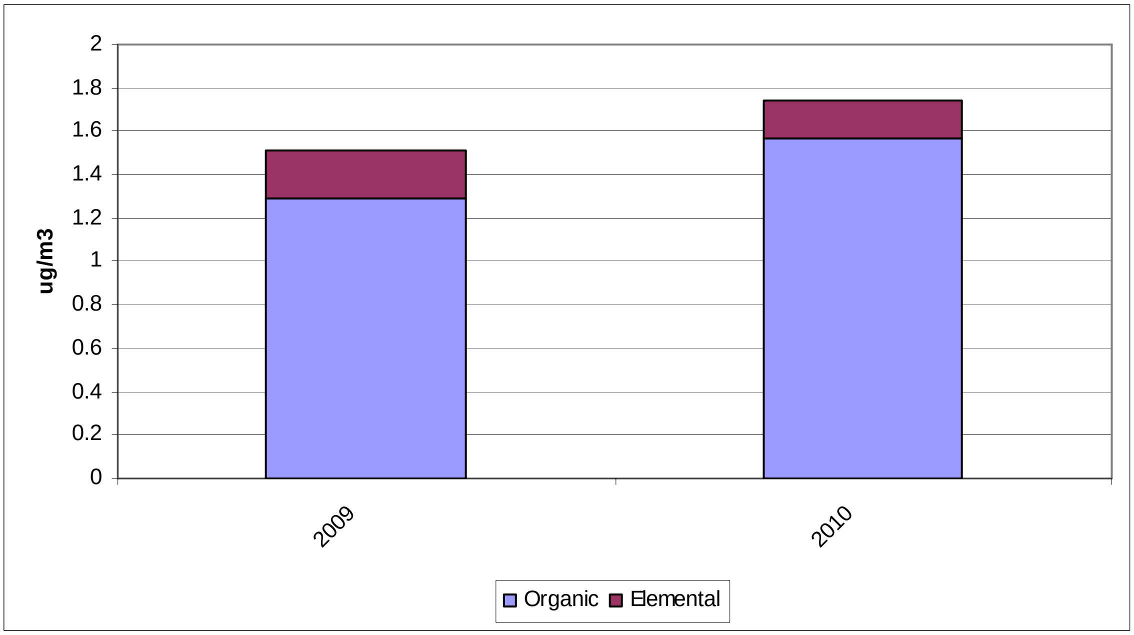
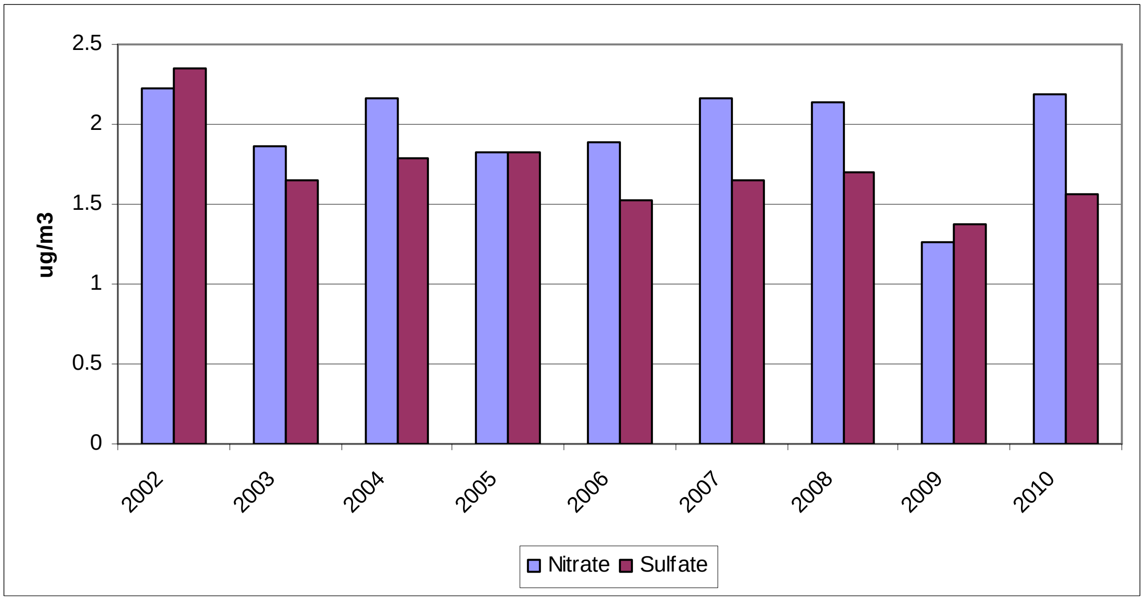


Figure 8-4 shows the average nitrate and sulfate concentrations analyzed from the $PM_{2.5}$ samples. The graph shows trends for the concentration of nitrates are at nearly a steady level over the seven year period. Sulfates in the $PM_{2.5}$ samples declined an average of 0.5 ug/m^3 during the testing period.

Figure 8-4 – Average Nitrate and Sulfate Concentrations



9.0 NETWORK MODIFICATIONS FOR 2011 and 2012

9.1 New Sites

The department will continue to evaluate the following areas for the need to modify the ambient air monitoring network:

1. With the change in deicing operations in Rapid City, the department will continue to evaluate the need for other air monitoring sites in the city if problems with dust are noted.

2. As monitoring rules and standard are finalized by EPA in 2011 there may be a need for modifications to the ozone testing site locations.

3. EPA has revised the sulfur dioxide standard and the rule requires population weighted emission averaged site in the Sioux City MSA which includes Union County in South Dakota. DENR will be evaluating the rule change and the impact on the state's ambient air monitoring network.

9.2 Modifications

The department is planning the following site modifications:

1. Manual method $PM_{2.5}$ monitors and a Met One BAM 1020 continuous $PM_{2.5}$ monitor are operated at UC #2 Site. At the end of 2011 three years of air monitoring data will be collected with both methods. Running both methods duplicates the sampling effort so the manual method will be discontinued at the end of 2011.

2. In 2011, modifications will be made to change equipment type in the $PM_{2.5}$ network. It is anticipated that a Met One BAM 2010 continuous monitor will replace the manual monitors at the Utility Yard Site in Watertown. The change from manual $PM_{2.5}$ monitors to Met One BAM 2010 continuous monitors as SLAMS will decrease the cost of running the $PM_{2.5}$ sites and increase the sampling rate.

3. In 2011, modifications will be made to continue the replacement of the RAAS $PM_{2.5}$ manual method monitors which were purchased in 1997. The RAAS $PM_{2.5}$ monitors are having a lot of malfunctions and the monitors have been discontinued by the manufacturer and replacement parts will no longer be available after 2011. The current plan is to replace the RAAS 100 manual monitors at City Hall Site in Brookings and Fire Station #1 in Aberdeen.

4. The air toxic monitor at UC #1 will complete the collection of three years by the end of 2011. No further testing should be required until the Hyperion Energy Center begins to operate so the monitor will be closed out.

9.3 Sites Closed

No ambient air monitoring sites are planned to be closed in the South Dakota in 2011.

10.0 REQUEST FOR WAIVER

There were no sampling frequency waivers requested for the 2010 sampling year and none are proposed for 2011.

11.0 CONCLUSIONS

The ambient air quality monitoring network has demonstrated or is in the process of demonstrating that South Dakota is attaining the federal NAAQS. The Air Quality Program is working to ensure that any changes in the air quality of the state are reviewed for possible health effects to the public. The ambient air quality monitoring network is continually reviewed to ensure that there is adequate coverage of populated areas in the state. As the state's population and industry changes, monitoring sites will be added or moved to new locations.

There is an ongoing effort to maintain staff training regarding the latest monitoring techniques and procedures to perform these studies. It is anticipated that the ambient air monitoring network will operate in much the same manner as it has in the past. This will include the identification of pollution problems, measurement and evaluation of the extent of the problem, and determination of action to be taken to protect the environment and the health of the people of South Dakota.

12.0 REFERENCES

1 Environmental Protection Agency, May 1977. Quality Assurance Handbook for Air Pollution Measurement Systems Volume II, Ambient Air Specific Methods (as amended), EPA-600/4-77-027a, Office of Air Quality Planning and Standards, Research Triangle Park, N.C.;

2 Environmental Protection Agency, January 2003. Title 40 Code of Federal Regulation, Parts 50 and 58 (as amended), United States Government Printing Office, Superintendent of Documents, Washington, D.C.; and

3 Environmental Protection Agency, March 1998. SLAMS / NAMS / PAMS Network Review Guidance, EPA-454/R-98-003, Office of Air Quality Planning and Standards, Research Triangle Park, N.C.