South Dakota Ambient Air Monitoring Network

5-Year Assessment of Air Monitoring Sites

2010 to 2014

UC #1 Site Union County

Air Quality Program

Dakota Department of Environment and Natural Resources

2015

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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 2015. 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. This is the second 5-year assessment report completed by South Dakota under the requirements listed above.

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 and/or approval after a 30 day public review period.

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 takeover 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 total suspended particulate was replaced by particulate matter 10 microns and less (PM_{10}), later added particulate matter 2.5 microns and less ($PM_{2.5}$) and reduced the concentration levels of the standards there was need for additional testing and pollution parameters. In some cases EPA rule specified additional testing like a National Core Site. The existing network is now testing for PM_{10}, $PM_{2.5}$, sulfur dioxide, nitrogen dioxide, carbon monoxide, and ozone.

2.1 Particulate Matter PM_{10}

In 1987, the total suspended particulate standard was replaced with the new PM_{10} standards. South Dakota submitted a revised ambient air monitoring network plan to include sampling sites for the new PM_{10} standard and shutdown the total suspended particulate monitoring network. The sites with low potential to have high PM_{10} concentrations were discontinued by 1987.

Continuous equivalent method PM_{10} monitors were added to the network replacing some of the manual monitors beginning in the 1990s. The goal was to continue to add continuous monitors to the network because more data is collected, data can be added to

the DENR's webpage for public access and the continuous monitor is significantly cheaper to operate. Currently, only Rapid City Library, Black Hawk and Aberdeen are operated with manual method monitors.

In the beginning of 2015, there were 10 monitoring sites in the network testing for PM_{10}. No new sites were added since the last assessment. Two sites, Guard Camp and UC #2 were closed and Brookings City Hall Site was closed and combined with Research Farm.

National Guard Site was closed because it had the lower concentration levels then Credit Union Site and represented the same area as the Credit Union Site. The National Guard Site never exceeded the 24-hour PM_{10} standard during the life time of the site.

The UC #2 Site was closed because the Hyperion Energy Center was not built and the site was redundant with UC #1 when testing for background concentration levels.

The Brookings City Hall Site was closed and combined with the Research Farm Site because a continuous monitor could replace the manual monitors and the data collected demonstrated regional air quality therefore only one site was needed to represent the area.

All current PM_{10} air monitoring sites are attaining the standard. Table 2-1 lists information on each past and present PM_{10} site operated in the state.

Table 2-1 PM_{10} Air Monitoring Sites

Site	Site Name	Location	County	Start Date	End Date
461031001	Public Library	Rapid City	Pennington	1987	
461030002	Mt. View	Rapid City	Pennington	1987	1987
461030012	Jaehn's	Rapid City	Pennington	1992	1997
461030010	Camp Rapid	Rapid City	Pennington	1987	1989
461030013	National Guard	Rapid City	Pennington	1992	2013
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
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 S.	Black Hawk	Meade	2000	
460990004	Augustana	Sioux Falls	Minnehaha	1987	1998
460990006	KELO	Sioux Falls	Minnehaha	1991	2009
460990007	Hilltop	Sioux Falls	Minnehaha	2000	2007
460990008	SD School	Sioux Falls	Minnehaha	2008	
460130001	Sanitation B.	Aberdeen	Brown	1987	1986
460130002	ARCC	Aberdeen	Brown	1987	1987
460130003	Fire Station #1	Aberdeen	Brown	1999	

Site	Site Name	Location	County	Start Date	End Date
460110002	City Hall	Brookings	Brookings	1989	2014
460110003	Research Farm	Rural	Brookings	2015	
460330132	Wind Cave	National P.	Custer	2005	
460710001	Badlands	National P.	Jackson	1999	
460290002	Utility Yard	Watertown	Codington	2000	
461270001	UC #1	Jensen	Union	2009	
461270002	UC #2	Renken	Union	2009	2013
461050001	Thom's	Lemmon	Perkins	1987	1986
460210001	Phone Building	Pollock	Campbell	1987	1986

2.2 Particulate Matter $PM_{2.5}$

A new standard was added by EPA for fine particulate matter called $PM_{2.5}$ in 1997. South Dakota submitted a revised ambient air monitoring network plan to include sampling sites for the new $PM_{2.5}$ standard. In 1999, manual $PM_{2.5}$ samplers were added to the ambient air monitoring network providing 24-hour sample concentrations to determine compliance with the new standard.

In 2006, EPA revised the $PM_{2.5}$ standard significantly by reducing the 24-hour standard from 65 to 35 micrograms per cubic meter. South Dakota submitted an attainment designation to EPA on December 11, 2007, designating each county as attaining the new $PM_{2.5}$ standard. In 2012, EPA revised the annual $PM_{2.5}$ from 15 to 12 ug/m^3. On December 13, 2013; DENR submitted an attainment designation to EPA recommending each county in South Dakota as attaining the revised annual standard for $PM_{2.5}$.

In 2009, equivalent method continuous $PM_{2.5}$ monitors were added to the network providing hourly concentrations. The goal was to move to more continuous monitors providing more data at a lower cost than the manual monitors. Currently, only the Rapid City Library and Aberdeen Fire Station #1 sites have manual method monitors. The SD School Site has both the manual and continuous monitoring methods for $PM_{2.5}$ as required for the NCore Site.

Currently in 2015, there are 10 sites in the air monitoring network collecting $PM_{2.5}$ data. Since the last 5-year Assessment three sites were closed. UC #2 site was closed because the Hyperion Energy Center was not built and the site data was redundant with UC #1. The Brookings City Hall Site was closed and combined with the Research Farm Site because a continuous monitor could replace manual monitors and the data collected demonstrated regional air quality and therefore only one site was needed to represent this area. The KELO Site was closed because the $PM_{2.5}$ data was redundant to the SD School Site so only one site was needed to represent the area of Sioux Falls for this parameter.

All sites in the state are currently attaining the $PM_{2.5}$ standard. Table 2-2 lists information on the past and present sites that have $PM_{2.5}$ testing data.

Table 2-2 $PM_{2.5}$ Air Monitoring Sites

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 S.	Black Hawk	Meade	2000	2004
460990006	KELO	Sioux Falls	Minnehaha	1999	2014
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	2014
460110003	Research Farm	Rural	Brookings	2015	
460330132	Wind Cave	National P.	Custer	2005	
460710001	Badlands	National P.	Jackson	1999	
460290002	Utility Yard	Watertown	Codington	2003	
461270001	UC #1	Jensen	Union	2009	
461270002	UC #2	Renken	Union	2009	2013

2.3 Ozone

In 1997, a new standard was set for ozone that significantly 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 accuracy of modeling results by the Ozone Transport Assessment Group, DENR started testing for ozone in South Dakota.

The first testing for ozone concentrations was completed 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. Currently the monitoring network includes six sites located at Sioux Falls, Brookings County, Union County, Badlands, Wind Cave and Black Hawk reporting as SLAMS.

Since the last 5-year Assessment one site was closed. UC #3 site was closed in 2012 and the ozone equipment was moved to UC #1.

All sites are currently attaining the 2008 ozone standard. See Table 2-3 for a list of past and present sites operated in South Dakota.

Table 2-3 Ozone Air Monitoring Sites

Site	Site Name	Location	County	Start Date	End Date
460990007	Hilltop	Sioux Falls	Minnehaha	1999	2007
460990008	SD School	Sioux Falls	Minnehaha	2008	
460110003	Research Farm	Rural	Brookings	2008	
461030020	Credit Union	Rapid City	Pennington	2005	2007
461030016	Robinsdale	Rapid City	Pennington	2002	2006
460930001	Elementary S.	Black Hawk	Meade	2008	
460330132	Wind Cave	National P.	Custer	2005	
460710001	Badlands	National P.	Jackson	2008	
461270002	UC #3	Wagner	Union	2009	2012
461270001	UC #1	Jensen	Union	2013	

2.4 Sulfur Dioxide

Testing for sulfur dioxide concentrations began in the state when the first air monitoring sites were setup by EPA in 1972. 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 months.

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.

Since the last 5-year assessment one site, UC #2, was closed and the sulfur analyzer was moved from the Wind Cave Site to the Credit Union Site. Currently, there are four sulfur dioxide analyzers operating in the network at UC #1, Sioux Falls School, Badlands, and Credit Union sites. See Table 2-4 for a list of the past and present sites with testing results for sulfur dioxide in the monitoring network.

Table 2-4 Sulfur Dioxide Air Monitoring Sites

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
461030020	Credit Union	Rapid City	Pennington	2011	
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

Site	Site Name	Location	County	Start Date	End Date
46033001	Teepee Work C.	Rural	Custer	1974	1980
460331001	Sanson Ranch	Rural	Custer	1986	1986
460330132	Wind Cave	National P.	Custer	2005	2010
460710001	Badlands	National P.	Jackson	2005	
461270001	UC #1	Jensen	Union	2009	
461270002	UC #2	Renken	Union	2009	2013

In 2010, EPA revised the primary standard for sulfur dioxide setting a 1-hour concentration level. Additional rule making specified changes to the 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. South Dakota has one large source of SO_2 emissions, Big Stone Power Plant, indicated by EPA proposed rule that would be required to be characterized. Before the rule was finalized, EPA entered into a consent decree requiring large sources to be characterized by September of 2015. The air monitoring rule was finalized by EPA shortly after.

Under the consent decree between EPA and environmental groups on March 2, 2015, EPA is requiring states to update the recommendations for counties with large sources of SO_2 emission. EPA will use the data to designate the counties for the 1-hour NAAQS for SO_2. DENR had originally requested Grant County designated along with the rest of the state as attaining the 1-hour SO_2 standard.

Grant County is impacted by the consent decree because the Big Stone Power Plant is a large source of SO_2 emissions as specified by the consent decree. DENR must provide information to show the Big Stone Power Plant is not causing the area to exceed the 1-hour standard by September 2015. DENR plans on reiterating to EPA that Grant County is attaining the standard and will provide additional information supporting an attainment conclusion.

2.5 Nitrogen Dioxide

Testing for nitrogen dioxide concentrations began in the state when the first air monitoring sites were setup by EPA in 1972. 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 months. Table 2-5 lists the sites testing for nitrogen dioxide past and present in the monitoring network.

Table 2-5 Nitrogen Dioxide Air Monitoring Sites

Site	Site Name	Location	County	Start Date	End Date
460650001	Andersen Bldg	Pierre	Hughes	1981	1988
461031001	Public Library	Rapid City	Pennington	1977	1986

Site	Site Name	Location	County	Start Date	End Date
461030002	Mt. View	Rapid City	Pennington	1979	1982
461030020	Credit Union	Rapid City	Pennington	2011	
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	2010
460710001	Badlands	National Park	Jackson	2005	
461270001	UC #1	Jensen	Union	2009	
461270002	UC #2	Renken	Union	2009	2013

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

In 2011, DENR added a new analyzer to the SD School Site. The analyzer 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 or volatile organic compound ion limited for ozone pollution.

Since 2010, no new sites were added, UC #2 is the only site closed and the Wind Cave nitrogen dioxide testing was moved to the Rapid City Credit Union Site. Currently, there are four operating sites in the network. There are nitrogen dioxide analyzers at UC #1, Sioux Falls School, Badlands, and Rapid City Credit Union sites. All sites are attaining the 1-hour and annual standards for nitrogen dioxide.

2.6 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.

South Dakota is attaining the national standard for lead. Table 2-6 contains a list of the historical lead monitoring locations in the state.

Table 2-6 Lead Air Monitoring Site

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

2.7 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 indicates 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. Because carbon monoxide levels were low and the completion of three years of testing the UC #1 Site was discontinued in 2013.

A second site was added in 2011, at the SD School Site in Sioux Falls as part of the required testing at an NCore site. All analyzers showed that South Dakota is attaining the National Ambient Air Monitoring Standards for carbon monoxide. Table 2-7 lists the details of both operating carbon monoxide sites in the state.

Table 2-7 Carbon Monoxide Air Monitoring Sites

Site	Site Name	Location	County	Start Date	End Date
461270001	UC #1	Jensen	Union	2009	2013
460990008	SD School	Sioux Falls	Minnehaha	2011	

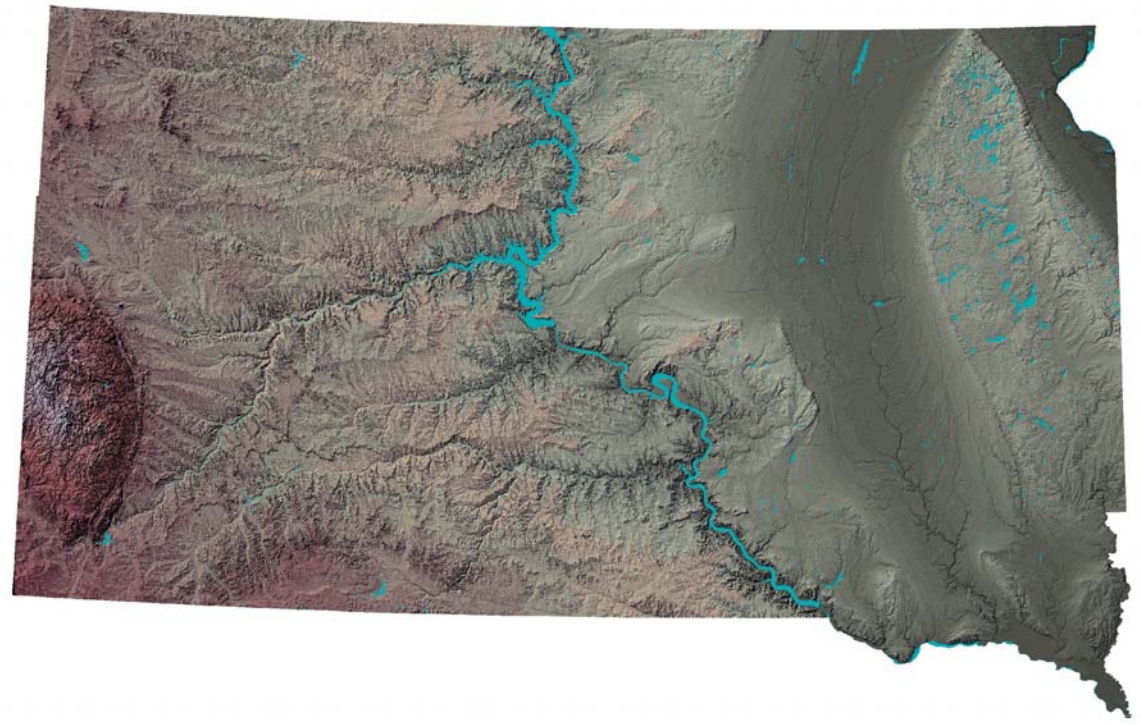
3.0 Description of Regional Issues

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 recorded 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 a topography map of South Dakota in Figure 3-1.

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 Canada combined with unusual meteorological conditions has resulted in high concentrations of $PM_{2.5}$. 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 $PM_{2.5}$ from sources of agricultural land burning to the south and southeast 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 large wildland fires. During the evening and night time hours smoke from local burning of wood, prescribed fires and wildland 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 11 monitoring sites representing 10 counties in the state. Air pollution parameters of ozone and $PM_{2.5}$ have the potential for high concentrations because these pollutants have higher potential for long range transport. Ozone and $PM_{2.5}$ 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 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 PM_{10} 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 PM_{10} 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 on any of the last five 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 recorded concentrations greater than the 24-hour PM_{10} standard. With the coordinated efforts of the City of Rapid City, Pennington County, state agencies, and Rapid City regulated facilities PM_{10} 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 PM_{10} 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 PM_{10} concentrations in other areas of the state outside of Rapid City may have five to ten years between these events. For example in 2011 the Watertown Utility and Brookings City Hall sites each had one concentration greater than the standard during a high wind event. In both cases no other high PM_{10} level events were recorded since that day.

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 2010 Census of 814,180 people. The US Census Bureau estimates the state's population in 2014 has increased by 4.8% to around 853,175 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 state's 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 communities but many continue to lose population.

There are 66 counties in the state. Only Minnehaha County has a population greater than 100,000 people. Only Pennington County has a population between 50,000 to 100,000. Sixteen 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 at just

over 975 people. See Table 3-1 for information on the 10 highest population counties in the state.

Table 3-1 Counties with the Highest Population

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	Sturgis
8	Lawrence	23,524	Spearfish
9	Yankton	28,835	Yankton
10	Davison	18,931	Mitchell

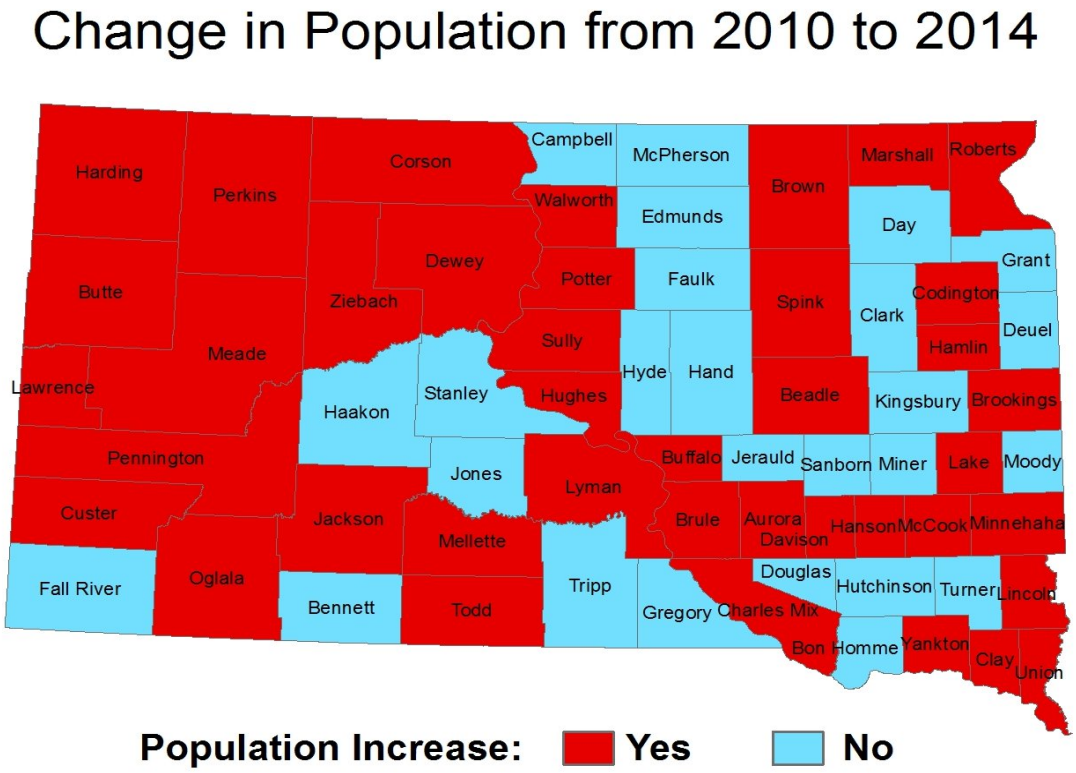
Forty of the counties had an estimated increase in population since the 2010 census. Most of the county's in this group had minor increases in population. The counties of Minnehaha, Pennington, and Lincoln had the majority of the estimated population increase for the state. Figure 3-2 shows a map of the counties in the state indicating which are gaining and losing population.

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 one air monitoring site is located in the central part of Sioux Falls providing a good characterization of population exposure to air pollution in the Metropolitan Statistical Area.

The state's second largest city is in the Rapid City Metropolitan Statistical Area and is mainly in Pennington County but also extends into the southwest corner of Meade County. DENR operates three monitoring sites in the Rapid City Metropolitan Statistical Area. Two 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 PM_{10}.

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

Figure 3-2 Counties Gaining and Losing Population



3.4 Revised Standards

EPA in the last five years has or is revising the NAAQS primary standards for ozone, nitrogen dioxide, sulfur dioxide and $PM_{2.5}$. Proposed changes may also include different concentration levels for secondary standards. In addition EPA plans to revise monitoring rules that will direct sampling resources from population to source oriented and in some cases rural testing. These changes may have a major impact on the air monitoring network in future years.

3.5 Prescribed Fires

The state, private landowners and federal land managers use prescribed fires as a means to improve the forest, agricultural lands and grassland ecosystems. In most cases the prescribed 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. Four pre-scribed fire events occurred in the 5-year assessment period that recorded concentrations greater than the standard at the monitoring sites in the network.

The first event was on October 20 to 21, 2010. A prescribed fire conducted by federal land managers at the Wind Cave National Park caused high concentrations to be recorded on the $PM_{2.5}$ monitor. $PM_{2.5}$ concentrations continued to be over the standard on October 21. Concentrations dropped back to normal levels as the fire burned out.

The other three events were all in 2014. Based on smoke trajectories, meteorological conditions transported smoke from agricultural burning in the states to the south of South Dakota on March 6, March 30 and April 12 causing five different exceedance days to be recorded at multiple monitoring sites in the east and southeast part of the state. This continues to be an issue in the spring each year.

3.6 Long Range Transport of Pollutants

A review of the $PM_{2.5}$ and PM_{10} data from 2010 to 2014 shows the highest concentration days occurring on the same days at several sites over large geographic areas of the state. When reviewing the meteorological data and other data from the National Weather Service, EPA's AIRNow website, and other sources of information it appears the high concentration days are due to long range transport of air pollution from different events.

3.6.1 $PM_{2.5}$ from Wild Fire Smoke Exceptional Events

In general the state can have days of high concentrations of $PM_{2.5}$ caused by smoke from wild fires located in the state, Canada or other states. During this 5-year review period no major wild fires burned within the state and no related exceedances of the $PM_{2.5}$ standard were recorded caused be transport of smoke from wild fires.

3.6.2 High Wind PM_{10} Events

During the last 5-years there was one exceptional event that caused high PM_{10} concentration days. On October 6, 2011, a large area was impacted by high winds in the northeast part of the state. Very dry soil conditions along with the high wind event caused PM_{10} concentrations to exceed the 24-hour standard at Brookings and Watertown. Only one day was affected by the high wind event and the day was flag by the state as an exceptional event, an exception event demonstration was developed, and sent to EPA for approval. No other concentrations over the 24-hour PM_{10} standard were recorded during the 5-year period.

3.6.3 $PM_{2.5}$ Pollution Transport/Inversions

Historically the transport of $PM_{2.5}$ air pollution into the state has affected concentrations of $PM_{2.5}$ at all of the sites in the eastern part of the state at some time in the past. During this review period two events caused high $PM_{2.5}$ concentrations greater than the 24-hour standard.

The first event caused concentrations over the standard at UC #1, UC #2, and SD School sites on February 5, 2010. The next day February 6, only UC #1 Site had a concentration over the standard.

The second event was on February 24, 2013, when UC #1 and UC #2 exceeded the 24-hour $PM_{2.5}$ standard. Information on both events showed transported particulates from

the east and southeast and air stagnation appears to be the major causes of the high $PM_{2.5}$ concentrations.

3.6.4 Ozone Pollution Transport

During the five year period no ozone concentrations greater than the 8-hour ozone standard of 0.075 parts per million (ppm) were recorded. Historically, the potential still remains to have high ozone levels caused by long range transport, air pollution from prescribed and wild fires and stratospheric ozone intrusions.

4.0 Air Monitoring Sites

This section will evaluate each parameter at each of the 11 air monitoring sites to determine if testing is meeting the goals and needs of the air monitoring network. Several different evaluation methods are completed for each parameter to determine the value of each site.

The main evaluation method is to determine if the site is meeting the sampling needs, goals, representation or has levels close or exceed the standards. Also if the parameter is providing data that is important to the sampling network and can be used by the public to determine the quality of the ambient air.

If the parameter is questionable, other evaluation methods will be performed. One evaluation method is the potential for pollution parameter to have recorded concentrations that are at or greater than 80% of the pollutant standard. The potential for high concentrations is calculated by counting the number of sampling days with concentrations at or over 80% of the pollutant standard and dividing that number by the number of sampling days collected during the year at the site. If the calculated percentage for the parameter data is less than 10%, the parameter may be considered for relocation or removal.

In areas of the state that have more than one air monitoring site, another evaluation method 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 with sampling data at about the similar level at both site. Over the last five years all sampling locations with more than one site in an air shed were compared and duplicate sites were closed.

Another evaluation method is air pollution data trends. Pollution trends are part of the 2015 Annual Plan and a copy of the plan can be printed from the DENR's air quality page at http://denr.sd.gov/des/aq/aqnews/Annual%20plan%202015%20Final.pdf Any discussion of air pollution concentration trends are referenced from the 2015 Annual Plan. The 2015 Annual Plan also contains site history and a picture of each monitoring site.

In addition, DENR is moving toward continuous monitors to provide real time data to the public. Therefore, sites are located to provide current air monitoring concentrations that are loaded from the monitoring sites to the DENR's air quality real time data page. To make data available to the largest part of the state's population monitors were located in the cities and counties with the highest population. Another goal is to provide sites that represent large areas of the state. There are large areas of the state that are rural, have low air pollution emissions and low populations so one monitoring site can represent a large area.

4.1 Sites and Parameters Changes

During the years covered in the 5-years assessment five sites were closed and one parameter at a current site was terminated. Two sites were added to the air monitoring network. The following sites and testing parameters changes were made during the last 5-years:

1. UC #3 Site was closed at the end of 2012. The ozone analyzer was moved to UC #1 because the UC #3 shelter was in poor condition and the UC #1 site is representative of the area. The site was closed for the following reasons:
   a. The site goal of testing for any possible increase in ozone levels caused by the Hyperion Energy Center operation was no longer valid when the project was terminated; and
   b. No further need to have a site located outside of the area influence for nitrogen oxides emissions because the project was terminated.

2. UC #2 Site was closed at the end of 2013. The parameters terminated were PM_{10}, $PM_{2.5}$, sulfur dioxide and nitrogen dioxide. The site was closed for the following reasons:
   a. The goal of providing background concentrations was met after five years of data was collected;
   b. The goal of providing data during the operation of the Hyperion Energy Center was no longer a goal once the project was abandon;
   c. UC #1 and UC #2 represent the same sampling area and UC #2 concentrations were slightly lower than UC #1; and
   d. UC #2 had met the sampling goals and was no longer needed in the monitoring network.

3. Brookings City Hall Site was closed at the end of 2013. The PM_{10} and $PM_{2.5}$ testing was moved to the Brookings Research Farm. The site was closed for the following reasons:
   a. The site has operated for 25 years and in that time only exceeded the 24-hour standard two times. Both exceedance days were exceptional events caused by high wind and dry soil conditions;
   b. The move to Research Farm Site allows the use of continuous monitors under ideal conditions in the sampling shelter;
   c. Data trends showed a declining concentration level; and

d. Concentrations appear to be regional in nature and because local industry has only minimal impact on PM_{10} levels it was decided to close this site and move the testing for PM_{10} to the Research Farm Site.

4. Guard Camp Site was closed at the end of 2013. The PM_{10} sampling was terminated. The site was closed for the following reasons:
   a. Site has never exceeded the standard in 23 years of testing;
   b. Site has met the goal of determining the size of the area being affected by the dust levels from the quarry area;
   c. Site was always lower in concentration level than the Credit Union Site representing the same sampling area; and
   d. Data trends showed a declining concentration level over the 23 year of testing meeting the data needs for this location.

5. KELO Site was closed at the end of 2014. The $PM_{2.5}$ monitor was terminated. The site was closed for the following reasons:
   a. Goals for operating the site have been achieved during the 13 years of testing for $PM_{2.5}$;
   b. The $PM_{2.5}$ data collected was duplicating the sampling results at the School Site so only one site was necessary; and
   c. Data trends indicated a declining concentration level.

6. UC #1 Site is currently operating but the carbon monoxide parameter was terminated in 2013 for the following reasons:
   a. Concentrations were low; and
   b. Five years of data provided sufficient data to determine background for the Union County area.

The following sites were added to the air monitoring network:

1. Research Farm Site by Brookings was added to the network of sites after first completing the goal of collecting ozone data for two PSD permits in 2010. At the beginning of 2015 PM_{10} and $PM_{2.5}$ continuous monitors were added to the site.

2. Airport Site in Pierre was setup in late 2014 and because the site just started operating it is not part of this 5-year assessment. A $PM_{2.5}$ monitor is operated at the site. An ozone analyzer was added in 2015.

4.2 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, part of the Sioux City Metropolitan Statistical Area, is representing the southeastern part of the state. The following sections will provide an evaluation of each site located in eastern half of the state.

4.2.1 Research Farm Site (Brookings County)

Brookings is located on the east 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 2010 census and estimates for 2014 indicate a continued slow growth rate. Both the city of Brookings and the county of Brookings are the fifth largest in the state.

The Research Farm Site is located about one mile north of the City of Brookings. The parameters being operated at the site include ozone, PM_{10} and $PM_{2.5}$. Table 4-1 contains general information about the site and parameter testing.

Table 4-1 Research Farm Site Details

Location	Rural North of Brookings
County	Brookings County
AQS #	46-011-0003
Parameter	PM_{10}
Goals	Population/High Concentration/Real Time Data
Sampling Schedule	Every Day
Parameter	$PM_{2.5}$
Goals	Population/High Concentration/Real Time Data
Sampling Schedule	Every Day
Parameter	Ozone
Goals	Population/High Concentration/Real Time Data
Sampling Schedule	Every Day

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.

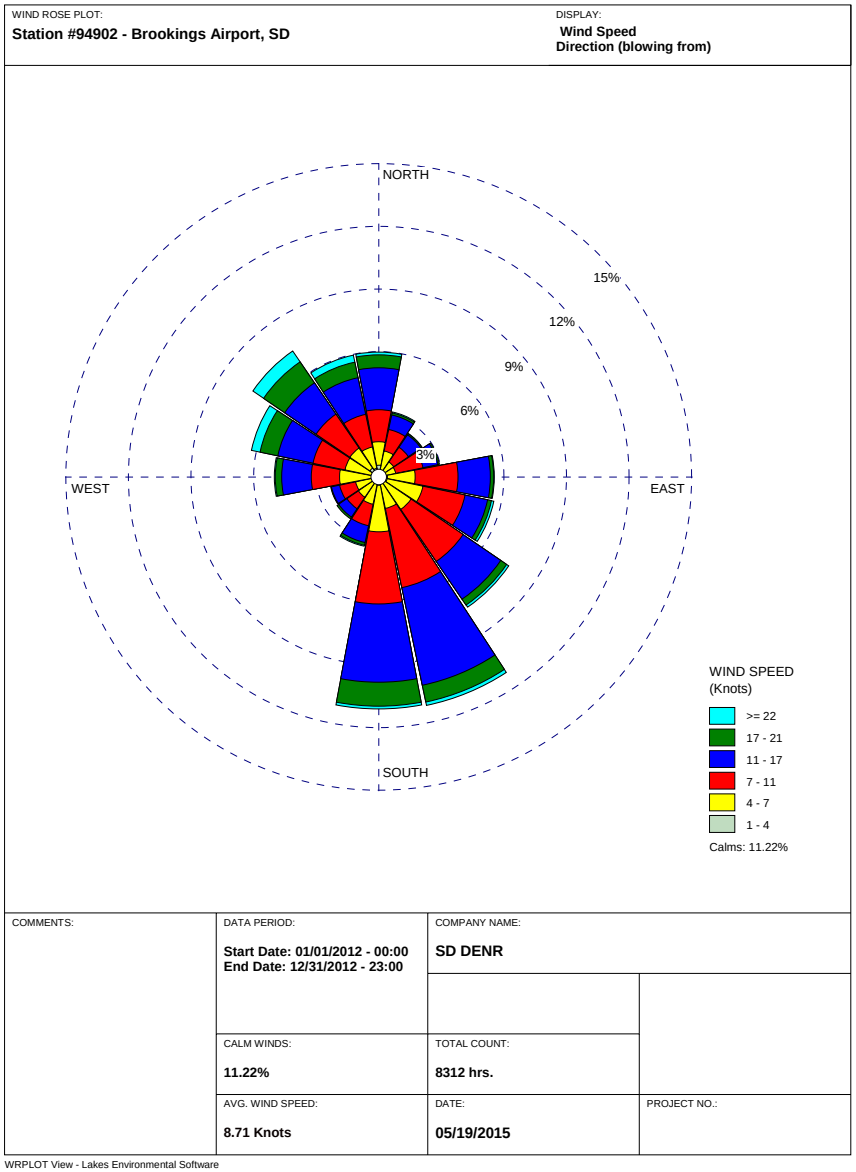
Industrial development in the city and surrounding area includes service oriented businesses and light industry. The largest facilities in the area include 3M Company, South Dakota Soybean Plant, and Valero Renewable Fuels Company. Land use around the city is mainly crop lands with a small amount of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

Historically there have been two different air monitoring sites in the city. The City Hall Site set up in 1989 and the Research Farm Site added as a SLAMS in 2010. The City Hall Site was closed as discussed above and the parameters combine with Research Farm at the end of 2014. This allows the DENR to operate continuous PM_{10} and $PM_{2.5}$ monitors that provide real time data to the public in the Brookings area. Currently, there is not enough data for this site to show trends for PM_{10} and $PM_{2.5}$.

4.2.1.1 Meteorological Data

The meteorological data used for this site is collected at the Brookings Airport located on the west side of the city. The data collected in 2012 was used for the wind rose because it had the most complete year of data. Predominate wind directions and highest wind speeds are out of the south, southeast and northwest as indicated by the graph in Figure 4-1.

Figure 4-1 Wind Rose Brookings Airport



4.2.1.2 $PM_{2.5}$ and PM_{10} Evaluation

The PM_{10} and $PM_{2.5}$ testing began at this site in 2015 so no comparisons can be made until three years of sampling is complete.

4.2.1.3 Ozone Evaluation

There have been seven years of testing for ozone levels at this site. The 8-hour daily maximum concentrations have ranged from 0.057 ppm in 2009 to a high of 0.074 ppm in 2012. There are sufficient years of data to show the area is attaining the ozone standard.

Trends indicate a slightly increasing level of ozone over the seven year period. The site has similar levels of ozone as compared to the other two sites in the eastern part of the state and provides good area coverage to assess ozone levels caused by transport into the state. It also provides real time data to the public through the state and federal webpages. See the Table 4-2 below for more information on the ozone concentrations recorded for this site.

4.2.1.4 Summary for Research Farm Site

The sampling goals of population exposure and high concentration are being met at this site for ozone. No concentrations greater than the standards were recorded during the assessment period but the design value for 2014 is greater than 80 percent of the standard. There continues to be a need for testing at this site and the geographic placement of this site augments the data collected at other sites in the state.

PM_{10} and $PM_{2.5}$ were added to this site in 2015. Concentrations for both pollutants have goals of high concentration and population. Concentrations of both appear to be impacted by regional events with are caused by transport or exceptional events. The use of continuous monitors will allow the public to use the data to make decisions on outdoor activities by viewing the data on the DENR's and EPA's webpages.

No further changes are planned to this site as a result of the assessment.

Table 4-2 Research Farm Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value 2014	% of Standard	Trends
Ozone	8-hour 0.075 ppm	0	0.074 ppm (2012)	0.063 ppm	84%	Slightly Increasing

4.2.2 Fire Station #1 Site (Aberdeen)

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 past population trends show a slightly declining level but with the addition of new industry it appears the population may

increase slightly in future years. Table 4-3 contains general information about the site and parameter testing.

Table 4-3 Fire Station #1 Site Details

Location	Aberdeen
County	Brown County
AQS #	46-013-0003
Parameter	**PM_{10}**
Goals	Population/High Concentration
Sampling Schedule	Every Sixth Day with co-location
Parameter	**$PM_{2.5}$**
Goals	Population/High Concentration
Sampling Schedule	Every Third Day with co-location

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.

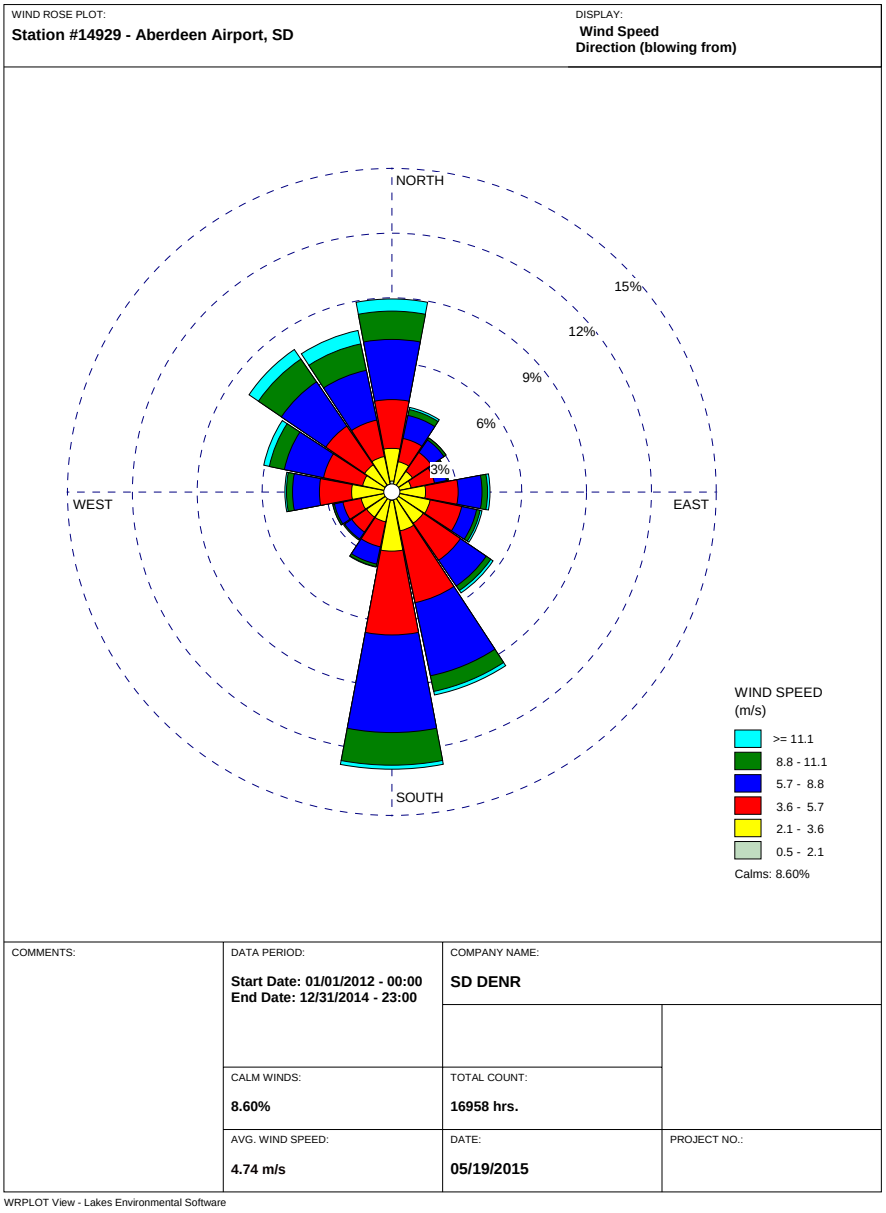
Industrial development in the city and surrounding area includes service oriented businesses and light industry on the west, south and east side of the city. Land use around the city is mainly agriculture with a small amount of grassland. Agriculture remains the largest industry in this area.

Historically there have been 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 PM_{10} and $PM_{2.5}$ using manual method monitors. 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 PM_{10} and $PM_{2.5}$ 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.

4.2.2.1 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 to northwest and south to southeast the majority of days. Figure 4-2 contains a wind rose graph for the Aberdeen Airport in 2012 to 2014.

Figure 4-2 Wind Rose Aberdeen Airport



4.2.2.2 PM_{10} Evaluation

The expected exceedance rate for five year review period is zero. The air monitoring data for the PM_{10} sample concentrations are all less than standard for the five years of data reviewed. The maximum 24-hour concentration during the five year period is less than 80% of the standard. There are sufficient years of data to show the area is attaining the PM_{10} standard. Table 4-4 shows an assessment of the PM_{10} data collected at this site.

4.2.2.3 $PM_{2.5}$ Evaluation

The air monitoring concentrations recorded at this site for $PM_{2.5}$ are all under the 24-hour and annual standards. Only one sample had a concentration greater than 80% of the standard during the 5-year period.

The design value for the 24-hour is 54% and annual is 58% of the standards. $PM_{2.5}$ concentration trends for this site are slightly decreasing. More information on $PM_{2.5}$ trends are contained in the Annual Plan for 2015. There are sufficient years of data to show the area is attaining the $PM_{2.5}$ standards. Table 4-4 shows the assessment of the $PM_{2.5}$ data collected at the site.

4.2.2.4 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 PM_{10} and $PM_{2.5}$. Proposed industry changes may increase population levels and air pollution concentrations. For the reasons stated above, no further changes are planned to this site as a result of the assessment.

Table 4-4 Fire Station #1 Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value 2014	% of Standard	Trends
PM_{10}	24-hr 150 ug/m^3	0	93 ug/m^3	[1]		Slight Decline
$PM_{2.5}$	24-hr 35 ug/m^3	0	30.2 ug/m^3	19 ug/m^3	54%	Slight Decline
	Annual 12 ug/m^3	0	8.7 ug/m^3	7.0 ug/m^3	58%	Slight Decline

[1] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances.

4.2.3 Utility Site (Watertown)

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 4-5 contains general information about the site and parameter testing.

Table 4-5 Utility Site Details

Location	Watertown
County	Codington County
AQS #	46-029-0002

Parameter	**PM_{10}**
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	**$PM_{2.5}$**
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.

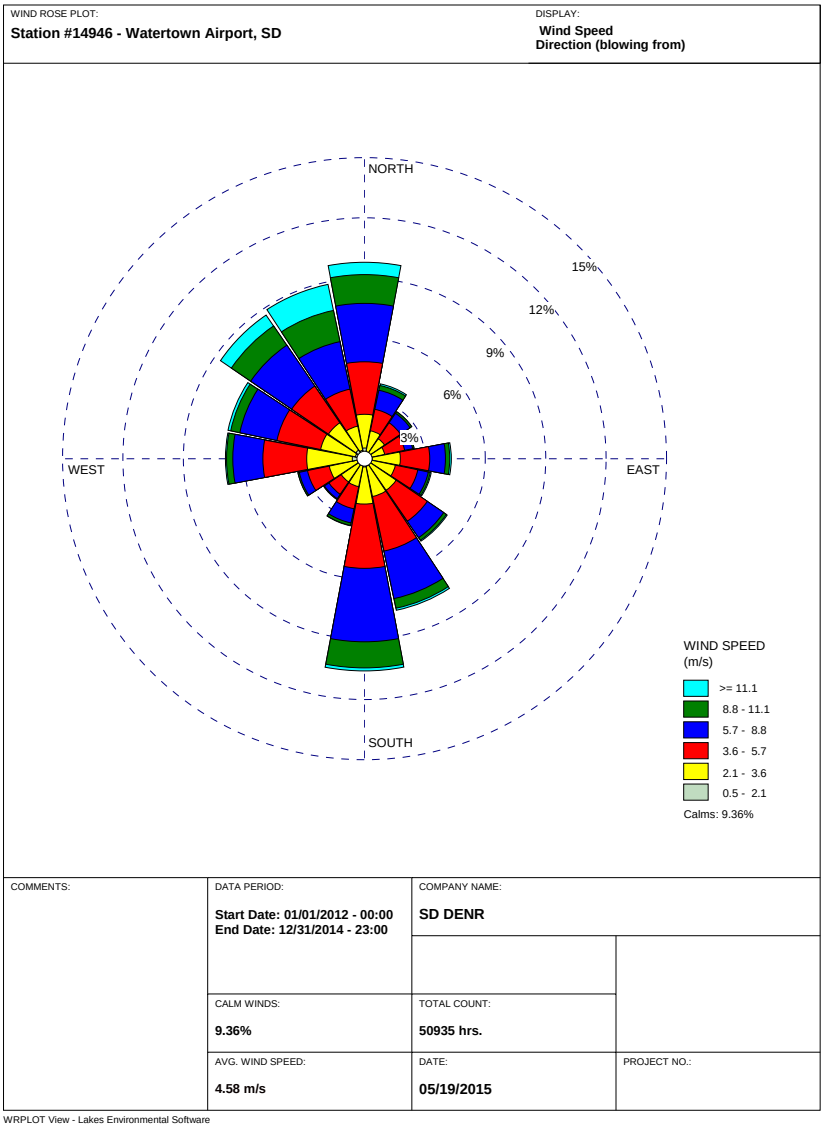
Historically there have been two different air monitoring sites in the city. The current site is the Utility Site setup in 2003 testing for PM_{10} and $PM_{2.5}$. This is the only air monitoring site in Watertown, Codington County and in any of the surrounding counties. The closest air monitoring site is located 45 miles south near the City of Brookings. Concentrations for PM_{10} and $PM_{2.5}$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 PM_{10} concentration to exceed the 24-hour standard on October 6, 2011. The sampling data on this day for PM_{10} was flagged by the state as a high wind exceptional event.

4.2.3.1 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 4-3 contains a wind rose graph of the meteorological data for Watertown collected in 2012 to 2014.

Figure 4-3 Wind Rose Watertown Airport



4.2.3.2 PM_{10} Evaluation

PM_{10} concentrations in general are steady to decreasing slightly over the life time of this site. Only one sampling day in 2011, had concentrations that exceeded the 24-hour standard in the last five years of operation. Two other days had concentrations greater than 80% of the standard but both were recorded in the first two years of the 5-year assessment period.

The sampling day over the standard in 2011 was affected by high winds and dry soil conditions. DENR flagged the sampling day as exceptional event when the data was submitted to the Air Quality System database.

The expected exceedance rate was 0.3 expected exceedances in 2013 but is zero at the end of 2014. Unless there is a significant drop in the standard level there is sufficient data to show attainment of the 24-hour PM_{10} standard. See Table 4-6 for more information on the data collected at the site.

4.2.3.3 $PM_{2.5}$ Evaluation

During the five year review period none of the 24-hour sample concentrations were greater than the 24-hour $PM_{2.5}$ standard of 35 ug/m^3. Three days had 24-hour $PM_{2.5}$ concentrations greater than 80% of the standard with one each in 2010, 2012, and 2014. An indication of low $PM_{2.5}$ concentrations is the 24-hour design value for 2014 of 54% which is well within the attainment level.

The Watertown $PM_{2.5}$ annual average design value concentration is 8.4 ug/m^3 or 70% of the annual $PM_{2.5}$ standard. The 2012 sampling year had the highest annual concentration at 11.0 ug/m^3 or 92% of the standard. The annual concentration trends show a slight decline in annual average concentrations over the life of the monitoring site. The $PM_{2.5}$ concentrations vary but on some years the concentrations are close to being the highest levels recorded in the state. However, there are sufficient years of data to show the area is attaining the $PM_{2.5}$ standards. See Table 4.6 for more information of the assessment of the data collected at this site for $PM_{2.5}$.

4.2.3.4 Summary of Utility Site

The sampling goals of population exposure and high concentration are being met at this site for both PM_{10} and $PM_{2.5}$. One concentration greater than the standards was recorded for the PM_{10} parameter during this five year review period so there continues to be a need for testing at this site. $PM_{2.5}$ concentrations are below the standard but the potential still remains to have concentrations that are close to the standard level for the 24-hour average. 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.

Table 4-6 Utility Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value 2014	% of Standard	Trends
PM_{10}	24-hr 150 ug/m^3	1	157 ug/m^3 (2011) [1]	[2]		Slight Decrease
$PM_{2.5}$	24-hr 35 ug/m^3	0	31.2 ug/m^3	19.0 ug/m^3	54%	Slight Decrease
	Annual	0	10.7 ug/m^3	8.4	70%	Decrease

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value 2014	% of Standard	Trends
	12 ug/m^3			ug/m^3		

[1] – Concentration during an Exceptional Event; and

[2] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances.

4.2.4 SD School Site

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 is one air monitoring site operating in Sioux Falls and is the only one 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.

The SD School Site is the one air monitoring site currently operating in Sioux Falls and in Minnehaha County. Concentrations for all parameters represent population exposure and high concentration of air pollution levels in this urban area. Table 4-7 contains general information about the site and parameter testing.

Table 4-7 SD School Site Details

Location	Sioux Falls
County	Minnehaha County
AQS #	46-099-0008
Parameter	**PM_{10}**
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	**$PM_{2.5}$**
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	**Carbon Monoxide**
Goals	Population/High Concentration

Sampling Schedule	Every Day (Hourly)
Parameter	**Nitrogen Oxides NOy**
Goals	Population/High Concentration
Sampling Schedule	Every Day (Hourly)
Parameter	**$PM_{2.5}$ Speciation**
Goals	Population/High Concentration
Sampling Schedule	Every Third Day
Parameter	**Meteorological**
Goals	Population/High Concentration
Sampling Schedule	Every Day (Hourly)

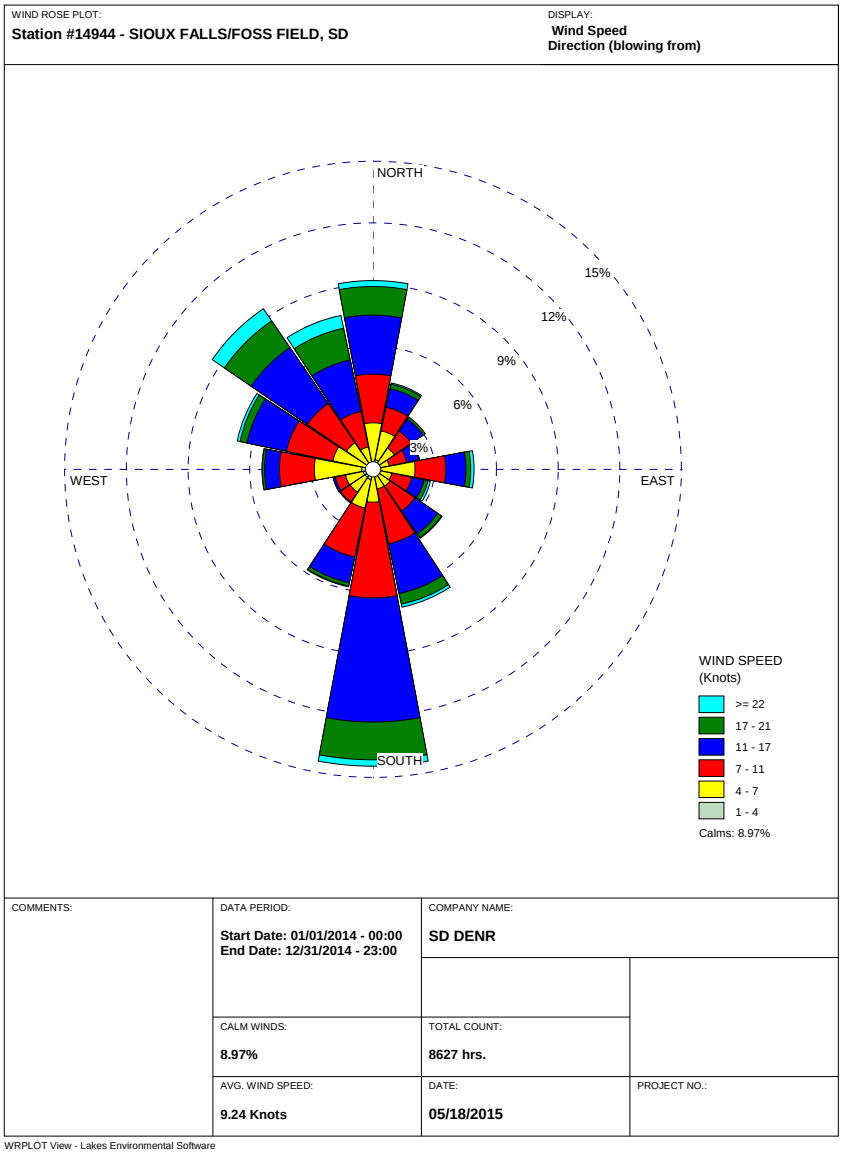
The SD School Site is located in the central and east part of the city. The area around the site is residential with two schools within one block west and northwest of the site. Service type businesses are located to the south along 10th Street and residential areas are located in all directions from the site. High traffic count roads are located to the south on 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, nitrogen dioxide, and carbon monoxide. Non-criteria air pollutant testing includes NOy, PM2.5 speciation and meteorology.

4.2.4.1 Meteorological Data Evaluation

Testing also includes a meteorological station collecting data on wind speed, wind direction, ambient temperature, humidity and barometric pressure. For the assessment the data from the airport station was used to do the wind rose. Figure 4-4 shows a wind rose for the data collected at the airport in 2014. The prevailing wind directions during the year are from the north to northwest and south to southwest directions. The location of the site is near the industrial park to the north and northwest of the site and is providing a good evaluation of population exposure to the industrial air pollution emissions.

Figure 4-4 Wind Rose Sioux Falls Airport



4.2.4.2 PM_{10} Evaluation

Based on previous monitoring data at other sites within the City, PM_{10} 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 PM_{10} concentrations in the state and only 69% of the standard when comparing the maximum concentration in 2014 to the standard. None of the concentrations have exceeded the 24-hour PM_{10} standard at this site. None of the 24-hour concentrations are within 80% of the standard level. There are sufficient years of data to show the area is attaining the PM_{10} standard. See Table 4-8 for more information on data assessment for the SD School Site.

4.2.4.3 $PM_{2.5}$ Evaluation

The SD School 24-hour concentrations for $PM_{2.5}$ were 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 and represented the general area. So in 2014, the KELO Site was closed.

When the daily data from School Site was reviewed, 2 days during the five year period had $PM_{2.5}$ concentrations greater than the standard (one each in 2010 and 2014). There were and another twelve days experienced $PM_{2.5}$ concentrations greater than 80% of the standard (nine in 2010, one in 2011, and two in 2013). Still this is a low number of sampling days with high concentrations compared to the number of sampling days in the five year period using a continuous monitor. Currently there are sufficient years of data to show the area is attaining the $PM_{2.5}$ 24-hour standard. See Table 4-8 for more information on data assessment for the SD School Site.

The annual design value for SD School Site is one of the highest in the state some years, but the annual average is decreasing over time. The annual average design value is 7.5 ug/m^3 and is less than 80% of the standard. There are sufficient years of data to show the area is attaining the $PM_{2.5}$ annual standard. See Table 4-8 for more information on data assessment for the SD School Site.

4.2.4.4 Ozone Evaluation

The ozone design value for the SD School Site is less than the national standard but is greater than 80% of the standard. Using the 2008 ozone standard of 0.075 ppm there are more than 45 days during the review period that have sampling days with 8-hour averages concentrations greater than 80% of the standard. The majority of the concentrations greater than 80% of the standard occurred in the last three years of the review period. Some of the high concentration days are outside of the current ozone period for South Dakota set by EPA. This site is the highest ozone location in the state so testing for this parameter will continue to be a priority. Although the site is the highest in the state, there are sufficient years of data to show the area is attaining the ozone standard. See Table 4-8 for more information on data assessment for the SD School Site.

4.2.4.5 Sulfur Dioxide Evaluation

The SD School Site has sulfur dioxide concentrations that are very low at less than 27% of the 1-hour standard. 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.

There are sufficient years of data to show the area is attaining the sulfur dioxide standards. See Table 4-8 for more information on data assessment for the SD School Site.

4.2.4.6 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 maximum annual average concentration occurred in 2010, at 13% of the standard and the design value for 2014 is 9% of the standard. The 1-hour concentration design value was 35% of the standard using the data from 2012 and 2014. When reviewing the data collected at this site the data indicates that the annual and the 1-hour concentrations have a minimal chance of exceeding 80% of the standards. There are sufficient years of data to show the area is attaining the nitrogen dioxide standards. See Table 4-8 for more information on data assessment for the SD School Site.

4.2.4.7 Carbon Monoxide Evaluation

The SD School Site is the only monitoring site in South Dakota currently testing for carbon monoxide and the levels are very low compared to the standards. The maximum concentrations recorded for the 8-hour standard was 0.9 ppm in 2011 and 2012, which is only 10% of the standard. The maximum concentration recorded for the 1-hour standard was 1.6 ppm in 2012, which is just under 5% of the 1-hour standard. There are sufficient years of data to show the area is attaining the carbon monoxide standards. See Table 4-8 for more information on data assessment for the SD School Site.

4.2.4.8 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 $PM_{2.5}$. 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. The results of the assessment indicate no changes are needed for the School Site.

Table 4-8 SD School Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM_{10}	24-hour 150 ug/m^3	0	104 ug/m^3 (2014)	[1]		Slightly Increasing
$PM_{2.5}$	24-hour 35 ug/m^3	2 [2]	44 ug/m^3 (2010)	21 ug/m^3	60%	
	Annual 12 ug/m^3	0	10.3 ug/m^3 (2010)	7.5 ug/m^3	63%	Slight Decrease
Ozone	8-hour 0.075	0	0.075 ppm (2012)	0.068 ppm	91%	Steady

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
	ppm					
Sulfur Dioxide	1-hour 75.0 ppb	0	20.4 ppb (2014)	6.0 ppb	8%	Decreasing
Nitrogen Dioxide	Annual 53 ppb	0	7 ppb (2010)	0.005 ppm	9%	Steady
	1-hour 100 ppb	0	58 ppb (2010)	35 ppb	35%	Slight Decrease
CO	8-hour 9.0 ppm	0	0.9 ppm (2011, 2012)	[3]		Slight Decrease
	1-hour 35.0 ppm	0	1.6 ppm (2012)	[3]		Slight Decrease

[1] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances;

[2] – One concentration over the standard occurred in 2010 and another occurred in 2014;

[3] - There is no design value for CO because the standards are based on no more than one exceedance per year.

4.2.5 UC #1 Site (Union County)

The Union County sites UC #1, UC #2 and UC #3 were setup in 2009 testing for parameters of PM_{10}, $PM_{2.5}$, ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide. Because the Hyperion Energy Center project has been cancelled only UC #1 Site is still operating in 2015. The site is located in a rural area of the county with objectives of background, transport, and population.

The site was selected to provide for testing south of the proposed Hyperion Energy Center. The closest air monitoring site is in Sioux Falls about 51 miles north of the site.

Site UC #1 is located about four miles north of Elk Point. Table 4-9 contains general information on the site and pollution parameter concentrations being collected at the site.

Table 4-9 UC #1 Site Details

Location	Rural
County	Union County
AQS #	46-127-0001
Parameter	**PM_{10}**
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)
Parameter	**$PM_{2.5}$**
Goals	Population/Background/Transport
Sampling Schedule	Every Day (Hourly)
Parameter	**Sulfur Dioxide**
Goals	Population/Background

Sampling Schedule	Every Day (Hourly)
Parameter	**Nitrogen Dioxide**
Goals	Population/Background
Sampling Schedule	Every Day (Hourly)
Parameter	**Ozone**
Goals	Population/Background/Transport
Sampling Schedule	Every Day (Hourly)

Testing at UC #1 includes continuous monitors for PM_{10} and $PM_{2.5}$ and continuous analyzers for ozone, sulfur dioxide and nitrogen dioxide. Table 4-10 contains a summary of the data collected at UC #1 Site during the assessment period.

4.2.5.1 Meteorological Data Evaluation

Testing also includes a meteorological station collecting data on wind speed, wind direction, ambient temperature, humidity and barometric pressure. Figure 4-5 shows a wind rose for the data collected on site in 2014. The prevailing wind directions during the year are from the northwest and southeast directions. The meteorological data provides a good reference if high hourly concentrations are recorded to determine if the data is a result of local agricultural activities.

4.2.5.2 PM_{10} Evaluation

PM_{10} concentrations are affected mainly by agriculture activities around the monitoring site. The highest concentration days occur around the field work activities of planting and harvesting. The only other local contributor is the gravel road located to the west of the monitoring site.

All of the sampling days during the assessment period were below the standard. None of the daily concentrations were greater than 80% of the standard. There are sufficient years of data to show the area is attaining the PM_{10} standard. Table 4-10 contains a summary of the data collected at UC #1 Site during the assessment period.

4.2.5.3 $PM_{2.5}$ Evaluation

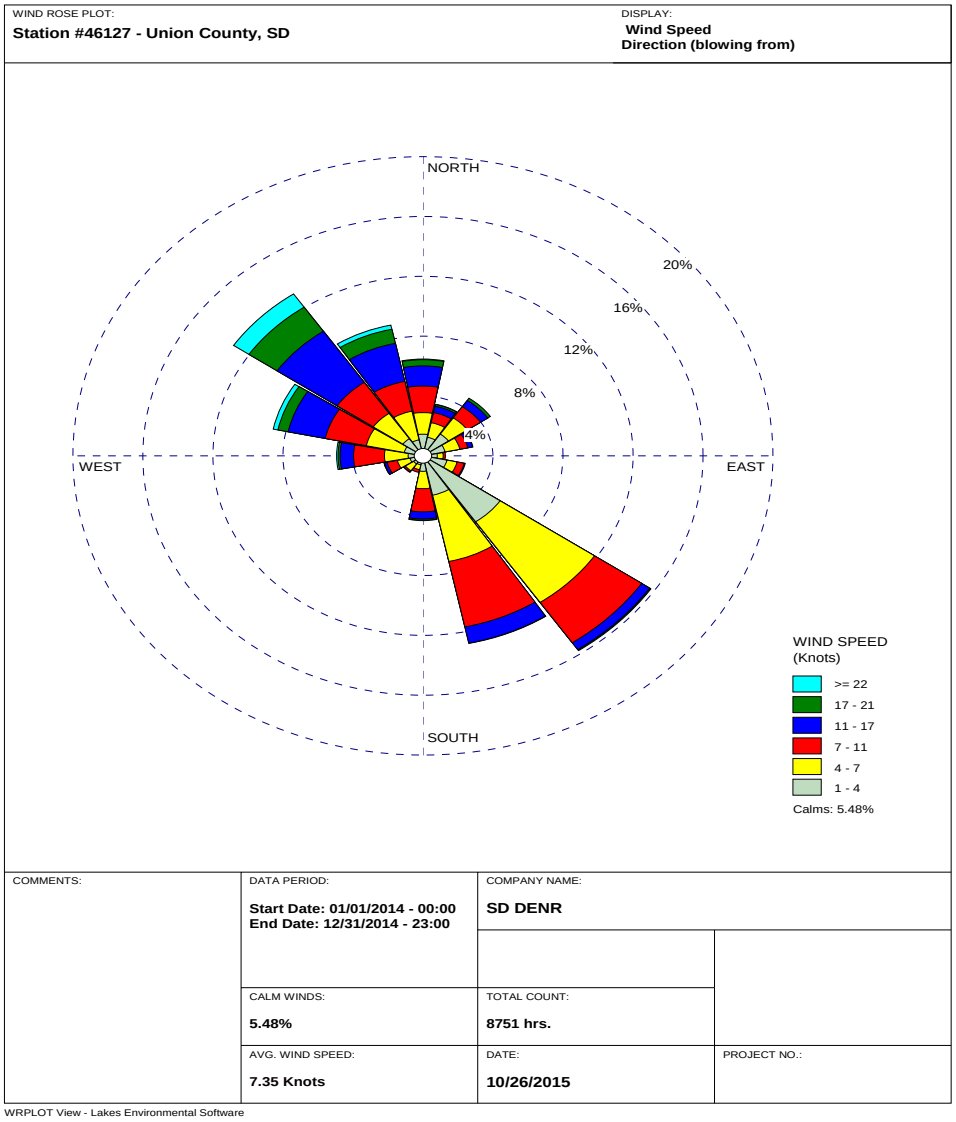
Levels of $PM_{2.5}$ have increased slightly during this assessment period. One concentration recorded in 2010 exceeded the 24-hour standard. A total of 17 days had concentrations over 80% of the 24-hour standard.

High daily concentrations of $PM_{2.5}$ appear to occur during transport events. Agriculture burning in the spring from states south of South Dakota and an occasional meteorological inversion seem to be the cause of the days with high concentrations.

The annual average design value for this site has not exceeded the standard even with the revision of the standard that lowered the concentration level from 15 ug/m^3 to 12 ug/m^3. This site has some of the highest concentration levels in the state for annual average.

Two of the annual averages in the assessment period had concentrations greater than 80% of the standard. Because of the number of 24-hour concentrations and annual averages over the 80% threshold, testing for $PM_{2.5}$ continue to be a priority for this site even though there are sufficient years of data to show the area is attaining the $PM_{2.5}$ standards. Table 4-10 contains a summary of the data collected at UC #1 Site during the assessment period.

Figure 4-5 Wind Rose for UC #1 Site



4.2.5.4 Ozone Evaluation

None of the sampling days had ozone concentrations greater than the standard of 0.075 ppm during the assessment period. The highest concentration day was in 2011 at 0.070 ppm. It was the only day at this level.

A total of 37 plus days in the 5-year period had concentrations greater than 80% of the standard. Some of these days were outside of the ozone season for South Dakota (June 1 to September 30). Because of the number of days over the 80% threshold, ozone continues to be a priority at this site. However, there are sufficient years of data to show the area is attaining the ozone standard. See Table 4-10 for more information on ozone data assessment for the UC #1 Site.

4.2.5.5 Sulfur Dioxide Evaluation

The UC #1 Site has sulfur dioxide concentrations that are very low with the design value for 2014 at 8% of the 1-hour standard. The highest concentration day was 30.3 parts per billion (ppb) recorded in 2010.

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 UC #1 Site located north of a large electrical coal fired power plant complex in Iowa the concentrations for sulfur dioxide are very low. There are sufficient years of data to show the area is attaining the sulfur dioxide standard. See Table 4-10 for more information on data assessment for the UC #1 Site.

4.2.5.6 Nitrogen Dioxide Evaluation

In general the UC #1 Site records concentrations that are very low and would represent background levels for this part of the state. The maximum annual average concentration was in 2012, at 37% of the standard. The 1-hour concentration design value was 18% of the standard using the data from 2012 and 2014. There are sufficient years of data to show the area is attaining the nitrogen dioxide standards. See Table 4-10 for more information on data assessment for this site.

4.2.5.7 Summary for UC #1 Site

There were no concentrations greater than the standards for the parameters PM_{10}, sulfur dioxide and nitrogen dioxide collected during the assessment period. Concentrations for sulfur dioxide and nitrogen dioxide are generally very low as was expected for a rural area with a low number of emission sources.

The $PM_{2.5}$ concentrations are slightly higher than anticipated for a background site. The $PM_{2.5}$ 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 UC #1 Site is meeting the goals and needs specified when setup. In addition the site fills the need of providing hourly concentrations to the DENR's and EPA's webpages for this part of the state. No changes are planned to the sampling sites or parameters as a result of the 5-year assessment.

Table 4-10 UC #1 Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM_{10}	24-hour 150 ug/m^3	0	103 ug/m^3 (2013)	[1]		Slight Increase
$PM_{2.5}$	24-hour 35 ug/m^3	1	41.7 ug/m^3 (2010)	21.3 ug/m^3	61%	
	Annual 12 ug/m^3	0	9.9 ug/m^3 (2012)	9.1 ug/m^3	76%	Slight Increase
Ozone	8-hour 0.075 ppm	0	0.070 ppm (2011)	0.062 ppm	83%	Slight Decline
Sulfur Dioxide	1-hour 75 ppb	0	30.3 ppb (2010)	6 ppb	8%	Slight Decline
Nitrogen Dioxide	Annual 53 ppb	0	4 ppb (2012)	3 ppb	6%	Steady
	1-hour 100 ppb	0	37.0 ppb (2010)	18.0 ppb	18%	Steady

[1] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances.

4.3 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 areas to rolling hills on the eastern part 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 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 total suspended particulate (TSP) standards. A state implementation plan was developed and concentrations of TSP were reduced. In 1986, the TSP standard was replaced by a new particulate matter 10 microns and smaller or PM_{10} standard.

In the 1990s, PM_{10} concentration levels exceeded the 24-hour standard under high wind events. 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 the Rapid City area was designated as attaining the PM_{10} 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, three sites are operated to continue to evaluate the particulate matter controls on point and fugitive dust sources that keep the PM_{10} levels within the standard.

4.3.1 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 PM_{10}. 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 PM_{10} monitor at the Credit Union Site is used to measure concentrations of dust during High Wind Dust Alerts. The

hourly PM_{10} and $PM_{2.5}$ 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. A total of 44 High Wind Dust Alerts were called during the assessment period. The highest PM_{10} concentration during a high wind dust alert during this time period was 117 ug/m^3 in 2011. General information on the site and the pollution parameters being samples are contained in Table 4-11.

Table 4-11 Credit Union Site Details

Location	Rapid City
County	Pennington County
AQS #	46-103-0020
Parameter	**PM_{10}**
Goals	Population/High Concentration
Sampling Schedule	Every Day (Hourly)
Parameter	**$PM_{2.5}$**
Goals	Population/High Concentration
Sampling Schedule	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 Dacotah'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.

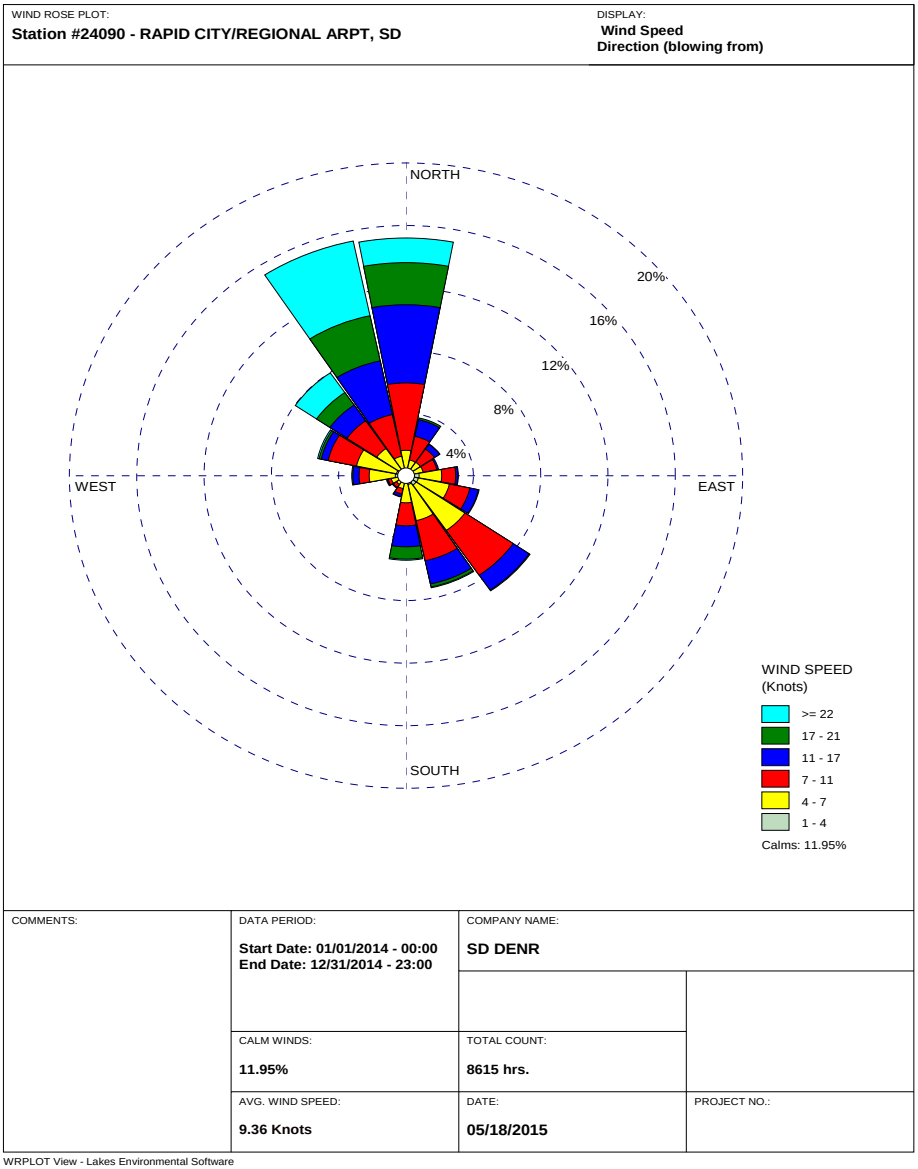
The Credit Union Site was setup in 2003 and the parameters included PM_{10}, $PM_{2.5}$ and ozone. In 2006, a screening model indicated the Credit Union Site was located within the 1 microgram foot print for nitrogen dioxide from industries in the quarry area. There was a high potential that ozone levels were bias low at this location because of the nitrogen dioxide concentrations. In 2007, the ozone parameter was moved to the Black Hawk Site. In 2011, sulfur dioxide and nitrogen dioxide analyzers were added to the site.

Currently, there are four continuous monitors and analyzers at the Credit Union Site. The sampling equipment includes Thermo BETA PM_{10} monitor, Met One BAM 1020 continuous $PM_{2.5}$ monitor, Thermo sulfur dioxide analyzer 43i and Thermo nitrogen dioxide analyzer 42i.

4.3.1.1 Meteorological Data Evaluation

Meteorological data collected in 2014 at the Rapid City Regional Airport was used in the wind rose for this site. Figure 4-6 shows a wind rose for the data collected at the airport in 2014. The prevailing wind directions during the year are from the north to northwest and south to southwest directions. The use of the Rapid City Airport data can be contrast with the data collected at the Black Hawk Site located north of the industrial area in west Rapid City.

Figure 4-6 Wind Rose Rapid City Airport



4.3.1.2 PM_{10} Evaluation

PM_{10} 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. Concentration of PM_{10} did not exceed the 24-hour standard at this site in the 5-year review period.

During the review period 7 daily concentrations were greater than 80% of the standard. With a number of days over the 80% threshold PM_{10} sampling continues to be a priority at this site. However, there are sufficient years of data to show the area is attaining the PM_{10} standard. See Table 4-12 for more information on the concentration levels.

4.3.1.3 $PM_{2.5}$ Evaluation

The Credit Union Site has the highest 24-hour $PM_{2.5}$ concentration design values for Rapid City area but levels remain low compared to the 24-hour standards. The 24-hour design value for 2014 is 46% of the 24-hour standard. None of the sampling days exceeded the 24-hour $PM_{2.5}$ standard in the 5-year period. The highest 24-hour concentration was recorded in 2012 at 23.6 ug/m^3.

During the 5-years assessment period none of the sampling days 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. Table 4-12 contains information on the assessment of data collected at the Credit Union Site.

Annual average design value for 2014 for this site is 51% of the standard. It is the highest in Rapid City but only by 1 ug/m^3. None of the annual averages were greater than 80% of the standard. There are sufficient years of data to show the area is attaining the $PM_{2.5}$ standards. Table 4-12 contains information on the assessment of data collected at the Credit Union Site.

4.3.1.4 Sulfur Dioxide Evaluation

The Credit Union Site began sulfur dioxide testing in 2011 so only four years of testing are included in the assessment. Sulfur dioxide concentration design value for 2014 is low at 12% of the 1-hour standard. The maximum 1-hour concentration day was 26.2 ppb recorded in 2013.

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 Credit Union Site located near sources of sulfur dioxide emissions, the site continues to have low concentrations. No daily concentrations were greater than 80% of the standard. There are sufficient years of data to show the area is attaining the sulfur dioxide standard. See Table 4-12 for more information on data assessment for the Credit Union Site.

4.3.1.5 Nitrogen Dioxide Evaluation

Credit Union Site started testing for nitrogen dioxide in 2011 so only four years of data was included in this assessment. In general the nitrogen dioxide levels are similar to concentrations recorded in Sioux Falls. But compared to the standard concentrations are low and well under the standard. The maximum annual average concentration was in 2011, at 15% of the standard. The 1-hour concentration design value was 38% of the standard using the data from 2012 to 2014. There are sufficient years of data to show the area is attaining the nitrogen dioxide standards. See Table 4-12 for more information on data assessment for this site.

4.3.1.6 Summary for Credit Union Site

There were no concentrations greater than the standards for the parameters PM_{10}, $PM_{2.5}$, sulfur dioxide and nitrogen dioxide collected during the assessment period. Concentrations for sulfur dioxide and nitrogen dioxide are generally low.

The Credit Union Site is meeting the goals and needs specified when setup. In addition the site fills the need of providing hourly concentrations to the DENR's and EPA's webpages for this part of the state. No changes are planned to the sampling site or parameters as a result of the 5-year assessment.

Table 4-12 Credit Union Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM_{10}	24-hour 150 ug/m^3	0	141 ug/m^3 (2011 and 2013)	[1]		Decreasing
$PM_{2.5}$	24-hour 35 ug/m^3	0	23.6 ug/m^3 (2012)	16.0 ug/m^3	46%	
	Annual 12 ug/m^3	0	7.9 ug/m^3 (2013)	6.7 ug/m^3	51%	Slight Decrease
SO_2	1-hour 75 ppb	0	26.2 ppb (2013)	9 ppb	12%	Steady
NO_2	Annual 53 ppb	0	8.4 ppb (2011)	6.7 ppb	13%	Slight Decrease
	1-hour 100 ppb	0	58.5 ppb (2011)	38 ppb	38%	

[1] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances.

4.3.2 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, $PM_{2.5}$ monitors were added to the site and operate along with the PM_{10} 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 44 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 4-13.

Table 4-13 Library Site Details

Location	Rapid City
County	Pennington County
AQS #	46-103-1001
Parameter	**PM_{10}**
Goals	Population/High Concentration
Sampling Schedule	Every Third Day
Parameter	**$PM_{2.5}$**
Goals	Population/High Concentration
Sampling Schedule	Every Third Day

During the early 1990s PM_{10} 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 PM_{10} 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 PM_{10} 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, still provide for public safety when roads were icy and keep particulate matter concentrations below the health based 24-hour PM_{10} standard. The plan has been successful during the winter seasons since the change was implemented. 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.

4.3.2.1 PM_{10} Evaluation

PM_{10} annual average concentrations have decreased significantly at the Library Site by more than 40% since the City of Rapid City switched to a chemical deicer in mid 1990s. None of the 24-hour concentrations have exceeded the PM_{10} standard in the last five years. None of the sampling days have had a concentration greater than 80% of the standard. The last 5-years concentration levels are steady so the change in deicing methods did not increase PM_{10} levels in the city. There are sufficient years of data to show the area is attaining the PM_{10} standard. See Table 4-14 for more information on the concentration levels.

4.3.2.2 $PM_{2.5}$ Evaluation

$PM_{2.5}$ concentrations remain low with design values less than 50% of the 24-hour and annual standards. None of the 24-hour concentrations had levels greater than the 24-hour $PM_{2.5}$ standard. Only one sampling day had a concentration greater than 80% of the 24-hour standard during the assessment period.

Annual average concentrations remain less than 50% of the standard. None of the yearly averages exceeded the standard. None of the annual averages in the last five years had concentrations greater than 80% of the standard even with the lowering of the annual standard concentration. There are sufficient years of data to show the area is attaining the $PM_{2.5}$ standards. See Table 4-13 for more information on the concentration levels.

4.3.2.3 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 PM_{10} and $PM_{2.5}$ 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.

Table 4-14 Public Library Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM_{10}	24-hour 150 ug/m^3	0	69 ug/m^3 (2010)	[1]		Decreasing
$PM_{2.5}$	24-hour 35 ug/m^3	0	31.4 ug/m^3 (2010)	15.0 ug/m^3	43%	
	Annual 12 ug/m^3	0	6.1 ug/m^3 (2013)	5.8 ug/m^3	48%	Decreasing

[1] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances.

4.3.3 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 PM_{10} and $PM_{2.5}$. At the end of 2005, the $PM_{2.5}$ 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 PM_{10} 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 sampled are contained in Table 4-15.

Table 4-15 Black Hawk Site Details

Location	Black Hawk
County	Meade County
AQS #	46-093-0001
Parameter	**PM_{10}**
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)

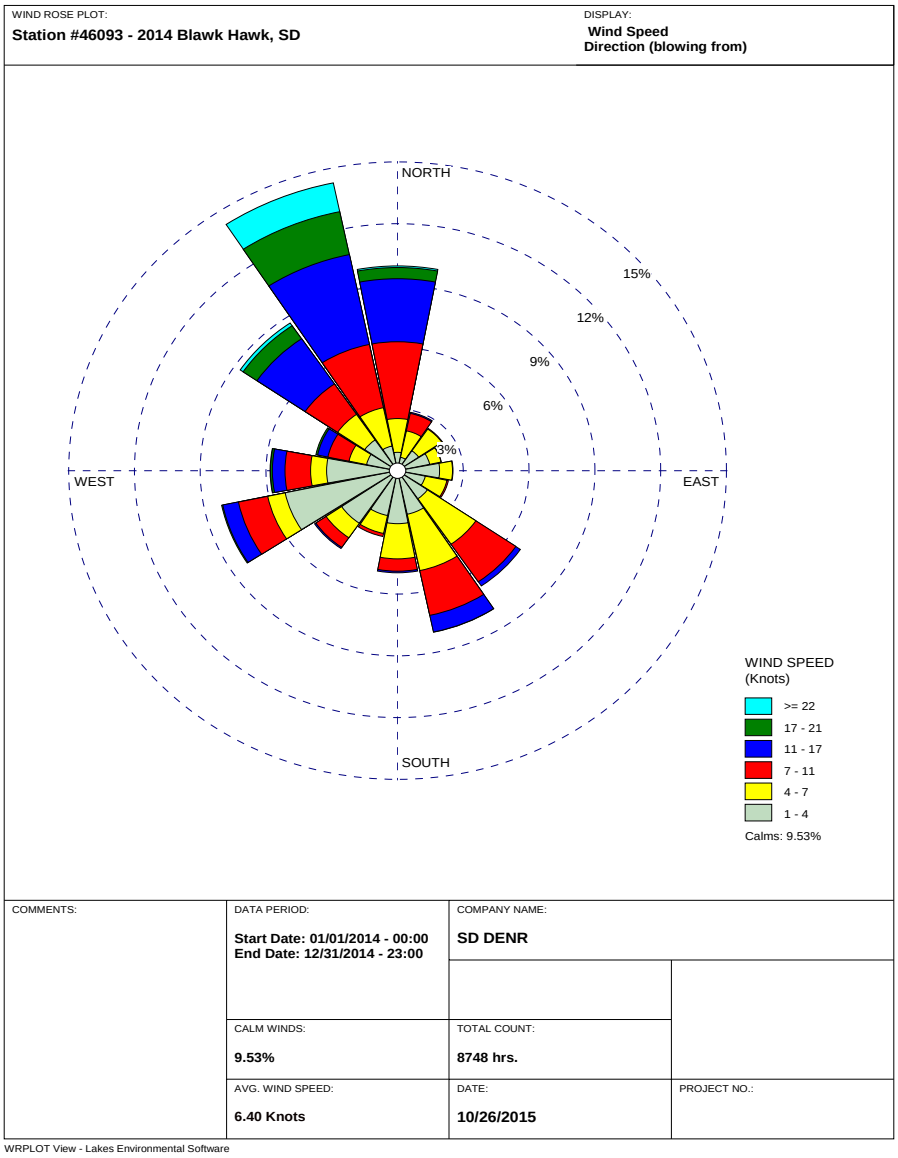
The Black Hawk Site is located on the top of a ridge on the property of the Black Hawk Elementary School. The area around the site is a growing residential area. The site is on the eastern edge of the Black Hills in Red Valley. The topography is complex with hills and valleys along the front edge of 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 Dacotah, 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.

4.3.3.1 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 and southeast directions. The highest wind events from the northwest are associated with the highest concentrations of PM_{10} in the western Rapid City area. See the graph in Figure 4-7 for more information on the wind direction and wind speed data.

Figure 4-7 Wind Rose from the Black Hawk Site



4.3.3.1 PM_{10} Evaluation

The PM_{10} concentrations continue to be low at this site. The maximum concentration recorded during the 5-year review period was only 29% of the standard. None of the sampling day concentrations had levels greater than 80% of the standard. There are sufficient years of data to show the area is attaining the PM_{10} standard. See Table 4-16 for more information on the concentration levels.

4.3.3.2 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. About 20 days during the 5-year period had sampling day maximum 8-hour averages greater than 80% of the standard with some of these days outside of the ozone season for South Dakota. Overall, there are sufficient years of data to show the area is attaining the ozone standard. See Table 5-24 for more information on the concentration levels.

4.3.3.3 Summary for Black Hawk Site

The Black Hawk Site continues to meet the goal of providing urban background PM_{10} daily concentrations to compare to the high concentration site in Rapid City. Levels of PM_{10} have decreased in the quarry area but with the quarrying operations moving closer to this site the testing for PM_{10} continues to be a priority at his location.

Ozone concentrations have increase slightly over the last five years. The design value is greater than 80% of the standard. Ozone testing will continue as one of the priorities for this location. No changes are planned because of the assessment.

Table 4-16 Black Hawk Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM_{10}	24-hour 150 ug/m^3	0	44 ug/m^3 (2012)	[1]		Slight Decrease
Ozone	8-hour 0.075 ppm	0	0.072 ppm (2012)	0.062 ppm	83%	Slight Increase

[1] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances.

4.4 Rural Background and Transport Sites (Badlands and Wind Cave 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 45 miles apart in different counties. Land use and topography are very different for each site. The rural setting, low year around population, and few if any facilities with air pollution emissions are similar for both sites.

4.4.1 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 4-17.

Table 4-17 Badlands Site Details

Location	Badlands National Park (Rural)
County	Jackson County
AQS #	46-071-0001
Parameter	**PM_{10}**
Goals	Background/Transport
Sampling Schedule	Every Day (Hourly)
Parameter	**$PM_{2.5}$**
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 PM_{10} and $PM_{2.5}$. 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 PM_{10}, $PM_{2.5}$, sulfur dioxide and nitrogen dioxide monitors to the site in 2004. The PM_{10} 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 $PM_{2.5}$ monitor with no designation with a Met One BAM federal equivalent method continuous $PM_{2.5}$ monitor. Currently, continuous PM_{10} and monitors of Thermo BETA and Met One BAM $PM_{2.5}$ provide hourly data. Continuous gas analyzers of Thermo ozone 49, Thermo SO2 43, and Thermo NO2 42 provide hourly data loaded to the DENR's data base and website.

4.4.1.1 Meteorological Evaluation

Having no new meteorological data collected at the Badlands Site the data from the previous 5-year assessment was used for the wind rose. 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 natural wall with significant elevation change that runs east and west for several miles within the park. The natural 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 4-8.

4.4.1.2 PM_{10} Evaluation

PM_{10} 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 PM_{10} concentrations greater than the standard were recorded during the 5-year review period. Ten years of data show the site is attaining the PM_{10} standard. See Table 4-18 for more information on the concentration levels.

4.4.1.3 $PM_{2.5}$ Evaluation

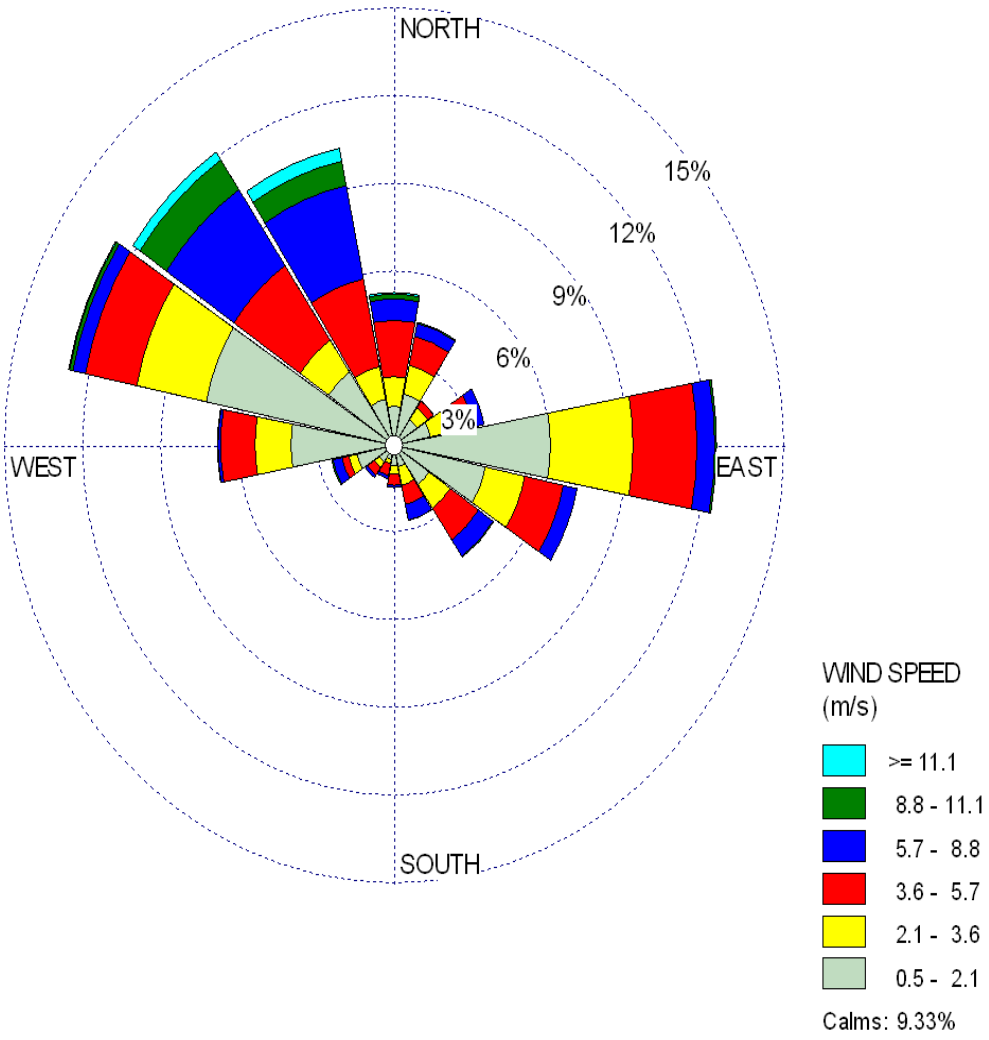
The 24-hour design value for $PM_{2.5}$ is one of the lowest in the state. No 24-hour concentration was recorded greater than the 24-hour standard. $PM_{2.5}$ concentrations have an annual average trend that is slightly decreasing. The annual $PM_{2.5}$ design value for 2014 is the second lowest in the state at 33% of the standard. Just slightly higher than the Wind Cave Site. There are sufficient years of data to show the area is attaining the $PM_{2.5}$ standards. See Table 4-18 for more information on the concentration levels.

4.4.1.4 Sulfur Dioxide Evaluation

The sulfur dioxide concentrations are generally very low near the detection level for most of the reporting hours for the analyzer. In 2013, one hour had a concentration of 24.7 ppb. This is the highest concentration recorded at this site. The trends for sulfur dioxide

are typically steady. There are sufficient years of data to show the area is attaining the sulfur dioxide standard. See Table 4-18 for more information on the concentration levels.

Figure 4-8 Wind Rose Badlands Site



4.4.1.5 Nitrogen Dioxide Evaluation

The nitrogen dioxide concentrations are similar to the sulfur dioxide levels. Concentrations are very low for a majority of the hourly concentrations. None of the sampling days had a 1-hour concentration greater than the standard. The maximum annual average occurred in 2013 and is less than 2% of the standard. There are sufficient years of data to show the area is attaining the nitrogen dioxide standards. See Table 4-18 for more information on the concentration levels

4.4.1.6 Ozone Dioxide Evaluation

Ozone levels have declined significantly since the last 5-year assessment. 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 five years the trend has changed with significantly lower ozone levels. The design value has dropped by 7 parts per billion by the end of 2014. The site has the lowest ozone concentrations in the state with a design value of 81% 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. The lower ozone levels that started in 2008 have continued through 2014. There are sufficient years of data to show the area is attaining the ozone standard. See Table 4-18 for more information on the concentration levels.

4.4.1.7 Summary for Badlands Site

Concentrations for PM_{10}, $PM_{2.5}$, 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 declined in 2008 but with the lowering of the ozone standard in 2015, past history of ozone testing, and the potential to exceed 80% of the standard, ozone testing remains a priority at this site.

No changes are planned for this site as a result of the site assessment.

Table 4-18 Badlands Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM_{10}	24-hour 150 ug/m^3	0	64 ug/m^3 (2012)	[1]		Slightly Decreasing
$PM_{2.5}$	24-hour 35 ug/m^3	0	21.6 ug/m^3 (2010)	13.0 ug/m^3	37%	
	Annual 12 ug/m^3	0	5.2 ug/m^3 (2013)	4.6 ug/m^3	33%	Slightly Decreasing
Sulfur Dioxide	1-hour 75 ppb	0	24.7 ppb (2013)	5 ppb	7%	
Nitrogen Dioxide	Annual 53 ppb	0	1 ppb (2013)	0.7 ppb	<1%	Steady
	1-hour 100 ppb	0	13.5 ppb (2012)	5.0 ppb	5%	
Ozone	8-hr 0.075	0	0.068 ppm (2012/2013)	0.061 ppm	81%	Decreasing

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
	ppm					

[1] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances.

4.4.2 Wind Cave Site

The Wind Cave Site is located a short distance 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 4-19.

Table 4-19 Wind Cave Site Details

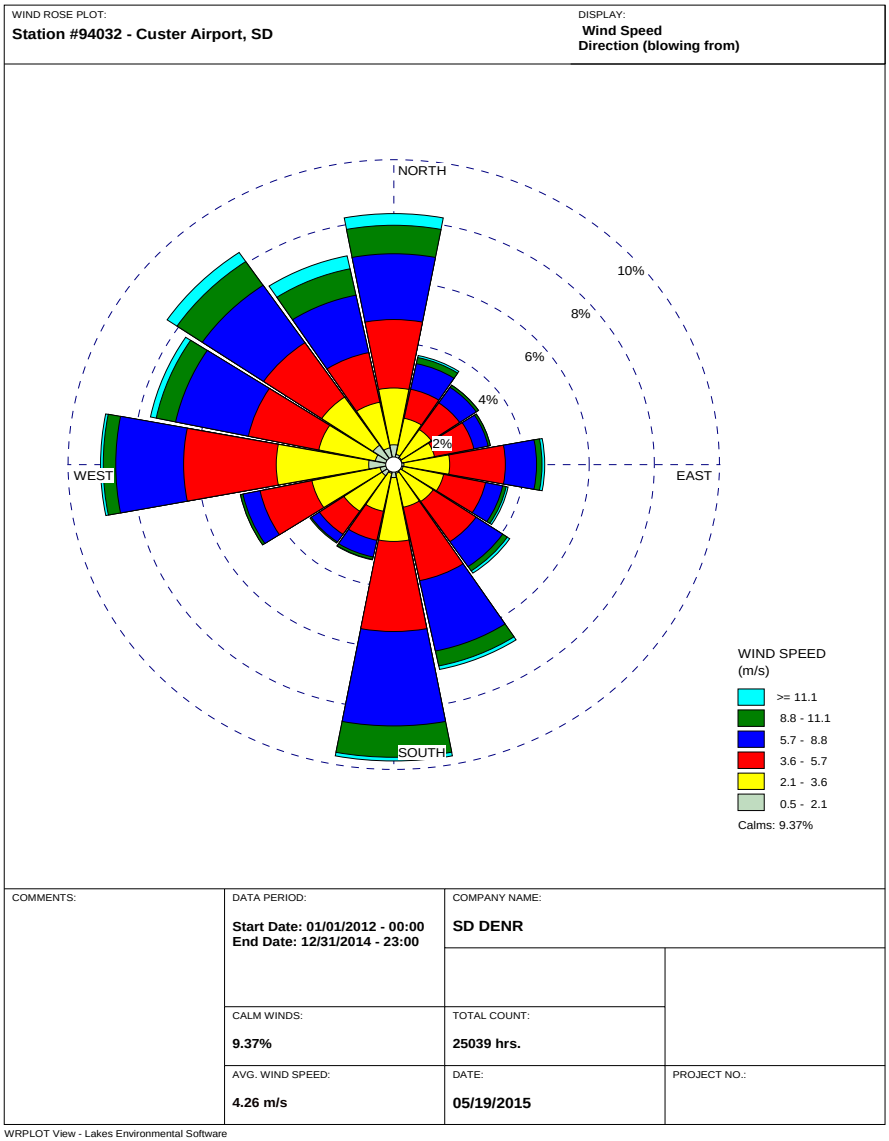
Location	Wind Cave National Park (Rural)
County	Custer County
AQS #	46-033-0123
Parameter	**PM_{10}**
Goals	Background/Transport
Sampling Schedule	Every Day
Parameter	**$PM_{2.5}$**
Goals	Background/Transport
Sampling Schedule	Every Day and Every Third Day
Parameter	**Ozone**
Goals	Background/Transport
Sampling Schedule	Every Day

The current monitoring site was added next to the IMPROVE equipment in 2005. The parameters included continuous for PM_{10}, $PM_{2.5}$, sulfur dioxide, nitrogen dioxide and ozone and manual monitors for $PM_{2.5}$. In 2009, the continuous $PM_{2.5}$ monitor was replaced with a Met One BAM $PM_{2.5}$ that is a federal equivalent method. No other changes were made to the sampling parameters.

4.4.2.1 Meteorological Data Evaluation

The closest location of meteorological data is the Custer Airport. Figure 4-9 shows a wind rose for the data collected on site in 2014. The prevailing wind directions during the year very from the west to north major part of the year and from the south direction to a lesser frequency. The meteorological data provides a good reference if high hourly concentrations are recorded to determine if the data is a result of local activities such as wild lands health burning.

Figure 4-9 Wind Rose for Wind Cave Site



4.4.2.2 PM_{10} Evaluation

PM_{10} concentrations are some of the lowest in the state at this site. No 24-hour PM_{10} concentrations greater than the standard were recorded during the 5-year review period. The highest concentration during the assessment period was recorded during a prescribed fire in Wind Cave National Park in 2010. This is also the only 24-hour period that had a concentration greater than 80% of the PM_{10} standard. There are sufficient years of data to show the area is attaining the PM_{10} standard. See Table 4-20 for more information on the concentration levels.

4.4.2.3 $PM_{2.5}$ Evaluation

$PM_{2.5}$ concentrations are similar to the Badlands Site except for the days affected by smoke from prescribed fires and wild fires. The 24-hour $PM_{2.5}$ design value for 2014 is only 29% of the standard. The 24-hour concentrations outside of the smoke exceptional events are some of the lowest in the state.

$PM_{2.5}$ 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. There are sufficient years of data to show the area is attaining the $PM_{2.5}$ standards. See Table 4-20 for more information on the concentration levels.

4.4.2.4 Ozone Evaluation

Ozone levels recorded at the Wind Cave Site were the highest in the state in 2006. There are only a few small emission sources of volatile organic compounds and nitrogen oxides, the precursors of ozone formation, in the county so transport is a big part of the concentration levels. 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 4.4.1.6 and the reasons stated also apply to levels at the Wind Cave Site.

During the 5-year review period the highest ozone concentration was 0.074 parts per million recorded in 2012. Even with the drop in ozone concentrations in the last seven years the site still has a design value that is 83% of the ozone standard of 0.075 parts per million. Most of the last seven years of testing had days with concentrations greater than 80% of the standard. There are still sufficient years of data to show the area is attaining the ozone standard. See Table 4-20 for more information on the concentration levels.

4.4.2.5 Summary for Wind Cave

Concentrations for PM_{10} and $PM_{2.5}$ 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 still possible. Ozone will continue to be a priority at this site.

All the continuous monitors and analyzers report their hourly data to the DENR's webpage providing data for the public to use. No changes to this site are planning because of the 5-year assessment.

Table 4-20 Wind Cave Site 5-year Assessment of Data (2010 – 2014)

Parameter	Standard	# > than Standard	Maximum Concentration	Design Value	% of Standard	Trends
PM_{10}	24-hour 150 ug/m^3	0	142 ug/m^3 (2010) [1]	[2]		Slight Increase
$PM_{2.5}$	24-hr 35 ug/m^3	1 [(1)]	115.0 ug/m^3 (2010) [1]	10.0 ug/m^3	29%	
	Annual 12 ug/m^3	0	4.9 ug/m^3 (2012)	3.4 ug/m^3	28%	Decrease
Ozone	8-hour 0.075 ppm	0	0.074 ppm (2012)	0.062 ppm	83%	Decrease

[1] – Concentration during an exceptional event; and

[2] – There is no design value for PM_{10} because the standard is based on a formula of expected exceedances.

5.0 40 CFR Part 58 Requirements

EPA rules in 40 CFR Part 58 contains requirements used to design, operate and quality assure data from an ambient air monitoring network. Below are the three basic goals in designing an air monitoring network:

1. Provide air pollution data to the general public in a timely manner.

   DENR accomplishes this objective by providing hourly concentration data to the 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 in rural areas like UC #1 Site and sites in Wind Cave and Badlands National Parks. It also provides data from smaller cities like Watertown, Black Hawk and Brookings sites. A special effort is made in the Rapid City area, calling High Wind Dust Alerts when meteorological conditions are forecasted that could cause high PM_{10} concentrations. This information along with a report graphing hourly concentrations recorded during the alert is also provided to the public through the 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.

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 and the public.

5.1 Appendix A - Quality Assurance Requirements

An assessment of the quality assurance completed at each site is part of the annual data certification completed by the DENR in July 1 of each year. See Attachment 1 for the assessment of the quality assurance for the South Dakota Air Monitoring Network completed for the sampling year of 2014 at:

http://denr.sd.gov/des/aq/monitoring/state-mo.aspx

5.2 Appendix C - Air Quality Monitoring Methodology

The listing of sampling methods for each parameter and the monitoring goals and representation are included in the Ambient Air Monitoring Network Annual Plan each year. See the webpage listed above:

5.3 Appendix D - Network Design Criteria

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 $PM_{2.5}$ is the three year average of the 98 percentile concentrations. Each design value is specific to the pollutant and form of the standard. The South Dakota Ambient Air Monitoring Plan addresses the requirements and evaluates the state's three Metropolitan Statistical Areas to determine the need for any changes to the monitoring sites yearly. See Section 5.6 of the South Dakota Ambient Air Monitoring Plan for 2015.

5.4 Appendix E - Probe and Monitor Path Siting Criteria

EPA conducted two Technical Systems Audits on the South Dakota air monitoring network one each in 2012 and 2015. As part of the audit EPA staff visited all the air monitoring sites in the network checking to be sure all Appendix E requirements were

followed. As a result of the two audits completed by EPA all air monitoring sites in the South Dakota air monitoring network are meeting the requirements in Appendix E.

5.5 Appendix G – Uniform Air Quality Index and Daily Reporting

South Dakota is not required to implement the requirements in Appendix G.

6.0 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. No adjustments are planned to the air monitoring network in South Dakota as a result of this assessment.

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. This process has mostly been completed in the last five years.

PM_{10} monitors will continue to be a priority in the Rapid City area. PM_{10} monitoring in the rest of the state will have a lower priority and sampling frequencies for filter method monitors will operate under a minimum sampling frequency.

$PM_{2.5}$ 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 $PM_{2.5}$ continue to be the highest in this area of the state. $PM_{2.5}$ concentration levels appear to be related to long range transport of the pollutants from locations south and east of the state. Any improvements made in these areas should reducing $PM_{2.5}$ levels in our state.

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 north and west of South Dakota. Because background levels are high any improvements in reducing ozone forming pollutants in states upwind will have a positive impact on reducing ozone levels in 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 level change statewide. The 1-hour standard has required the characterization of large sulfur dioxide emission sources nationwide. This includes only one facility in South Dakota, the Big Stone Power Plant. The characterization of this source will be done by the collecting air monitoring data around the plant, limiting yearly emissions to less than 2000 tons per year or by emission modeling. Any new analyzers purchased will be trace level methods 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. The 1-hour standard will drive any new sampling efforts in the future.

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.

Carbon monoxide testing levels continue to be well below the national standards. Testing for carbon monoxide for South Dakota included sampling at one site. Because levels are low only the NCore site continues to have testing for carbon monoxide. No increase in the number of sampling locations is anticipated in the future.