South Dakota Ambient Air Monitoring Network

5-Year Assessment of Air Monitoring Sites

2020 to 2024

Air Quality Program

South Dakota Department of Agriculture and Natural Resources

2025

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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 Agriculture and Natural Resources (DANR) to complete a 5-year network assessment of the state's ambient air monitoring sites in 2025. 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 fourth 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. The document was put out for public comment May 22 through June 20, 2025. No comments were received.

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, total suspended particulate was replaced by particulate matter 10 microns and less (PM_{10}), later particulate matter 2.5 microns and less ($PM_{2.5}$) was added and concentration levels of the standards were reduced, requiring the need for additional testing and pollution parameters. In some cases, EPA rule specified additional testing, such as at 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 DANR's webpage for public access and the continuous monitor is significantly cheaper to operate. In 2016, the Black Hawk site switched from manual to continuous monitoring. At the end of 2019, the Rapid City Library and the Aberdeen Fire Station sites were closed. With the closing of those two sites, there is no PM_{10} manual monitoring in the state.

At the beginning of 2020, there were nine monitoring sites in the network testing for PM_{10}. During this assessment period the Aberdeen Bus Stop site replaced the Aberdeen Fire Station #1 site, the SD School site was replaced by the Sioux Falls USD site, and the UC#1 site was closed. This left eight monitoring sites in the network testing for PM_{10} at the end of 2024. Table 2-1 lists information on each past and present PM_{10} site operated in the state through the end of 2024. For South Dakota, EPA designated the entire state except the Rapid City Area as Unclassifiable for the PM_{10} NAAQS on November 15, 1990. On April 5, 2006, the Attainment designation was given for the Rapid City Area.

Table 2-1 PM_{10} Air Monitoring Sites

Site	Site Name	Location	County	Start Date	End Date
461031001	Public Library	Rapid City	Pennington	1986	2019
461030002	Mt. View	Rapid City	Pennington	1985	1998
461030012	Jaehn's	Rapid City	Pennington	1992	1997
461030010	Camp Rapid	Rapid City	Pennington	1985	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	2001	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	1986	1998
460990006	KELO	Sioux Falls	Minnehaha	1991	2010
460990007	Hilltop	Sioux Falls	Minnehaha	1999	2007
460990008	SD School	Sioux Falls	Minnehaha	2008	2021
460990009	SF-USD	Sioux Falls	Minnehaha	2021	
460130001	Sanitation B.	Aberdeen	Brown	1985	1986
460130002	ARCC	Aberdeen	Brown	1985	1987
460130003	Fire Station #1	Aberdeen	Brown	2000	2019
460130004	Bus Stop	Aberdeen	Brown	2020	
460110002	City Hall	Brookings	Brookings	1989	2014

Site	Site Name	Location	County	Start Date	End Date
460110003	Research Farm	Rural	Brookings	2015	
460330132	Wind Cave	National P.	Custer	2005	
460710001	Badlands	National P.	Jackson	2000	
460290002	Utility Yard	Watertown	Codington	2003	
461270001	UC #1	Jensen	Union	2009	2021
461270002	UC #2	Renken	Union	2009	2013
461050001	Thom's	Lemmon	Perkins	1985	1986
460210001	Phone Building	Pollock	Campbell	1985	1986
460650001	Anderson Building	Pierre	Hughes	1985	1988

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. For South Dakota, EPA designated the entire state as Unclassifiable/Attainment for the 2006 24-Hour $PM_{2.5}$ NAAQS 30 days after November 13, 2009. In 2012, EPA revised the annual $PM_{2.5}$ from 15 to 12 ug/m^3. For South Dakota, EPA designated the entire state as Unclassifiable/Attainment for the 2012 Annual $PM_{2.5}$ NAAQS on April 15, 2015. In 2024, EPA revised the annual $PM_{2.5}$ from 12 to 9 ug/m^3. The EPA has not yet made the final designations for this new standard.

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. The SF-USD site has both the manual and continuous monitoring methods for $PM_{2.5}$ as required for the NCore Site. At the end of 2019, the Rapid City Library and the Aberdeen Fire Station sites were closed. With the closing of those two sites, the NCore site has the only $PM_{2.5}$ manual monitors in the state.

At the beginning of 2020, there were 9 sites in the air monitoring network collecting $PM_{2.5}$ data. During this assessment period, the SF-USD site replaced the SD School site, the UC #1 site closed, and the Vermillion DOT site opened. Table 2-2 lists information on each past and present $PM_{2.5}$ site operated in the state through the end of 2024.

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	2019
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	2021
460990009	SF-USD	Sioux Falls	Minnehaha	2021	
460130003	Fire Station #1	Aberdeen	Brown	1999	2019
460130004	Bus Stop	Aberdeen	Brown	2020	
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	2021
461270002	UC #2	Renken	Union	2009	2013
460650003	Airport	Pierre	Hughes	2015	
460270001	Verm-DOT	Vermillion	Clay	2022	

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 8-hour average standard. Due to the standard change and concern with the accuracy of modeling results by the Ozone Transport Assessment Group, DANR started testing for ozone in South Dakota. The 8-hour standard was lowered in 2008 and again in 2015. For South Dakota, EPA designated the entire state as Attainment/Unclassifiable for the 2015 8-hour ozone standard on January 16, 2018.

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. In 2020, the monitoring network included seven sites monitoring for ozone. During this assessment period the SF-USD site replaced the SD School site, the UC #1 site closed, and the Watertown and Vermillion sites were opened. See Table 2-3 for a list of ozone sites operated in South Dakota through the end of 2024.

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	2021
460990009	SF-USD	Sioux Falls	Minnehaha	2021	
460110003	Research Farm	Rural	Brookings	2008	
461030020	Credit Union	Rapid City	Pennington	2005	2007
461030016	Robinsdale	Rapid City	Pennington	2002	2004
460930001	Elementary S.	Black Hawk	Meade	2007	
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	2021
460270001	Vermillion DOT	Vermillion	Clay	2022	
460290002	Watertown	Watertown	Codington	2020	

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.

At the beginning of 2020, there were four monitoring sites in the network testing for Sulfur Dioxide. During this assessment period, the SF-USD site replaced the SD School site, and the Badlands and UC #1 sites closed. At the end of 2024, there were two sulfur dioxide analyzers operating in the network at SF-USD 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 through 2024.

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

Site	Site Name	Location	County	Start Date	End Date
460990008	SD School	Sioux Falls	Minnehaha	2008	2021
460990009	SF-USD	Sioux Falls	Minnehaha	2021	
460510001	SE of Plant	Big Stone	Grant	1978	1985
461050001	Thom's	Lemmon	Perkins	1981	1984
460630001	Water Tower	Buffalo	Harding	1983	1986
46033001	Teepee Work C.	Rural	Custer	1974	1980
460331001	Sanson Ranch	Rural	Custer	1986	1986
460330132	Wind Cave	National P.	Custer	2005	2010
460710001	Badlands	National P.	Jackson	2005	2023
461270001	UC #1	Jensen	Union	2009	2021
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 required states to update the recommendations for counties with large sources of SO_2 emission.

For South Dakota, EPA designated Grant County as Attainment/Unclassifiable for the 2010 Sulfur Dioxide NAAQS on September 12, 2016. On April 9, 2018, the Attainment/Unclassifiable designation was given for the entire state.

The secondary Sulfur Dioxide standard was revised December 11, 2024, from a 3-hour average concentration of 0.5 parts per million, not to be exceeded more than once per year to an annual standard of 10 parts per billion averaged over three years. EPA has not made the final designations for this new standard.

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. For South Dakota, EPA designated the entire state as 'Cannot be classified or better than the national standards' for the 1971 nitrogen dioxide annual standard. 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.

At the beginning of 2020, there were four sites sampling for Nitrogen Dioxide. During this assessment period, the SF-USD site replaced the SD school site, and the Badlands

and UC #1 sites were closed. Table 2-5 lists the sites testing for nitrogen dioxide past and present in the monitoring network through 2024.

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
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	2021
460990009	SF-USD	Sioux Falls	Minnehaha	2021	
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	2023
461270001	UC #1	Jensen	Union	2009	2021
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 but is still required to have nitrogen dioxide testing at the NCore site. For South Dakota, EPA designated the entire state as Unclassifiable/Attainment for the 2010 Nitrogen Dioxide 1-hour standard 90days after October 31, 2011.

In 2011, DANR 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.

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. For South Dakota, EPA designated the whole state as Unclassifiable/Attainment for the 2008 Lead NAAQS on December 31, 2011. 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, DANR 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. During this assessment period, the SD School site was replaced by the SD-USD site. Table 2-7 lists the details of both carbon monoxide sites operated in the state through 2024. For South Dakota, EPA designated the entire state as Unclassifiable/Attainment for the Carbon Monoxide NAAQS on November 15, 1990.

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	2021
460990009	SF-USD	Sioux Falls	Minnehaha	2021	

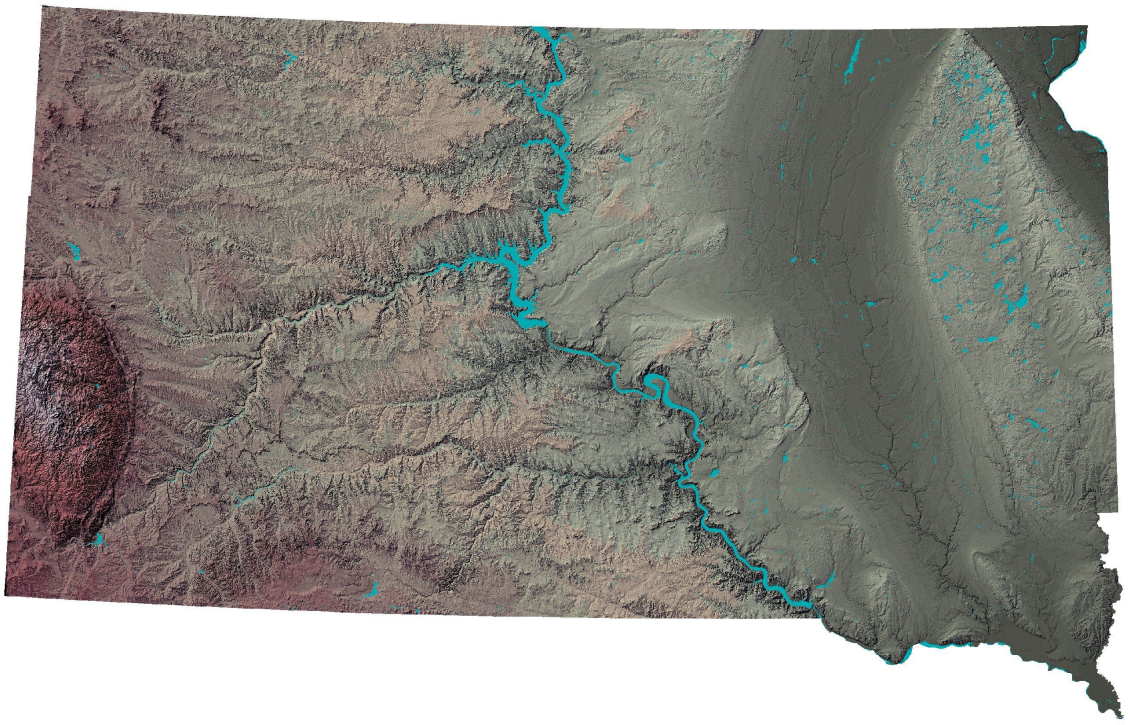
3.0 Description of Regional Issues

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 Black Elk Peak (formerly Harney Peak), the highest point in the state. See the 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 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 wildfires 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.

The state's large overall geographic area and tight financial resources presents a problem with providing representative data for all counties. At the end of this assessment period, there were 10 monitoring sites representing 10 counties in the state monitoring for the National Ambient Air Quality Standards. 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 -40 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 have 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, there were 56 high wind dust alert days. Two of these days recorded concentrations greater than the 24-hour PM_{10} standard. Those were January 14, 2021, with a PM_{10} concentration of 260.6 micrograms per cubic meter and January 14, 2022, with a PM_{10} concentration of 185.6 micrograms per cubic meter at the Credit Union site. 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 less frequently.

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 2020 Census of 886,667 people. The US Census Bureau estimates the state's population in 2024 has increased by 4.3% to around 924,669 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. From 2024 estimates, Minnehaha and Pennington counties have a population greater than 100,000 people. Only Lincoln County has a population between 50,000 to 100,000. Fifteen counties have populations from 10,000 to 40,000. The remaining 48 counties have populations less than 10,000 with the smallest population in Jones County at 874 people. See Table 3-1 for information on the 10 highest population counties in the state.

Table 3-1 Counties with the Highest Estimated 2024 Population

Number	County	Population	Largest City
1	Minnehaha	208,639	Sioux Falls
2	Pennington	115,979	Rapid City
3	Lincoln	73,142	Sioux Falls
4	Brown	37,495	Aberdeen
5	Brookings	36,359	Brookings
6	Meade	30,918	Sturgis
7	Codington	29,278	Watertown
8	Lawrence	28,809	Spearfish
9	Yankton	23,509	Yankton
10	Davison	19,907	Mitchell

Forty-one of the counties had an estimated increase in population since the 2020 census. Most of the counties in this group had minor increases in population. The counties of Minnehaha, Lincoln, Pennington, Lawrence, Brookings and Meade had greatest percentage increase of population for the state ranging from an increase of 10,921 to 1,015. Figure 3-2 shows a map of the percentage of population change in the state.

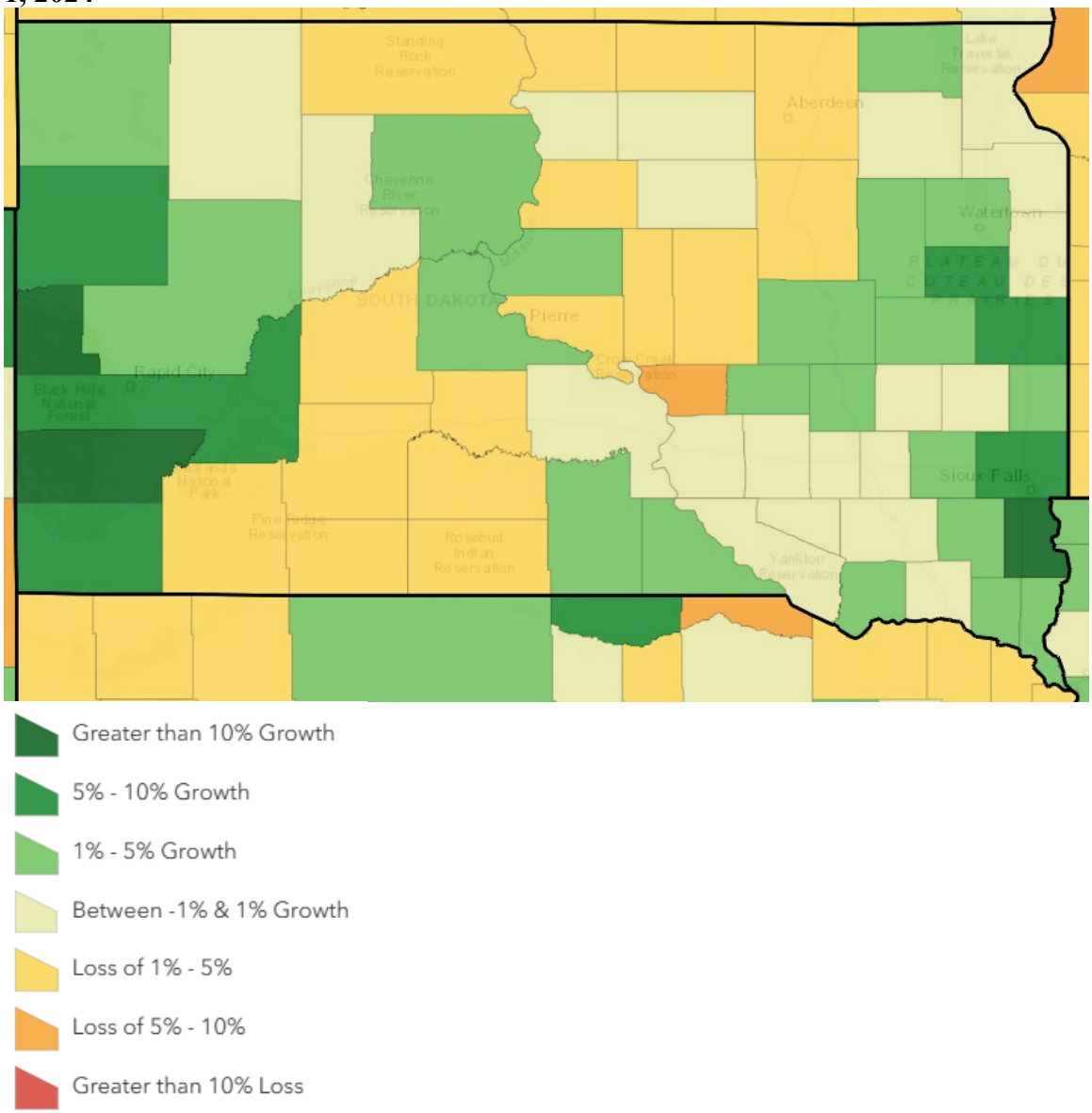
The Sioux Falls Metropolitan Statistical Area has the highest population in the state and most of the population lives in Minnehaha County with some of the residential areas located in Lincoln, McCook, and Turner counties. The current SF-USD air monitoring site is in the northwest part of Sioux Falls providing a good characterization of population exposure to air pollution in the Metropolitan Statistical Area. This site replaced the SD School site in 2021.

The Sioux City Metropolitan Statistical Area has the second largest population in the state. It includes Union County in South Dakota, Dixon and Dakota counties in Nebraska, and Woodbury County in Iowa. DANR operated the UC #1 monitoring site in the Sioux City Metropolitan Statistical Area through 2021. In 2022, that site moved just outside of the Sioux City Metropolitan Statistical area to the Vermillion DOT site in Clay County. During this assessment period, a new site in Iowa was opened to represent the Sioux City Metropolitan Statistical area.

The Rapid City Metropolitan Statistical Area is mainly in Pennington County but also extends into Meade County. DANR operates two monitoring sites in the Rapid City Metropolitan Statistical Area. One monitoring site was in Pennington County and one in Meade County.

It is anticipated that South Dakota population growth and demographics will continue at 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 South Dakota Population, estimated percent change April 1, 2020 to July 1, 2024



3.4 Revised Standards

EPA continues to review the NAAQS primary standards for ozone, nitrogen dioxide, sulfur dioxide, particulate matter and lead. 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 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.

3.6 Long Range Transport of Pollutants

A review of the $PM_{2.5,}$ $PM_{10,}$ and ozone data from 2020 to 2024 indicates exceedances 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 including Canadian wildfires.

3.6.1 $PM_{2.5}$ from Wildfire Smoke Exceptional Events

In general, the state can have days of high concentrations of $PM_{2.5}$ caused by smoke from wildfires located in the state, Canada or other states. In 2020, one $PM_{2.5}$ exceedance was attributed to wildfire smoke. This occurred at the UC #1 site. In 2021, 31 $PM_{2.5}$ exceedances were attributed to wildfires. These occurred over six days. In 2022, two $PM_{2.5}$ exceedances on September 13 at the Credit Union and Wind Cave sites were attributed to wildfires In 2023, 56 $PM_{2.5}$ exceedances were attributed to wildfires. These occurred over 15 days. In 2024, five $PM_{2.5}$ exceedances were attributed to wildfires. These occurred over 6 different days. These days were flagged in AQS, and if needed the department will submit exceptional events packages to EPA for concurrence.

3.6.2 High Wind and/or Smoke PM_{10} Events

During the last 5-years there were 28 PM_{10} exceedances. Of those, only four were not flagged for high winds and/or smoke. Three were at the Credit Union site and the other was at the Wind Cave site. In addition to these high wind and/or smoke days causing exceedances, they also caused violations of the PM_{10} 24-hour standard at the Credit Union site. These days were flagged in AQS, and if needed the department will submit exceptional events packages to EPA for concurrence.

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 $PM_{2.5.}$ All of the wildfire events mentioned in 3.6.1 were the result of the transport of smoke.

3.6.4 Ozone Pollution Transport

During the five-year period, there were 85 exceedances of the 8-hour ozone standard. All but one of these days occurred when there was smoke in the area. In 2020, there were two exceedances over two days. In 2021, there were 11 exceedances over nine days. In 2022, there was one exceedance. In 2023, there were 50 exceedances over 24 days. In 2024, there were 21 exceedances over 9 days.

Before the beginning of the ozone season 2020, the department added an additional ozone analyzer in Watertown. This expanded the network along the entire eastern part of the state giving a better view of regional transport.

Historically, the potential exists to have high ozone levels caused by long range transport, air pollution from prescribed and wildfires and stratospheric ozone intrusions.

4.0 Air Monitoring Sites

This section will evaluate each parameter at each of the 10 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 to or exceeding 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. 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 sites.

Another evaluation method is air pollution data trends. Pollution trends are part of the 2025 Annual Plan and a copy of the plan can be viewed on the DANR's air quality page at https://danr.sd.gov/des/aq/airprogr.aspx during the 30-day review period or at https://danr.sd.gov/des/aq/monitoring/state-mo.aspx once it is finalized. Any discussion of air pollution concentration trends is referenced from the 2025 Annual Plan. The 2025 Annual Plan also contains site history and a picture of each monitoring site.

In addition, DANR 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 DANR 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 three new sites replaced old sites at nearby locations and two sites had modifications. The following changes were made during the last 5-years:

1. In 2021 the NCORE site at SFSD was closed due to new landowners and a new NCORE site was established at the SF-USD campus on the northwest side of Sioux Falls.

2. In 2021 the landowners of the UC#1 site decided they no longer wanted the site on their property. Therefore, the site was closed and moved to the DOT site at Vermillion. The site currently monitors for ozone and PM2.5.

3. The Aberdeen Fire Station site was closed at the end of 2019. The Fire Station site had manual monitors for PM_{10} and $PM_{2.5}$. The Aberdeen Bus Stop site was opened in 2020 to replace the Fire Station site, but it has continuous particulate monitoring instead. This results in a savings of time and money and will allow for the display of real-time data on the website and AirNow.

4. In 2020, Ozone was added to the Watertown site to be able to better track ozone transport along the eastern side of the state. The closest ozone site to Watertown was 45 miles to the south in Brookings.

5. In 2023, the sulfur dioxide analyzer and nitrogen dioxide analyzer were removed from the site at Badlands. Both pollutants had very low levels at the site and it was determined it was no longer necessary. The Badlands continues to monitor for ozone, PM10 and PM2.5.

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 in the largest cities of Sioux Falls, Aberdeen, Watertown, and Brookings. The Union County site was moved to Vermillion in 2022 and is representing the southeastern part of the state. The following sections will provide an evaluation of each site located in the eastern half of the state.

4.2.1 Brookings Research Farm Site

Brookings is located on the east central edge of South Dakota in Brookings County. Brookings County has the fifth largest population in the state. Brookings County population trends show a 5.8% increase from the 2020 census to the estimates for 2024.

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

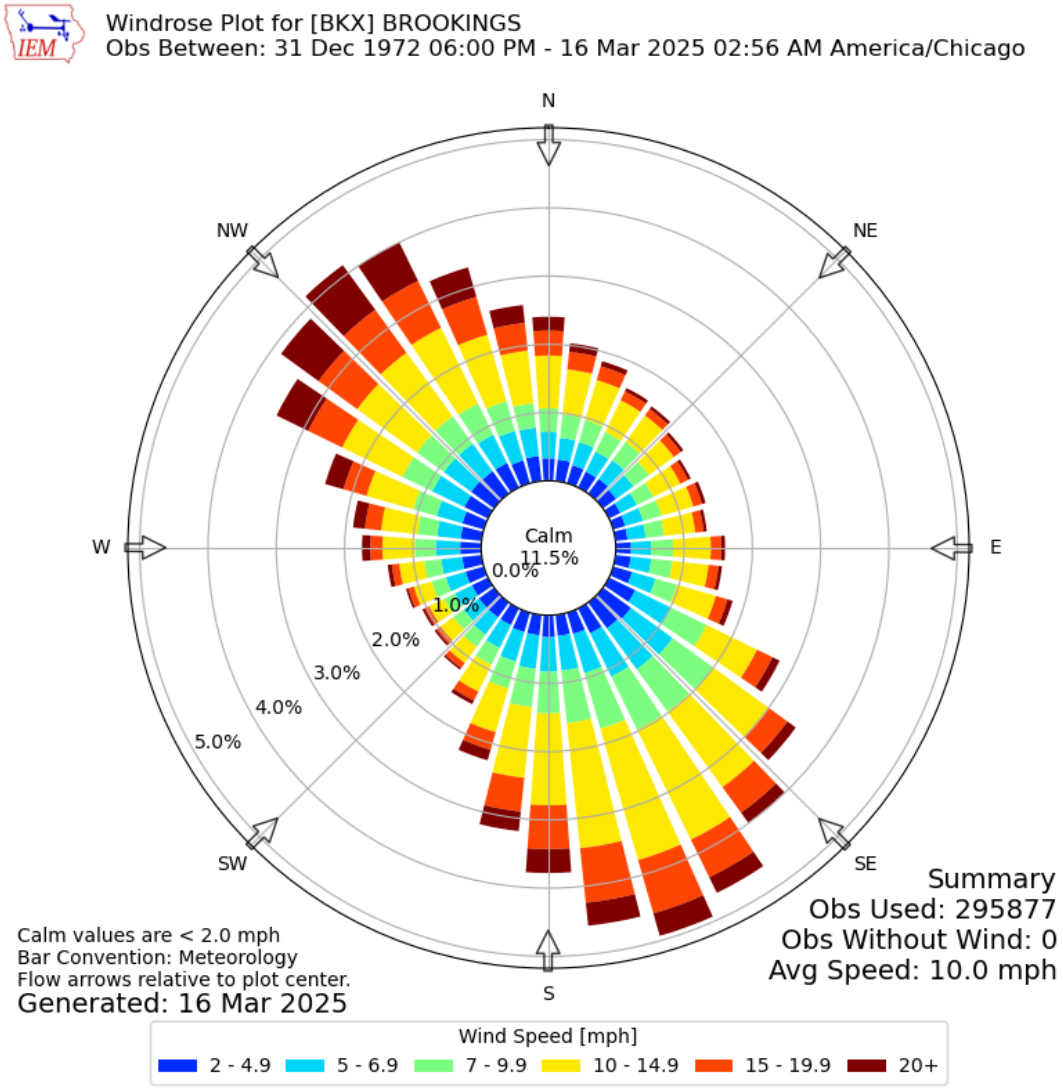
Historically there have been two different air monitoring sites in the city. The City Hall Site set up in 1989 and the Research Farm Site added as a SLAMS for ozone in 2010. The City Hall Site was closed and the PM_{10} and $PM_{2.5}$ parameters were added to the Research Farm at the beginning of 2015. This allows the DANR to operate continuous monitors that provide real time data to the public in the Brookings area.

4.2.1.1 Meteorological Data Evaluation

The meteorological data used throughout this report, unless otherwise stated, is from the Iowa State University, Iowa Environmental Mesonet website, using the South Dakota ASOS network: http://mesonet.agron.iastate.edu/sites/locate.php?network=SD_ASOS. For this site, the Brookings (BKX) station located on the west side of the city was used.

The data collected from 1973 to 2025 was used for the wind rose. Predominate wind directions are out of the south-southeast and northwest and the predominate wind speeds are in the 10-15 mph category as indicated by the graph in Figure 4-1.

Figure 4-1 Wind Rose Brookings



4.2.1.2 PM_{10} Evaluation

PM_{10} levels at the Brookings Research Farm Site have been collected since 2015. The trend for the PM_{10} annual average during the past 5-years shows slightly increasing concentrations. Concentrations of PM_{10} exceeded the 24-hour standard three times at this site in the 5-year review period, once in 2021 and twice in 2024. There was smoke in the area all three times. The current PM_{10} 24-Hour Concentrations expected exceedance level is 0.7. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site. 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 DANR's and EPA's webpages.

4.2.1.3 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the Brookings Research Farm Site have been collected since 2015. The trend for the $PM_{2.5}$ annual standard during the past 5-years shows slightly increasing concentrations. The current $PM_{2.5}$ annual design value is 5.3 ug/m3 or 59% of the annual standard and is the third lowest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site nine times (associated with wildfires) in the 5-year review period. The current $PM_{2.5}$ 24-hour design value is 19 ug/m3 or 54% of the 24-hour standard and is the third lowest in the state. This site is attaining the 24-hour and annual standards.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site. 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 DANR's and EPA's webpages.

4.2.1.4 Ozone Evaluation

Ozone levels at the Brookings Research Farm Site have been collected since 2008. The trend for ozone 8-hour daily maximum concentrations during the past 5-years shows decreasing concentrations. Concentrations of ozone exceeded the 8-hour daily maximum concentration six times in the 5-year review period. All of those happened while smoke was in the area. The current ozone 8-hour design value is 0.060 ppm or 86% of the standard and is the lowest in the state. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site. 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 DANR's and EPA's webpages.

4.2.2 Aberdeen Bus Stop Site

Aberdeen is in the northeastern part of South Dakota in Brown County. Brown County has the fourth largest population in the state. Brown County population trends show a 2.1% decrease from the 2020 census to estimates for 2024. Table 4-2 contains general information about the site and parameter testing.

Table 4-2 Bus Stop Site Details

Location	Aberdeen
County	Brown County
AQS #	46-013-0004
Parameter	**PM_{10}**
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	**$PM_{2.5}$**
Goals	Population/High Concentration
Sampling Schedule	Every Day

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

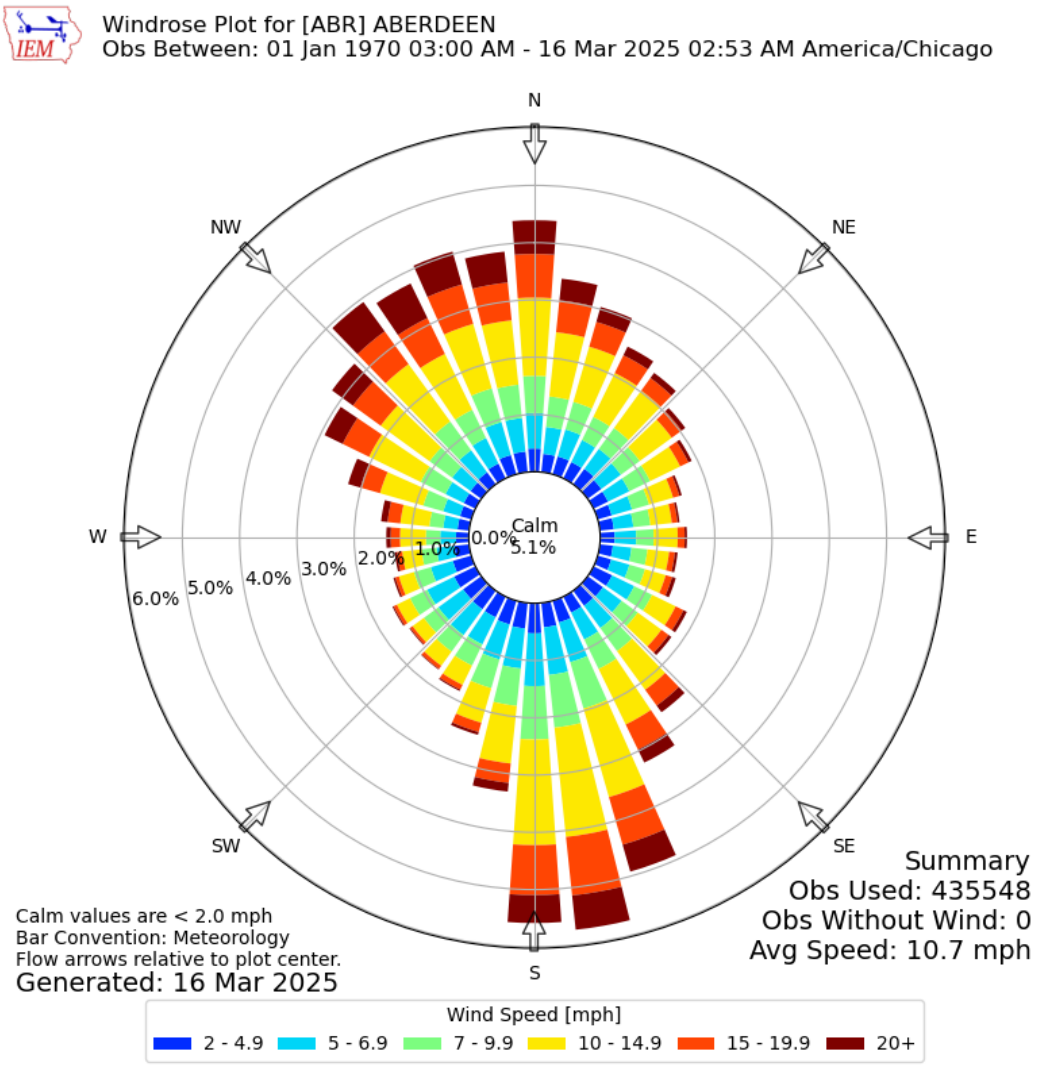
Industrial development in the city and surrounding area includes service-oriented businesses and light industry on the west, south and east side of the city. Land use around the city is mainly agriculture with a small amount of grassland. Agriculture remains the largest industry in this area.

There have been three different air monitoring sites in the city up to this assessment. The site operated during the past 5-years is the Bus Stop Site. The Fire Station #1 Site was closed in 2019 which included PM_{10} and $PM_{2.5}$ manual method monitors. The Bus Stop Site uses continuous monitors for PM2.5 and PM10, which will result in saving time and money. This change will also allow for the real-time data to be added to the DANR and AirNow websites. The Bus Stop Site is the only air monitoring site 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.

4.2.2.1 Meteorological Data Evaluation

For this site, the Aberdeen (ABR) station located on the east side of the city at the Aberdeen Airport was used. The data collected from 1970 to 2025 was used for the wind rose. Predominate wind directions are out of the south to south-southeast and north to northwest and the predominate wind speeds are in the 10-15 mph category as indicated by the graph in Figure 4-2.

Figure 4-2 Wind Rose Aberdeen Airport



4.2.2.2 PM_{10} Evaluation

PM_{10} levels at the Bus Stop Site have been collected since 2020. The trend for the PM_{10} annual average during the past 5-years shows steady concentrations. Concentrations of PM_{10} exceeded the 24-hour standard three times at this site in the 5-year review. The department believes the exceedances were caused by natural events. All three of these days were flagged as either high winds and/or smoke. The current PM_{10} 24-Hour Concentrations expected exceedance level is one.

Switching to a continuous monitor will result in a savings of time and money in the long run. With continuous monitors, the real time data will also be available to the public on the website.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the new site.

4.2.2.3 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the Bus Stop Site have been collected since 2020. The trend for the $PM_{2.5}$ annual standard during the past 5-years shows steady concentrations. The current $PM_{2.5}$ annual design value is 5.5 ug/m3 or 61% of the annual standard and is the fifth lowest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site eleven (associated with wildfires) in the 5-year review period. The current $PM_{2.5}$ 24-hour design value is 22 ug/m3 or 63% of the 24-hour standard and is tied with the Watertown site for the fourth highest in the state. This site is attaining the annual and 24-hour standards.

At the end of 2019, the Fire Station #1 site was closed and a new site at the Aberdeen Bus Stop was opened. Switching to a continuous monitor will result in a savings of time and money in the long run. With continuous monitors, the real time data will also be available to the public on the website. Testing for this parameter is meeting the goals of high concentration and population and will continue at the new site.

4.2.3 Watertown Utility Site

Watertown is on the northeastern edge of South Dakota in Codington County. Codington County has the seventh largest population in the state. Codington County population trends show a 3.4% increase from the 2020 census to the estimates for 2024. The topography is flat with some low rolling hills. There are no indications that topography is causing air pollutants to accumulate. Table 4-3 contains general information about the site and parameter testing.

Table 4-3 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 Day
Parameter	**Ozone**
Goals	Population/High Concentration/Transport
Sampling Schedule	Every 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. Facilities in the area include an ethanol plant on the south edge of the city. Land use around the city is mainly

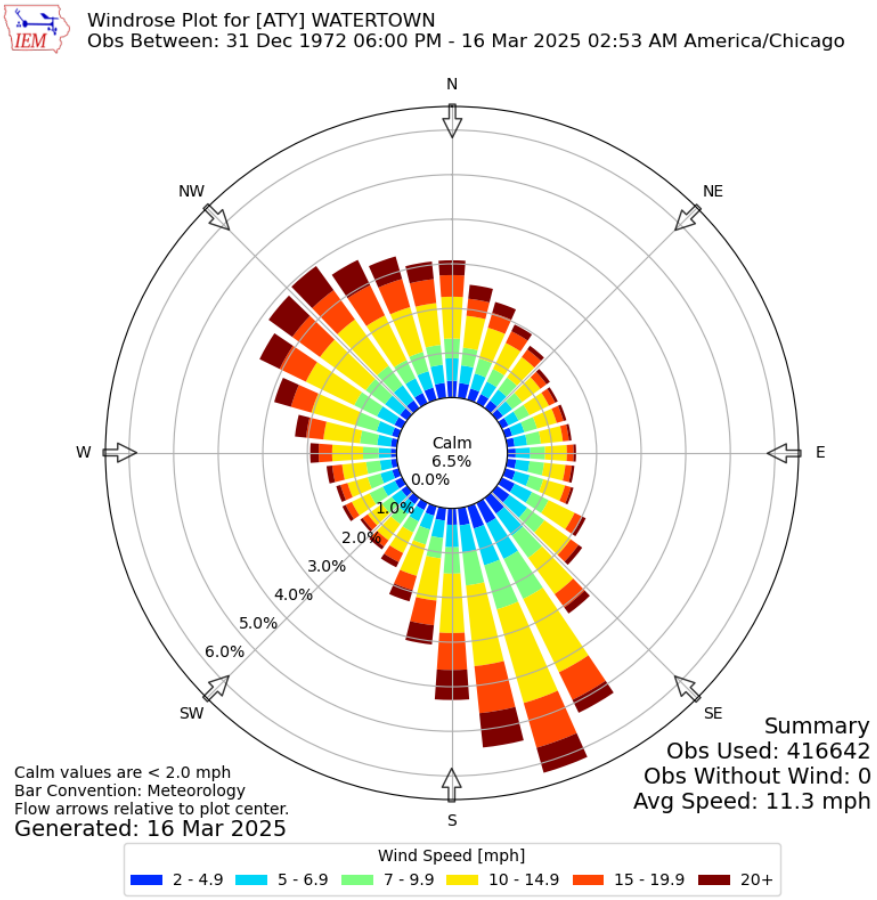
agriculture with a small amount of grassland. Agriculture remains the largest industry in this area.

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. In 2020, the Department added an ozone analyzer at the Watertown site to expand transport observations farther North along the eastern border of the state.

4.2.3.1 Meteorological Data Evaluation

For this site, the Watertown (ATY) station located on the west side of the city was used. The data collected from 1973 to 2025 was used for the wind rose. Predominate wind directions are out of the south-southeast and northwest and the predominate wind speeds are in the 10-15 mph category as indicated by the graph in Figure 4-3.

Figure 4-3 Wind Rose Watertown



4.2.3.2 PM_{10} Evaluation

PM_{10} levels at the Watertown site have been collected since 2003. The trend for the PM_{10} annual average during the past 5-years shows slightly decreasing concentrations. Concentrations of PM_{10} exceeded the 24-hour standard three times at this site (associated with high winds and/or smoke) in the 5-year review period. The current PM_{10} 24-Hour Concentrations expected exceedance level is 0.4. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.3.3 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the Watertown Site have been collected since 2003. The trend for the $PM_{2.5}$ annual standard during the past 5-years shows slightly increasing concentrations. The current $PM_{2.5}$ annual design value is 8.0 ug/m3 or 89% of the annual standard and is the highest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site ten times (associated with wildfires) in the 5-year review. The current $PM_{2.5}$ 24-hour design value is 22 ug/m3 or 63% of the 24-hour standard and is tied with Aberdeen for the fourth highest in the state. This site is attaining the annual and 24-hour standards.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.3.4 Ozone Evaluation

Ozone levels at the Watertown Site have been collected since 2020. The trend for ozone 8-hour daily maximum concentrations during the past 4-years shows slightly declining concentrations. Concentrations of ozone exceeded the 8-hour daily maximum concentration 12 times in the five-year review. All of the days were flagged for smoke in the area. The current ozone 8-hour design value is 0.062 ppm or 89% of the standard and is the second lowest value in the state. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.4 Sioux Falls (SF -USD) Site

Sioux Falls is located on the east central edge of South Dakota in Minnehaha and Lincoln Counties. Minnehaha County has the largest population and Lincoln County has the third largest population in the state. Minnehaha County population trends show a 6% and Lincoln County a 16% increase from the 2020 census to the estimates for 2024.

Historically, Sioux Falls has had nine different air monitoring site locations operating in the city since the air monitoring network was setup in 1970s. The Sioux Falls School site was closed in 2021, due to the sale of the property and the site was moved to the SF-USD campus on the northwest edge of town. This is the only 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 50 miles south in Vermillion. Concentrations for all parameters represent population exposure and high concentration of air pollution levels in this urban area. Table 4-4 contains general information about the site and parameter testing.

Table 4-4 SF-USD Site Details

Location	Sioux Falls
County	Minnehaha County
AQS #	46-099-0009
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/Transport
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
Parameter	**Carbon Monoxide**
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	**Nitrogen Oxides NOy**
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	**$PM_{2.5}$ Speciation**
Goals	Population/High Concentration
Sampling Schedule	Every Third Day
Parameter	**Meteorological**
Goals	Population/High Concentration
Sampling Schedule	Every Day

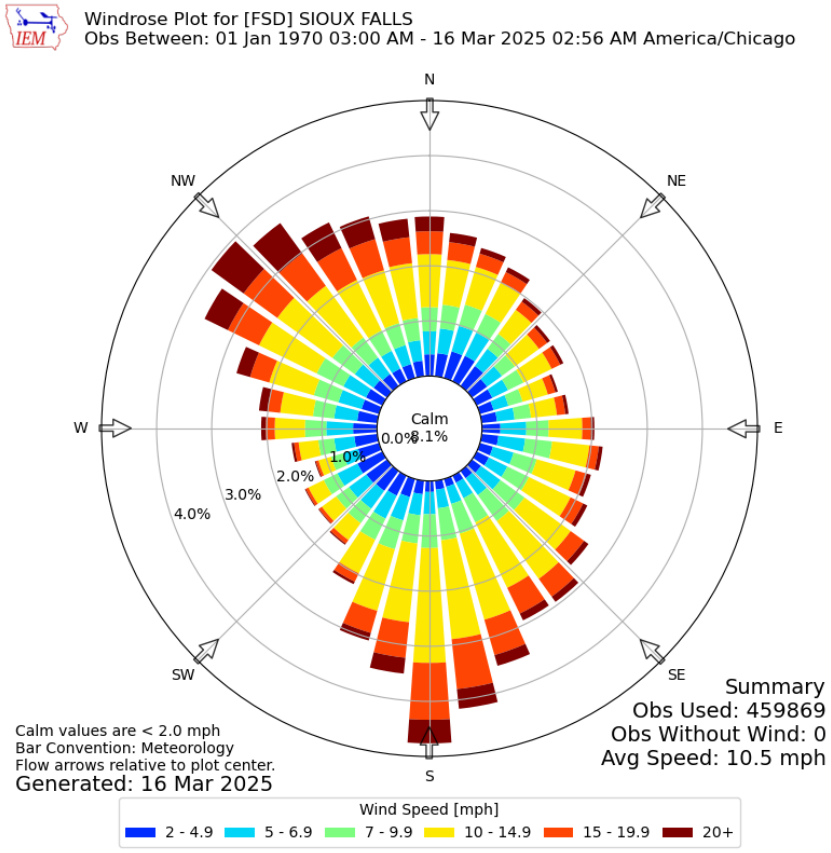
The SF-USD site is in the northwest part of the city. The area around the site is a mix of agriculture, commercial and residential property. Service type businesses are located to the north along 60th Street and residential areas are located approximately ¼ mile to the south-southwest. Most of the immediate area around the site is agriculture. High traffic count roads are located to the north about ¼ mile on 60th Street and I-29 ½ mile to the east of the site.

The SF-USD Site was setup in 2021, as a replacement for Sioux Falls School Site and is the National Core site for South Dakota. The SF-USD 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, and relative humidity. For the assessment of this site, the Sioux Falls (FSD) station located at the airport on the north central part of the city was used. The data collected from 1973 to 2025 was used for the wind rose. Predominate wind directions are out of the south and northwest and the predominate wind speeds are in the 10-15 mph category as indicated by the graph in Figure 4-4.

Figure 4-4 Wind Rose Sioux Falls Airport



4.2.4.2 PM_{10} Evaluation

PM_{10} levels at the SF-USD Site have been collected since 2021. The trend for the PM_{10} annual average during the past 4-years shows declining concentrations. Concentrations of PM_{10} exceeded the 24-hour standard one time at this site in the 5-year review period. This day was flagged for both high winds and smoke. The current PM_{10} 24-Hour Concentrations expected exceedance level is 0.3. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.4.3 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the SF-USD Site have been collected since 2021. The trend for the $PM_{2.5}$ annual standard during the past 4-years shows decreasing concentrations. The current $PM_{2.5}$ annual design value is 5.4ug/m3 or 60% of the annual standard and is the fourth lowest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site ten times (associated with wildfires) in the 5-year review period. The current $PM_{2.5}$ 24-hour design value is 20 ug/m3 or 57% of the 24-hour standard and is the fourth lowest in the state. This site is attaining the annual and 24-hour standards.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.4.4 Ozone Evaluation

Ozone levels at the SF-USD Site have been collected since 2021. The trend for ozone 8-hour daily maximum concentrations during the past 4-years shows slightly increasing concentrations. Concentrations of ozone exceeded the 8-hour daily maximum concentration 24 times in the five-year review. All but one of the days was flagged for smoke in the area. The current ozone 8-hour design value is 0.069 ppm or 99% of the standard and is tied with the Badlands site for the highest value in the state. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.4.5 Sulfur Dioxide Evaluation

Sulfur dioxide levels at the SF-USD Site have been collected since 2021. The trend for yearly 99th percentile, 1-hour concentrations during the past 4-years shows slightly decreasing concentrations. Concentrations of sulfur dioxide did not exceed 1-hour standard in the five-year review period. The current sulfur dioxide 1-hour design value is 1 ppb or 1% of the standard and is the lowest value in the state. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.4.6 Nitrogen Dioxide Evaluation

Nitrogen dioxide levels at the SF-USD Site have been collected since 2021. The trend for nitrogen dioxide annual average during the past 4-years shows slightly increasing concentrations. Concentrations of nitrogen dioxide did not exceed 1-hour standard in the five-year review period. The current nitrogen dioxide 1-hour design value is 31 ppb or 31% of the standard. The 2024 1-hour design value is the highest value in the state. This site is attaining the annual and 1-hour standards.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.4.7 Carbon Monoxide Evaluation

Carbon monoxide levels at the SF-USD Site have been collected since 2021. The SF-USD 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 trend for the carbon monoxide 8-hour average shows slightly decreasing concentrations. Concentrations of carbon monoxide did not exceed 1-hour standard in the five-year review period. This site is as attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.2.5 Vermillion DOT

The Vermillion DOT site is in the southeast corner of South Dakota in Clay County and is located on the eastern edge of Vermillion along Hwy. 50. Clay County population trends show a 1.8% increase from 2020 census to the estimates for 2024.

The Vermillion DOT site started operating in 2022 replacing the UC #1 site, which was closed due to the landowner no longer wanting it on their property. The closest air monitoring site is in Sioux Falls about 50 miles north of the site. Table 4-5 contains general information about the site and parameter testing.

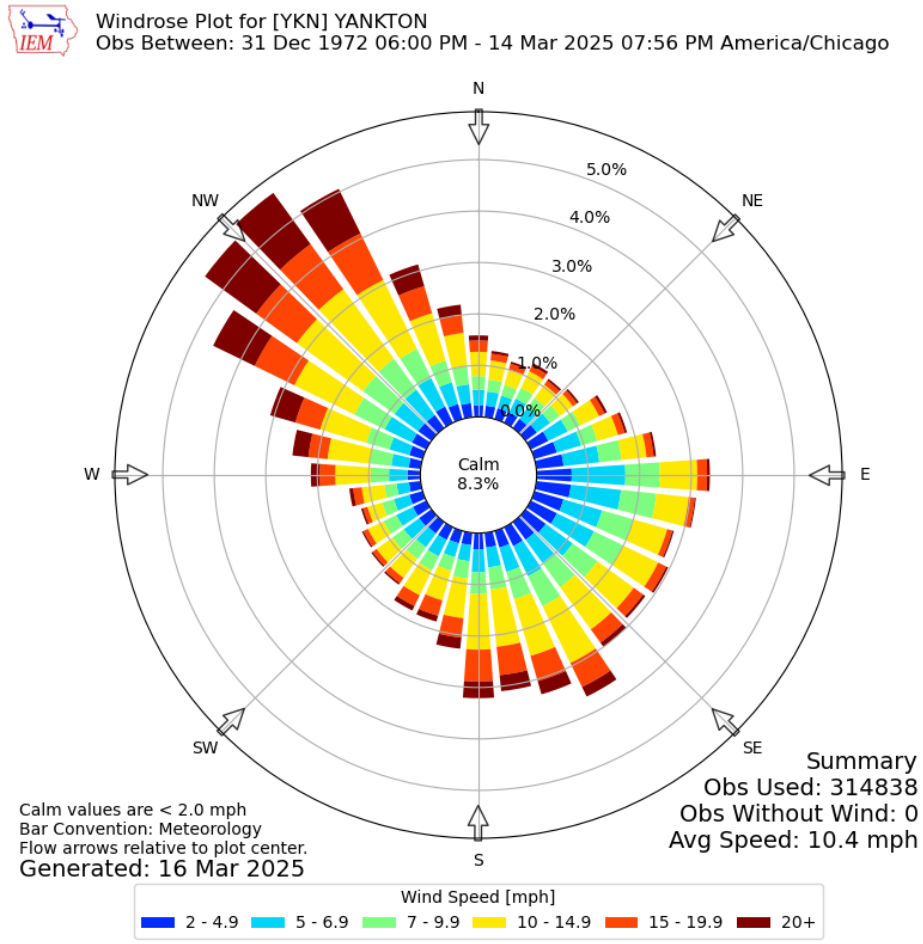
Table 4-5 Vermillion DOT Site Details

Location	Vermillion
County	Clay County
AQS #	46-027-0001
Parameter	**$PM_{2.5}$**
Goals	Population/Background/Transport
Sampling Schedule	Every Day
Parameter	**Ozone**
Goals	Population/Background/Transport
Sampling Schedule	Every Day

4.2.5.1 Meteorological Data Evaluation

For this site, the Yankton (BKX) station located on the west side of the city was used. The data collected from 1973 to 2025 was used for the wind rose. Predominate wind directions are out of the south-southeast and northwest and the predominate wind speeds are in the 10-15 mph category as indicated by the graph in Figure 4-5.

Figure 4-5 Wind Rose for Vermillion Site



4.2.5.2 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the Vermillion DOT Site have been collected since 2022. The trend for the $PM_{2.5}$ annual standard during the past 5-years shows slightly increasing concentrations. The current $PM_{2.5}$ annual design value is 7.1 ug/m3 or 79% of the annual standard and is the third highest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site ten times in the 5-year review period. All but one on the days were flagged for smoke in the area. The current $PM_{2.5}$ 24-hour design value is 24 ug/m3 or 69% of the 24-hour standard and is the second highest in the state. The site is attaining the annual and 24-hour standards.

Testing for this parameter is meeting the goals of background and population and will continue at the site.

4.2.5.3 Ozone Evaluation

Ozone levels at the Vermillion DOT Site have been collected since 2022. The trend for ozone 8-hour daily maximum concentrations during the past 3-years shows slightly decreasing concentrations. Concentrations of ozone exceeded the 8-hour daily maximum concentration ten times in the five-year review. All of the exceedances were flagged for smoke in the area. The current ozone 8-hour design value is 0.065 ppm or 93% of the standard and is third lowest in the state.

Testing for this parameter is meeting the goals of population, background, and transport and will continue at the site.

4.3 Rapid City Area

The 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. Pennington County has the second largest and Meade County has the sixth largest population in the state. Pennington County population trends show a 6.2% increase and Meade a 3.6% increase from the 2020 census to the estimates for 2024. Rapid City is the second largest city in the state. 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 the Rapid City metropolitan statistical area since 1972. Two sites were operated during this assessment 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 website, 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 56 High Wind Dust Alerts were called during the assessment period. Of these only two resulted in an exceedance. The highest PM_{10} 24-hour concentration during a high wind dust alert during this time period was 260.6 ug/m^3 in 2021. General information on the site and the pollution parameters being sampled are contained in Table 4-6.

Table 4-6 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
Parameter	**$PM_{2.5}$**
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	**Sulfur Dioxide**
Goals	Population/High Concentration
Sampling Schedule	Every Day
Parameter	**Nitrogen Dioxide**
Goals	Population/Background Concentration
Sampling Schedule	Every Day

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 which is the area between the hogback and the eastern edge of the Black Hills.

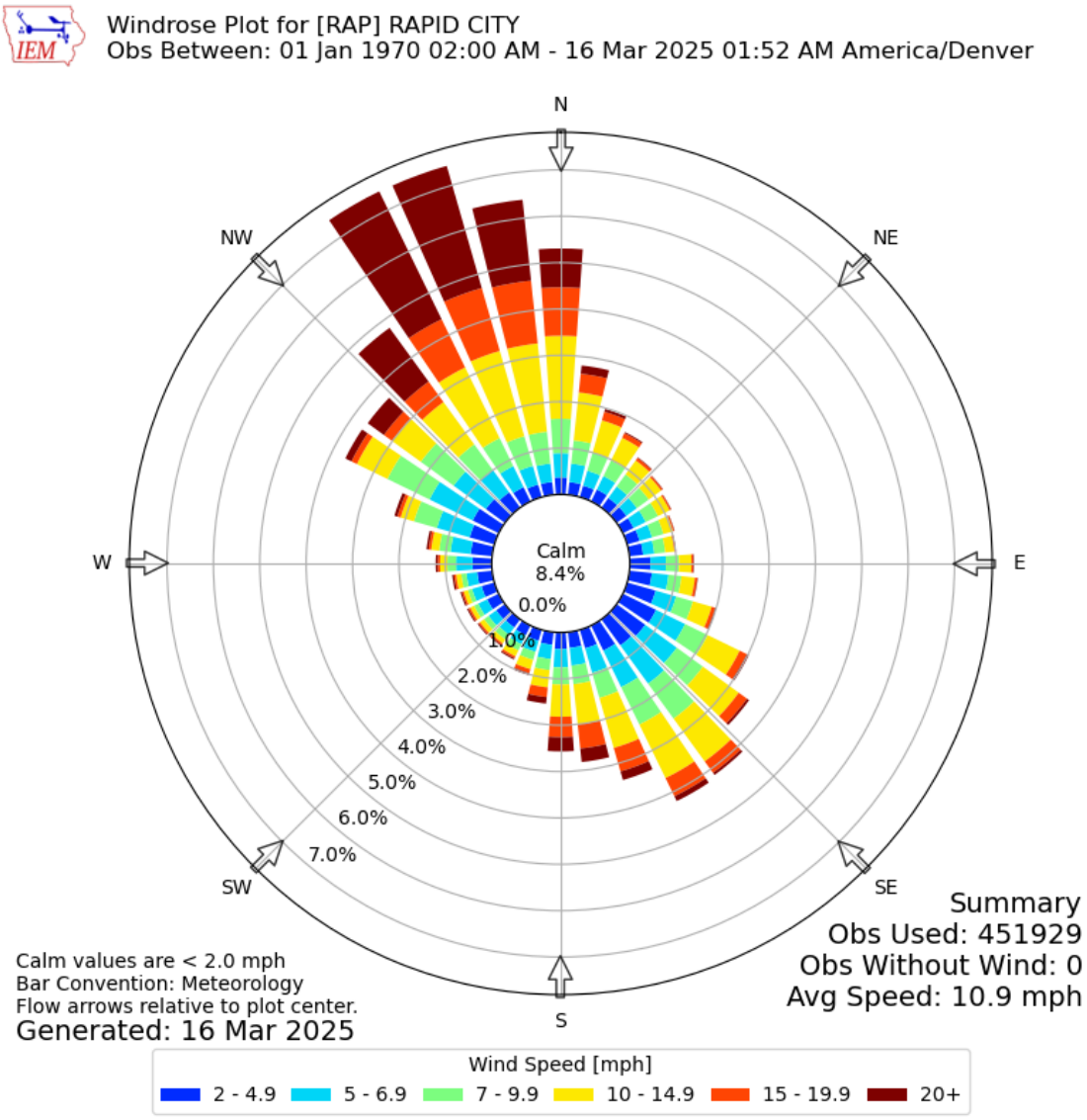
The Credit Union Site was setup in 2003, and the parameters included PM_{10}, $PM_{2.5}$ and ozone. In 2006, a screening model indicated the Credit Union Site was located within the 1 microgram footprint for nitrogen dioxide from industries in the quarry area. There was a high potential that ozone levels were biased 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 a continuous PM_{10} monitor, a continuous $PM_{2.5}$ monitor, a sulfur dioxide analyzer and a nitrogen dioxide analyzer.

4.3.1.1 Meteorological Data Evaluation

For all the Rapid City area sites, the Rapid City (RAP) station located on the airport on the southwest side of the city was used. The data collected from 1973 to 2025 was used for the wind rose. Predominate wind directions are out of the north-northwest with the predominate wind speeds in the 20+ mph category and the southeast with predominate wind speeds in the 10-15 mph category as indicated by the graph in Figure 4-6. The use of the Rapid City Airport data can be compared 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



4.3.1.2 PM_{10} Evaluation

PM_{10} levels at the Credit Union Site have been collected since 2003. The trend for the PM_{10} annual average during the past 5-years shows increasing concentrations. Concentrations of PM_{10} exceed the 24-hour standard 13 times at this site in the 5-year review period. All but three of these days were flagged with either high winds or smoke. The current PM_{10} 24-Hour concentrations expected exceedance level is 2.7. The flagged events in AQS the department believes fit under the definition of exceptional events. If needed, the department will develop an exceptional events package for these events and submit it to EPA for its concurrence. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.3.1.3 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the Credit Union Site have been collected since 2003. The trend for the $PM_{2.5}$ annual standard during the past 5-years shows steady concentrations. The current $PM_{2.5}$ annual design value is 7.4 ug/m3 or 82% of the annual standard and is the second highest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site eleven times in the 5-year review period. All of the exceedances were attributed to wildfires. The current $PM_{2.5}$ 24-hour design value is 25 ug/m3 or 71% of the 24-hour standard and is the highest in the state. The site is attaining the annual and 24-hour standards.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.3.1.4 Sulfur Dioxide Evaluation

Sulfur Dioxide levels at the Credit Union Site have been collected since 2011. The trend for yearly 99^{th} percentile, 1-hour concentrations during the past 5-years shows steady concentrations. Concentrations of sulfur dioxide did not exceed 1-hour standard in the five-year review period. The current sulfur dioxide 1-hour design value is 4 ppb or 5% of the standard and is the highest value in the state. This site is attaining the standard.

Testing for this parameter is meeting the goals of high concentration and population and will continue at the site.

4.3.1.5 Nitrogen Dioxide Evaluation

Nitrogen dioxide levels at the Credit Union Site have been collected since 2011. The trend for nitrogen dioxide annual average during the past 5-years shows decreasing concentrations. Concentrations of nitrogen dioxide did not exceed 1-hour standard in the five-year review period. The current nitrogen dioxide 1-hour design value is 30 ppb or

30% of the standard and is the lowest value in the state. This site is attaining annual and 1-hour standards.

Testing for this parameter is meeting the goals of background and population and will continue at the site.

4.3.2 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 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 2008, an ozone analyzer was added to the site. Meteorological data is also collected and can 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 4-7.

Table 4-7 Black Hawk Site Details

Location	Black Hawk
County	Meade County
AQS #	46-093-0001
Parameter	**PM_{10}**
Goals	Population/Background
Sampling Schedule	Every Day
Parameter	**Ozone**
Goals	Population/Background
Sampling Schedule	Every Day
Parameter	**Meteorological**
Goals	Population/Background
Sampling Schedule	Every Day

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.

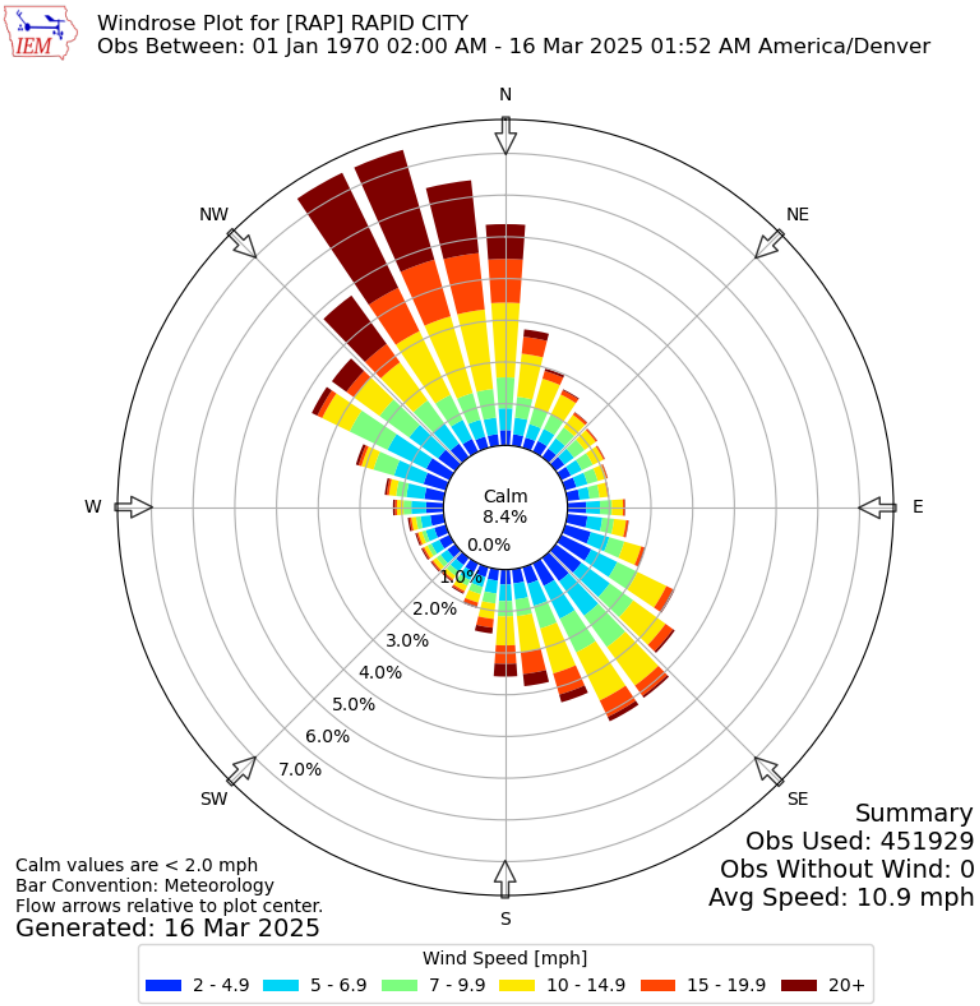
About a mile to the south of the site is the start of current and future locations of the limestone quarry businesses of Pete Lien and Sons, GCC Dacotah, and Hills Material.

The site 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.

4.3.2.1 Meteorological Data Evaluation

The Rapid City Airport data from the previous 5-year assessment was used for the wind rose. The meteorological data collected on site shows the predominate wind directions are north-northwest in the 20+ mph range and southeast in the 10-15 mph range. See the graph in Figure 4-7 for more information on the wind direction and wind speed data.

Figure 4-7 Wind Rose for the Black Hawk Site



4.3.2.2 PM_{10} Evaluation

PM_{10} levels at the Black Hawk Site have been collected since 2000. The trend for the PM_{10} annual average during the past 5-years shows decreasing concentrations. Concentrations of PM_{10} exceeded the 24-hour standard at this site one time in the 5-year review period. That day was flagged with smoke in the area. The current PM_{10} 24-Hour Concentrations expected exceedance level is zero. This site is as attaining the standard.

Testing for this parameter is meeting the goals of background and population and will continue at the site.

4.3.2.3 Ozone Evaluation

Ozone levels at the Black Hawk Site have been collected since 2008. The trend for ozone 8-hour daily maximum concentrations during the past 5-years shows increasing concentrations. Concentrations of ozone exceeded the 8-hour daily maximum concentration 13 times in the five-year review. All these days were flagged as having smoke in the area. The current ozone 8-hour design value is 0..068 ppm or 97% of the standard and is the third highest in the state.

Testing for this parameter is meeting the goals of background and population and will continue at the site.

4.4 Rural Background and Transport Sites (Badlands, Wind Cave, and Pierre 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 activities in Colorado, Wyoming, North Dakota, 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.

The Pierre site is in the center of the state. The sampling goal for this site was to test a new area of the state with no past $PM_{2.5}$ monitoring.

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 4-8.

Table 4-8 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
Parameter	**$PM_{2.5}$**
Goals	Background/Transport
Sampling Schedule	Every Day
Parameter	**Ozone**
Goals	Background/Transport
Sampling Schedule	Every Day

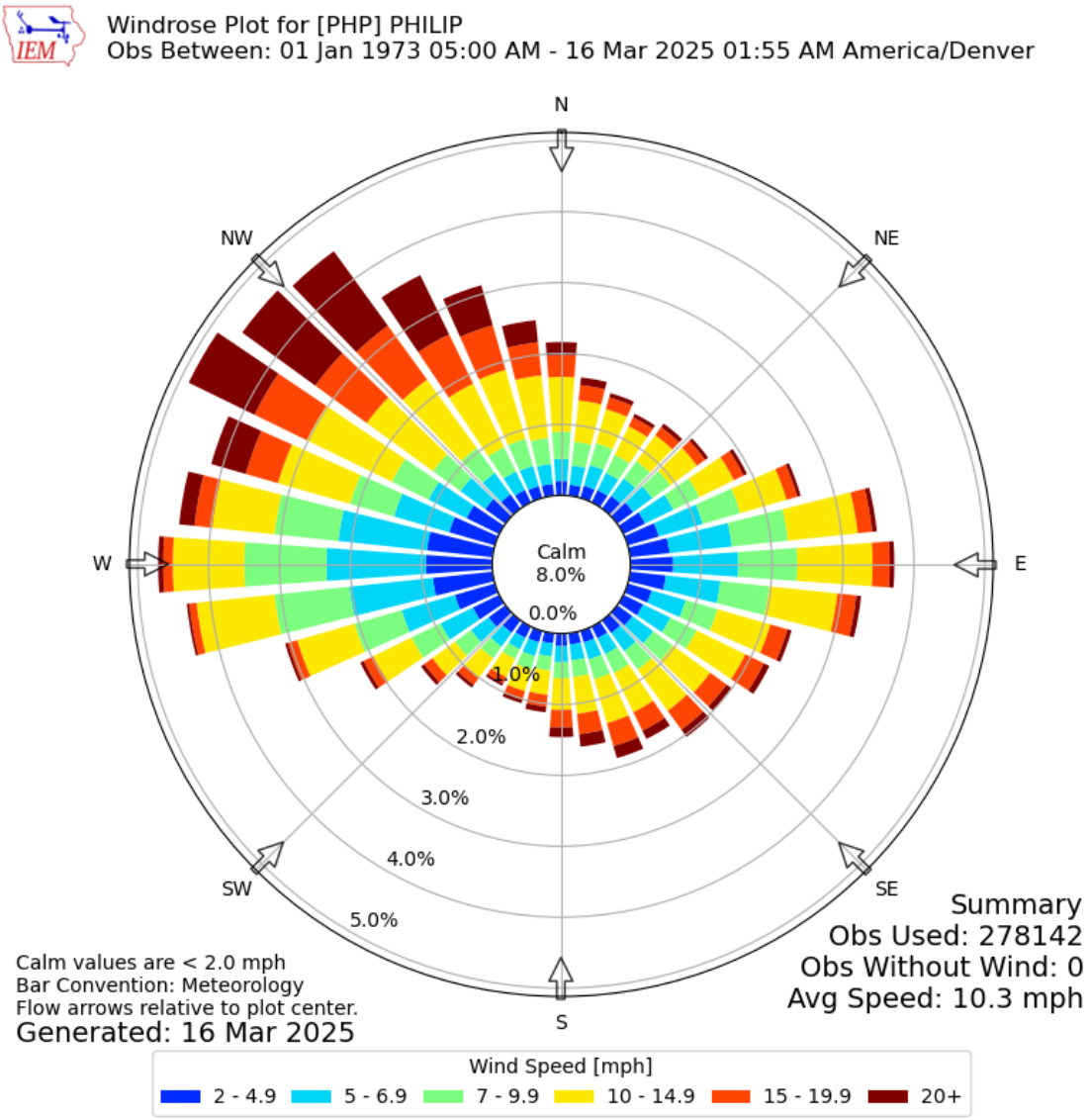
The main industries are farming, ranching, and tourism. The area is sparsely populated with about 3,344 people in an 1,869 square mile county. Tourism brings in more than a million people each year, visiting mainly in the months from May through September.

The Badlands Site was setup in 1987, with an IMPROVE monitor operated by the National Park Service. In 2000, DANR 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 DANR 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, DANR took over the operation of the ozone analyzer from the National Park Service. In 2009, DANR replaced the continuous $PM_{2.5}$ monitor with no designation with a Met One BAM federal equivalent method continuous $PM_{2.5}$ monitor. In early 2023 the sulfur dioxide and nitrogen dioxide analyzers were removed from the site. Currently, continuous PM_{10} and $PM_{2.5}$ and a continuous gas analyzer for ozone, provide hourly data to the DANR's data base and website.

4.4.1.1 Meteorological Evaluation

For this site, the Philip (PHP) station located about 23 miles to the north of the site was used. The data collected from 1973 to 2025 was used for the wind rose. 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 east. The Badlands wall influence on the wind direction is indicated by the wind rose graph in Figure 4-8.

Figure 4-8 Wind Rose Badlands Site



4.4.1.2 PM_{10} Evaluation

PM_{10} levels at the Badlands Site have been collected since 2000. The trend for the PM_{10} annual average during the past 5-years shows decreasing concentrations. Concentrations of PM_{10} exceeded the 24-hour standard twice at this site in the 5-year review period. Both days have been flagged with smoke in the area. The current PM_{10} 24-Hour Concentrations expected exceedance level is 0.3. This site is attaining the standard.

Testing for this parameter is meeting the goals of background and transport and will continue at the site.

4.4.1.3 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the Badlands Site have been collected since 2000. The trend for the $PM_{2.5}$ annual standard during the past 5-years shows increasing concentrations. The current $PM_{2.5}$ annual design value is 6.0 ug/m3 or 67% of the annual standard and is the fourth highest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site nine times (associated with wildfires) in the 5-year review period. The current $PM_{2.5}$ 24-hour design value is 23 ug/m3 or 66% of the 24-hour standard. The 2024 $PM_{2.5}$ 24-hour design value the third highest in the state. The site is attaining the annual and 24-hour standards.

Testing for this parameter is meeting the goals of background and transport and will continue at the site.

4.4.1.4 Ozone Evaluation

Ozone levels at the Badlands Site have been collected since 2008. The trend for ozone 8-hour daily maximum concentrations during the past 5-years shows increasing concentrations. Concentrations of ozone exceeded the 8-hour daily maximum concentration eight times during this evaluation period (all flagged as fire related). The current ozone 8-hour design value is 0.069 ppm or 99% of the standard and is tied with the SF-USD site for the highest value in the state.

Testing for this parameter is meeting the goals of background and transport and will continue at the site.

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 4-9.

Table 4-9 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

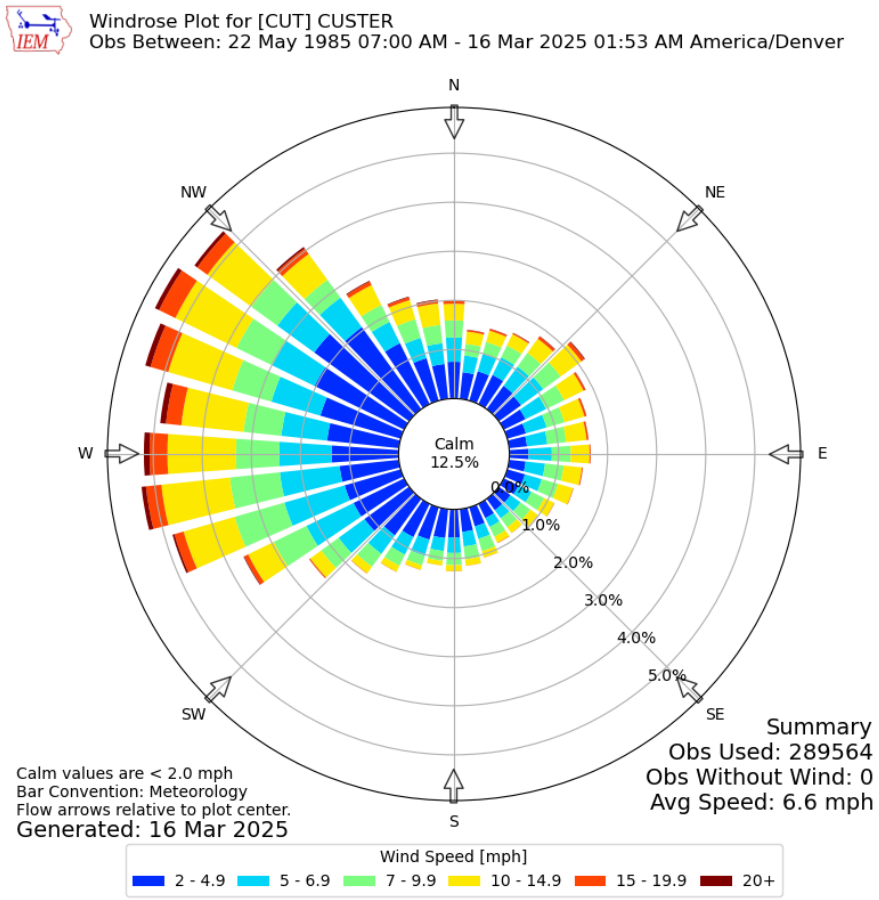
Sampling Schedule	Every Day
Parameter	**Ozone**
Goals	Background/Transport
Sampling Schedule	Every Day

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. At the end of 2010, the manual $PM_{2.5}$ monitor and the sulfur dioxide and nitrogen dioxide analyzers were removed.

4.4.2.1 Meteorological Data Evaluation

For this site, the Custer (CUT) station located southwest of the city was used. The data collected from 1985 to 2025 was used for the wind rose. Predominate wind directions are out of the west-southwest to northwest and the predominate wind speeds are in the 2-5 mph category as indicated by the graph in Figure 4-9.

Figure 4-9 Wind Rose for Wind Cave Site



4.4.2.2 PM_{10} Evaluation

PM_{10} levels at the Wind Cave Site have been collected since 2005. The trend for the PM_{10} annual average during the past 5-years shows decreasing concentrations. Concentrations of PM_{10} exceeded the 24-hour standard twice at this site in the 5-year review period. One of these days was flagged for smoke in the area. The current PM_{10} 24-Hour Concentrations expected exceedance level is zero. This site is attaining the standard.

Testing for this parameter is meeting the goals of background and transport and will continue at the site.

4.4.2.3 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the Wind Cave Site have been collected since 2005. The trend for the $PM_{2.5}$ annual standard during the past 5-years shows increasing concentrations. The current $PM_{2.5}$ annual design value is 5.2 ug/m3 or 58% of the annual standard and is the second lowest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site eleven times (associated with wildfires) in the 5-year review period. The current $PM_{2.5}$ 24-hour design value is 18 ug/m3 or 51% of the 24-hour standard and is tied with the Pierre site for third lowest in the state. The site is attaining the annual and 24-hour standards.

Testing for this parameter is meeting the goals of background and transport and will continue at the site.

4.4.2.4 Ozone Evaluation

Ozone levels at the Wind Cave Site have been collected since 2005. The trend for ozone 8-hour daily maximum concentrations during the past 5-years shows increasing concentrations. Concentrations of ozone exceeded the 8-hour daily maximum concentration ten times in the five-year review period. The current ozone 8-hour design value is 0.067 ppm or 96% of the standard and is the fourth highest in the state.

Testing for this parameter is meeting the goals of background and transport and will continue at the site.

4.4.3 Pierre Airport Site

At the beginning of 2015, a new monitoring site was set up in Pierre. The site is located at the Pierre Regional Airport Industrial Park in northeast Pierre. The sampling goal for the new site was to test a new area of the state with no past $PM_{2.5}$ monitoring. Pierre is the capital city of South Dakota. It is in the center of the state along the rough river bluffs overlooking the Missouri River. Pierre has a relatively dry, four-season climate with long, dry, cold winters, hot summers and brief spring and autumn transitions. See the general information about the site in Table 4-10.

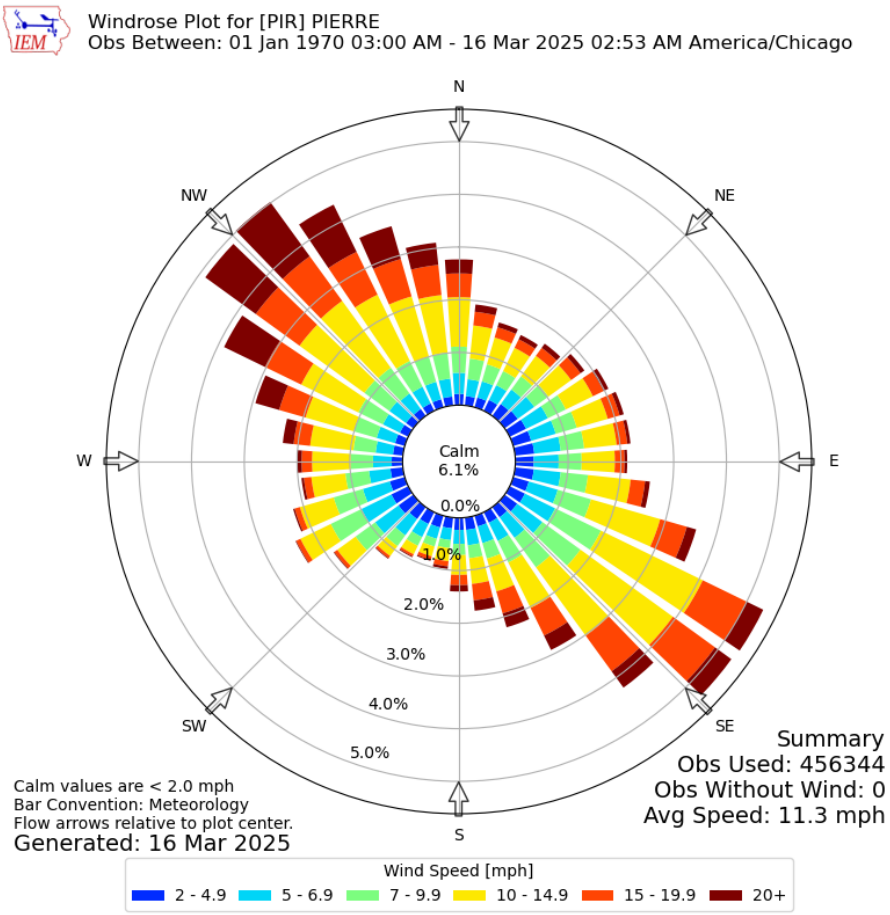
Table 4-10 Pierre Airport Site Details

Location	Pierre Airport
County	Hughes County
AQS #	46-065-0003
Parameter	**$PM_{2.5}$**
Goals	Background/Transport
Sampling Schedule	Every Day

4.4.3.1 Meteorological Data Evaluation

For this site, the Pierre (PIR) station located at the Pierre airport northeast of the city was used. The data collected from 1970 to 2025 was used for the wind rose. Predominate wind directions are out of the northwest and east-southeast to southeast and the predominate wind speeds are in the 10-15 mph category as indicated by the graph in Figure 4-10.

Figure 4-10 Wind Rose for Pierre Site



4.4.3.2 $PM_{2.5}$ Evaluation

$PM_{2.5}$ levels at the Pierre Site have been collected since 2015. The trend for the $PM_{2.5}$ annual standard during the past 5-years shows decreasing concentrations. The current $PM_{2.5}$ annual design value is 3.1 ug/m3 or 34% of the annual standard and is the lowest in the state. Concentrations of $PM_{2.5}$ exceeded the 24-hour standard at this site nine times (associated with wildfires) in the 5-year review. The current $PM_{2.5}$ 24-hour design value is 18 ug/m3 or 51% of the 24-hour standard and is the lowest in the state. The site is attaining the annual and 24-hour standards.

Testing for this parameter is meeting the goals of background and transport and will continue at the site.

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.

   DANR accomplishes this objective by providing hourly concentration data to the DANR's website for the Air Quality Program. The data on this website includes hourly data for PM_{10}, $PM_{2.5}$, ozone, sulfur dioxide, nitrogen dioxide, and carbon monoxide. Since 2020, all sites have continuous monitors and are reporting to this website. 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 is provided to the public through the DANR's website at: http://DANR.sd.gov/des/aq/aarealtime.aspx . PM_{10}, $PM_{2.5}$, and ozone data is also reported to the AirNow site to provide health and air quality information for the nation at: https://www.airnow.gov.

2. Support compliance with ambient air quality standards and emissions strategy development.

   DANR 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.

   DANR 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 DANR on May 1 of each year.

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 completed by July 1 of each year. See the following webpage for annual plans: https://DANR.sd.gov/des/aq/monitoring/state-mo.aspx .

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 5.4 of the South Dakota Ambient Air Monitoring Plan for 2025.

5.4 Appendix E - Probe and Monitor Path Siting Criteria

EPA conducted two Technical Systems Audits on the South Dakota air monitoring network one in 2021 at the six east river sites and one in 2024 at the Pierre Airport site and the five west river sites. 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. DANR does report hourly data and the Air Quality Index (AQI) for PM_{10}, $PM_{2.5}$, ozone, sulfur dioxide, nitrogen dioxide, and carbon monoxide through the DANR's website at: http://danr.sd.gov/des/aq/aarealtime.aspx. PM_{10}, $PM_{2.5}$, and ozone data is also reported to the AirNow site to provide AQI health and air quality information for the nation at: https://www.airnow.gov.

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. Adjustments were made to the air monitoring network in South Dakota during this assessment period.

One of the goals for the monitoring network was 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. At the end of 2019, the Rapid City Library Site was closed, and the Aberdeen Fire Station Site was closed and replaced with continuous monitoring at the new Aberdeen Bus Stop Site for 2020. This leaves only manual $PM_{2.5}$ monitors at the NCore site in Sioux Falls.

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.

$PM_{2.5}$ sampling will continue to be a priority in 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 related to long range transport from ag fires from locations south and east of the state. Wildfires from the west and Canada also contributed to high readings during this assessment.

Ozone will continue to be a priority in the state to help characterize changes in concentration levels caused by long range transport, and wildfires. 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. 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 includes 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.

There currently have been hints of reduced federal and state funding. Budget reductions in the future may cause a need to re-evaluate some of the monitoring sites during the next 5-year assessment period.