South Dakota Ambient Air Monitoring Network

5-Year Assessment of Air Monitoring Sites

2005 to 2009

Air Quality Program

Dakota Department of Environment and Natural Resources

2010

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1.0 INTRODUCTION

The United States Environmental Protection Agency (EPA) through the Code of Federal Regulations and the Performance Partnership Agreement requires the South Dakota Department of Environment and Natural Resources (DENR) to complete a 5-year network assessment of the state's ambient air monitoring sites in 2010. EPA's requirements for the 5-year network assessment are listed in 40 Code of Federal Regulations § 58.10 with guidelines in the Ambient Air Monitoring Network Assessment Guidance and Analytical Techniques for Technical Assessment of Ambient Air Monitoring Networks EPA-454/D-07-001 February 2007.

The 5-year assessment analyzes the air monitoring network, determines if the current air monitoring network is meeting the needs within the state, and assesses the future needs. The final 5-year assessment will be submitted to EPA for comments.

2.0 AIR QUALITY MONITORING HISTORY

In 1972, South Dakota developed and EPA approved a state implementation plan which included the establishment and operation of an ambient air monitoring network for special purpose studies (SPM) in the state. The network of sites included the take over of the EPA sites operating in the state. In 1980, South Dakota submitted a revision to its State Implementation Plan to upgrade the program by establishing a network of state and local air monitoring stations, national air monitoring sites, special purpose monitoring stations, and developed a quality assurance project plan to operate the network. The early air monitoring network in the 1980s contained sites testing for total suspended particulate, nitrogen dioxide, and sulfur dioxide. As EPA changed indicators for pollutants, like particulate matter 10 microns and less (PM10) and particulate matter 2.5 microns and less (PM2.5) for total suspended particulate, and reduced the concentration levels of the standards there was need for additional testing and pollution parameters. In some cases EPA rule required additional testing. The existing network, now testing for PM10, PM2.5, sulfur dioxide, nitrogen dioxide, carbon monoxide, and ozone is the South Dakota ambient air monitoring network.

2.1 Particulate Matter

During the 1970s and 1980s the state operated total suspended particulate monitors to test for levels of particulate matter all across the state. The total suspended particulate samples were collected on high volume method monitors. A total of 48 monitoring sites were operated during this period of time. Sampling objectives included background, high concentration, population exposure, and transport. The total suspended particulate sampler remained the main sampling method in the network until the total suspended particulate was replaced with the PM10 standard in 1986. Within a few years all of the total suspended particulate monitors were retrofitted for PM10 or removed from the sampling sites. Table 2-1 lists the sites operated in the air monitoring network testing for total suspended particulate concentrations. Currently, there are no total suspended particulate monitors operating in the air monitoring network.

Table 2-1 Total Suspended Particulate Air Monitoring Network

Site	Site Name	Location	County	Start Date	End Date
460650001	Andersen Bldg	Pierre	Hughes	1972	1987
461031001	Public Library	Rapid City	Pennington	1972	1989
461030001	Sayer's Store	Deerfield	Pennington	1974	1977
461030002	Mt. View	Rapid City	Pennington	1972	1988
461030003	Ken Freeze	Rapid City	Pennington	1974	1976
461030004	Cement Plant	Rapid City	Pennington	1974	1975
461030005	Public Service	Rapid City	Pennington	1976	1987
461030006	Steven's HS	Rapid City	Pennington	1976	1987
461030007	S. Junior High	Rapid City	Pennington	1978	1985
461030008	Arrowhead Club	Rapid City	Pennington	1978	1979
461030009	Mini Mart	Rapid City	Pennington	1979	1979
461030010	Camp Rapid	Rapid City	Pennington	1985	1989
461030011	Banks/Johnson	Rapid City	Pennington	1985	1985
460990001	City Hall	Sioux Falls	Minnehaha	1979	1988
460990002	Airport	Sioux Falls	Minnehaha	1972	1987
460990003	Sewer Treatment P.	Sioux Falls	Minnehaha	1972	1977
460990004	Augustana	Sioux Falls	Minnehaha	1975	1988
460990005	O'Gorman	Sioux Falls	Minnehaha	1981	1985
460130001	Sanitation B.	Aberdeen	Brown	1972	1980
460130002	ARCC	Aberdeen	Brown	1979	1985
460110001	Ag Engineering	Brookings	Brookings	1975	1987
460050001	Post Office	Huron	Beadle	1975	1985
460350001	Corn Palace	Mitchell	Davison	1974	1979
460350002	High School	Mitchell	Davison	1981	1986
461350001	Water Plant	Yankton	Yankton	1975	1987
460331001	Sanson Ranch	Buffalo Gap	Custer	1982	1987
460330001	Teepee Work	Forest Service	Custer	1958	1980
460510001	SE of Plant	Big Stone	Grant	1978	1985
461090002	NW of Plant	Big Stone	Roberts	1978	1985
461050001	Thom's	Lemmon	Perkins	1975	1986
460630001	Water Tower	Buffalo	Harding	1975	1986
460630003	NOAA Site	Redig	Harding	1975	1975
460190001	REID Well #11	Newell	Butte	1977	1978
460190002	Ollila Ranch	Nisland	Butte	1980	1986
460210001	Phone Building	Pollock	Cambell	1980	1985
460290001	Jenkin's Home	Watertown	Codington	1975	1987
460470001	Waste Water Plant	Hot Springs	Fall River	1976	1981
460790001		Madison	Lake	1974	1979
460810001	6-miles South	BellFourche	Lawrence	1976	1976

Site	Site Name	Location	County	Start Date	End Date
	East				
460810002	BHSC Admin B	Spearfish	Lawrence	1974	1975
461290001	Post Offcie	Mobridge	Walworth	1974	1974
461290002	High School	Mobridge	Walworth	1974	1974
461290003	Marv's Grocery	Mobridge	Walworth	1974	1974
SPM	SDSU Rotunda	Brookings	Brookings	1979	1985
SPM	SDSU Ag Hall	Brookings	Brookings	1979	1985
SPM	Whitaker-Mattson	Rapid City	Pennington	1982	1984
SPM	Western S.	Rapid City	Pennington	1985	1985

In 1985, the state set up the first samplers to test for levels of PM10 in anticipation of EPA adopting a PM10 National Ambient Air Quality Standard. In 1987, the total suspended particulate standard was replaced with the new PM10 standards. South Dakota submitted a revised ambient air monitoring network plan to include sampling sites for the new PM10 standard and shutdown the total suspended particulate monitoring network. The sites with low potential to have high PM10 concentrations were discontinued by 1987.

Continuous equivalent method PM10 monitors were added to the network replacing some of the manual monitors beginning in the 1990s. The goal is to continue to add continuous monitors to the network because more data is collected for each site and the continuous monitor is cheaper to operate.

Currently, 13 of the monitoring sites in the air monitoring network are testing for PM10. PM10 continues to be a priority in the limestone quarry area of Rapid City. The remaining areas of the state have few issues with high concentrations unless there are high winds or some kind of exceptional event. Table 2-2 lists information about each PM10 site operated in the state and includes the sites being operated in the current monitoring network. See Table 2.2 listing the sites with PM10 data.

Table 2-2 PM10 Air Monitoring Network

Site	Site Name	Location	County	Start Date	End Date
461031001	Public Library	Rapid City	Pennington	1987	
461030002	Mt. View	Rapid City	Pennington	1985	1987
461030012	Jaehn's	Rapid City	Pennington	1992	1997
461030010	Camp Rapid	Rapid City	Pennington	1985	1989
461030013	National Guard	Rapid City	Pennington	1992	
461030011	Banks/Johnson	Rapid City	Pennington	1989	1991
461030012	Jaehn's	Rapid City	Pennington	1992	1997
461030014	Thrift Center	Rapid City	Pennington	1995	1999
461030015	Northdale	Rapid City	Pennington	1995	2000
461030016	Robinsdale	Rapid City	Pennington	2000	2001

Site	Site Name	Location	County	Start Date	End Date
461030017	Meadowbrook	Rapid City	Pennington	1999	2002
461030019	Fire Station #3	Rapid City	Pennington	2000	2003
461030020	Credit Union	Rapid City	Pennington	2003	
460930001	Elementary School	Black Hawk	Meade	2000	
460990004	Augustana	Sioux Falls	Minnehaha	1986	1998
460990006	KELO	Sioux Falls	Minnehaha	1991	
460990007	Hilltop	Sioux Falls	Minnehaha	2000	2007
460990008	SD School	Sioux Falls	Minnehaha	2008	
460130001	Sanitation B.	Aberdeen	Brown	1985	1986
460130002	ARCC	Aberdeen	Brown	1985	1987
460130003	Fire Station #1	Aberdeen	Brown	1999	
460110002	City Hall	Brookings	Brookings	1989	
460330132	Wind Cave	National Park	Custer	2005	
460710001	Badlands	National Park	Jackson	1999	
460290002	Utility Yard	Watertown	Codington	2000	
461270001	UC #1	Jensen	Union	2009	
461270002	UC #2	Renken	Union	2009	
461050001	Thom's	Lemmon	Perkins	1985	1986
460210001	Phone Building	Pollock	Campbell	1985	1986

A new standard was added by EPA for PM2.5 in 1997. South Dakota submitted a revised ambient air monitoring network plan to include sampling sites for the new PM2.5 standard. In 1999, manual PM2.5 samplers were added to the ambient air monitoring network providing 24-hour sample concentrations to determine compliance with the new standard. Table 2-3 lists information on the sites that have PM2.5 testing data.

In 2006, EPA revised the PM2.5 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 PM2.5 standard.

In 2009, equivalent method continuous PM2.5 monitors were added to the network providing hourly concentrations. The goal is to move to more continuous monitors providing more data at a lower cost than the manual monitors.
Currently, there are 11 sites in the air monitoring network collecting PM2.5 data. PM2.5 continues to be one of the major testing parameters in the network because a few days each year have PM2.5 concentrations over the current 24-hour standard. Most if not all are due to long range transport or from some kind of exceptional event. The issues with transport and exceptional events will be discussed further in this document.

Table 2-3 PM2.5 Air Monitoring Network PM2.5

Site	Site Name	Location	County	Start Date	End Date
461031001	Public Library	Rapid City	Pennington	1999	
461030013	National Guard	Rapid City	Pennington	2000	2004
461030014	Thrift Center	Rapid City	Pennington	1998	1999
461030015	Northdale	Rapid City	Pennington	1999	2000
461030016	Robinsdale	Rapid City	Pennington	1999	2006
461030017	Meadowbrook	Rapid City	Pennington	1999	2002
461030019	Fire Station #3	Rapid City	Pennington	2000	2003
461030020	Credit Union	Rapid City	Pennington	2003	
460930001	Elementary School	Black Hawk	Meade	2000	2004
460990006	KELO	Sioux Falls	Minnehaha	1999	
460990007	Hilltop	Sioux Falls	Minnehaha	1999	2007
460990008	SD School	Sioux Falls	Minnehaha	2008	
460130003	Fire Station #1	Aberdeen	Brown	1999	
460110002	City Hall	Brookings	Brookings	1999	
460330132	Wind Cave	National Park	Custer	2005	
460710001	Badlands	National Park	Jackson	1999	
460290002	Utility Yard	Watertown	Codington	2003	
461270001	UC #1	Jensen	Union	2009	
461270002	UC #2	Renken	Union	2009	

2.2 Ozone

In 1997, a new standard was 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, DENR started testing for ozone.

The first testing for ozone levels was done in 1996, in Volga, South Dakota as part of the requirements for a Prevention of Significant Deterioration permit. The first site in the network was set up at the Hilltop Site in Sioux Falls in 1999. A second site was added at the Robbinsdale Site in Rapid City in 2002. Currently the monitoring network includes sites at Sioux Falls, Union County, Badlands, Wind Cave and Black Hawk reporting as SLAMS and one site in Brookings County as a special purpose site. See Table 2-4 for a list of the sites operated in South Dakota.

Table 2-4 Ozone Air Monitoring Network

Site	Site Name	Location	County	Start Date	End Date
460990007	Hilltop	Sioux Falls	Minnehaha	1999	2007
460990008	SD School	Sioux Falls	Minnehaha	2008	
461030020	Credit Union	Rapid City	Pennington	2005	2007
461030016	Robinsdale	Rapid City	Pennington	2002	2006
460930001	Elementary School	Black Hawk	Meade	2008	
460330132	Wind Cave	National Park	Custer	2005	
460710001	Badlands	National Park	Jackson	2008	
461270002	UC #3	Wagner	Union	2009	

South Dakota submitted an attainment designation to EPA on April 15, 2003, designating each county as attaining the new ozone 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. In 2009, EPA revisited the ozone standard and proposed a lower concentration level. A final rule is scheduled for July 2011.

2.3 Sulfur Dioxide

Testing for sulfur dioxide concentrations began in the state when the first air monitoring sites were setup by EPA in 1974. The sulfur dioxide concentrations were collected using a pararosaniline bubbler method. The bubbler method for sulfur dioxide was removed from the monitoring network by 1986 because concentrations were very low compared to the standard and there were operational problems during winter weather. Table 2-5 lists the sites testing for sulfur dioxide in the monitoring network.

Table 2-5 Sulfur Dioxide Air Monitoring Network

Site	Site Name	Location	County	Start Date	End Date
460650001	Andersen Bldg	Pierre	Hughes	1981	1988
461031001	Public Library	Rapid City	Pennington	1975	1986
461030002	Mt. View	Rapid City	Pennington	1975	1982
460990001	City Hall	Sioux Falls	Minnehaha	1979	1986
460990002	Airport	Sioux Falls	Minnehaha	1978	1987
460990007	Hilltop	Sioux Falls	Minnehaha	2002	2007
460990008	SD School	Sioux Falls	Minnehaha	2008	
460510001	SE of Plant	Big Stone	Grant	1978	1985
461050001	Thom's	Lemmon	Perkins	1981	1984
460630001	Water Tower	Buffalo	Harding	1983	1986
46033001	Teepee Work C.	Rural	Custer	1974	1980

Site	Site Name	Location	County	Start Date	End Date
460331001	Sanson Ranch	Rural	Custer	1986	1986
460330132	Wind Cave	National Park	Custer	2005	
460710001	Badlands	National Park	Jackson	2005	
461270001	UC #1	Jensen	Union	2009	
461270002	UC #2	Renken	Union	2009	

For several years no sulfur dioxide analyzers were operated in the network. Beginning in 2002, the first sulfur dioxide continuous analyzer providing hourly concentrations was added to the network at the Hilltop Site in Sioux Falls. Currently, there are five sulfur dioxide analyzers operating in the network. There are sulfur dioxide analyzers at two sites in Union County and one site each at the Sioux Falls, Badlands, and Wind Cave sites.

In 2010, EPA revised the primary standard for sulfur dioxide setting a 1-hour concentration level. Additional rule making specified air monitoring requirements. The rule required testing around any major source that had sulfur dioxide emissions equal to or greater than 5% of the national total and at least one site near a source that had the highest potential for high short term concentrations.

South Dakota sources have emission levels less than 5% of the national total. Therefore, DENR will have only one required sulfur dioxide testing site located at the modeled high concentration site near the facility with the highest potential for short term high sulfur dioxide levels at ground level. In South Dakota the facility with the highest sulfur dioxide emissions is the Big Stone Power Plant but because of the tall stack at the facility the potential for high concentrations is low. Black Hills Power and Light Ben French and GCC Dakotah Cement Plant in Rapid City are the facilities with next highest annual emissions levels. Both have about the same emissions levels and modeling will be needed to determine which facilities will have the highest potential for short term sulfur dioxide concentrations.

2.4 Nitrogen Dioxide

Testing for nitrogen dioxide concentrations began in the state when the first air monitoring sites were setup by EPA in 1974. Nitrogen dioxide concentrations were measured using a sodium arsenite bubbler method. The bubbler method for nitrogen dioxide was removed from the monitoring network by 1986 because concentrations were very low compared to the standard and there were operational problems during winter weather. Table 2-6 lists the sites testing for nitrogen dioxide in the monitoring network.

Table 2-6 Nitrogen Dioxide Air Monitoring Network

Site	Site Name	Location	County	Start Date	End Date
460650001	Andersen Bldg	Pierre	Hughes	1981	1988
461031001	Public Library	Rapid City	Pennington	1977	1986
461030002	Mt. View	Rapid City	Pennington	1979	1982
460990001	City Hall	Sioux Falls	Minnehaha	1979	1986
460990002	Airport	Sioux Falls	Minnehaha	1978	1987
460990007	Hilltop	Sioux Falls	Minnehaha	2000	2007
460990008	SD School	Sioux Falls	Minnehaha	2008	
460510001	SE of Plant	Big Stone	Grant	1978	1985
461050001	Thom's	Lemmon	Perkins	1978	1984
460630001	Water Tower	Buffalo	Harding	1976	1986
460330001	Teepee Work Center	rural	Custer	1974	1980
460331001	Sanson Ranch	rural	Custer	1986	1986
460330132	Wind Cave	National Park	Custer	2005	
460710001	Badlands	National Park	Jackson	2005	
461270001	UC #1	Jensen	Union	2009	
461270002	UC #2	Renken	Union	2009	

For several years no nitrogen dioxide analyzers were operated in the network. In 2000, the first continuous nitrogen dioxide analyzer was setup at the Hilltop Site in Sioux Falls. Currently, there are five operating sites in the network. There are nitrogen dioxide analyzers at two sites in Union County and one site each at the Sioux Falls, Badlands, and Wind Cave sites.

In 2010, EPA revised the standard for nitrogen dioxide setting a 1-hour concentration level. Additional rule making specified air monitoring requirements. It appears South Dakota will not have a required nitrogen dioxide testing site because of low population level and associated traffic counts.

In 2011, DENR will be adding a new analyzer to the SD School Site. The analyze measures the sum of all reactive nitrogen ions at the intake of the analyzer located on a 10 meter tower. The sampling will provide data that can indicate ozone forming potential of the area and indicate if the Sioux Falls area is nitrogen of volatile organic compound ion limited for ozone pollution.

2.7 Lead

South Dakota has limited reasons for operating a lead monitor. With minimal industrial lead emissions, testing has been a low priority. The testing that was completed showed lead concentrations low even when vehicle gasoline contained higher amounts of lead. With the removal of a large part of the lead in fuel and with source emissions less than

0.5 ton per year, the potential for lead pollution concentrations exceeding the national standard are low. It is anticipated that testing for lead will continue to be a low priority. Table 2-7 contains a list of the historical lead monitoring locations in the state.

Table 2-7 Lead Air Monitoring Network

Site	Site Name	Location	County	Start Date	End Date
460470001	Sewer Plant	Hot Springs	Fall River	1981	1981
461030012	Jaehn's	Rapid City	Pennington	1992	1994
460330001	Teepee Work Center	rural	Custer	1975	1981
460331001	Sanson Ranch	rural	Custer	1982	1986

2.8 Carbon Monoxide

Sampling for carbon monoxide has been a low priority for South Dakota. Areas having high concentrations of carbon monoxide typically have high traffic counts or emissions and have topography that would allow the trapping of pollutants like in a mountain valley. The combination of South Dakota's low traffic counts and low emissions levels leaves a very low potential for high concentrations of carbon monoxide pollution.

Historically no testing for carbon monoxide was completed in the state. As part of collecting air monitoring data to show background levels for the criteria pollutants in Union County prior to the construction of the Hyperion Energy Center, DENR setup the first carbon monoxide analyzer in 2009.

A second site is planned for the NCore site located in Sioux Falls at the SD School Site. The carbon monoxide is one of the required parameters at the national core sites. The carbon monoxide analyzer will begin reporting data at the start of 2011 calendar year. Table 2-8 lists the details of both operating carbon monoxide sites in the state.

Table 2-8 Carbon Monoxide Air Monitoring Network

Site	Site Name	Location	County	Start Date	End Date
461270001	UC #1	Jensen	Union	2009	
460990008	SD School	Sioux Falls	Minnehaha	2011	

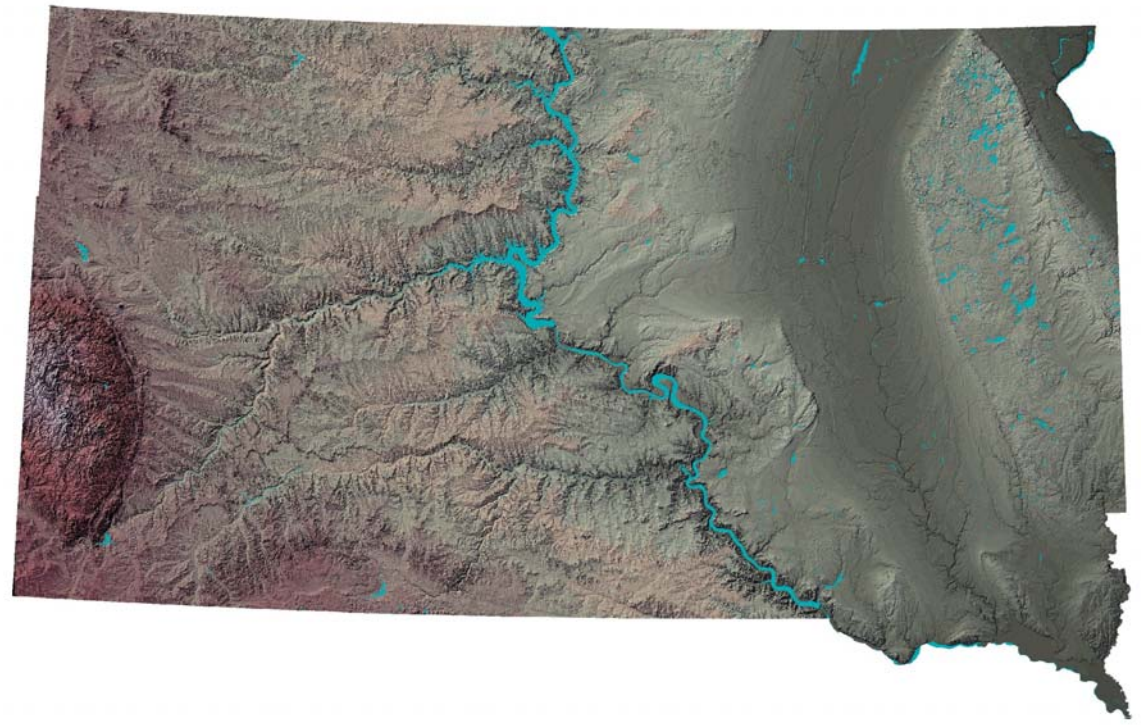
3.0 Description of Regional Issues

This section will discuss regional issues that affect air pollution levels in South Dakota. The issues discussed in this section are the ones identified in the guidance document or are issues associated with high concentration of air pollution in the state.

3.1 Topography

The state of South Dakota is a large geographic area with a low population density. Most of the South Dakota terrain is flat to rolling hills. The exception is the Black Hills Region which is a mountainous area ranging from 3,000 to 7,242 feet of elevation on Harney Peak, the highest point in the state. See Figure 3-1 to view a topography map of South Dakota.

Figure 3-1 Topography of South Dakota



The flat to rolling terrain allows good dispersion of air pollutants over a large part of the state. In these areas there are few problems with inversions and stagnation of air pollution. In the past five years air pollution transported from other states and Canadian Provinces combined with unusual meteorological conditions has resulted in high concentrations of PM2.5. The sources of air pollution for some events have come from the transport of smoke from prescribed and wild fires in the other states and Canada. Other events come from the transport of PM2.5 from sources to the east of South Dakota and affects particulate matter levels along the eastern edge of the state.

The mountainous Black Hills region has some potential for stagnation of air pollution in the valleys. But low population and minimal air pollution from the industrial sources keeps most of the area free of air pollution problems. One of the main concerns for air pollution in this region is smoke from large local prescribed and wild land fires. During the evening and night time hours smoke from local burning of wood, prescribed fires and wild land fires can cause areas of high levels of fine particulate matter in the mountain valleys.

Topography does not present a significant problem for increasing air pollution in South Dakota. There are some issues in the Black Hills region but these are usually short term and do not occur during a consistent period of time.

The state has a large overall geographic area and combined with tight financial resources presents a problem with providing representative data for all counties. Currently, there are 15 monitoring sites representing nine counties in the state. Air pollution parameters of ozone and PM2.5 have the highest potential for a wider range of concentrations because these pollutants have higher potential for long range transport. Ozone and PM2.5 testing will be a priority in the network. As testing needs change the network of sites will be modified to represent pollution exposure, high concentration and rural areas of high pollution potential.

3.2 Climate

The region has a diverse climate with changing conditions. Winters can be cold reaching temperatures as low as a negative 40 below zero degrees F. Summers are warm with some days hot and can have temperatures to 113 degrees F.

In general the eastern third of the state has precipitation amounts that can average 20 or more inches per year. Dry periods can occur but are usually short term events affecting spotted areas. The northern Black Hills has higher moisture amounts and have fewer issues with dry conditions.

The central and western parts of the state have lower average precipitation levels averaging around 13 inches or less per year. On the average a large part of the precipitation falls during the growing season or spring and summer months. Snow amounts can range from a few inches to over 100 inches per year. In the northern Black Hills snow amounts can exceed 200 inches per year

The central part of the state is a transition area from the higher precipitation areas in the east to the arid western part of the state which have periods of significantly less precipitation. In the central and western parts of the state the dry periods are more frequent and can last for several years.

High winds can occur at any time of the year and can be a source of localized high PM10 concentrations. Usually the levels are the highest when high winds are associated with extended drought. Rapid City historically is one area of the state that has problems with

PM10 levels over the National Ambient Air Quality Standards during high wind events. South Dakota has a Natural Events action plan for Rapid City. The plan includes a high wind dust alert and fugitive dust action plans for the facilities in the Rapid City Air Quality Control Zone. Under the plan the National Weather Service provides a public service alert when forecasted average hourly wind speeds exceed 20 miles per hour, peek wind gusts exceed 40 mile per hour and 0.02 inches or less of daily precipitation accumulation during the last 5 or more days. In addition the alert initiates the fugitive dust control plans developed by each major source in the Rapid City area.

Several high wind dust alerts are called each year in Rapid City. During the last five years none of the high wind dust alert days have concentrations greater than the 24-hour PM10 standard. With the coordinated efforts of the City of Rapid City, Pennington County, state agencies, and Rapid City regulated facilities PM10 concentrations have been reduced and the area was re-designated to attainment by EPA on April 5, 2006.

Other areas of the state can have high PM10 concentrations during high wind events but the events occur infrequent and to date have not affected more than one day per year. In all cases high PM10 concentrations in other areas of the state outside of Rapid City may have five to ten years between these events. For example during the last five years the Watertown Utility and Brookings City Hall sites each had one concentration greater than the standard during high wind events. In both cases no other high PM10 level events were recorded in several years of testing.

Unusual climate events can cause transport of air pollution into South Dakota but the events are not predictable and may occur once or not at all in a year. These events are becoming more important as EPA continues to lower air pollution standards close to concentrations recorded in South Dakota. This issue will be studied further during the next 5-year period but currently no adjustments to the network will be made because of climate events.

3.3 Population and Demographic Trends

South Dakota is a sparsely populated state with a 2000 Census of 755,657 people. The US Census Bureau estimates the state's population in 2008 has increased by 6% to around 804,194 people. General changes in population show people moving from rural and small town areas to the medium and large cities. This trend began in the 1930s and continues today. The states largest industry, agriculture, shows the size in acreage of the farms and ranches continues to increase with fewer people involved with the day to day operations. Value added agriculture projects such as ethanol plants in rural areas have helped stabilize the population of some rural counties but many continue to lose population.

There are 66 counties in the state. Only one county, Minnehaha, has a population greater than 100,000 people. Only one county, Pennington, has a population between 40,000 to 100,000. Fifteen counties have populations from 10,000 to 40,000. The remaining 49 counties have populations less than 10,000 with the smallest population in Jones County

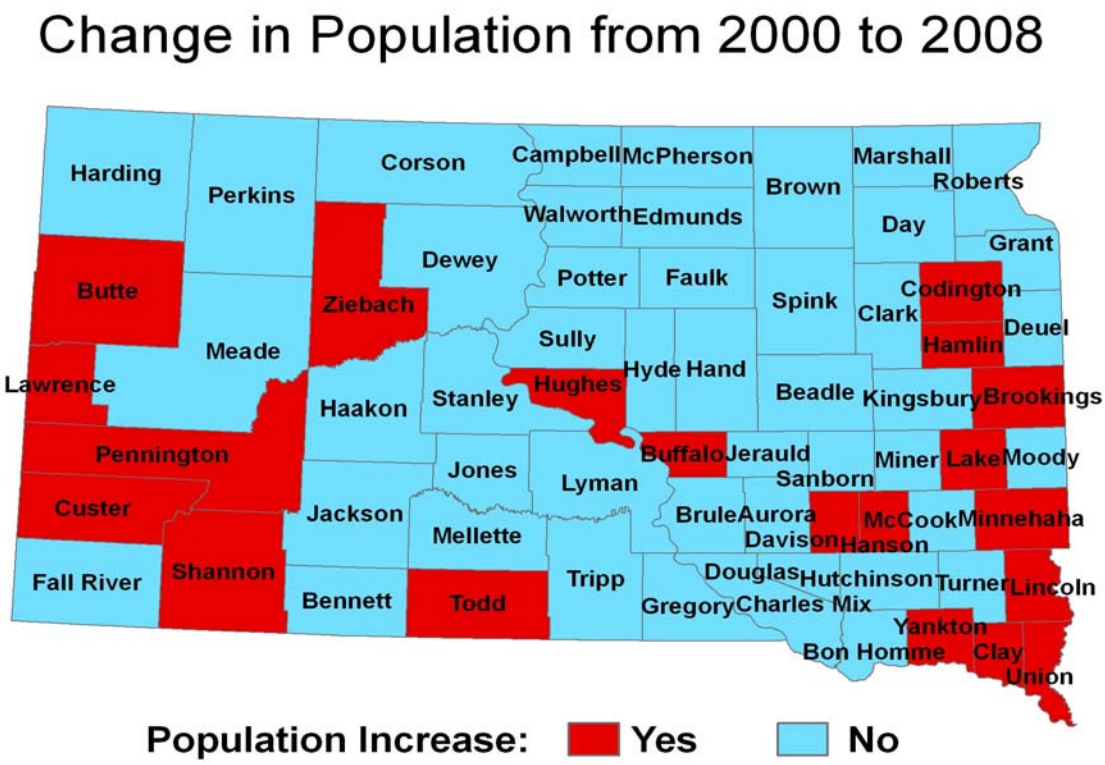
just over 1000. See Table 3-1 for information on the 10 highest population counties in the state.

Table 3-1 Counties with the Highest Estimated Populations

Number	County	Population	Largest City
1	Minnehaha	179,180	Sioux Falls
2	Pennington	98,533	Rapid City
3	Lincoln	39,713	Sioux Falls
4	Brown	35,154	Aberdeen
5	Brookings	29,668	Brookings
6	Codington	26,317	Watertown
7	Meade	23,989	Surgis
8	Lawrence	23,524	Spearfish
9	Yankton	28,835	Yankton
10	Davison	18,931	Mitchell

Twenty of the counties had an estimated increase in population since the 2000 census. Most of the county's in this group had minor increases in population. The counties of Minnehaha, Pennington, and Lincoln had the majority of the estimated population increase for the state. Figure 3-2 shows a map of the counties in the state indicating which are gaining and losing population.

Figure 3-2 Counties Gaining and Losing Population



The City of Sioux Falls Metropolitan Statistical Area has the highest population in the state and most of the population lives in Minnehaha County with some of the residential areas located in Lincoln and Turner counties. The majority of the industrial source emissions in this area are generated in Minnehaha County. The two air monitoring sites are located in the central part of Sioux Falls providing a good characterization of population exposure to air pollution in the Sioux Falls Metropolitan Statistical Area .

The state's second largest city, Rapid City Metropolitan Statistical Area is mainly in Pennington County but also extends into the southwest corner of Meade County. DENR operates four monitoring sites in the Rapid City Metropolitan Statistical Area. Three monitoring sites are located in Pennington County and one site in Meade County. Because of the complicated topography within the Rapid City Metropolitan Statistical Area more air monitoring sites are needed to characterize the population exposure to air pollution. In addition there is a need to monitor for Metropolitan Statistical Area background concentrations coming into the city to determine source impacts and the size of the high concentration area for PM10.

It is anticipated that South Dakota population growth and demographics will continue on the same trends as the last 10 years. Population oriented air monitoring is meeting this need by testing in the states largest population centers.

3.4 Revised Standards

EPA has revised or is revising the NAAQS primary standards for Lead, PM2.5, nitrogen dioxide, sulfur dioxide, carbon monoxide, PM10 and PM2.5. Proposed changes may also include different concentration levels for secondary standards. In addition EPA has revised or plans to revise monitoring rules that will direct sampling resources from population to source oriented and in some cases rural testing. These changes in rule will have a major impact on the air monitoring network in future years.

The final revised lead standard and monitoring rule will not affect the air monitoring network for South Dakota. Currently, none of the point sources have lead emissions greater than 0.5 tons per year. No testing will be required for lead at the state's NCore site because the Sioux Falls Metropolitan Statistical Area population is less than 500,000.

The adding of the 1-hour nitrogen dioxide primary standard and monitoring rule will also not affect the current monitoring network because the highest traffic counts and Metropolitan Statistical Area populations are low so there are no required sites. Other proposed changes to other criteria pollutant standards and monitoring rules were not completed before the 5-year assessment was done so they were not included in this document.

3.5 Pre-scribed Fires

The state and federal land managers use pre-scribed fires as a means to improve the forest and grassland ecosystems. In most cases the pre-scribed fires have not been a problem for high air pollution impacts on the public. Mainly because the fires are short duration, burn small areas and occur under good dispersion periods of the day. Only one event occurred in the 5-year assessment period that recorded high concentrations at one of the monitoring sites in the network.

The event on September 3, 2009, which included 652 acres of grasslands and forest around the Wind Cave air monitoring site caused high concentrations to be recorded on the PM10 and PM2.5 monitors and the sulfur dioxide and nitrogen dioxide analyzers. PM2.5 concentrations continued to be over the standard until September 6. Hourly concentrations from the Met One BAM PM2.5 showed the highest concentrations occurred during the evening and night time hours when the air cooled and the smoke remained close to the ground. See Figure 3-3 which shows a picture of the air monitoring site and the blackened ground.

Figure 3-3 Wind Cave Air Monitoring Site Pre-scribed Fire

The manifold sampling system was contaminated during this event to the point that the ozone analyzer was not reporting accurate data. When the manifold system was cleaned ozone concentrations increased to as high as span levels. After replacing the manifold sampling system, sampling lines, particulate filter, and ozone analyzer, valid ozone data was once again recorded.

3.6 Long Range Transport of Pollutants

A review of the data from 2005 to 2009 shows the highest concentration days occurring on the same days at several sites over large geographic areas of the state. When the meteorological data and other data from the National Weather Service, EPA AIRNow website, and other sources of information it appears the high concentration days are due to long range transport of air pollution.

3.6.1 PM2.5 from Smoke Exceptional Events

Some days of high concentrations of PM2.5 are caused by smoke from prescribed and wild fires in Canada and other states are transported into the state or accumulated from wild fires burning in the state. During this 5-year review period no major wild fires burned within the state but there were two major smoke events in 2008. See Figure 3-4 for a picture showing a wild fire near Rapid City.

Figure 3-4 Wild Fire Piedmont

The first event was in April 15, 2008 when PM2.5 concentrations exceeding the 24-hour PM2.5 standard were recorded at the Brookings Site and both the Sioux Falls sites. The difference in PM2.5 concentrations between the three sites was less than 1 ug/m3 on this day. This sampling day was the highest concentration day and the only day to exceed the 24-hour standard in 2008 for all three sites. PM2.5 concentrations at Watertown and Aberdeen sites on this day were high but less than the standard so were impacted less by the heavy smoke. The National Oceanic and Atmospheric Administration's smoke map web page indicated the source of the high concentrations came from pre-scribed fires in Kansas.

The second event was on July 2 to 5, 2008, which brought smoke from wild fires in Canada into the western part of the state. Visibility was reduced and PM2.5 concentrations at Badlands, Wind Cave, and in Rapid City. Air monitoring sites at all three locations recorded PM2.5 concentrations greater than the 24-hour PM2.5 standard on July 2, 2008. This was the highest 24-hour PM2.5 concentration recorded at all three sites in 2008.

3.6.2 PM2.5 Pollution Transport

The transport of PM2.5 air pollution into the state has affected concentrations of PM2.5 at all of the sites in the eastern part of the state at some time in the five year review period. All of the high PM2.5 concentrations were reported on the same days at all of the air monitoring site in the eastern half of the state. This is the first time this kind of event has caused concentrations of PM2.5 to be higher than the 24-hour standard level.

Transported particulates from the east and southeast and air stagnation appears to be major causes of the high PM2.5 concentration on December 17, 2009. Concentrations exceeded the standard at all but one PM2.5 monitoring site in the eastern half of the state. This was the only occurrence during the last five years that was not associated with an exceptional event.

The PM2.5 transport event in South Dakota started on December 17, 2009 and continued to December 22, 2009. PM2.5 concentrations ranged from 11 to 44 micrograms per cubic meter (ug/m^3) during a period of time when concentrations are usually in the single digits to low teens. On December 18, 2009 all of the sites on the eastern edge of the state had concentrations over the 24-hour PM2.5 standard ranging from 35.9 to 43.9 ug/m^3. Aberdeen recorded a level of 30.2 ug/m^3 so the high concentrations did not extend very far into the state. On the same day areas in the south half of Minnesota, most of Iowa, and the eastern edge of Nebraska had PM2.5 concentrations great than the standard. Minnesota and Iowa both called PM2.5 air pollution alerts.

Minnesota's alert notice stated:

MPCA News Releases

Air Pollution Health Advisory Issued for Southern Two-Thirds of MN

FOR IMMEDIATE RELEASE: 12/17/2009

The Minnesota Pollution Control Agency (MPCA) has issued an air pollution health advisory for the southern two-thirds of Minnesota, including the Twin Cities, Rochester, St. Cloud, Marshall, and Detroit Lakes areas for Thursday, December 17 through Friday, December 18. Light southerly winds and local temperature inversions are encouraging fine particle transport and buildup in the region. As a result, Air Quality Index (AQI) levels in the Twin Cities are forecasted to be high-moderate on Thursday and unhealthy for sensitive groups on Friday, with an expected peak AQI of 105. The MPCA issues an air pollution health alert when actual AQI levels exceed 101.
Air quality is expected to improve late Friday as winds increase and clean air from the north enters the region. The extended air quality forecast indicates air quality will improve to low-moderate conditions on Saturday, and should become good by Sunday.

Minnesota network of sites are operates most of their sites in the Minneapolis/St. Paul area. Looking at the PM2.5 sites in Minnesota the high concentration area extended from St. Cloud south in Minnesota. Concentrations on December 18, 2009, ranged from 39.2 to 43.4 ug/m3 in St. Paul/Minneapolis area to 41.9 ug/m3 in the Rochester area.

Nebraska has five sites in the state and three are in the Omaha area. All three in Omaha had concentrations on December 18 greater than the PM2.5 standard ranging from 38.4 to 44.7 ug/m3. No other monitors are operated along the eastern edge of Nebraska. The Lincoln Site had a concentration similar to the Aberdeen Site with a concentration of 29.1 ug/m3.

Iowa operates more than fifteen PM2.5 sites in the state. At least nine of these sites had concentrations greater than the 24-hour PM2.5 standard. Concentrations on December 18 ranged from 36.0 to 49.2 ug/m3. The sites are located through out the state and the sites reporting less than the 24-hour concentration were just under the standard. The sites located near South Dakota had concentrations from 40.2 at Sioux City to 49.2 at Emmetsburg near Lake Okoboji.

The high concentration period of December 18 impacted a large geographic area of the northern plains. Even though high concentrations of PM2.5 caused by long range transport occur infrequent pollutants from large metropolitan areas like Minneapolis and Chicago can be transported into the state causing poor air quality days. While high PM2.5 events can be caused by smoke from wild land fires that are treated as exceptional events others like the December 18, 2009 count towards attaining the standard.

3.6.3 Ozone Pollution Transport

During the past five years the highest ozone concentrations have been recorded at the Wind Cave Site. This location is one of the most remote locations in the state from any population center or large emission source for volatile organic compounds and nitrogen oxides. The area is a Class I Area under the Regional Haze Program. The land use is rural with grasslands and ponderosa pine forest mixture. No large pollution sources are within 50 miles of the site. All indications are air pollutants are transported from outside the state to this location to form the ozone levels.

The Wind Cave Site has the highest elevation of any of the sites in the state at 4230 feet. It is unknown if the site elevation plays a role in recording the highest concentrations of ozone in the state. Concentrations have decreased over the last five years but a revision of the ozone standard could bring compliance levels near current concentrations at this site and other locations in the state.

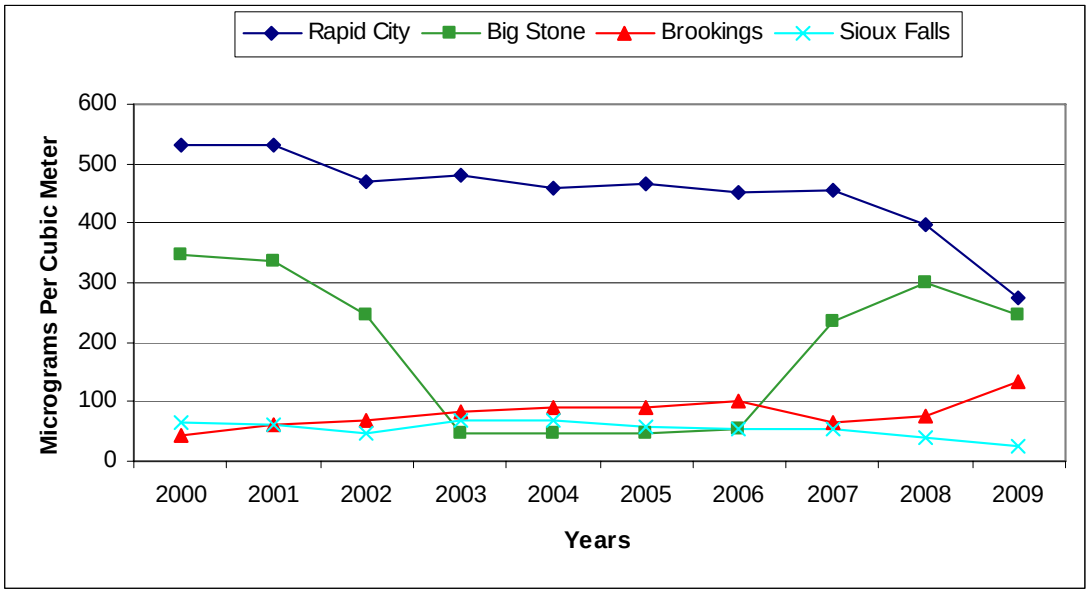
4.0 Emission Inventories

Emissions inventory data and trends are used to identify areas that may have air quality problems and will need air monitoring data to verify actual air quality levels. The DENR uses stack testing data, material balance equations, emission factors provided by manufacturers or EPA, and other acceptable methods to calculate air emissions based on annual operational reports submitted by the facility. The annual operational reports provide the information necessary for calculating air emissions from point sources. For example, if the emission factor is based on the amount of tons processed each year, the operational report will provide the amount of tons processed through the point source. Point sources are operations that actually emit through a stack or vent such as a boiler or rotary kiln.

4.1 Particulate Mater Emissions Inventory

Particulate matter emissions from permitted sources are calculated as total suspended particulates in tons per year because South Dakota's Title V air fees for particulate matter is based on total suspended particulates. Figure 4-1 compares four areas in the state with the greatest total suspended particulates emissions.

Figure 4-1 Particulate Matter Emissions



The Rapid City area has a long history of high particulate matter pollution levels. One reason for the high particulate matter pollution levels is that the Rapid City area has the greatest number of facilities in the state that generate total suspended particulates emissions. The total suspended particulates emissions from point sources in Rapid City declined significantly over the 10 years shown in Figure 4-2. One reason for the reduction in total suspended particulates emission is attributable to Black Hills

Corporation installing a natural gas combustion turbine at the Lange facility. The use of the combustion turbine reduced the operation of the natural gas/diesel fired turbines and the diesel generators at the Ben French facility. In addition GCC Dakotah has reduced some of the operations also lowering emission levels in Rapid City.

The second highest emissions location is the Big Stone area. Otter Tail Power Company began reducing total suspended particulates emissions starting in calendar year 2002 and then emissions leveled off in 2003 through 2006. The reduction is the result of Otter Tail Power Company installing a hybrid electrostatic precipitator/baghouse control device. The hybrid electrostatic precipitator/baghouse was replaced with a normal baghouse in December 2007 because of operational problems with the hybrid electrostatic precipitator/baghouse. In 2007 and 2008, emission levels in the Big Stone area had increases both years but remained below emission levels in 2000. In 2009, emission levels dropped from 2008.

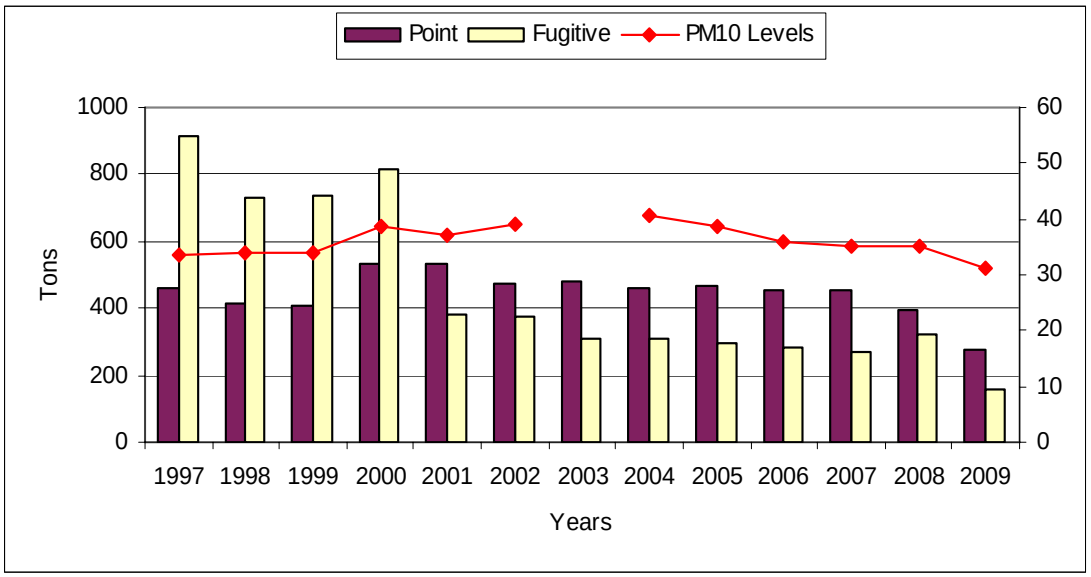
Brookings and Sioux Falls are the 3rd and 4th highest areas in the state, respectively. Total suspended particulates emissions in these areas are not significantly higher than the other areas of the state. Brookings total suspended particulates emissions increased slightly to their highest level in 2006 but declined to previous emission levels in 2007 and 2008. In 2009, emission levels increase to the highest level in 10 years. Sioux Falls emission sources remained at about the same total tons per year with a slight drop in particulate emissions in 2008 and 2009.

The department has air monitoring sites in Rapid City, Brookings, and Sioux Falls. Due to the tall stack on the Big Stone Power Plant and past air monitoring concentrations being near background levels, no further monitoring for particulate matter is planned for the Big Stone area. No other areas of the state show significant particulate matter emissions levels, so no new areas are identified for further testing based on current total suspended particulates emissions.

A comparison of emissions levels from permitted facilities compared to air quality PM10 concentration was completed to see if reductions in PM10 emission levels had an affect on the ambient air quality concentrations from the Rapid City Credit Union site (see Figure 4-2).

The PM10 emission levels were split into point and fugitive sources. There does appear to be a comparison between PM10 emissions and PM10 concentrations measured at the Credit Union site during the last five years. As point and fugitive PM10 emissions declined so did ambient PM10 concentrations from the monitoring site at Credit Union. The PM10 and total suspended particulates emissions in Rapid City justifies the use of the current four air monitoring sites to determine the effects of control measures used to maintain the attainment status of this area.

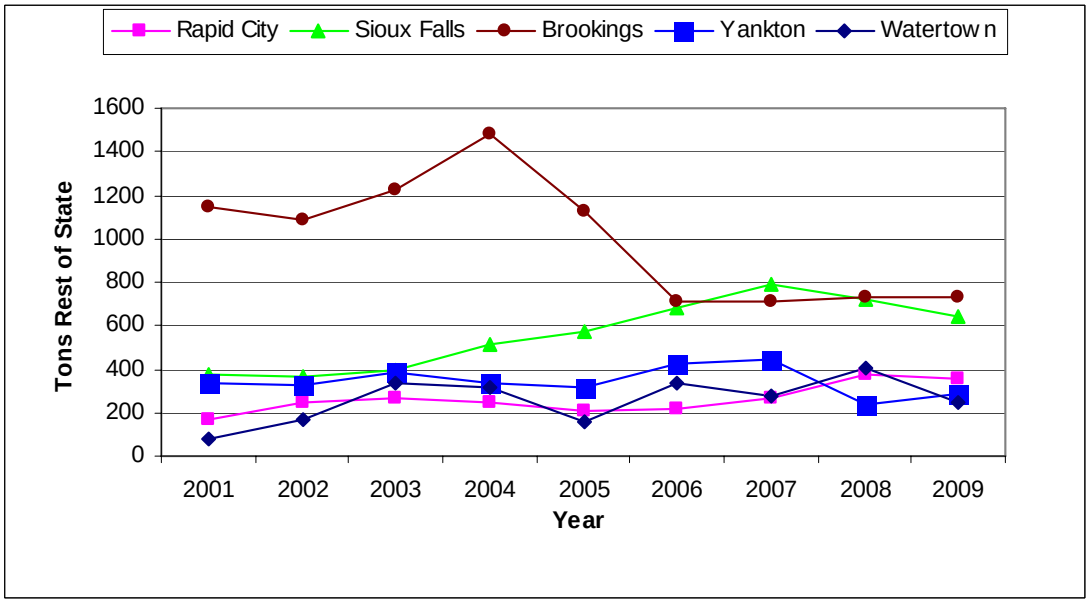
Figure 4-2 Rapid City Area Particulate Matter Emissions



4.2 Volatile Organic Compound Emissions

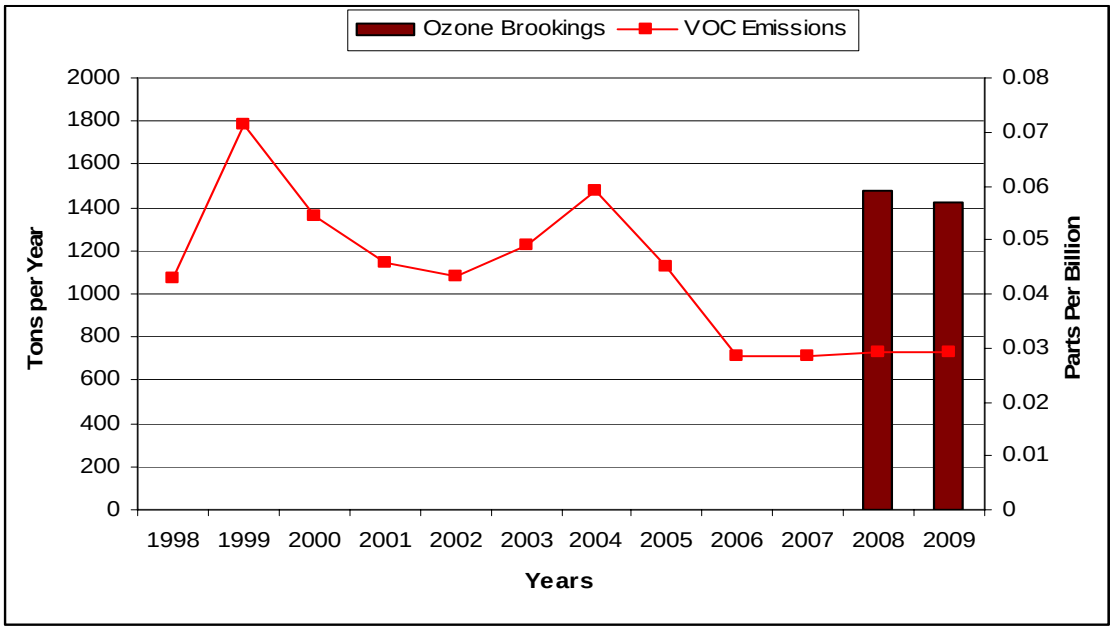
Volatile organic compounds (VOC) are a major component of ozone pollution. Levels of volatile organic compounds emissions can be an indicator of potential high concentration areas that may need testing for ozone levels. Because volatile organic compounds emission inventory totals are very close for several of the areas, Figure 4-3 displays the top five areas that emit volatile organic compounds emissions.

Figure 4-3 Volatile Organic Compound Emissions



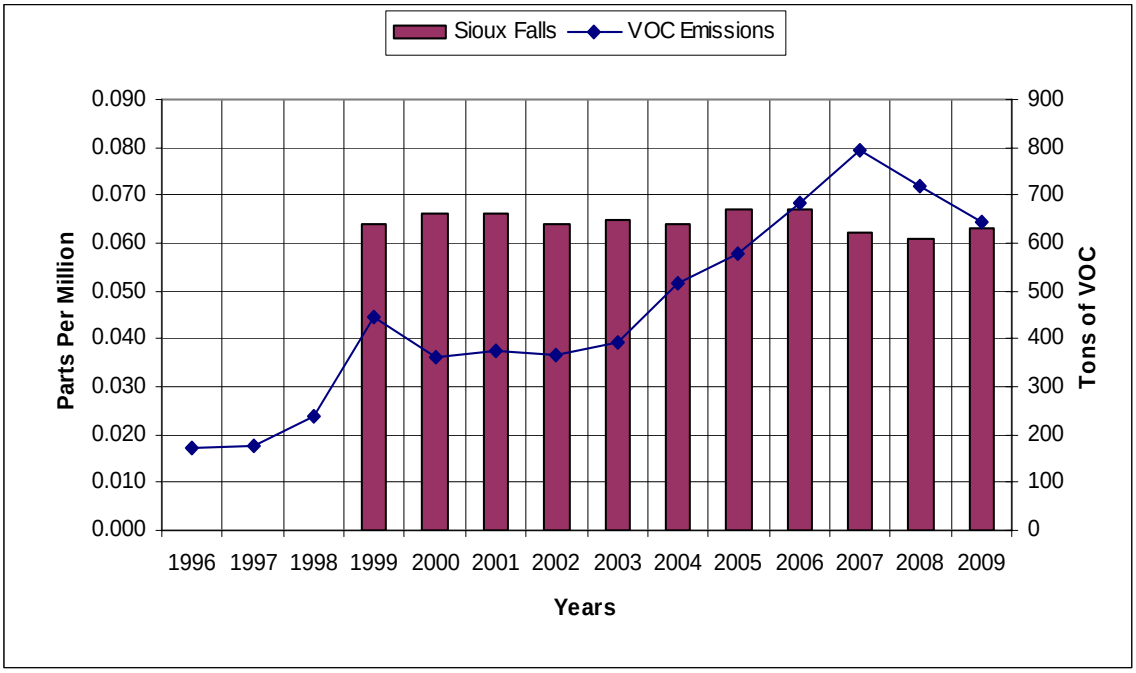
Volatile organic compounds emissions were the highest in the Brookings and Sioux Falls area. Three major sources of volatile organic compounds emissions are located in and around the Brookings area. However, emission levels in the last two years have continued to fall until 2006 when emission levels have remained about the same in the Brookings area. In 1997, one year of ozone monitoring was conducted in this area by South Dakota Soybean Processors. The ozone monitor was located northeast of Volga, which is west of Brookings approximately 5 miles. The 4th highest ozone concentration recorded during that time was 0.065 parts per million. In 2008 and continuing into 2009, ozone testing was conducted at a site north of the City of Brookings called the Research Farm. The Brookings 3M Company and Valero Renewable Fuels Company are required to test for ozone levels as part of facility expansion under a Prevention of Significant Deterioration air quality permit. The operation of the Research Farm site is a cooperative agreement between the facilities and DENR. Even with an increase in volatile organic compounds emissions the ozone concentrations do not indicate a connection to the changes in levels.

Figure 4-4 Brookings VOC Emissions and Ozone Concentrations



The volatile organic compounds emissions in Sioux Falls have increased approximately 390 tons from 2003 through 2007. In 2008 and 2009, volatile organic compounds emissions decreased. The main increase in volatile organic compounds emissions in the Sioux Falls area is related to the increase in production capacity of several cabinetry businesses in the area. Figure 4-5 displays ozone readings versus volatile organic compounds emissions in the Sioux Falls area. The increase and decrease in volatile organic compounds emissions does not appear to be impacting ozone levels.

Figure 4-5 Sioux Falls VOC Emissions and Ozone Concentrations



The next three highest sites include Rapid City, Watertown, and Yankton. The volatile organic compounds emissions in these three areas are all about the same level. Testing for ozone is conducted at the Black Hawk Site near Rapid City and is one of the lowest concentration levels in the state. No testing of ozone has been completed for Watertown or Yankton.

An assessment of volatile organic compounds emissions would indicate the potential for continued air monitoring at Brookings and Sioux Falls because they have the highest volatile organic compounds emissions in the state.

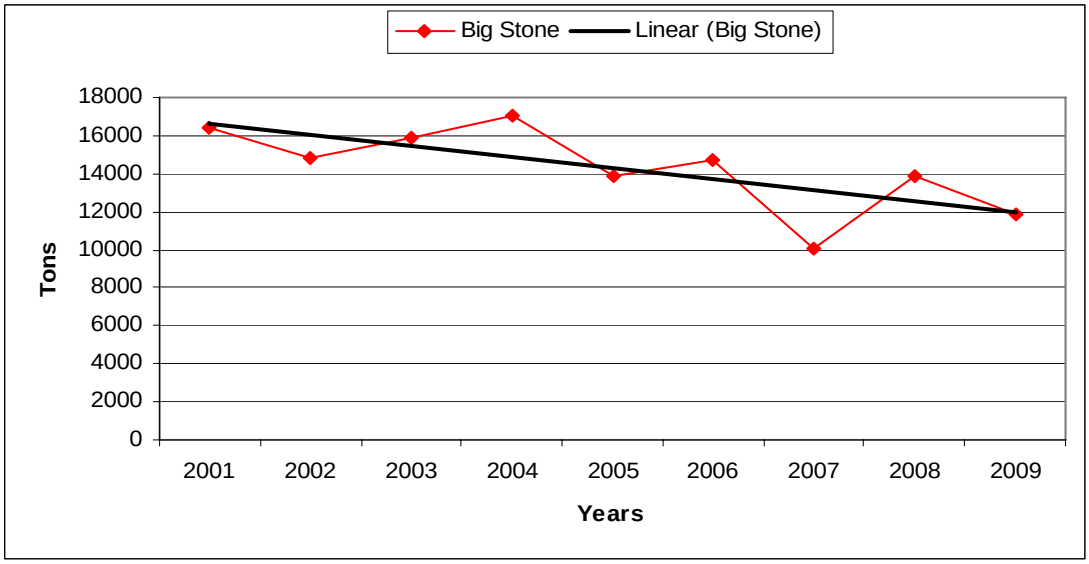
4.3 Nitrogen Dioxide Emissions

Nitrogen dioxide emissions can affect not only ambient concentrations for this pollutant but are also a major component in ozone pollution. For the review of the areas that have the highest concentration levels in the state, two graphs will be used to demonstrate emission trends. The emissions are calculated as nitrogen oxide. Comparing nitrogen oxide to nitrogen dioxide is feasible since nitrogen dioxide makes up the largest component of nitrogen oxide.

The Big Stone Power Plant has the highest nitrogen oxide emissions total per year and is graphed separately from the other sites (see Figure 4-6). If not shown in this manner, the other sites trends can not be seen on the same graph. In 2009, emission levels decrease with the overall trend indicated by the Big Stone Power Plant emissions show a decrease in nitrogen oxide emissions over the last ten years. No future testing has been planned

for this area because past sampling results for nitrogen dioxide were near background levels.

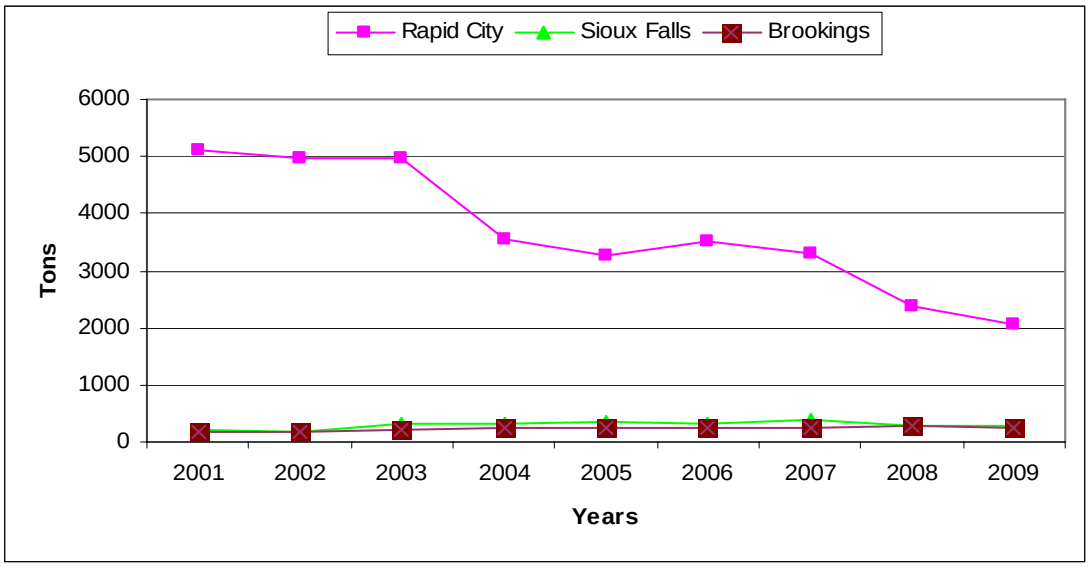
Figure 4-6 Big Stone Power Plant Annual Nitrogen Oxide Emissions



The second highest nitrogen oxide emissions in the state are located in the Rapid City area (see Figure 4-7). The nitrogen oxide emissions in the Rapid City area continue to decreased the last ten years. The main reason for the decrease resulted from improvements at GCC Dacotah's portland cement plant. GCC Dacotah installed a staged combustion system with a thermal-efficient in-line, low NOx calciner complemented by a low NOx burner with indirect firing in the dry rotary kiln, which reduced their nitrogen oxide emissions. The Sioux Falls and Brookings areas have low and relatively flat emissions levels. The annual total tons of nitrogen oxide emissions are shown in Figure 4-7.

Based on the nitrogen oxide emissions, the Rapid City area will tested for nitrogen dioxide concentrations beginning in 2011, because it has the second highest emission levels in the state. The remaining areas have low emissions and will not be considered unless there are major increase in point source emissions.

Figure 4-7 Other Annual Nitrogen Oxide Emissions



4.4 Sulfur Dioxide Emissions

For the review of areas for sulfur dioxide emissions, the top four highest emission areas in the state will be displayed on two graphs to demonstrate emission trends. The Big Stone Power Plant has the highest sulfur dioxide emissions per year and is graphed separately from the other sites. If not shown in this manner the other sites trends can not be seen on one graph.

In 2009, sulfur dioxide emission levels decreased at the Big Stone Power Plant. The overall trends for Big Stone Power Plant show a declining level of emissions over the last nine years. No future monitoring is planned for sulfur dioxide because past air monitoring showed concentrations to be near background levels. See Figure 4-8 to view a graph of the sulfur dioxide emissions inventory for Big Stone area.

The second highest sulfur emissions area is in Rapid City. The Rapid City area is continuing to decrease emission levels of sulfur dioxide the last three years. The decrease in sulfur dioxide emission levels is due to the down turn in the economy and a shift to the use of more natural gas for power production. Testing for sulfur dioxide levels will begin at the start of 2011 in Rapid City because of the emission levels are the second highest in the state and because of the complex terrain in the western half of Rapid City. The Sioux Falls and Brookings areas have emissions levels less then Rapid City and are not a consideration for increase in testing in the future at this time. Figure 4-9 contains a graph of these sites.

Figure 4-8 Big Stone Power Plant Sulfur Dioxide Emissions

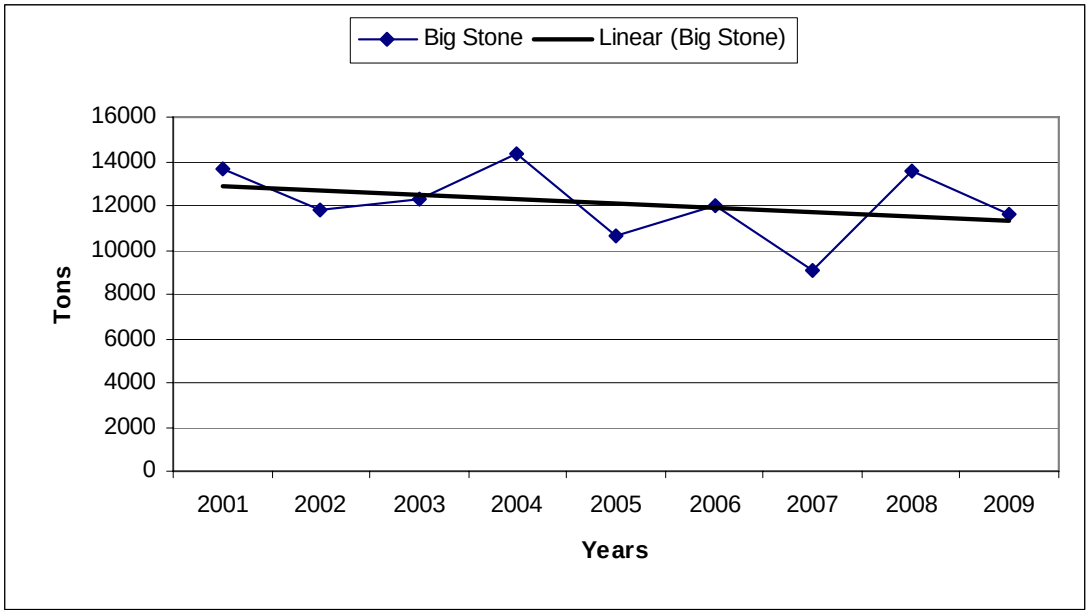
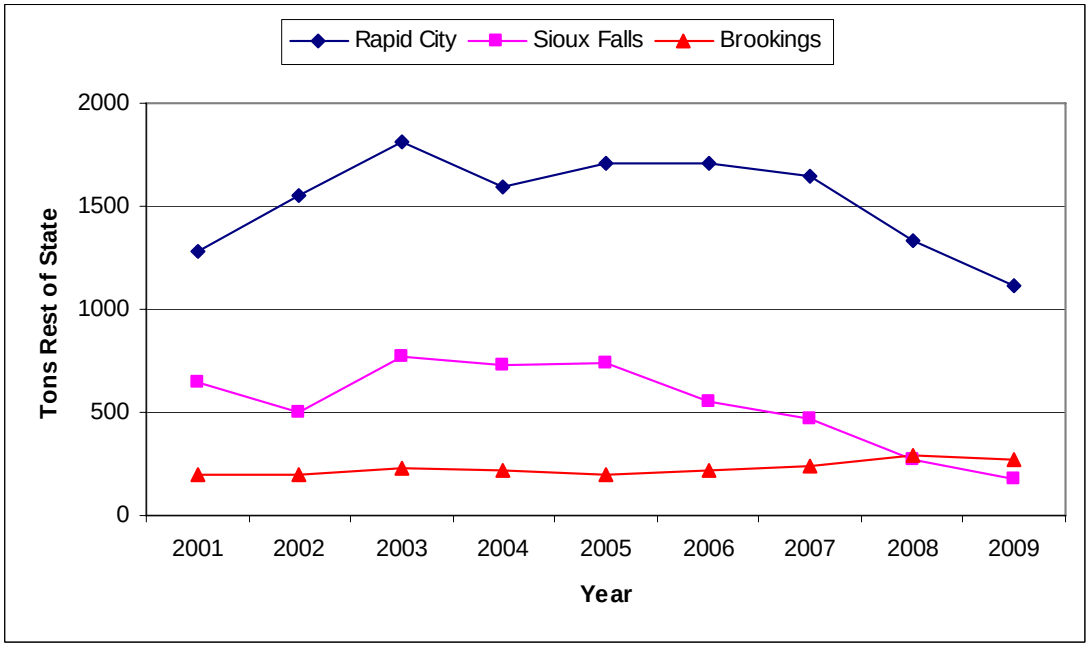


Figure 4-9 Other Annual Sulfur Dioxide Emissions



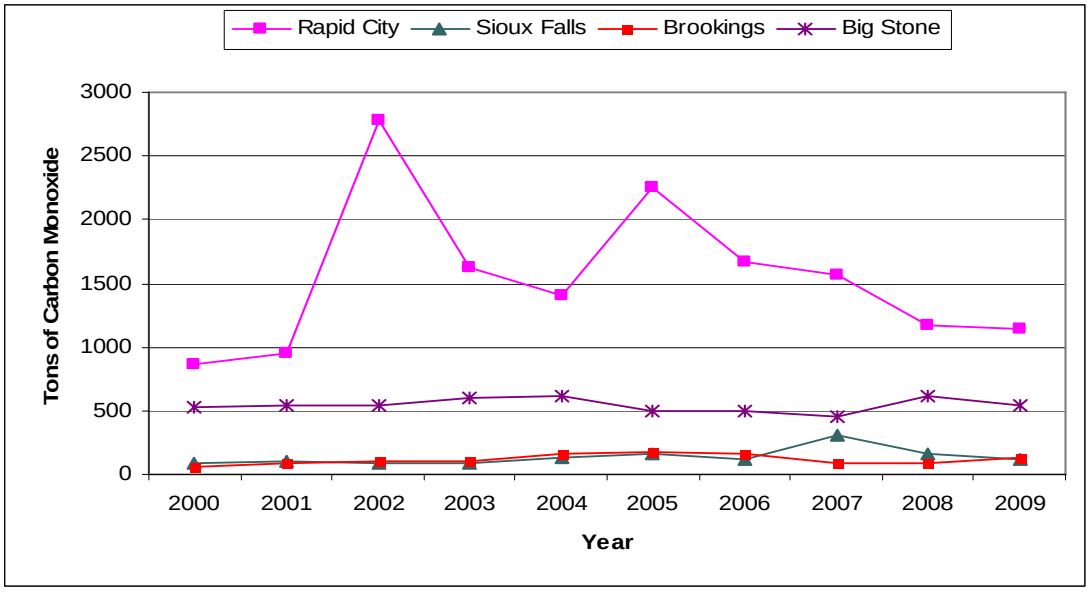
4.5 Carbon Monoxide Emissions

Carbon monoxide emissions have recently been calculated for fuel burning sources. Figure 4-10 shows the emissions levels for highest four areas of the state. During the last

ten years the Rapid City area has the highest emission of carbon monoxide followed by the Big Stone Power Plant. Carbon monoxide trends shows decreasing levels in Rapid City area during the last four years of testing because of the down turn in the national economy reducing the construction of new homes and businesses.

The carbon monoxide emission levels for Big Stone Power Plant, Sioux Falls area, and Brookings area are remaining about the same level. The down turn in the national economy has not affect the other three areas of the state like it has the GCC Dakotah Cement Plant.

Figure 4-10 Carbon Monoxide Emissions



5.0 Air Monitoring Sites

This section will evaluate each parameter at each of the 15 air monitoring sites to determine if testing is meeting the goals and needs of the air monitoring network. Several different evaluations are completed for each parameter to determine the value of each site.

One of the evaluation points is the potential for pollution parameter concentrations to be greater than 80% of the pollutant standard. The potential for high concentrations is calculated by counting the number of sampling days with concentrations greater than 80% of the pollutant standard and dividing that number by the number of sampling days collected during the year at the site. If the potential for high concentrations for the pollutant parameter data is less than 10% the parameter can be considered for relocation or removal.

In areas of the state that have more than one air monitoring site, another evaluation point will be to compare the concentration levels at the sites to determine which represents the highest concentration for the area and determine if sampling efforts are being duplicated is sampling data is similar at each site.

Another evaluation points is air pollution data trends. Pollution trends are part of the 2010 Annual Plan and a copy the plan is included in Attachment A. Any discussion of air pollution concentration trends are referenced from the 2010 Annual Plan. The 2010 Annual Plan also contains site history and a picture of each monitoring site.

5.1 Air Monitoring in the Eastern Half of South Dakota

Air monitoring sites in the eastern half of South Dakota are generally located in the areas with the greatest density of population or highest potential for air pollution levels. Sites are located in the largest cities of Sioux Falls, Aberdeen, Watertown, and Brookings. Union County, the proposed location for the Hyperion Energy Center is the only other area in eastern half of the state that has air monitoring sites. The following sections will provide an evaluation of each site located in eastern half of the state.

5.1.1 City Hall Site (Brookings)

Brookings is located on the eastern central edge of South Dakota in Brookings County. Brookings is the fifth largest city in the state. The population trends show a slightly increasing population in the 2000 census and projections indicate a continued slow growth rate. Both the city of Brookings and the county of Brookings are the fifth largest in the state. Table 5-1 contains general information about the site and parameter testing.

The topography is very flat surrounding the city. The area changes to slightly rolling hills to the east and west of Brookings. Topography will not cause air pollution accumulation in the Brookings area.

Table 5-1 City Hall Site

Location	City of Brookings
County	Brookings County
AQS #	46-011-0002
Parameter	PM10
Goals	Population/High Concentration
Sampling Schedule	Every Sixth Day
Parameter	PM2.5
Goals	Population/High Concentration
Sampling Schedule	Every Third Day

Industrial development in the city and surrounding area includes service oriented businesses and light industry. The largest facilities in the area include the Brookings 3M, South Dakota Soybean Plant, and Valero Renewable Fuels Company in Aurora. Land use around the city is mainly crop lands with a small amount of grassland. Agriculture remains the largest industry in this area.

Historically there have been two different air monitoring sites in the city. The current site is the City Hall Site. The City Hall Site is located in the center of the city close to the downtown business district. The City Hall Site was setup in 1989 testing for PM10 and was a cooperative agreement between the City of Brookings and DENR. Agriculture related businesses to the south of the site were causing dusty conditions and testing would provide data to determine compliance with the national standards for PM10. In 1999, PM2.5 monitors were added to the current site.

Data concentrations for PM10 and PM2.5 represent population and high concentration of air pollution levels in the east central part of the state associated with industry and an urban area. The data reviewed for the 5-year assessment indicates the highest concentrations for PM2.5 at this site appear to be associated with long range transport of air pollution.

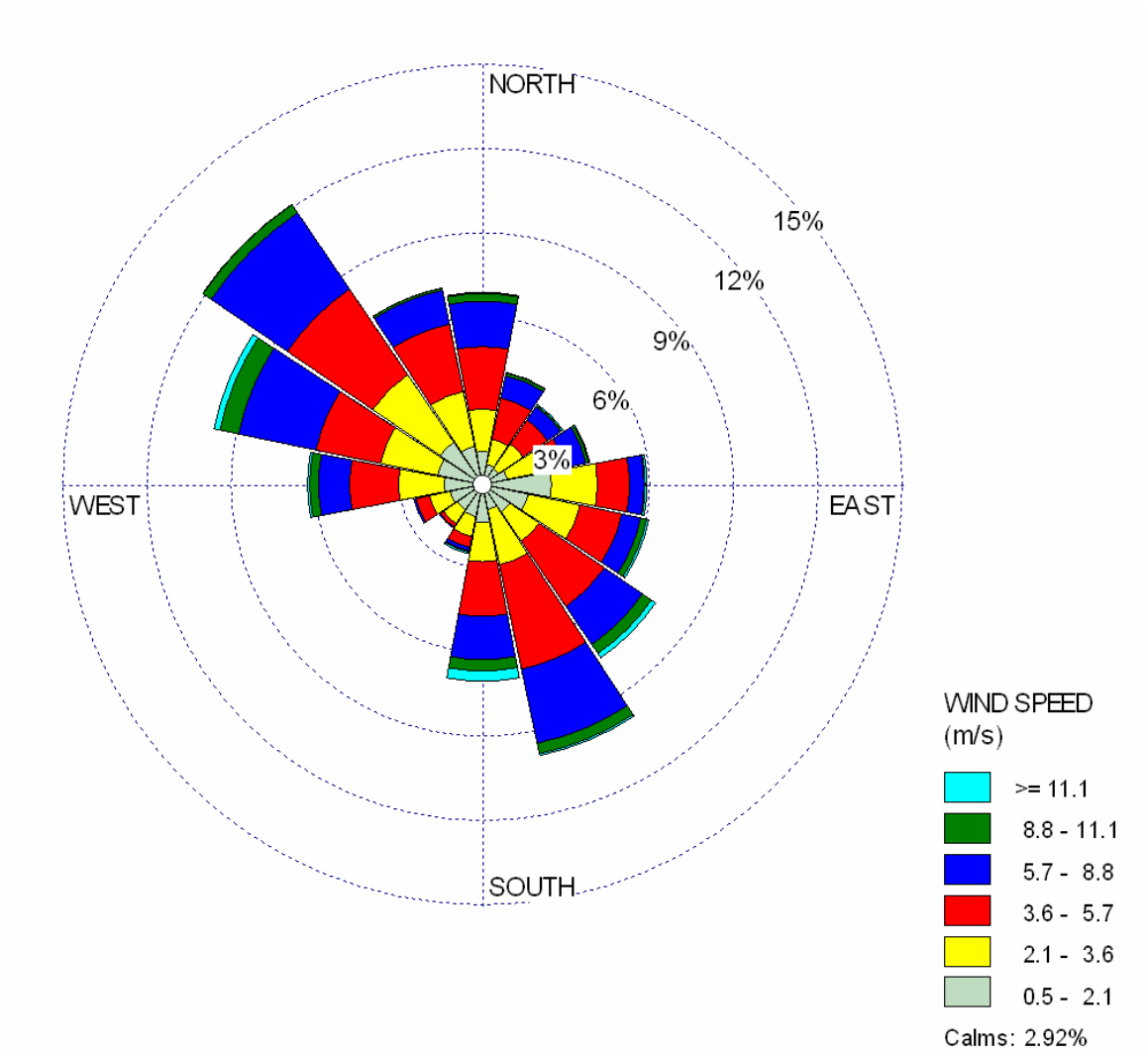
Two high concentration days caused by exceptional events were recorded at this site during the five year review period. One was a PM2.5 sample and other a PM10 sample both collected in 2008. More information on the events is discussed later in this section. Both sampling days were flagged by DENR as exceptional events. See further information in Section 3.6.1 on long range transport of Pollutants.

The only other 24-hour PM2.5 concentration over the standard at this site was collected on December 18, 2009. This sampling day appears to have been caused by long range transport of PM2.5 from outside of the state. See more information on this event in Section 3.6.2.

5.1.1.1 Meteorological Data

The meteorological data used for this site is collected at the Research Farm Site located about 1 mile northwest of the city. The data was collected in 2009 on a 10 meter tower. Predominate wind directions and highest wind speeds are out of the northwest and the south southeast as indicated by the graph in Figure 5-1.

Figure 5-1 Wind Rose Brookings Research Farm Site



5.1.1.2 PM10 Evaluation

PM10 concentrations in general have decreased over the life time of this site. Only one sampling day in 2008, had concentrations that exceeded the 24-hour standard in the last five years of operation. The remaining highest concentration days for each of the other years are all less than 80% of the standard including the second highest for 2008.

The sampling day over the standard was July 2, 2008. The sampling day was affected by smoke from a wild fire in the morning and dust from high winds. A street area near the monitoring site was under construction to replace the street and the water and waste water infrastructure under the street. DENR flagged the sampling day as exceptional events.

The design value for PM10 remains low at 51% of the standard. Unless there is a significant drop in the standard level there is sufficient data to show attainment of the 24-hour PM10 standard. See the information in Table 5-2.

The chance of recording concentrations greater than 80% of the standard a very low and are less than 10%. The design value for PM10 is the second highest 24-hour concentration for each year averaged over three years. With a design value of only 51% also shows these is a very small probability of having a concentration over 80% of the standard.

No comparison was made for this site to other sites in the area because the closest sites are in Watertown and in Sioux Falls 45 to 50 miles away.

The testing for PM10 sampling objectives at the City Hall Site are population and high concentration. It is anticipated that population and industry will continue to grow in a steady rate in the coming years. No changes are planned for this parameter at this site.

Table 5-2 City Hall Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	1 (2008)	203 ug/m^3 (1)	76 ug/m^3	51%	Decreasing
PM2.5	24-hr 35 ug/m^3	2 (2008) (2009)	39.6 ug/m^3 (1)	21.9 ug/m^3	63%	Slight Decrease
	Annual 15 ug/m^3	0	9.7 ug/m^3	8.4 ug/m^3	56%	Slight Decrease

(1) Concentration during an exceptional event.

5.1.1.3 PM2.5 Evaluation

During the five year review period only two 24-hour samples recorded concentrations greater than the 24-hour PM2.5 standard of 35 ug/m^3. Each of the years of 2008 and 2009 had one sampling day greater than the current 24-hour PM2.5 standard.

The highest concentration day in 2008 was recorded on April 15. A check of the National Oceanic and Atmospheric Administration smoke map indicated the presents of smoke originating from prescribed and wild fires in Kansas. The sampling concentrations were also over the standard at both Sioux Falls and the Watertown sites. The data indicated transport of PM2.5 from the Kansas fires into the eastern part of South Dakota. DENR flagged the sampling day as an exceptional event when it was entered into the Air Quality System data base.

A second 24-hour PM2.5 concentration was recorded higher than the standard on December 18, 2009. The sampling concentrations were also over the standard at Union County, Sioux Falls and Watertown sites on this day. It appears PM2.5 pollution transport combined with a slow moving air mass over a large area including the eastern edge of South Dakota and parts of Minnesota and Iowa were affected by these conditions. See the details in Section 3.6.2 on PM2.5 transport issues.

Three other 24-hour PM2.5 concentrations were greater than 80% of the standard with one each in 2005, 2006, and 2009. Even with the sample concentrations greater than 80% of the standard, the potential for high concentrations is less than 10%. Another indication of low PM2.5 concentrations is the design value for the site being at 63% of the 24-hour standard which is well within the attainment level. See Table 5-3 for more information.

The Brookings PM2.5 annual design value concentrations are under the standard at 56% of the annual PM2.5 standard of 15 ug/m^3. The 2005 sampling year had the highest annual concentration at 9.7 ug/m^3 or 65% of the standard. The annual concentration trends show a slight decline in annual average concentrations over the life of the monitoring site. See Attachment A for more details on the PM2.5 annual average trends for this site.

No comparison was made for this site to other sites in the area because the closest sites in Watertown and in Sioux Falls are 45 to 50 miles away.

5.1.1.4 Summary for City Hall Site

The sampling goals of population exposure and high concentration are being met at this site for both PM10 and PM2.5. Concentrations greater than the standards were recorded for both parameters during this five year review period so there continues to be a need for testing at this site. Because of the geographic distance between the City Hall Site and the

sites in Watertown and Sioux Falls, the diversity of industrial sources, and the difference in population trends, no changes are planned at this site.

5.1.2 Fire Station #1 Site

Aberdeen is located in the northeastern area of South Dakota, is the third largest city in the state, and the largest city in the northeast. The population trends show a slightly declining level and trends indicate the population will continue to decrease slightly. But resent and potential future addition of new business may reverse this trend. Table 5-3 contains general information about the site and parameter testing.

Table 5-3 Fire Station #1 Site

Location	Aberdeen
County	Brown County
AQS #	46-013-0003
Parameter	PM10
Goals	Population/High Concentration
Sampling Schedule	Every Sixth Day
Parameter	PM2.5
Goals	Population/High Concentration
Sampling Schedule	Every Third Day

The topography is very flat in and around the Aberdeen area. No topography issues that could increase air pollution levels caused by air stagnation is anticipated in this area.

Industrial development in the city and surrounding area includes service oriented businesses and light industry on the west and east side of the city. New facilities in the area include two ethanol plants and a beef processing plant being constructed. Land use around the city is mainly agriculture with a small amount of grassland. Agriculture remains the largest industry in this area.

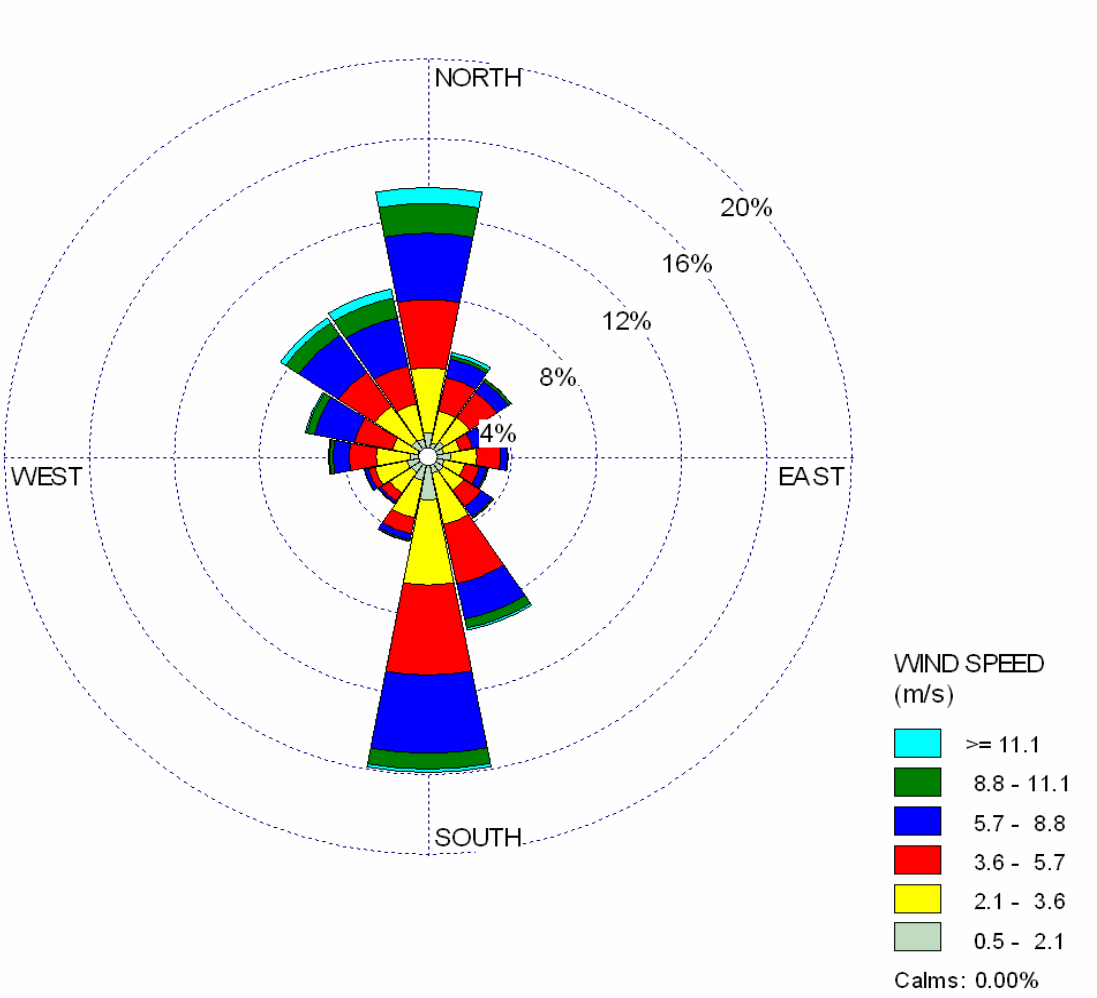
Historically there have been three different air monitoring sites in the city. The current site is the Fire Station #1 Site. The Fire Station #1 Site was setup in 1999 and testing includes PM10 and PM2.5. The Fire Station #1 Site is the only air monitoring site currently operating in Aberdeen, Brown County or in any of the surrounding counties. The closest air monitoring site is 75 miles away in Watertown. Data concentrations for PM10 and PM2.5 represent the highest concentration air pollution levels in the northeast central part of the state associated with industry and an urban center. No exceptional events were recorded at this site during the last five years.

5.1.2.1 Meteorological Data Evaluation

Meteorological data for this site comes from the Aberdeen Airport located on the east edge of the city. The predominate wind directions and highest average wind speeds are

from the north and south the majority of days. Figure 5-2 contains a wind rose graph for the Aberdeen Airport in 2009.

Figure 5-2 Wind Rose Aberdeen Airport



5.1.2.2 PM10 Evaluation

The air monitoring data for the 24-hour PM10 samples are all under the standard and all are less than 80% of the standard for the five years of data reviewed. The potential of high concentrations are less than 10%.

The design value is 38% of the standard so the chance of exceeding the PM10 standard is very low. PM10 concentration trends in Aberdeen are steady. There are sufficient years of data to show the area is attaining the PM10 standard. Appendix A contains further

information specific to PM10 trends for this site. Table 5-4 shows an assessment of the PM10 data collected at this site.

No comparison was made between this site to other sites in the area because the closest site is in Watertown about 85 miles away.

Table 5-4 Fire Station #1 Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	81 ug/m^3	57 ug/m^3	38%	Slight Increase
PM2.5	24-hr 35 ug/m^3	0	30.2 ug/m^3	18 ug/m^3	51%	Slight Decline
	Annual 15 ug/m^3	0	9.0 ug/m^3	7.9 ug/m^3	53%	Slight Decline

5.1.2.3 PM2.5 Evaluation

The air monitoring concentrations recorded at this site for PM2.5 are all under the 24-hour and annual standards. The potential for high concentrations greater than 80% of the standard are less than 10%.

The design value for the 24-hour is 51% and annual is 53% of the standards. There is a very low chance of exceeding the PM2.5 standards at this site. PM2.5 concentration trends for this site are slightly decreasing. More information on PM2.5 trends are contained in Appendix A. Table 5-4 shows the assessment of the PM2.5 data collected at the site. There are sufficient years of data to show the area is attaining the PM2.5 standards.

No comparison was made for this site to other sites in the area because the closest site is in Watertown about 85 miles away.

5.1.2.4 Summary for Fire Station #1

The Fire Station #1 Site in Aberdeen represents a large geographic area and this is the main reason to continue the site operation. Aberdeen is the third largest city in the state so it provides a continued representation of population exposure to both PM10 and PM2.5. Proposed industry changes may increase population levels and air pollution concentrations. For the reasons state above the site and parameters will be continue unless resource needs require a reduction of the air monitoring network.

5.1.3 Utility Site

Watertown is located in northeastern corner of South Dakota and is the fourth largest city in the state. Population trends are slightly increasing and it is anticipated this trend for population will continue along with industrial growth. The topography is flat with some low rolling hills. There are no indications that topography is causing air pollutants to accumulate. Table 5-5 contains general information about the site and parameter testing.

Table 5-5 Utility Site

Location	Watertown
County	Codington County
AQS #	46-029-0002
Parameter	PM10
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	PM2.5
Goals	Population/High Concentration
Sampling Schedule	Every Third Day

Industrial development in the city and surrounding area includes service oriented businesses and light industry on the west and south sides of the city. New facilities in the area include an ethanol plant on the south edge of the city. Land use around the city is mainly agriculture with a small amount of grassland. Agriculture remains the largest industry in this area.

Historically there have been two different air monitoring sites in the city. The current site is the Utility Site setup in 2003 testing for PM10 and PM2.5. This is the only air monitoring site in Watertown, Codington County and in any of the surrounding counties. The closest air monitoring site is located 45 miles south in the City of Brookings. Concentrations for PM10 and PM2.5 represent population and high concentration of air pollution levels in the northeast part of the state associated with industry and an urban area.

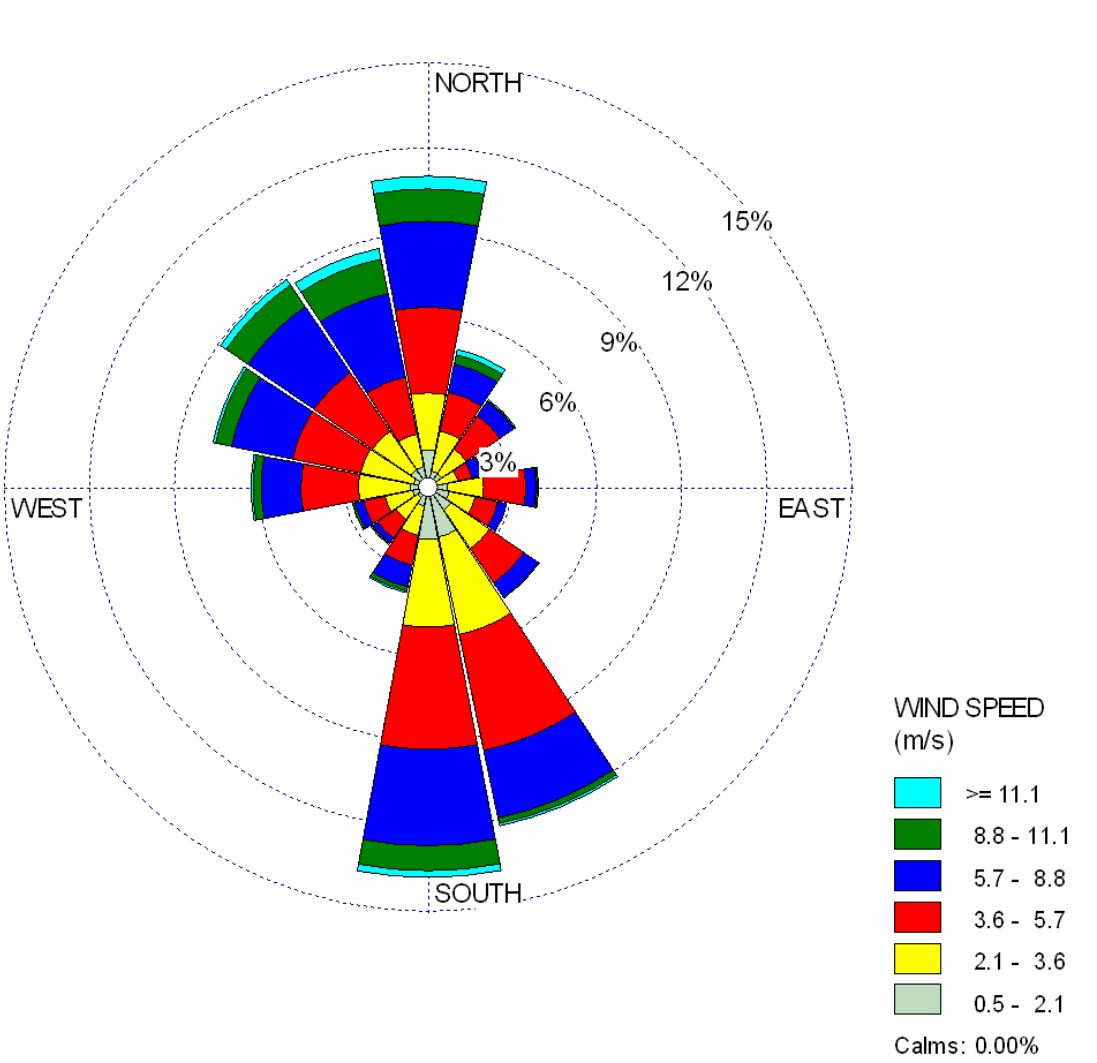
One exceptional event was recorded during the last five years. High winds caused the PM10 and PM2.5 concentrations to exceed the 24-hour standard for both on December 17, 2008. The sampling data for both PM10 and PM2.5 were flagged by the state as a high wind exceptional event.

5.1.3.1 Meteorological Data Evaluation

Meteorological data used for this site was collected at the Watertown Airport located west edge of the city. The predominate wind directions and highest wind speeds are north to northwest and south to south southeast. The location of the monitoring site should indicate if any air pollution levels from the industrial sources to the south, west

and northwest of the site are causing health concerns. Figure 5-3 contains a wind rose graph of the meteorological data for Watertown collected in 2009.

Figure 5-3 Wind Rose Watertown Airport



5.1.3.2 PM10 Evaluation

PM10 concentrations in general are steady to decreasing slightly over the life time of this site. Only one sampling day in 2008, had concentrations that exceeded the 24-hour standard in the last five years of operation. All of the remaining daily concentrations in the 5-year period are less than 80% of the standard. The probability of having high concentration day is less than 10%.

The sampling day over the standard in 2008 was affected by high winds, blowing snow and an eroding dirt pile temporally stored next to the monitoring site. DENR flagged the sampling day as exceptional event when the data was submitted to the Air Quality System data base.

The design value for PM10 remains low at 53% of the standard. Unless there is a significant drop in the standard level there is sufficient data to show attainment of the 24-hour PM10 standard. See Table 5-6 for more information on the data collected at the site.

No comparison was made for this site to other sites in the area because the closest site is in Brookings about 45 miles away.

The parameter is meeting the goals of testing for impacts to population and high concentration for the area. It is anticipated that population and industrial growth trends will remain at current levels by grow slightly in the coming years. No changes are planned for this parameter during this review period.

Table 5-6 Utility Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	1 (2008)	156 ug/m^3 (1)	79 ug/m^3	53%	Steady
PM2.5	24-hr 35 ug/m^3	2 (2008) (2009)	56 ug/m^3 (1)	24.2 ug/m^3	69%	Slight Decrease
	Annual 15 ug/m^3	0	10.7 ug/m^3	9.0 ug/m^3	60%	Slight Decrease

(1) Concentration during an Exceptional Event

5.1.3.3 PM2.5 Evaluation

During the five year review period two 24-hour samples recorded concentrations greater than the 24-hour PM2.5 standard of 35 ug/m^3. Each of the years of 2008 and 2009 had one sampling day greater than the current 24-hour PM2.5 standard.

The high concentration day in 2008 was recorded on April 15. A check of the National Oceanic and Atmospheric Administration smoke map indicated the presents of smoke originating from prescribed fires in Kansas. The sampling concentrations were also over the standard at both Sioux Falls and the Brookings sites on the same day. The data indicated transport of smoke from fires into the eastern part of South Dakota. DENR flagged the sampling day as an exceptional event when the data was entered into the Air Quality System data base.

A second 24-hour PM2.5 concentration was recorded higher than the standard on December 18, 2009. The sampling concentrations were also over the standard at Union County, Sioux Falls and Brookings sites on this day. It appears PM2.5 pollution

transport combined with a slow moving air mass over a large area including the eastern edge of South Dakota and parts of Minnesota and Iowa were affected by these conditions. See the details in Section 3.6.2 on PM2.5 transport issues.

Five other 24-hour PM2.5 concentrations were greater than 80% of the standard with one each in 2006, 2007, and 2009 and two in 2008. Even with the seven samples with concentrations greater than 80% of the standard the potential for a high concentration day is less than 10%. Another indication of low PM2.5 concentrations at this site is the design value at 69% of the 24-hour standard well within the attainment level.

The Watertown PM2.5 annual average design value concentration is 60% of 15 ug/m^3, the annual PM2.5 standard. The 2005 sampling year had the highest annual concentration at 10.7 ug/m^3 or 71% of the standard. The annual concentration trends show a slight decline in annual average concentrations over the life of the monitoring site. The PM2.5 concentrations vary but on some years the concentrations are close to being the highest levels recorded in the state. See Table 5.6 for more information of the assessment of the data collected at this site for PM2.5.

No comparison was made for this site to other sites in the area because the closest site is in Brookings about 45 miles away.

5.1.3.4 Summary of Utility Site

The sampling goals of population exposure and high concentration are being met at this site for both PM10 and PM2.5. Concentrations greater than the standards were recorded for both parameters during this five year review period so there continues to be a need for testing at this site. Because of the geographic distance between the Utility Site and the sites in Aberdeen and Brookings, the diversity of industrial sources and the difference in population trends, no changes are planned to this site during this review.

5.2 Sioux Falls Sites

Historically, Sioux Falls has had nine different air monitoring site locations operating in the city since the air monitoring network was setup in 1970s. Sioux Falls is the largest city in the state with a population of 123,975 and is located in the county with the highest population level. Currently there are two air monitoring sites operating in Sioux Falls and are the only ones in Minnehaha County and the neighboring counties. The closest air monitoring site outside of Sioux Falls is located about 51 miles south in Union County.

5.2.1 KELO Site

The KELO Site is located in the down town or center of the City of Sioux Falls. The industry is mainly service type businesses in the area around the site. Minnesota Avenue, two blocks to the west of the site, is one of the busiest roads in the city. Mobile source emissions may be the major contributor to concentrations at this site. Residential areas are located to the south of the monitoring site.

The KELO Site was setup in 1991 testing for PM10. The parameter of PM2.5 was added in 1999. Concentrations for PM10 and PM2.5 represent population and high concentration of air pollution levels for this urban area. Only one exceptional event, wildfire smoke, was recorded at this site and was flagged by DENR. The sampling day was the highest PM2.5 concentration for this site during the last five years. Table 5-7 contains general information about the site and parameter testing.

Table 5-7 KELO Site

Location	Sioux Falls
County	Minnehaha County
AQS #	46-099-0006
Parameter	PM10
Goals	Population/High Concentration
Sampling Schedule	Every Sixth Day
Parameter	PM2.5
Goals	Population/High Concentration
Sampling Schedule	Every Third Day

5.2.1.1 PM10 Evaluation

The 24-hour PM10 concentrations at this site are all less than the national standard in the 5-year review period. The site trend shows concentrations decreasing over the 19 years of testing from an annual average of 28 ug/m^3 to 15 ug/m^3 in 2009. The design value is very low and the potential to have concentrations greater than 80% of the standard are less than 10%. The design value as calculated at the end of 2009, had the lowest concentration of the two sites in Sioux Falls by 10 ug/m^3. See Table 5-8 for an assessment of the PM10 data for this site.

One PM2.5 sampling day had a high concentration caused by an exceptional event happened during the five years of data at the KELO Site. Further discussion of the exceptional event is included in Section 5.2.1.3.

Table 5-8 KELO Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	98 ug/m^3	43 ug/m^3	29%	Decreasing
PM2.5	24-hr 35 ug/m^3	2 (2008) (2009)	43 ug/m^3	25.5 ug/m^3	73%	
	Annual 15 ug/m^3	0	10.7 ug/m^3	9.4 ug/m^3	63%	Slight Decrease

The KELO Site is one of the lowest PM10 sites in the state. The chance of exceeding 80% of the standard is less than 10% and may never record a high concentration. During the 19 years of operation the site has not recorded a concentration over the standard.

5.2.1.2 PM2.5 Evaluation

The opposite is true for PM2.5 concentrations with the design value at the KELO Site higher than the SD School Site by 4.4 ug/m^3. In most cases the high 24-hour PM2.5 concentrations occur on the same days and are close in level at all of the other sites along the eastern edge of the state. This causes the highest concentration design value to shift from one site to the other in different years. Long range transport of PM2.5 pollution appears to be the cause of the high concentration days and the events can include all of the sites along the eastern edge of the state. The 24-hour design value in 2009 puts this site as the highest concentration site in the state followed closely by the Watertown Site. See Table 5-8 for information of the concentration level assessment for PM2.5 at this site.

A review of the last five years of data shows two days, one each in 2008 and 2009, had concentrations greater than the standard. The site had seven other days with concentrations within 80% of the standard. The chance of exceeding 80% of the standard remains less then 10%.

The KELO Site also recorded a high concentration on April 15, 2008. As previously discussed in the Brookings and Watertown sites smoke originating from prescribed fires in Kansas seems to have caused the exceedance. The sampling concentrations were also over the standard at both Watertown, SD School and the Brookings sites on the same day. The data indicated transport of smoke from fires into the eastern part of South Dakota. DENR flagged the sampling day as an exceptional event when the data was entered into the Air Quality System data base.

As discussed previously a 24-hour PM2.5 concentration was recorded higher than the standard on December 18, 2009. The sampling concentrations were also over the standard at Union County and SD School sites on this day. Only the sites with continuous PM2.5 monitors were running on this sampling day so other locations may have had high concentrations. It appears PM2.5 pollution transport combined with a slow moving air mass over a large area including the eastern edge of South Dakota and parts of Minnesota and Iowa were affected by these conditions. See the details in Section 3.6.2 on PM2.5 transport issues.

The annual averages for PM2.5 during the 5-year review period are all less than the national standard. The annual average has decrease slightly over the years of operation. The annual average design value just like the 24-hour design value is the highest of all the sites in the state but only 0.4 ug/m^3 lower than the SD School Site. None of the annual averages had concentrations within 80% of the standard.

5.2.1.3 Summary of KELO Site

The PM10 parameter has sufficient data to show attainment of the standard and has a less than 10% chance of having a concentration greater than the standard. The PM10 parameter is not the high concentration location is the city so is not a priority for this area.

The chance of having concentrations greater than 80% of the 24-hour and annual PM2.5 standard are less than 10%. But concentrations are still among the highest in the state. With the possibility of EPA reducing the annual average standard, the PM2.5 parameter will remain a priority at this site.

5.2.2 SD School Site

The SD School Site is one of two air monitoring sites in Sioux Falls and in Minnehaha County. Concentrations for all parameters represent population exposure and high concentration of air pollution levels in an urban area. Table 5-9 contains general information about the site and parameter testing.

Table 5-9 SD School Site

Location	Sioux Falls
County	Minnehaha County
AQS #	46-099-0008
Parameter	PM10
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	PM2.5
Goals	Population/High Concentration
Sampling Schedule	Every Day and Every Third Day
Parameter	PM coarse
Goals	Population/High Concentration
Sampling Schedule	Every Day (Starting 2011)
Parameter	Ozone
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	Sulfur Dioxide
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	Nitrogen Dioxide
Goals	Population/High Concentration
Sampling Schedule	Every Day (Hourly)
Parameter	PM2.5 Speciation
Goals	Population/High Concentration
Sampling Schedule	Every Third Day

Parameter	Meteorological
Goals	Population/High Concentration
Sampling Schedule	Every Day (Hourly)

The SD School Site is located in the central and east part of the city. The area around the site is residential with two schools within one block west and northwest of the site. Service type businesses are located to the south along 10th Street and residential areas are located in all directions from the site. High traffic count roads are located to the south 10th Street about 1.5 blocks and I 229 six blocks to the east of the site.

The main industrial area in the city is located starting about 1 mile to the north and northwest of the site. The facilities include light industry and service oriented businesses.

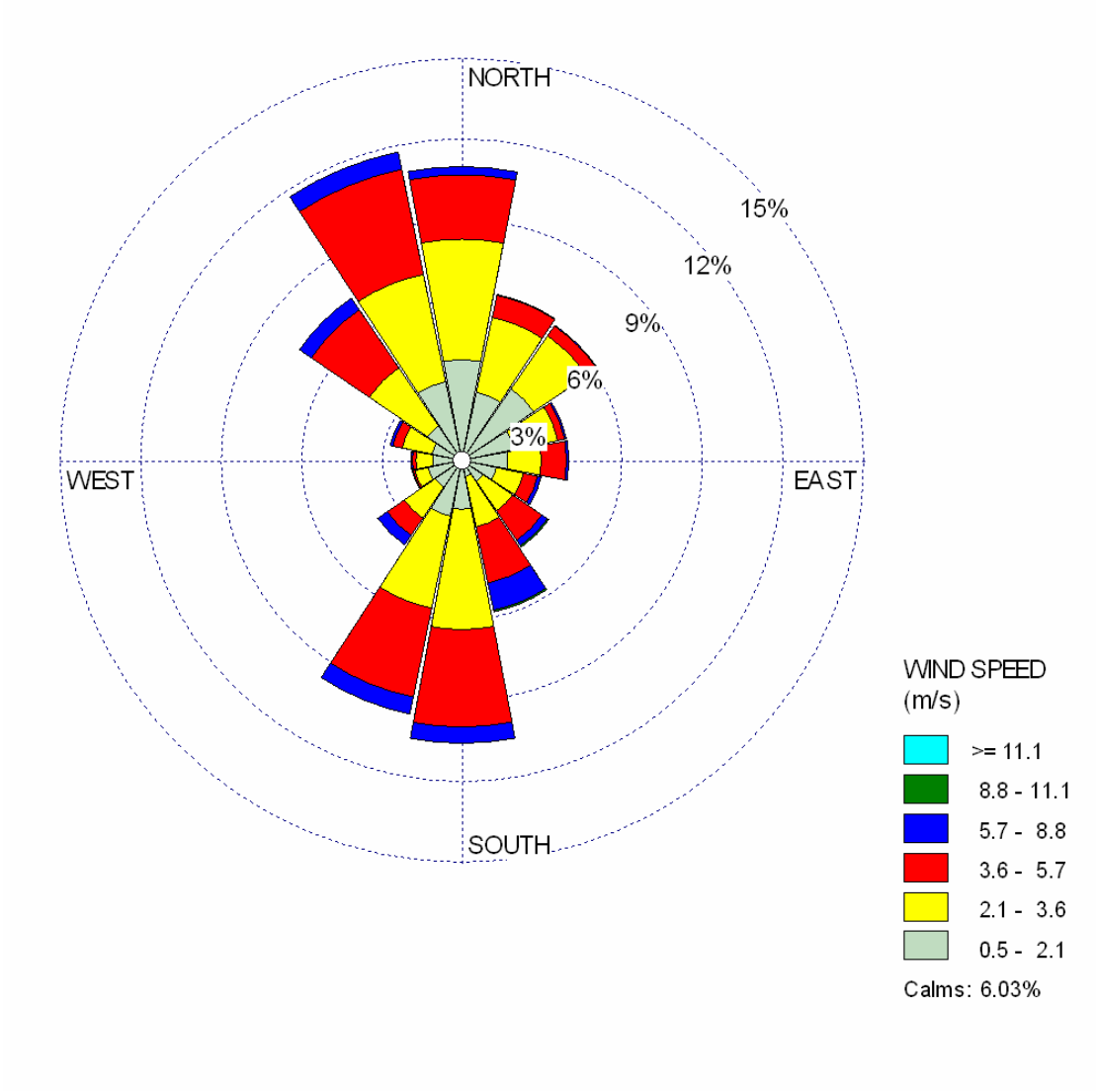
The SD School Site was setup in 2008, as a replacement for Hilltop Site and is the National Core site for South Dakota. The SD School Site is testing for the criteria pollutants of PM10, PM2.5, Ozone, sulfur dioxide, and nitrogen dioxide. Non-criteria air pollutant testing includes Air Toxics, PM2.5 speciation and meteorology.

One exceptional event for PM2.5 was recorded and flagged by the state at this site during the last five years. The exceptional event in April of 2009 was caused by smoke being transported from fires in Kansas.

5.2.2.1 Meteorological Data Evaluation

Testing also includes a meteorological station collecting data on wind speed, wind direction, ambient temperature, humidity and barometric pressure. Figure 5-4 shows a wind rose for the data collected at the site in 2009. The prevailing wind directions during the year are from the north to northwest and south to southwest directions. The location of the site to the industrial park to the north and northwest of the site is providing a good evaluation of population exposure to the industrial air pollution emissions.

Figure 5-4 Wind Rose SD School Site



5.2.2.2 PM10 Evaluation

PM10 concentrations at the SD School Site are the highest being recorded in the City. Even with that statement the site remains near the middle of the PM10 design values in the state and only 37% of the standard. None of the concentrations have exceeded the 24-hour PM10 standard at this site. None of the 24-hour concentrations are within 80% of the standard level so the chance of exceeding 80% of the standard is less than 10%. See Table 5-10 for more information on data assessment for the SD School Site.

5.2.2.3 PM2.5 Evaluation

The SD School 24-hour concentrations are similar to the KELO Site. The concentrations are slightly less when comparing the design values but still one of the highest concentration sites in the state. When comparing the date of the highest 24-hour concentration it was found that both Sioux Falls sites had high levels on the same days. When the daily data was review for the two years the site has operated two days during the five year period had concentrations greater than the standard (one in each of 2008 and 2009) and another two days with concentrations within 80% of the standard (one each in 2008 and 2009). With a low number of sampling days with high concentrations compared to the number of sampling days there is less than a 10% chance of having a concentration greater than 80% of the 24-hour PM2.5 standard. See Table 5-10 for more information on data assessment for the SD School Site.

Table 5-10 SD School Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	68 ug/m^3	55 ug/m^3	37%	Decreasing
PM2.5	24-hr 35 ug/m^3	2 (2008) (2009)	42 ug/m^3	21.1 ug/m^3	60%	
	Annual 15 ug/m^3	0	9.0 ug/m^3	9.0 ug/m^3	60%	Slight Decrease
Ozone	0.075 ppm 8-hour	0	0.066 ppm	0.062 ppm	83%	Steady
Sulfur Dioxide	0.14 ppm 24-hour	0	0.010 ppm	0.006 ppm	4%	Steady
	0.03 ppm Annual	0	0.002 ppm	0.001 ppm	3%	Steady
	0.5 ppm 3-hour	0	0.017 ppm	0.016 3 ppm	1%	Steady
Nitrogen Dioxide	0.053 ppm Annual	0	0.007 ppm	0.007 ppm	13%	Steady
	100 ppb 1-hour	0	54 ppb (2009)	38 ppb	38%	Steady

The annual design value for SD School Site is one of the highest in the state. But the annual averages for the two years are both less than 80% of the standard. Annual averages have remained the same over the two years of testing. There is less than 10% chance of the SD School Site having a concentration greater than 80% of the annual

standard. See Table 5-10 for more information on data assessment for the SD School Site.

5.2.2.4 Ozone Evaluation

The ozone design value for the SD School Site is less than the national standard and is less than 80% of the standard. There are only three sampling days with 8-hour averages concentrations greater than 80% of the standard during the two years of operation. Therefore, there is less than 10% chance the site will have concentrations greater than 80% of the standard. This site is the second highest ozone location in the state so testing for this parameter will continue to be a priority. See Table 5-10 for more information on data assessment for the SD School Site.

5.2.2.5 Nitrogen Dioxide Evaluation

The SD School Site records the highest nitrogen dioxide concentrations in the state but levels are still very low compared to the standards. The annual concentration in 2009, was 13% of the standard. The 1-hour concentration design value was 38% of the standard using the data from 2008 and 2009. When reviewing the two years of data collected at this site the data indicates that the annual or the 1-hour concentrations have a minimal chance of exceeding 80% of the standards. See Table 5-10 for more information on data assessment for the SD School Site.

5.2.2.6 Sulfur Dioxide Evaluation

The SD School Site has sulfur dioxide concentrations that are very low at less than 10% of the 24-hour, annual and 3-hour standards. Sulfur dioxide concentrations statewide measured in the cities, rural areas, and national parks show little difference in concentration levels. Concentration trends are difficult to evaluate when levels are near the detection level of the analyzer. Even with the SD School Site located in the largest city in the state concentrations for sulfur dioxide are very low and close to the other sites in the state. See Table 5-10 for more information on data assessment for the SD School Site.

5.2.2.7 Summary for SD School Site

The SD School Site is meeting the objectives and monitoring needs of the area. As the National Core site for South Dakota, additional parameters will be added as required by rule and needs of the Sioux Falls area. Currently, the high priority parameters are ozone and PM2.5. As EPA reviews the national standards and reduces the concentration levels for other pollution parameters there may be a need for other types of testing.

5.3 Union County Sites

The Union County sites UC #1, UC #2 and UC #3 were setup in 2009 testing for parameters of PM10, PM2.5, ozone, carbon monoxide, sulfur dioxide, and nitrogen

dioxide. The sites are located in a rural area of the county with objectives of background, construction impacts, and population exposure, and high concentration.

The sites were selected to provide for testing north and south of the proposed Hyperion Energy Center and for a representative ozone site outside the modeled 1 microgram nitrogen dioxide area. The closest air monitoring site to UC #3 Site is in Sioux Falls about 35 miles north of the site.

The only exceptional event concentration flagged by the state was at UC #1 when the harvest of crops grown a short distance from the site caused elevated PM10 concentrations well above the normal levels recorded at the site but under the standard. All other high concentrations will count toward attainment of the standards.

5.3.1 UC #1 Site

Site UC #1 is located about three miles south of the proposed Hyperion Energy Center. Table 5- 11 contains general information on the site and pollution parameter concentrations being collected at the site.

Table 5-11 UC #1 Site

Location	Rural
County	Union County
AQS #	46-127-0001
Parameter	PM10
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)
Parameter	PM2.5
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)
Parameter	Sulfur Dioxide
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)
Parameter	Nitrogen Dioxide
Goals	Population/Background Concentration
Sampling Schedule	Every Day (Hourly)
Parameter	Carbon Monoxide
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)
Parameter	Meteorology
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)

Only one year of date was collected during the period of the 5-year Assessment. No trends, comparison to the standard, or comparison between monitoring sites will be completed until three years of data is collected. Table 5-12 contains a summary of the data collected in 2009 at UC #1 Site.

Table 5-12 UC #1 Site 5-year Assessment of Data

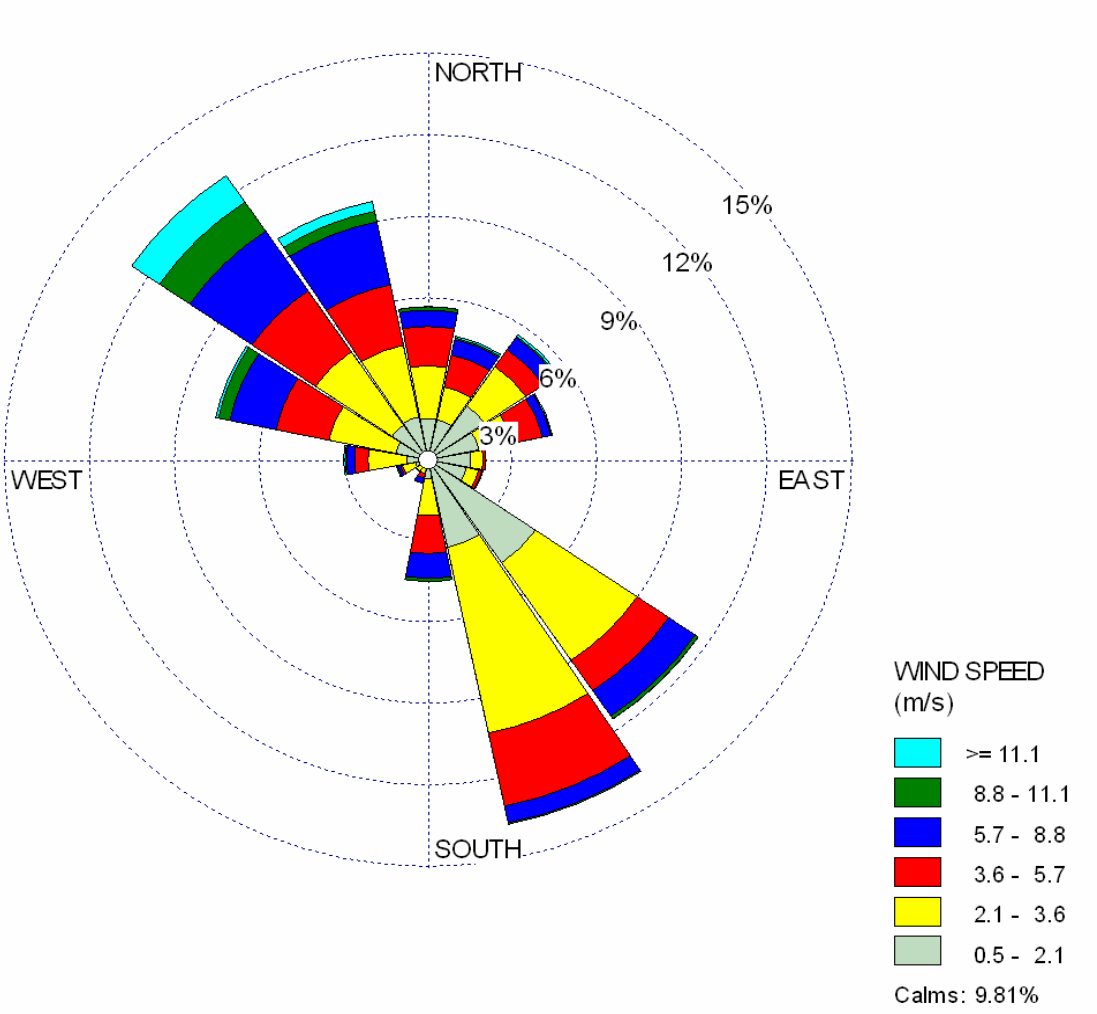
Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	82 ug/m^3	79 ug/m^3	52%	
PM2.5	24-hr 35 ug/m^3	1 (2009)	39.3 ug/m^3 (1)	21.3 ug/m^3	61%	
	Annual 15 ug/m^3	0	7.4 ug/m^3	7.4 ug/m^3	49%	
CO	9.0 ppm 8-hour	0	0.458 ppm	0.0386 ppm	1%	
	35.0 ppm 1-hour	0	0.316 ppm	0.293 ppm	3%	
Sulfur Dioxide	0.14 ppm 24-hour	0	0.004 ppm	0.003 ppm	2%	
	0.03 ppm Annual	0	0.001 ppm	0.001 ppm	3%	
	0.5 ppm 3-hour	0	0.009 ppm	0.007 ppm	1%	
Nitrogen Dioxide	0.053 ppm Annual	0	0.002 ppm	0.002 ppm	4%	
	100 ppb 1-hour	0	0.021 ppm	0.016 ppm	16%	

(1) Concentration during an exceptional event.

5.3.2 Meteorological Data

Meteorological data is collected at this site. Parameters include wind speed, wind direction, ambient temperature, humidity and barometric pressure. Data from this site can be used for future modeling of air quality impacts to Union County. Wind rose data indicates the prevailing wind direction is from the northwest and south southeast. The highest wind speeds are also associated with the predominate wind directions. Figure 5-5 shows a graph of the wind speed and direction data collected in 2009.

Figure 5-5 Wind Rose UC #1 Site



5.3.3 UC #2 Site

UC #2 Site is located 1 ½ miles northwest of the proposed Hyperion Energy Center. General information on the site and the pollution parameters being samples are contained in Table 5-13.

Only one year of date was collected during the period of the 5-year Assessment. No trends, comparison to the standard, or comparison between monitoring sites will be completed until three years of data is collected. Table 5-14 contains a summary of the data collected in 2009 at UC #2 Site.

Table 5-13 UC #2 Site

Location	Spink
County	Union County
AQS #	46-127-0002
Parameter	PM10
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)
Parameter	PM2.5
Goals	Population/Background
Sampling Schedule	Every Day (Hourly) and Every Third Day
Parameter	Sulfur Dioxide
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)
Parameter	Nitrogen Dioxide
Goals	Population/Background Concentration
Sampling Schedule	Every Day (Hourly)

Table 5-14 UC #2 Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	56 ug/m^3	49 ug/m^3	31%	
PM2.5	24-hr 35 ug/m^3	1 (2009)	42.1 ug/m^3 EE	21.6 ug/m^3	67%	
	Annual 15 ug/m^3	0	8.7 ug/m^3	8.7 ug/m^3	58%	
Sulfur Dioxide	0.14 ppm 24-hour	0	0.003 ppm	0.001 ppm	1%	
	0.03 ppm Annual	0	0.001 ppm	0.001 ppm	3%	
	0.5 ppm 3-hour	0	0.007 ppm	0.004 ppm	1%	
Nitrogen Dioxide	0.053 ppm Annual	0	0.002 ppm	0.002 ppm	4%	
	100 ppb 1-hour	0	0.022 ppm	0.016 ppm	16%	

5.3.4 UC #3 Site

UC #3 is located about 3 ½ miles northwest of the proposed Hyperion Energy Center. The site was located outside of the one microgram impact area nitrogen dioxide around

the Hyperion facility. The impact area was determined through modeling completed as part of the air quality permit application. The monitoring site is also located at the base of a ridge of hills that extend from the northeast to the northwest of the proposed facility. The elevation level is similar to the proposed facility area and should provide a location for pre-construction and post construction comparison of ozone concentration data. General information on the site and the pollution parameters being samples are contained in Table 5-15.

Table 5-15 UC #3 Site

Location	Rural
County	Union County
AQS #	46-127-0003
Parameter	Ozone
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)

Only one year of date was collected during the period of the 5-year Assessment. No trends or comparison to the standard will be completed until three years of data is collected. Table 5-16 contains a summary of the ozone data collected in 2009 at UC #3 Site.

Table 5-16 UC #3 Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
Ozone	0.075 ppm	0	0.063 ppm	0.060 ppm	80%	

5.3.5 Summary For Union County Sites

There were no concentrations greater than the standards for any of the parameters PM10, CO, sulfur dioxide and nitrogen dioxide collected during the first year. Concentrations for these parameters are very low as was expected near background concentrations for a rural area with a low number of emission sources.

The PM2.5 concentrations are slightly higher than anticipated at both sites. The PM2.5 levels appear to be affected by long range transport from outside the state and are similar to concentration recorded at the other sites along the eastern edge of South Dakota. All the sites along the eastern edge of the state have their high concentration days on the same 24-hour periods.

The ozone concentrations in Union County are generally about the same as the SD School Site in Sioux Falls. This trend may also point to long range transport from outside of the state.

The three monitoring sites in Union County are meeting the goals and needs specified when they were setup. With only one year of testing completed no trends or comparison

to the standards can be determined. No changes are planned to the sampling sites or parameters as a result of the 5-year review.

5.4 Rapid City Area

Rapid City metropolitan statistical area is located on the western third of the state on the eastern edge of the Black Hills in Pennington and Meade Counties. It is the second largest city in the state with a population of 59,607. Rapid City has a growing population and business community.

The topography in the city is a complex mix of flat to rolling hills on the eastern apart of the city to areas of valleys and ridges leading into the forested Black Hills in the south and west parts of the city.

The western part of the city has a ridge or hogback and Red Valley that separate the rolling plains from the forested Black Hills. Temperature inversions in the valleys going up into the Black Hills can increase particulate matter pollution levels but the inversions are usually short in duration and rarely last more than a few hours in this area.

To the east of the city is the small town of Box Elder and flat to rolling areas of grass and crop land. To the south of the city are areas of rolling grasslands and the forested eastern edge of the Black Hills. To the north of the city are the small communities of Black Hawk, Piedmont, and Summerset located in the Red Valley between the hogback ridge and the Black Hills.

Businesses include light industry, limestone quarry industries, service oriented industries, and just to the east of the city is the Ellsworth Air Force Base. The limestone quarry area has the highest source emissions of particulate matter air pollution in the city

The Rapid City area has a long history of high particulate matter levels. High concentrations of particulate matter in the late 1970s ranged up to several magnitudes over the TSP standards. A state implementation plan was developed to reduce concentrations of dust. In 1986, the TSP standard was replaced by a new standard particulate matter 10 microns and smaller or PM10.

In the 1990s, PM10 concentration levels exceeded the 24-hour standard. Significant work on ways to reduce the high dust levels were developed by working with local industry, Rapid City, Pennington County and the state. The results reduced levels of particulate matter so Rapid City area was designated as attaining the PM10 standard in 2006. The high concentration area is contained in the Rapid City Metropolitan Statistical Area which includes areas in Pennington County and a small area in southwest Meade County.

A total of 21 air monitoring sites and several more special study sites have been operated in Rapid City metropolitan statistical area since 1972. Currently, four sites are operated

to continue to evaluate the particulate matter controls on point and fugitive dust sources that keep the PM10 levels within the standard.

5.4.1 Credit Union Site

The Credit Union Site is designated as the high concentration site for the Rapid City area and the compliance point for comparison of the area to the national standard for PM10. This site is the replacement site for a series of other locations that were previously setup and operated for the same purpose. The names of past high concentration sites include Fire Station #3, Family Thrift Center and Jaehn's and all were located south of the quarry area in western Rapid City.

The Rapid City area has a Natural Events Action Plan to notify the public of possible high dust concentration levels caused by high winds and to begin special control measures to reduce dust levels from industrial sources. The PM10 monitor at the Credit Union Site is used to measure concentrations of dust during High Wind Dust Alerts. The hourly PM10 and PM2.5 continuous monitor data is loaded to the Air Quality webpage so the public has access to near real time air monitoring data. Alerts are called by the National Weather Service in Rapid City when forecast average wind speeds are greater than 20 miles per hour, wind gusts will be greater than 40 miles per hour and if there has been more than 5 days without precipitation greater than 0.02 inches. The highest concentration during a high wind dust alert was in 2005 right at the standard with a level of 150 ug/m^3. All the remaining concentrations on alert days were less than 100 ug/m^3 during the review period. General information on the site and the pollution parameters being samples are contained in Table 5-17.

Table 5-17 Credit Union Site

Location	Rapid City
County	Pennington County
AQS #	46-103-0020
Parameter	PM10
Goals	Population/High Concentration
Sampling Schedule	Every Day (Hourly)
Parameter	PM2.5
Goals	Population/High Concentration
Sampling Schedule	Every Third Day and Every Day (Hourly)
Parameter	Sulfur Dioxide (2011)
Goals	Population/High Concentration
Sampling Schedule	Every Day (Hourly)
Parameter	Nitrogen Dioxide (2011)
Goals	Population/Background Concentration
Sampling Schedule	Every Day (Hourly)

The Credit Union Site is located about one block south of the GCC Dakotah's cement plant and the limestone quarry area. The Credit Union Site is located in a mix of

residential areas, parks, service industries, and the limestone quarry/manufacturing industries. The topography is complex with hills and valleys located in Red Valley the area between the hogback and the eastern edge of the Black Hills.

The Credit Union Site was setup in 2003 and the parameters included PM10, PM2.5 and ozone. In 2006, a screening model indicated the Credit Union Site was located within the 1 microgram foot print for nitrogen dioxide from industries in the quarry area. There was a high potential that ozone levels were bias low at this location because of the nitrogen dioxide concentrations. In 2007, the ozone parameter was moved to the Black Hawk Site.

Meteorological parameters were collected for several years at this location. Because of interference from near by buildings the meteorological equipment was moved to the Black Hawk Site at the same time the ozone analyzer was moved.

Currently, a continuous Thermo BETA monitor is used to collect hourly concentrations of PM10, a Met One BAM 1020 continuous monitor collects hourly PM2.5 levels and Andersen RAAS 100 manual monitors are used to collect 24-hour PM2.5 concentrations.

5.4.1.1 PM10 Evaluation

PM10 levels at the Credit Union Site continue to be the highest recorded in the state but trends show a slight decline in levels since the site was setup in 2003. The only time a concentration exceeded the 24-hour standard at this site in the 5-year review period was one sampling day in 2006.

The slight decline in PM10 levels has brought the 24-hour design value for the Credit Union Site down to 78% of the standard. During the review period 11 daily concentrations were greater than 80% of the standard. Four of the five years had design values greater than 80% of the PM10 standard. See Table 5-18 for more information on the concentration levels.

Table 5-18 Credit Union Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	1 (2006)	170 ug/m^3	117 ug/m^3	78%	Decreasing
PM2.5	24-hr 35 ug/m^3	2 (2008) (2009)	58.6 ug/m^3 (1)	16.1 ug/m^3	46%	
	Annual 15 ug/m^3	0	9.3 ug/m^3	7.6 ug/m^3	51%	Slight Decrease

(1) Concentrations during an exceptional event

Several samples each year have concentration greater than 100 ug/m^3 at the Credit Union Site. Because this site has the highest concentrations in the state a special review of

meteorological conditions was completed. The review included nine sampling days with concentrations greater than 100 ug/m^3 in 2009. Eight of nine days had wind directions from the north to northwest. Seven of the nine days had high wind speeds and high humidity. Six of the nine high concentration days occurred during high winds with snow, rain, fog, or a combination of these moisture conditions.

When individual hours were evaluated at for the days with high winds many of the highest concentration hours were associated with weather data periods of moisture or fog. The data in question was collected on one type of continuous monitor, a Thermo BETA 1020. The review brought up concerns that moisture during some of the sampling days may have been measured instead of levels of PM10. There are other sites that may have had similar high concentration hours using the same monitor under the same weather conditions. Further investigation is planned to verify the levels of PM10 during these events. In addition adjustments will be made to the monitor to reduce the chance of moisture getting to the sample filter.

5.4.1.2 PM2.5 Evaluation

The Credit Union Site has the highest PM2.5 concentrations design values for Rapid City but levels remain low compared to the 24-hour and annual standards. The 24-hour design value is 46% and the annual design value is at 51% of the standards. Table 5-18 contains information on the assessment of data collected at the Credit Union Site.

Two sampling days, one in each year of 2008 and 2009, had concentrations greater than the 24-hour PM2.5 standard in the 5-year period. The sampling days were affected by wild fire smoke transported from Canada. All of the sites in the western part of South Dakota had high concentrations of PM2.5 on these days.

Two days during the 5-years assessment period had concentrations greater than 80% of the standard. Over all the Credit Union Site has less than a 10% chance of exceeding the 24-hour standard. Annual average for each year in the review period were less than 80% of the standard so there is a very low chance of this site having an annual concentration greater than 80% of the standard. See Table 5-18 for more information on the concentration levels.

5.4.1.3 Summary For Credit Union Site

The Credit Union Site is meeting the goals of population exposure, high concentration, and measuring the success of point and fugitive dust control measures being implemented by the city, state, county and industry in Rapid City. Testing for both PM10 and PM2.5 continues to be important at this site because it is the high concentration site for the Rapid City area for both parameters and continues to provide hourly data for the public use.

5.4.2 Public Library Site

The Public Library Site is the oldest operating site in the state. The site was setup in 1972 and pre-dates the state's air quality program. Testing for particulate matter started when the site was setup and continues today with modifications to equipment type and size selection changes over the years. Other parameters of nitrogen dioxide, sulfur dioxide and meteorology were collected and discontinued at this site. In 1999, PM2.5 monitors were added to the site and operate along with the PM10 monitors today.

In 2001, the monitoring site location was moved about 80 feet further east on the roof of the building because an addition was added to the west side of the Library building. This is the only change in location for the site monitors in the 38 years of operation.

The monitoring site is located in the downtown part of Rapid City. Industry includes service and tourism oriented businesses. The site is east of the hogback in the Rapid Creek valley. The topography is complex with hills, valleys and ridges associated with the eastern edge of the Black Halls. The site monitoring objectives are high concentration, population exposure and determining the success of the road deicing and street sweeping operation changes in the city. General information on the site and the pollution parameters being samples are contained in Table 5-19.

Table 5-19 Library Site

Location	Rapid City
County	Pennington County
AQS #	46-103-1001
Parameter	PM10
Goals	Population/High Concentration
Sampling Schedule	Every Third Day
Parameter	PM2.5
Goals	Population/High Concentration
Sampling Schedule	Every Third Day

During the early 1990s PM10 concentrations greater than the 24-hour standard were recorded at the Library Site. A study was conducted by DENR which indicated road sanding materials were the main source of the high PM10 concentrations in the downtown area. Rapid City switched deicing materials from sand to a chemical deicer. This change along with vacuum sweeping the streets provided a great improvement in PM10 concentrations in the downtown area.

In 2007, a new water intake was built on Rapid Creek on the east edge of the city for the Rapid Valley Drinking Water District. Shortly after the District began using the new intake problems were found with high sodium chloride levels during snow melt runoff events. The problem appeared to be caused by the use of deicing chemicals on the city streets. In the 2009/2010 winter months the city began using more sanding materials and less chemical deicer. The goal was to bring sodium chloride levels down in Rapid Creek

during snow melt events, provide for public safety when roads were icy and keep particulate matter concentrations below the health based 24-hour PM10 standard. The plan was successful during the past winter season. The City of Rapid City plans to continue to refine the balance between chemical deicer and sanding material use in parts of the city to further reduce sodium chloride levels in the creek water.

5.4.2.1 PM10 Evaluation

PM10 annual average concentrations have decreased significantly at the Library Site by more than 30% since the City of Rapid City switched to a chemical deicer in mid 1990s. None of the 24-hour concentrations have exceeded the PM10 standard in the last five years. The 24-hour design value is now only 32% of the standard and none of the sampling days have had a concentration greater than 80% of the standard. See Table 5-20 for more information on the concentration levels.

Table 5-20 Public Library Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	74 ug/m^3 (2006)	48 ug/m^3	32%	Decreasing
PM2.5	24-hr 35 ug/m^3	1 (2008)	62.0 ug/m^3 (1)	15.0 ug/m^3	43%	
	Annual 15 ug/m^3	0	7.4 ug/m^3	6.7 ug/m^3	45%	Slight Decrease

(1) Concentration during an exceptional event

5.4.2.2 PM2.5 Evaluation

PM2.5 concentrations remain low with design values less than 50% of the 24-hour and annual standards. Only one sampling day had a concentration greater than the 24-hour PM2.5 standard. The sampling day was affected by wild fire smoke transported from Canada. See Table 5-20 for more information on the concentration levels.

5.4.2.3 Summary For Public Library Site

The Library Site is meeting the goals of population exposure, high concentration, and measuring the success of fugitive dust control measures being implemented by the city, state, county and industry in Rapid City. Testing for both PM10 and PM2.5 continues to be important at this site because of changes in the deicing plans for the city and continued revisions of the standards by EPA.

5.4.3 National Guard Site

The National Guard Site is located on the armory of the Rapid City National Guard campus in western Rapid City and was setup in 1992 testing for PM10. The site is located about five city blocks south of the quarry area. The monitoring objectives are high concentration and population exposure. The site also helps define the area impacted by PM10 concentrations from the quarry operations.

The Rapid City National Guard Camp is the base for National Guard operations in western South Dakota. The area around the base is a mix of residential areas, parks, service industries, and the limestone quarry/manufacturing industries. The topography is complex with hills and valleys located in the Red Valley on the edge of the Black Hills.

Historically DENR has operated a site on the campus at three different locations. The first site setup in 1985 was located near the current day site and had the same monitoring objectives testing for particulate matter and was removed in 1989. The second site was located on the eastern part of the campus and was used to collect sulfur dioxide and nitrogen dioxide parameters in 1998 to 1999 to determine urban concentration levels to be used for modeling of facility expansion projects in Rapid City. The current site was setup in 1992 testing for PM10. PM2.5 parameter was added in 2000 and removed because of low concentrations and duplicate testing with Credit Union Site in 2004. General information on the site and the pollution parameters being samples are contained in Table 5-21.

Table 5-21 National Guard Site

Location	Rapid City
County	Pennington County
AQS #	46-103-0013
Parameter	PM10
Goals	Population/High Concentration
Sampling Schedule	Every Sixth Day

5.4.3.1 PM10 Evaluation

The PM10 concentrations at this site are the second highest in the state. Only the Credit Union Site has concentrations higher than the National Guard Site. The design value is at 53% well under the 24-hour PM10 standard. Sampling data trends show a decreasing concentration level. See Table 5-22 for more information on the concentration levels.

One sampling day in the 5-years review period had a concentration greater than 80% of the standard. The probability of a sampling day having a concentration greater than 80% of the standard is less than 10%.

Table 5-22 National Guard Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	123 ug/m^3 (2006)	79 ug/m^3	53%	Decreasing

5.4.3.2 Summary For National Guard Site

The National Guard Site has been operating for 18 years. During the review years the site has never been close to violating the 24-hour PM10 standard. The collected data shows attainment of the standard.

The National Guard Site is located in the same general area as the Credit Union Site. The PM10 concentrations at the National Guard Site are lower than the Credit Union and the Credit Union Site is four blocks closer to the quarry area. The sampling concentrations at this site do not represent highest concentrations for this area of Rapid City. The only monitoring goal provided by this site is to determine how large an area in western Rapid City has PM10 concentrations greater than the 24-hour standard and to show population exposure. All the other monitoring objects are being met by the Credit Union Site. The PM10 parameter could be considered for removal but that determination should be made in 2011 after EPA completes a review of the PM10 standard.

5.4.4 Black Hawk Site

The Elementary School or Black Hawk Site was setup in the fall of 2000 as a replacement for the Northdale Site. This site is the upwind location for comparison with the high concentration site in Rapid City. The site monitoring objective is urban background and population exposure. This site is located in the southwest corner of Meade County and is the only site operated in this county. The City of Black Hawk is part of the Rapid City Metropolitan Statistical Area.

At the startup of the site testing included the parameters of PM10 and PM2.5. At the end of 2005, the PM2.5 monitors were removed because the data showed low concentrations well under the standards. In 2007, an ozone analyzer was added to the site. The 5-year review period includes only the PM10 and ozone data. Meteorological data is also collected and will provide an indication of major wind directions and wind speeds. General information on the site and the pollution parameters being samples are contained in Table 5-23.

Table 5-23 Black Hawk Site

Location	Black Hawk
County	Meade County
AQS #	46-093-0001
Parameter	PM10
Goals	Population/Background
Sampling Schedule	Every Sixth Day
Parameter	Ozone
Goals	Population/Background
Sampling Schedule	Every Day
Parameter	Meteorological
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)

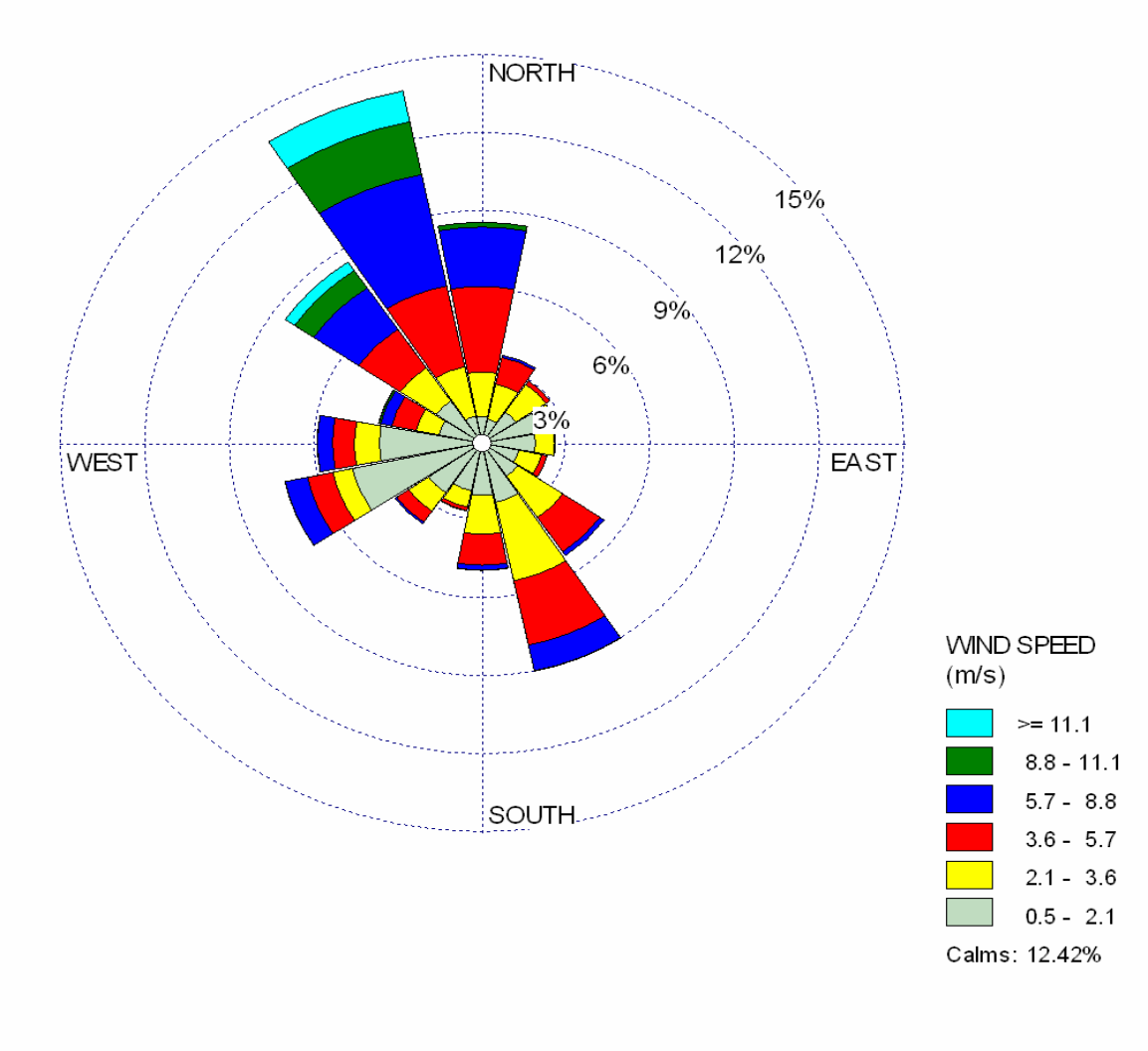
The Black Hawk Site is located on the top of a ridge on the property of the Black Hawk Elementary School. The area around the site is a growing residential area. The site is on the eastern edge of the Black Hills in Red Valley. The topography is complex with hills and valleys along the front edge of the Black Hills. Land use ranges from urban housing to forest and grasslands.

About a mile to the south of the site is the start of current and future locations of the limestone quarry businesses of Pete Lien and Sons, GCC Dakotah and Hills Material. The site still continues to be upwind of the high concentration areas but quarry operations are significantly closer to the site then when it was setup in 2000.

5.4.4.1 Black Hawk Site Meteorological Data

The meteorological data collected on site show the predominate wind directions are northwest and southeast following the general direction of Red Valley. The highest wind speeds are mainly from the northwest to north directions. The highest wind events from the northwest are associated with the highest concentrations of PM10 in the western Rapid City area. See the graph in Figure 5-7 for more information on the wind direction and wind speed data.

Figure 5-7 Wind Rose from the Black Hawk Site



5.4.4.2 PM10 Evaluation

The PM10 concentrations continue to be low at this site. The highest concentration recorded during the 5-year review period was less than 50% of the standard. The design value level is the lowest in the state. None of the sampling day concentrations had levels greater than 80% of the standard. The probability of a sampling day concentration greater than 80% of the standard is less than 10%. See Table 5-24 for more information on the concentration levels.

Table 5-24 Black Hawk Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	70 ug/m^3 (2006)	37 ug/m^3	25%	Decreasing
Ozone	8-hr 0.075 ppm	0	0.063 ppm	0.057 ppm	76%	

5.4.4.3 Ozone Evaluation

The ozone testing began in 2007 at this site. The Black Hawk Site measures some of the lowest ozone levels in the state. The three years of ozone data show an eight parts per billion difference in concentration range but a steady concentration level trend overall. None of the sampling day maximum 8-hour averages were greater than 80% of the standard in the three years the parameter has been operated. See Table 5-24 for more information on the concentration levels.

5.4.4.4 Summary For Black Hawk Site

The Black Hawk Site continues to meet the goal of providing urban background PM10 daily concentrations to compare to the high concentration sites in Rapid City. Levels of PM10 have decreased in the quarry area but with the uncertainty of changes to the PM10 standard and with the quarrying operations moving closure to this site the testing for PM10 continues to be a priority at his location.

Ozone levels are the lowest in the state at this site but uncertainty of what concentration level EPA will set for the revised standard in 2011 will require that testing for ozone be continued.

Currently, there is no information indicating the need to add more parameters to this site. No parameters will be removed during this review period.

5.5 Rural Background and Transport Sites

Two sites in western South Dakota represent sampling in Class I areas for visibility protection at the national parks of Badlands and Wind Cave. The objectives of the monitoring sites are to determine impacts to the Class I areas, measure rural background and to determine if the current oil and gas boom in Colorado, Wyoming, and Montana are increasing air pollution concentrations.

Badlands and Wind Cave sites are about 80 miles apart in different counties. Land use and topography are very different for each site. The rural setting, low year around population, and low amount of local facility air pollution levels are similar at both sites. A comparison of parameter concentrations will help determine if both sampling sites should operate the same parameters.

5.5.1 Badlands Site

The site is located a short distance south of the Ben Reifel Visitor Center/Park Headquarters at the Badlands National Park. The Badlands National Park includes about 240,000 areas of table lands, rolling prairie, and banded colored walls, peaks, gullies, and buttes to the east, north and west of the site. To the south of the site is a flat slightly rolling plain along the White River. General information on the site and the pollution parameters being samples are contained in Table 5-25.

Table 5-25 Badlands Site

Location	Badlands National Park (Rural)
County	Jackson County
AQS #	46-071-0001
Parameter	PM10
Goals	Background/Transport
Sampling Schedule	Every Day (Hourly)
Parameter	PM2.5
Goals	Background/Transport
Sampling Schedule	Every Day (Hourly)
Parameter	Sulfur Dioxide
Goals	Background/Transport
Sampling Schedule	Every Day (Hourly)
Parameter	Nitrogen Dioxide
Goals	Background/Transport
Sampling Schedule	Every Day (Hourly)
Parameter	Ozone
Goals	Background/Transport
Sampling Schedule	Every Day (Hourly)

The main industries are farming, ranching, and tourism. The area is sparsely populated with about 2,930 people in a 1,869 square mile county. Tourism brings in more than a million people each year visiting mainly in the months from May through September.

The Badlands Site was setup in 1987, with an IMPROVE monitor operated by the National Park Service. In 2000, DENR with cooperation of the National Park Service added federal reference method manual monitors for PM10 and PM2.5. In 2003, the National Parks Service modified the site by adding a sampling shelter and an ozone monitor. With the addition of the shelter DENR added continuous PM10, PM2.5, sulfur dioxide and nitrogen dioxide monitors to the site in 2004. The PM10 manual monitors

were then removed. In 2008, DENR took over the operation of the ozone analyzer from the National Park Service. In 2009, DENR replaced the continuous PM2.5 monitor with no designation with a Met One BAM federal equivalent method continuous PM2.5 monitor.

5.5.1.1 PM10 Evaluation

PM10 concentrations are some of the lowest in the state at the Badlands Site. The only site with a slightly lower design value is the Black Hawk Site. No 24-hour PM10 concentrations greater than the standard were recorded during the 5-year review period. The calculated chance of recording a concentration greater than 80% of the standard is zero. Ten years of data show the site is attaining the PM10 standard and the design value is only 28% of the standard. See Table 5-26 for more information on the concentration levels.

Table 5-26 Badlands Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	0	85 ug/m^3	42 ug/m^3	28%	Slightly Decreasing
PM2.5	24-hr 35 ug/m^3	1 (2008)	51.2 ug/m^3 (1)	11.9 ug/m^3	34%	
	Annual 15 ug/m^3	0	5.5 ug/m^3	4.9 ug/m^3	33%	Slightly Decreasing
Sulfur Dioxide	0.14 ppm 24-hour	0	0.006 ppm	0.003 ppm	3%	
	0.03 ppm Annual	0	0.002 ppm	0.001 ppm	3%	Steady
	0.5 ppm 3-hour	0	0.006ppm	0.005 ppm	1%	
Nitrogen Dioxide	0.053 ppm Annual	0	0.001 ppm	0.001 ppm	2%	Steady
	100 ppb 1-hour	0	0.006 ppm	0.004 ppm	4%	
Ozone	8-hr 0.075 ppm	0	0.074 ppm	0.057 ppm	76%	Decreasing

(1) Concentration during an exceptional event

5.5.1.2 PM2.5 Evaluation

The 24-hour design value for PM2.5 is the lowest in the state and is very close to the concentration at the Wind Cave Site. Only one 24-hour concentration was recorded greater than the 24-hour standard. The sample was collected during an exceptional event

when smoke from forest fires in Canada accumulated in western part of the state. All the other PM2.5 sites in the western part of the state also exceeded the 24-hour standard on this day. The calculated chance of recording a concentration greater than 80% of the 24-hour PM2.5 standard is zero. See Table 5-26 for more information on the concentration levels

PM2.5 concentrations have an annual average trend that is slightly decreasing over the nine years of testing. The annual PM2.5 design value is the lowest in the state. The calculated chance of recording a concentration greater than 80% of the annual PM2.5 standard is zero.

5.5.1.3 Sulfur Dioxide Evaluation

The sulfur dioxide concentrations are very low near the detection level for the analyzer. The trends for sulfur dioxide are steady but it is hard to do a trend for the site because concentrations are very low. Concentrations for the 24-hour, annual and 3-hour are all less and 5% of the standard. The calculated chance of recording a concentration greater than 80% of the sulfur dioxide standards are zero. See Table 5-26 for more information on the concentration levels

5.5.1.4 Nitrogen Dioxide Evaluation

The nitrogen dioxide concentrations are similar to the sulfur dioxide levels. Concentrations are very low with the annual and 1-hour levels less than 5% of the standard. The calculated chance of recording a concentration greater than 80% of the sulfur dioxide standards are zero. See Table 5-26 for more information on the concentration levels

5.5.1.5 Ozone Dioxide Evaluation

Badlands was the second highest ozone concentration site in the state when looking at the data in 2005 to 2007. Only the Wind Cave Site had slightly higher concentration levels. During the last three years the trend has changed with significantly lower ozone levels. The design value has dropped by 11 parts per billion by the end of 2009. The site is now one of the lowest sites in the state with a design value of 76% of the standard.

An evaluation of the potential of exceeding 80% of the ozone standard more than 10% of the sampling days was completed. The years from 2005 to 2007 all had more than 10% of the sampling days with 8-hour average concentrations greater than 80% of the standard. The last two years of 2008 and 2009 had less than 10% of the days with maximum 8-hour average concentrations greater than 80% of the standard.

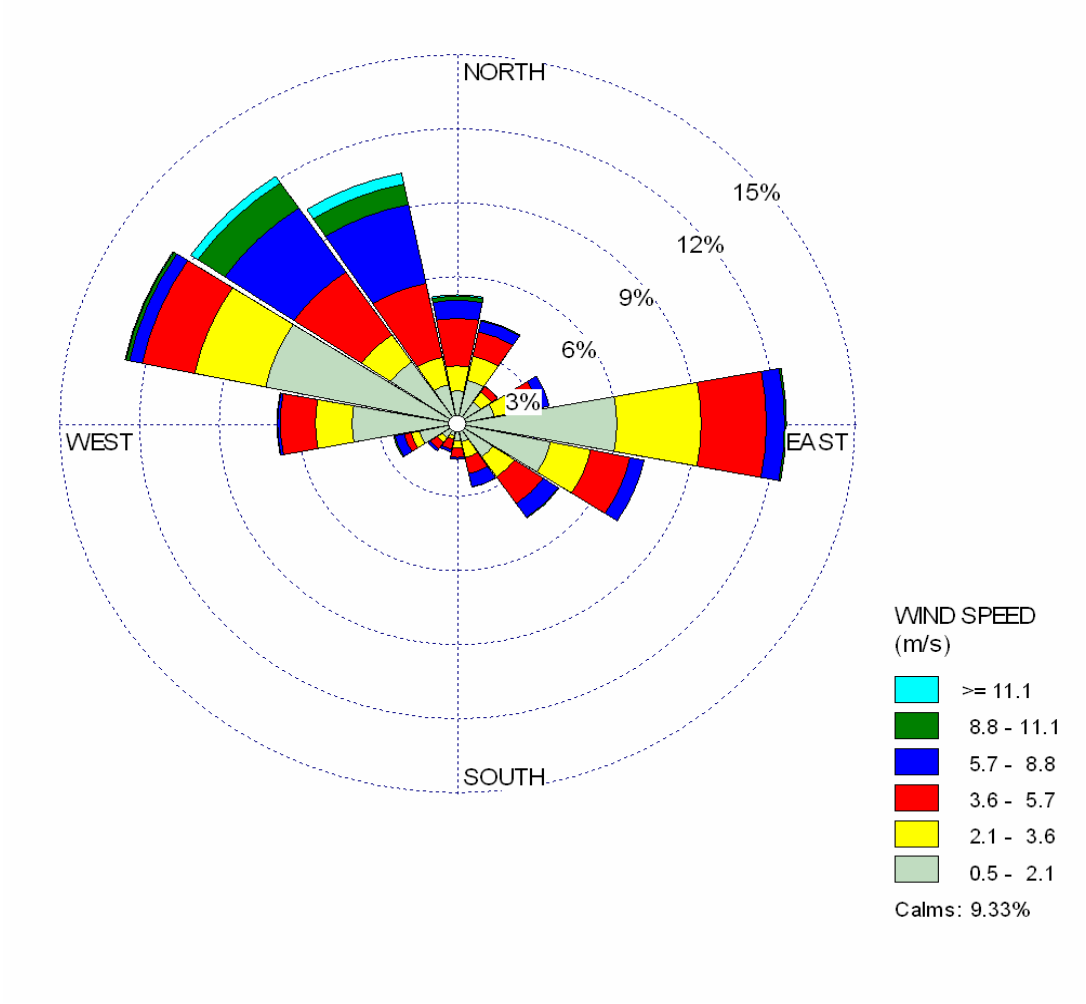
DENR is not certain if lower ozone levels are due to a reduction of ozone forming pollution emission or weather patterns are not transporting the higher ozone concentrations from outside of the state. Another possibility is the cooler and wetter

weather the last two years are not allowing high ozone levels to form. See Table 5-26 for more information on the concentration levels.

5.5.1.3 Meteorological Evaluation

The meteorological data collected at the Badlands Site indicates predominate wind directions are from the northwest to west northwest and the east to east southeast. Generally predominate wind directions are from the northwest and southeast in the state unless the land surface has some kind of significant change in topography. To the north of the site there is a wall with significant elevation change that runs east and west for several miles within the park. The wall appears to affect predominate wind directions and may channel winds along the face of the wall when wind direction is out of the northwest and southeast. The Badlands wall influence on the wind direction is indicated by the wind rose graph in Figure 5-8.

Figure 5-8 Wind Rose Badlands Site



5.5.1.4 Summary For Badlands Site

Concentrations for PM10, PM2.5, sulfur dioxide and nitrogen dioxide are low and data collection over the last five years indicate the monitoring objectives of background and long range transport have been met for these parameters and the data is sufficient to determine compliance with the national standards.

The ozone concentrations have declined in the last two years but the potential to exceed 80% of the standard is greater than 10% in three of five year. Ozone will continue to be a priority at this site.

5.5.2 Wind Cave Site

The Wind Cave Site is located west of the park headquarters next to the IMPROVE Site. This is the third monitoring site location in Custer County and is the only site currently being operated in the county. The land use is grasslands mixed with ponderosa pine forest. No industrial sites are within 10 miles of the site. The topography is complex with rolling hills, valleys and ridges of the Black Hills. Ranching, small scale mining, timber cutting, and tourism are the main industries. The area is sparsely populated most of the year when tourism is low. See the general information about the site in Table 5-27.

Table 5-27 Wind Cave Site

Location	Wind Cave National Park (Rural)
County	Custer County
AQS #	46-033-0123
Parameter	PM10
Goals	Background/Transport
Sampling Schedule	Every Day
Parameter	PM2.5
Goals	Background/Transport
Sampling Schedule	Every Day and Every Third Day
Parameter	Sulfur Dioxide
Goals	Background/Transport
Sampling Schedule	Every Day
Parameter	Nitrogen Dioxide
Goals	Background/Transport
Sampling Schedule	Every Day
Parameter	Ozone
Goals	Background/Transport
Sampling Schedule	Every Day

The current monitoring site was added next to the IMPROVE equipment in 2005. The parameters included continuous for PM10, PM2.5, sulfur dioxide, nitrogen dioxide and ozone and manual monitors for PM2.5. In 2009, the continuous PM2.5 monitor was

replaced with a Met One BAM PM2.5 that is a federal equivalent method. No other changes were made to the sampling parameters.

5.5.2.1 PM10 Evaluation

PM10 concentrations are generally very low and are close to the concentration levels recorded at the Badlands Site. The only high concentration days were collected in September of 2009, when a prescribed fire caused concentrations to exceed on one day and elevated concentrations on two other days. If these days are removed from the site data the design value is only 1 ug/m^3 lower than the Badlands Site. Also with these days removed there are no other days during the 5-year period that exceed 80% of the 24-hour PM10 standard. See Table 5-28 for more information on the concentration levels.

Table 5-28 Wind Cave Site 5-year Assessment of Data

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM10	24-hr 150 ug/m^3	1 (2009)	337 ug/m^3 (1)	41 ug/m^3	27%	Slight Increase
PM2.5	24-hr 35 ug/m^3	6 (1)	303.6 ug/m^3 (1)	12.6 ug/m^3	36%	
	Annual 15 ug/m^3	0	6.5 ug/m^3	5.3 ug/m^3	35%	Slight Decrease
Sulfur Dioxide	0.14 ppm 24-hour	0	0.006 ppm	0.002 ppm	1%	
	0.03 ppm Annual	0	0.001 ppm	0.001	3%	Steady
	0.5 ppm 3-hour	0	0.014 ppm	0.005 ppm	1%	
Nitrogen Dioxide	0.053 ppm Annual	0	0.001 ppm	0.001 ppm	2%	Steady
	100 ppb 1-hour	0	0.014 ppm	0.004 ppm	4%	
Ozone	8-hr 0.075 ppm	1	0.078 ppm (2006)	0.063 ppm	84%	Decreasing

(1) Concentration during an exceptional event.

5.5.2.2 PM2.5 Evaluation

PM2.5 concentrations are similar to the Badlands Site except for the days affected by smoke from prescribed fires and wild fires. The 24-hour PM2.5 design value is only 36% of the standard. The 24-hour concentrations outside of the smoke exceptional events are some of the lowest in the state.

PM2.5 annual concentrations follow the same trend as the 24-hour levels as being one of the lowest concentration sites in the state. Annual average levels for all five years of data reviewed were under 80% of the standard. See Table 5-28 for more information on the concentration levels.

5.5.2.3 Sulfur Dioxide Evaluation

The sulfur dioxide concentrations are very low with all concentrations less than 5% of the standards. The sulfur dioxide trends are steady but are also hard to determine because concentrations are close to the detection level of the analyzers. There is potential chance of recording a concentration greater than 80% of the standard unless there is an exceptional event. See Table 5-28 for more information on the concentration levels.

5.5.2.4 Nitrogen Dioxide Evaluation

The nitrogen dioxide concentrations are similar to the sulfur dioxide levels. The design values are both less than 5% of the nitrogen dioxide standards. The potential of having high concentrations greater than 80% of the standard level is very low. See Table 5-28 for more information on the concentration levels.

5.5.2.5 Ozone Evaluation

Ozone levels recorded at the Wind Cave Site are the highest in the state. There are only a few small emission sources of volatile organic compounds and nitrogen oxides, the precursors of ozone formation, in the county. The county is mostly rural and has a population of 7,275. Tourism is a big industry in this area but daily traffic counts on the busiest road near the monitoring site is still well under counts on a busy street in Rapid City or Sioux Falls.

The decline in ozone levels started in 2007. By 2009 the Wind Cave yearly 4th highest 8-hour daily concentration was not the highest in the state. The SD School Site in Sioux Falls had a concentration level one part per billion higher. The shift to lower ozone concentrations beginning in 2007 was discussed in Section 5.5.1.5 and the reasons stated also apply to levels at the Wind Cave Site.

During the 5-year review period the highest ozone concentration was 0.078 parts per million recorded in 2006. The highest concentration recorded in 2009 was 0.065 parts per million a significant drop in levels.

Even with the drop in ozone concentrations in the last two years the site still has a design value that is 85% of the ozone standard of 0.075 parts per million. Four of the last five years of data had a potential of more than 10% of having an ozone concentration greater than 80% of the standard. See Table 5-28 for more information on the concentration levels.

5.5.2.5 Summary For Wind Cave

Concentrations for PM10, PM2.5, sulfur dioxide and nitrogen dioxide are low and data collection over the last 5-years indicates the monitoring objectives of background and long range transport have been met for these parameters and the data is sufficient to determine compliance with the national standards.

The ozone concentrations have declined in the last two years but the potential to exceed 80% of the standard is greater than 10% in four of five years. Ozone will continue to be a priority at this site.

5.5.3 Comparison of Badlands and Wind Cave Data

Concentrations for PM10, PM2.5, sulfur dioxide and nitrogen dioxide are close in levels between the two sites. This indicates background levels are consistent over a large area of western South Dakota that have the same general population, low industry pollution levels and land use. The number of years each site has been operated provides sufficient information to compare to the national standards and to provide background pollution levels for western part of the state.

The comparison shows duplication of sampling efforts for these parameters between the Badlands and Wind Cave sites. Visibility levels are affected by particulate matter so these parameters are necessary to evaluate visibility impacts in the Class I areas. Ozone levels are close to the standard at both sites so this is an important parameter. To maintain usable background concentrations for modeling at least one site should continue to operated for sulfur dioxide and nitrogen dioxide. The preferred option would be to remove the sulfur dioxide and nitrogen dioxide analyzers from one site and continue to collect data at the other. Three years later the analyzers would be shifted to the other site for the next three years. This option would make new data available at a frequency that will assess any new sources of the air pollution and keep the data current for modeling. The extra analyzers could be then used for another priority location that does not have sulfur dioxide and nitrogen dioxide data.

6.0 Metropolitan Statistical Areas

Appendix D in 40 CFR Part 58 contains information used to design an ambient air monitoring network and lists three basic goals in designing an air monitoring network which are listed below:

1. Provide air pollution data to the general public in a timely manner. DENR accomplishes this objective by providing hourly concentration data to DENR's website for the Air Quality Program. The data on this website includes hourly data from the metropolitan statistical areas in Sioux Falls and Rapid City. It also includes ambient air monitoring at the Wind Cave and Badlands National Parks, Watertown, Black Hawk, and all three Union County sites (e.g., UC #1, UC #2, and UC #3). Specifically in the Rapid City area, High Wind Dust Alerts are called when meteorological conditions are forecasted that could cause high PM10 concentrations. This information along with a report graphing hourly concentrations recorded during the alert is also provided to the public through DENR's website at:

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

2. Support compliance with ambient air quality standards and emissions strategy development. DENR 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 facility permit control measures and the special measures taken to reduce fugitive dust levels; and

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

Appendix D in 40 CFR Part 58 contains the requirements for air monitoring in a metropolitan statistical area. Appendix D includes tables that list the number of required sampling sites as determined by the population of the Metropolitan Statistical Area and each pollutant's design value for the Metropolitan Statistical Area. The design value means the calculated pollutant concentration according to the applicable appendix in 40 CFR Part 50 as compared to the pollutant's standard. An example of a design value for the 24-hour standard for PM2.5 is the three year average of the 98 percentile concentrations. Each design value is specific to the pollutant and form of the standard.

If there is no air monitoring data for the Metropolitan Statistical Area, only the minimum number of sites listed in the tables in Appendix D is required to be operated. If there has been a minimum of three years of air quality data for the Metropolitan Statistical Area, a design value can be calculated. If the Metropolitan Statistical Area has a design value greater than 85% of the standard for ozone and PM2.5 and 80% of the standard for PM10, the required number of sampling sites continues to increase as the population

increases. If the highest concentration site in a Metropolitan Statistical Area has a design value less than 80% for PM10 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 Metropolitan Statistical Area .

South Dakota has three areas, Sioux Falls, Rapid City, and Sioux City with population levels large enough to be an Metropolitan Statistical Area. The areas have air monitoring sites and Table 6-1 shows an evaluation of both areas to the 40 CFR Part 58, Appendix D requirements. There are only three areas in the state Sioux Falls, Rapid City, and Union County that have population levels large enough to be classified as a Metropolitan Statistical Area. Union County is part of the Sioux City Metropolitan Statistical Area which includes parts of South Dakota, Iowa, and Nebraska. The only types of air pollution parameters required by 40 CFR Part 58, Appendix D for South Dakota is as follows:

1. One PM2.5 Speciation monitor (operated at the Sioux Falls SD School Site, the largest urban area in the state);
2. PM2.5 background and transport site, (Sites being operated at Badlands and Wind Cave sites);
3. Ozone testing in Metropolitan Statistical Area with a population greater than 50,000 (Sioux Falls, Rapid City, and Union County); and
4. One National Core site (Being operated in Sioux Falls at the SD School Site).

No other types of ambient air monitoring is required by 40 CFR Part 58, Appendix D in South Dakota because cities have low population levels and concentration of pollutants in the state are below concentration levels that would require the operation of the required number of air quality monitoring sites in the Metropolitan Statistical Area s. The type and scale of each monitoring site is listed under the individual site discussions in Appendix A Section 7.0 of this report.

Table 6-1 Monitoring Requirements for Metropolitan Statistical Area

MSA and Site	2000 MSA Population	Counties	Maximum Design Values	AQS ID	> NAAQS Criteria (Yes or No)	Minimum Sites Required
Sioux Falls						
SF KELO	123,975	Minnehaha Lincoln McCook Turner	PM10 24-hr - 43 PM2.5 24-hr - 26 Annual - 9.4	46-099-0006	No – PM10 No – PM2.5	0 – PM10 0 – PM2.5
SD School NCore	123,975	Minnehaha Lincoln McCook Turner	PM10 24-hr - 53 PM2.5 24-hr - 21 Annual – 9.0 Ozone 8-hr - 0.062	46-099-0008	No – PM10 No – PM2.5 No - Ozone	0 – PM10 0 – PM2.5 1 – MSA > 50,000 population 1 - NCore
Sioux City IA-NE-SD						
UC #1		Union - SD Woodbury-IA Dakota-NE Dixon-NE	PM10 PM2.5 sulfur dioxide Nitrogen Dioxide CO	46-127-0003		
UC #2		Union - SD Woodbury-IA Dakota-NE Dixon-NE	PM10 PM2.5 sulfur dioxide Nitrogen Dioxide	46-127-0003		
UC #3		Union - SD Woodbury-IA Dakota-NE Dixon-NE	Ozone	46-127-0003		1 - MSA > 50,000 population
Rapid City						
National Guard	59,607	Pennington Meade	PM10 24-hr – 79	46-103-0013	No – PM10	0 – PM10 0 – PM2.5
Credit Union			PM10 24-hr - 118 PM2.5	46-103-0020	No – PM10 No - PM2.5	0 – PM10 0 – PM2.5

MSA and Site	2000 MSA Population	Counties	Maximum Design Values	AQS ID	> NAAQS Criteria (Yes or No)	Minimum Sites Required
			24-hr -16 Annual – 7.6			
Library			PM10 24-hr - 50 PM2.5 24-hr - 15 Annual – 6.7	46-103-1001	No – PM10 No – PM2.5	0 – PM10 0 – PM2.5 0 - Ozone
Black Hawk			PM10 24-hr – 37 Ozone 8-hr – 0.057	46-093-0001	No – PM2.5 No - Ozone	0 – PM10 1 - Ozone MSA > 50,000 population

7.0 Conclusions

The South Dakota air monitoring network contains a minimum number of monitoring sites to characterize the air pollution levels in this size of state. Some adjustments will be made to parameters at these sites but in general the sites represent exposure levels of air pollution to a majority of the people living in this state.

One of the goals for the monitoring network is to continue to move from manual monitors to continuous monitors and analyzers. The continuous samplers provide the greatest amount of data and the data can be added to the website providing the public with near real time access. In general the continuous monitors cost less to operate and require fewer hours to maintain.

PM10 monitors will continue to be a priority in the Rapid City area. PM10 monitoring in the rest of the state will have a low priority and sampling frequencies for filter method monitors will operate under a minimum sampling frequency. This could change if there is a significant reduction in the 24-hour PM10 standard.

PM2.5 sampling will continue to be a priority in the eastern part of the state specifically the counties along the Minnesota and Iowa borders. Concentrations of PM2.5 continue to be the highest in this area of the state. PM2.5 concentration levels appear to be related to long range transport of the pollutants from locations east of the state. Any improvements made reducing PM2.5 levels in the states east of South Dakota should have an impact on the high concentration days.

Ozone will continue to be a priority in the state to help characterize changes in concentration levels caused by long range transport and weather conditions. No changes are planned to the network of sites as a result of this assessment. In the future, locations and number of sites may vary due to changes in the standard and impacts from the development of oil and gas in the states west of South Dakota.

Sulfur dioxide testing in South Dakota has a low priority in the network. The current sites provide a good background concentration level and have little concentration change statewide. As the new 1-hour standard is implemented some monitoring resources may need to shift toward near source sampling. One change planned as a result of the assessment will be to move the sulfur dioxide analyzers from the Wind Cave Site to the Credit Union Site in Rapid City. Data for this parameter is generally old for Rapid City and new data will help characterize pollution levels from point sources. Any new analyzers purchased will be Trace Level units so data collected will have a better accuracy at low concentration levels.

Nitrogen dioxide levels are low at all sites in the state. Similar to the sulfur dioxide data, concentrations of nitrogen dioxide provide a background level and a minimum number of sites are needed to maintain this database. As the new 1-hour standard is implemented some monitoring resources will need to shift toward near source sampling. One change planned as a result of the assessment will be to move the nitrogen dioxide analyzers from

the Wind Cave Site to the Credit Union Site in Rapid City. Data for this parameter is generally old for Rapid City and new data will help characterize pollution levels from point and mobile sources at this site location.

Carbon monoxide testing has just started in the state at the UC #1 Site. Due to equipment problems data recovery has been an issue. The limited amount of data collected in 2009 shows concentration levels very low and well under the standard. Beginning in 2011, a second analyzer will be added to the National Core site in Sioux Falls. At this time there does not appear to be a need to expand sampling for carbon monoxide beyond the two sites in the network.

It appears there currently is no need to test for ambient lead pollution levels in South Dakota. All point sources have emission levels less than 0.5 tons per year. Therefore, no sampling resources will be used to do testing at this time.