



September 16, 2015

DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

Shaun McGrath
Regional Administrator
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

Dear Mr. McGrath:

On June 2, 2011, South Dakota submitted its timely designation letter for EPA's new 1-hour sulfur dioxide standard of 75 parts per billion, which EPA promulgated on June 2, 2010. After reviewing South Dakota's sulfur dioxide air emissions inventory, ambient air monitoring data, and other factors, South Dakota proposed designating each county in South Dakota as attaining the new 1-hour sulfur dioxide standard.

EPA failed to act on South Dakota's proposed designation within the timeframe specified in the Clean Air Act. Therefore, South Dakota joined North Dakota along with other states in a lawsuit requiring EPA to act on each state's proposed designation letters. EPA was also sued by the Sierra Club and the Natural Resources Defense Council. EPA decided to settle with the Sierra Club and the Natural Resources Defense Council and proposed a consent decree, which was accepted by the U.S. District Court for the Northern District of California on March 2, 2015.

On March 20, 2015, EPA notified South Dakota of the requirements in the consent decree. Of the three deadlines in the consent decree that EPA was ordered to meet, South Dakota is impacted by the first round and third round. In the first round, EPA is required to promulgate final sulfur dioxide area designations for areas containing large sources of sulfur dioxide pollution by no later than July 2, 2016. In South Dakota, this involves the Big Stone coal-fired power plant located in Grant County. In the third round, EPA is required to address all remaining undesignated areas by December 31, 2020. The consent decree does not render invalid or obsolete the state's proposed designation that EPA failed to act on originally. However, if states wish, EPA is requesting that states submit any additional information and/or updates for their recommendations for the first round by September 18, 2015.

On January 18, 2011, Governor Daugaard submitted a letter to EPA designating the Secretary of the Department of Environment and Natural Resources as his designee for submitting designations and other matters that involves South Dakota's Air Quality Program. In that capacity, I have the authority to submit proposed designations for South Dakota.

The consent decree does not prohibit the states from pursuing earlier EPA designations for the remaining undesignated areas within the state. Therefore, I am reaffirming South Dakota's original designation package and I am again recommending EPA designate all counties in South Dakota, including Grant County, as attaining the 1-hour sulfur dioxide standard (see Attachment A). These recommendations are based on the June 2, 2011 submittal, Attachment B which provides the technical analysis for designating all of South Dakota's counties in attainment, Attachment C which provides a copy of the Air Quality System AMP480 and AMP450 reports, and Attachment D which provides an analysis of modeling accuracy. The Air Quality System AMP 480 and AMP450 reports show the Design Values and yearly 99th percentile concentrations for calendar years 2012 to 2014 for current ambient air monitoring sites, 2008 to 2010 for the Wind Cave Site and the 12 months of data collected near the Big Stone Power Plant in Roberts County.

Thank you for the opportunity to propose designations for the 2010 1-hour sulfur dioxide standard and I look forward to your timely concurrence. If you have questions, please contact Brian Gustafson at 605-773-3151.

Sincerely,

A handwritten signature in black ink, appearing to read "Steve", with a horizontal line extending to the right.

Steven M. Pirner, PE
Secretary

Attachments

cc: Governor Dennis Daugaard
Attorney General Marty Jackley
Matt Konenkamp, Governor's Office
Monica Morales, EPA Region 8

Attachment A
South Dakota Area Designations for the
2010 1-Hour Sulfur Dioxide Standard

Designated Area	Designation Type	Classification Type
Aurora County	Attainment	
Beadle County	Attainment	
Bennett County	Attainment	
Bon Homme County	Attainment	
Brookings County	Attainment	
Brown County	Attainment	
Brule County	Attainment	
Buffalo County	Attainment	
Butte County	Attainment	
Campbell County	Attainment	
Charles County	Attainment	
Clark County	Attainment	
Clay County	Attainment	
Codington County	Attainment	
Corson County	Attainment	
Custer County	Attainment	
Davison County	Attainment	
Day County	Attainment	
Deuel County	Attainment	
Dewey County	Attainment	
Douglas County	Attainment	
Edmunds County	Attainment	
Fall River County	Attainment	
Faulk County	Attainment	
Grant County	Attainment	
Gregory County	Attainment	
Haakon County	Attainment	
Hamlin County	Attainment	
Hand County	Attainment	
Hanson County	Attainment	
Harding County	Attainment	
Hughes County	Attainment	
Hutchinson County	Attainment	
Hyde County	Attainment	
Jackson County	Attainment	
Jerauld County	Attainment	
Jones County	Attainment	
Kingsbury County	Attainment	
Lake County	Attainment	

Designated Area	Designation Type	Classification Type
Lawrence County	Attainment	
Lincoln County	Attainment	
Lyman County	Attainment	
Marshall County	Attainment	
McCook County	Attainment	
McPherson County	Attainment	
Meade County	Attainment	
Mellette County	Attainment	
Miner County	Attainment	
Minnehaha County	Attainment	
Moody County	Attainment	
Pennington County	Attainment	
Perkins County	Attainment	
Potter County	Attainment	
Roberts County	Attainment	
Sanborn County	Attainment	
Shannon County	Attainment	
Spink County	Attainment	
Stanley County	Attainment	
Sully County	Attainment	
Todd County	Attainment	
Tripp County	Attainment	
Turner County	Attainment	
Union County	Attainment	
Walworth County	Attainment	
Yankton County	Attainment	
Ziebach County	Attainment	

Attachment B Area Designations

The agreement between the Sierra Club and the Natural Resources Defense Council (hereinafter referred to as the Sierra Club) and EPA, which was approved in the March 2, 2015, consent decree, attempts to require states to use modeling to demonstrate attainment status of areas around large sources of sulfur dioxide emissions. The agreement classifies large sources based on actual sulfur dioxide emissions in 2012, without consideration of state and federal regulations that a majority of these large sources are required to meet in the near future to comply with the federal Regional Haze Program.

DENR believes the demonstration package South Dakota submitted in June 2011, shows South Dakota is attaining the 1-hour sulfur dioxide standard and request that EPA use that demonstration package for area designations in South Dakota. In addition, DENR is providing updated data which supports South Dakota's area designation of every county in South Dakota, including Grant County, as attaining the 1-hour sulfur dioxide standard.

1.0 Air Monitoring

In South Dakota's submittal in June 2011, all sulfur dioxide monitoring in South Dakota demonstrated that the 1-hour sulfur dioxide standard was being attained. For that demonstration package, DENR used sulfur dioxide monitoring data throughout the state for 2008 through 2010, except for the Big Stone II project. For the Big Stone II project, DENR used the 12 months of continuous data collected in Roberts County from November 2001 through October 2002.

In support of South Dakota's demonstration that every county in South Dakota is attaining the 1-hour sulfur dioxide standard, DENR updated the data using 2012 through 2014 sulfur dioxide concentrations throughout the state including new data from the Credit Union Site in Rapid City. The sulfur dioxide data for the Wind Cave Site will not change from the original submittal because the sulfur dioxide monitor was moved to the Credit Union Site in Rapid City in 2011. In addition, since there is no new data around the Big Stone coal-fired power plant and the consent decree does not allow states the time to gather additional ambient air quality data, DENR will use the data collected for the Big Stone II project to demonstrate even the area around the Big Stone coal-fired power plant is attaining the 1-hour sulfur dioxide standard.

The sulfur dioxide data collected throughout the state continues to demonstrate that sulfur dioxide 1-hour concentrations in South Dakota are low statewide. Table B-1 displays the three year calculated design value concentration for each site using the most current three years of complete data, except as specified above.

Table B-1 – 3-Year Design Values in South Dakota

Site	County	99 th Percentile	3-Year Design Value	Attainment
SD School	Minnehaha	2012 – 5.5 parts per billion 2013 – 3.3 parts per billion 2014 – 10.5 parts per billion	6 parts per billion	Yes

Site	County	99 th Percentile	3-Year Design Value	Attainment
Badlands	Jackson	2012 – 2.6 parts per billion 2013 – 9.1 parts per billion 2014 – 1.8 parts per billion	5 parts per billion	Yes
Wind Cave	Custer	2008 – 3.0 parts per billion 2009 – 10.0 parts per billion 2010 – 5.0 parts per billion	6 parts per billion	Yes
UC #1	Union	2012 – 9.2 parts per billion 2013 – 5.9 parts per billion 2014 – 4.1 parts per billion	6 parts per billion	Yes
Credit Union	Pennington	2012 – 9.6 parts per billion 2013 – 9.4 parts per billion 2014 – 7.2 parts per billion	9 parts per billion	Yes
Big Stone II	Roberts	2001/ 2002 - 14 parts per billion ¹		²

¹ – The 99th percentile for the Big Stone II project is based on the 12 months of data collected from November 2001 through October 2002; and

² – Not comparable to the standard because there is only 12 months of data.

The sulfur dioxide 1-hour concentrations collected in the state demonstrate there were no concentrations exceeding the 1-hour sulfur dioxide standard. The highest design value concentration was recorded at the Credit Union Site in Rapid City at 9 parts per billion or 12% of the 1-hour sulfur dioxide standard. The Badlands Site has the lowest design value concentrations at 5 parts per billion or 7% of the 1-hour sulfur dioxide standard. Even if it is assumed the Big Stone II sulfur dioxide concentration of 14 parts per billion was the 3-year average of the 99th percentile, sulfur dioxide concentrations throughout the state are less than 19% of the 1-hour sulfur dioxide standard.

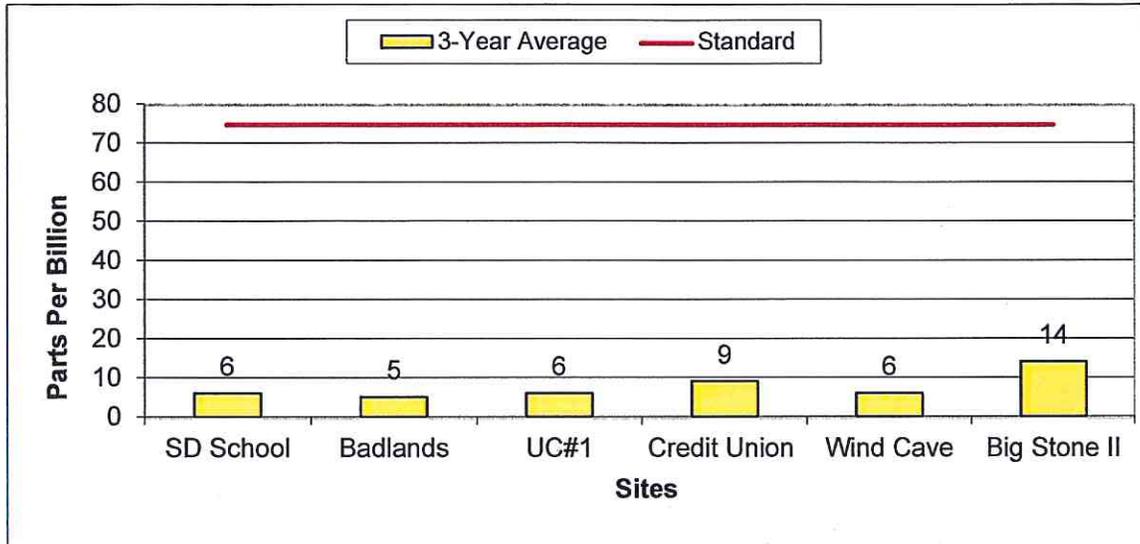
The concentrations in South Dakota are low for several reasons. First, the state’s population and sulfur dioxide emissions from point and area sources are low. Second, all but five sources with Title V air quality operating permits in the state emit sulfur dioxide emissions less than 100 tons per year. Finally, sulfur dioxide emissions from area sources are low because of the move to ultra-low sulfur fuels in 2010.

Figure B-1 provides a graph comparison of the design value concentrations from Table B-1 for each site compared to the 1-hour sulfur dioxide standard. Although the Big Stone II Site does not have three years of data, the 99th percentile for the 12 months of testing is provided for comparison purposes.

The Badlands Site represents rural areas consisting mainly of rangeland area representing the counties with low population levels in the western half of South Dakota. The Union County UC #1 Site represents the low population areas with mainly farming activities in the eastern half of South Dakota. The SD School Site represents South Dakota’s largest populated area in the Sioux Falls Metropolitan Statistical Area (MSA). The Credit Union Site represents South Dakota’s second largest populated area in the Rapid City MSA and represents testing near industrial sources. The Big Stone II site represents sulfur dioxide concentrations near South Dakota’s largest emitting sulfur dioxide source. DENR believes that its sulfur dioxide monitoring network represents sulfur dioxide concentrations each county in South Dakota would experience since the monitors are located in rural, urban and

industrial areas. Based on the current monitoring data throughout the state which reflects the potential highest sulfur dioxide concentrations in the state, South Dakota continues to attain the 1-hour sulfur dioxide standard in every county in the state.

Figure B-1 –Design Values Compared to the 1-Hour Sulfur Dioxide Standard



2.0 Big Stone Coal-Fired Power Plant

According to the consent decree, the first round of designations involves two groups of areas:

- 1) Areas that have newly monitored violations of the 2010 sulfur dioxide standard; and
- 2) Areas that contain any stationary source that according to EPA’s Air Market Database:
 - Emitted more than 16,000 tons of sulfur dioxide in 2012;
 - Emitted more than 2,600 tons of sulfur dioxide and had an emission rate of at least 0.45 pounds of sulfur dioxide per million Btus in 2012; and
 - Facility has not been announced for retirement as of March 2, 2015.

The Big Stone coal-fired power plant emitted 12,290 tons of sulfur dioxide in 2012 based on continuous emission monitoring. In calendar year 2012, the Big Stone coal-fired power plant produced 30,221,559 million Btus. Therefore, the Big Stone Power Plant’s emission rate was 0.81 pounds of sulfur dioxide per million Btus in 2012. The Big Stone Power Plant meets the criteria for round one designation established in the consent decree and is the only facility in South Dakota that meets those criteria.

In South Dakota’s original submittal, South Dakota provided EPA the ambient air quality data for sulfur dioxide collected in 2001 and 2002. In that time frame, 12 consecutive months of data was collected and the highest 99th percentile was 14 parts per billion or 19 percent of the 1-hour sulfur dioxide standard. The monitoring site location was based on modeling and represented the highest sulfur dioxide concentration around the Big Stone coal-fired power plant. Although there is less than three year of data available to compare to the standard, this is a good indication that the Big Stone

coal-fired power plant is not causing a violation of the 1-hour sulfur dioxide standard. Keep in mind the ambient air quality data was collected while the Big Stone coal-fired power plant was emitting at 0.70 and 0.66 pounds per million Btus in 2001 and 2002, respectively.

As part of South Dakota's Regional Haze Program submitted to EPA on January 21, 2011, and amended September 19, 2011, a sulfur dioxide emission limit of 0.09 pounds per million Btus, which includes periods of startup, shutdown, and malfunctions, was promulgated in the Administrative Rules of South Dakota, section 74:36:21:06 for Unit #1 at the Big Stone coal-fired power plant. In addition, Unit #1 also has to meet a 505 pounds of sulfur dioxide per hour emission limit which is applicable at all-times including periods of startup, shutdown, and malfunctions. The air emission rates in section 74:36:21:06 were submitted as part of South Dakota's state implementation plan. EPA approved South Dakota's Regional Haze Program as part of South Dakota's state implementation plan on April 26, 2012. According to the Administrative Rules of South Dakota, section 74:36:21:07, the Big Stone coal-fired power plant is required to install the air pollution controls and meet the sulfur dioxide emission rate within five years of EPA's approval or by April 26, 2017. However, the air pollution controls required under EPA's approved state implementation plan will be operational in the fourth quarter of 2015.

If the Sierra Club and EPA in their negotiations or the judge would have considered federally enforceable limits in place at the time the consent decree was established, the Big Stone coal-fired power plant would not be considered a large emitting source. The sulfur dioxide emission rates that the Big Stone coal-fired power plant has to meet will ensure sulfur dioxide emissions will stay below the thresholds established in the consent decree for a large sulfur dioxide emitting source.

At this lower sulfur dioxide emission rate, DENR anticipates sulfur dioxide concentrations at the highest concentration points identified by any type of modeling will record sulfur dioxide concentrations lower than the levels observed in 2001 and 2002. In 2001 and 2002, the sulfur dioxide emission rates based on continuous emission monitoring systems were 0.70 and 0.66 pounds per million Btus, respectively. The emission limit of 0.09 pounds of sulfur dioxide per million Btus represents an 86% reduction in sulfur dioxide emissions from the emission rate occurring in 2002. Therefore, the monitoring data collected in 2001 and 2002 overestimates the sulfur dioxide concentrations Grant County will experience once the federal Regional Haze Program limits are implemented. Based on this information, DENR believes Grant County is attaining the 1-hour sulfur dioxide standard and will continue to attain the standard after the air pollution control equipment under the Regional Haze Program is operational. Therefore, EPA should designate Grant County as attaining the 1-hour sulfur dioxide standard.

3.0 Air Modeling

Because of the timeline agreed upon by the Sierra Club and EPA and established in the consent decree, states are being pushed to use modeling to determine if areas around large sources of sulfur dioxide emissions are attaining the 1-hour sulfur dioxide standard. EPA's Memorandum from Stephen D. Page to Regional Air Division Directors, I-X, dated March 24, 2011, indicates EPA may initially designate an area attaining the standard if it is clear it meets the 1-hour sulfur dioxide standard. EPA further states it does not believe it would be appropriate to designate areas as attainment without

appropriate refined dispersion modeling and where available, air quality monitoring data indicating no violations of the 1-hour sulfur dioxide standard. DENR agrees modeling may be used as a tool by states but disagrees it is the only or best tool to demonstrate attainment for the following reasons:

1. DENR recently used AERMOD to model the impacts of an existing coal-fired power plant using sulfur dioxide emissions being reported to EPA in accordance with the Acid Rain Program. A receptor was placed on two ambient air quality monitoring sites in South Dakota to compare hourly monitoring data to the hourly modeling data. This comparison assumed no other sulfur dioxide emitting sources were impacting the monitors. In reality, if the model was accurate, the modeling results would be less than the monitoring results. The comparison indicated AERMOD has the potential to over-predict the concentrations of sulfur dioxide by greater than a factor of two (see Appendix D for analysis).
2. In accordance with 40 CFR Part 51, Appendix W, which is the federal guideline for air quality modeling, uncertainties and accuracy of the models are discussed. As noted in section 9.1.2, Studies of Model Accuracy, “(1) Models are more reliable for estimating longer time-averaged concentrations than for estimating short-term concentrations at specific locations; and (2) the models are reasonably reliable in estimating the magnitude of highest concentrations occurring sometime, somewhere within an area. For example, errors in highest estimated concentrations of ± 10 to 40 percent are found to be typical, *i.e.*, certainly well within the often quoted factor-of-two accuracy that has long been recognized for these models.” EPA’s guideline agrees that air quality modeling can over-predict the concentrations of sulfur dioxide by greater than a factor of two.
3. The option to only use modeling by the timeline established in the consent decree is also contrary to EPA’s previous decisions, court cases, and rule as identified below:
 - a. On page 26382 of the Federal Register, Vol. 43, No. 118, June 19, 1972, EPA states in the preamble to the 1977 PSD rules, “...EPA intends that monitoring should generally focus on obtaining data necessary for required review against NAAQS. Although the increment consumption must of necessity be tracked through the use of modeling, EPA does not intend that there be no “real world” checks on the accuracy of modeling.”
 - b. In *Alabama Power Co. v. Costle* C.A.D.C. 1979, the U.S. Court of Appeals, District of Columbia Circuit states, “We discern from the statute a technology-forcing objective. Congress intended that monitoring would impose a certain discipline on the use of modeling techniques, which would be the principal device relied upon for the projection of the impact on air quality of emissions from a regulated source. This projects that the employment of modeling techniques be held to earth by a continual process of confirmation and reassessment, a process that enhances confidence in modeling, as a means for realistic projection of air quality.”
 - c. This is further emphasized by EPA’s current rules under the Prevention of Significant Deterioration program. In accordance with 40 CFR §52.21(m)(2), if the Administrator believes it is necessary, the owner or operator shall conduct ambient air quality monitoring, “...to determine the effect emissions from the stationary source or modification may have, or are having, on air quality in any area.” Even after a PSD source has demonstrated it can construct and operate and not cause a violation of the National Ambient Air Quality standard or PSD increment using modeling, EPA may require a source to conduct monitoring to ensure the modeling provided realistic results and no violations will occur.

Historically, both Congress and EPA intended for monitoring to be the real determination if an area is attaining the National Ambient Air Quality Standards. DENR believes monitoring provides the reality check both Congress and EPA believe are necessary for states to demonstrate an area is attaining or not attaining the standard and current air quality models are not the best tool for demonstrating attainment.

Therefore, if EPA does not agree that the evidence provided in this package demonstrates that Grant County is attaining the 1-hour sulfur dioxide standard, EPA should provide South Dakota with the option to monitor in Grant County to ensure the most accurate data can be used in designating Grant County.

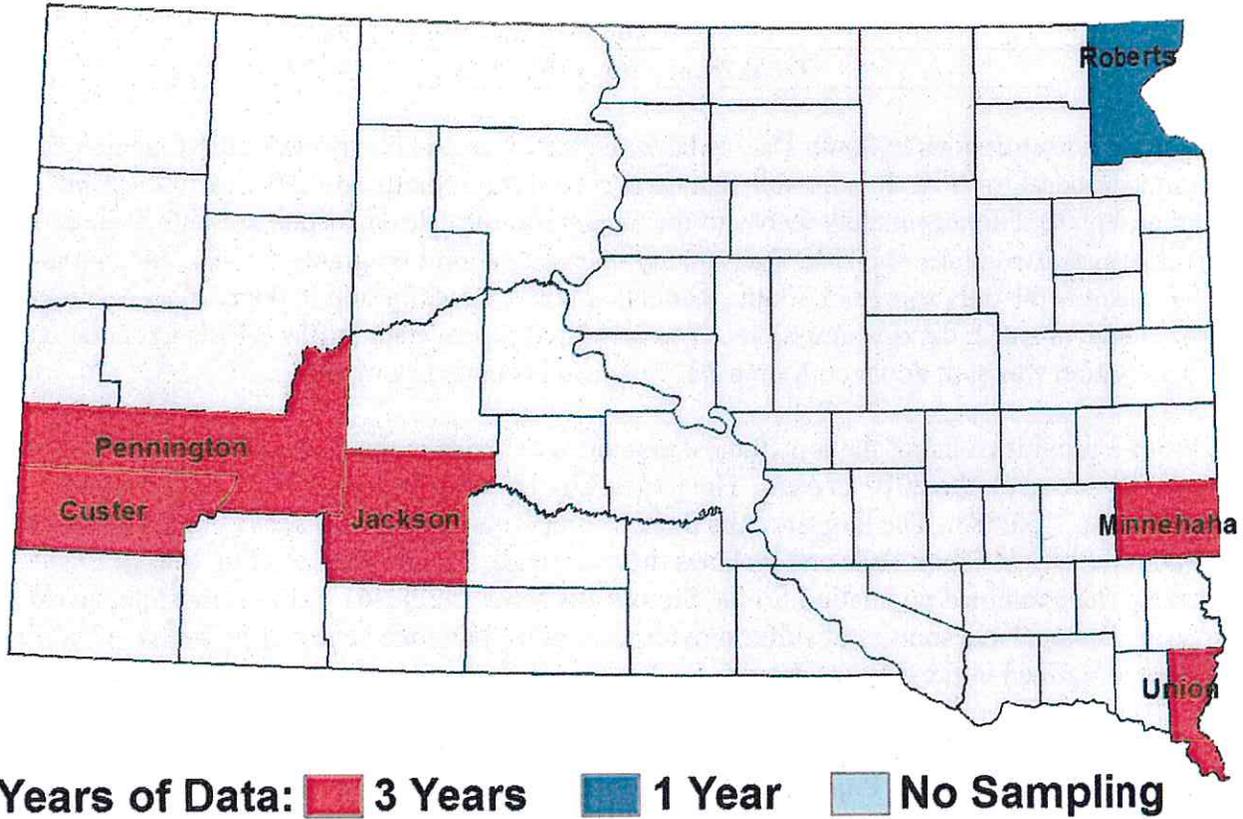
4.0 Sulfur Dioxide Monitoring Network in South Dakota

The first sampling effort in South Dakota to collect hourly sulfur dioxide data was near the Big Stone coal-fired power plant. The monitoring location for sulfur dioxide was based on modeling indicating the area of highest concentration located near the facility and still in South Dakota. A continuous 12-month period of air monitoring was completed in the years of 2001 and 2002 as part of a Prevention of Significant Deterioration permit application. Sulfur dioxide levels were low with a 99th percentile 1-hour average concentration level of 14 parts per billion.

In 2002, DENR expanded its sulfur dioxide monitoring network and began collecting hourly sulfur dioxide data at the Hilltop Site in Sioux Falls. The monitor was later moved to the SD School Site and continues today. In 2005, two more locations were added at the Badlands and Wind Cave National Parks. In 2009, two more locations were added in Union County. In 2011, the sulfur dioxide analyzer was moved from Wind Cave Site to Rapid City Credit Union Site. In 2013, the sulfur dioxide analyzer at the Union County UC #2 site was shutdown after an analysis demonstrated that the sulfur dioxide concentrations recorded at the Union County UC #1 sites were comparable.

The current sampling network includes sites in several counties around the state with goals of high concentration, population, source impact, background, and regional transport. See Figure B-2 for a map of the state showing the counties with sulfur dioxide air monitoring data.

Figure B-2 – South Dakota Counties with Sulfur Dioxide Data



5.0 South Dakota’s Population and Sulfur Dioxide Emissions

In the original submittal, DENR provided the top 10 sulfur dioxide emitters in South Dakota for calendar year 2009. In this submittal, DENR is reviewing those top ten emitters and comparing them to calendar year 2012 and 2014. Calendar year 2012 was chosen because that is the year the Sierra Club and EPA chose in the consent decree for identifying large sources of sulfur dioxide emissions and 2014 was chosen because that is the most recent year. Table B-2 provides the comparison.

Table B-2 – 2009 Top 10 Sulfur Dioxide Emitters in South Dakota (tons per year)

#	County	Facility	2009	2012	2014
1	Grant	Otter Tail Power Company – Big Stone I	11,651	12,290	13,885
2	Pennington	Black Hills Corporation – Ben French	823	12	0
3	Pennington	GCC Dacotah	285	152	304
4	Brookings	South Dakota State University	183	99	59
5	Minnehaha	John Morrell & Company	170	39	101
6	Brookings	Valero Renewable Fuels Company	85	59	19
7	Spink	Redfield Energy	42	42	41
8	Turner	Great Plains Ethanol	21	39	47
9	Minnehaha	Sioux Falls Water Reclamation Facility	13	11	12

#	County	Facility	2009	2012	2014
10	Codington	Glacial Lakes Energy	11	12	12
Top 10 Total =			13,284	12,755	14,480
Total from Title V Sources			13,323	12,821	14,542

Sulfur dioxide emissions in South Dakota have fluctuated up and down since DENR submitted its original proposal to EPA. It is notable that the top 10 sulfur dioxide emitters in South Dakota on average represent approximately 99.6% of the total sulfur dioxide emissions in South Dakota from facilities permitted under the Title V air quality operating permit program. The Big Stone coal-fired power plant is the only source in South Dakota that meets the definition in the consent decree of a large source of sulfur dioxide emissions. The coal-fired power plant at Black Hills Corporation's Ben French station was shut down on March 20, 2014 and is being decommissioned.

Table B-3 provides a list of the top 10 most populated counties in the state and the largest city within the county based on the 2010 Census. The largest city in South Dakota is Sioux Falls with a population of 153,888. The largest of the three Metropolitan Statistical Areas (MSAs) in the state includes the city of Sioux Falls and includes the counties of Minnehaha, Lincoln, McCook, and Turner. The combined population for the Sioux Falls MSA is 228,261. The 10 most populated areas in South Dakota have sources of sulfur dioxide emissions, but none have a large source of sulfur dioxide as defined in the consent decree.

Table B-3 – Ten Highest Population Counties in South Dakota

Number	County	Population	Largest City	Population
1	Minnehaha	169,468	Sioux Falls	153,888
2	Pennington	100,948	Rapid City	67,956
3	Lincoln	44,828	Sioux Falls	153,888
4	Brown	36,531	Aberdeen	26,091
5	Brookings	31,965	Brookings	22,056
6	Codington	27,227	Watertown	21,482
7	Meade	25,434	Sturgis	6,627
8	Lawrence	24,097	Spearfish	10,494
9	Yankton	22,438	Yankton	14,454
10	Davison	19,504	Mitchell	15,254

Based on the population and sulfur dioxide emissions, Minnehaha and Pennington County have sources of sulfur dioxide emissions and the highest populations in the state. Both of these areas have ambient air monitoring data for sulfur dioxide that demonstrates these areas are attaining the 1-hour sulfur dioxide standard. The sulfur dioxide concentrations observed in Sioux Falls and Rapid City would be greater than what one would experience in the other counties identified Table B-2, except for Grant County, because of lower sulfur dioxide emissions and population. Therefore, DENR is recommending those counties be designated as attaining the 1-hour sulfur dioxide standard.

Other than Grant County, the remaining counties in South Dakota not listed in Table B-2 have very low sulfur dioxide emissions (see Appendix E of the June 2, 2011 submittal). The sulfur dioxide concentrations in these areas would be similar to the concentrations South Dakota is experiencing at its Badlands, Wind Cave, and Union County monitoring sites depending on what rural area one is

located. DENR believes these counties should be designated as attaining the 1-hour sulfur dioxide standard and the state should not be required to do further characterization through data collection or modeling.

Grant County has the highest sulfur dioxide emissions in South Dakota and are generated by the Big Stone I coal-fired power plant. DENR does not believe modeling is necessary at this site since modeling was used to determine the location of highest concentrations, an ambient air monitor was located at the modeling site in Roberts County, and recorded concentrations just under 19% of the 1-hour sulfur dioxide standard. In addition, sulfur dioxide emissions will be lowered by approximately 86% from the Big Stone I coal-fired power plant once the control equipment required by the Regional Haze Program is installed and operational in the fourth quarter of 2015. Therefore, DENR believes there is enough evidence to designate Grant County as attaining the 1-hour sulfur dioxide standard without modeling.

Attachment C

Air Quality System Reports

AMP 480

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Sep. 4, 2015

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile

Design Value Year: 2010

REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

Level: 75

State Name: South Dakota

Site ID	STREET ADDRESS	2010			2009			2008			3-Year	
		Comp. Qtrrs	99th Percentile	Certa Eval	Comp. Qtrrs	99th Percentile	Certa Eval	Comp. Qtrrs	99th Percentile	Certa Eval	Design Value	Valid Ind.
46-033-0132	WIND CAVE NATIONAL PARK, SO	4	5		3	10 *		4	3	N	6	N
46-071-0001	BADLANDS PO BOX 6 HEADQUART	4	9		4	5		4	5	N	6	Y
46-099-0008	2001 E 8th St	4	5		4	10		3	27 *	Y	14	Y
46-127-0001	31986 475th Ave	4	12		4	10					11	N
46-127-0002	31307 473rd Ave	4	9		4	6					7	N

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data are shown as "N" in the official report due to additional analysis.
3. Annual Values not meeting completeness criteria are shown as "N" in the official report due to additional analysis.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 AIR QUALITY SYSTEM
 PRELIMINARY DESIGN VALUE REPORT

Report Date: Sep. 4, 2015

Pollutant: Sulfur dioxide(42401)
 Standard Units: Parts per billion(008)
 NAAQS Standard: SO2 1-hour 2010
 Statistic: Annual 99th Percentile

Design Value Year: 2010
 REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
 State Name: South Dakota
 Level: 75

Site ID	STREET ADDRESS	2010			2009			2008			3-Year	
		Comp. Qtrs	99th Percentile	Certa Eval	Comp. Qtrs	99th Percentile	Certa Eval	Comp. Qtrs	99th Percentile	Certa Eval	Design Value	Valid Ind.
46-033-0132	WIND CAVE NATIONAL PARK, SO	4	5		3	10 *		4	3	N	6	N

- Notes:
1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
 2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
 3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Air Quality System Reports AMP450

Sulfur dioxide (42401) South Dakota Parts per billion (008)

SITE ID	P O C	FOAO	CITY	COUNTY	ADDRESS	YEAR	METH	OBS	COMP CTRS	1ST	2ND	95TH	1ST	2ND	Days	ARITH	CERT	
										MAX 1-HR	MAX 1-HR	PCTL 1-HR	MAX 24-HR	MAX 24-HR	>24HR STD	MEAN AN-STD	and EVAL EDT	
46-071-0001	3	0973	Not in a city	Jackson	BADLANDS PO BOX 6 HEADQUARTER S	2012	060	8613	4	3.8	3.7	2.6	1.6	1.6	0	.45	Y	0
46-071-0001	3	0973	Not in a city	Jackson	BADLANDS PO BOX 6 HEADQUARTER S	2013	060	8595	4	24.7	9.6	9.1	3.1	2.7	0	.24	Y	0
46-071-0001	3	0973	Not in a city	Jackson	BADLANDS PO BOX 6 HEADQUARTER S	2014	060	8473	4	4.3	2.1	1.6	.8	.8	0	.23	Y	0
46-099-0008	3	0973	Sioux Falls	Minnehaha	2001 E 9th St	2012	060	8707	4	6.3	5.7	5.5	1.5	1.5	0	.49	Y	0
46-099-0008	3	0973	Sioux Falls	Minnehaha	2001 E 9th St	2013	060	8672	4	4.3	3.8	3.3	1.5	1.3	0	.56	Y	0
46-099-0008	3	0973	Sioux Falls	Minnehaha	2001 E 9th St	2014	560	8545	4	20.4	18.5	10.5	2.9	2.8	0	.71	Y	0
46-103-0020	3	0973	Rapid City	Pennington	CREDIT UNION SITE, 108 KINNEY AVE.	2012	060	8698	4	14.5	11.7	9.6	2.1	2.1	0	.25	Y	0
46-103-0020	3	0973	Rapid City	Pennington	CREDIT UNION SITE, 108 KINNEY AVE.	2013	060	8259	4	26.2	12.0	9.4	2.3	2.1	0	.24	Y	0
46-103-0020	3	0973	Rapid City	Pennington	CREDIT UNION SITE, 108 KINNEY AVE.	2014	060	8597	4	12.4	9.6	7.2	2.1	1.9	0	.26	Y	0
46-127-0001	3	0973	Not in a city	Union	31986 475th Ave	2012	560	8351	4	9.7	9.6	9.2	2.4	2.1	0	.37	Y	0
46-127-0001	3	0973	Not in a city	Union	31986 475th Ave	2013	000	8540	4	10.1	6.2	5.9	2.1	1.7	0	.32	Y	0

Note: The * indicates that the mean does not satisfy summary criteria.

Sulfur dioxide (42401)

South Dakota

Parts per billion (009)

SITE ID	P O C	POAC	CITY	COUNTY	ADDRESS	YEAR	METH	OBS	COMP QTRS	1ST	2ND	99TH	1ST	2ND	Days	ARITH	CERT	
										MAX 1-HR	MAX 1-HR	PCTL 1-HR	MAX 24-HR	MAX 24-HR	>24HR STD	MEAN	and EVAL	EDT
46-127-0001		3 0973	Not in a city	Union	31966 475th Ave	2014	560	8666	4	14.8	5.1	4.1	2.1	1.3	0	.34	Y	0
46-127-0002		3 0973	Not in a city	Union	31307 473rd Ave	2012	560	8715	4	8.1	7.3	6.6	1.9	1.7	0	.34	Y	0
46-127-0002		3 0973	Not in a city	Union	31307 473rd Ave	2013	560	8684	4	5.2	4.8	4.3	1.9	1.8	0	.38	Y	0
46-033-0132		3 0973	Not in a city	Custer	WIND CAVE NATIONAL PARK, SOUTH DAKOTA	2008	060	8678	4	4.0	4.0	3.0	1.4	1.3	0	.23	N	0
46-033-0132		3 0973	Not in a city	Custer	WIND CAVE NATIONAL PARK, SOUTH DAKOTA	2009	060	6487	3	32.0	20.0	10.0	5.7	3.0	0	.53*		0
46-033-0132		3 0973	Not in a city	Custer	WIND CAVE NATIONAL PARK, SOUTH DAKOTA	2010	060	8640	4	16.0	10.0	5.0	2.8	2.6	0	.12		0
46-109-4003		3 0973	Not in a city	Roberts	482ND AVE	2001	060	1390	0	5.0	5.0	5.0	.7	.7	0	.04*	N	0
46-109-4003		3 0973	Not in a city	Roberts	482ND AVE	2002	060	6935	3	28.0	20.0	14.0	5.3	4.0	0	.19*	N	0

Attachment D

AERMOD Modeling Accuracy

This analysis was taken from DENR's section 4.4.1 – Modeling Accuracy of the Statement of Basis for Hyperion Energy Center's extension request for its Prevention of Significant Deterioration air quality permit #28.0701-PSD.

4.4.1 Model Accuracy

The modeling analysis indicates Hyperion will not cause or contribute to a violation of the new 1-hour sulfur dioxide National Ambient Air Quality Standard; but the analysis does show the modeled concentration plus the background monitoring concentration is within 2 percent of the new 1-hour sulfur dioxide National Ambient Air Quality Standard. Therefore, DENR considered several factors involving how realistic the models predict the concentration and what facility or facilities is contributing to the modeling concentration.

The high-modeled sulfur dioxide concentrations are located in the southeast corner of the modeling domain. The facility contributing to the high-modeled concentration for sulfur dioxide (greater than 90% contribution) is the MidAmerican George Neal facilities in Iowa. During these periods when MidAmerican George Neal is the majority contributor, Hyperion's contribution is less than 1%.

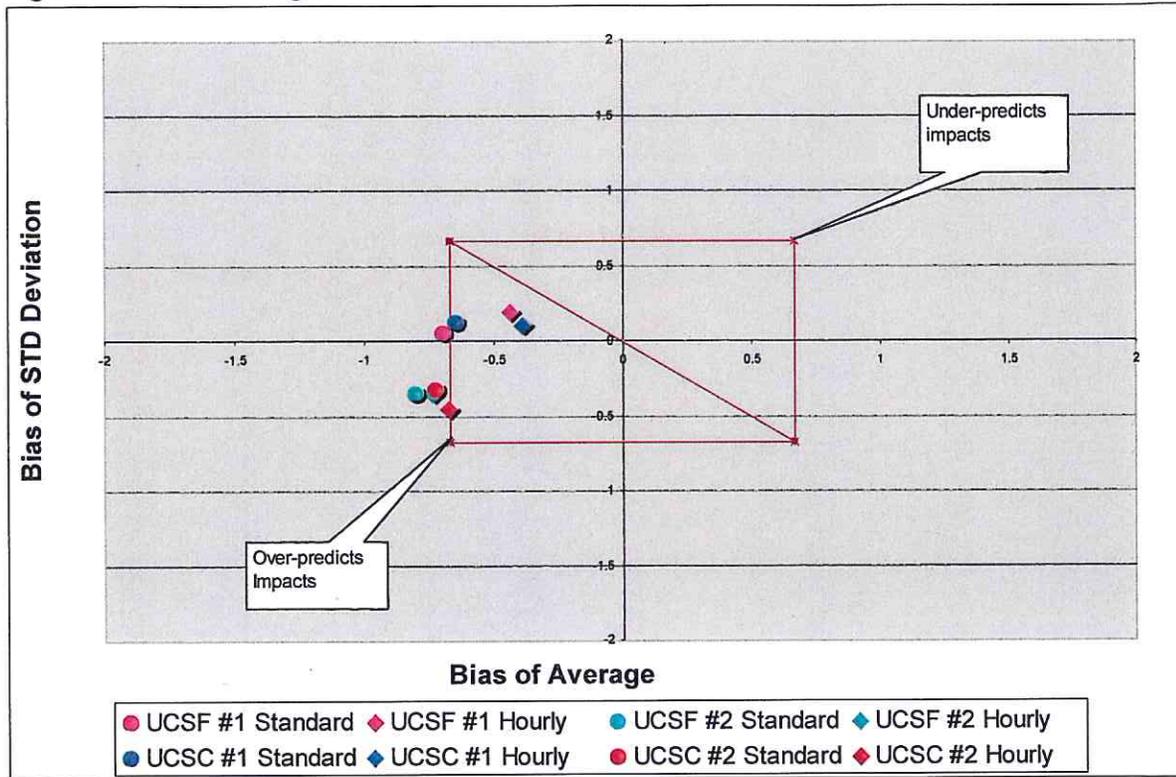
In accordance with 40 CFR Part 51, Appendix W, uncertainties and accuracy of the models are discussed. As noted in section 9.1.2, Studies of Model Accuracy, "(1) Models are more reliable for estimating longer time-averaged concentrations than for estimating short-term concentrations at specific locations; and (2) the models are reasonably reliable in estimating the magnitude of highest concentrations occurring sometime, somewhere within an area. For example, errors in highest estimated concentrations of ± 10 to 40 percent are found to be typical, *i.e.*, certainly well within the often quoted factor-of-two accuracy that has long been recognized for these models. However, estimates of concentrations that occur at a specific time and site are poorly correlated with actually observed concentrations and are much less reliable."

To determine if the AERMOD is correctly quantifying the sulfur dioxide concentration, DENR conducted a screening test to determine if AERMOD would meet a minimum operational performance for the 1-hour sulfur dioxide National Ambient Air Quality Standard. DENR used the fractional bias procedure identified in EPA's Protocol for Determining the Best Performing Model (EPA – 454/R-92-025). DENR modeled MidAmerican George Neal facilities actual emissions from March 31, 2009 through March 31, 2010, at two receptor points in South Dakota using the two meteorological data sets for Union County. The two receptor points used were the location of the two sulfur dioxide monitoring stations currently being operated by DENR in Union County. The modeled results were then compared to the monitored results using the screening approach specified in EPA's protocol. Since the new 1-hour sulfur dioxide National Ambient Air Quality standard represents a new form of a standard, DENR compared both the highest 25 hourly readings and the highest 25 readings representing the form of the standard (e.g., highest 25 daily 1-hour values).

Figure 4-1 shows a graphical representation of the screening test. As identified in the protocol "Models that plot close to the center (0,0) are relatively free from bias, while models that plot further

away from the center tend to over or under-predict. Values equal to -0.67 are equivalent to over-predictions by a factor of two while values equal to +0.67 are equivalent to under-predictions by a factor of two. As the graph indicates, AERMOD over-predicts the concentrations of sulfur dioxide with five of the eight scenarios indicating the model would over-predict the concentrations greater than a factor of two.

Figure 4-1 – Screening Test



Based on the analysis, the model is over-predicting the impact MidAmerican George Neal will have on the sulfur dioxide concentrations in the modeling domain. If it is over-predicting MidAmerican George Neal it is also likely over-predicting all of the sources in the area including Hyperion. Since the approved models are inherently conservative, DENR believes actual monitoring data will be lower than what is being predicted by the models.