South Dakota
Ambient Air Monitoring
Annual Network Plan
2008

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Executive Summary

The department conducts a review of the ambient air monitoring network each year as required by 40 CFR Part 58. The review completed through the 2007 calendar year finds the state's air quality better than the EPA National Ambient Air Quality Standards statewide. Modifications to the state's air monitoring network are being proposed to adjust the sampling sites to meet the changing needs of the state.

The annual plan is published in the department's air quality website so adjustments can be made to meet the needs of the general public. The ambient air monitoring annual plan includes the following major sections:

1. Air monitoring goals, plans and needs are in Sections 3.0 to 5.0;

2. Evaluation of collected data compared to the National Ambient Air Quality Standards is in Section 6.0;

3. Determination of air pollution trends, changes in emission trends are in Sections 7.0 to 9.0; and

4. Proposed modifications to the ambient air quality network of sites to meet the changing trends and national requirements are in Section 11.0.

The modifications being proposed for incorporation into the annual plan include:

1. Three new air quality monitoring sites that will be located around the proposed Hyperion Energy Center in Union County to collect data for background before the project begins, during the construction phase of the facility, and continued sampling during the operation of the facility;

2. Replace old equipment with new because of operation failure and allowing the collection of larger number of samples at a lower annual operation cost;

3. Continue to develop the Sioux Falls NCore site as required by 40 CFR Part 58; and

4. Cost saving measures to reduce sampling frequency and quality assurance checks as allowed in 40 CFR Part 58. The reductions will shift resources from sites with low potential for air pollution problems to the new air monitoring sites being planned.

1.0 INTRODUCTION

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

The department is required to public notice the annual monitoring network plan for 30 days prior to submitting the plan to EPA. The department will comply with this requirement by posting this document on the department's Air Quality Program website page under the "AQ News" for 30 days. All comments received by the department during this 30 day period will be addressed by the department and the appropriate changes will be incorporated in the plan. The final plan, public comments, and the department's responses will be submitted to EPA for comments and approval.

2.0 AIR QUALITY PROGRAM MONITORING HISTORY

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

In 1985, the state set up the first samplers to test for levels of particulate matter 10 microns in diameter or less (PM10) in anticipation of EPA adopting a PM10 National Ambient Air Quality Standard. In 1987, the total suspended particulate (TSP) standard was replaced with the new PM10 standard. South Dakota submitted a revised ambient air monitoring network plan to include sampling sites for the new PM10 standard and shutdown the TSP monitoring network in 1987.

A new standard was added by EPA for particulate matter 2.5 microns in diameter or less (PM2.5) in 1997. South Dakota submitted a revised ambient air monitoring network plan to include sampling sites for the new PM2.5 standard. In 1999, PM2.5 samplers were added to the ambient air monitoring network to determine compliance with the new standard.

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

In 2006, EPA revised the PM2.5 standard significantly by reducing the 24-hour standard from 65 to 35 micrograms per cubic meter. South Dakota submitted an attainment designation to EPA on December 11, 2007, designating each county as attaining the new PM2.5 standard.

In 2007, EPA revised the ozone standard and significantly reduced the standard from 0.08 to 0.075 parts per million. A fourth ozone monitoring site was operated by the National Park Service at the Badlands National Park in 2007. At the beginning of 2008, the state took over the operation of the ozone monitor from the National Park Service. South Dakota is attaining the new standard and will be submitting a designation package to EPA by March of 2009.

Data collected from the ambient air monitoring network is entered into the federal database called the Air Quality System (AQS). Information in this database is available to anyone registered with EPA. If an individual is interested in reviewing the data they may register with EPA at the following site: http://www.epa.gov/ttn/airs/airsaqs/aqsweb/aqswebhome.htm.

3.0 AIR MONITORING GOALS AND USES OF DATA

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

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

4.0 AIR MONITORING PLAN IN 2008

In calendar year 2007, the ambient air monitoring network included 16 air monitoring sites. Air monitoring site files are maintained in the department's Pierre office for the SLAMS and SPMS sites. Figure 4-1 shows a map of the cities with air monitoring sites. The monitoring site files are available for public review during normal working hours from 8:00 AM to 5:00 PM each workday. The monitoring site files contain at a minimum the following information for each site:

- AQS site identification form;
- Sampling location;
- Sampling and analysis method;
- Operating schedule;
- Monitoring objective and spatial scale;
- Beginning date of operation; and
- Site maps.

4.1 State Local Air Monitoring Sites (SLAMS)

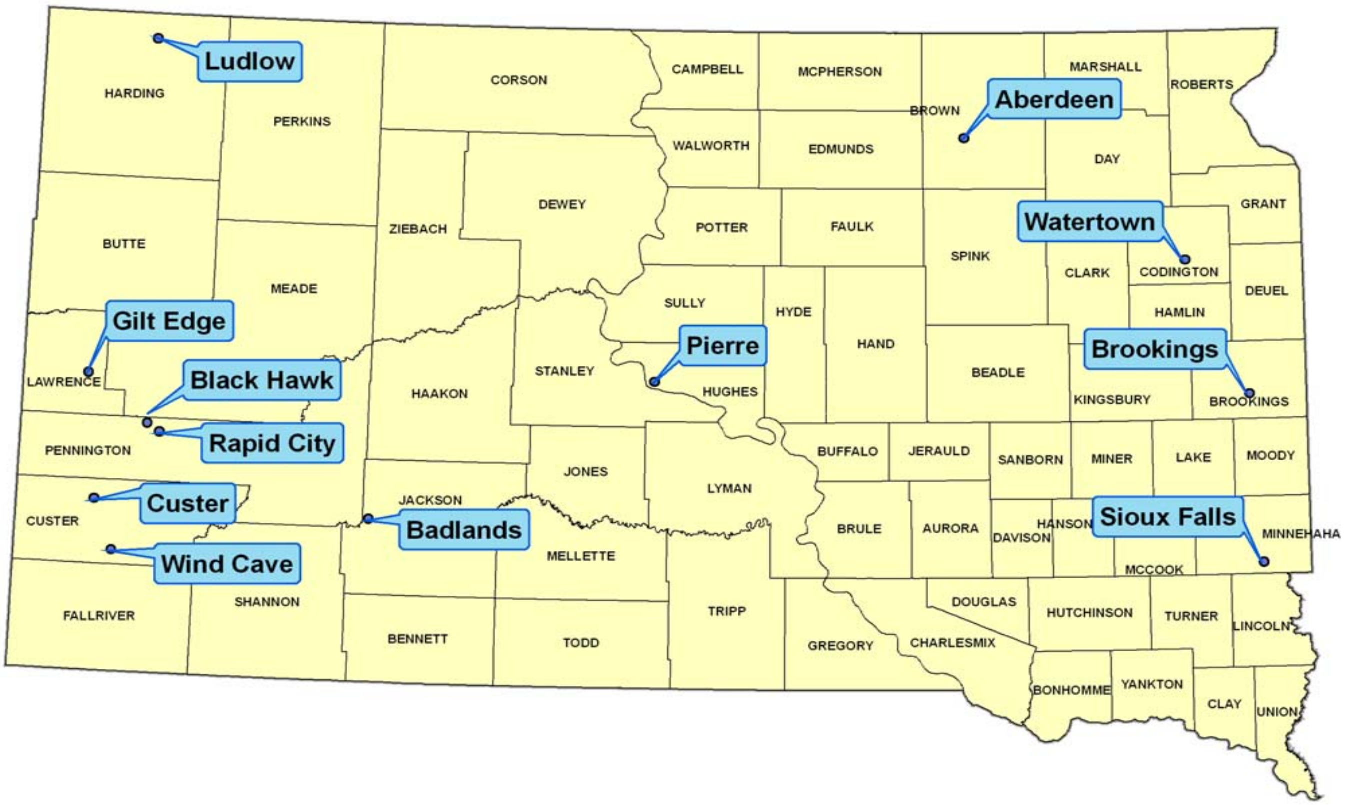
SLAMS means State or Local Air Monitoring Stations and are air monitoring sites selected by the state and local air programs. Data from SLAMS air monitoring stations are used to determine compliance with the NAAQS. In 2007, 11 of the networks air monitoring sites were SLAMS sites for at least one air pollutant. These sites collected PM10 data at all 11 sites, PM2.5 data at nine sites, and sulfur dioxide, nitrogen dioxide, and ozone (ground level) at three sites.

4.2 Special Purpose Monitoring (SPM)

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

- Weather stations at the Black Hawk and Hilltop sites;
- Gilt Edge site operates a weather station in support of a Superfund cleanup action;
- Continuous PM2.5 monitors were operated at the Badlands, Wind Cave, and Credit Union sites;
- A PM2.5 speciation monitor is operated at the KELO site; and
- National Guard site is a SPM site to help define the extent of the PM10 high concentration area in western Rapid City
- One year study in Ludlow and Pierre, South Dakota collecting total suspended particulate to be analyzed for uranium levels.

Figure 4-1 – South Dakota Air Monitoring Sites



4.3 Air Toxics Monitoring Sites

As part of a national research project, air monitors testing for pollutants classified as air toxics are being operated at the Hilltop site in Sioux Falls and the Sports Complex site in Custer. Sampling started for air toxics in 2000, at the Hilltop site because the city of Sioux Falls has the largest population in South Dakota.

In 2002, a second air toxics site was established in Custer. This location was established because EPA's modeling estimates of air toxic emissions showed that Custer County had the potential for some parameters to be the highest readings in the state. The city of Custer is the largest city in Custer County. In March 2008, five years of sampling data was completed at this site.

The air toxic data is reported to the AQS database by the EPA contractor so it can be compared with other national sites and provide baseline levels for South Dakota and used in health studies. Currently, the data collected between 2000 and 2006 have been added by the EPA contractor into the AQS database. If an individual is interested in reviewing the data they may register with EPA at: http://www.epa.gov/ttn/airs/airsaqs/aqsweb/aqswebhome.htm.

4.4 Prevention of Significant Deterioration (PSD) Monitoring Sites

One Prevention of Significant Deterioration monitoring site was started in the state in 2007. The Basin NextGen site located near Gettysburg, South Dakota, started operation in April of 2007, and was established by Basin Electric Power Cooperative. The project ran until the end of June 2008, and will determine background levels for PM10, PM2.5, sulfur dioxide, nitrogen dioxide, and ozone. Meteorological readings were collected on a 30 meter tower. Basin Electric Power Cooperative is using the information in their application for a proposed coal-fired electric power plant to be built in that general area.

In 2008, a Prevention of Significant Deterioration monitoring project will start as a cooperative project between the Brookings 3M Company, VeraSun Energy, and the department. The project will include one site testing for ozone as post construction monitoring permit requirement for both facilities in Brookings County. In addition, the department will add manual PM2.5 monitors to determine rural background concentrations for the eastern part of the state.

4.5 IMPROVE Network

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

4.6 Environmental Radiation Ambient Monitoring System (ERAMS)

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

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

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

The radiation data collected at this site may be reviewed at:
http://oaspub.epa.gov/enviro/erams_query.simple_query.

4.7 NCore Multi Pollutant Site

Each state's monitoring network will be required to have at least one NCore monitoring site to be established by 2011. The NCore site will collect data for trace level sulfur dioxide (SO_2), trace level nitrogen oxide (NOx), all reactive oxides of nitrogen (NOy), carbon monoxide (CO), ozone (O_3), PM2.5 continuous and filter based monitors, PMcoarse mass and speciated, PM2.5 speciated and meteorological parameters of wind speed, wind direction, relative humidity, and ambient temperature.

The development of the NCore site in South Dakota was to be located at the Sioux Falls Hilltop site. Because this site location was lost due to ownership change the NCore site will be located at the replacement location on the School for the Deaf campus in Sioux Falls, which is identified as the SD School site. This site meets the location requirements to be in an urban residential area. Sioux Falls is also the largest city in the state and is a fast growing community.

The department is currently beginning the process of equipment selection and training to operate the monitors required at this site. The SD School site was setup at the beginning of 2008. The site currently has monitors collecting data for PM10 continuous, PM2.5 manual every third day, ozone continuous, trace level sulfur dioxide, and nitrogen dioxide. A meteorological station collects data for wind speed, wind direction, relative humidity, and ambient temperature.

5.0 MONITORING NEEDS

5.1 Monitoring Largest Populations

South Dakota's industrial base and population centers are typical of many of the northern plains states. The largest industry in the state is agriculture. Most of the other industries are located in several localized areas. The industries in these locations are typically small (less than 50 employees) and generally do not produce large quantities of air pollutants.

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

Table 5-1 – 10 Largest Cities in South Dakota

Ranking	City Name	Population
1	Sioux Falls	123,975
2	Rapid City	59,607
3	Aberdeen	24,658
4	Watertown	20,237
5	Brookings	18,504
6	Mitchell	14,558
7	Pierre	13,876
8	Yankton	13,528
9	Huron	11,893
10	Vermillion	9,765

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

5.2 Real Time Data

Air monitoring goals have shifted to the collection of data using continuous air monitoring samplers and providing the data as quickly as possible for the public to use. Continuous samplers provide more data at lower operational cost, which is necessary as EPA continuous to expand ambient air monitoring programs for the same amount of money or less. In many cases the continuous emission monitoring can be accessed by telephone and uploaded to a website for public use. The public can then use this data to determine if they need to take extra precautions when doing outdoor activities. The real time information is used to monitor PM10 and PM2.5 concentrations when high wind dust alerts are forecasted in Rapid City and is provided to the public on South Dakota's website at:

http://www.state.sd.us/denr/DES/AirQuality/NEAP/neaphome.htm.

In 2007, data uploaded from the PM2.5, and ozone monitors at Wind Cave Site and ozone monitor in Sioux Falls Hilltop Site were reporting hourly data to the EPA AirNow website. EPA's AirNow site is located at:

http://www.airnow.gov/

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

5.3 Class I Areas

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

Monitors were placed in these areas in order to determine background levels and the impact of long range transport of air pollutants like particulate matter, ozone, sulfur dioxide and nitrogen dioxide. In addition, continuous data is needed for modeling purposes to help in determining air quality permit requirements. The National Park sites collect data from IMPROVE monitors for PM10, PM2.5, and chemical analysis of the collected particulates. In October of 2004, the department established a new monitoring site at Wind Cave National Park to collect PM10, PM2.5, sulfur dioxide, nitrogen dioxide, and ozone data and added sulfur dioxide and nitrogen dioxide analyzers at the Badlands site.

5.4 New Ozone Standards

Ozone levels in the nation are affecting larger areas. In some cases, because of long range transport of air pollution, rural ozone levels are sometimes higher than levels in large cities. This is a serious problem for states in the eastern half of the nation in meeting the ozone standard and beginning to be a problem in the western half of the nation. National modeling efforts show there is potential for having ozone concentrations near the standard in the east and southeastern parts of the state. Therefore, there is a need to monitor for ozone to determine if modeling results are accurate and to determine if the population is being exposed to high ozone levels.

There is a significant increase in the production of ethanol from corn in South Dakota. As more plants are built and existing plants are increased in size, the amount of volatile organic compound emissions are on the increase in rural areas. This may have an affect on the ozone levels in the state and may require more monitoring locations to show attainment status and trends.

5.5 Metropolitan Statistical Areas

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

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

   http://www.state.sd.us/denr/DES/AirQuality/aarealtime.htm.

   The data includes hourly data from the metropolitan statistical areas in Sioux Falls and Rapid City. It also includes both national park sites of Wind Cave and Badlands. Specifically in the Rapid City area, High Wind Dust Alerts are called when meteorological conditions are forecasted that could cause high PM10 concentrations. This information along with a report graphing hourly concentrations recorded during the alert is also provided to the public through the department's website;

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

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

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

If there is no air monitoring data for the MSA, only the minimum number of sites listed the tables in Appendix D are required to be operated. If there has been a minimum of three years of air quality data for the MSA a design value can be calculated. If the MSA has a design value greater than 85% of the standard the required number of sampling sites continues to increase as the population increases. If the highest concentration site in a MSA has a design value less than 85% of the standard the required number of sites may be one or even zero depending on the design value and population of the MSA.

Table 5.1 shows that only Sioux Falls and Rapid City have population numbers large enough to be classified as a MSA in the state and to be evaluated under Appendix D. South Dakota MSA network development requirements as calculated using data through the 2007 sampling year are shown in Table 5-2.

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

- PM2.5 Speciation monitor at the Sioux Falls KELO site; the largest urban area in the state;
- PM2.5 background and transport monitors at Badlands and Wind Cave sites; and
- An NCore site is being developed in the city of Sioux Falls.

South Dakota is not required to have a Photochemical Assessment Monitoring Station.

Type and scale of each monitoring site is listed under the individual site discussions in Section 7.0 of this report.

Table 5-2 – 40 CFR Part 58, Appendix D Requirements for MSA

MSA and Site	MSA Population	Counties	Maximum Design Values	AQS ID	> NAAQS Criteria (Yes or No)	Minimum Sites Required
Sioux Falls						
KELO	123,975	Minnehaha Lincoln	**PM10** 24-hr - 57 **PM2.5** 24-hr - 23 Annual -10.2	46-099-0006	No – PM10 No – PM2.5	0 – PM10 0 – PM2.5
SD School			**PM10** 24-hr - 49 **PM2.5** 24-hr - 24 Annual – 9.6 **Ozone** 8-hr - 0.066	46-099-0008	No – PM10 No – PM2.5 Yes - Ozone > 85 %	0 – PM10 0 – PM2.5 1 – Ozone 1 - NCore
Rapid City						
National Guard	59,607	Pennington Meade	**PM10** 24-hr - 91	46-103-0013	No – PM10	0 – PM10 0 – PM2.5
Credit Union			**PM10** 24-hr - 125 **PM2.5** 24-hr -19 Annual - 8.8 **Ozone** 8-hr - 0.063	46-103-0020	No – PM10 No - PM2.5 No - Ozone	0 – PM10 0 – PM2.5 0 - Ozone
Library			**PM10** 24-hr - 43 **PM2.5** 24-hr - 16 Annual - 7.3	46-103-1001	No – PM10 No – PM2.5	0 – PM10 0 – PM2.5
Black Hawk			**PM10** 24-hr - 43	46-093-0001	No – PM2.5	0 – PM10

5.6 Future Monitoring

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

In March of 2008, the Hyperion Energy Company submitted a permit application to construct and operate an oil refinery in Union County located in the southeast part of the state. This proposed facility would be the largest manufacturing facility in the state. A monitoring proposal has been developed to establish three new monitoring sites to collect data before construction begins, during construction, and during the operation of the facility.

6.0 COMPLIANCE WITH NAAQS

6.1 Particulate Matter (PM10)

In 2007, the statewide PM10 monitoring network included 11 monitoring locations. Six of these sites recorded data using manual monitors and five sites have continuous monitors that provide hourly PM10 concentration levels. The main distribution of the PM10 air monitoring sites is located in South Dakota's two largest cities, Rapid City (three sites) and Sioux Falls (two sites). Other locations include sites operated in the Badlands and Wind Cave National Parks, Aberdeen, Watertown, Black Hawk, and Brookings.

Beginning in 2007, the PM10 standard consists of a 24-hour concentration. The maximum 24-hour average concentration allowed is 150 micrograms per cubic meter (ug/m^3). Attainment with the 24-hour standard is demonstrated when there is less than or equal to one expected exceedance per year averaged over three years. A concentration of 154.4 ug/m^3 is the highest level that would attain the 24-hour standard for PM10.

Table 6-1 contains a list of the 24-hour expected exceedance rates and the 24-hour design value concentration for each site through the end of 2007. Since the 24-hour standard allows for one expected exceedance per year, the 2nd highest maximum 24-hour concentration, helps determine how close a site is to exceeding the 24-hour standard. The design value is calculated by averaging the most current 3 year 2nd highest maximum 24-hour concentration for each site. By using the design value the concentration allows a comparison to how close a site is to the standard and the potential of the site to exceed the standard. Using the design value reduces the impact from an unusually high or low concentration in one year to the average.

Table 6-1 – Statewide PM10 24-Hour Concentrations in 2007

Site	Expected Exceedance Rate	Design Value	Attainment
Rapid City Library	0	44 ug/m^3	Yes
Rapid City National Guard	0	87 ug/m^3	Yes
Rapid City Credit Union	0.33	126 ug/m^3	Yes
Black Hawk	0	44 ug/m^3	Yes
Badlands	0	36 ug/m^3	Yes

Site	Expected Exceedance Rate	Design Value	Attainment
Sioux Falls KELO	0	48 ug/m^3	Yes
Sioux Falls Hilltop	0	49 ug/m^3	Yes
Brookings	0	59 ug/m^3	Yes
Aberdeen	0	49 ug/m^3	Yes
Watertown	0	73 ug/m^3	Yes
Wind Cave	0	43 ug/m^3	Yes

None of the air monitoring sites had 24-hour concentrations greater than the PM10 standard in 2007. The only concentration in the last three years greater than the 24-hour standard was recorded at the Rapid City Credit Union site in 2006, which resulted in an expected exceedance of 0.33.

In general, PM10 concentrations were slightly higher in the western part of the state and slightly lower in the eastern half of the state in 2007. This trend followed the rainfall patterns in the state with areas having periods of below to normal moisture levels in the eastern half of the state and continued multi-year drought in the western part of South Dakota. The drought in the western half of the state continues from the last seven years. The Rapid City Area continues to be the only location in South Dakota having issues with meeting the PM10 standard. However, work by the City, County, industry, and state agencies have reduced PM10 concentrations to levels that Rapid City was designated in attainment for PM10 on April 5, 2006. In addition the design value also reflects the reduction in PM10 concentrations as it is less than 85% of the 24-hour standard as calculated using the data between 2005 and 2007.

The Rapid City Credit Union site continues to record the highest 24-hour PM10 concentration in the state. The second highest 24-hour concentration was recorded at the Rapid City National Guard site. All the sites outside of the Rapid City Area have 24-hour concentrations less than 70% of the 24-hour standard.

With a significant number of sites that have maximum 24-hour concentrations less than 50% of the PM10 standard, this parameter and specifically the manual method sites will be reviewed further to determine if the frequency of monitoring can be reduced. Cuts in PM10 monitoring sites will be based on changing monitoring network needs, meeting new requirements by EPA, and/or federal funding level stagnation or reduction.

6.2 Particulate Matter (PM2.5)

In 2007, there were nine PM2.5 SLAMS sites operated in the state. Federal Reference Method (FRM) manual monitors were operated at all the PM2.5 sites. Continuous monitors with no method designation were also operated at the Credit Union, Badlands, and Wind Cave sites collecting hourly PM2.5 concentrations as special purpose monitoring sites.

In 2007, the highest 24-hour concentration from the manual monitors in the state was recorded at the Sioux Falls KELO site with a level of 31.6 ug/m^3 at 91% of the standard. The highest annual concentration in 2007 was also recorded at the KELO site at 9.6 ug/m^3 or 64% of the annual standard. PM2.5 concentrations were lower at all of the sites in the eastern half of the state.

The Rapid City Library site had concentrations that were slightly higher while the Credit Union site was slightly lower. Both the Badlands and Wind Cave background sites had slightly higher PM2.5 concentrations in 2007. The western half of the state had periods of heavy smoke during the summer months from wildfires in Idaho, Wyoming, and Montana. Numerous days in July and August had visible smoke in the air reducing visibility as far east as Pierre. These sources may have caused an increase in annual concentration levels.

The 24-hour standard concentration for PM2.5 is 35 ug/m^3. Attainment of the 24-hour standard is achieved when the maximum expected 24-hour average concentration, based on the annual 98th percentile averaged over three years, is less than or equal to 35 ug/m^3.

In general, concentrations of PM2.5 are the highest in the eastern third of the state. The highest 24-hour, 3-year, 98th percentile was recorded at the Sioux Falls KELO site with a concentration of 26 ug/m^3 or 74% of the standard. The Sioux Falls Hilltop and Watertown sites follow closely with only 3 ug/m^3 separating the three sites. As expected, the background locations at the Badlands and Wind Cave sites had the lowest calculated 24-hour PM2.5 concentrations. Figure 6-1 contains the expected 24-hour 98 percentile concentration for each PM2.5 monitoring site in the state.

The PM2.5 annual national standard is 15 ug/m^3. Attainment is demonstrated when the maximum expected annual arithmetic mean averaged over three consecutive years is equal to or less than 15 ug/m^3. As required by Section 58.30 of 40 CFR Part 58 the nine FRM PM2.5 sites meet the location requirements and all are suitable for comparison to the annual PM2.5 National Ambient Air Quality Standard. Figure 6-2 contains a graph of the expected annual averages for each of the PM2.5 sites in the state.

The expected annual average concentrations in 2007, followed about the same pattern as the 24-hour levels. The highest annual concentrations were collected in the eastern third of the state. The highest annual was recorded at the KELO site with a level of 10.0 ug/m^3. The second highest expected annual mean was recorded at the Watertown site. None of sites in the network exceeded the annual PM2.5 standard as of the end of 2007. The lowest PM2.5 expected annual average was recorded at the background sites at Badlands.

Figure 6-1 – PM2.5 Statewide 24-Hour, 98th Percentiles in 2007

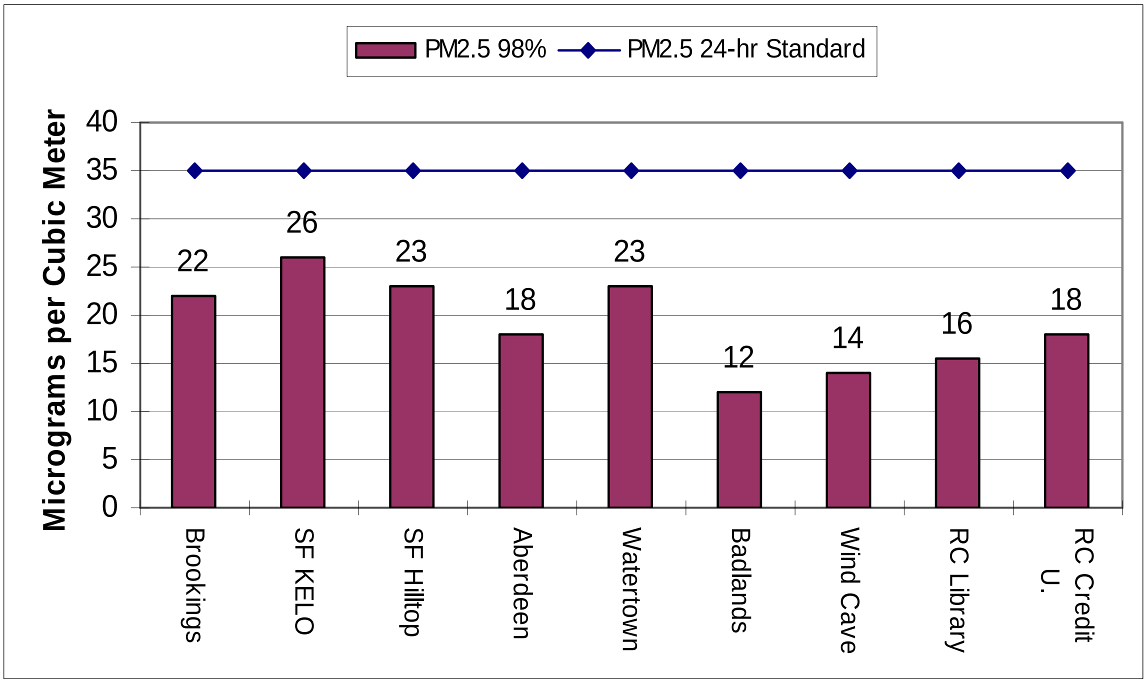
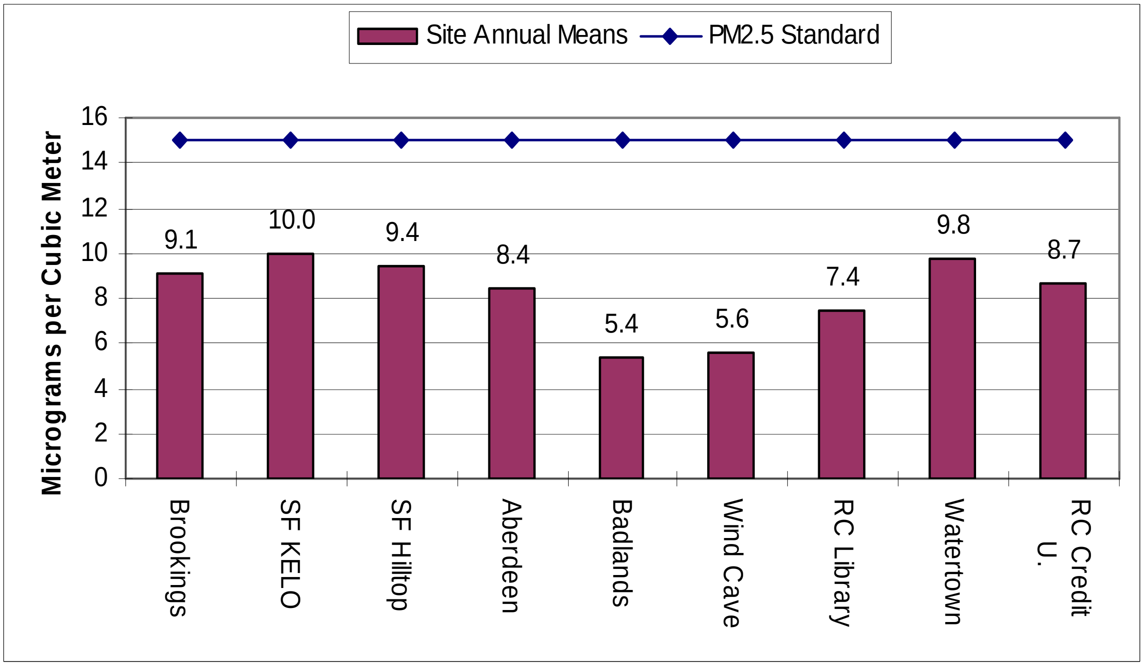


Figure 6-2 – PM2.5 Statewide 3-Year Annual Averages for 2007



6.3 Lead

During the early 1980's, the department conducted lead sampling. The levels detected were well below the NAAQS levels. After passage of the 1990 Clean Air Act Amendments, there were concerns with the way EPA had instructed states in determining if those areas were in attainment of the lead standard. For this reason, a monitoring site was established in April 1992, at the Jaehn's site in Rapid City to determine compliance with the standard again. This site was down wind of GCC Dacotah, which is a cement plant and has the potential to emit lead.

The results of the analyzed data from the second quarter of 1992 through the first quarter of 1994 showed lead levels well below the current NAAQS. Due to the low concentrations of lead in Rapid City, the sampling site was terminated at the end of the first quarter in 1994.

In the past, the largest source of lead pollution in South Dakota was vehicle emissions because of lead in the fuel. Since the lead content of fuel was reduced, levels of lead nationwide have dropped.

EPA published proposed changes to the lead standard in May of 2008. The proposed changes would significantly lower the standard and may require ambient testing in locations that have sources of lead emissions. It is anticipated that no changes in the air monitoring network will be needed for lead testing until 2010. Point source emissions of lead are low in South Dakota so any sampling goals should be to show attainment, establish background, and compare the results to earlier sampling to determine if lead concentrations in South Dakota dropped after lead concentrations in gasoline were reduced.

6.4 Ozone

In 1999, the first ozone monitor was setup in South Dakota and was located at the Sioux Falls Hilltop site. In 2000, a second ozone monitor was added at the Robbinsdale site in Rapid City. In 2003, the Rapid City ozone monitor was moved to the Credit Union Site because of the planned removal of the Robbinsdale sampling shelter to be used at the Wind Cave Site. Also in 2003, the National Parks Service added an ozone monitor to the Badlands National Park. It is located in a shelter next to the IMPROVE monitors near the park headquarters.

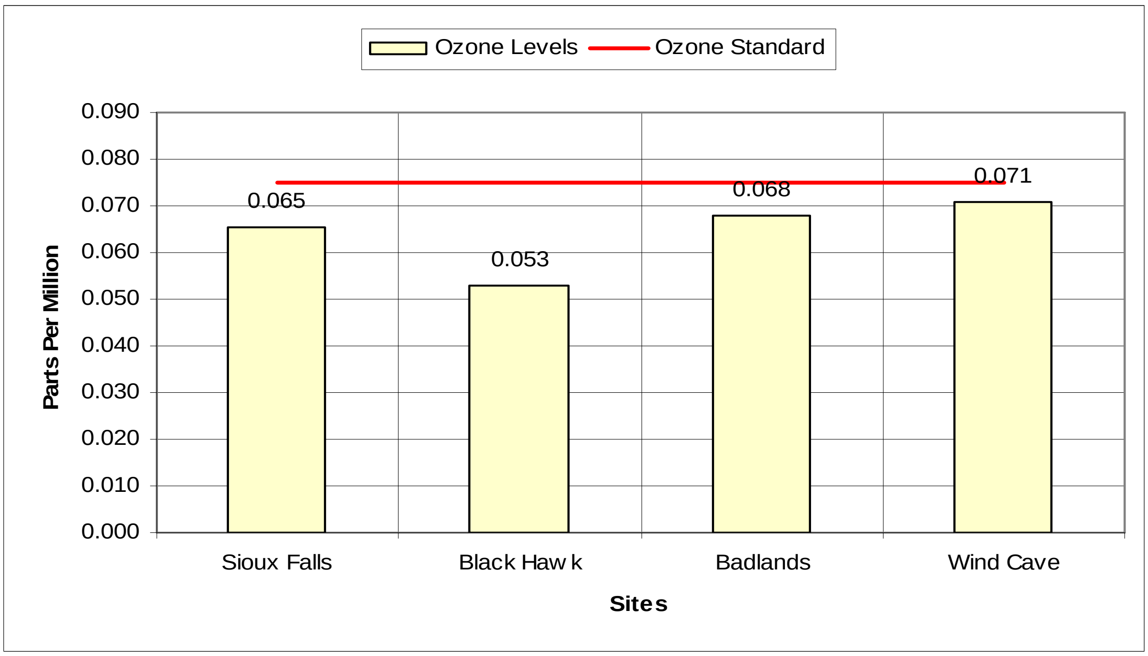
In 2005, a fourth ozone site was added at the Wind Cave Site. The Wind Cave Site was added to determine if a large increase in oil and gas mining in Colorado, Wyoming and Montana would cause impacts on the Wind Cave National Park, which is a Class 1 area.

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

The final change to the ozone air monitoring network came at the end of 2007. Because of funding issues the National Park Service asked the department to take over the operation of the ozone analyzer at the Badlands Site. Beginning in January 2008, the ozone analyzer operation was taken over by the department.

In 2008, EPA changed the ozone standard from 0.08 to 0.075 ppm. The form of the standard remained as the fourth highest, daily 8-hour average, averaged over three years. The 3-year average of the yearly 8-hour average concentrations in parts per million for each of the sites including the Badlands Site can be seen in Figure 6-3.

Figure 6-3 – Ozone Statewide 3-Year, 8-Hour Averages for 2007



*** The Black Hawk site started in 2007 so this is the first year at this location.**

The data collected in the past three years demonstrates that South Dakota is attaining the 2008 revised national ozone standard. Ozone concentrations are very close in concentration level statewide. Wind Cave continues to have the highest ozone concentration level in the state at 0.071 ppm, which is 95% of the new standard. Due to the drop in ozone standard this parameter may need more sampling locations to determine the state's compliance with the standard in future years because only the Black Hawk Site has a potential design value that is less than 85% of the revised ozone standard of 0.075 parts per million.

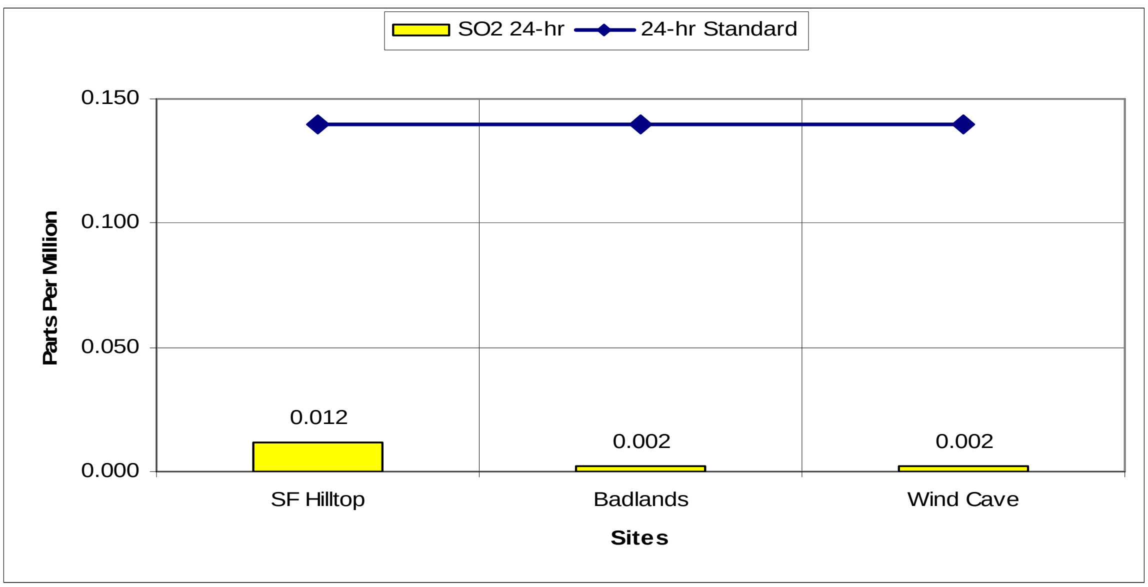
6.5 Sulfur Dioxide

Three sites were operated in 2007, Sioux Falls Hilltop, Badlands, and Wind Cave sites. The SD School site replaced the Hilltop site at the beginning of 2008. In general sulfur dioxide levels are low in the state with many readings at the detection level of the current sampling method of 0.001 ppm.

The standards for sulfur dioxide have three different concentration levels. There are two primary standards based on 24-hour average and annual average concentrations. The third is a secondary standard based on a maximum 3-hour average.

The graph in Figure 6-4 shows the maximum 24-hour concentrations in 2007 for all three sites in the network. The 24-hour standard is based on an average concentration of 0.14 ppm, not to be exceeded more than once per year. All three sites recorded concentrations well under the 24-hour standard level. The highest 24-hour concentration was recorded at the Sioux Falls Hilltop site with a maximum concentration of 0.015 ppm which is 11% of the standard. This level is 7% higher than last year but still well under the standard. The sulfur dioxide 24-hour maximum levels at the other two sites are at the same concentration just above the detection level for the sampling equipment.

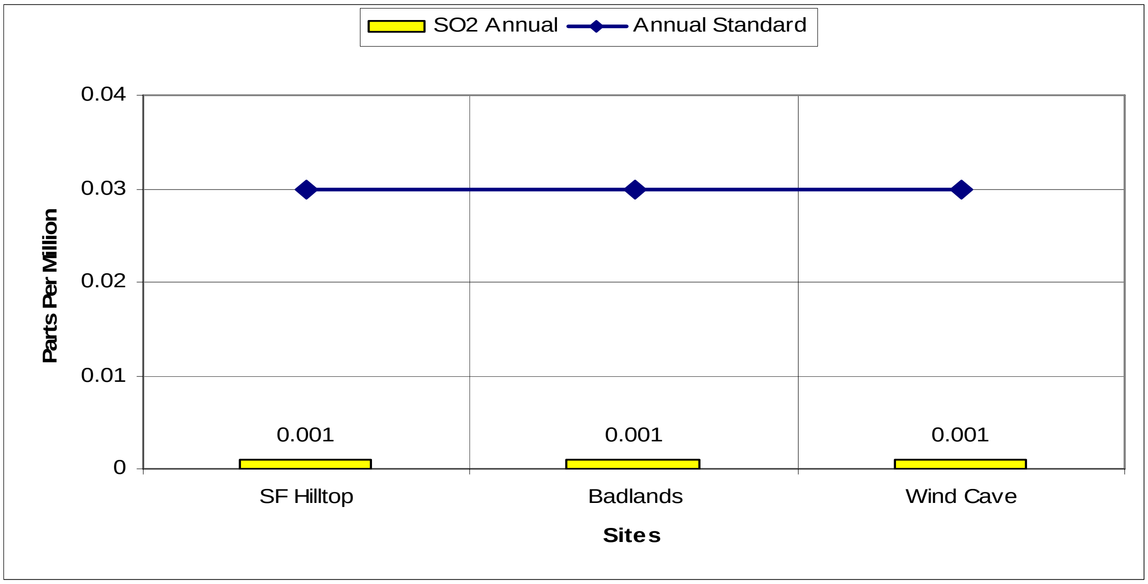
Figure 6-4 – Sulfur Dioxide 24-Hour Concentrations in 2007



The annual sulfur dioxide standard is based on a maximum annual arithmetic mean. Attainment is demonstrated when the annual arithmetic mean is less than or equal to 0.030 ppm.

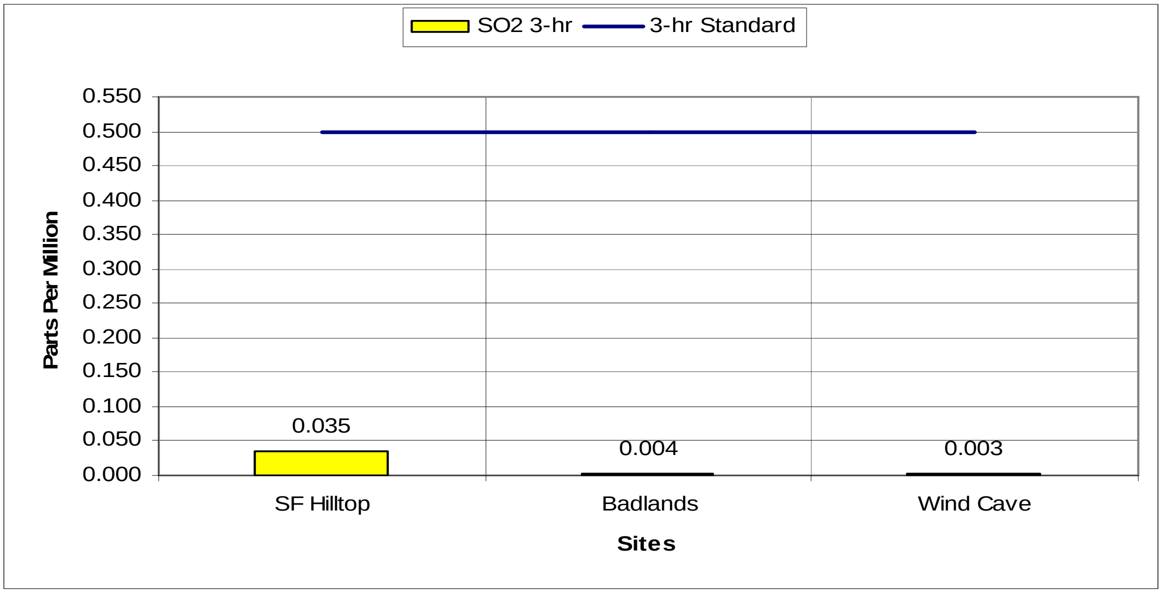
All three sites in 2007 are well under the level of the standard and had the same annual concentration of 0.001. This level is at the detection level of the equipment and is 3% of the annual standard. The annual sulfur dioxide concentrations for all three sites were unchanged from the previous year. The graph in Figure 6-5 shows the annual concentrations in 2007 for all three sites in the network.

Figure 6-5 – Sulfur Dioxide Annual Concentrations in 2007



The secondary standard is based on a 3-hour average concentration of 0.500 ppm, not to be exceeded more than once per year. All three sites attained the standard. The Sioux Falls Hilltop site recorded the highest 3-hour average in 2007. The Sioux Falls Hilltop site concentration of 0.035 ppm was only 7% of the 3-hour standard. This level was 4% higher then in 2006 but still well under the 3-hour standard for sulfur dioxide. The graph in Figure 6-6 shows the maximum 3-hour concentrations in 2007 for all three sites in the network.

Figure 6-6 – Sulfur Dioxide 3-hour Concentrations in 2007



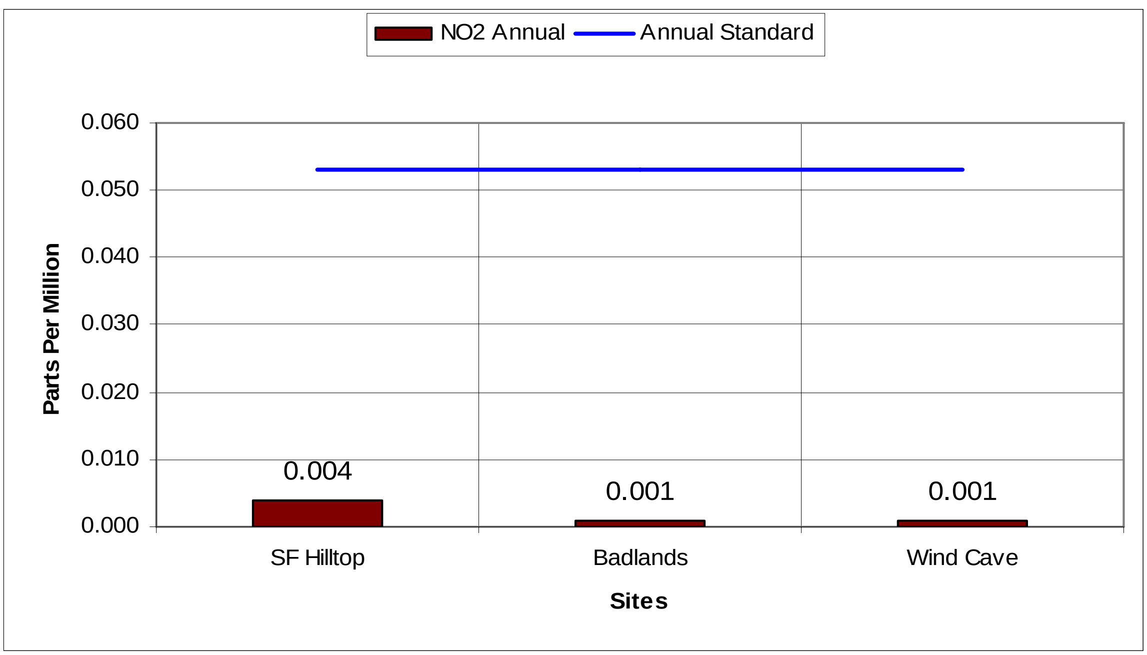
Because of low sulfur dioxide levels all future purchases of monitors will be for trace level monitors which can test for levels to 0.0002 ppm. The SD School site in Sioux Falls is the first site to operate the trace level sulfur dioxide analyzer starting in January of 2008.

6.6 Nitrogen Dioxide

The standard for nitrogen dioxide is an annual arithmetic mean concentration of 0.053 ppm. Attainment is demonstrated when the annual arithmetic mean is less than or equal to the standard. There were three sites operated in the monitoring network in 2007, Sioux Falls Hilltop, Badlands, and Wind Cave sites. At the beginning of 2008 the SD School site replaced the Hilltop site in Sioux Falls.

All three sites had concentrations under the annual standard in 2007. The Sioux Falls Hilltop site recorded the highest annual arithmetic mean of 0.004 ppm. This level is well under the annual standard at only 8% of the standard. Many of the hourly concentrations collected at the three sites are at the detection level of the analyzers. In 2007, nitrogen dioxide levels were down in Sioux Falls by 1%. The Badlands and Wind Cave sites remained at the detection level for the nitrogen dioxide analyzer. Figure 6-7 contains a graph of the 2007 annual concentration.

Figure 6-7 – Nitrogen Dioxide Annual Concentrations in 2007



6.7 Carbon Monoxide

The carbon monoxide standard is based on two primary standards in the form of a one-hour and 8-hour average concentration. The one-hour standard is 35.0 ppm and is not to be exceeded more than once per year. The other standard is an 8-hour average concentration of 9.0 ppm, not to be exceeded more than once per year.

The state's low population numbers, low traffic counts, and small cities directly influence why there has been no carbon monoxide monitoring in South Dakota in the past. The state's largest city, Sioux Falls, is not prone to atmospheric inversions and the amount of automobile traffic has historically been small when compared to cities with carbon monoxide problems nationally. The state's second largest city, Rapid City, can have atmospheric inversions but historically they are short in duration.

The department will begin the operation of the first carbon monoxide testing site sometime in late 2008 or early 2009. The location of one monitor will be at the SD School site as required by the NCore sampling requirements. A second site is being planned for operation near the proposed Hyperion Energy Center location in Union County. The Air Quality Program will continue to evaluate the need to monitor carbon monoxide in other locations in South Dakota on a year-to-year basis. The first two sites should provide information to determine if other locations in the state need to be tested for carbon monoxide.

7.0 AIR MONITORING SITE EVALUATION AND TRENDS

7.1 Rapid City Area

The Rapid City area had a total of three monitoring sites collecting data for PM10 in 2007. The high concentration site was located at the Credit Union site and a continuous PM10 monitor was used to determine compliance with the NAAQS standards. The Library and National Guard sites have manual Andersen PM10 monitors collecting 24-hour data using a filter based gravimetric sampling method.

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

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

During 2007, a total of 24 high wind dust alerts were called for the Rapid City area. None of the days exceeded the PM10 standards. The PM10 sites in Rapid City all showed a slight increase in PM10 levels in 2007. This could be due to heavy smoke during some periods of the summer from forest fires in Wyoming, Montana, and Idaho. Also a continued drought for the last seven years has had an impact on fugitive dust sources.

The Rapid City area had a total of two monitoring sites collecting data for PM2.5 in 2007. All the sites have manual Andersen PM2.5 monitors collecting 24-hour data using a filter based gravimetric sampling method. In addition to the manual monitor method, a continuous Thermo BETA PM2.5 monitor was operated on the Credit Union site.

7.1.1 Rapid City Public Library Site

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

Figure 7-1 – Library Site

PM10 sampling began at the site in 1987. An attainment designation for PM10 was completed and approved by EPA for the Rapid City area in 2006. PM2.5 monitors were added to the site in 1999. An attainment designation for PM2.5 was completed for the Rapid City area in 2004. Table 7-1 contains details on the monitoring site specific to 40 CFR Part 58.

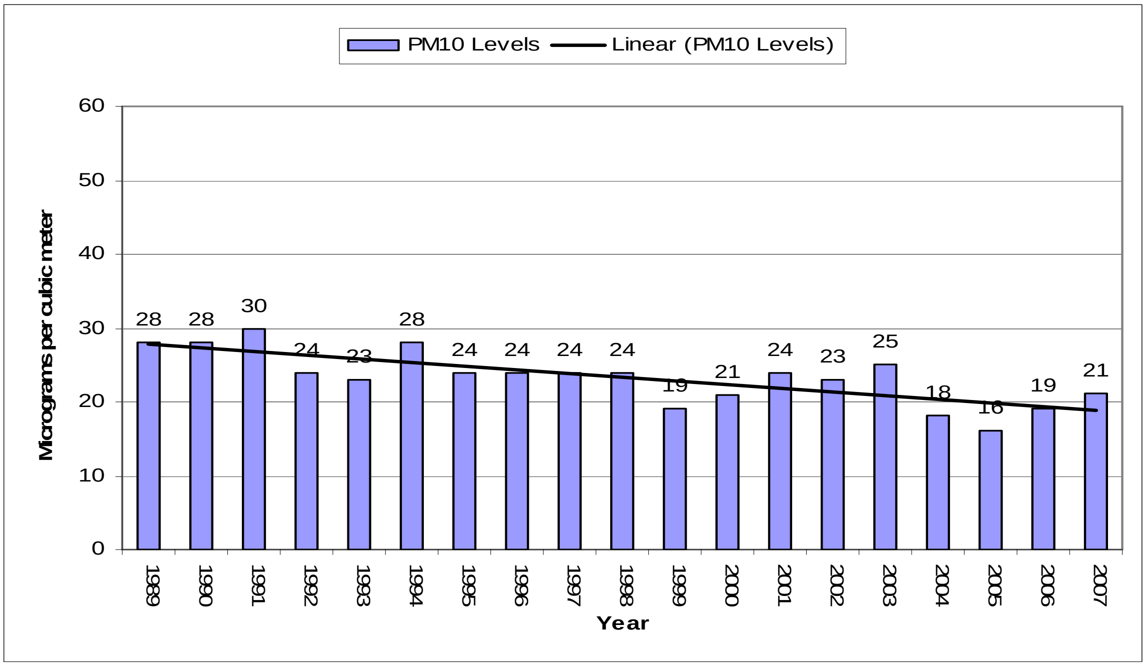
Table 7-1 – Rapid City Library Monitoring Site Specifics

Parameter	Information
Site Name	Rapid City Public Library
AQS ID Number	46-103-1001
Street Address	6^{th} and Quincy, Rapid City, South Dakota
Geographic Coordinates	UTM Zone 13, NAD 83, E 641,837.99, N 4,882,111.77
MSA	City of Rapid City
PM10	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3^{rd} Day, Co-located Every 6^{th} Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS),
Operational Status	No Changes proposed in 2008
PM2.5	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3^{rd} Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 PM2.5 w/WINS
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
Operational Status	No Changes proposed in 2008

7.1.1.1 Library PM10 Data

Annual averages for the Library site are shown in Figure 7-2 and show a decline from a high of 30 ug/m^3 in 1991, to a low of 16 ug/m^3 in 2005. The largest reduction in annual concentrations came when changes were implemented by the city on the street sanding and sweeping operations in the early 1990s. In the last ten years, annual levels have leveled out, except for 2004 and 2005. In 2004 and 2005, the annual levels of PM10 declined significantly at 9 ug/m^3. During the last three years including 2007, PM10 levels increased slightly. The plan is to continue the PM10 monitoring as this is the only site east of the Hogback in Rapid City.

Figure 7-2 – Library PM10 Annual Averages



7.1.1.2 Library PM2.5 Data

The graph in Figure 7-3 shows the PM2.5 annual average for each sampling year since 2001. The annual average concentrations vary in difference by 0.6 micrograms per cubic from the highest to lowest annual average. The highest was 7.8 ug/m^3 in 2001 and the lowest was 7.2 ug/m^3 recorded in 2002. In 2007, the annual average was 7.4 ug/m^3. The trends indicate a steady concentration level for PM2.5 for the last seven years of sampling. The annual average concentration level is 48%, which is well under the PM2.5 standard.

7.1.2 Rapid City National Guard Site

The National Guard site is located on the roof of the armory at the Camp Rapid facility in western Rapid City (see Figure 7-4). The site was established at this location in 1992, with PM10 the only sampling parameter because a large portion of the particulate matter emissions near this site consists of crustal material. Because the site is located only a few blocks from the high concentration location at the Credit Union site, the site is designated as a SPM site for PM10. The sampling frequency for this site is every third day.

Figure 7-3 – Library PM2.5 Annual Averages

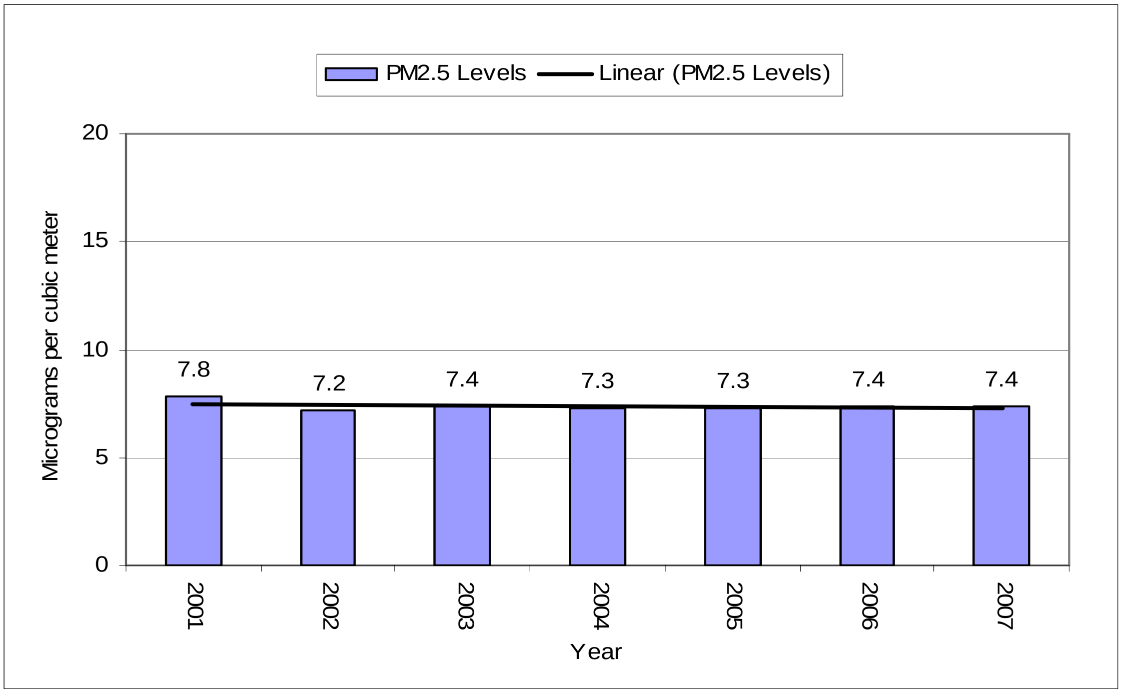


Figure 7-4 – National Guard Site

The goals of the site are to measure population exposure and source impacts from the quarry area north of the monitoring site. In addition, this monitoring site along with the Credit Union site, define the high PM10 concentration area in western Rapid City. Table 7-2 contains details on the monitoring site specific to 40 CFR Part 58.

Table 7-2 – National Guard Monitoring Site Specifics

Parameter	Information
Site Name	National Guard Site
AQS ID Number	46-103-0013
Street Address	Camp Rapid Armory West Main Street
Geographic Coordinates	UTM Zone 13, NAD 83, E 638,543.08, N 4,882,373.72
MSA	City of Rapid City
PM10	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SPMS (Comparison to the NAAQS),
Operational Status	No Changes proposed in 2008

7.1.2.1 National Guard PM10 Data

The National Guard site is the second oldest monitoring site and is a special purpose site sampling for PM10 in Rapid City. The graph in Figure 7-5 shows the annual means for the site since 1992. The annual means vary from a high of 41 ug/m^3 in 1997 to a low of 27 ug/m^3 in 2005. The trends for the annual mean concentrations continue to decline; but do cycle up and down from year to year. In 2007, PM10 annual average concentrations increased by 3 ug/m^3 from 2006. Concentrations are still low and under the previous levels recorded in 1997.

The National Guard Site PM10 concentration data continues to be well below the levels recorded at the Credit Union Site. The Credit Union Site is only four city blocks from the National Guard Camp Site. Therefore, the National Guard Site will continue to be evaluated for closure in the future years.

7.1.3 Credit Union Site

The Credit Union site is located on a lot next to the new Fire Station #3 building. The Credit Union site replaced the Fire Station #3 site in October 2003, as the high PM10 concentration location for the western part of Rapid City. The Credit Union site is located just south of the quarry area and is centrally located in relation to the quarry facilities. Figure 7-6 contains a picture of the monitoring site looking in a south direction.

Figure 7-5 – National Guard PM10 Annual Averages

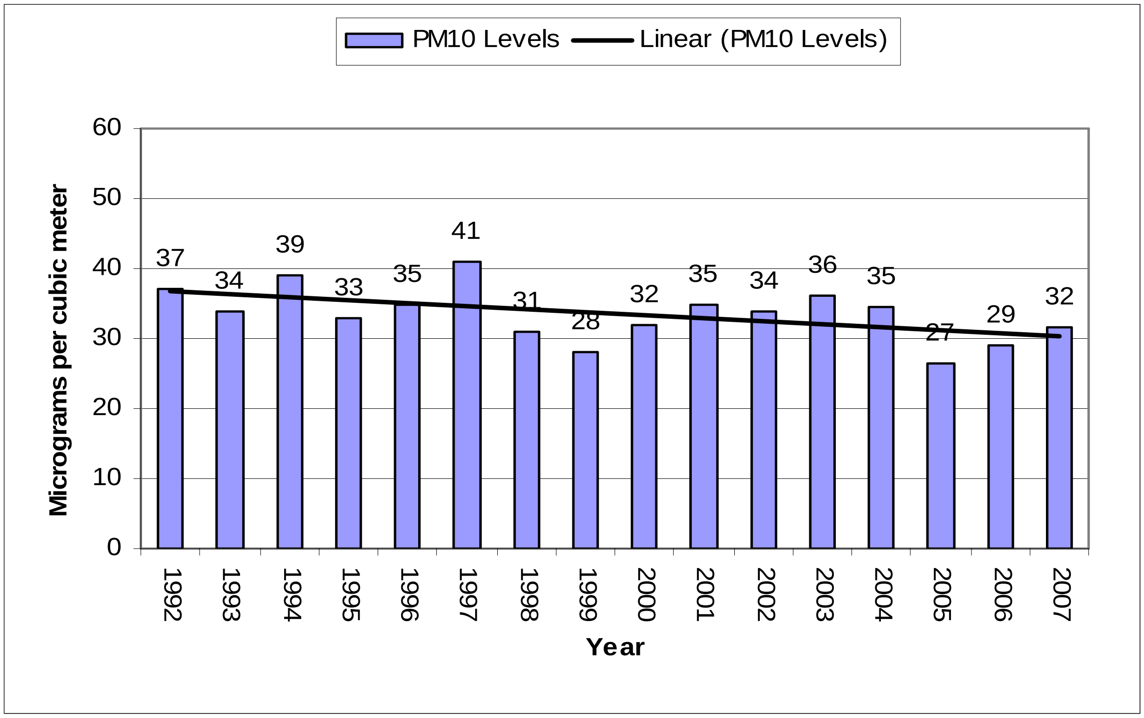


Figure 7-6 – Credit Union Site

Continuous Thermo BETA PM10 and PM2.5 monitors were operated at this site in 2007. The BETA produces hourly concentrations on an every day sampling schedule. The hourly readings from the continuous PM10 monitor are used to assist in the calling of high wind dust alerts for Rapid City and to compare concentrations to the PM10 NAAQS.

Manual PM2.5 federal reference method monitors are operated at this site on a schedule of every third day to assess the concentrations levels to the PM2.5 NAAQS. This site also has co-located PM2.5 federal reference method monitors as one of the two required sites for the network. A continuous Thermo BETA PM2.5 monitor is used to supply hourly data for investigation of high concentrations recorded on the manual PM2.5 monitors. The Thermo BETA PM2.5 monitor has no sampling method designation for PM2.5 from EPA and data from the monitor can only be used for special purpose activities.

The site's spatial scale is neighborhood for ozone, PM10, and PM2.5 sampling. The objectives of the PM10 sampling are high concentration, population, and source impact. The objectives of the PM2.5 sampling are population and source impact. The objectives of the ozone sampling are high concentration and population. Table 7-3 contains details on the monitoring site specific to 40 CFR Part 58.

Table 7-3 – Credit Union Monitoring Site Specifics

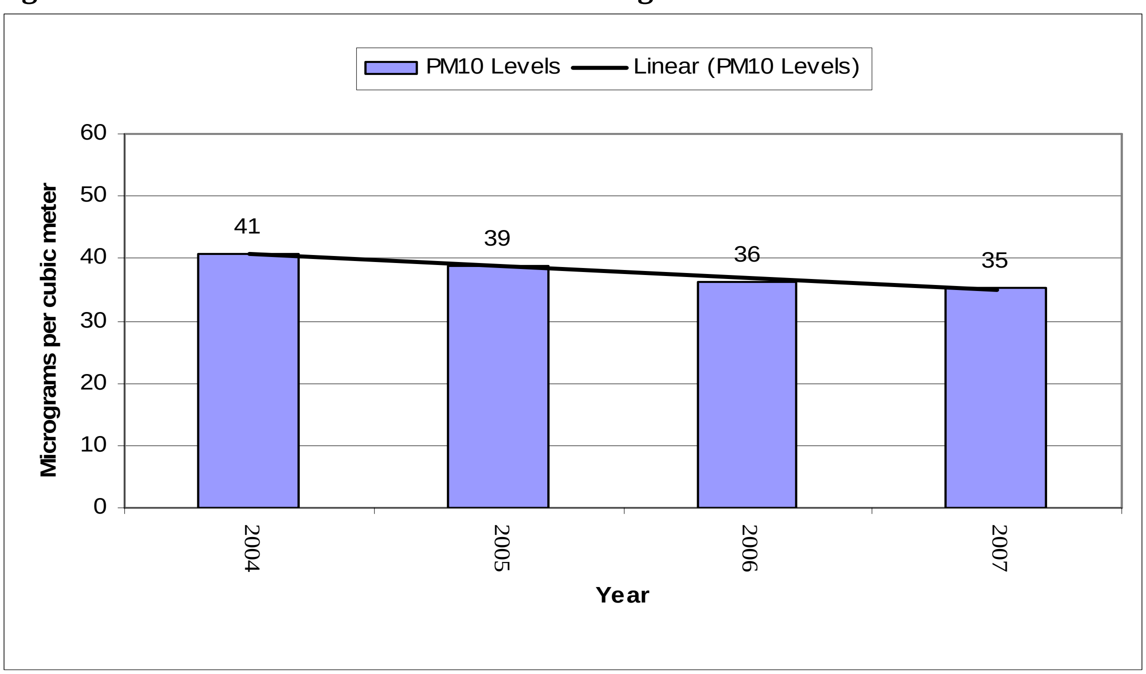
Parameter	Information
Site Name	Credit Union Site
AQS ID Number	46-103-0020
Street Address	106 Kinney Ave.
Geographic Coordinates	UTM Zone 13, NAD 83, E 638,199.75, N 4,882,811.92
MSA	City of Rapid City
PM10 (Continuous)	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Methods	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-Time Data
Operational Status	No Changes proposed in 2008
PM2.5 (Manual)	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day, Co-located Every 6th Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 PM2.5 w/WINS
Analysis Methods	Gravimetric

Parameter	Information
Data Use	SLAMS (Comparison to the NAAQS)
Operational Status	The TEOM was replaced with a Thermo Beta monitor. See below.
PM2.5 (Continuous Thermo BETA)	
Sampler Type	No Method Designation
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Methods	Beta Attenuation
Data Use	Real-time Data and SPM
Operational Status	The TEOM was replaced with a Thermo Beta Monitor. See below.

7.1.3.1 Credit Union PM10 Data

PM10 data has been collected at the Credit Union site since October of 2003 when a continuous PM10 monitor was added to the site. Only three months of data was collected in 2003, so 2004 is the first complete sampling year. Figure 7-7 shows a graph of the annual average PM10 concentration.

Figure 7-7 – Credit Union PM10 Annual Averages



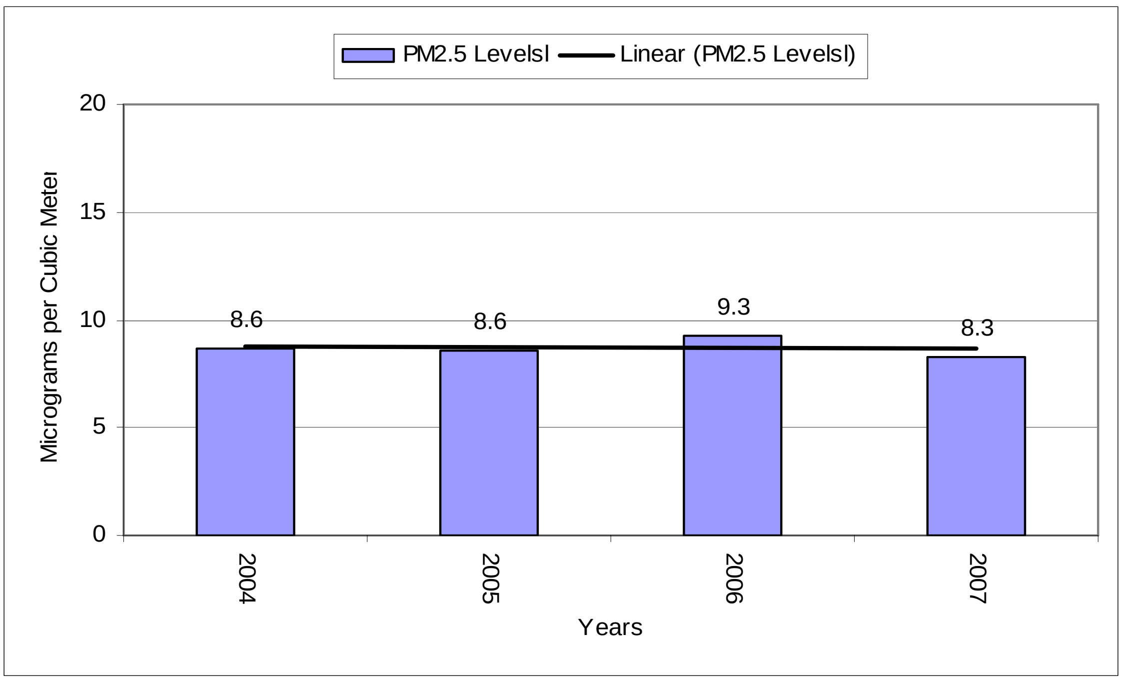
The PM10 annual average concentration trends show a declining concentration each year since 2004. In 2007, average concentration levels decrease to the lowest level recorded at this site since 2004. Over the four year period, annual concentrations changed significantly by 6.0 ug/m^3.

7.1.3.2 Credit Union PM2.5 Data

The Credit Union site began operation in October of 2003 and completed the first full year of testing in 2004. The Credit Union site records the highest PM2.5 concentrations in the Rapid City area both 24-hour and annual concentrations.

The annual average concentrations have remained relatively constant over the four year period. In 2007, PM2.5 annual concentrations recorded the lowest level since the site began operation. The PM2.5 levels ranged from a high of 9.3 ug/m^3 in 2006 to a low of 8.3 in 2007. Over the four year period, annual concentrations changed by only 1.0 ug/m^3. The graph in Figure 7-8 shows the annual average for each sampling year since 2004.

Figure 7-8 – Credit Union PM2.5 Annual Averages



7.2 Black Hawk Site

Black Hawk is a small town located just north of the Rapid City in Meade County north of the quarry area. Black Hawk is not an incorporated city but is a growing subdivision providing a bedroom community for Rapid City. The Black Hawk site provides data that demonstrates the urban background levels of particulate matter coming into the Rapid City area from the north. The site also is the area ozone testing site for the Rapid City area.

The Black Hawk site was setup in the fall of 2000. The site is located on a small hill east of the Black Hawk Elementary School. PM10 and PM2.5 monitors were located on a sampling shelter until October 2003 when the sampling shelter was moved to the Credit Union site. The monitors were located on scaffolding within the fenced site until the fall of 2006 when a shelter was added back to the site. At the end of 2004 the PM2.5 monitors were removed because concentrations were the lowest in the area. In 2007, the ozone analyzer was moved from Credit Union site to the Black Hawk site to operate the ozone site outside of the modeled one microgram nitrogen oxide influence area from air quality sources in western Rapid City.

The land use around the site is mainly residential with a few service type businesses. There are no obstructions around the monitoring site. See Figure 7-9 for a picture of the site looking to the northwest.

Figure 7-9 – Black Hawk Site

The limestone quarry industries are located to the south and southeast of the Black Hawk site. The current quarry area will be mined out in the near future and the new quarry areas are located south of the monitoring site. The first of the new limestone quarries is currently operating about one mile south of the site. Table 7-4 contains details on the monitoring site specific to 40 CFR Part 58.

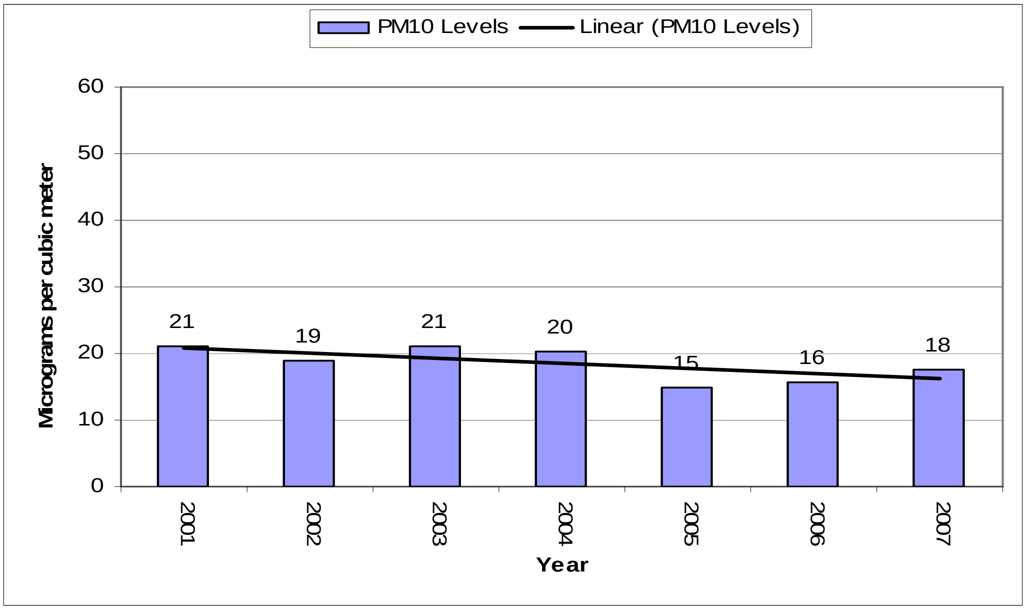
Table 7-4 – Black Hawk Monitoring Site Specifics

Parameter	Information
Site Name	Black Hawk Elementary
AQS ID Number	46-093-0001
Street Address	7108 Seeaire Street
Geographic Coordinates	UTM Zone 13, NAD 83, E 634,683.07 N 4,890,309.65
MSA	None
PM10	
Sampler Type	Federal Reference Method
Operating Schedule	Every Third Day
Scale Representation	Neighborhood
Monitoring Objective	Population, Urban Background
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
Operational Status	No change planned for 2008
Ozone (Continuous)	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Instrumental
Analysis Methods	Ultra Violet
Data Use	SLAMS (Comparison to the NAAQS) and Real-time Data
Operational Status	Monitor was moved at the start of 2007. See Section 10.

7.2.1 Black Hawk PM10 Data

Sampling for PM10 levels began at this site in 2001. The first four years concentration levels remained about the same. In 2005, the annual average dropped significantly by 6 ug/m^3 from the 2004 level. The highest annual average was 21 ug/m^3 recorded in both 2001 and 2003. The lowest level of 15 ug/m^3 was recorded in 2005. In 2007, there was a slight increase in concentrations but still under the annual average concentrations recorded in the first four years of testing. Figure 7-10 contains a graph showing the PM10 annual averages for the Black Hawk site. Over all the PM10 levels have declined as indicated by the linear trends line.

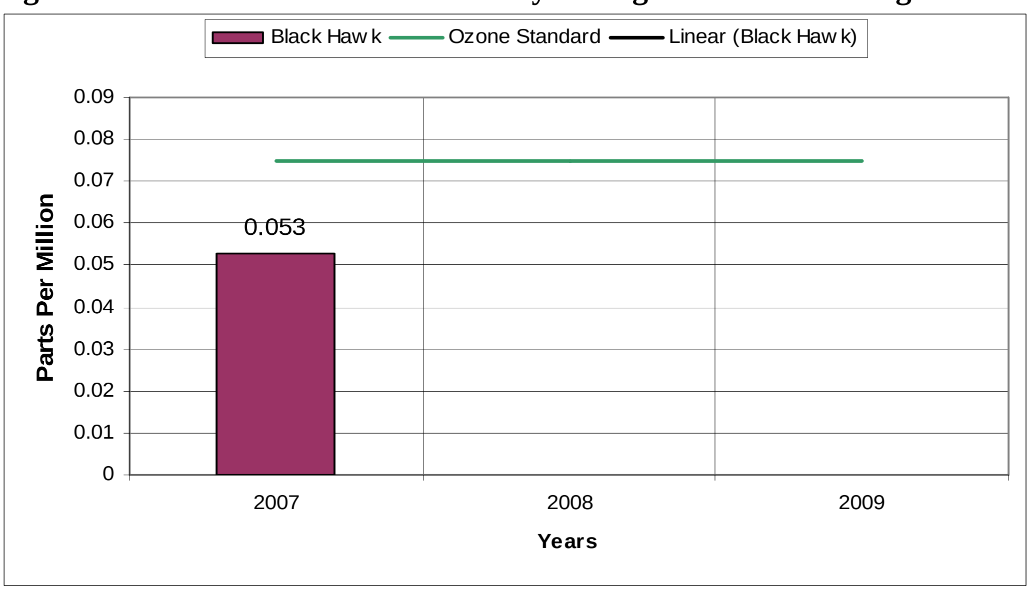
Figure 7-10 – Black Hawk PM10 Annual Averages



7.2.2 Black Hawk Ozone 8-hour Average

The 2007 year was the first ozone season at the Black Hawk Site (see Figure 7-11). Concentrations were the lowest ozone levels recorded in the state during the first year of testing. A minimum of two more years of testing are planned so a standard comparison can be made for this site.

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



7.3 Badlands Site

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

The Badlands site was established in 2000, with manual monitors for PM10 and PM2.5. The site is setup next to the IMPROVE site operated by the National Park Service. The site is located on the southeast part of the park near the visitor center. Figure 7-12 shows a current picture of the Badlands site.

Figure 7-12 – Badlands Site

In October of 2004, the number of pollutant parameters was increased by adding continuous monitors for PM10, PM2.5, sulfur dioxide, and nitrogen dioxide. The changes improved the amount of data collected and provide additional information on transport of air pollution. At the end of 2007, the department took over the operation of the ozone monitor at this site upon a request made by the National Park Service.

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

Table 7-5 – Badlands Monitoring Site Specifics

Parameter	Information
Site Name	Badlands National Park
AQS ID Number	46-071-0001
Street Address	25216 Ben Reifel Road, Interior, South Dakota 57750
Geographic Coordinates	UTM Zone 14, NAD 83, E 263,173.81 N 4,847,799.95
MSA	None
PM10 (Continuous)	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Method	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No change planned for 2008
PM2.5 (Manual)	
Sampler Type	Federal Reference Method
Operating Schedule	Every Third Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Andersen RAAS2.5-100 PM2.5 SAM w/WINS
Analysis Method	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
Operational Status	No change planned for 2008
PM2.5 (Continuous)	
Sampler Type	No Method Designation
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Anderson BAM w/PM2.5 VSCC
Analysis Method	Beta Attenuation
Data Use	Real-time Data and SPM
Operational Status	No change planned for 2008
Sulfur Dioxide	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport

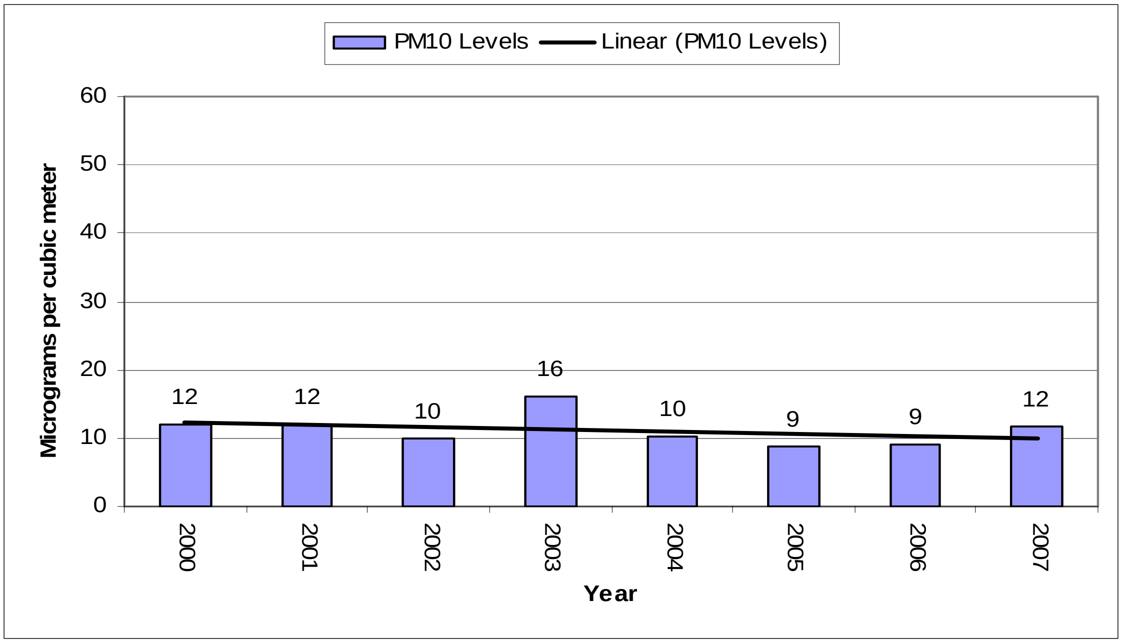
Parameter	Information
Sampling Method	Instrumental
Analysis Methods	Pulsed Fluorescent
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No change planned for 2008
Nitrogen Dioxide	
Sampler Type	Federal Reference Method
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Method	Chemiluminescence
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No change planned for 2008
Ozone	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Method	Ultra Violet
Data Use	SLAMS (Comparison to the NAAQS) and Real-time Data
Operational Status	Analyzer no operated by the department

7.3.1 Badlands PM10 Data

PM10 data has been collected by the state at this site since 2000. The PM10 manual monitor was operated on an every sixth day schedule through 2004. Beginning in 2005, a continuous Thermo Beta Gauge PM10 monitor replaced the manual monitor at this site. Figure 7-13 contains a graph of the annual averages for the Badlands site.

The annual average concentrations over the last seven years have gone up and down but overall have remained relatively constant. The highest annual average concentration 16 ug/m^3 was recorded in 2003. The lowest annual average concentration 9 ug/m^3 was recorded in 2005 and 2006. In 2007, PM10 annual average increase to 12 ug/m^3, which is the same concentration as the first two years of sampling at this site. The PM10 concentrations recorded at this site are some of the lowest levels recorded and are considered background for the western half of the state.

Figure 7-13 – Badlands PM10 Annual Averages



7.3.2 Badlands PM2.5 Data

The PM2.5 monitors run on an every third day schedule since the site was set up in 2000. The first complete year of PM2.5 data at this site was completed in 2001. With the completion of the 2003 year, the site had three years of PM2.5 data and the department was able to make a comparison of the concentration levels to the 24-hour and annual standards.

The annual averages for the Badlands site show a concentration range with a high of 5.8 ug/m^3 in 2003 and a low of 5.2 ug/m^3 in 2002. In 2007, the annual average was 5.5 ug/m^3. The trend for the annual average is steady during the seven year period. PM2.5 concentrations at this site are one of the lowest in the state and represent background levels for western South Dakota. Figure 7-14 contains a graph of the annual averages.

7.3.3 Badlands Sulfur Dioxide Data

The 2005 year is the first year of testing at the Badlands site for sulfur dioxide. As expected, concentrations for sulfur dioxide are very low and represent background levels. Concentrations are at the detection limit of the analyzers at 0.001 ppm for the annual average levels for sulfur dioxide. See Figure 7-15 to view a graph of the annual average concentrations for sulfur dioxide. The linear trends line shows a steady concentration level.

Figure 7-14 – Badlands PM2.5 Annual Averages

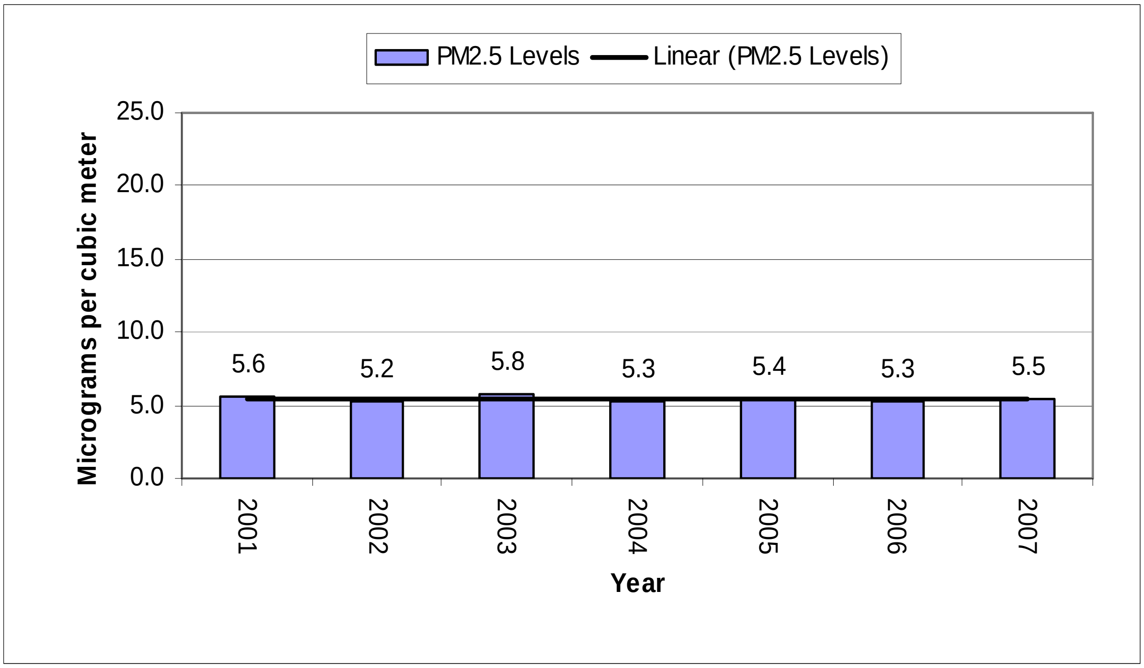
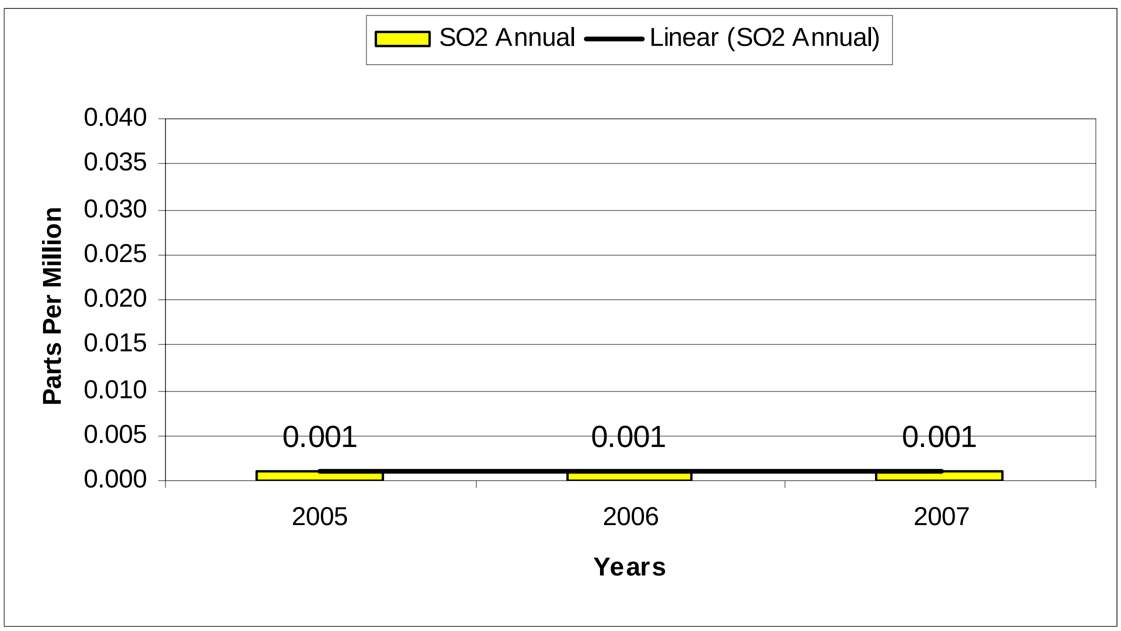


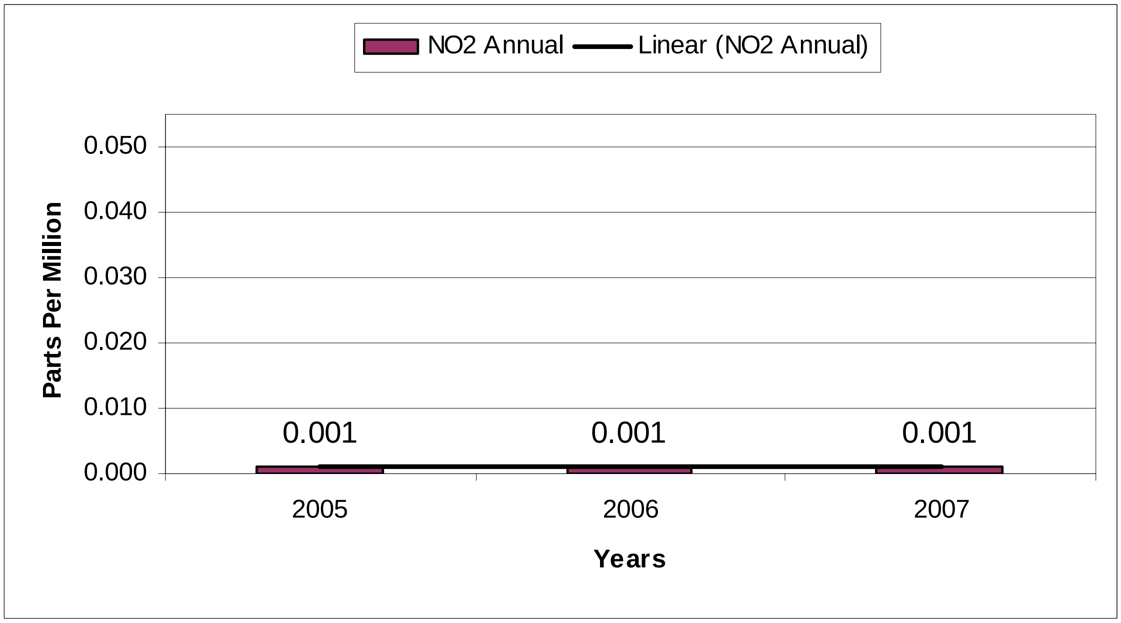
Figure 7-15 – Badlands Sulfur Dioxide Annual Averages



7.3.4 Badlands Nitrogen Dioxide Data

The 2005 year is the first year of testing at the Badlands site for nitrogen dioxide. As expected, concentrations for nitrogen dioxide are very low and represent background levels. Many hourly concentrations are at the detection limit of the analyzer at 0.001 ppm. The calculated annual average levels for all three years are also at the detection level for nitrogen dioxide. See Figure 7-16 to view a graph of the annual average concentrations. The linear trends line shows a steady concentration level.

Figure 7-16 – Badlands Nitrogen Dioxide Annual Averages



7.4 Wind Cave Site

The Wind Cave National Park is one of two class I areas in South Dakota designated for visibility protection under the Clean Air Act. The Wind Cave area is a large national park located in the southern Black Hills of South Dakota. The Wind Cave site was established in 2005, with manual monitors for PM2.5 and continuous monitors for PM2.5, PM10, sulfur dioxide, nitrogen dioxide, and ozone. The monitoring equipment is located in a sampling shelter next to the IMPROVE site operated by the National Park Service. The site is located a short distance west of the visitor center. Figure 7-17 shows a current picture of the Wind Cave site.

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

Figure 7-17 – Wind Cave Site

Table 7-6 – Wind Cave Monitoring Site Specifics

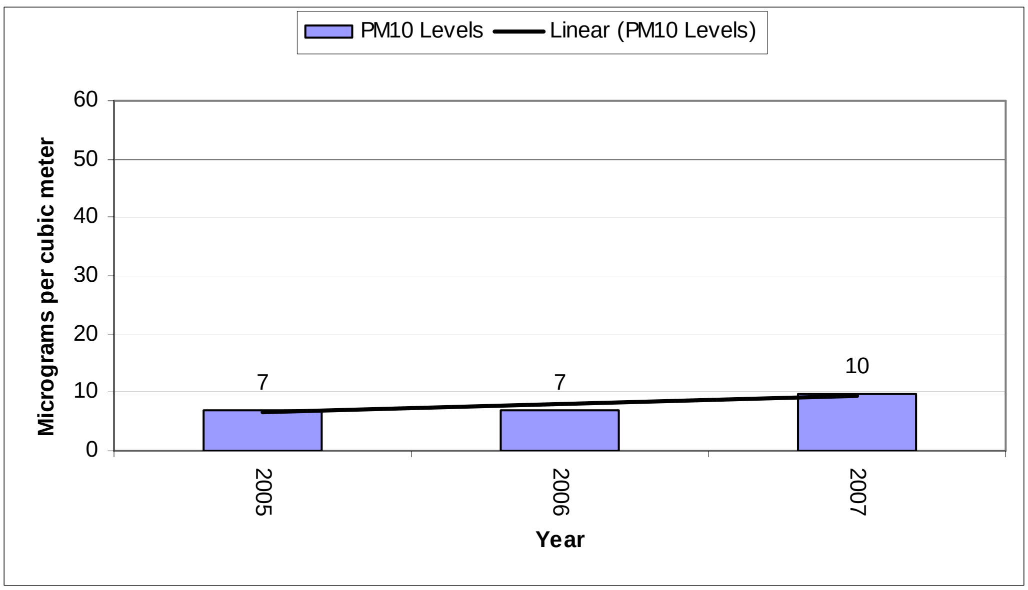
Parameter	Information
Site Name	Wind Cave
AQS ID Number	46-033-0132
Street Address	290 Elk Mountain Camp Road, Hot Springs, South Dakota
Geographic Coordinates	UTM Zone 13, NAD 83, E 622,471.56 N 4,823,856.93
MSA	None
PM10 (Continuous)	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Method	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No change planned for 2008
PM2.5 (Manual)	
Sampler Type	Federal Reference Method
Operating Schedule	Every Third Day
Scale Representation	Regional

Parameter	Information
Monitoring Objective	Background, Transport
Sampling Method	Andersen RAAS2.5-100 PM2.5 SAM w/WINS
Analysis Method	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
Operational Status	No change planned for 2008
PM2.5 (Continuous)	
Sampler Type	No Method Designation
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Anderson BAM w/PM2.5 VSCC
Analysis Method	Beta Attenuation
Data Use	Real-time Data and SPM
Operational Status	No change planned for 2008
Sulfur Dioxide	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Methods	Pulsed Fluorescent
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No change planned for 2008
Nitrogen Dioxide	
Sampler Type	Federal Reference Method
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Method	Chemiluminescence
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No change planned for 2008
Ozone	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Regional
Monitoring Objective	Background, Transport
Sampling Method	Instrumental
Analysis Method	Ultra Violet
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No change planned for 2008

7.4.1 Wind Cave PM10 Data

The 2007 sampling year completes three years of testing for PM10 at this site. The PM10 concentrations are the lowest in the state. The Wind Cave site is the most remote site in the state and a site that has no influence from industry and agriculture activities close by. The 2007, PM10 concentrations were up slightly and were the highest concentrations recorded in the three yearsof sampling. Smoke from wild land fires impacted the area for two months which may be the cause of the increase in levels. Figure 7-18 contains a graph showing the annual average PM10 concentrations. The linear trend line indicates a slight increase in concentration levels over the three years, which may be skewed by the 2007 concentrations. In either case, the concentrations ranged from 7 to 10 ug/m^3, which are some of the lowest PM10 concentrations in the nation.

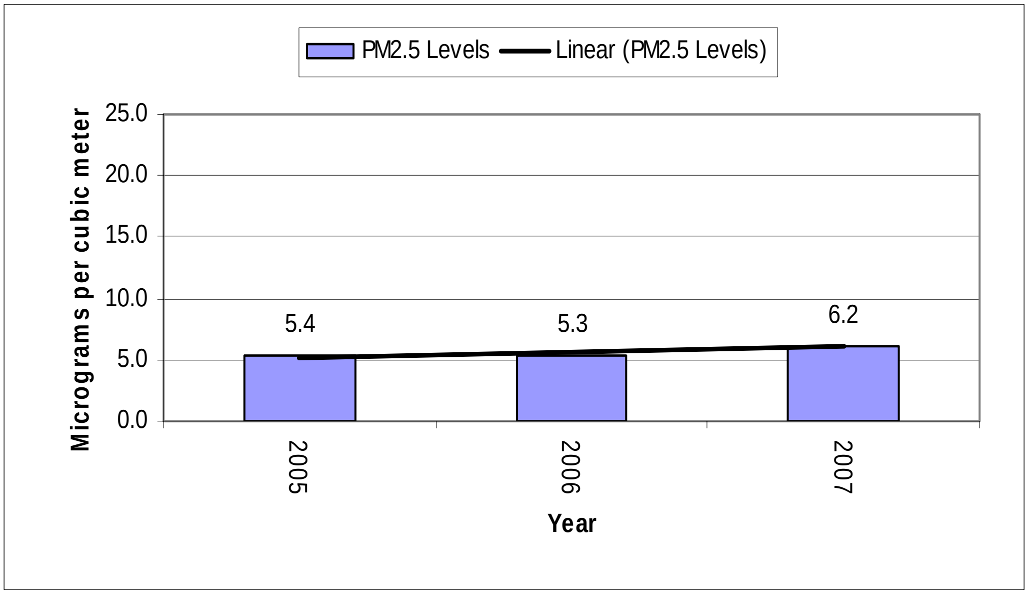
Figure 7-18 – Wind Cave PM10 Annual Averages



7.4.2 Wind Cave PM 2.5 Data

The PM2.5 concentrations are similar to the levels recorded at the Badlands site and are some of the lowest in the state. Figure 7-19 contains a graph showing the annual average PM2.5 concentration levels. The linear trend line indicates a slightly increasing concentration level. The increase is due to the PM2.5 level recorded in 2007. It appears the increase in the annual concentration level in 2007 may be due to smoke from wild land fires in Wyoming, Montana, and Idaho and control burns near the site. The PM2.5 annual average concentration ranges from 6.2 in 2007 to 5.3 ug/m^3 in 2006.

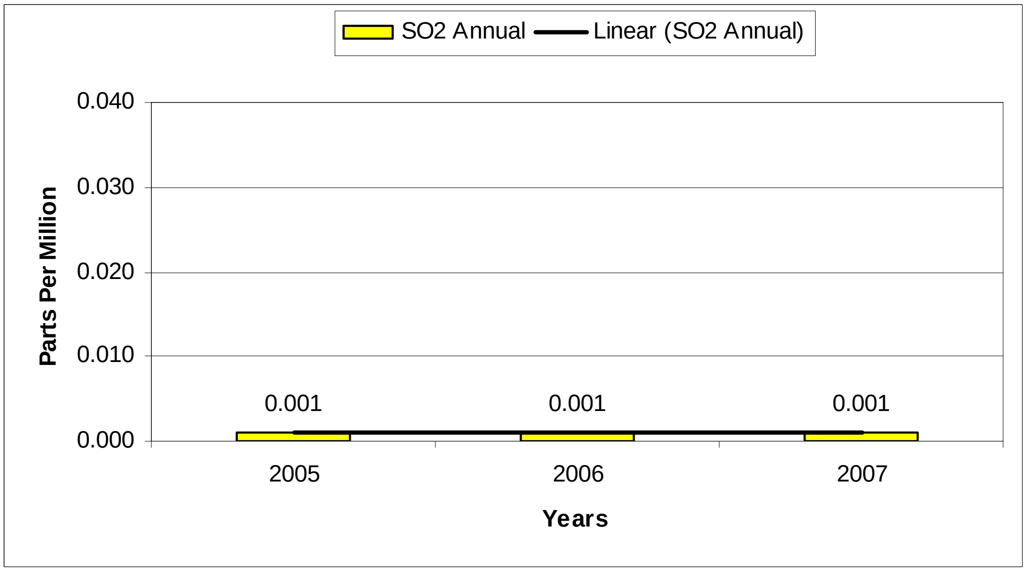
Figure 7-19 – Wind Cave PM2.5 Annual Averages



7.4.3 Wind Cave Sulfur Dioxide

The annual averages for Wind Cave are very low and are at the detection level for the sulfur dioxide analyzer. The graph in Figure 7-20 shows the annual concentration levels. The linear trends line shows a steady sulfur dioxide concentration level but levels are too low to provide any indication of actual trends.

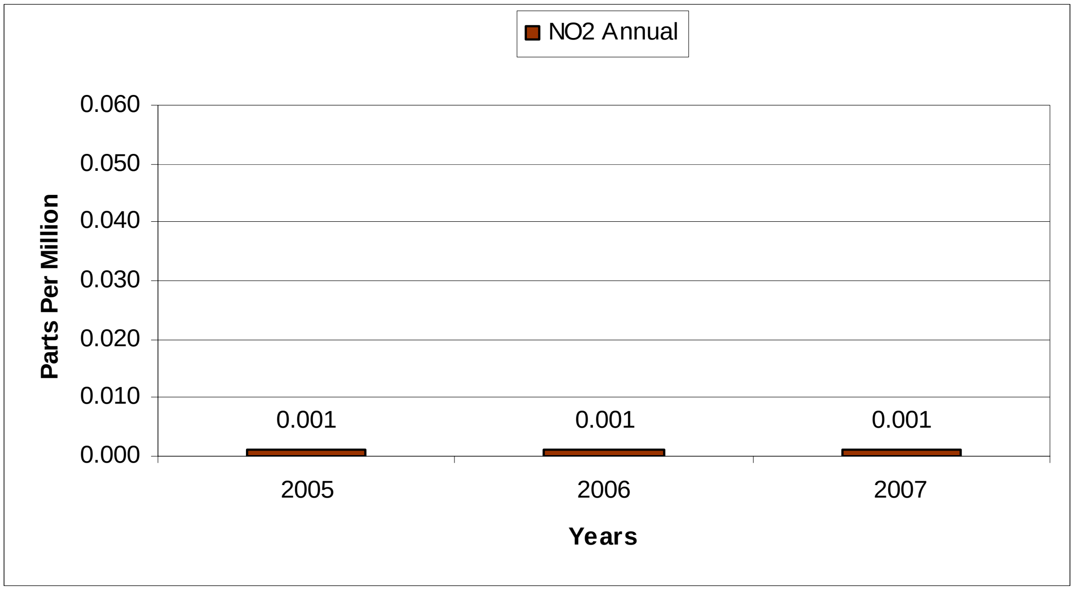
Figure 7-20 – Wind Cave Sulfur Dioxide Annual Averages



7.4.4 Wind Cave Nitrogen Dioxide

The annual nitrogen dioxide averages are very low and are at the detection level for the analyzer just as the sulfur dioxide levels. The graph in Figure 7-21 shows the annual average concentration levels for the Wind Cave site. The linear trend line shows a constant concentration level but with levels this low no trends can be determined.

Figure 7-21 – Wind Cave Nitrogen Dioxide Annual Averages



7.4.5 Wind Cave Ozone

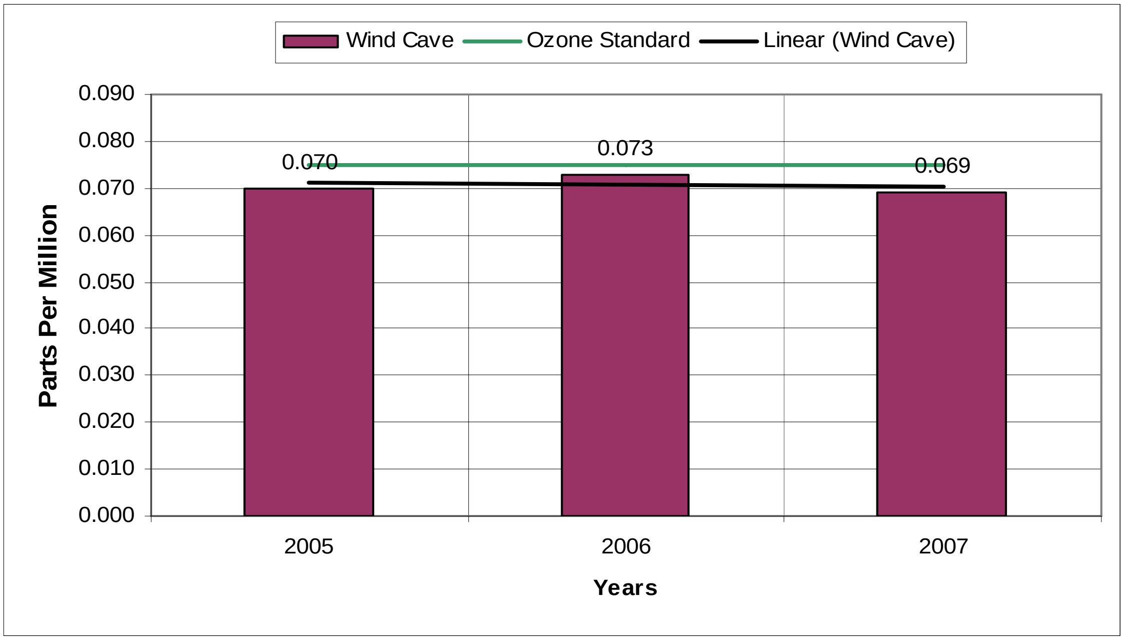
The Wind Cave site has the highest reported 8-hour ozone level in the state at 0.071 parts per million, three year average. Figure 7-22 contains a graph of the ozone 8-hour concentrations for the Wind Cave site since 2005.The linear trends line indicates a slightly decreasing ozone level for this site; however, it is difficult to say if the decrease will continue with all three reporting years having concentrations at about the same level.

7.5 Sioux Falls Area

In 2007, two sampling sites were operated in Sioux Falls. The criteria pollutant parameters tested at these sites include PM10, PM2.5, ozone, sulfur dioxide, and nitrogen dioxide. In addition special purpose monitoring for continuous PM2.5, PM2.5 speciation and air toxics are also operated at the two sites. Air monitoring data records show the Sioux Falls area is attaining all of the National Ambient Air Quality Standards set by EPA. Because concentrations for PM10 and PM2.5 are less than 70% of the standards and because the population of the area is less than 500,000, no National Air Monitoring Site is required for Sioux Falls.

The city continues to grow and now includes residential areas in two counties, Minnehaha and Lincoln. Sioux Falls is the largest city in the state with a 2000 Censes population of 148,281 for Minnehaha County and 24,131 in Lincoln County. The industrial base is mainly service oriented businesses with some heavy industry.

Figure 7-22 – Wind Cave Ozone Yearly 4th Highest 8-hour Averages



7.5.1 KELO Site

The KELO site was established in 1991, as a replacement for the City Hall site. The site is located in the downtown, central part of the city and is the oldest site still operating in Sioux Falls. The KELO site is a SLAMS site for both PM10 and PM2.5. The sampling frequency is every third day for both. A co-located sampler is operated for PM2.5 on an every sixth day schedule. Sampling objectives for these monitoring parameters are population and high concentration. The sampling scale is neighborhood for both PM10 and PM2.5. Figure 7-23 shows a current picture of the monitoring site.

In 2002, a PM2.5 speciation monitor was added to the site to determine the chemical make up of the PM2.5 pollution. The sampler was located at this site because the PM2.5 concentrations are some of the highest in the state and because the city of Sioux Falls is the largest population center in the state.

Figure 7-23 – KELO Site

During an oversight review completed by EPA in 2001, it was noted that a tree planted to the west of the sampling site had grown and would require that the sampling platform be moved about 10 feet east of the current location. The monitors were moved so the tree would not be an obstruction of the 360-degree arch around the monitor. In 2007, the distance between the monitors and the tree is sufficient so the tree is not an obstruction to the site. The height of the tree will be assessed each year to be sure the distance of the monitors from the tree meets the location requirements in 40 CFR Part 58. Table 7-7 contains details on the monitoring site specific to 40 CFR Part 58.

Table 7-7 - KELO Monitoring Site Specifics

Parameter	Information
Site Name	KELO
AQS ID Number	46-099-0006
Street Address	500 South Phillips, Sioux Falls, SD
Geographic Coordinates	UTM Zone 14, NAD 83, E 683,678.21 N 4,823,550.80
MSA	Sioux Falls
PM10 (Continuous)	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS) Real-time Data
Operational Status	No Changes proposed in 2008

Parameter	Information
PM2.5 (Manual)	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day, Co-located Every 6th Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 PM2.5 w/WINS
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
Operational Status	No Changes proposed in 2008
PM2.5 Speciation	
Sampler Type	No Method Designation
Operating Schedule	Every 6th Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Met One SASS
Analysis Methods	Electronic (several methods)
Data Use	SPM (Special Studies)
Operational Status	No Changes proposed in 2008

7.5.1.1 KELO PM10 Data

The annual averages for the KELO site range from a high of 28 ug/m^3 in 1991 to a low of 17 ug/m^3 in 2005. Annual average concentrations vary moving back and forth through the high and low range over the 17 years of sampling. In 2007, the annual average was up 2 ug/m^3 but still below the highest level in 1991. Figure 7-24 contains a graph of the annual averages since the site was set up in 1991. The overall PM10 annual trend line shows a declining concentration level.

7.5.1.2 KELO PM2.5 Data

Sampling for PM2.5 concentrations began in 2001. Annual averages for the KELO site have a range from a high of 10.7 ug/m^3 in 2003 and 2005 to a low of 9.2 ug/m^3 in 2002. Figure 7-25 contains a graph of the annual averages for the KELO site. Concentrations at KELO showed a slight decline in 2007. Annual averages show some variation from year to year, but the trend line also shows a slight decrease concentration levels with the addition of the 2007 year.

Figure 7-24 – KELO PM10 Annual Averages

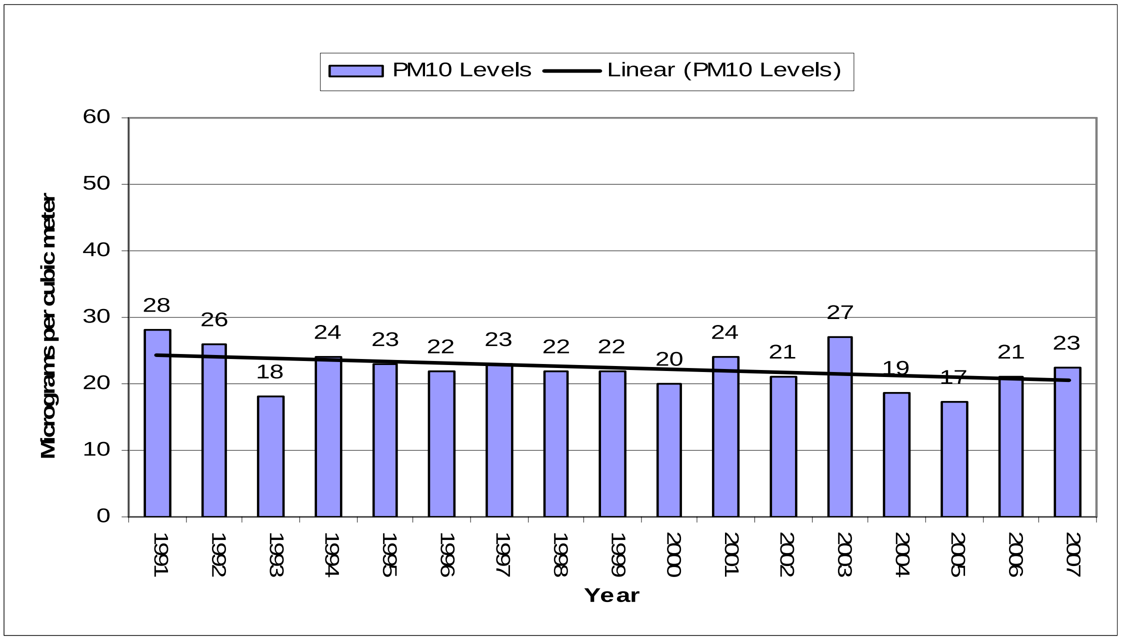
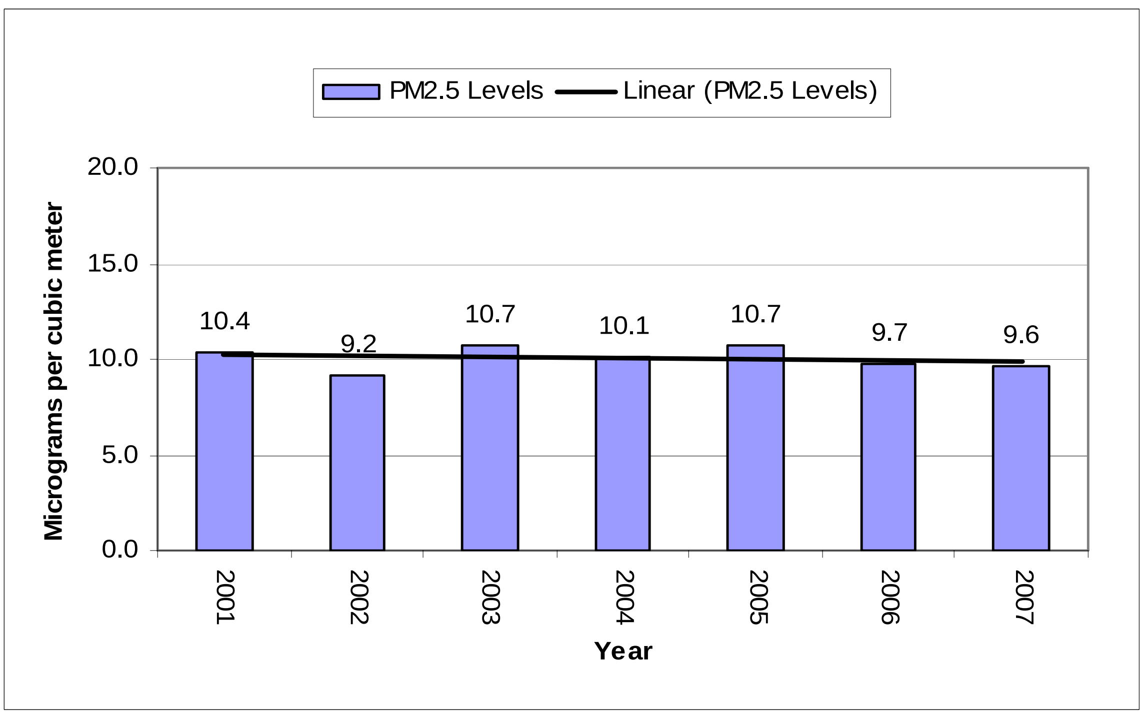


Figure 7-25 – KELO PM2.5 Annual Averages



7.5.2 Hilltop Site

The Hilltop site was established in 1999, as part of the new PM2.5 monitoring network implementation. Sampling parameters at the Hilltop site included PM10, PM2.5, ozone, sulfur dioxide, nitrogen dioxide, meteorology, and air toxics in 2007. At the beginning of 2007, the city of Sioux Falls informed the department the water tower would be removed from the site some time in the next 18 months. The land would then revert back to the original owner. A replacement site was found and the sampling equipment was moved to the SD School site about one mile northwest of the Hilltop site at the beginning of 2008. Figure 7-26 shows a picture of the Hilltop site.

Figure 7-26 – Hilltop Site

The site is in the east central part of the city and is located on the east edge of the Big Sioux River valley on city property. The site is about two miles southeast of the main industrial area in Sioux Falls. The area around the site is mainly residential. Interstate 229 which is a major commuting road runs north and south about eight city blocks west of the monitoring site. Table 7-8 contains details on the monitoring site specific to 40 CFR Part 58.

Table 7-8 - Hilltop Monitoring Site Specifics

Parameter	Information
Site Name	Hilltop
AQS ID Number	46-099-0007
Street Address	Corner of 18th Street and Bahnson Avenue, Sioux Falls, SD

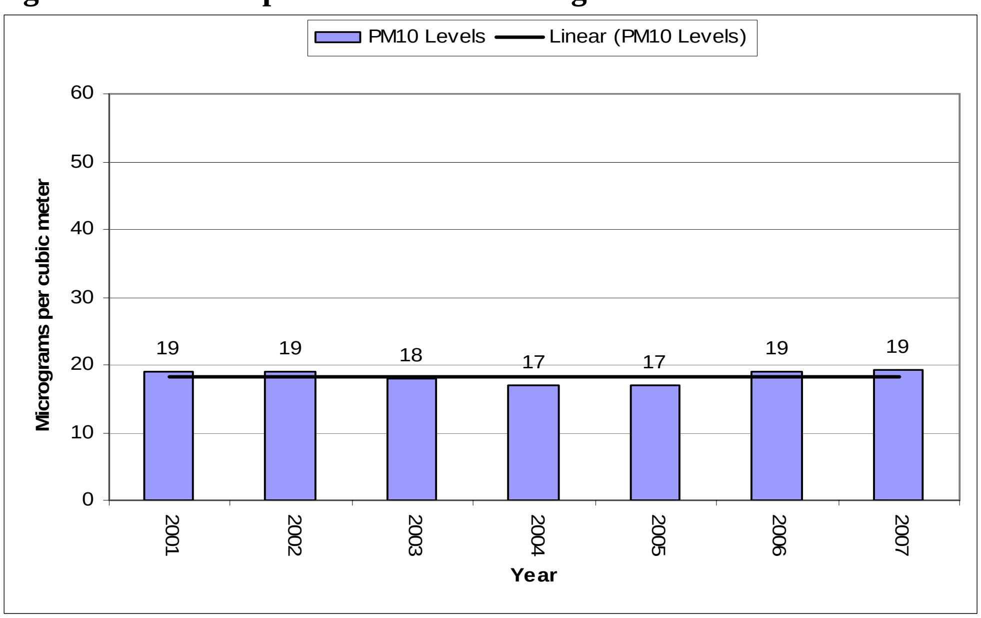
Parameter	Information
Geographic Coordinates	UTM Zone 14, NAD 83, E 687,288.70 N 4,822,930.29
MSA	Sioux Falls
PM10 (Continuous)	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Instrumental-R&P TEOM SA246B-Inlet
Analysis Methods	TEOM-Gravimetric
Data Use	SLAMS (Comparison to the NAAQS), Real-time Data
Operational Status	Closed at the end of 2007
PM2.5	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 PM2.5 w/WINS
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)
Operational Status	Closed at the end of 2007
Air Toxic	
Sampler Type	No Method Designation
Operating Schedule	Every 6th Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Canister/Dragger Tube
Analysis Methods	Cryogenic (several methods)
Data Use	SPM (Special Studies)
Operational Status	Closed at the end of 2007
Ozone (Continuous)	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Instrumental Thermo 49C
Analysis Methods	Ultra Violet
Data Use	SLAMS (Comparison to the NAAQS), Real-time Data
Operational Status	Closed at the end of 2007
NOx (Continuous)	
Sampler Type	Federal Reference Method
Operating Schedule	Every Day

Parameter	Information
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Automated Analyzer Thermo 42C
Analysis Methods	Ultraviolet Fluorescence
Data Use	SLAMS (Comparison to the NAAQS), Real-time Data
Operational Status	Closed at the end of 2007
SO_2 (Continuous)	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Instrumental Thermo 43C
Analysis Methods	Pulsed Fluorescence
Data Use	SLAMS (Comparison to the NAAQS), Real-time Data
Operational Status	Closed at the end of 2007

7.5.2.1 Hilltop PM10 Data

The annual averages at the Hilltop site range from a high of 19 ug/m^3 in four of the years to a low of 17 ug/m^3 in 2004 and 2005. In 2007, PM10 concentrations were at the same level of the previous year. The overall long term trends line show a steady PM10 concentration levels over the seven years of testing. Figure 7-27 shows a graph of the annual averages since 2001.

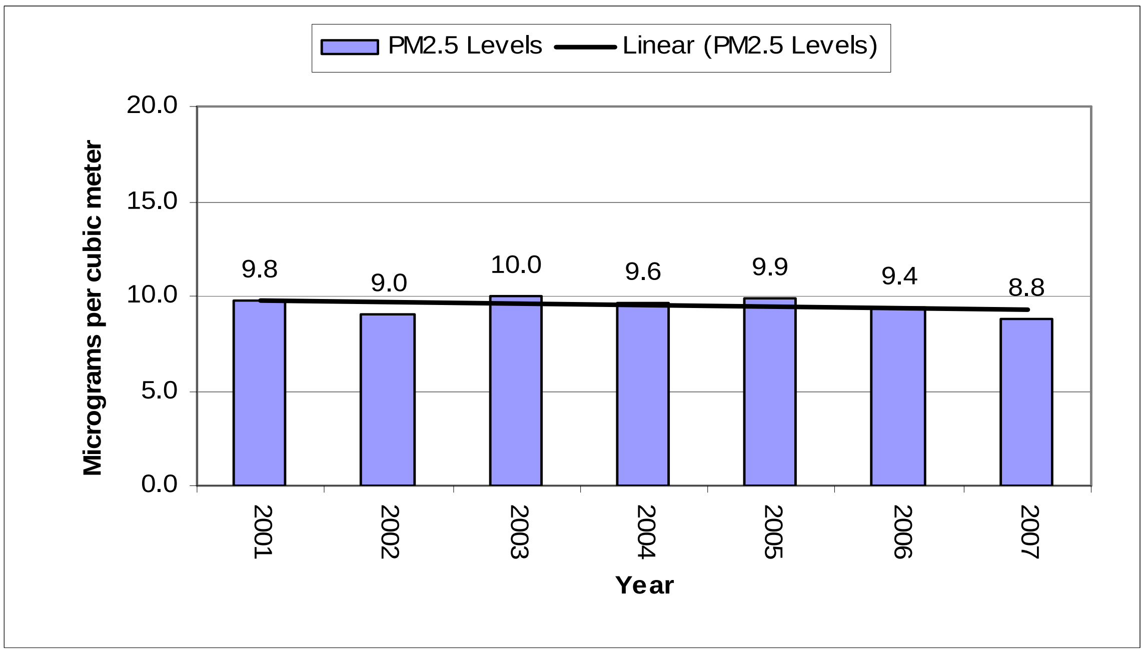
Figure 7-27 – Hilltop PM10 Annual Averages



7.5.2.2 Hilltop PM2.5 Data

PM2.5 data has been collected at this site since 2001. Annual averages for the Hilltop site range from a low of 8.8 ug/m^3 in 2007 to a high of 10.0 ug/m^3 in 2003. The 2007 sampling year recorded the lowest PM2.5 annual average for this site. With the addition of the 2007 annual average the trends line shows a slight decline in concentration level over the seven years but over all the annual averages show little change. Figure 7-28 contains a graph of the annual averages.

Figure 7-28 – Hilltop PM2.5 Annual Averages

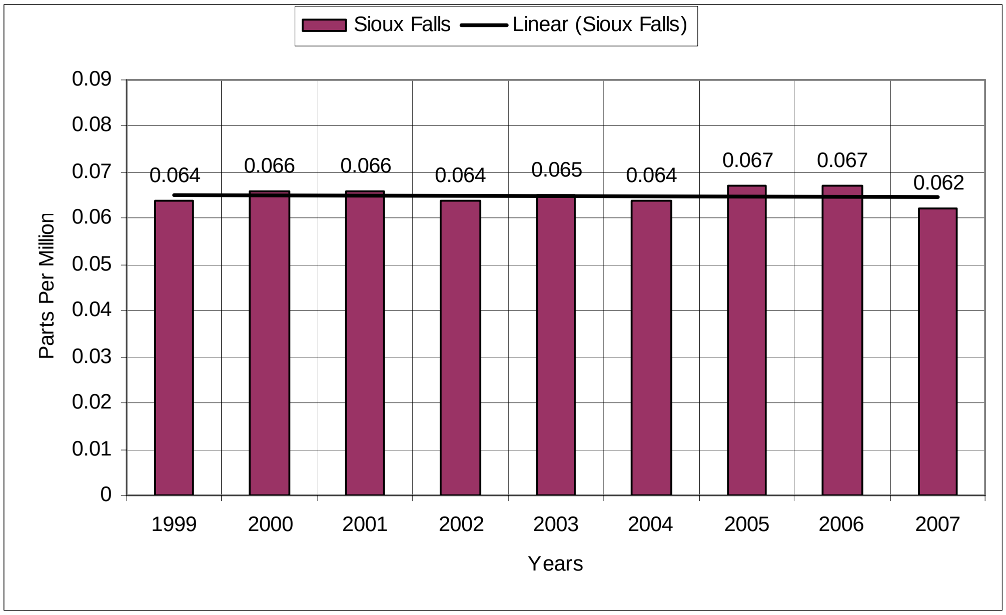


7.5.2.3 Hilltop Ozone Data

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

Sampling began for ozone at this site in 1999. The highest annual 8-hour ozone concentration was recorded in 2005 and 2006 at 0.067 ppm. The lowest annual 8-hour ozone concentration was recorded at 0.062 ppm in 2007. Figure 7-29 contains a graph of each year's 4th highest ozone concentration level. With the addition of the 2007 level trends indicate that concentrations are steady over the nine years of testing at this site.

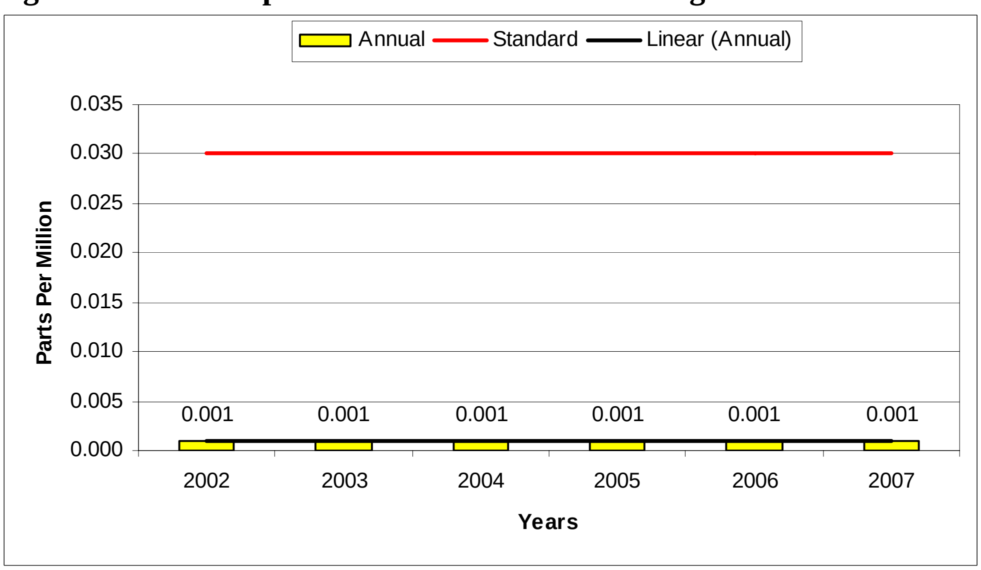
Figure 7-29 – Hilltop Ozone Yearly 4th Highest 8-Hour Averages



7.5.2.4 Hilltop Sulfur Dioxide Data

Testing for sulfur dioxide started at the Hilltop site in 2002. A continuous analyzer is operated providing hourly concentration levels. The sulfur dioxide levels remain low at or just above the detection level for this type of analyzer. No trends can be determined because of the low sulfur dioxide levels. Figure 7-30 contains a graph of the sulfur dioxide annual average for each sampling year.

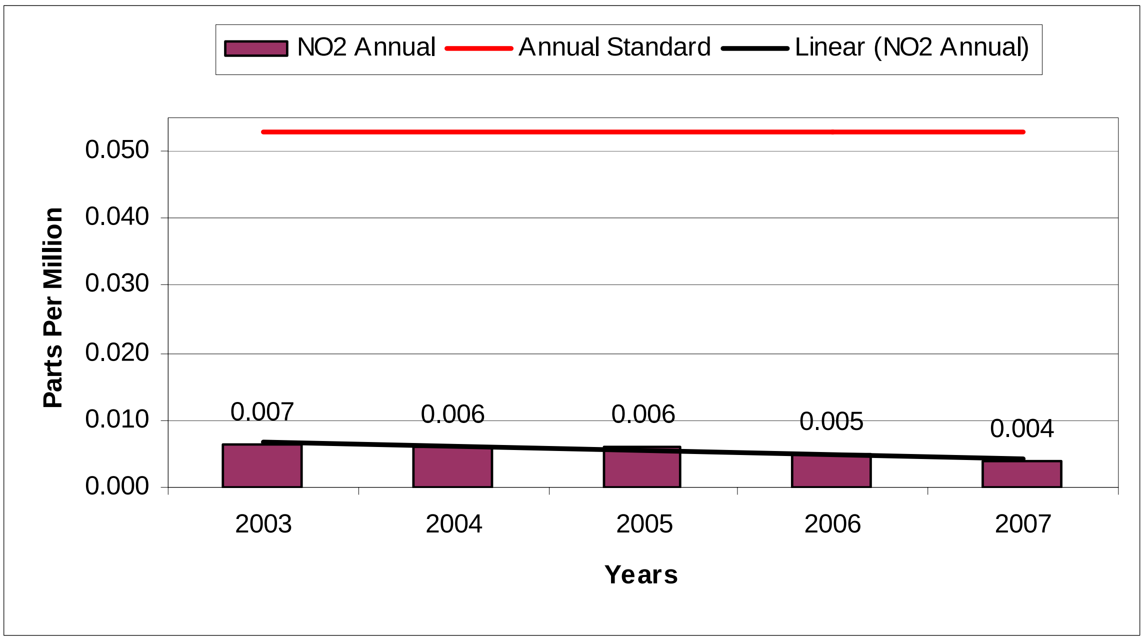
Figure 7-30 – Hilltop Sulfur Dioxide Annual Averages



7.5.2.5 Hilltop Nitrogen Dioxide Data

Nitrogen dioxide testing was added at this site in 2003. The analyzer provides hourly concentration levels. The annual average concentration for nitrogen dioxide at the Hilltop site was 0.004 ppm in 2007. There is only 0.004 ppm difference in concentration levels from 2002 to 2007. The highest level was recorded in 2003 at 0.008 ppm. The lowest level of 0.004 ppm was recorded in 2007. The trends indicated a slight decline in concentration levels in the five years of sampling. See Figure 7-31 for more information on the nitrogen dioxide levels collected at this site.

Figure 7-31 – Hilltop Nitrogen Dioxide Annual Averages



7.6 Aberdeen Fire Station #1 Site

In 2007, one sampling site was operated in the city of Aberdeen at the Fire Station #1 site. The Fire Station #1 site was established in 2000 as part of the implementation of the PM2.5 air monitoring network. The parameters tested at the site included PM10 and PM2.5. The monitoring site is located in the center of the city on top of the fire station roof just east of the main downtown business area. The area around the site has service type businesses, county and city offices, and residential area to the east. See Figure 7-32 for a picture of the monitoring site.

Figure 7-32 – Aberdeen Fire Station #1 Site

Only one change has been noted at this site. The high school which is located across the street to the southeast was closed in 2003 and a new high school was built on the southeast edge of the city. This move significantly reduces the traffic count during the school year months on the south and east sides of the site. There were no other significant changes noted in buildings or trees around the site during this review. Table 7-9 contains details on the monitoring site specific to 40 CFR Part 58.

Table 7-9 – Aberdeen Monitoring Site Specifics

Parameter	Information
Site Name	Fire Station #1
AQS ID Number	46-013-0003
Street Address	111 2nd Ave SE, Aberdeen, SD
Geographic Coordinates	UTM Zone 14, NAD 83, E 540,216.92 N 5,034,545.94
MSA	None
PM10	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS),

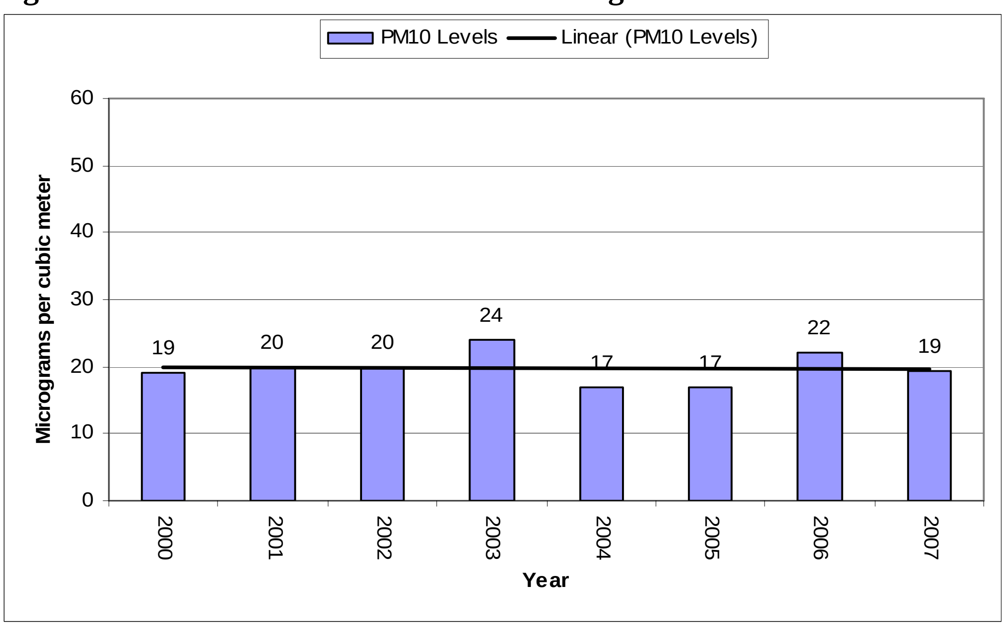
Parameter	Information
PM2.5	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day, Co-located Every 6th Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 PM2.5 w/WINS
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

In the next year part of this building will be renovated and a new section added to the south of the monitors. The proposed plan for the renovation does not indicate these building changes will affect the location requirements for this site.

7.6.1 Aberdeen PM10 Data

The PM10 monitors run on an every third day sampling schedule. Figure 7-33 contains a graph of the annual averages since the site was set up in 2000. The annual average concentrations vary slightly but the trends line indicates levels are steady through the eight years of testing. The annual averages range from a low of 17 ug/m^3 in 2004 and 2005 to a high concentration level of 24 ug/m^3 recorded in 2003. In 2007, the annual average was 19 ug/m^3, which is the average concentration for the eight years of monitoring. The site trend for PM10 is at a steady concentration level.

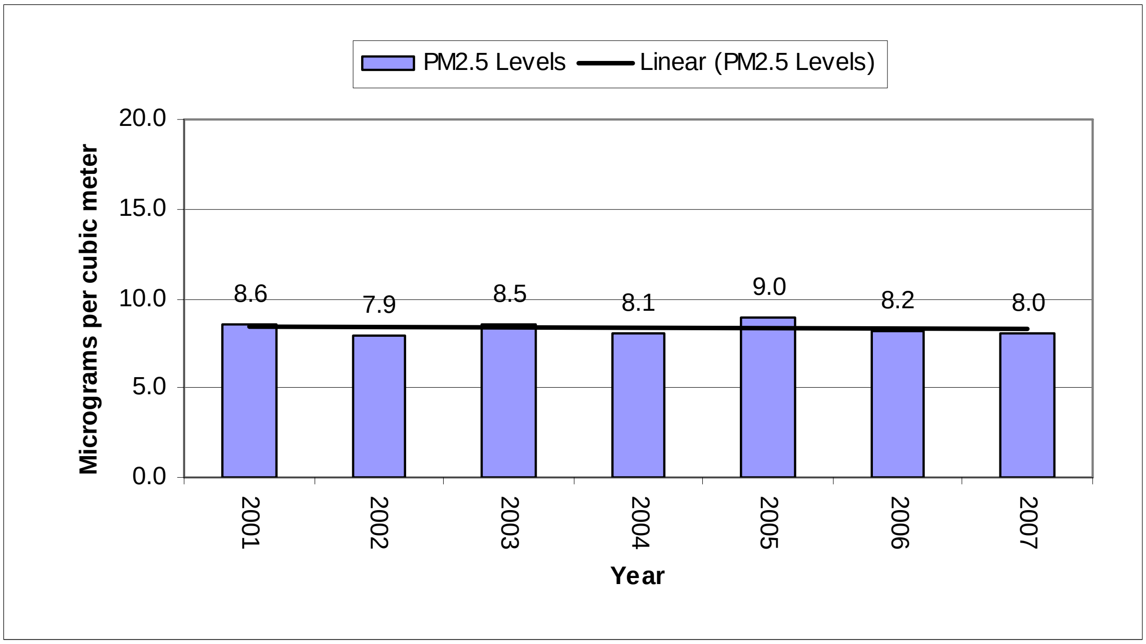
Figure 7-33 – Aberdeen PM10 Annual Averages



7.6.2 Aberdeen PM2.5 Data

Sampling began for PM2.5 at this site in 2001. The PM2.5 monitors run on an every third day sampling schedule. Annual averages for the Fire Station #1 site in Aberdeen have concentrations that range from 7.9 ug/m^3 in 2002 to 9.0 ug/m^3 in 2005. In 2007, concentrations were slightly lower than in 2006. The trend line shows that annual averages have decreased slightly over the last eight years. Figure 7-34 contains a graph of the annual average concentrations.

Figure 7-34 – Aberdeen PM2.5 Annual Averages



7.7 Brookings City Hall Site

In 2007, one air monitoring site was operated in Brookings. The site is located at the City Hall building in the center of the city. The area to the west of the site is residential and the areas north, east, and south have service oriented businesses and light industry. Brookings is a growing community with a population of 18,504 and has a growing industrial base.

The City Hall site was established in 1989 and sampled for levels of PM10. The site is the result of a cooperative effort between the department and the City of Brookings. In 1999, PM2.5 monitors were added to the site. The sampling frequency for PM10 and PM2.5 are every third day. Figure 7-35 shows a current picture of the monitoring site. Table 7-11 contains details on the monitoring site specific to 40 CFR Part 58.

Figure 7-35 – Brookings City Hall Site

Table 7-10 – Brookings Monitoring Site Specifics

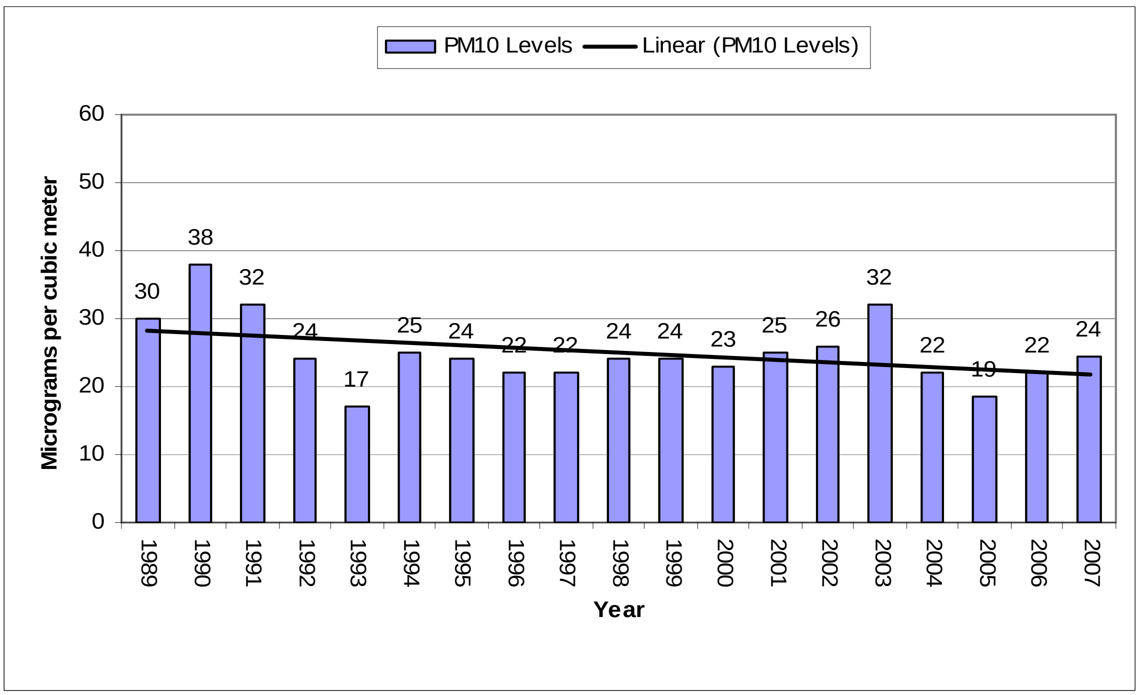
Parameter	Information
Site Name	City Hall
AQS ID Number	46-011-0002
Street Address	311 3rd Avenue, Brookings, SD
Geographic Coordinates	UTM Zone 14, NAD 83, E 675,410.76 N 4,908,468.06
MSA	None
PM10	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	Hi-Vol SA/GMW-1200
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS),
PM2.5	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day, Co-located Every 6th Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 PM2.5 w/WINS

Parameter	Information
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

7.7.1 Brookings PM10 Data

PM10 sampling began at this site in 1989. The annual averages range from a high of 38 ug/m^3 in 1990 to a low of 17 ug/m^3 in 1993. The trend line shows concentration levels declining over the 19 years the site has been operating. In 2007, PM10 concentrations were up slightly from the previous year but still well below the highest concentration in 1990. In Figure 7-36, there is a graph of the yearly annual averages since the site was setup in 1989.

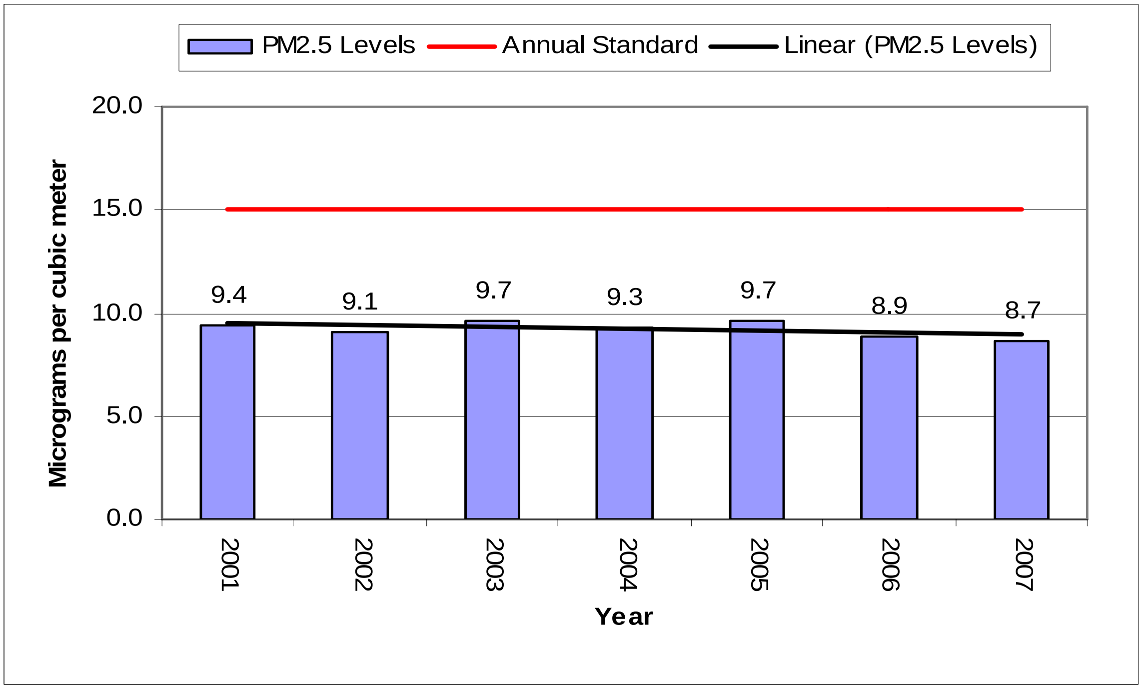
Figure 7-36 – Brookings PM10 Annual Averages



7.7.2 Brookings PM2.5 Data

The PM2.5 monitors run on an every third day schedule since the PM2.5 monitors were setup in 1999. Annual averages for the City Hall site range from a high of 9.7 ug/m^3 in 2003 and 2005 to a low of 8.7 ug/m^3 in 2007. The trends for the seven years of testing show a slight decrease in PM2.5 levels overall, with 2007 PM2.5 concentrations at the lowest level in the seven years of testing. Figure 7-37 contains a graph of the annual average concentrations.

Figure 7-37 – Brookings PM2.5 Annual Averages



7.8 Watertown Utility Yard

In 2007, one sampling site was operated in the city of Watertown at the Utility Yard site. Watertown is the fourth largest city in South Dakota with a population of 20,237. The city has an increasing growth rate and industrial base. The industrial base is a mixture of service-oriented business and light industry. One other air monitoring site was operated in Watertown starting in 1974 and closed 1987. No other air monitoring data has been collected in the city. Figure 7-38 shows a picture of the monitoring site.

The Utility Yard site was established in 2003 as part of the implementation of the PM2.5 network. The parameters tested at the site include PM10 and PM2.5. The monitoring site is located in the western third of the city just east of the industrial area of the city. The site is located on the roof of a monitoring shelter. The area around the site has service type businesses and light industry to the west and south. Residential areas are located to the north and east of the site. There have been no significant changes noted in buildings or trees around the site during this review. Table 7-11 contains details on the monitoring site specific to 40 CFR Part 58.

Figure 7-38 – Watertown Utility Yard Site

Table 7-11 – Watertown Monitoring Site Specifics

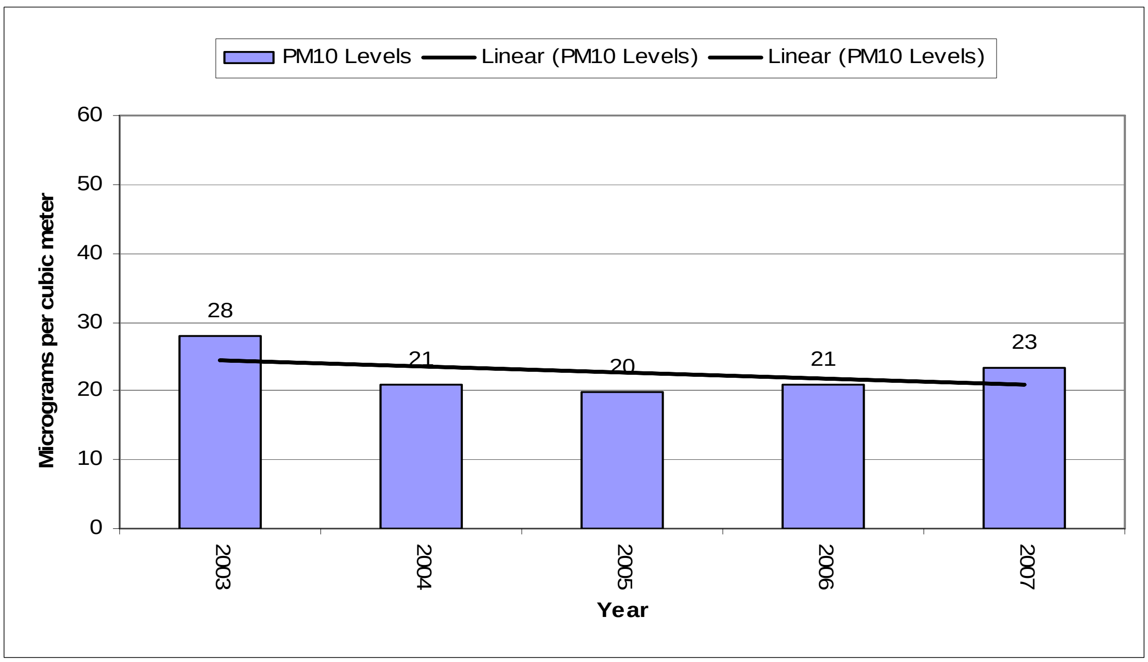
Parameter	Information
Site Name	Utility Yard Site
AQS ID Number	46-029-0002
Street Address	801 4th Ave. SW, Watertown, SD
Geographic Coordinates	UTM Zone 14, NAD 83, E 647,740.74 N 4,973,300.25
MSA	None
PM10 (Continuous)	
Sampler Type	Federal Equivalent Method
Operating Schedule	Every Day
Scale Representation	Neighborhood
Monitoring Objective	High Concentration and Population
Sampling Method	T A Series FH 62 C14 Continuous
Analysis Methods	Beta Attenuation
Data Use	SLAMS (Comparison to the NAAQS) Real-Time Data
PM2.5	
Sampler Type	Federal Reference Method
Operating Schedule	Every 3rd Day
Scale Representation	Neighborhood
Monitoring Objective	Population and High Concentration
Sampling Method	Andersen RAAS2.5-100 PM2.5 w/WINS

Parameter	Information
Analysis Methods	Gravimetric
Data Use	SLAMS (Comparison to the NAAQS)

7.8.1 Watertown PM10 Data

The PM10 monitor operated on an every third sampling schedule until 2006 when a continuous PM10 monitor replaced the manual monitors and an every day sampling schedule began. The highest recorded annual average for PM10 concentrations was 28 ug/m^3 recorded in the first sampling year of 2003. The lowest annual average concentration of 20 ug/m^3 was recorded on the manual monitors in 2005. In 2007, concentrations were up slightly from the previous year but still under the high end of the concentration range. The annual average trend line indicates concentration levels are declining. Figure 7-39 contains a graph of the annual averages.

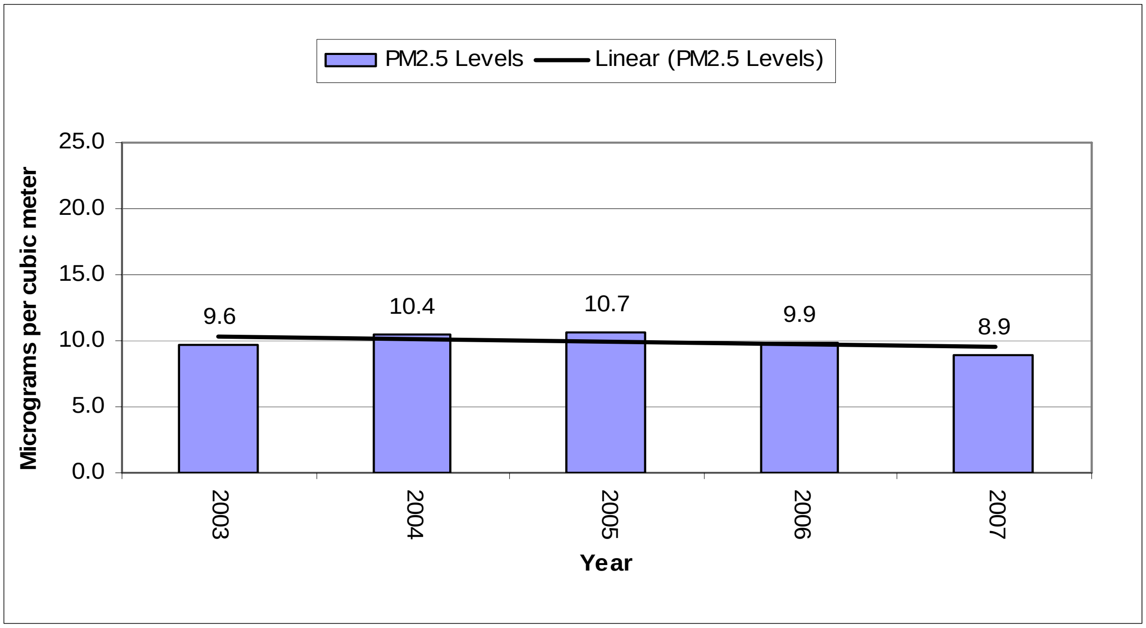
Figure 7-39 – Watertown PM10 Annual Averages



7.8.2 Watertown PM2.5 Data

The PM2.5 monitors run on an every third day schedule since the PM2.5 monitors were setup in 2003. Annual averages for the Utility Yard site range from a high of 10.7 ug/m^3 in 2005 to a low of 8.9 ug/m^3 in 2007. The 2007 annual average was the lowest recorded in five years and recorded the largest change in concentration level during this period. The annual average trend line shows a decrease in PM2.5 concentration levels over the five years of testing. Figure 7-40 contains a graph showing the annual average concentration for each year of testing.

Figure 7-40 – Watertown PM2.5 Annual Averages



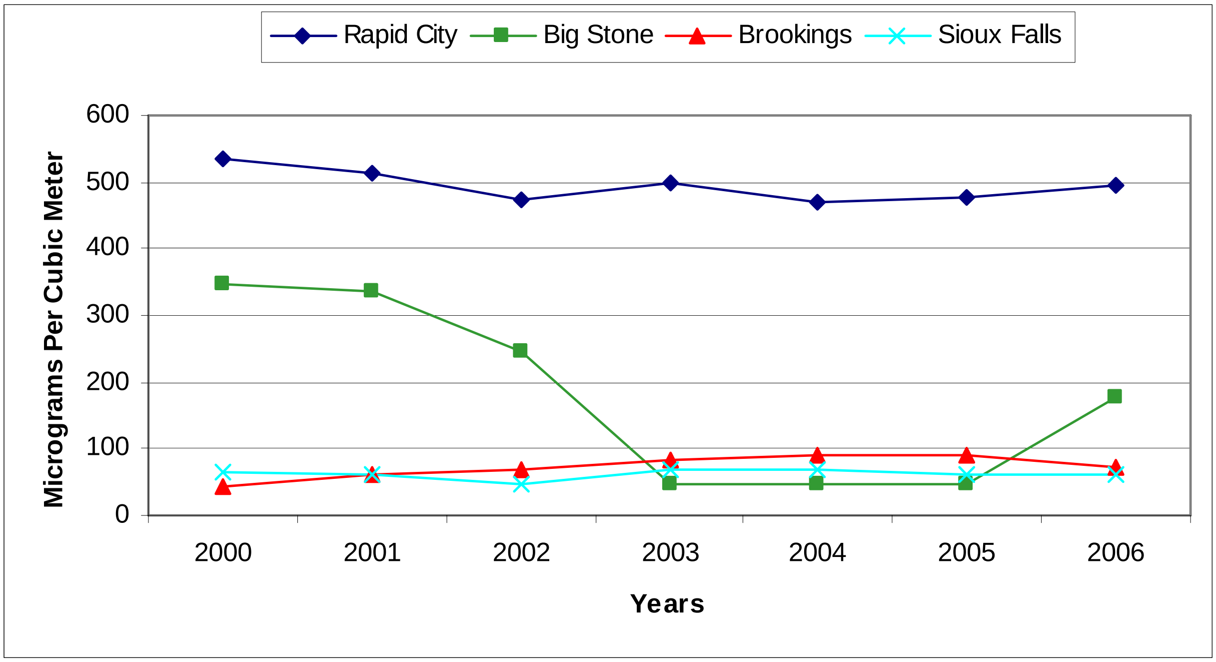
8.0 EMISSIONS INVENTORY

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

8.1 Particulate Mater Emissions Inventory

Particulate matter emissions from permitted sources are calculated as total suspended particulates (TSP) in tons per year because South Dakota's Title V air fees for particulate matter is based on TSP. Figure 8-1 compares four areas in the state with the greatest TSP emissions.

Figure 8-1 – Particulate Matter Emissions



The Rapid City area has a long history of high particulate matter pollution levels. One reason for the high particulate matter pollution levels is that the Rapid City area has the greatest number of facilities in the state that generate TSP emissions. The TSP emissions from point sources in Rapid City declined slightly in the last five years. One reason for the reduction in TSP emission is attributable to Black Hills Corporation installing a natural gas combustion turbine at the Lange facility. The use of the combustion turbine reduced the operation of the natural gas/diesel fired turbines and the diesel generators at the Ben French facility.

The second highest site is the Big Stone area. The reduction in TSP emissions starting in calendar year 2002 until it leveled off in 2003 through 2005 is the result of Otter Tail Power Company installing a hybrid electrostatic precipitator/baghouse control device. In 2006, emissions in the Big Stone area had a moderate increase but are still below emission levels in 2002. The hybrid electrostatic precipitator/baghouse was replaced with a normal baghouse in December 2007 because of operational problems with the hybrid electrostatic precipitator/baghouse.

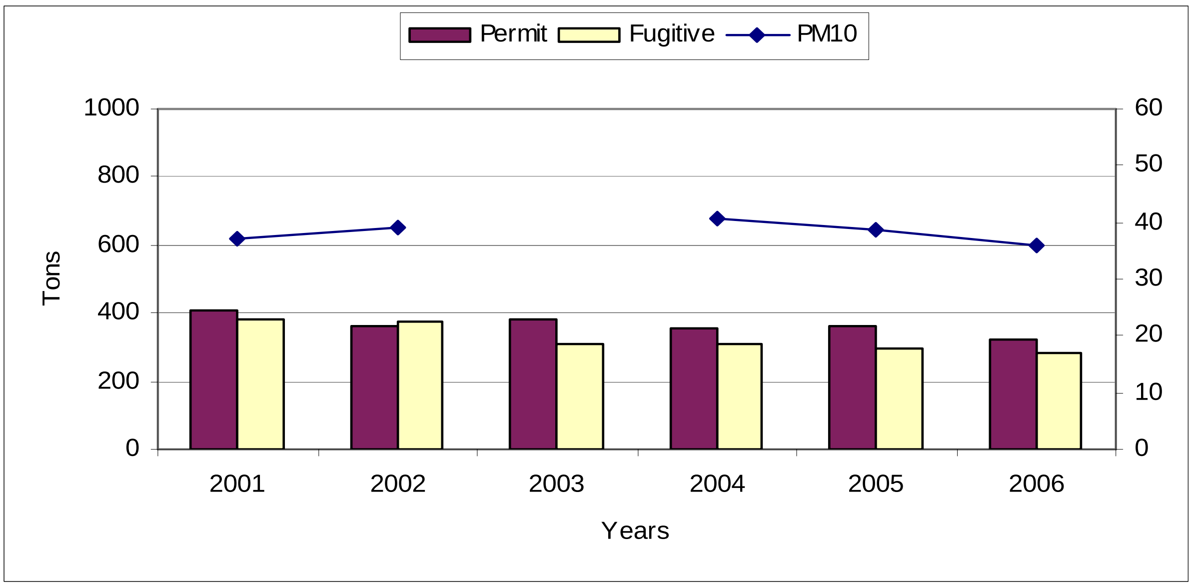
Brookings and Sioux Falls are the 3rd and 4th highest areas in the state, respectively. TSP emissions in these areas are not significantly higher than the other areas of the state. Brookings TSP emissions increased slightly in 2005 but declined to previous emission levels in 2006.

The department has air monitoring sites in Rapid City, Brookings, and Sioux Falls. Due to the tall stack on the Big Stone Power Plant and past air monitoring concentrations being near background levels, no further monitoring for particulate matter is planned for the Big Stone area.

No other areas of the state show significant particulate matter emissions levels, so no new areas are identified for further testing based on current TSP emissions.

A comparison of emissions levels from permitted facilities compared to air quality PM10 concentration was completed to see if reductions in PM10 emission levels had an affect on the ambient air quality concentrations from the Rapid City Credit Union site (see Figure 8-2).

Figure 8-2 – Rapid City Area Emissions

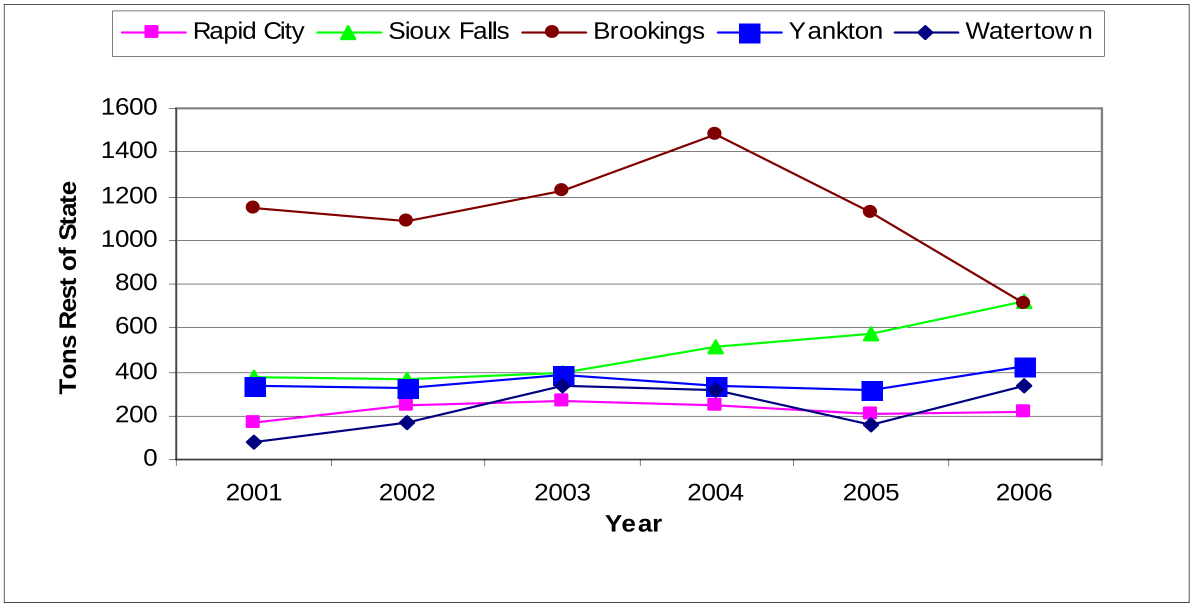


The PM10 emission levels were split into permitted and fugitive sources. There does appear to be a comparison between PM10 emissions and PM10 concentrations measured at the Credit Union site during the last three years. As permit and fugitive PM10 levels declined so did ambient PM10 concentrations from the monitoring site at Credit Union. The PM10 and TSP emissions in Rapid City justifies the use of more monitoring resources to continue to determine the effects of control measures used to maintain the attainment status of this area.

8.2 Volatile Organic Compound Emissions

Volatile organic compounds (VOC) are a major component of ozone pollution. Levels of VOC emissions can be an indicator of potential high concentration areas that may need testing for ozone levels. Because VOC emission inventory totals are very close for several of the areas, Figure 8-3 displays the top five areas that emit VOC emissions.

Figure 8-3 – Volatile Organic Compound Emissions



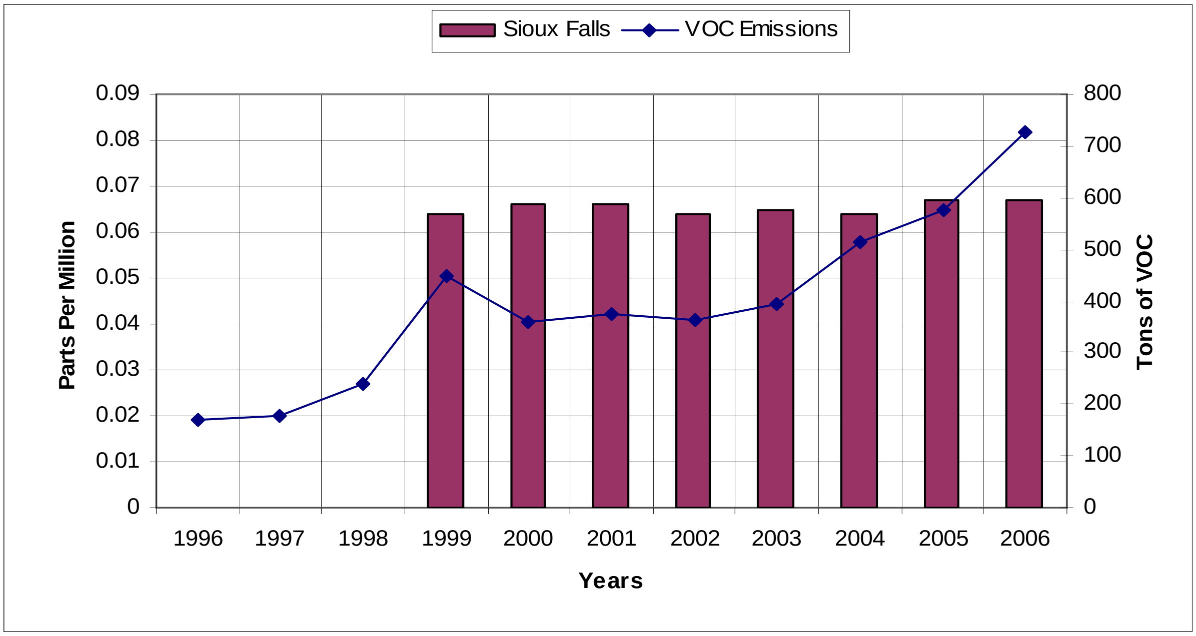
VOC emissions were the highest in the Brookings and Sioux Falls area. Three major sources of VOC emissions are located in and around the Brookings area. However, emission levels in the last two years have continued to fall in the Brookings area. In 1997, one year of ozone monitoring was conducted in this area by South Dakota Soybean Processors. The ozone monitor was located northeast of Volga, which is west of Brookings approximately 5 miles. The 4th highest ozone concentration recorded during that time was 0.065 ppm. In 2008 and 2009, ozone testing will be conducted at a site north of the City of Brookings. Brookings 3M Company and VeraSun Energy are required to test for ozone levels as part of facility expansion under a PSD air quality permit.

The VOC emissions in Sioux Falls have increased approximately 360 tons from 2003 through 2006. The main increase in VOC emissions in the Sioux Falls area is related to the increase in production capacity of several cabinetry businesses in the area. Figure 8.4 displays ozone readings versus VOC emissions in the Sioux Falls area. The increase in VOC emissions does not appear to be impacting ozone levels.

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

An assessment of VOC emissions would indicate the potential for a continued air monitoring site at Brookings because it has the highest VOC emissions in the state. VOC emissions are increasing in Sioux Falls and it is the largest population center in the state so testing will continue.

Figure 8-4 – Comparison of VOC Emissions and Ozone Concentrations in Sioux Falls

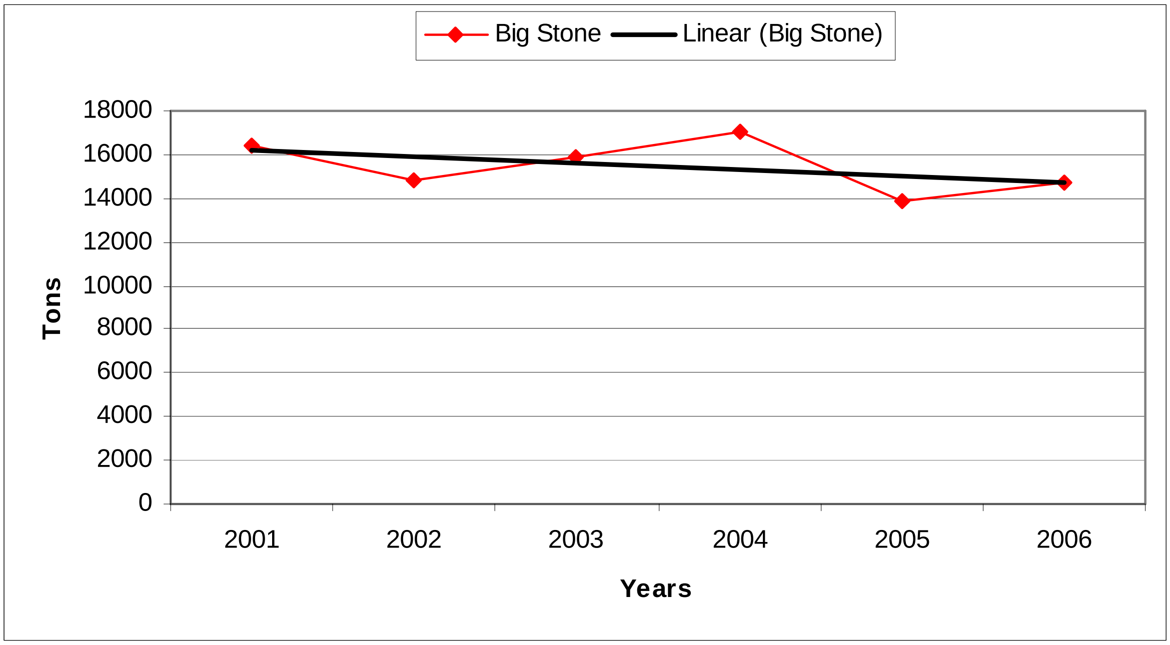


8.3 Nitrogen Dioxide Emissions

Nitrogen dioxide (NO_2) emissions can affect not only ambient concentrations for this pollutant but are also a major component in ozone pollution. For the review of the areas that have the highest concentration levels in the state, two graphs will be used to demonstrate emission trends. The emissions are calculated as nitrogen oxide (NOx). Comparing nitrogen oxide to nitrogen dioxide is feasible since nitrogen dioxide makes up the largest component of nitrogen oxide.

The Big Stone Power Plant has by far the highest nitrogen oxide emissions total per year and is graphed separately from the other sites (see Figure 8-5). If not shown in this manner, the other sites trends can not be seen on the same graph. The trends indicated by the Big Stone area emissions shows a slight decrease in nitrogen oxide emissions. No future testing has been planned for this area because past sampling results for nitrogen dioxide are near background levels.

Figure 8-5 – Big Stone Area Annual Nitrogen Oxide Emissions



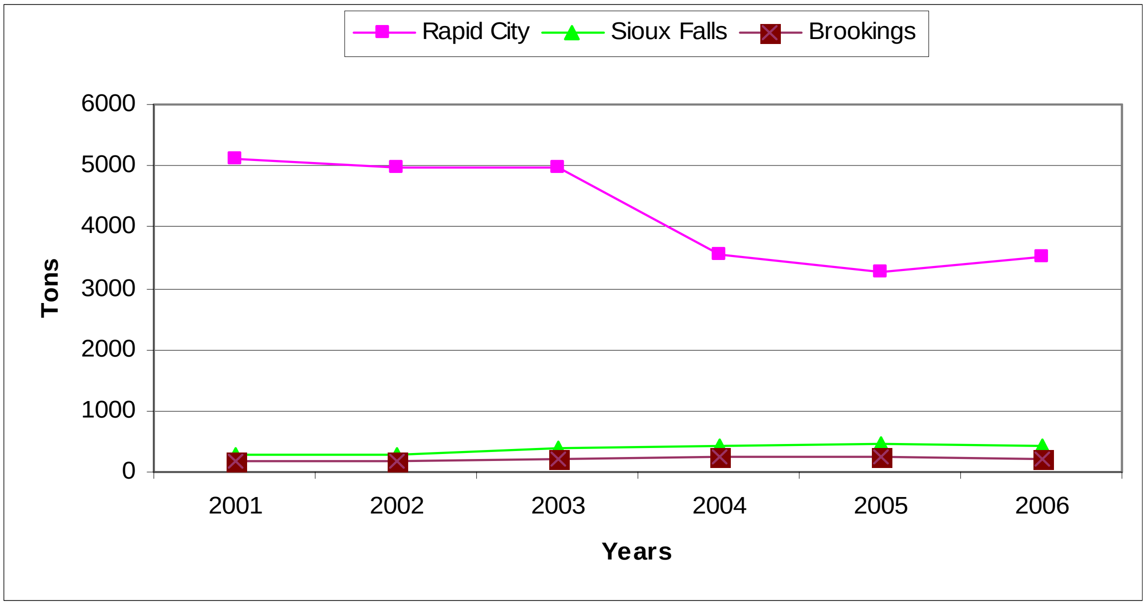
The second highest nitrogen oxide emissions in the state are located in the Rapid City area (see Figure 8-6). The nitrogen oxide emissions in the Rapid City area had decreased in 2004 and 2005. The main reason for the decrease resulted from improvements at GCC Dacotah's portland cement plant. GCC Dacotah installed a staged combustion system with a thermal-efficient in-line, low NOx calciner complemented by a low NOx burner with indirect firing in the dry rotary kiln, which reduced their nitrogen oxide emissions. The Sioux Falls and Brookings areas have low and relatively flat emissions levels. The annual total tons of nitrogen oxide emissions are shown in the graph in Figure 8-6.

Based on the nitrogen oxide emissions, the Rapid City area will be considered in the future for testing for nitrogen dioxide concentrations because it has the highest emission levels in the state. The remaining areas have low emissions and will not be considered unless there is a major increase in emissions.

8.4 Sulfur Dioxide Emissions

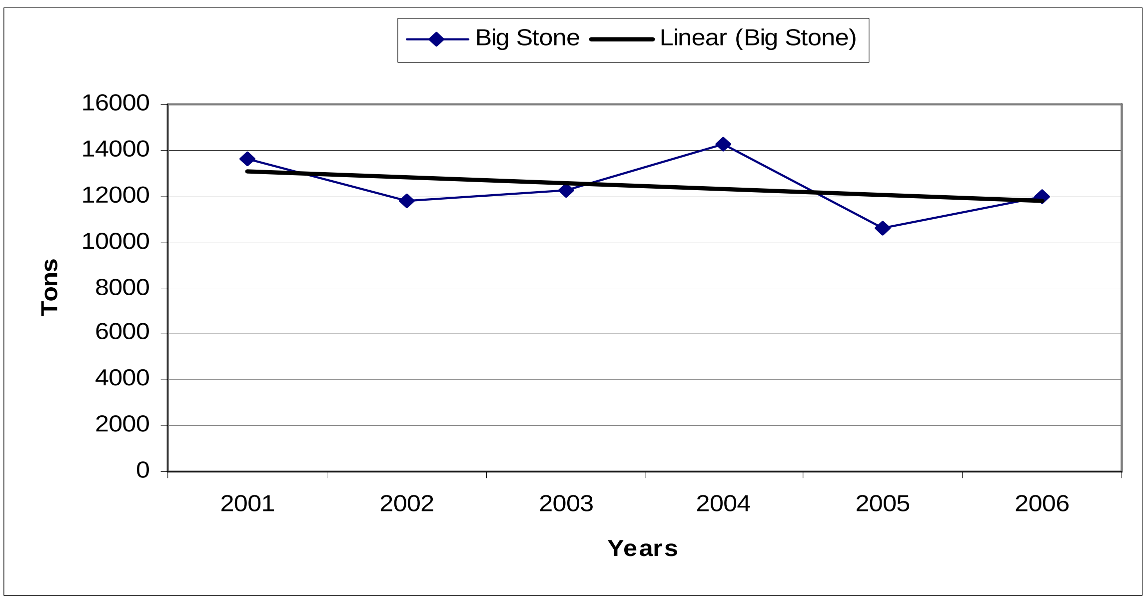
For the review of areas for sulfur dioxide (SO_2) emissions, the four highest concentration areas in the state will be displayed on two graphs to demonstrate emission trends. The Big Stone Power Plant has the highest SO_2 emissions per year and is graphed separately from the other sites. If not shown in this manner the other sites trends can not be seen on one graph.

Figure 8-6 – Other Annual Nitrogen Oxide Emissions



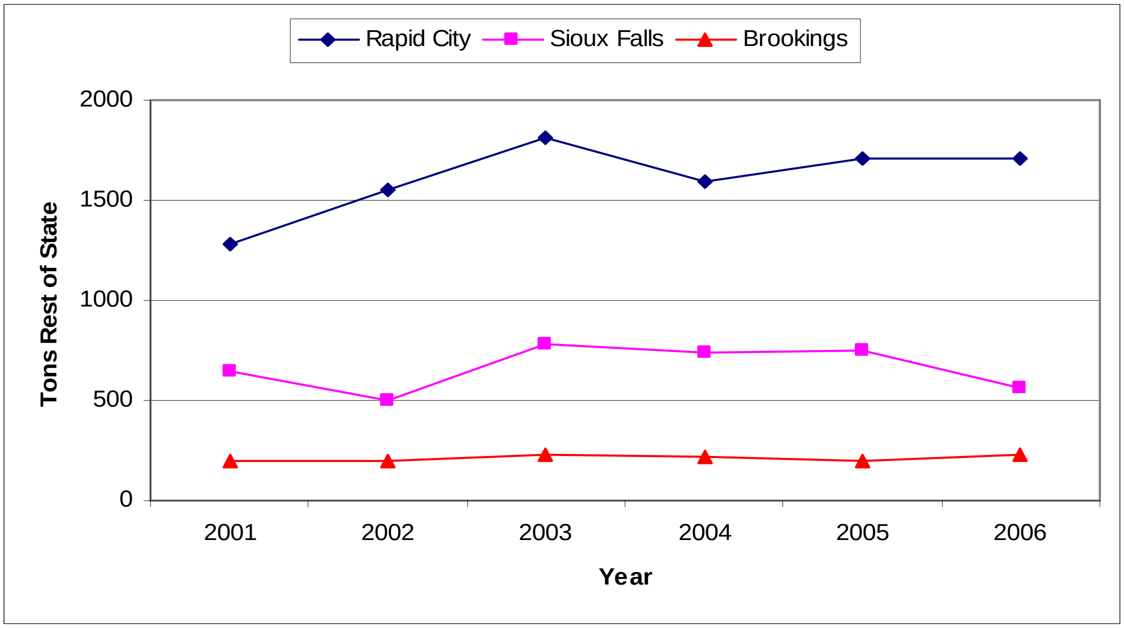
The trends for the Big Stone area show a declining level of emissions over the five years (see Figure 8-7). No future monitoring is planned for SO_2 because past air monitoring showed concentrations to be low near background levels. See Figure 8-7 to view a graph of the SO_2 emissions inventory for Big Stone area.

Figure 8-7 – Big Stone Area Sulfur Dioxide Emissions



The second highest sulfur emissions area is in Rapid City. Significantly lower than the Big Stone area the Rapid City area has a slightly increasing level of SO_2 emissions. The Rapid City area will continue to be evaluated for testing at a later time. The remaining two areas Sioux Falls and Brookings have emissions levels less then Rapid City and are not a consideration for future testing at this time. Figure 8-8 contains a graph of these sites.

Figure 8-8 – Other Area Sulfur Dioxide Emissions



8.5 Carbon Monoxide Emissions

Carbon monoxide emissions have recently been calculated for fuel burning sources. Figure 8-9 shows the emissions levels for highest four areas of the state. During the last six years the Rapid City area has the highest emission of carbon monoxide followed by the Big Stone area. Trends show a slight increase in levels in Rapid City area. The other three selected areas are remaining about the same level.

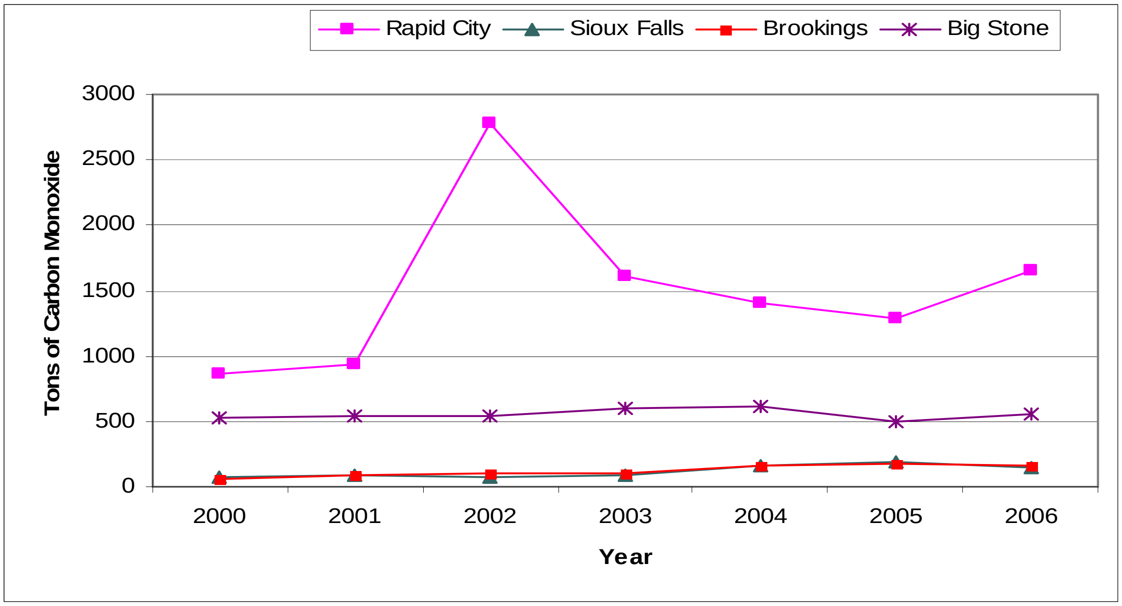
9.0 SPECIAL AIR QUALITY MONITORING

9.1 Urban Air Toxics Monitoring Program

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

One site is in Sioux Falls (SFSD), located in southeastern South Dakota. Sioux Falls is the largest city in the state. The site is located near two grade schools and residential areas. The main industrial area of the city is about three miles northwest and two miles to the west of the site. The site was selected because it represents population exposure to chemical and particulate emissions from the industrial parts of the city. The predominant wind direction is northwest for most of the year with southeast winds during the summer months. The monitor was setup in March of 2000, sampling for hydrocarbons, halogenated hydrocarbons, and polar compounds. In 2002, carbonyls sampling was added.

Figure 8-9 – Carbon Monoxide Emissions



The other site is in Custer (CUSD), located in western South Dakota, south of Rapid City. The site is located in a pasture to the east side of the city of Custer. Custer is in a river valley in the Black Hills with pine covered hills on the north and south sides of the valley. Major sources near the site include vehicles, forest fires, wood burning, and wild land health fires. The main industries in the area include tourism, logging, and mining. The site was selected to verify modeling results from the 1996 National Air Toxics Assessment. These modeling results indicated that Custer County had the highest median county concentration in the state for Acrolein, Formaldehyde, and 1,3-Butadiene and the third highest median county concentration in the state for Acetaldehyde and Benzene. The monitor was setup in March of 2002, sampling for hydrocarbons, halogenated hydrocarbons, polar compounds and carbonyls.

Table 9-1 shows a comparison of the two sites for the five pollutants we were concentrating on at the Custer site. It shows which site had the higher concentration in 2007, what the overall trend has been at each site, and what the sources are for these pollutants. Custer had the higher concentration in 2007 for all the pollutants except Formaldehyde. The trend for these pollutants has been decreasing at both sites except for 1,3-Butadiene at the Custer site.

Table 9-1 - Air Toxic Sampling Results for 2007

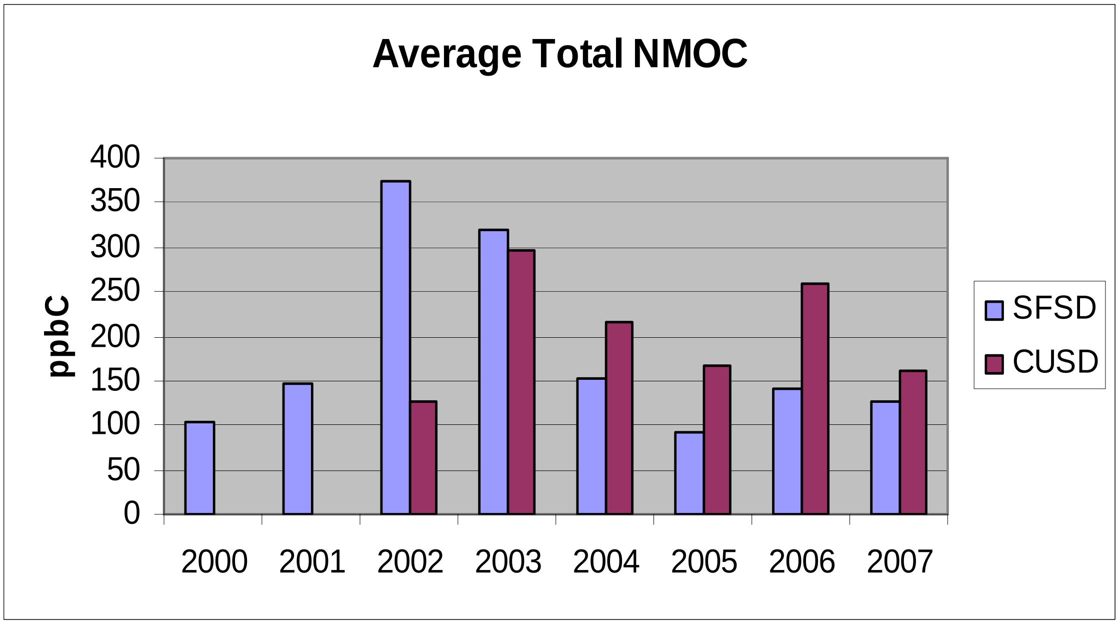
Air Toxic	Site	Site with Higher Concentration (ppbc)	Trend	Potential Sources
1,3-Butadiene	CU	X	Increase	Motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke.
1,3-Butadiene	SF		Decrease	
Formaldehyde	CU		Decrease	Power plants, manufacturing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

The department also opted to have total non-methane organic compounds (NMOC) sampled during the air toxic sampling. NMOC compounds are of particular interest because of their role in ozone formation. The average total NMOC values are shown in Figure 9-1. Last year, the speciated NMOC compounds with the highest concentrations were Propane and n-Pentane at Custer and Isopentane and n-Pentane at Sioux Falls.

9.2 Speciation Monitoring Program

The chemical speciation network will quantify mass concentrations and significant PM2.5 constituents which include trace elements, sulfate, nitrate, sodium, potassium, ammonium, and carbon. This series of analysts is very similar to those measured within the Interagency Monitoring of Protected Visual Environments (IMPROVE) program.

Figure 9-1 - Average Total NMOC



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

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

South Dakota has one site that collects samples as part of the Speciation Network. This site collects 24-hour air samples on a 6-day schedule. Speciation testing involves the collection of PM2.5 size particulates in specialized devices and analyzing the particulates for several elements and compounds. The site is in Sioux Falls (SFSD), located in southeastern South Dakota. Sioux Falls is the largest city in the state. The site is located in the downtown area. The site was selected because it represents population exposure to chemical and particulate emissions from the industrial parts of the city. The predominant wind direction is northwest for most of the year with southeast winds during the summer months. The monitor was setup in February of 2002.

Figure 9-2 shows a comparison of the PM2.5 concentrations between the speciation monitor (SPM) and the manual monitor (FRM) located at this site. Concentration trends for both of the PM2.5 manual and speciation monitors remains steady. The difference between the two PM2.5

sampling methods in annual average levels is only 0.44 ug/m^3, with the speciation monitor recording the higher annual average.

Figure 9-2 – Annual Average PM2.5 Concentration

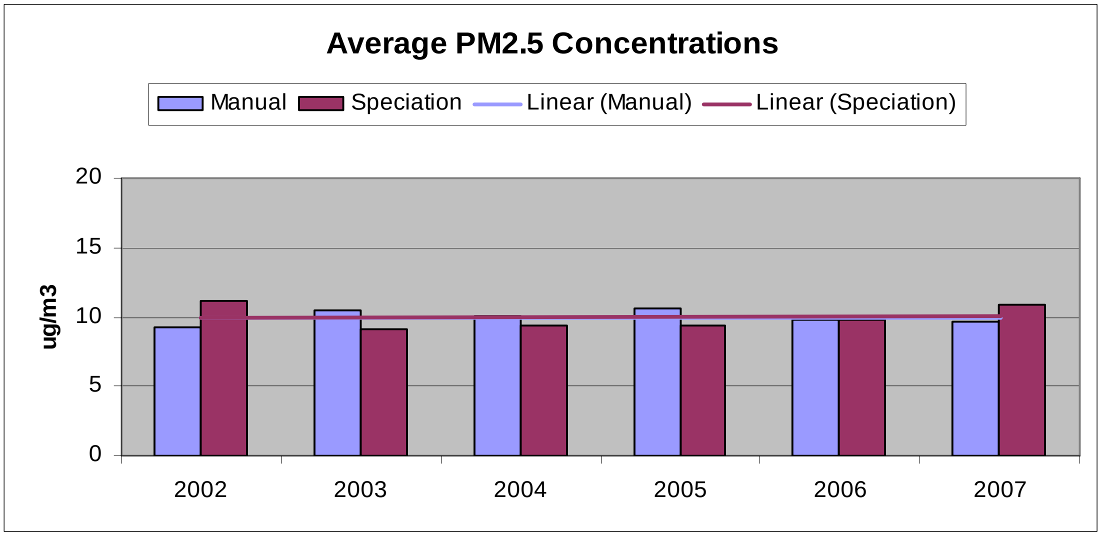


Figure 9-3 shows the average carbon concentrations for speciation testing at the KELO Site. Total carbon concentrations are declining over the six year testing period. Almost all of the decline is due to organic carbon. Elemental carbon trends show little change during the test period.

Figure 9-3 - Average Carbon Concentrations

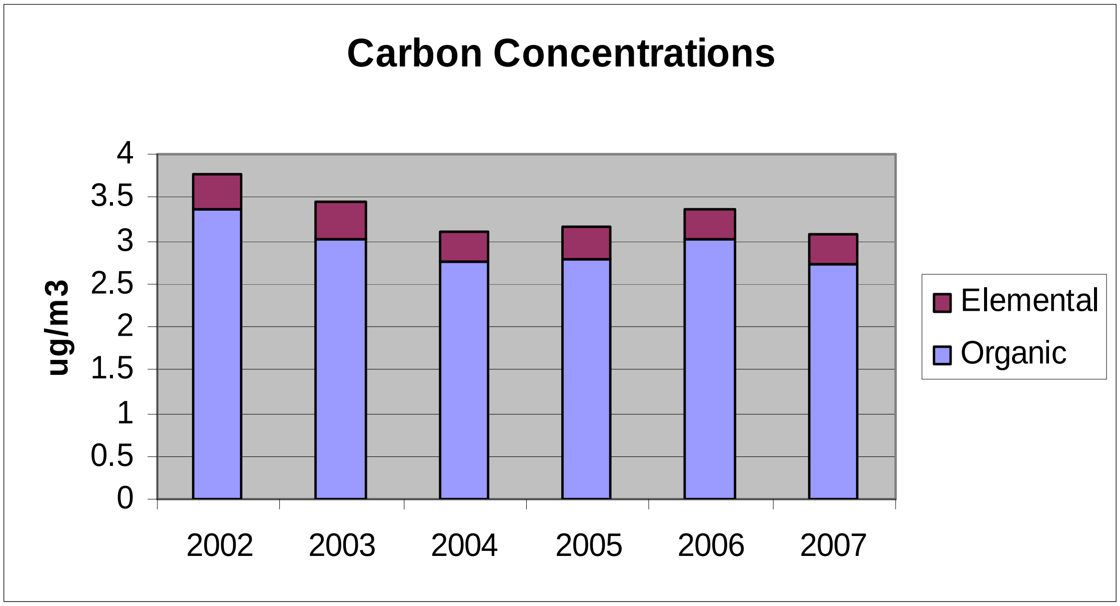
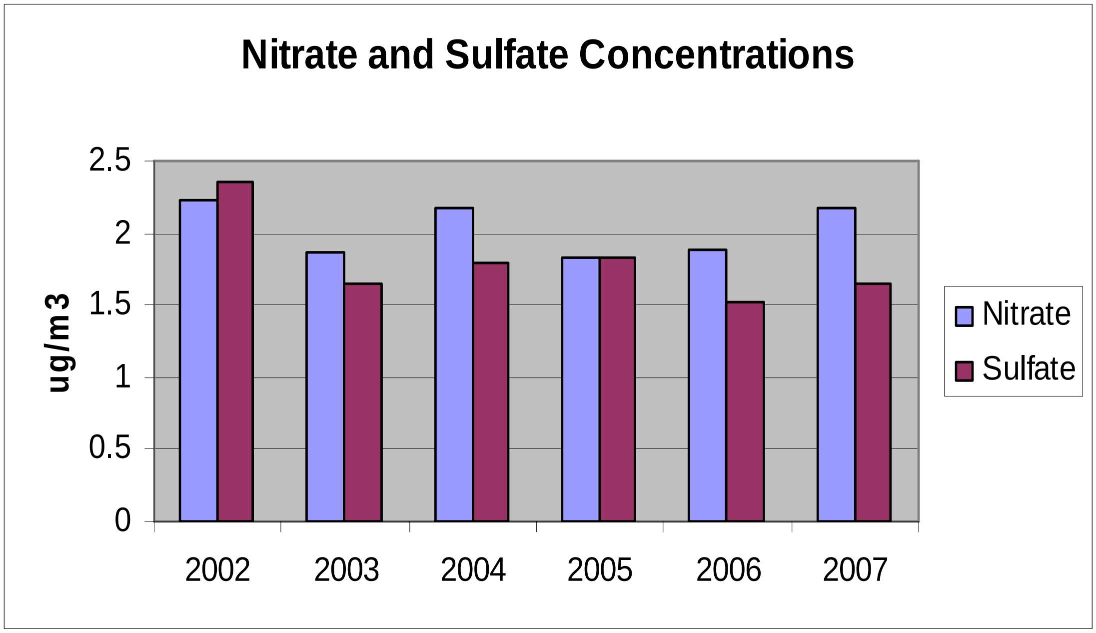


Figure 9-4 shows the average nitrate and sulfate concentrations. The graph shows trends for concentrations of nitrates are at nearly a steady level over the six year period. Sulfates in the PM2.5 particulate matter have declined an average of 0.5 ug/m^3 during the test period.

Figure 9-4 - Average Nitrate and Sulfate Concentrations



10.0 QUALITY ASSURANCE REQUIRMENTS

Table 10-1 provides information on how the South Dakota air monitoring network is meeting the quality assurance requirements in 40 CFR Part 58, Appendix A. The table includes six manual PM10 sites of which two are co-located. There were nine PM2.5 sites of which two were co-located. The South Dakota Ambient Air Monitoring Network is meeting the quality assurance requirements specified in 40 CFR Part 58, Appendix A including the SPM PM2.5 continuous monitors.

"POC" means Parameter Occurrence Code used to distinguish between different monitors monitoring the same pollution parameter at the same site or monitors with different sampling frequency and data uses. In most cases the numbering system in the "POC" column means: "1" – Data from monitors with sampling frequency of every third or every six day; "2" – Data from co-located precision monitors; and "3" – Data from continuous monitors with hourly values.

The numbers in the "Precision and Accuracy Check" columns indicates the number of checks completed during each monthly quarter.

Table 10-1 – 40 CFR Part 58, Appendix A Requirements

Site Name	AQS ID	POC	Parameter	Precision Checks	Accuracy Audits			
					1st	2nd	3rd	4th
Aberdeen	46-013-0003	1	PM10	57	1		1	
		1	PM2.5			1	1	1
Brookings	46-011-0002	1	PM10		1	1		1
		1	PM2.5		1	1	1	1
SF KELO	46-099-0006	1	PM10					1
		1	PM2.5	51	1	1	1	1
SF Hilltop	46-099-0007	3	PM10	26	1	1	1	1
		1	PM2.5		1	1	1	1
		3	Ozone	49	1	1	1	1
		1	SO_2	50	1	1	1	
		1	NO_2	49	1	1	1	
Watertown	46-029-0002	3	PM10	29	1	1	1	1
		1	PM2.5		1	1	1	1
Badlands	46-071-0001	3	PM10	24	1	1	1	1
		3	PM2.5					
		1	PM2.5		1	1	1	1
		3	SO_2	49	1	1	1	1
		3	NO_2	49	1	1	1	1
Wind Cave	46-033-0132	3	PM10	30	1	1	1	1
		3	PM2.5					
		1	PM2.5		1	1	1	1
		3	Ozone	48	1	1	1	1
			SO_2	50	1	1	1	
			NO_2	46	1	1	1	
Black Hawk	46-093-0001	1	PM10		1	1		
		1	Ozone	46	1	1	1	1
RC National Guard	46-103-0013	1	PM10				1	
RC Credit Union	46-103-0020	3	PM10	29	1	1	1	1
		3	PM2.5					
		1	PM2.5	60	1	1	1	1
RC Library	46-103-1001	2	PM10	59				1
		1	PM2.5		1	1	1	1

Tables 10-2 and 10-3 show details on how the South Dakota Ambient Air Monitoring Network is meeting the requirements in 40 CFR Part 58, Appendix E.

Table 10-2– 40 CFR Part 58, Appendix E Requirements

Site Name	AQS ID	Parameter	Probe Inlet Height Above Ground (meters)	Horizontal/ Vertical Distance From Supporting Structures (meters)	Distance From Trees (meters)	Distance From Roads (meters)
Aberdeen	46-013-0003	PM10	10	0/2	NA	16.7
		PM2.5	10	0/2	NA	16.7
Brookings	46-011-0002	PM10	7	0/2	NA	154
		PM2.5	7	0/2	NA	154
SF KELO	46-099-0006	PM10	6	0/2	10	26
		PM2.5	6	0/2	11	27
SF Hilltop	46-099-0007	PM10	4.3	0/2	30	37
		PM2.5	4.3	0/2	30	37
		Ozone	3.5	1/3	30	37
		SO_2	3.5	1/3	30	37
		NO_2	3.5	1/3	30	37
Watertown	46-029-0002	PM10	5.1	0/2	NA	34
		PM2.5	5.1	0/2	NA	32
Badlands	46-071-0001	PM10	4.6	0/2	NA	43.9
		PM2.5	4.7	0/2	NA	45
		SO_2	4.1	1/2	NA	46
		NO_2	4.1	1/2	NA	46
Wind Cave	46-033-0132	PM10	4.3	0/2	32	90
		PM2.5	2.7	0/2	30	90
		Ozone	3.3	1/1.1	30	90
		SO_2	3.3	1/1.1	30	90
		NO_2	3.3	1/1.1	30	90
Black Hawk	46-093-0001	PM10	3.1	0/2	NA	117
		Ozone	2.4	1/1	NA	117
RC National Guard	46-103-0013	PM10	6.5	0/2	70	50
RC Credit Union	46-103-0016	PM2.5	3.5	0/2	5	40
RC Library	46-103-1001	PM10	8.9	0/2	NA	31
		PM2.5	8.9	0/2	NA	37

Notes: “NA” means Not Applicable

Table 10-3 – 40 CFR Part 58, Appendix E Requirements

Site Name	AQS ID	Parameter	Distance/ Direction To Nearest Obstacle (meter)	Height of Obstruction Above Probe Inlet (meter)	Distance To Point/Area Source (meters)
Aberdeen	46-013-0003	PM10	NA	NA	2,012
		PM2.5	NA	NA	2,012
Brookings	46-011-0002	PM10	NA	NA	357
		PM2.5	NA	NA	357
SF KELO	46-099-0006	PM10	10/west	3	800
		PM2.5	11/west	3	800
SF Hilltop	46-099-0007	PM10	NA	NA	1,200
		PM2.5	NA	NA	1,200
		Ozone	NA	NA	1,200
		SO_2	NA	NA	1,200
		NO_2	NA	NA	1,200
Watertown	46-029-0002	PM10	NA	NA	805
		PM2.5	NA	NA	805
Badlands	46-071-0001	PM10	NA	NA	10,000+
		PM2.5	NA	NA	10,000+
		SO_2	NA	NA	10,000+
		NO_2	NA	NA	10,000+
Wind Cave	46-033-0132	PM10	NA	NA	10,000+
		PM2.5	NA	NA	10,000+
		Ozone	NA	NA	10,000+
		SO_2	NA	NA	10,000+
		NO_2	NA	NA	10,000+
Black Hawk	46-093-0001	PM10	NA	NA	1,100
		Ozone	NA	NA	1,100
RC National Guard	46-103-0013	PM10	17/west	40	350
RC Credit Union	46-103-0016	PM2.5	5/NW	10	2400
RC Library	46-103-1001	PM10	2.1/south	0.8	1,609
		PM2.5	2.1/south	0.8	1,609

Notes: "NA" means Not Applicable

11.0 NETWORK MODIFICATIONS FOR 2008 and 2009

11.1 New Sites

In response to public requests on air monitoring in Union County, the department will be adding three new sites in 2008. A proposed oil refinery is planned near Junction City call Hyperion Energy Center and will also include a power plant. The monitoring objectives are to gather data to determine current pollution levels that can be compared to the air quality standards before construction of the project begins, collect data during plant construction, and determine levels during the operation of the facility. It is anticipated these monitoring sites will be setup as soon as equipment and shelters arrive in early fall of 2008.

The site name, approximate location and the type of air pollutants being monitored are listed below:

- **UC Site 1** will be located southeast of the proposed facility property boundary within the modeled PM, SO2, NOx, and CO one microgram facility emissions foot print of impact if possible. The site will monitor for PM10, PM2.5, SO2, NO2, CO, meteorological parameters and air toxics;
- **UC Site 2** will be located northwest of the proposed facility property boundary within the modeled PM, SO2, NOx, and CO one microgram facility emissions foot print of impact if possible. The site will monitor for PM10, PM2.5, SO2, and NO2; and
- **UC Site 3** will be located northwest of the proposed facility property boundary outside the modeled NOx one microgram facility emissions foot print of impact. The site will monitor for ozone concentrations.

11.2 Modifications

During 2008, modifications will be made to change equipment type, to reduce the cost of operating the PM2.5 network of sites and to shift resources to the new Hyperion monitoring sites. The toxics monitor from the Custer site will be shutdown and moved to a Hyperion site. Other modifications to equipment type will be made to begin replacing the RAAS PM2.5 manual method monitors which were purchased in 1997 and are beginning to have a lot of malfunctions and require a lot of maintenance work. These monitors have been discontinued by the manufacturer and replacement parts are getting hard to find. Shortly, replacement parts will not be provided by the manufacturer. Changes will be made to the co-located PM10 and PM2.5 sites to bring the network in line with the minimum requirements for number of sites and sampling frequency. The speciation monitor at the KELO site will be moved to the SD School site to meet NCore requirements.

11.2.1 Equipment Replacement

A modification will be made in the replacement of the continuous Thermo BETA PM2.5 monitors at the Credit Union, Badlands, and Wind Cave sites with Met One BAM PM2.5 continuous Federal Equivalent Method monitors. The Thermo BETA PM2.5 continuous monitors have no EPA method designation and can only be used for special purpose sampling. The addition of the Met One BAM PM2.5 (FEM) continuous monitors will allow reduction and in some cases the discontinuation of the use of RAAS PM2.5 Federal Reference Method monitors at some sites. A significant savings in monitoring dollars can be made through this change. The Thermo BETA PM2.5 monitors will be reused as PM10 (FEM) continuous monitors in the network at the new Hyperion sites. Near Real Time hourly concentrations from all three monitor locations will continue to be loaded from the three sites to the department's website at: http://www.state.sd.us/denr/DES/AirQuality/aarealtime.htm

A modification will be made by replacing the RAAS 100 PM2.5 (FRM) monitors with PQ 200 PM2.5 (FRM) monitors made by BGI Incorporated. Two PQ 200 PM2.5 monitors have been purchase and will be used to replace the two RAAS 100 PM2.5 monitors at the SD School site in Sioux Falls. The BGI monitor will be tested to determine if this will be a good replacement for the RAAS 100 PM2.5 monitors.

A Met One BAM PM2.5 (FEM) continuous monitor will be added to the SD School site at the beginning of 2009. The SD School site is the NCore site for South Dakota. This change will also provide a PM2.5 co-located site for the FEM to FFM quality assurance comparison of monitors.

11.2.2 Cost Saving Measures

At the beginning of 2009, the following will occur:

1. The department anticipates removing the RAAS 100 PM2.5 monitors and using the data from the Met One BAM PM2.5 (FEM) continuous monitors at Wind Cave and Badlands sites for comparison to the NAAQS. This change will reduce the PM2.5 manual method sampling costs by reducing yearly sample numbers by 244;
2. The number of PM2.5 co-located FRM to FRM sites will be reduced to one site. This will provide a cost saving of 61 samples per year. The co-located PM2.5 monitors will be removed from the KELO site. This move is being made because only one co-located FRM to FRM monitors is required if the number of PM2.5 FRM manual sites in the network falls below 10 sites. This will occur when the Met One BAM PM2.5 continuous monitors replace the FRM manual monitors at two sites listed in the item above;
3. The number of PM10 co-located FRM to FRM manual monitor sites will be reduced to one site. The co-located PM10 monitor at the Rapid City Library site will be removed. This change will reduce the number of PM10 samples by 61 per year;

4. The sampling frequency for the PM10 and PM2.5 co-located sites will be reduced from every sixth day to every 12th day as allowed by 40 CFR Part 58. This will reduce the number of year filters for co-located PM10 and PM2.5 sites in the network by 122 for each parameter; and
5. The sampling frequency for all the PM10 sites with highest yearly 24-hour concentrations less than 70% of the PM10 standard will be reduced from every third day to every sixth day as allowed by 40 CFR § 58.12 as it relates to PM10 manual monitoring sites. This change will reduce the yearly number of PM10 sample filters by 244.

The only site operating PM10 manual method monitors not included in the sampling frequency reduction will be the Rapid City Library site. The Rapid City area has a potential to exceed the PM10 standard so it is important to continue a minimum of every third day sampling at this site. See Table 11-1 for details on the maximum 24-hour concentration for each site recorded in the last three years.

Table 11-1 – Comparison of Maximum 24-Hour Concentrations to PM10 Standard

Site	Maximum 3-year 24-hour	% of the PM10 24-hour Standard
Aberdeen Site	72 ug/m^3	48 %
Brookings Site	79 ug/m^3	53 %
SF KELO Site	99 ug/m^3	66 %
Black Hawk Site	52 ug/m^3	35 %
RC Library Site	99 ug/m^3	66 %

11.3 Sites Closed

One site was closed at the end of 2007. The Hilltop site was closed and moved to the SD School site at the beginning of 2008. In 2009, the Custer Air Toxic Site will be closed and the equipment will be moved the Union County Site #1 locations.

12.0 REQUEST FOR WAIVER

There were no sampling frequency waivers requested for the 2008 sampling year and none are proposed for 2009.

13.0 CONCLUSIONS

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

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

14.0 REFERENCES

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

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

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

APPENDIX A

2008 EQUIPMENT PURCHASE AND REPLACEMENT PLAN

MONITORING EQUIPMENT PURCHASE

AND REPLACEMENT PLAN

South Dakota Department of Environment and Natural Resources

EPA Region VIII

Date Submitted: January 30, 2008
Revised October 10, 2008

NEW MONITORING EQUIPMENT PURCHASE PLAN

AGENCY: South Dakota Department of Environment and Natural Resources

DATE PREPARED: January, 2008 **Revised:** October 10, 2008

PREPARED BY: Brad Schultz

	Equipment Type	Model	Manufacturer	# of Units	Est. Cost ($)	FY 2008 Total Cost	FY 2009 Total Cost	FY 2010 Total Cost	Comments
1.	CO Analyzer	Trace Level	Teledyne	1	9,328		9,328		PPG
2.	Calibrators	6103	Environics	3	42,320	31,320		11,000	PPG
3.	Gas Standard		Scott	3	2,500	5,000		2,500	PPG
4.	NOy Analyzer	NOy	Thermo	1	17,000		17,000		PPG
5.	PMcoarse	PM2.5/10	Thermo	1	20,000		20,000		PPG
6.	Ozone Analyzer	49i	Thermo	1	9,675	9,675			PPG
7.	Shelter	8810	EKTO	1	22,657		22,657		PPG
8.	Shelter	81014	EKTO	1	34,145		34,145		PPG
9.	PM Monitors	BAM-1020	Met One	4	76,637	76,637			PPG and 103 PM2.5 Grant
10.	Datalogger	8832	ESC	3	25,455	25,455			PPG
11.	SO2 Analyzer	Series i TL	Thermo	2	24,000	24,000			PPG
12.	NOx Analyzer	Series i	Thermo	2	23,000	23,000			PPG
13.									
14.									

MONITORING EQUIPMENT REPLACEMENT PLAN

AGENCY: South Dakota Department of Environment and Natural Resources

DATE PREPARED: January, 2008 **Revised:** October 10, 2008

PREPARED BY: Brad Schultz

	Equipment Type	Model	Manufacturer	# of Units	Age	Condition	Est. Cost ($)	FY 2008 Total Cost	FY 2009 Total Cost	FY 2010 Total Cost	Comments
1.	Data logger	8816	ESC	3	10	Fair	18,000	9,000	9,000	9,000	PPG
2.	Computer		Gateway	6	5	Fair/Poor	15000	5,000	5,000	5,000	PPG
3.	Ozone Calibrator	Series i	Thermo	2	6	Fair	20,000	10,449	11,000	12,000	PPG
4.	Ozone Analyzer	Series i	Thermo	2	9	Fair	18,000		9,000	9,000	PPG
5.	PM2.5 Continuous Monitor	TEOM	R&P	4	8	Fair	84,800	42,400	21,200	21,200	PPG
6.	SO2 Analyzer	Series i TL	Thermo	1	7	Fair	10,000		10,000		PPG
7.	NOx Analyzer	Series i	Thermo	2	8	Poor	12,000		12,000		PPG
8.	Flow Standard	FTS	Thermo	3	10	Fair	10,500	3,500	3,500	3,500	PPG
9.	PM2.5 Manual Monitor	RAAS 100	Andersen	6	10	Fair	52,800	17,600	17,600	17,600	PPG
10.											
11.											
12.											