DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES
PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

December 13, 2013

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

Dear Mr. McGrath:

On December 13, 2012, EPA revised the primary annual National Ambient Air Quality Standard for particulate matter 2.5 microns in diameter or less ($PM_{2.5}$) by reducing the annual average concentration level to 12 microgram per cubic meter. Initial recommendations for area designations are due to EPA by December 13, 2013.

On January 18, 2011, Governor Daugaard submitted a letter to EPA Region 8 designating the Secretary of the Department of Environment and Natural Resources as his designee for submitting designations and other matters which involves South Dakota's Air Quality Program. In that capacity, I recommend EPA designate all counties in South Dakota as attaining the primary annual $PM_{2.5}$ standard (see Attachment A) based on the attached supportive document. Attachment B provides the technical analysis for designating all of South Dakota's counties as attaining the 2012 annual average standard for $PM_{2.5}$. Attachment C provides a copy of a report printed from the Air Quality System database showing the annual average design value for each site operating in the calendar years of 2010 to 2012 in South Dakota.

Thank you for the opportunity to propose designations for the revised primary annual $PM_{2.5}$ standard and I look forward to your concurrence. If you have questions, please contact Brian Gustafson at 605-773-3151.

Sincerely,

Steven M. Pirner
Secretary

Attachments

ec: Adam Clark, EPA Region 8 w/attachments

Attachment A
South Dakota Area Designations
Annual Average $PM_{2.5}$ Standard

Designated Area	Designation 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
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
Determining Area Designations

On December 13, 2012, EPA revised the primary annual National Ambient Air Quality Standard for particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$). In accordance with Section 107(d)(1)(A) of the Clean Air Act, initial recommendations for area designations are due to EPA by December 13, 2013. EPA revised the primary $PM_{2.5}$ annual standard by reducing the three year annual average concentration level to 12 microgram per cubic meter.

The recorded annual average $PM_{2.5}$ concentrations throughout South Dakota have not exceeded the revised annual standard since valid data collection began in 2001. The monitoring site with the highest annual average design value for $PM_{2.5}$ was recorded at the UC #1 Site in Union County at 80% of the revised annual standard using data collected from 2010 to 2012. The Badlands Site has the lowest design value concentration at 32% of the standard. The concentrations in South Dakota are low for several reasons. First the state's population is small with only 700,000 people in the state. Second, there are only 13 facilities in South Dakota that have a Title V air quality operating permit and emit measureable amounts of $PM_{2.5}$ emissions. All but one of those facilities has $PM_{2.5}$ emissions less than 100 tons per year and a majority are less than 50 tons per year.

1. Air Monitoring Data

DENR believes South Dakota's ambient air monitoring network is representative of the highest $PM_{2.5}$ concentration areas in the state. Table B-1 displays the three year calculated design value concentration for each site using data from 2010 to 2012.

Table B-1 – Site Design Values Concentrations in South Dakota

AQS #	Site	County	Annual Average	3-Year Average	Attainment
46-099-0008	SD School	Minnehaha	2010 – 10.3 ug/m^3 2011 – 8.0 ug/m^3 2012 – 6.0 ug/m^3	8.1 ug/m^3	Yes
46-099-0006	KELO	Minnehaha	2010 – 9.2 ug/m^3 2011 – 8.7 ug/m^3 2012 – 8.7 ug/m^3	8.9 ug/m^3	Yes
46-11-0002	Brookings	Brookings	2010 – 8.6 ug/m^3 2011 – 7.9 ug/m^3 2012 – 8.6 ug/m^3	8.4 ug/m^3	Yes
46-029-0002	Watertown	Codington	2010 – 8.9 ug/m^3 2011 – 8.1 ug/m^3 2012 – 11.0 ug/m^3	9.3 ug/m^3	Yes
46-013-0003	Aberdeen	Brown	2010 – 8.7 ug/m^3 2011 – 7.1 ug/m^3 2012 – 7.5 ug/m^3	7.8 ug/m^3	Yes
46-127-0001	UC #1	Union	2010 – 9.6 ug/m^3 2011 – 9.3 ug/m^3 2012 – 9.9 ug/m^3	9.6 ug/m^3	Yes

AQS #	Site	County	Annual Average	3-Year Average	Attainment
46-127-0002	UC #2	Union	2010 – 9.6 ug/m^3 2011 – 8.2 ug/m^3 2012 – 7.5 ug/m^3	8.4 ug/m^3	Yes
46-103-1001	RC Library	Pennington	2010 – 6.6 ug/m^3 2011 – 5.4 ug/m^3 2012 – 5.8 ug/m^3	5.9 ug/m^3	Yes
46-103-0020	RC Credit Union	Pennington	2010 – 6.6 ug/m^3 2011 – 4.5 ug/m^3 2012 – 6.3 ug/m^3	5.3 ug/m^3	Yes
46-071-0001	Badlands	Jackson	2010 – 3.9 ug/m^3 2011 – 3.5 ug/m^3 2012 – 4.1 ug/m^3	3.8 ug/m^3	Yes
46-033-0132	Wind Cave	Custer	2010 – 4.7 ug/m^3 2011 – 3.7 ug/m^3 2012 – 4.9 ug/m^3	4.3 ug/m^3	Yes

Concentrations of $PM_{2.5}$ are the highest along eastern South Dakota near the borders of Minnesota, Iowa and Nebraska. A comparison of $PM_{2.5}$ data shows the highest concentration days affect a large geographic area that includes areas within the state and neighboring states (all having similar concentration levels). Back trajectory analysis of meteorological data for these days using the AirNow shows low elevation air mass movement to South Dakota from outside of the state that range in direction from the east to the south. The back trajectory analysis points toward long range transport of air pollutants from sources out-side of the state's boundaries on high concentration days.

Attachment D provides a back trajectory analysis for one of the high concentration days. The information in Attachment D is explained along the right side and bottom of the attachment. The lines represent air mass movement at the elevations of 50, 100 and 500 meters during the previous 30 hours before the hourly concentration of PM2.5 was recorded at the selected monitoring site.

Figure B-1 provides a graph comparison of the annual design values for each site using the 2010 to 2012 data compared to the 2012 revised annual $PM_{2.5}$ standard. As is demonstrates in the graph, all sites are attaining the revised annual $PM_{2.5}$ standard of 12 ug/m^3.

2. $PM_{2.5}$ Monitoring Network in South Dakota

DENR has operated a network of 10 to 11 $PM_{2.5}$ ambient air monitoring sites collecting data in nine counties since the startup of the $PM_{2.5}$ network in 1999. Because of significant problems with the new monitoring equipment, the first year of valid sampling data occurred in 2001. After collecting at least three years of data some sites were moved to new locations because $PM_{2.5}$ concentrations were low. The current sampling network includes the goals of high concentration, population, source impact, regional background and regional transport. See Figure B-2 for a map of the state showing the counties with $PM_{2.5}$ air monitoring data.

Figure B-1 – Data Compared to the Annual $PM_{2.5}$ Standard

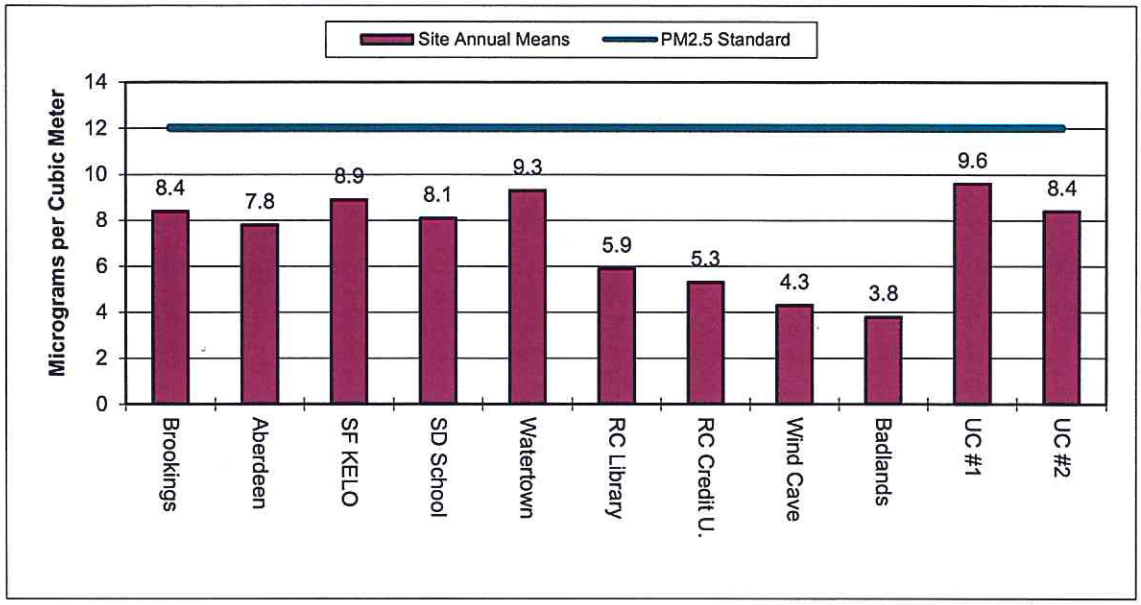
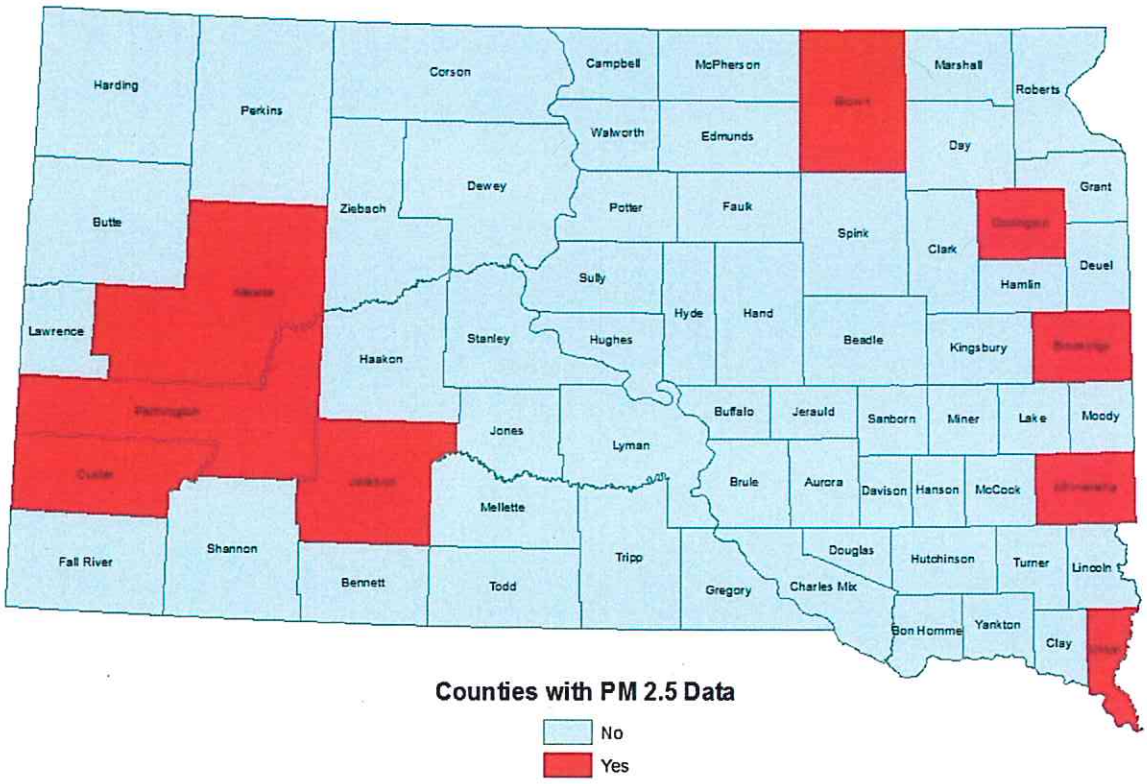


Figure B-2 – South Dakota Counties with $PM_{2.5}$ Ambient Air Monitoring Data



The first sites added to the state were required to represent population exposure and to determine high concentration. Sites were setup at Sioux Falls (two sites), Rapid City (four sites), Black Hawk, Aberdeen, Brookings and Watertown. Rapid City was a main focus as this city is located on the east edge of the Black Hills. Valley and bowl areas with historic wood smoke complaints were tested for

high concentrations. No areas with high $PM_{2.5}$ concentrations were found so some of the sites were moved to test at different locations for other purposes.

Currently sampling sites represent high population areas and include three Metropolitan Statistical Areas (MSA), Rapid City, Sioux Falls, and Sioux City. The SD School and SF KELO sites represent South Dakota's largest population center in the Sioux Falls MSA. The RC Library and RC Credit Union sites represent the second largest population center in the state, largest in western half of South Dakota, and within the Rapid City MSA. The Union County sites represent the rural area north of the main population center of Sioux City, Iowa and is within the Sioux City MSA. The Sioux City MSA is a shared MSA in the southeastern part of the state including counties in South Dakota, Iowa and Nebraska. Aberdeen, Brookings and Watertown sites represent small cities with populations from 20,000 to 30,000 in eastern and northeastern parts of the state.

South Dakota is required by EPA rule in 40 CFR Part 58 to have one National Core (NCore) site. Required parameters are $PM_{2.5}$ continuous, $PM_{2.5}$ filter based, and $PM_{2.5}$ speciation monitors. The SD School Site in Sioux Falls is the NCore site for South Dakota. The site is located in a populated area including near-by schools with a neighborhood sampling scale.

South Dakota is required by 40 CFR Part 58 to have $PM_{2.5}$ sampling sites representing regional background and regional transport. The state meets these requirements by operating sites in the Wind Cave and Badlands National Parks. The Wind Cave Site is located in the southern part of the Black Hills with land use mainly grassland and forest. The Badlands Site is located in the western plains of the state with land use mainly grasslands with some crop land farming. A large number of the counties without air monitoring sites in western and central parts of the state are represented by the data from the Badlands Site because of their low population levels, flat geographic nature of the land, general land use similarities and small amounts of $PM_{2.5}$ emissions in these counties.

3. South Dakota's Population

Sioux Falls, Rapid City, and Sioux City represent the three MSAs in South Dakota. Sioux Falls is the largest MSA with a combined 2010 Census population of 228,261. The Sioux Falls MSA includes the counties of Minnehaha, Lincoln, McCook, and Turner.

Table B-2 provides a list of the top 10 most populated counties in the state and the largest city within each the county. The city with the highest population is Sioux Falls with a population of 153,888.

Table B-2 – 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

Number	County	Population	Largest City	Population
9	Yankton	22,438	Yankton	14,454
10	Davison	19,504	Mitchell	15,254

Only two counties Minnehaha and Pennington have populations greater than 100,000 people. Five of the eleven air monitoring sites are operated in or near these two counties. Seven of the ten counties with the highest populations have $PM_{2.5}$ air monitoring sites. These monitoring sites demonstrate the areas of the state with the highest population density are attaining the revised annual $PM_{2.5}$ standard.

Many of the other counties in South Dakota are rural with low population densities and very little $PM_{2.5}$ emission from permitted sources. For this reason some counties have no sampling results. However, DENR believes the $PM_{2.5}$ concentrations recorded at the Badlands and Wind Cave monitoring sites are representative of the concentrations in the rural areas of South Dakota. Union County represents only the area along the eastern edge of the state. This is proven when comparing annual concentrations with the sites in Sioux Falls, Brookings and Watertown. On some years UC#1 or UC#2 can have the highest annual average. Aberdeen is more representative of other rural counties in eastern part of the state.

Based on the monitoring data which reflects the highest and lowest potential $PM_{2.5}$ concentrations in the state, South Dakota is attaining the 2012 revised annual $PM_{2.5}$ National Ambient Air Quality Standard in every county of the state.

4. South Dakota's 2011 $PM_{2.5}$ Emission Inventory

Table B-3 contains 2011 $PM_{2.5}$ emissions data for South Dakota by county derived from EPA's National Emission Inventory (NEI) and South Dakota's air emission inventory database. The non-point source emissions are estimated by EPA while the Title V source air emissions where calculated by DENR using operational reports provided by the facilities. The total $PM_{2.5}$ emissions column is the non-point source and Title V source emissions added together.

Spink County emitted the highest amount of total $PM_{2.5}$ emissions in South Dakota in 2011 at 3,500 tons. All of the emissions were from non-point sources. Over half (1,942 tons) of the $PM_{2.5}$ emissions estimated by EPA from Spink County is derived from agricultural field burning followed by over a third (1,320 tons) derived from agricultural dust. Buffalo County emitted the least amount of total $PM_{2.5}$ emissions at 208 tons in 2011. A total of 44 counties emitted less than 1,000 tons of $PM_{2.5}$ emissions in 2011.

Table B-3 – $PM_{2.5}$ NEI Emissions in 2011

County	Non-point source Estimated Emissions (tons)	Title V Source Emissions (tons)	Total $PM_{2.5}$ Emissions (tons)
Aurora	561	0	561
Beadle	1,570	2	1,572
Bennett	485	0	485
Bon Homme	1,078	0	1,078
Brookings	1,887	30	1,917

County	Non-point source Estimated Emissions (tons)	Title V Source Emissions (tons)	Total $PM_{2.5}$ Emissions (tons)
Brown	2,631	2	2,633
Brule	674	0	674
Buffalo	208	0	208
Butte	392	0	392
Campbell	373	0	373
Charles Mix	1,344	0	1,344
Clark	856	46	902
Clay	1,011	0	1,011
Codington	887	25	912
Corson	552	0	552
Custer	315	0	315
Davison	788	0	788
Day	762	0	762
Deuel	726	46	772
Dewey	443	0	443
Douglas	559	0	559
Edmunds	1,072	63	1,135
Fall River	303	0	303
Faulk	1,164	0	1,164
Grant	830	235	1,065
Gregory	555	0	555
Haakon	669	0	669
Hamlin	694	0	694
Hand	1,486	0	1,486
Hanson	679	0	679
Harding	261	0	261
Hughes	933	0	933
Hutchinson	1,724	0	1,724
Hyde	598	0	598
Jackson	398	0	398
Jerauld	546	0	546
Jones	335	0	335
Kingsbury	1,185	0	1,185
Lake	775	0	775
Lawrence	531	42	573
Lincoln	1,366	0	1,366
Lyman	877	0	877
Marshall	1,122	0	1,122
McCook	598	0	598
McPherson	701	0	701
Meade	850	0	850
Mellette	224	0	224

County	Non-point source Estimated Emissions (tons)	Title V Source Emissions (tons)	Total $PM_{2.5}$ Emissions (tons)
Miner	726	0	726
Minnehaha	2,399	8	2,407
Moody	895	0	895
Pennington	1,488	81	1,569
Perkins	764	0	764
Potter	1,075	0	1,075
Roberts	1,452	0	1,452
Sanborn	638	0	638
Shannon	460	0	460
Spink	3,500	0	3,500
Stanley	536	0	536
Sully	1,602	0	1,602
Todd	408	0	408
Tripp	696	0	696
Turner	1,179	69	1,248
Union	1,202	0	1,202
Walworth	488	0	488
Yankton	746	12	758
Ziebach	478	0	478
Statewide Total	**59,309**	**661**	**59,970**

Based on EPA's estimates, agricultural dust emissions account for almost 60% (34,259 tons) of South Dakota's $PM_{2.5}$ non-point source emissions in 2011. Agricultural field burning is second with just under 20% (11,480 tons). A total of 44 counties in South Dakota have less than 1,000 tons of $PM_{2.5}$ emissions from non-point sources in 2011.

$PM_{2.5}$ emissions from point sources in South Dakota are based on facilities that operate under a Title V air quality operating permit. Each facility is required to submit an annual operational report which DENR uses to calculate actual air emissions. In 2011, there were only 13 counties with Title V sources that emit measurable amounts of $PM_{2.5}$ air emissions. The remaining 53 counties did not have point sources that emit measurable amounts of $PM_{2.5}$ emissions.

Grant County generated the highest amount of $PM_{2.5}$ emissions in 2011 from Title V sources at 235 tons. The major source in Grant County is Otter Tail Power Company's Big Stone I coal-fired electric power plant (see Table B-4). Pennington, Turner and Edmund counties each generated less than 100 but greater than 50 tons of $PM_{2.5}$ emissions from Title V sources in 2011. The major source in Pennington, Turner, and Edmund counties is GCC Dacotah, POET Biorefining – Great Plains Ethanol, and TransCanada Northern Border, respectively. The remaining nine counties emitted less than 50 tons of $PM_{2.5}$ emissions from point source in 2011.

See Table B-4 for a list of the ten Title V sources in the state with the highest $PM_{2.5}$ emissions in 2011. The top 10 emitted 91% of the state's total emissions from permitted sources.

Table B-4 – 2011 $PM_{2.5}$ Emissions from Title V Sources in South Dakota (tons per year)

#	Facility	County	Tons
1	Otter Tail Power Company – Big Stone I	Grant	235
2	POET Biorefining – Great Plains Ethanol	Turner	69
3	TransCanada Northern Border – CS11	Deuel	46
4	TransCanada Northern Border – CS10	Clark	46
5	TransCanada Northern Border – CS9	Edmunds	45
6	Spearfish Forest Products	Lawrence	42
7	GCC Dacotah	Pennington	37
8	Dakota Panel	Pennington	35
9	Glacial Lakes Energy	Codington	25
10	South Dakota State University	Brookings	24
		Total	**604**

Attachment C

Pollutant: Site-LevelPM2.5 - Local Conditions(88101)
Standard Units: Micrograms/cubic meter (LC)(105)
NAAQS Standard: PM25 24-hour 2006 / PM25 Annual 2006
Statistic: Annual Weighted Mean **Level:** 15
Statistic: Annual 98th Percentile **Level:** 35

Design Value Year: 2012
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

State Name: South Dakota

Site ID / STREET ADDRESS	2012 Cred. Days	2012 Comp. Qrtrs	2012 98th Perctil	2012 Wtd. Mean	2012 Cert& Eval	2011 Cred. Days	2011 Comp. Qrtrs	2011 98th Perctil	2011 Wtd. Mean	2011 Cert& Eval	2010 Cred. Days	2010 Comp. Qrtrs	2010 98th Perctil	2010 Wtd. Mean	2010 Cert& Eval	24-Hour Design Value	24-Hour Valid Ind.	Annual Design Value	Annual Valid Ind.
46-011-0002	121	4	20.6	8.6	Y	120	4	18.4	7.9		118	4	25.7	8.6		22	Y	8.4	Y
BROOKINGS CITY HALL BUILDING																			
46-013-0003	109	3	22.6*	7.5*	Y	120	4	15.6	7.1		116	4	26.2	8.7		21	N	7.8	N
111 2ND AVE SE FIRE STATION #1 ABERDEEN																			
46-029-0002	336	4	21.5	11.0	Y	118	4	18.4	8.1		116	4	23.9	8.9		21	Y	9.3	Y
801 4TH AVE SW - WATERTOWN																			
46-033-0132	352	4	14.9	4.9	Y	350	4	11.5	3.7		350	4	12.4	4.2		13	Y	4.3	Y
WIND CAVE NATIONAL PARK, SOUTH DAKOTA																			
46-071-0001	363	4	12.9	4.1	Y	337	4	10.0	3.4		358	4	13.6	3.9		12	Y	3.8	Y
BADLANDS PO BOX 6 HEADQUARTERS																			
46-099-0006	122	4	20.8	8.7	Y	121	4	21.5	8.7		121	4	27.8	9.2		23	Y	8.9	Y
500 S. PHILLIPS KELO SITE																			
46-099-0008	364	4	17.3	6.0	Y	355	4	19.4	8.0		360	4	29.0	10.3		22	Y	8.1	Y
2001 E 8th St																			
46-103-0020	353	4	17.1	6.3	Y	348	4	13.1	4.5		339	4	14.3	5.2		15	Y	5.3	Y
CREDIT UNION SITE, 106 KINNEY AVE.																			
46-103-1001	113	4	14.5	5.8	Y	116	4	12.3	5.4		120	4	20.7	6.6		16	Y	5.9	Y
CITY LIBRARY 6TH AND QUINCY																			
46-127-0001	359	4	19.7	9.9	Y	361	4	23.1	9.3		354	4	27.8	9.6		24	Y	9.6	Y
31986 475th Ave																			
46-127-0002	350	4	20.8	7.5	Y	364	4	21.0	8.0		348	4	29.2	9.6		24	Y	8.4	Y
31307 473rd Ave																			

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 ('*').

Attachment D

AirNow Back Trajectory Analysis for January 22, 2012